INSTITUTE FOR FERMENTATION

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INSTITUTE FOR FERMENTATION

4–54, *Juso-Nishinocho, Higashiyodogawa-ku,*

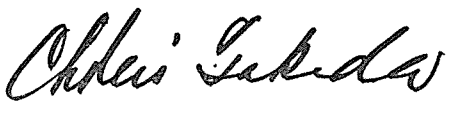
Osaka, Japan

FORWORD

The Institute for Fermentation was established in Osaka in November, 1944, as one of the research institutes for microbiology owing to the state policy to be pursued then. Following the termination of the World War its functions have been exercised under the financial protection of Takeda Chemical Industries, Ltd. Up to the year 1960, the activities of the Institute covered various fields for researches into applied and fundamental microbiology, including the production of antibiotics, ergot alkaloids and nucleotides, the microbial transformation of organic substances, and the physiological and taxonomical studies of microorganisms.

Originally the Institute was established for forming valuable contributions to the development of fundamental microbiology essential for industry, for which purpose, a type culture collection was attached to the Institute. Under the development of things after the War researches within the Institute had been more in the nature of practical applications than in that of fundamental studies. According to an increase both in number of the research staff and the amount of equipment, an astronomical budget was required for administrative purposes.

In the summer of 1960 when a new department of applied microbiology was established in the Takeda Research Laboratories, the Institute for Fermentation was so reorganized as to carry on, as its main objective, studies in the basic field of microbiology. Since then, the Institute has made an issue of its own periodical that includes original articles and summaries of published papers. It would be a great pleasure for the Institute to seek the advice of acknowledged authorities in all countries on this field of study.



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ADMINISTRATIVE REPORT

Ann. Rep. Inst. Fermentation, Osaka
No. 3, p. 1~138, 1967 (February)

MYCOLOGICAL STUDIES OF THE ALASKAN ARCTIC

Yosio KOBAYASI[1]
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The present work was executed formally as one of the 1965 Research Programs at Arctic Research Laboratory (ARL) supported by a contract between the Office of Naval Research, Department of the Navy (ONR), and the Arctic Institute of North America (AINA).

So far as the authors' knowledge is concerned, only a few reports have been published on the fungal flora of the Alaskan Arctic.

The fungous collections by the Harriman Alaskan Expedition were examined by Saccardo, Peck and Trelease. In their "The fungi of Alaska" (1904), the following six species of Micromycetes collected in Point Barrow were enumerated.

Sphaerella pachyasca Rostrup (*Mycosphaerella tassiana*), on *Draba alpina*
Pleospora herbarum (Fr.) Rab., on *Ranunculus nivalis*
Septoria chamissonis Sacc. et Scalia, incl. *Septoria eriophorella* Sacc. et Scalia, on *Eriophorum chamissonis*
Stagonospora aquatica var. *luzulicola* Sacc. et Scalia, on *Luzula arcuata*
Massarina dryadis Rostrup, on *Dryas integrifolia*
Ustilago vinosa (Berk.) Tul., on *Oxyria digyna*

It was not until 1940 that the second report was published by Anderson, who recorded *Puccinia conglomerata* (Strauss) Schm. et G. on *Petasites frigida* in Point Barrow and *Melampsora arctica* Rostr. on *Salix arctica* in Point Hope.

According to "A check list of Alaskan fungi" (1953), G.A. Llano collected the following Micromycetes and higher fungi at Anaktuvuk Pass, where the large Eskimo village is situated.

Dothidella alni Pk. on *Alnus* sp.
Euryachora betulina (Fr.) Schm. on *Alnus* sp.

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3) Dept. Plant Pathology, Cornell University, Ithaca, U.S.A.—supported in part by National Science Foundation (USA) Grant, GB-2339, "Monographic Studies of the Discomycetes".
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5) Lab. Mycology, Government Forest Exper. Station, Tokyo
6) Nagao Institute, Tokyo
7) Dept. Botany, Fac. Science, Tokyo University

Hypoxylon blankei B. et C.	on *Salix alaxensis*
Valsa boreella Karst.	on *S. alaxensis*
Rhytisma salicinum Fr.	on *S. alaxensis*
Mollisia sublividula (Nyl.) Karst.	on *S. alaxensis*
Exidia glandulosa Fr.	on *S. alaxensis*
Solenia anomala (Fr.) Fckl.	on *S. alaxensis*
Cytidia salicina (Fr.) Burt	on *S. alaxensis*
Polyporus elegans Fr.	on *S. alaxensis*
Calvatia cretacea (Berk.) Lloyd	
Ozonium auricomum Pk.	on *S. alaxensis*

In this list is also mentioned *Tricholoma ionides* (Fr.) Kummer collected by W. Geist in Point Barrow.

As a result, twenty two species of Eumycetes have been reported from the Alaskan Arctic.

Since Kobayasi visited Antarctica in 1963 and made a microbiological exploration in Ross Island and in neighbouring Victoria Land, he was fascinated by the exquisite and peculiar life of microorganisms in such a deep freezing land, and hoped to visit a little more fertile arctic land. Fortunately he was given a chance to do microbiological field work in the Alaskan Arctic in 1965. A small party was organized with his companions, viz. Kho Maruyama (algologist), Junta Sugiyama (mycologist) and Toshiro Hirata. On July 30, 1965, our Japanese party left Japan and arrived Point Barrow on August 1. They engaged in microbiological experiments for three weeks in the laboratory of ARL and also in field work in the environmental region of Barrow and three satellite field stations, namely, Umiat, Cape Thompson and Lake Peters, which were specially selected for them from among 22 stations under ARL by Drs. Max C. Brewer and John F. Schindler. They were obliged to postpone for the next chance visits to Lake Noluck (Station No. 8) and Anaktuvuk Pass (Station No. 21), both of which places are thought to be very favorable for microbiological field work. In the area surrounding Barrow, located at 71° 20′ N lat, 156° 46′ W, extends the vast tundra composed of polygons, muskags and lakes. Neither *Betula* nor *Alnus* copses are seen there.

Umiat is situated along the largest river, Colville, in the Alaskan Arctic and also in the northernmost part of the arctic slope of Brooks Range. Here develop dense copses of *Salix alaxensis, Betula glandulosa* and *Alnus crispa*, offering a suitable habitat for parasitic fungi.

Cape Thompson fronts on Chukotsk Sea and is characteristic for rocky slopes and long sandy beaches. Many species of mushrooms and Micromycetes were found among the *Salix alaxensis* copse and on drift timbers around here.

Lake Peters is situated near the north-eastern end of Brooks Range. Low copses of *Betula glandulosa* and *Arctostaphylos alpina* are characteristic. In a small copse of *Salix alaxensis* along L. Peters, several interesting corticicolous fungi were collected. As a result, it is obvious that the above mentioned four stations offer a characteristic

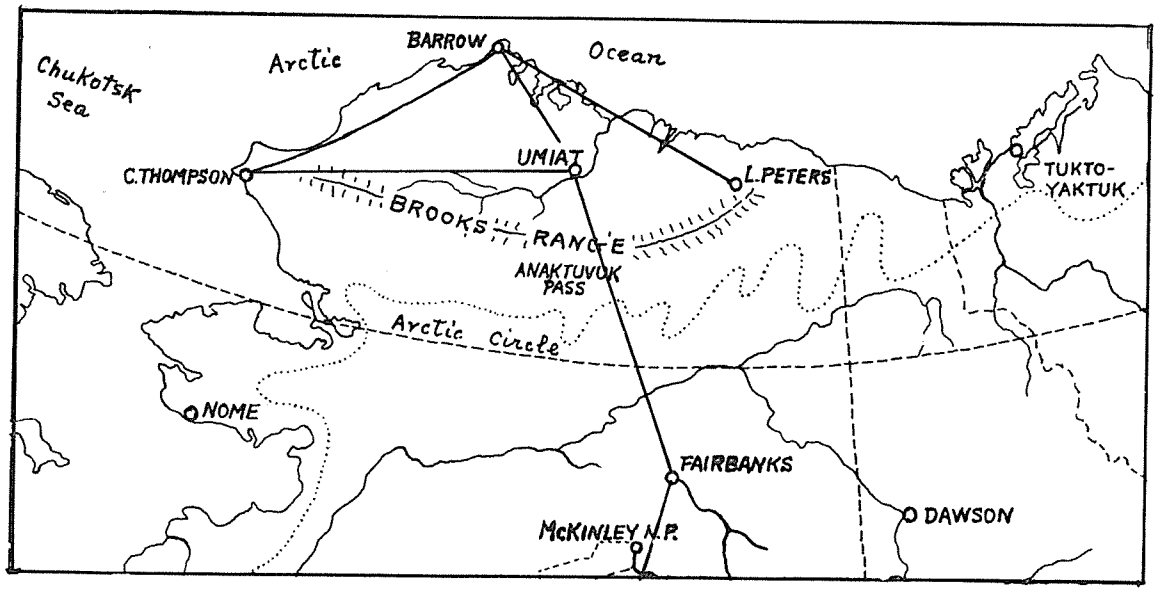

Fig. 1. Location and route of our field observation in arctic region of Alaska. Dotted line showing northern limit of coniferous trees.

and prosperous habitat for higher fungi. Our party was obliged to leave almost all of the Micromycetes, including rusts and smuts parasiting higher plants, untouched on this occasion. If, in future, the exploration of the arctic slope of Brooks Range and the examination of other groups of Micromycetes will be executed, the total number of fungal species will reach that known for higher plants of this region, that is, 450 taxa.

As for the higher fungi and a part of moulds, the adequate notes that are so necessary for their determination were made with the fresh materials in field. On the contrary, almost all of moulds and yeasts were isolated from the soil and dung of various animals in moist chambers arranged in the laboratories of the National Science Museum in Tokyo, Institute for Fermentation, and Nagao Institute. Several experiments for separating water moulds were tried and successful in the laboratory of ARL, using the water samples of ponds and various kinds of baits. Concerning Trichomycetes, many kinds of host Arthropods such as hermit crabs, shrimps, daphnia, sand flea and other small insects were collected and dissected at once in each station, although the result was unsuccessful except for one case, in which *Stachylina* was found in the midgut of midge larvae. Generally speaking, millipedes are suitable host animals for Trichomycetes, but we could find them nowhere in this region.

We tried in vain to find yeasts in the slime-flux from wounded parts of branches of woody plants, and also the *Onygena* species which grow on the naked bones of dead birds or other animals. Data on soil and dung collected in the field and brought back to Japan are mentioned at the end of this preface. The total number of Eumycetes collected by our party amounts to 230 strains, 203 taxa covering 61 Families and 136 Genera, with one additional species of Myxomycetes.

The following six species are published as new to science.

Leptosphaeria arctalaskana Y. Kobayasi
Aleuria aphanodictyon Y. Kobayasi
Ascobolus doliiformis Y. Kobayasi
Sebacina arctica Y. Kobayasi
Clavulinopsis arctica Y. Kobayasi
Geotrichella arctica Tubaki

Some arctic fungi show somewhat different appearances or fertility compared with the conspecific fungi of other regions because of the influences of severe arctic environmental conditions. Considered from a mycological point of view, the most explored part in the arctic regions are Arctic Scandinavia, especially Lappland, and then follow Spitsbergen, Greenland and Arctic Siberia. As for Arctic Alaska and Canada, the mycological explorations are admittedly incomplete, and in addition, the proper North American elements seem to be the inhabitants mixed with the modified European Arctic Alpine elements in these districts. Accordingly it is obvious that the identification of these fungi is accompanied with considerable difficulty.

Unfortunately, we were obliged to leave forty or more species of fungi without giving them strict specific names, although short descriptions are given to all undetermined fungi.

Almost all of the specimens, including those undetermined ones, will be presented to the Smithsonian Institution and Cornell University. Of course, the type specimens are to be kept in the Herbarium of Smithsonian Institution, according to a subcontract between Y. Kobayasi and ONR/AINA in 1965.

There may be critical opinion among American mycologists against Japanese mycologists having much interest in the fungal flora of Alaska, last frontier of the U.S.A. Now we hope them to be generous and comprehensive to our mode of investigation and to give us their valuable advice. We have refrained from giving any general discussion about the mycoflora of the Alaskan Arctic and precise conclusions in the present paper, because it is premature to do so in the present status of investigations.

In 1966, Kobayasi visited Arctic Scandinavia and Spitsbergen to observe the mycoflora and is now hoping to have his next chance to visit Arctic Canada or Alaska in the following years.

The nature of these arctic regions is splendid, but, furthermore, the field of acrtic mycology is fascinating as stated by D.B.O. Savile of Canada.

For the planning and execution of this exploration, the following gentlemen gave us every facility and made it possible.

Dr. M.E. Britton, Chief, Office of Naval Research, Dept. of the Navy.

Dr. Robert Faylor, Director, Washington Office, Arctic Institute of North America.

Dr. Max C. Brewer, Director, Arctic Research Laboratory.

During our stay in Arctic Alaska, the staff of ARL made every arrangement to assist us. We are also indebted to Dr. Kaoru Miyake, Chairman of the Takeda Science Foundation for a financial aid.

The following gentlemen cooperated with us in identification of fungi.

Dr. J. van Brummelen, Rijksherbarium, Leiden, Holland.

Dr. J. Gremmen, Jr., Forest Research Station T.N.O., Wageningen, Holland.

Dr. James W. Kimbrough, Univ. of Florida, Gainesville, Florida, U.S.A.
Dr. Mien A. Rifai, Royal Botanic Gardens, Kew, England.
Dr. S. Udagawa, National Hygienic Laboratory, Tokyo.
Mr. I. Asano, Institute for Fermentation, Osaka.

The authors' sincere gratitude is due to all of these gentlemen.

Soil samples collected by J. Sugiyama

Sample No.	Locality	Note	Date
6401	Point Barrow	Sand	Aug. 4
2	〃	〃	〃
3	near Barrow Vill.	Polygon (mosses)	〃
4	〃	〃	〃
5	〃	〃	〃
6	〃	〃	〃
7	〃	〃	〃
0501	〃	〃	Aug. 5
2	North Meadow Lake	Scum	〃
3	near N. Meadow L.	Dead leaves	〃
0601	near Barrow Vill.	Polygon	Aug. 6
2	〃	〃	〃
0701	South Meadow Lake	Dead leaves	Aug. 7
2	〃	Polygon	〃
3	〃	〃	〃
0901	near N. Meadow L.	Scum	Aug. 9
2	〃	Dead leaves	〃
1001	near N. Meadow L.	White Balls	Aug. 10
2	〃	Polygon	〃
3	〃	〃	〃
1901	Lake Peters	〃	Aug. 19
2	〃	〃	〃
3	〃	〃	〃
2001	〃	〃	Aug. 20
2201	near N. Meadow L.	under 25 feet (0 cm)	Aug. 22
2	〃	〃 (2 cm)	〃
3	〃	〃 (5 cm)	〃

Soil samples collected by Y. Kobayasi

A 1	Barrow, Eskimo Village	Aug. 10
A 2	Barrow near North Meadow Lake	〃
A 3	Barrow, Eskimo Village	Aug. 4
A 4	〃	〃
A 5	Barrow, near Eskimo Village	Aug. 6

B 1	Lake Peters	Aug. 19
B 2	〃	〃
B 3	〃	〃
B 4	〃	〃
B 5	〃	〃
C 1	Cape Thompson	Aug. 16
C 2	〃	〃
D 1	Umiat	Aug. 13
D 2	〃	〃
D 3	C. Thompson	Aug. 16
D 4	〃	〃
D 5	C. Thompson, around Eskimo's tomb	〃
E 1	Umiat	Aug. 13
E 2	〃	〃
E 3	〃	〃
E 4	〃	〃
E 5	〃	〃

Arctic mammal and ptarmigan dung

No. 1	Coyote at Barrow	Aug. 4
2	Caribou at L. Peters	Aug. 19
3	〃	〃
4	〃	〃
5	Dall sheep at L. Peters	〃
6	Wolves, coyote or foxes at L. Peters	〃
7	Caribou at Umiat	Aug. 12
8	Caribou at Umiat	Aug. 11
9	Moose at Umiat	〃
10	〃	〃
11	〃	〃
12	Arctic ground squirrel at Barrow	Aug. 8
13	〃	〃
14	〃	Aug. 4
15	Ptarmigan at Barrow	Aug. 8
16	〃	Aug. 4
17	Wolves, coyote or foxes at Barrow	Aug. 4
18	〃	Aug. 8
19	〃	〃
20	〃	Aug. 4
21	Vole at Umiat	Aug. 12
22	Caribou, with moulds at L. Peters	Aug. 19
23	Ptarmigan at L. Peters	〃
24	Moose at L. Peters	〃

(Animals were partly identified by Dr. Y. Imaizumi)

Abbreviations

J. Lind Studies on the geographical distribution of Arctic Circumpolar Micromycetes, in Det Kgl. Danske Videnskabernes Selskab, Biologiske Meddelerser **11** (2) (1934) .....**Arctic Circ. Micromyc.**

F.H. Möller Fungi of the Faeröes Pt. 1 Basidiomycetes (1945), Pt. 2 Myxomycetes, Archimycetes, Phycomycetes, Ascomycetes and Fungi Imperfecti (1958)..... ..... **F. Faeröes**

David H. Linder Botany of the Canadian Eastern Arctic Pt. 2 Thallophyta and Bryophyta 4 Fungi, in National Museum of Canada, Bulletin No. 97 (1947) .... **Fungi Canad. E. Arctic**

Morten Lange Macromycetes Pt. 1 The Gasteromycetes of Greenland (The Botanical Expedition to West Greenland 1946), in Meddelelser om Grønland 147 (4) (1948) .....**Macromyc.** 1 **Gaster. Greenland**

Macromycetes Pt. 2 Greenland Agaricales (Pleurotaceae, Hygrophoraceae, Tricholomataceae, Amanitaceae, Agaricaceae, Coprinaceae and Strophariaceae), in Med. Grønl. 147 (11) (1955) .....**Macromyc.** 2 **Greenland Agar.**

Macromycetes Pt. 3 Greenland Agaricales (Pars), Macromycetes Caeteri, in l.c. 148 (2) (1957) .....**Macromyc.** 3 **Greenland Agar.**

Jules Favre Les Champignons supérieurs de la zone Alpine du Parc National Suisse, in Résultats des recherches scientifiques entreprises au Parc National Suisse 5 (1955) .....**Champ. Alp. Suisse**

The following will serve as index to the Families and genera with which we are concerned in the present paper.

Saprolegniaceae

1. ***Achlya conspicua*** Coker

Sapro. p. 131 pl. 45, 46 (1923); Coker et Matthews, N. Am. Fl. **2**(1): 40 (1937); Johnson, Achlya p. 80 pl. 19 A-D (1956); Cejp, Flora ČSR-Oomycetes p. 142 fig. 43 (1959).

(Text fig. 2 A-C)

Hyphae extensive, stout, sparingly branched. Zoosporangia scarce, naviculate filiform, straight, single, 140–160×19–22 μ. Oogonia abundant, terminal then lateral, spherical or pyriform, 33–60 μ in diam.; oogonial wall not so thick, largely pitted, smooth; oogonial stalk long, 1–5 or more times of the diameter of oogonium in length, stout, rarely branched. Antheridial branch sparse, androgynous, rarely monoclinous; antheridial cell clavate or irregular, frequently coiled, branched, laterally attached by long side wall or by projection, with fertilization tube. Oospores 4–8 in oogonium, spherical, eccentric, 22–25 μ in diameter, slightly thick walled, pale ochraceous.

Hab. Isolated from soil (No. 0501) with hemp seed as bait, collected on Aug. 5, near Barrow Village, polygon, planted on Oct. 16, observed on Nov. 12 (Specimen No. 125).

Distr. Europe, India, North & Middle America.

So far as the present strain is concerned, terminal oogonia and androgynous antheridial branches are dominant. Zoosporangia are rarely produced. (Y. Kobayasi)

2. ***Aplanes turfosus*** (Minden) Coker

Journ. Elisha Mitchell Soc. **42**: 216 (1927): Coker et Matthews, N. Am. Fl. **2**(1): 19 (1937); Cejp, Flora ČSR-Oomycetes p. 271 (1959).

Syn. *Saprolegnia monoica* var. *turfosa* Minden, Krypt. Fl. Brandenb. **5**: 516 (1912).

(Plate 14 M; Text fig. 3 A-F)

Hyphae abundant, straight, 9–26 μ thick, commonly ending in sterile tip or in zoosporangium. Zoosporangia extremely scarce, cylindric, bent or straight, proliferate. Oogonia solitary, lateral or rarely terminal, spherical, smooth, 40–76 μ in diameter; oogonial wall thick ca 2 μ or more, with several large pits; oogonial stalk very short and thick, 15–40 μ long, 9–12 μ thick, bent or straight. Oospores 3–15–20 or more in an oogonium (commonly 8–12), spherical, 15–21 μ in diameter, centric, pale ochraceous, with very thick wall. Antheridial branches androgynous or less frequently monoclinous, forming 1–3 antheridia on each oogonium; antheridial cell bent, clavate or cylindrical, laterally attached to oogonial wall by projections; fertilization tubes obscure.

Hab. Isolated from soil (No. 0703, Aug. 7, South Meadow Lake), by using rose fruit as bait, planted Oct. 18, observed Nov. 9 (Specimen No. 120).

Distr. Europe, N. America.

Compared with the typical form of the present species, this arctic strain is characteristic in possessing very short oogonial stalk and many androgynous antheridia. (Y. Kobayasi)

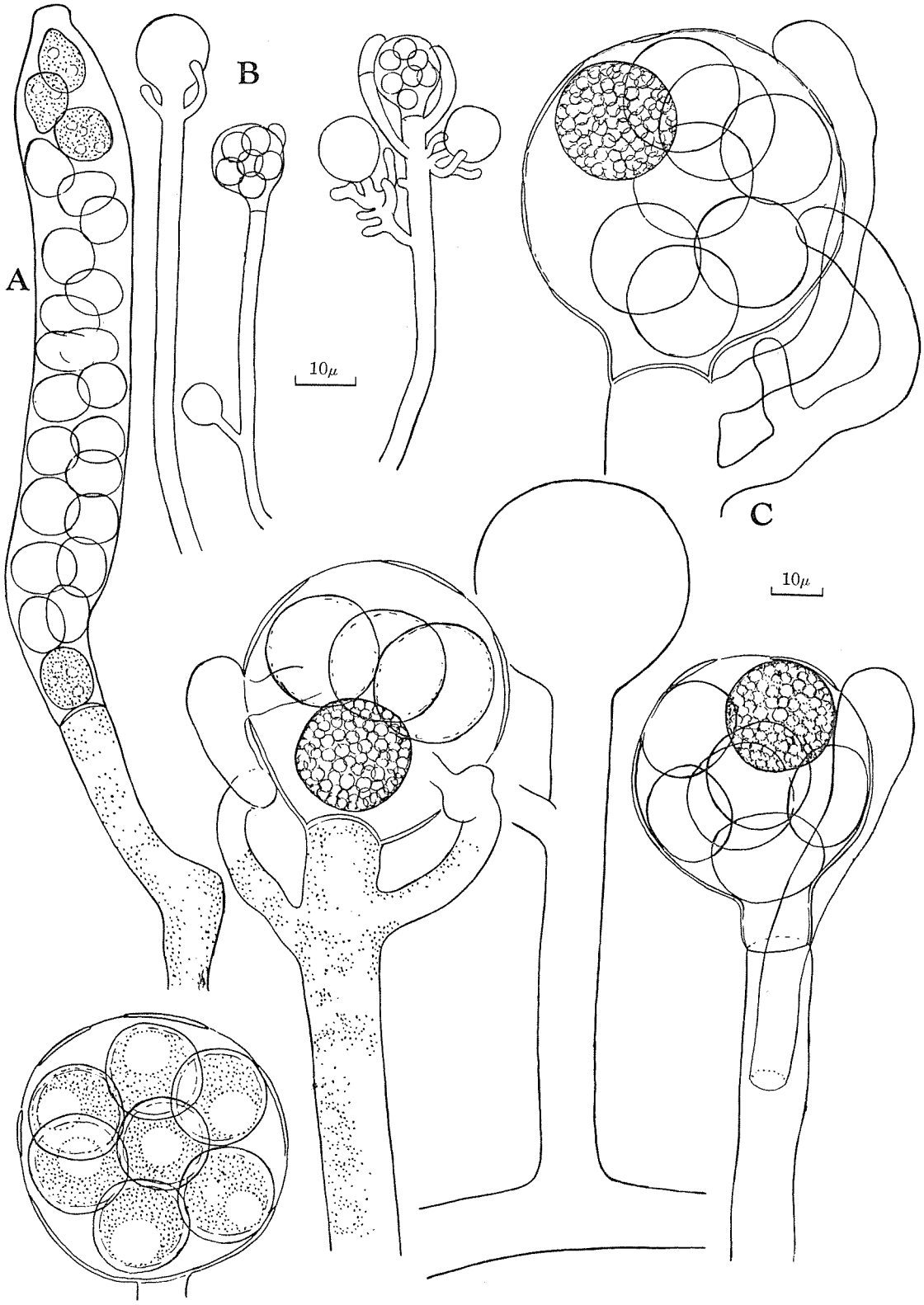

Fig. 2. *Achlya conspicua* A. Zoosporangium B. Young oogonia and antheridia C. Oogonia, oospores and antheridia.

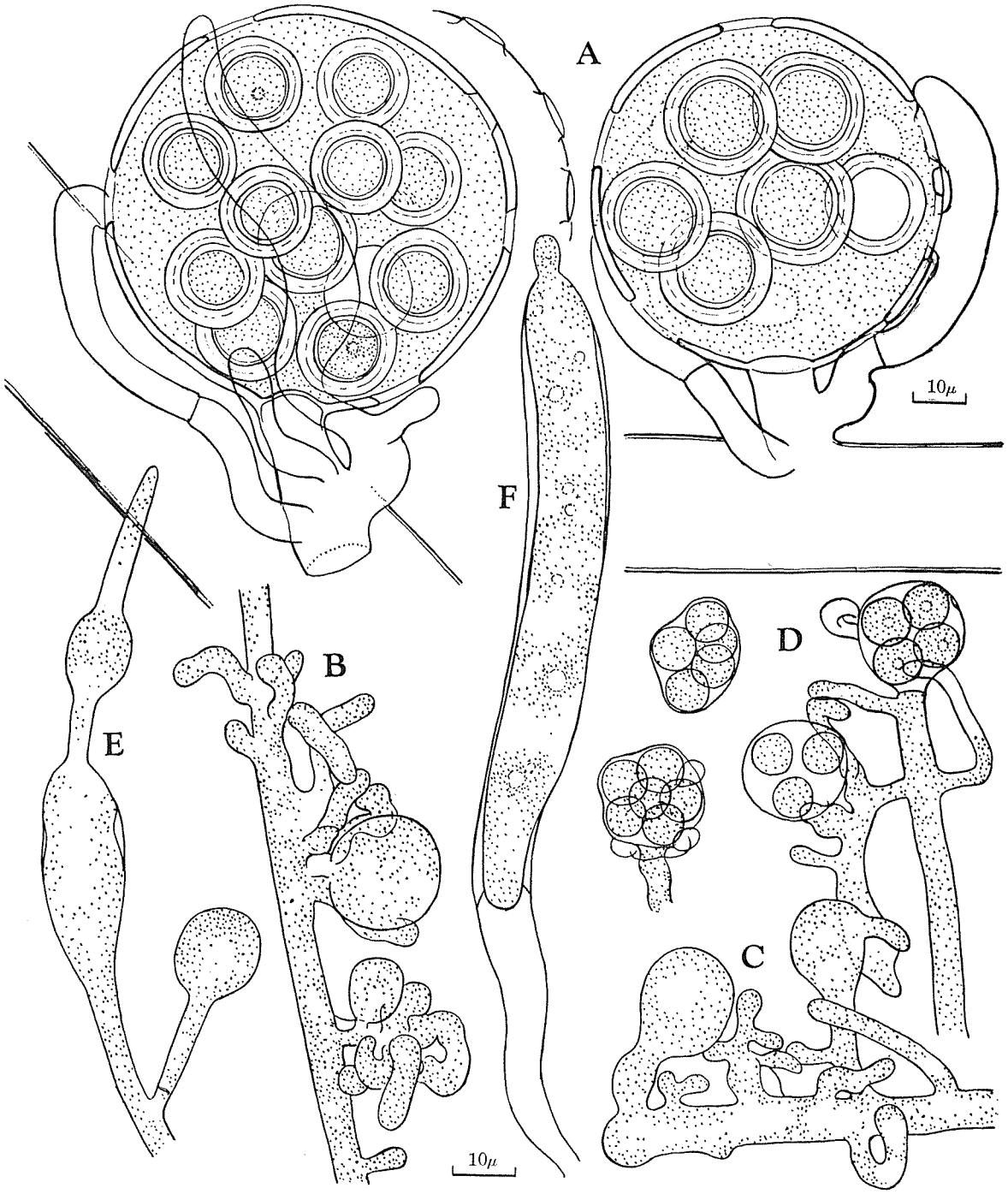

Fig. 3. *Aplanes turfosus* A,D. Oogonia and antheridia B,C,E. Abnormal organ F. Zoosporangium.

3. ***Aphanomyces*** (subg. *Asperomyces*) sp. (Text fig. 4)

Hyphae rather slender, almost isodiametric, 4–7μ in diameter, dichotomously or irregularly branched, hyaline. Zoosporangia filamentous, of variable length, isodiametric, no proliferate. Oogonia terminal on short lateral branches, rarely on long

hyphae, globose, beset with bluntly conical tubercles, 26–40μ in diameter. Oospores single, pale ochraceous, thick walled, 13–17μ in diameter, with one large oil drop and several small ones. Antheridia hypogenous, cylindric or clavate, contorted, slightly thinner than main hyphae, fertilization tube not observed.

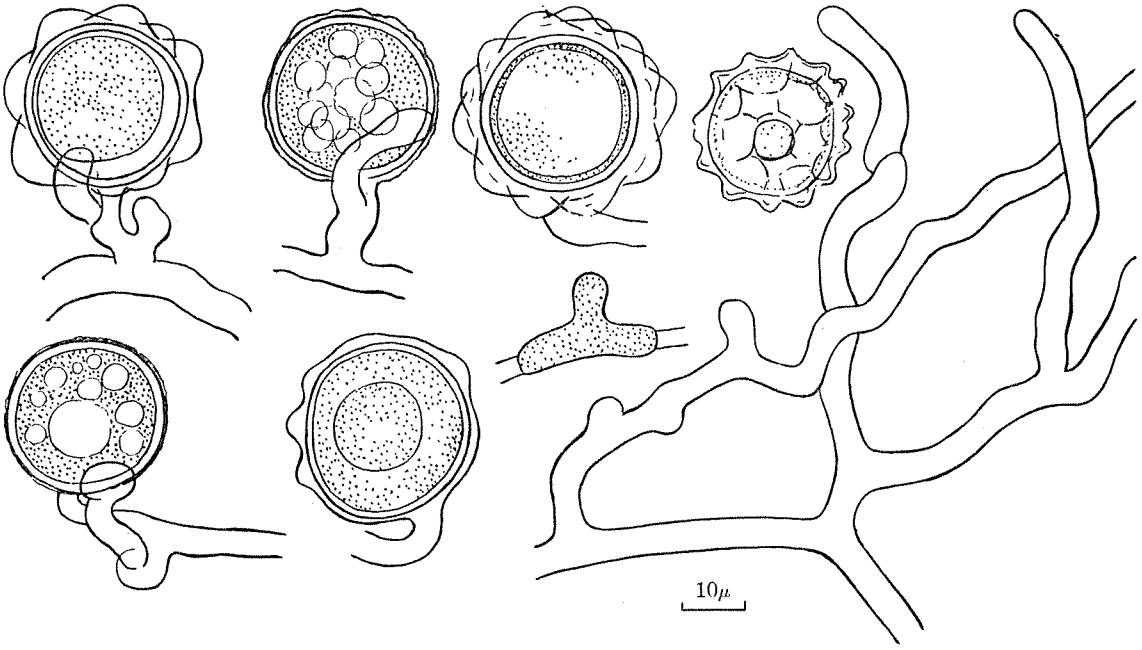

Fig. 4. *Aphanomyces* sp. Oogonia, antheridia, gemma and hyphae.

Hab. Isolated from soil (No. 0601, Aug. 6, near Barrow Vill.) by using small pieces of dried cuttlefish, planted on Oct. 18, kept. in room temperature, observed on Nov. 11 (Specimen No. 126).

So far as the observations on oogonia, antheridia and zoosporangia are concerned, the present mould should be included into either *Aphanomyces* or *Pythium*, but further discussion on the taxonomic status is impossible, since the details concerning zoospore formation and discharge are not available. According to monographic studies on *Aphanomyces* by W.W. Scott (1961), *Aphanomyces norvegicus* Wille and *A. stellatus* DeBary have already been recorded from arctic regions of North America. The latter species has several common characteristics with the present fungus. (Y. Kobayasi)

Leptomitaceae

4. ***Apodachlya brachynema*** Hildebrand

Jahrb. Wiss. Bot. **6**: 261 pl. 16 fig. 12–23 (1868); Sparrow, Aquatic Phycomycetes ed. 2, p. 876 (1960). (Plate 14 L; Text fig. 5)

Hyphae 5–8μ thick, obscurely septate, slightly constricted at septa. Oogonia terminal on short lateral branches, rarely catenate producing secondary oogonia, some one

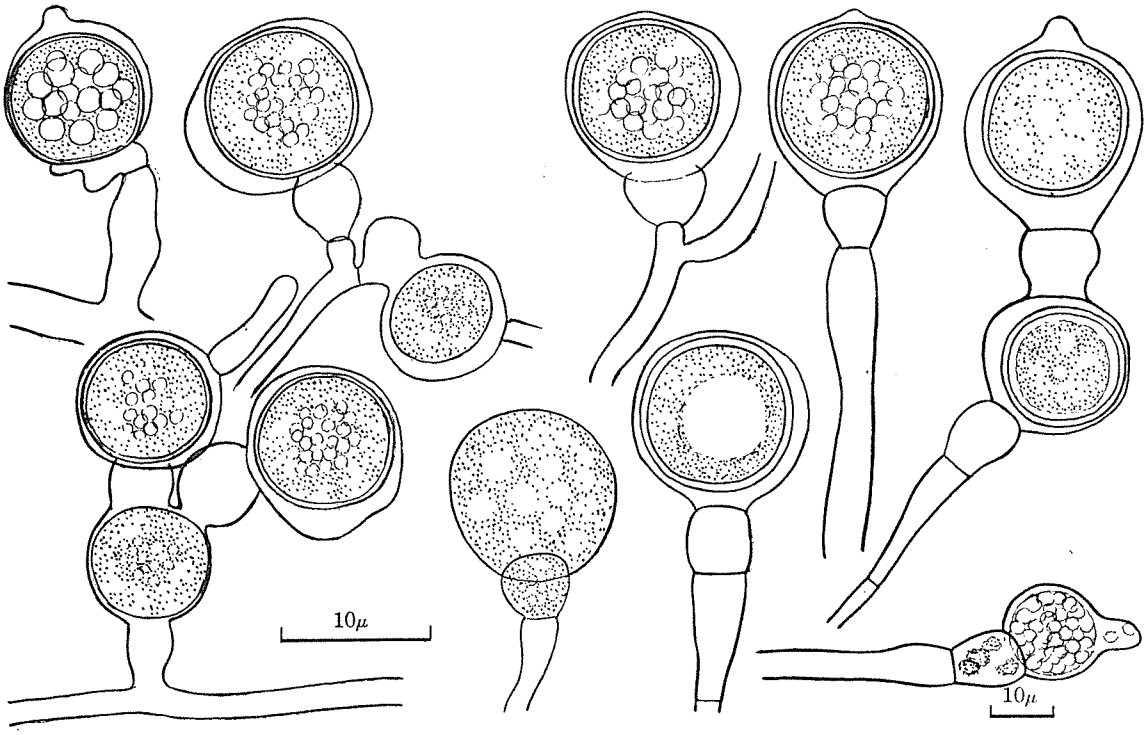

Fig. 5. *Apodachlya brachynema* Oospores in oogania and antheridia.

intercalar or terminal on main hyphae, globose or pyriform, 22–33 μ in diameter, with one oospore. Oospores globose, filling the oogonium, 20–26 μ in diameter, thick-walled, smooth with granular contents. Antheridia just under each oogonium, pyriform, doliiform or irregular, 11–12×10–11μ. Zoosporangium not observed.

Hab. Isolated from soil (No. 1, C. Thompson) using hemp seed as bait, planted on Oct. 18, observed on Nov. 12. (Specimen No. 124) (Y. Kobayasi)

Pythiaceae

5. ? ***Pythium carolinianum*** Matthews

Stud. Pythium p. 71 pl. 19 (1931); Middleton, Taxonomy, Host Range and Geogr. Distr. Pythium p. 124 (1943). (Text fig. 6)

Sexual reporudction not observed. Hyphae slender 2.5–4 μ thick. Zoosporangium typically acrogenous, spherical, ovoid or pyriform, 25–32×18–26 μ, papillate, proliferous with the secondary sporangia formed inside or outside on the long germ tube.

Hab. Isolated from soil (No. 1903, L. Peters, Aug. 19) by using rose fruit, planted on Oct. 20, observed on Nov. 11. (Specimen No. 123)

Distr. N. America (N. Carolina). (Y. Kobayasi)

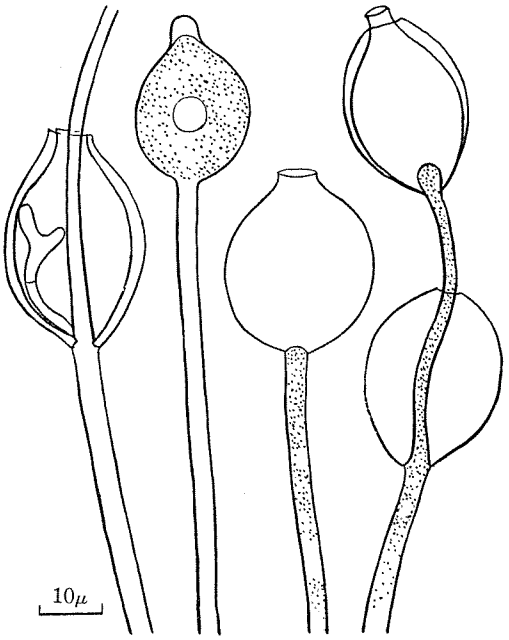

Fig. 6. *Pythium carolinianum* Zoosporangia and their proliferation.

Mucoraceae

6. ***Mucor hiemalis*** Wehmer (Plate 20 H)

Colony spreading, turfy, composed of erect sporangiophores, up to 15 mm, white to pale grayish yellow; reverse pale bright yellow. Sporangiophores usually unbranched, 12–15 μ in diam. Sporangia globose to subglobose, brownish yellow to yellowish gray, 40–60 μ, rarely 70–80μ in diam. Columellae oval to short pyriform, 18–25(40) $\times$20–35 μ. Spores ellipsoid or kidney-shaped, 4–7$\times$2–3 μ. Zygospores globose, verrucose, 70–80 μ in diam., dark black-brown.

Two strains (Tube 9–1, –2) were isolated from a test-tube culture made by J. Sugiyama, soil of North Meadow Lake. (Specimen No. 182)

The zygosporic stage was readily obtained when each strain was mated with *M. hiemalis* IFO. 5303 (—) and IFO. 5304 (—) respecitvely on malt agar. Consequently each strain was designated as Tube 9–1 (+) and 9–2 (—). The latter (—) strain differs from the former strain (+) in darker color of the sporangia and hyaline reverse.

This species was already found from the Alaskan tundra area by Cooke & Fournella (Jour. Arctic Inst. N. Amer., Arctic 3(4): 266, 1960), Cooke & Lawrence (1959), and by Nielsein (1927), but no description of the zygospores are found. (K. Tubaki)

Pilobolaceae

7. ***Pilobolus crystallinus*** [Tode 1784] Coemans

Mem. Acad. Bruxelles **30**: 57 (1861); van Tieghem, in Ac. Sc. Nat. **6** ser. 4: 335 (1876); Fischer, in Rab. Krypt. Fl. Phycomycetes p. 260 (1892); Zycha, Mucorineae p. 150 (1935): (Plate 20 I; Text fig. 7)

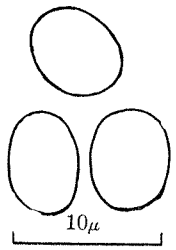

Fig. 7. *Pilobolus crystallinus* Sporangiospores.

Sporangiophore 4–6 mm long. Subsporangial vesicle ovoid, 500–700 μ in diameter. Sporangium hemispherical 400 μ in diameter, dark cinereous under microscope, almost black by lupe. Sporangiospores ellipsoid or subglobose, 6.5–7×3.5–4 (–5.5) μ.

Hab. On caribou dung, L. Peters, observed in field, and other strain grown on caribou dung in laboratory, Nov. 18.

Above mentioned strains have no hexagonal net work on the upper surface of sporangium. (Y. Kobayasi)

Mortierellaceae

8. ***Mortierella alpina*** Peyroud (Plate 20 A)

Colony with sparse aerial mycelium, white. Sporangiophores unbranched, with large basal foot formed from original hyphae, 130–200 μ long, tapering from 8–10 to 2–3 μ. Spornagia globose, with definite basal collar, 20–25 μ in diam. Spores small, ellipsoid or often slightly kidney-shaped, 3–4×1–2 μ, commonly 2.5×1.5 μ, hyaline. Mycelial knots formed. No zygospores observed. Growth best at 15–24°C.

One strain was isolated from the tundra soil of Peters Lake (1902–3).

This species is known as the commonest *Mortierella* species in the salt marsh (Turner & Pugh, 1961). Though Linneman (1941) reported the abundant zygospores, in the present strain, only mycelial knots were observed like in the description of Turner & Pugh (1961). (K. Tubaki)

9. ***Mortierella bainieri*** Costantin (Plate 20 B, Text fig. 8 A–D)

Substrate mycelium zonate. Sporangiophores branched, without rhizoids, 14–20 μ in diam. at base and 4–6 μ at point. Sporangia many spored, 30–50 μ in diam., usually 30 μ. Spores elliptical or irregular, 8–10(14)×4–6(8) μ. Growth best at 15–20°C.

Two strains were isolated from the tundra soil of C. Thompson (D-4-1) and the Lake Peters (B-2-2); on the moose-dung, Lake Peters (No. 24).

This species is fairly common on decaying mushroom. (K. Tubaki)

10. ***Mortierella elongata*** Linneman (Plate 20 C)

Substrate mycelium spreading, tattered, forming more or less rounded lobes; aerial mycelium thick and white. Sporangiophores long, without rhizoid, usually unbranched, 90–350 μ long, tapering 6–7 μ at base 2–3 μ at tips. Sporangia few-spored, 20–30 μ in diam. Spores cylindrical, 8–16×4–6 μ, and mixed later with irregularly formed

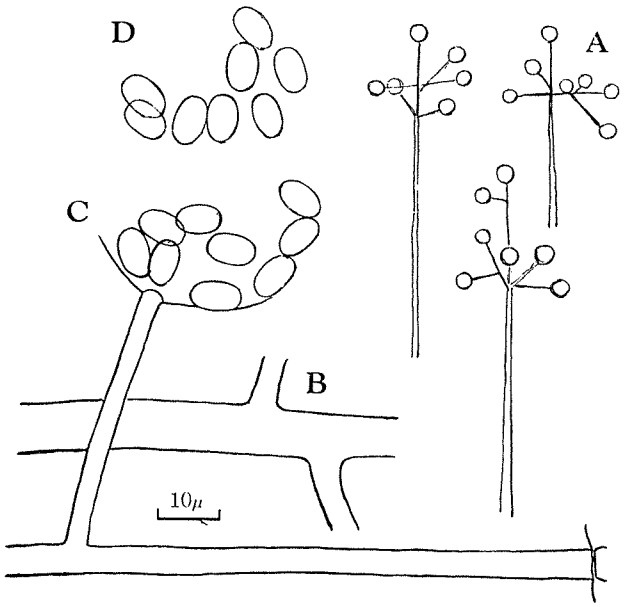

Fig. 8. *Mortierella bainieri*
A. Habit B. Hypha C. Sporangia D. Sporangiospores.

spores which measured up to 14 to 20 μ or more large. Mycelial knots present, measuring 70 μ or more. Growth best at 20°C.

Two strains were isolated from the tundra (E-1-1) and the decaying mushorom (D-1-5) of Umiat.

These isolates, having higher unbranched sporangiophores, few spored-sporangia, and shape and size of spores, agree closely with the description given by Linneman (1941). (K. Tubaki)

11. ***Mortierella isabellina*** Oudemans

Linneman, Die Mucorineen Gattung *Mortierella* Coemans, Jena p. 18 (1941)

Colony firm, dense velvety or felt-like with white margin, pale grey to isabellina-colored. Sporangiophores simple or branched, 100–300 μ long. Sporangia 10–20 μ in diam. Collar distinct, cup-like. Spores round, oval or slightly angular, 2–3 μ, in diam.

Optimum temperature for the growth is 24°C.

One strain was isolated from the soil of Point Barrow (501–1).

This species was already reported from the Alaskan soil by Cooke & Fournelle (1960) and the present strain is like those of typical. (K. Tubaki)

12. ***Mortierella minutissima*** van Tieghem (?)

Linneman, Die Mucorineen Gattung Mortierella Coemans, p. 38 (1941).

(Plate 20 E)

Substrate mycelium tattered-striate, round and nipple-like at margin; aerial mycelium often with rhizoid at ends; white mycelial knots developed. Sporangiophores

unbranched or branched monopodially or in cymose, 80–140 μ long; each branch usually arises from lower part of main axis. Sporangia 10–20 (25) μ in diam. containing several to ten or so spores; spores mostly globose, often slightly oval, small, 4–6 μ in diam. Good growth at 20°C.

Three strains were isolated from the tundra soil of L. Peters (B–5–7) and the tundra of Umiat (E–1–2) and C. Thompson (D–3–4).

Sporangia of these strains are slightly larger than that of the Linneman's description (10–15 μ). In addition, they do not possess typical garlic-like smell (Turner & Pugh, 1961). Therefore, the identification of the present fungi is uncertain, though other features agree with the original description. (K. Tubaki)

13. ***Mortierella ramanniana*** (Möller) Linneman

Linneman, Mucorineen Gattung *Mortierella*, p. 19 (1941)

Colony flat with narrow, regular zones, pinkish brown or with lilac tint. Sporangiophores 100–300 μ or longer, usually branched. Sporangia 15–25 (30) μ; collar small but distinct, cup-like. Spores round to oval, 2–3 μ. Chlamydospores thick-walled, numerous, with oily contents, 30–50 (100) μ in diam. Good growth at 15–20°C.

Two strains were isolated from the tundra soil of L. Peters (B–1–3), Umiat (E–2–2). These strains requires thiazol for the growth like the report by Müller & Schopfer (1939). They are like those of typical *M. ramanniana.* (K. Tubaki)

14. ***Mortierella ramanniana*** var. ***angulispora*** (Naumov) Linneman

Linneman, Mucorineen Gattung *Mortierella* p. 19 (1941).

Colony dark russet-vinaceous, felt-like, with narrow zones. Sporangiphores branched sympodially, 100–300 μ long. Sporangia 15–20 μ in diam; collar distinct, spherical. Spores angular, 2–3 μ in diam. Good growth at 15–24°C.

One strain was isolated from the tundra soil of L. Peters (B-3-5).

This species was already found by Cooke & Fournelle (1960) from Alaska.

(K. Tubaki)

15. ***Mortierella parvispora*** Linneman

Mucorineen Gattung *Mortierella* p. 53 (1941). (Plate 20 F)

Substrate mycelium in characteristically rounded lobes, becoming zonate to effuse. Sporangiophores up to 300–500 μ high, branched cymose, without rhizoid; 12 μ wide at base to 1.5–3 μ at apex. Sporangia globose with diffluent wall and collarette, 20–40 μ in diam., hyaline. Spores small, globose, 2–3 μ in diam. Good growth at 20°C.

Three strains were isolated from the tundra soil of Barrow Vill. (406–2), South Meadow Lake (702–2) and Umiat (E-4-1).

Above isolates agree closely with the original description given by Linneman.

(K. Tubaki)

16. ***Mortierella verticillata*** Linneman

Mucorineen Gattung *Mortierella* p. 22 (1941). (Plate 20 G)

Substrate mycelium restrictedly radiate forming uniform and narrow-bladed overlapping rosette-lobes; aerial mycelium luxriant. Sporangiophores more or less perpendicular to aerial hyphae, 50–130 μ long, without definite collarette; branching monopodially up to several branchlets in whorl. Stylospores globose, spinulate very finely, 6–12 μ in diam. Good growth at 20–24°C.

Four strains were isolated from the tundra soil of Umiat (E-3-4, E-4-6) and L. Peters (B-1-2, B-1-4).

The low power magnification of the growth shows the *Cephalosporium*-like branching of the sporangiophores which is the characteristic of the present species. The formation of the overlapping rosette-lobes is exactly the same with that in Linneman's figure (plate VIIIa, 1941). (K. Tubaki)

17. ***Mortierella vinacea*** Dixon-Stewart

Linneman, Mucorineen Gattung *Mortierella* p. 20 (1941).

Colony with narrow, regular zones, felt-like, russet-vinaceous. Sporangiophores branched, 100–150 μ long. Sporangia 10–20(30) μ in diam; collar small and indistinct. Spores sharply angular, 3–4 μ in diam. Chlamydospores not numerous, round to oval, 5–10 μ in diam. Good growth at 15–20°C..

Three strains were isolated from the tundra soil of L. Peters (B-3-2, B-3-4) and C. Thompson (D-3-1).

Among three isolates, culture D-3-1 is typical and other two strains developed uncolored colonies on malt agar as noted by Turner (Brit. Mycol. Soc. Trans. **46**: 268, 1963). (K. Tubaki)

18. ***Mortierella*** sp. B-3-6 (Plate 20 D)

Colony spreading with more or less large pointed or zonate substrate mycelia; aerial mycelium thick, white to pale cream colored. Sporangiophores very few, 200–400 μ long, tapering from 5–6 μ at base to 1–2 μ at apex, usually unbranched. Sporangia globose, 16–20 μ in diam. Spores oval or ellipsoid, 4–7 $\times$ 3–4 μ. Gemmae numerous on the mycelium, at first spherical to hemispherical, becoming characteristic irregular shape bearing several protuberances, 10–20 μ large, hyaline to pale yellow. Good growth at 15–24°C.

One strain was isolated from the tundra soil of L. Peters.

Identification of this strain is uncertain because unbranched sporagiophores and the characteristic shape of the gemmae are identical with the Linneman's original figure of *Mortierella exigua*, but the shape and size of spores differ from the description and gross appearance of the substrate mycelia differs also from the original figure, rather resembles to that of *M. zychae* L. The isolate might possibly be regarded as representing a variant of *M. exigua* Linneman. (K. Tubaki)

19. ***Mortierella*** sp. C-1-3

Substrate mycelium spreading, zonate to rounded lobes. Sporangiophores un-

branched, 100–220 μ long, tapering from 10–15 μ at base to 3–4 μ at apex. Sporangia few to usually ten-spored, 25–40 μ in diam. Spores thin walled, globose or oval, 6–8 μ, hyaline. Mycelial knots in abundance, up to 700 μ large, creamy colored.

One strain was isolated from the tundra soil of C. Thompson.

This fungus differed from the *Mort. minutissima* in the unbranched sporangiophores and the abundant formation of mycelial knots, and agrees to some extent with the Linneman's description of *Mort. minutissima* var. *dubia* L. in unbranched sporangiophores and spore form. However, spore of the present fungus is slightly larger than that of the latter species (5–7 μ). (K. Tubaki)

Entomophthoraceae

20. ***Delacroixia coronata*** (Cast.) Sacc. et Sydow

Syn. *Conidiobolus villosus* Martin, in Bot. Gaz. **80**: 311 (1925); Saito, in Jour. Ferm. Tech. **28**: 195 (1950). (Plate 19 F)

Growth on malt agar rapid with abundant conidial formation, spreading, rather flat, pure white to pale yellow. Vegetative hyphae colorless, thin walled, branched, 7–12 μ in diam., becoming septate and disjoining into hyphal segments which round up into globose to sublobose measuring 30–55 $\times$ 22–40 μ in diam. Conidiophores phototropic, unbranched, extending vertically from the hyphae, up to 100–500 μ (commonly 150–200 μ) with a terminal conidium. Conidia globose or occasionally prolate ellipsoid, with large basal papilla, 34–50 $\times$ 30–35 μ; papilla 5–10 μ high and 10–18 μ wide. Microconidia spring off actively, colorless, globose, usually 4 μ in diam.

One strain was isolated from the tundra soil, Umiat (E-2-1).

First evidence of the presence of this species is the white, clouded area on the lid of the petri dish where the conidia had been deposited upon discharge. This species was found on *Agaricus* (Saccardo, 1899), *Hypochnus* (Martin, 1925) and soil (Saito, 1950). (K. Tubaki)

Harpellaceae

21. ***Stachylina*** sp. (Text fig. 9 A-F)

Young thallus fusiform with curved peg- or fist-like hold fast at base. Mature thallus clavate or cylindric, simple, non septate or 1–3 septate. Non septate thallus 28–31 $\times$ 7–8 μ, producing short conidiophore on lateral side near apex; young conidia ellipsoid. Septate thallus 50 $\times$ 90 μ long, 7–9 μ thick, with unilateral conidia on each cell; apical cell with rounded apex, producing a short conidiophore on middle part of lateral wall; basal cell attenuated toward base, producing short conidiophore near upper septum. Conidia elliptic-fusiform, hyaline, 33–40 (–45) $\times$ 7–8 μ, displaying one filamentous appendage after release, which measured 30–40 μ long.

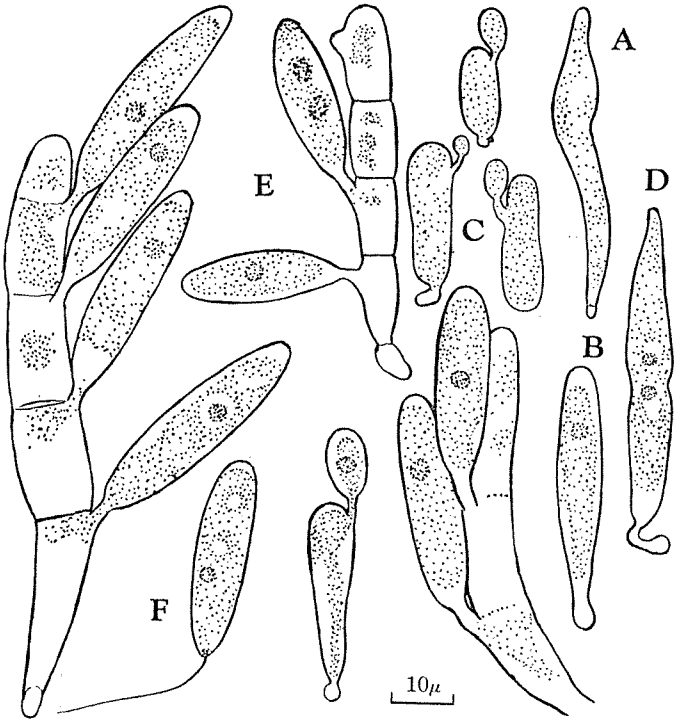

Fig. 9. *Stachylina* sp. A,B,D. Young fruitbodies C. One-celled fruitbodies E. Four-celled fruitbodies F. Asexual spore.

Hab. Parasiting in the midgut of larvae of *Chironomidae* (*Diptera*) in pond near Barrow, Aug. 7 and in streams at L. Peters, Aug. 20 (Specimen No. 78).

The following species have hitherto been known in the genus *Stachylina*.

Stachylina longa Lég. et Gauth. (1932)

Thallus 1000×9–10 μ, with 6–8 conidial measuring 2.5×5–6 μ.

Stachylina macrospora Lég. et Gauth. (1932)

Thallus 100–140×8–10 μ, with 4–8 conidia, measuring 40–45×7–8 μ.

Stachylina intermedia Poisson (1936)

Thallus 150–200 μ long with 2,4,6,8 conidia measuring 42–50 μ long.

Stachylina minuta Gauth. (1961)

Thallus 45–55×5–6 μ with 1–4 conidia, measuring 15–16×5–6 μ.

The present arctic fungus seems to be near *Stachylina minuta* in the structure of thallus and also to have some resemblances to *St. macrospora* in conidial size.

(Y. Kobayasi)

Gymnoascaceae

22. ***Shanorella*** sp. (Plate 16 C)

Colonies on oat-meal agar with wheat germ powder or pablum agar slow growing,

very thin and loose-textured, surface appearing somewhat powdery to granular due to white, arthroaleurie-bearing hyphae, producing unevenly scattered or confluent ascocarps in age, pale yellow to pale yellowish brown in color, loosely surrounded by a thin network of interwoven hyphae and the arthroaleuries, in successive cultures usually tending to develop in limited areas, reverse uncolored or plae yellow.

Ascocarps superficial, more or less spherical, pale yellowish brown near straw-colored, 300–750 μ in diam., often confluent, loosely invested with the white, arthroaleurie-bearing hyphae, without a wall, ripening late. Peridial hyphae pale yellow, thick-walled, often swollen, smooth to asperulate, later conspicuously roughened, septate, tightly interwoven and anastomosed to form a compact network, measuring 2.0–7.5 μ in diam., terminating in and intermingling with the arthroaleurie-bearing hyphae, sometimes ending to a few, loosely coiled tips but well-defined appendages lacking, at maturity becoming disarticulated to more or less elongate, often curved or twisted, thick-walled, swollen cells, variable in shape and size, measuring 10–40 $\times$ 2.5–7.5 μ. Asci 8-spored, globose, 6.0–7.5 μ in diam., evanescent. Ascospores hyaline to pale yellow, globose on face view, oblate on side view, 2.5–4.0 $\times$ 2.5–4.0 $\times$ 1.5–2.5 μ, smooth-walled, with a scarcely visible, shallow, equatorial furrow. Conidial fructifications represented by terminal aleuriospores or by intercalary arthroaleuries. Aleuriospores numerous, hyaline, pyriform to elongate or rarely ovate, with truncated bases, 4.0–12.0 or more $\times$ 2.0–4.5 μ, variously asperulate. Arthroaleuries hyaline, cylindrical or nearly so, with both ends truncated, 4.5–20.0 $\times$ 1.5–3.5 μ, smooth to minutely asperulate. Ampulliform mycelium present, swollen to 3.5–8.5 μ wide. Chlamydospores sometimes present.

On modified Leonian's agar, slow growing, consisting of a thin basal felt with surface floccose from the more abundant development of aerial hyphae, at first white and then becoming pale yellow, ascocarps not produced in sufficient numbers to influence colony appearance, overgrown and obscured by the dense aerial growth, reverse pale yellow with a slightly brown tint.

Habitat: On the bone, North Meadow Lake, Barrow, Aug. 10 (Specimen No. 208).

In most respects this isolate resembles *Shanorella spirotricha* R.K. Benjamin[1] which is only representative in the genus, but there are some noticeable differences in ascocarp size and characters of peridial hyphae. The isolate has larger sacocarps and rough-walled peridial hyphae which are less easily disarticulated at maturity and no appendages such as closely wound coils of 20–30 turns in that species. As Dr. R.F. Cain points out (personal communication), the coiled appendages may be so variable in the genus as to be of minor significance because he has likewise found such atypical *Shanorella* in the character of peridial hyphae. Thus, the final placement of the isolate must await for further study but at present it seems more reasonable to regard it as a distinct species than as merely a variety of *S. spirotricha.* (S. Udagawa)

R.K. Benjamin: A new genus of the Gymnoascaceae with a review of the other genera. El Aliso, **3**: 301–328. 1956.

Phaeotrichaceae

23. ***Phaeotrichum*** sp. (Plate 16 B)

Colony spreading, composed of felt-like mycelium, dark olive-brown colored. Ascocarps developed after nearly two months on malt agar, superficial, cleistocarpous, scattered or loosely aggregated, globose, subglobose, ovate to cylindrical, opening by an irregular break in the wall, 300–500 μ in length, 100–300 μ wide, almost black, with appendages over the surface. Appendages straight or slightly flexed, dark brown to almost black, opaque, 50–80 μ in length, 6 μ at base, tapering to 3 μ near blunt apex. Asci 8-spored, rounded above and abruptly narrowed to an stipe, 20 μ in length. Ascospores oblong-ellipsoid, 2-celled, deeply constricted at the septum, with hyaline circular germ pore at each end, 14–15 $\times$ 4–5 μ, readily separable to individual cells when mature.

Good growth at 20–32°C; best at 28°C; much reduced below 15°C.

One strain was isolated from the dung of Ptarmigan, FN23–1, L. Peters. (Specimen (No. 200)

The genus *Phaeotrichum* was established by Cain and Barr in Canad. J. Bot **34**: 676 (1956), basing on *Ph. hystericinum* which was found on porcupine dung, Ontario, Canada; another species, *P. circinatum* Cain, was found on lemming dung. The present fungus approaches to *Ph. hystericinum* in non-circinate appendages and in the shape and size of the ascospores, however, differs from the latter in the shorter appendages and shape of the ascospores. Because the present observation was made under the malt agar cultivation, there may be some difficulties to compare the shape of the appendage with those of the orginal description made on the natural habitat. The present fungus, therefore, is believed to be a very related to if not identical with *Ph. hystericinum* Cain et Barr. (K. Tubaki)

Chaetomiaceae

24. ***Chaetomium funicola*** Cooke

Grevillea **1**: 176 (1873). (Plate 16 A)

Perithecia dark olive to almost black at maturity, subglobose or oval, 150–250μ in diam., ostiolate. Terminal hairs of two kinds; branched dichotomously at an acute angles, coarsely roughened, with abrupt tips; straight, unbranched, similar to lateral hairs. Asci club-shaped, 8-spored, very evanescent. Ascospores olive green to blue green, ovate to ellipsoid, 4.5–6 $\times$ 4–4.5 μ, apiculate at one end.

One starin was isolated from the dung of Arctic Ground Squirrel, P. Barrow, by M. Soneda, Nagao Institute (FN 14–2): this assigned to the J.W. Grove's strain of *Ch. funicola*, given from S. Udagawa, National Hygienic Laboratory, Tokyo. (K. Tubaki)

Sordariaceae

25. ***Coniochaeta discospora*** (Auerswald) Cain

Copro. Sphaer. Ontario p. 62 (1934); Moreau, Gen. *Sordaria* et *Pleurage* p. 295 (1953).

Syn. *Sordaria discospora* Auersw., Niessl. Verh. Nat. Ver. Brünn **10**: 192 (1872); Winter, in Rabenh. Krypt. Fl. **1** (2): 167 (1887).

Fimetaria discospora (Auersw.) Griff. et Seav., in N. Am. Fl. **3**: 68 (1910). (Text fig. 10 G-J)

Perithecia subglobose or pyriform, half immersed, with protruding conic neck, 300 μ high, 200–250 μ in diameter, almost black; setae on neck crowded, straight, 1–2 septate, attenuated, thick walled, vinaceous brown, 26–65 $\times$ 3–4 μ. Asci very short, cylindric with short slender stalk, 68–80 $\times$ 16–18 μ, apically rounded, opened by pore, J-, containing 1-seriate 8 spores. Ascospores discoid, 13–14 μ long 6.5–8 μ thick, dark purplish brown, surface coarse, with one large transverse germ slit.

Hab. On dung of arctic ground squirrel at Barrow (No. 13), observed on Nov. 8. (Specimen No. 119)

Distr. Europe, N. America. (Y. Kobayasi)

26. ***Delitschia bisporula*** (Crouan) Hansen

Vidensk. Meddel. Kopenhagen (1876): 313 (1877); Cain, Copr. Sphaer. Ontario p. 88 fig. 66 (1934); C. Moreau, Gen. *Sordaria* et *Pleurage* p. 280 fig. 72 (1953).

Syn. *Hormospora bisporula* Crouan, Flor, Finistire p. 21 (1867). (Text fig. 10 K-O)

Perithecia pyriform, aggregated, ca 0.5 mm high, 0.3 mm wide, almost superficial, upper half and neck covered with spiny setae, dark brown or almost black, neck short cylindrical. Setae straight, 110–170 μ long 6–7 μ wide at base, pale ochraceous brown, septate, somewhat thick-walled. Asci cylindrical, then clavate 130–185 $\times$ 8–15 μ with slender stalk, 8 spored. Ascospores uniseriate then oblique or biseriate, oblong, composed of two cells, 17.5–19 $\times$ 7–8 μ, strongly constricted, part cell pyriform, dark purplish brown, minutely umbonate, covered with fine gelatinous sheath. Paraphyses simple, septate, hyaline, 2–4 μ thick.

Hab. On moose dung (No. 24) at L. Peters, Aug. 19. (Specimen No. 133)

Distr. Europe, N. America. (Y. Kobayasi)

27. ***Pleurage minuta*** (Fuckel) Kuntze f. ***tetraspora*** (Winter) C. Moreau Gen. *Sordaria* et *Pleurage* p. 235 fig. 29 d, 34 a, 44 a-h, 46 c, d, 59 a, 63 a-d (1953).

Syn. *Sordaria tetraspora* Winter, in Hedw. **10**: 161 (1871); Cain, Copr. Sphaer. Ontario p. 37 (1934). (Plate 16 D; Text fig. 10 A-C)

Perithecia aggregated, superficial, elongate, conical or more horn-like, gradually tapering to neck, frequently curved, truncate at base, 0.6–0.8 mm high, 0.2–0.25 mm thick at base, dark olivaceous brown, ornamented with conical scales composed of agglutinated hairs, neck base easily shrincked. Asci fusiform with slender stalk, 130–143 $\times$ 14–17 μ, J-, with uniseriate 4 ascospores. Ascospores ellipsoid or citriform, 18–22 $\times$ 12–14 μ, olivaceous brown, with short cylindrical primary appendages and frequently producing long secondary appendages.

Hab. On moose dung, Umiat (No. 10), observed on Nov. 10. On wolves (?)

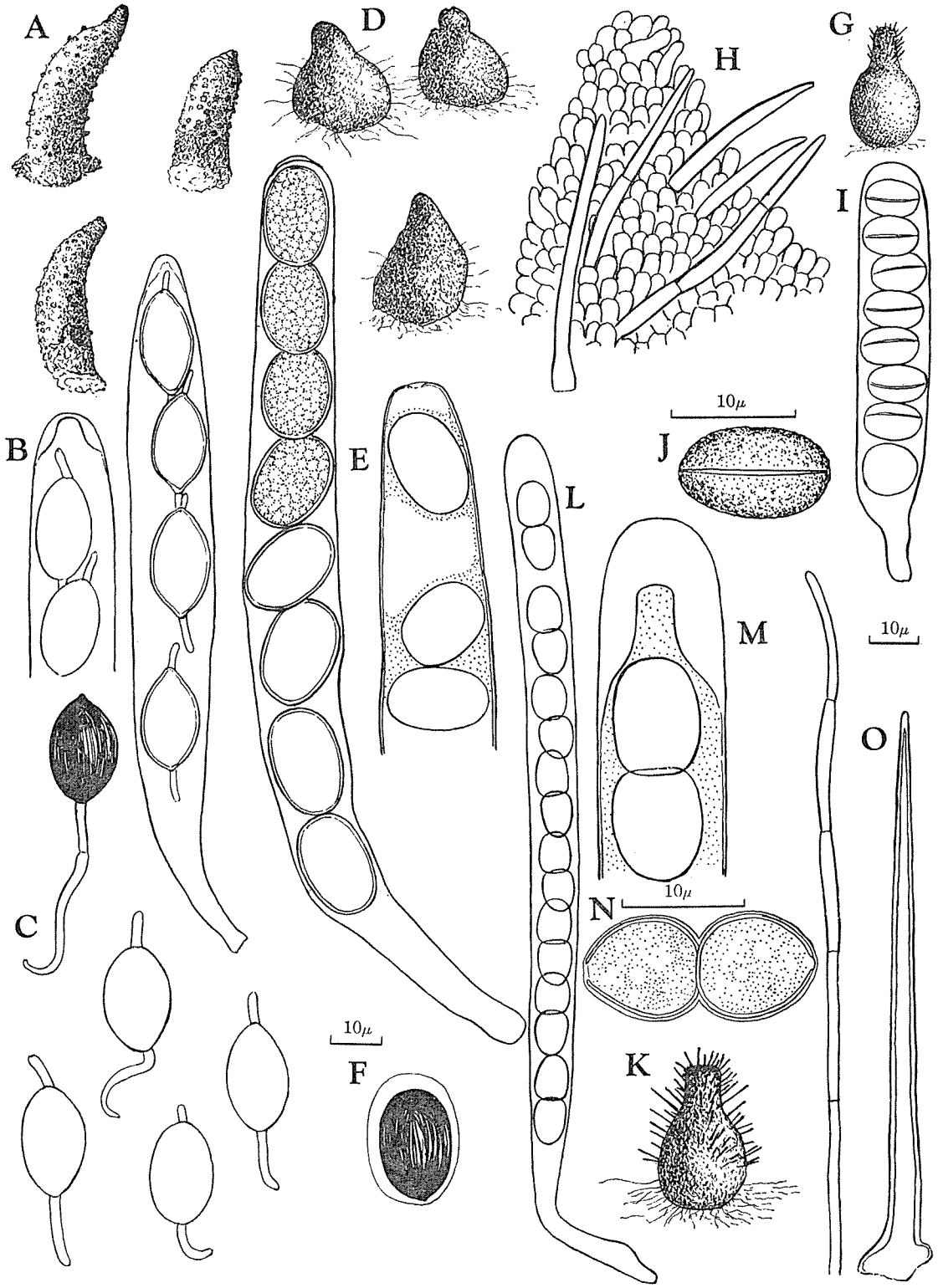

Fig. 10. A-C. *Pleurage minuta* f. *tetraspora* A. Fruitbodies (×30) B. Asci C. Ascospores D-F. *Sordaria humana* D. Fruitbodies (×30) E. Asci F. Ascospore G-J. *Coniochaeta discospora* G. Fruitbody (×30) H. Upper part of fruitbody I. Ascus J. Ascospore K-O. *Delitschia bisporula* K. Fruitbody (×40) L,M. Asci N. Ascospore O. Paraphysis and seta.

dung, L. Peters (No. 6), observed on Nov. 3 (Specimen No. 111).

Distr. Europe, N. America. (Y. Kobayasi)

28. ***Sordaria humana*** (Fuckel) Winter

Abh. Natur. Ges. Halle 13(1): 24 (1873) et in Rabenh. Krypt. Fl. **1**(2): 166 (1887); Cain, Copr. Sphaer. Ontario p. 18 (1934): C. Moreau, Gen. *Sordaria* et *Pleurage* p. 106 fig. 5a, 17 a, e (1953); Dennis, Brit. Cup fungi p. 170 fig. 12–I (1960) (Text fig. 10 D-F)

Perithecia pyriform or obconic, frequently deformed, 450–600×350–400 μ, almost black, lower half immersed or almost superficial, commonly with scattered slender hairs on the surface. Asci cylindric with stalk, 160–180×17–20 μ, convex or truncate, perforated at the tip. Ascospores obliquely uniseriate, broadly obovoid, 20–23.5×13–15(17) μ, olivaceous, then dark vinaceous brown, without appendages, with small umbo at base and thick hyaline gelatinous sheath.

Hab. On caribou dung at Umiat (No. 7), grown on Nov. 2. (Specimen No. 110)

Distr. Europe, N. America. (Y. Kobayasi)

29. ? ***Sporormia intermedia*** Auersw.

Hedwigia **7**: 67 (1868); Winter, in Rabenh. Krypt. Fl. **1**(2): 182 (1887); Cain, Copr. Sphaer. Onatiro p. 96 fig. 73 (1934); Dennis, Brit. Cup fungi p. 253 (1960).

(Textfig. 11 A-C)

Perithecia scattered, immersed, with neck protruding above matrix, ovoid or pyriform, smooth without hairs, dark brown or almost black; moderately thick-walled, neck cylindrical, dark olivaceous, sometimes elongated at the apex, 100×5 μ. Asci 8 spored, cylindrical clavate, broadly rounded above, almost destitute of stalk, transversely cutted at maturity. Ascospores 2-seriate, cylindrical fusiform, slightly curved, 50–55 ×10–11 μ, 4-celled, dark purplish brown, slightly constricted at septa, segments easily separable with diagonal germ slit.

Hab. Commonly found on every kinds of dung. Caribou dung, Umiat (No. 7,8), observed on Nov. 5. Arctic ground squirrel, Barrow (No. 12, 14), observed on Nov. 8. Vole dung, Umiat (No. 21), observed on Nov. 8. (Specimen No. 112)

Distr. Europe, Abisco (by Lind), N. America.

The writer has some doubt whether this arctic fungus should be referred to *Spor. intermedia*, which has some different shape of perithecia. (Y. Kobayasi)

30. ***Sporormia octomera*** Auersw.

Hedwigia **7**: 70 (1868); Winter, in Rabenh. Krypt. Fl. **1**(2): 185 (1887); Cain, Copr. Sphaer. Ontario p. 103 fig. 85 (1934). (Text fig. 11 D-F)

Perithecia globose, almost immersed in the substratum with protruding small, smooth, papilliform neck, 500–700 μ high, 300–500 μ in diameter, surface coarse, almost black. Asci clavate, 100–130×18–20 μ, with slender curved stalk, J—. Ascospores

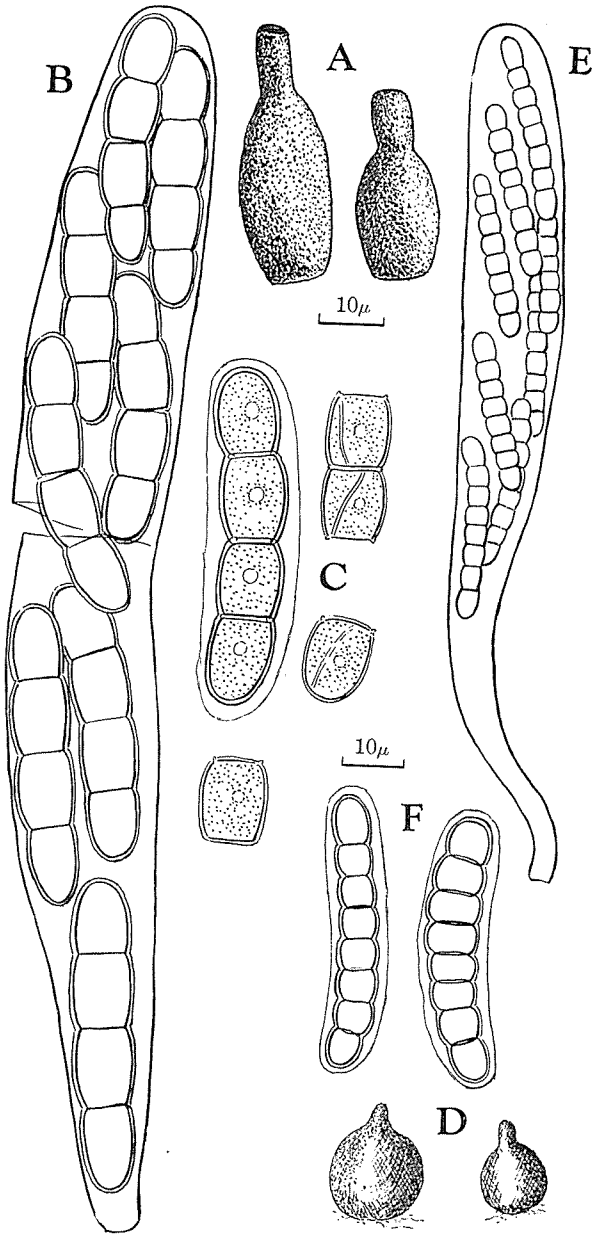

Fig. 11. A-C. *Sporormia intermedia* A. Fruitbodies B. Ascus C. Ascospores and their fragments D-F. *Sporormia octomera* D. Fruitbodies (×20) E. Ascus F. Ascospores.

8 in 2 or 3 series, 8–celled, fusiform cylindrical, 40–45×6–7μ, third and fourth cells from the apex widest, dark vinaceous brown, segments easily separable. Paraphyses filiform, septate, 2μ thick.

Hab. On ptarmigan dung at Barrow (No. 16), observed on Nov. 8. (Specimen No. 118) (Y. Kobayasi)

Xylariaceae

31. ***Hypoxylon fuscum*** [Pers.] Fr.

Summ. Veg. Scand. p. 384 (1849); Winter, in Rabenh. Krypt. Fl. **1** (2):861 (1887).

Stromata gregarious, hemisphaerical, discoid or irregularly elongated, frequently confluent, 2–5 mm in diameter, surface irregularly verrucose, vinaceous brown (Sorghum brown), farinaceous, internally dark brown or almost black except for paler base. Perithecia non matured.

Hab. Mixed with crustaceous lichens on corticated dead branch of *Alnus crispa*, Umiat, Aug. 13. (Specimen No. 171)

On *Salix alaxensis* at Anaktuvuk Pass has already been reported *Hypoxylon blakei* Berk. et Curt. (North Am. Fungi No. 842), which is distinct from *H. fuscum*.

(Y. Kobayasi)

Diaporthaceae

32. ***Hypospila rhytismoides*** (Babingt) Niessl.

Winter Fungi Europe no. 3261; Winter, in Rab. Krypt. Fl. **1**(2): 566 (1887); Lind, Arctic Circ. Micromyc. p. 77 (1934).

Syn. *Sphaeria rhytismoides* Babingt, in Abst. Linn. Trans. p. 32.

Laestadia rhytismoides (Bab.) Sacc. Syll. Fung. **1**: 424 (1882).

(Text fig. 14 A-C)

Stroma depressed globose, black, 200–300 μ in diameter, minutely cracked, at first embedded under the epidermal layer of leaves, then upper half erumpent through cracks of epidermis. Asci clavate, stipitate, 60–65 × 16–18.5 μ, not changing to blue, only to brick-red with J, containing biseriate or irregularly arranged eight ascospores. Ascospores ellipsoid or oblong, 9–14.5 × 4–6.5 μ, inaequilateral, smooth, almost hyaline.

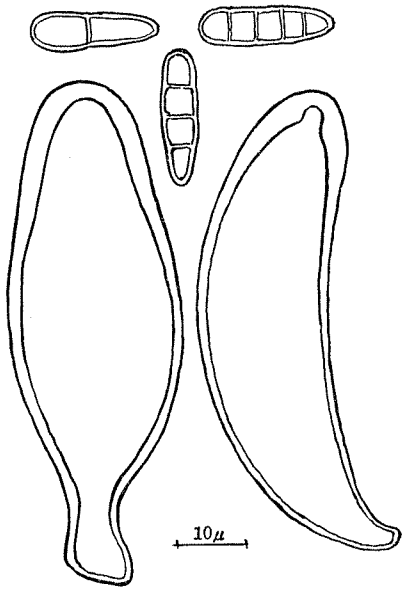

Fig. 12. *Hypospila* sp. Asci and ascospores.

Hab. Gregarious on the dead leaves of *Dryas integrifolia*, C. Thompson, Aug. 15. (Specimen No. 146)

Distr. All over the arctic region and also alpine region of Europe, confined only to *Dryas*.

(Y. Kobayasi)

33. ***Hypospila*** sp. (Text fig. 12)

Stroma composed of 1–3 perithecia, immersed, upper half emerging by rupture of bark,

depressed globose or sclerotioid, black, coarse, 0.3–0.4 mm in diameter, not beaked. Asci fasciculated, arcuate fusiform, with short stalk, thick-walled, especially on upper half, 65–75×22–26 μ. Ascospores broadly fusiform 19–20×4.5–5.5 μ, 1–3 (rarely 4) septate, hyaline, basal cell longest and slender. Pycnidia present, aggregated. Pycnospores oblong, 6–6.5×2 μ, pale brown.

Hab. Gregarious on corticated branch of *Salix alaxensis*, C. Thompson, Aug. 15. (Specimen No. 172)

From Greenland, *Hypospila groenlandica* Rostr. has already been known on leaves of *Salix glauca*. This has the characteristics as "asci 95–115×10–12 μ; ascospores 2 seriate, 48–52×4–5 μ".

(Y. Kobayasi)

Erysiphaceae

34. ***Oidium*** sp., conidial form of Erysiphaceae (Text fig. 13)

Amphigenous, mostly epiphyllous. Hyphae spreading, forming farinaceous masses, hyaline, septate, 5–7 μ thick. Conidiophore simple 1 or more septate. Conidia solitary or in chain, oblong or subcylindric, hyaline, 29–40×12–17 μ, granulate.

Hab. On *Astragalus* sp., Umiat, Aug. 13. (Specimen No. 169)

The host plant above mentioned could not determine because of the destitute of flower, although the following species of *Astragalus* have already been known from Arctic Alaska.

Astragalus alpinus L.
Astragalus lepagei Hultén
Astragalus sealei Lepage
Astragalus umbellatus Bunge

As for the members of Erysiphaceae parasiting on *Astragalus*, there is *Erysiphe polygoni* DC., distributing in Pacific North West America. The present arctic fungus seems to be the conidial form of this *Erysiphe polygoni* considering from conidial structures and host-parasite relationship, although the perithecial form was not found in this occasion.

(Y. Kobayasi)

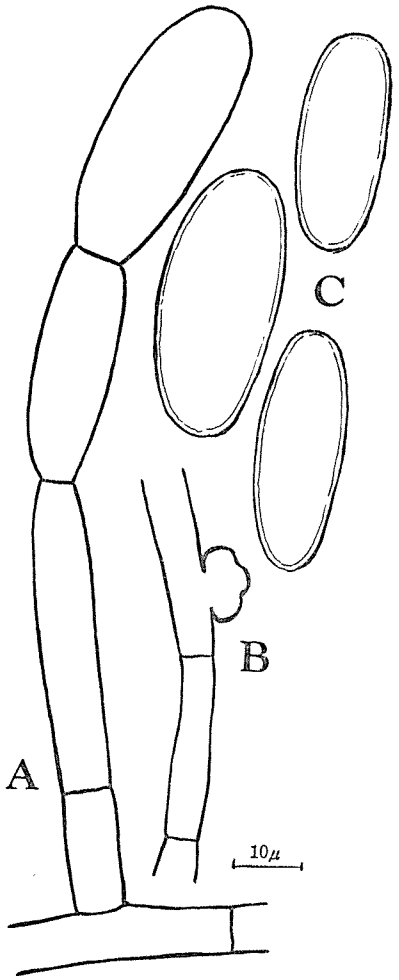

Fig. 13. *Oidium* sp., conidial form of Erysiphaceae A. Conidiophore B. Appressorium C. Conidia

Mycosphaerellaceae

35. ***Mycosphaerella tassiana*** (De Not.) Johanson

Svenska Vetensk. Akad. Ofvers. **9**: 163 (1884); J.A. von Arx, in Beitr. Kenntnis Gatt. Mycosphaerella p. 39 (1949).

Syn. *Sphaerella tassiana* De Not., Sferiacei Ital. p. 87 pl. 98 (1863). (Text fig. 14 I-K)

Pseudothecia gregarious, subepidermal, subglobose, 100–150 μ in diameter, black, surface glabrous with slightly protruding ostiolum. Asci subfusiform or pyriform, sessile, thick-walled in upper half, 50–65 $\times$ 23–26 μ, containing irregularly arranged eight ascospores, changing dark reddish brown with iodine. Ascospores short clavate, 2 celled, non or slightly constricted, 15–17 $\times$ 6–7 μ, hyaline or pale ochraceous, upper cell short and broader. Paraphyses almost disappearing in adult stage.

Hab. Gregarious on dead leaves and scapes of *Papaver radicatum*, Barrow, Aug. 5. (Specimen No. 142)

We collected also the following two strains of this species. They have slightly different characteristics to each other.

Strain 2. (Text fig. 14 G.H)

Asci subfusiform, 75–80 $\times$ 30–35 μ. Ascospores longer, 22–24 $\times$ 9–10 μ, hyaline.

Hab. Gregarious on under surface of leaves of *Lupinus arcticus*, Umiat, Aug. 11. (Specimen No. 151)

Strain 3. (Text fig. 14 D-F)

Pseudothecium 100–125 μ in diameter. Asci cylindric or fusiform, subventricose, sessile, 74–90 $\times$ 19–21 μ. Ascospores 14–16 $\times$ 5–6 μ, hyaline.

Hab. Gragarious on under surface of dead leaves of *Astragalus* sp., mixed with *Oidium* sp. of Erysiphaceae, Umiat, Aug. 13. (Specimen No. 150)

From Point Barrow, the present species has already been reported in the name "*Sphaerella pachyasca*" on *Draba alpina*, in Report of Harriman Alaska Expedition (1904). In Spitsbergen and Novaya Zemlya, this species is known on *Papaver nudicaule* and in the latter place also on *Astragalus alpinus*.

According to J.A. von Arx (1949), this fungus has wide range of host plant, i.e. more than 70 genera, and wide distribution, namely arctic alpine and rarely in low land of North and South Hemisphere. Accordingly, the measurements of every parts of pseudothecium are ranging widely as "pseudothecia 60–200 μ in diameter and ascospores 14–35 $\times$ 4–11 μ". (Y. Kobayasi)

Pleosporaceae

36. ***Leptosphaeria silenes-acaulis*** de Notaris

Comment. Societa Critt. Ital. **2**(3): 485 (1867); Sacc. Syll. Fung. **2**: 47 (1883); Winter, in Rabenh. Krypt. Fl. **1**(2): 485 (1887); Lind, Arctic Circ. Micromyc. p. 26 (1934).

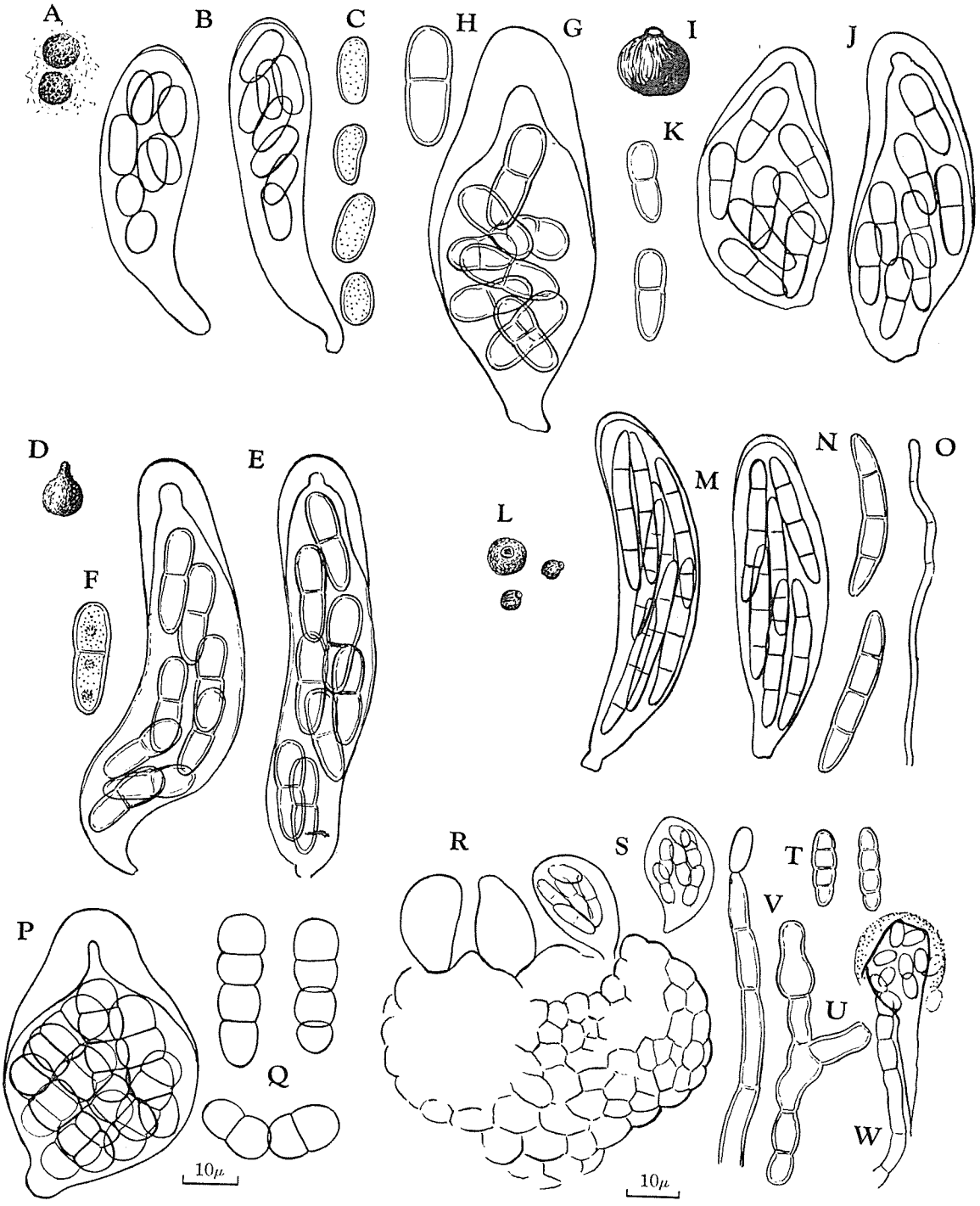

Fig. 14. A-C. *Hypospila rhytismoides* A. Stromata (×20) B. Asci C. Ascospores D-F. *Mycosphaerella tassiana* on *Astragalus* G-H. *Mycosph. tassiana* on *Lupinus* I-K. *Mycosphaerella tassiana* on *Papaver* I. Stroma (×60) J. Asci K. Ascospores L-O. *Leptosphaeria silenes-acaulis* L. Stromata (×60) M. Asci N. Ascospores O. Paraphysis P-Q. *Leptosphaeria* sp. R-W. *Leptosphaeria arctalaskana* R. Stroma S. Ascus T. Ascospores U. Hypha V. Conidiophore W. Conidia.

(Text fig. 14 L-O)

Pseudothecia superficial, minute globose, black, 75–100 μ in diameter, with somewhat protruding ostiolum, destitute setae. Asci subfusiform, slightly curved, apex rounded, attenuated toward base, with short stalk, 58–60 × 14–16 μ, upwardly slightly thick-walled, with 8 ascospores in 3 series. Ascospores fusiform curved, with 3 septa, 27–32 × 5.5–7 μ, olivaceous brown. Paraphyses filiform, septate 3 μ in diameter, hyaline.

Hab. Gregarious on upper surface of leaves, sepals and stems of *Silene acaulis*, C. Thompson, Aug. 15. (Specimen No. 144) (Y. Kobayasi)

37. ***Leptosphaeria*** (subg. *Scleropleella*) sp. (Text fig. 14 P, Q)

Pseudothecia gregarious, immersed, then exposed by shedding of epidermis of leaves, subglobose with conical tip, 100–150 μ in diameter, thick-walled black, surface coarse. Asci pyriform, very thick-walled on upper half, 54–56 × 33–35 μ, containing 8 spores, with short and thick stalk at base. Ascospores cylindric, rounded at both ends, 28–30 × 10–11 μ, brown, 4 celled, constricted at septa, rarely separated at central septum.

Hab. On dead leaves of *Cassiope tetragona*, Barrow, Aug. 7. (Specimen No. 137)

On *Cassiope tetragona* in Lappland and Spitsbergen is reported *Leptosphaeria andromedae*, which differs from the Alaskan species in subclavate and longer asci (136 × 27 μ). (Y. Kobayasi)

38. ***Leptosphaeria*** (subg. *Scleropleella*) ***arctalaskana*** Y. Kobayasi sp. nov. (Text fig. 14 R-W)

Pseudothecia dispersa, immersa, deinde emergentia, compresso-globosa, 100–250 μ in diam., levia, badia, ostiolis non protrudentia. Asci pauci, fusoidei vel pyriformes, 22–26 × 13–15 μ, crassiusculiparietales, cum stipite obconico, 8 spori. Ascosporae assymmetrico-fusoideae 10–18 × 4–6 μ, 3 septatae, plus minusve constrictae apud septa, pallide brunneae.

Pseudothecia scattered, immersed, then exposed by shedding of epidermis of the leaves, compressed globose, 100–250 μ in diameter, brown, smooth, ostiole not protruding. Asci few, broadly fusiform or pyriform, 22–26 × 13–15 μ, slightly thick-walled, with obconical stalk, containing 8 conglomerate spores. Ascospores fusiform, slightly assymmetrical 10–18 × 4–6 μ, 3 septate, slightly constricted at septa, pale brown. Hyphae creeping in the leaf tissue, thick-walled, septate, producing conidia in the cavity of stomata: conidia ellipsoid, non septate, 4 × 2.5–3 μ, pale brown.

Hab. Scattered near the inner surface of bract of inflorescence of *Lycopodium selago* var. *appressum*, L. Peters, Aug. 19. (Specimen No. 147. Type preserved in Herbarium Smithsonian Institution)

More than 700 species have been described in the present genus. As for the members of *Leptosphaeria* parasiting on *Lycopodium*, the followings have already been known.

Leptosphaeria lycopodina (Karst.) from Finnland

Asci cylindric, clavate, 60–80×8–12 μ. Spores 20–24×3–5 μ.

Leptosphaeria lycopodicola Peck from N. America

Asci clavate, 4–6 spored, 65–75×8–10 μ. Spores 3–5 septate, 20–25×4–5 μ.

Leptosphaeria crepini (West.) de Not. from Europe

Asci 50–70×13–14 μ. Spores 3 septate, 20–26×7–10 μ.

From these species, the present arctc new species is distinctly separable.

(Y. Kobayasi)

39. ***Pleospora*** sp. (Text fig. 15 A-E)

Pseudothecia subglobose with somewhat flattened base, 400–500 μ in diameter, dark purplish brown or almost black, with protruding ostiolum, with several very short dark brisles around ostiolum. Paraphyses not longer than asci, simple, septate, hyaline, 2–2.5 μ thick. Asci thick, cylindrical or more clavate, curved with very short and

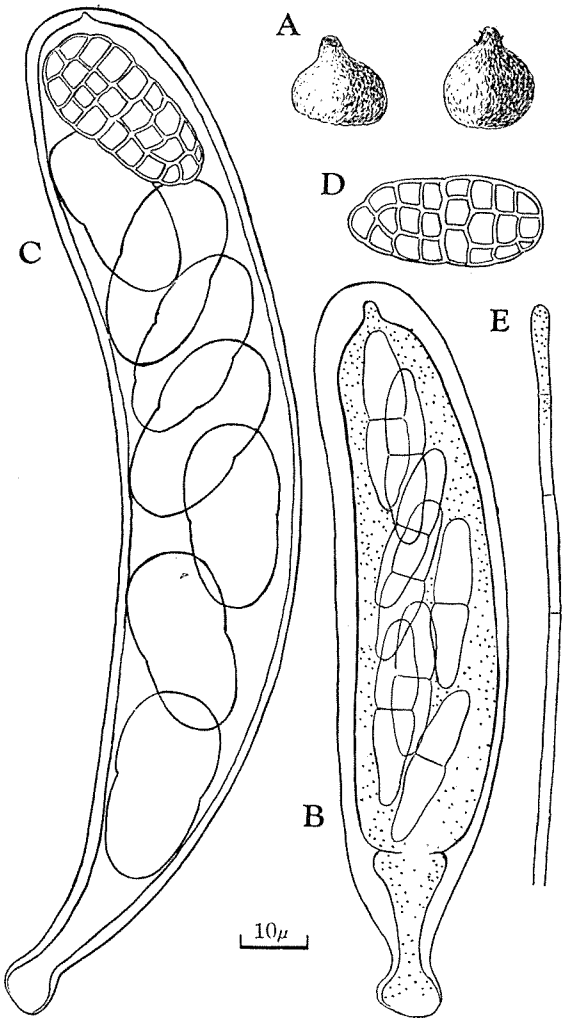

Fig. 15. *Pleospora* sp. A. Stroma (×24) B. Young ascus C. Mature ascus D. Ascospore E. Paraphysis.

thick disk-like stalk, 140–170×28–33 μ, thick-walled, J-, containing 8 spores in 1–2 series. Ascospores oblong, 35–37×15–18 μ, constricted at center, with 7 cross septa and 2–3 longitudinal septa, dark ochraceous, upper half broader.

Hab. Gragarious on stems, petioles and leaves of *Artemisia borealis*, C. Thompson, Aug. 16. (Specimen No. 139)

The present fungus is distinct from *Pleospora coronata* and *Pyrenophora chrysospora* parasiting on *Artemisia* and *Pyrenophora hispida* in various features. (Y. Kobayasi)

40. ***Pyrenophora androsaces*** (Fuckel) Sacc.

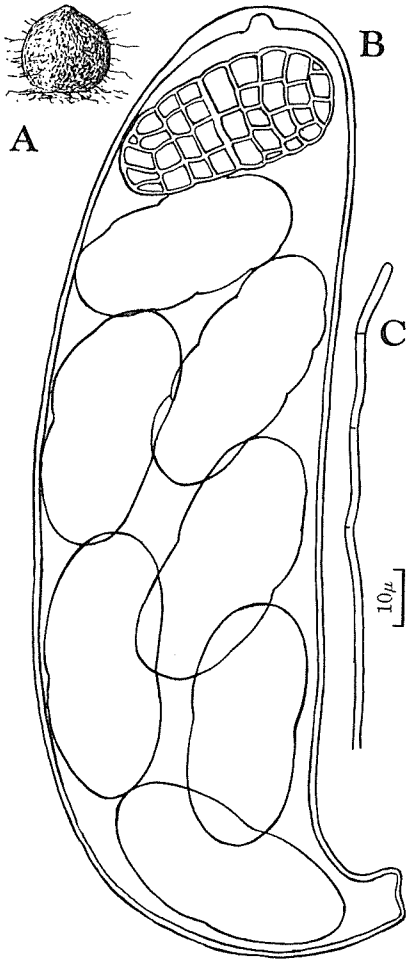

Fig. 16. *Pyrenophora androsaces* A. Stroma (×50) B. Ascus C. Paraphysis.

Syll. Fung. **2**: 284 (1883); Lind, Arctic Circ. Micromyc. p. 49 (1934).

Syn. *Pleospora androsaces* Fuckel, Symb. Myc. App. **3**: 19 (1875).

Pleospora fuckeliana Niessl., Notizen p. 34; Winter, in Rabenh. Krypt. Fl. **1** (2): 517 (1887). (Text fig. 1) 6 A-C

Pseudothecia subepidermal, subglobose or slightly depressed, black without distinct ostiolum, about 200 μ in diameter, with plenty diverging slender bristles on surface. Bristles flexuous, filiform, 50–170 μ or more long, 7–8 μ thick at base, attenuated, septate, brown. Paraphyses about the same length with asci 1.5–2 μ thick, septate, hyaline. Asci very large, oblong with cruved short stalk, 123–143×39–42 μ, J-, contents changing brick-red coloured with iodine, containing 8 biseriate ascospores. Ascospores large, oblong 40–42×18–20 μ, ochraceous or darker, constricted at center, with 7–8 cross septa and 2–3 longitudinal septa, upper half broader.

Hab. Gregarious on dead stem of *Draba lactea*, Barrow, Aug. 4. (Specimen No. 140)

Distr. On many species of host plants in arctic and alpine regions of Europe.

In Novaya Zemlya, the present species is known on *Arabis petraea*. (Y. Kobayasi)

41. ***Pyrenophora chrysospora*** (Niessl.) Sacc. var. ***polaris*** Karst.

Hedwigia 1884: 38; Sacc. Syll. Fung. **9**: 896 (1891).

Syn. *Pyrenophora cerastii* (Ouds.) Lind, in Report Sci. Res. Nov. Zeml. 1921: 18 (1924) et Arctic Circ. Micromyc. p. 47 (1934). (Text fig. 17 A-F)

Pseudothecia half imbedded, subglobose, 150–200 μ in diameter, with obscure ostiole and several setae around the pore. Setae stiff, straight, thick-walled, 70–130 μ long, 5–8 (–13) μ thick at base, 1–3 septate, dark brown. Asci oblong with minute stalk, moderately thick-walled, 100–130 × 30–35 μ, with 8 (rarely 2 or 4) spores. Ascospores biseriate or irregularly arranged, oblong, 32–35 × 16–18 μ, with 7 cross septa and 1–4 longitudinal septa, slightly or strongly constricted at center, yellowish brown, upper half broader. Paraphyses simple, about the same length with asci, septate, 2 μ thick.

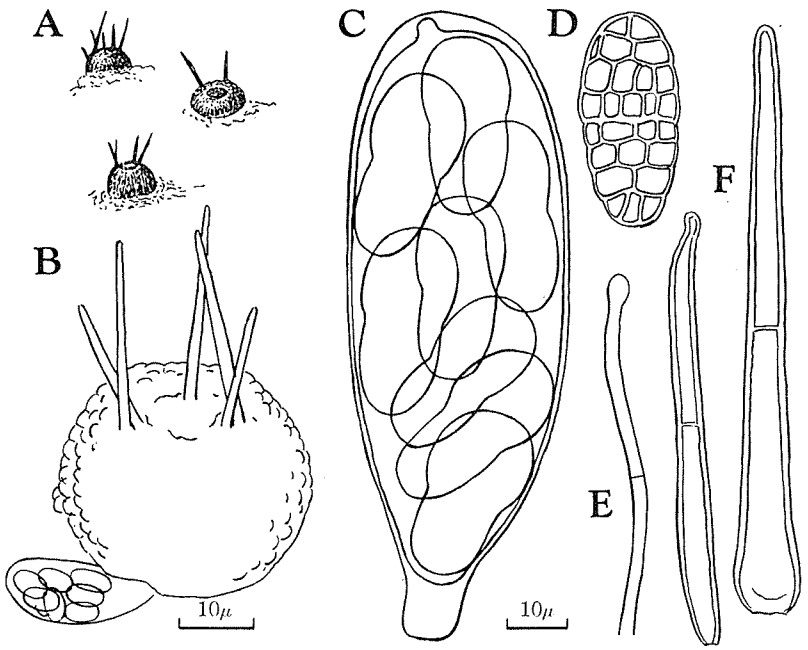

Fig. 17. *Pyrenophora chrysospora* var. *polaris* A, B. Stromata C. Ascus D. Ascospore E. Paraphysis F. Setae.

Hab. On dead leaves of *Melandrium apetalum* ssp. *arcticum*, C. Thompson, Aug. 16. (Specimen No. 141)

Distr. Spitsbergen, Beeren Isl., Lappland, Tirol (?), Siberia, Alaska, Canada.

As for the members parasiting on *Melandrium*, there are also *Pyrenophora cerastii*, *Pyren. hispida* and *Pleospora scrophulariae*.

The measurements of ascospores are somewhat different according to the strain as follows.

Pyrenophora chrysospora	24–30 × 10.5–11 μ
Pyr. chrysospora v. *polaris*	30–53 × 18–27 μ
Alaskan strain	32–35 × 16–18 μ

42. ***Pyrenophora*** sp. (Text fig. 18 A-D)

Pseudothecia depressed globose, sub-superficial, 200–350 μ in diameter, black, with plenty diverging setae all over the surface; ostiole obscure. Setae flexuous 40–160 ×

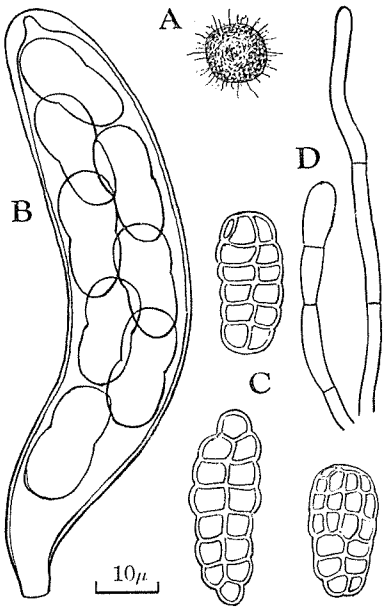

Fig. 18. *Pyrenophora* sp. A. Stroma (×20) B. Ascus C. Ascospores D. Paraphysis.

4–6.5 μ, with several septa, pale brown, paler at the tip, abruptly swollen at base. Paraphyses simple, septate, hyaline, 2.5–3 μ thick. Asci thick cylindrical, curved, with short stalk, 88–100×19–20 μ, with biseriate eight asscospores. Ascospores oblong, constricted at center, 19–29×10–12 μ, with 5 or rarely 6–7 cross sepat and one longitudinal septum, lower half slightly slender and longer.

Hab. On dead leaves and stems of *Papaver radicatum*, Barrow, Aug. 5. (Specimen No. 143)

Four species of *Pyrenophora* and *Pleospora* have been recorded on *Papaver*, namely, *Pleospora herbarum, Pl. papaveracea. Pyrenophora chrysospora* and *Pyren. paucitricha.* The two former species are destitute of setae on the surface of pseudothecia. *Pyrenophora chrysospora* is provided with setae only around the ostiole. The last species *Pyren. paucitricha* is near the present fungus concerning the setae and ascospores. (Y. Kobayasi)

Hysteriaceae

43. ***Lophodermium cladophilum*** (Lév.) Rehm

Rabenh. Krypt. Fl. **1**(3): 42 (1887); Lind, Arctic Cir. Micromyc. p. 83 (1934). (Text fig. 19 A-C)

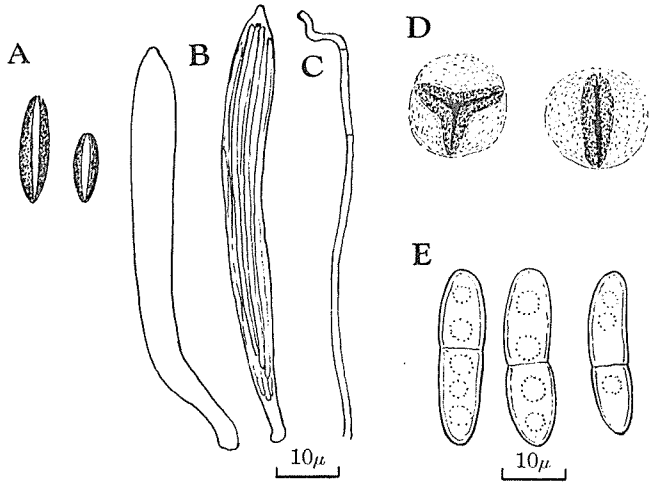

Fig. 19. A-C. *Lophodermium cladophilum* A. Stroma (×12) B. Asci C. Paraphysis D-E. *Schizothyrium* sp. D. Stroma (×30) E. Ascospores.

Stroma oblong or fusiform, black, 0.6–1.0×0.3 mm, opened by longitudinal slit. Asci cylindric or clavate, 65–70×5–7μ, J-, 8 spored. Ascospores linear, simple, 1.5–2μ thick, septate, hyaline, curled at the tip.

Hab. Scattered on bark of *Andromeda prolifolia*, Umiat, Aug. 13. (Specimen No. 145)

Distr. Arctic-alpine regions of Europe and N. America.

The present fungus has some resemblances to *Lophodermium melaleucum* (Fr.) Rehm and *Loph. maculare* (Fr.) Rehm, differing, however, in spores and asci.

From Unalaska of Alaska, *Loph. orbiculare* (Ehrenb.) Sacc. and *Loph. gracile* (Ehrenb.) Sacc. have been known as the parasite on *Cassiope* (*Andromeda*) *lycopodioides*, although both species are imperfectly described. (Y. Kobayasi)

Phacidiaceae

44. ***Schizothyrium*** sp. (Text fig. 19 D–E)

Pseudothecia immersed, then apical part exposed by breaking the epidermal layer of leaves, depressed globose, 250–300μ in diameter, black, beset with many setae. Setae straight or curved, non septate, attenuated, with acute tip, 90–145 μ long, 15–16 μ thick near the base, thick-walled, hyaline. Asci arcuate, fusiform, 90–95×15–16 μ, thick-walled, J—, with 8 spores. Ascospores oblong fusiform, 1 septate, constricted at septa, 24–29×5.5–8 μ, hyaline, with granular contents.

Hab. Gregarious on dead leaves of *Cassiope tetragona*, L. Peters, Aug. 19. (Specimen No. 138) (Y. Kobayasi)

Pezizaceae

45. ***Peziza limosa*** (Grelet) Nannf., in Lundell et Nannf. Fungi Exsicc. Suecici no. 373 fasc. 19–20 p. 46 (1941); Möller, Fungi Faeroes **2**: 108 fig. 32 (1958).

Syn. *Galactinia castanea* (Quél.) Boud. var. *limosa* Grelet, in Bull. Soc. Bot. Centre-Ouest p. 166 (1936). (Text fig. 20 E-H)

Galactinia limosa (Grelet) Le Gal et Romagnesi, in Rev. de Mycol. 4: 176 (1939); Le Gal, l.c. 6 Suppl. 3: 74 fig. 12 (1941). (Text fig. 20 E-H)

Apothecia medium size or rather small, 7–12 mm. across, cup-shaped with slightly incurved margin, sessile; hymenium dark purplish brown, darker at bottom: outer surface and margin grayish brown, velvety or farinaceous. Asci 280–300×16–18μ, J+. Spores ellipsoid or oblong, 18–20×9–11μ, surface densely ornamented with pulvinate warts or irregular ridges, not reticulate, hyaline, with two unequal oil drops.

Hab. On bare, wet peat soil, Umiat, Aug. 13. (Specimen No. 36)

Distr. Europe, Faeröes Isl. (R.P. Korf)

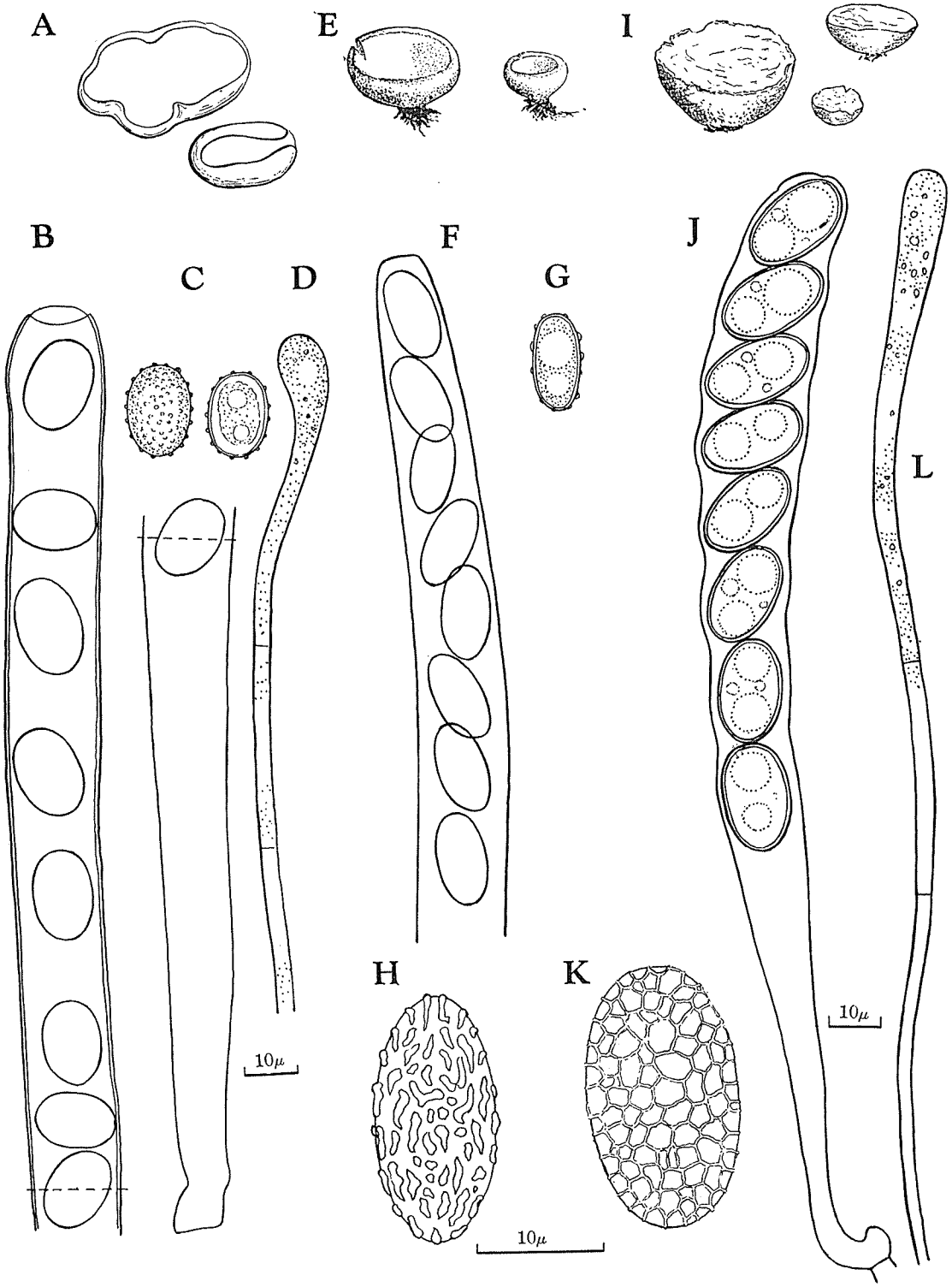

Fig. 20. A-D. *Peziza irrorata* A. Apothecia (×3) B. Ascus C. Ascospores D. Paraphysis E-H. *Peziza limosa* E. Apothecia (×1.3) F. Ascus G, H. Ascospores I-L. *Aleuria aphanodictyon* I. Apothecia (×3) J. Ascus K. Ascospores L. Paraphysis.

46. ***Peziza*** cfr. ***irrorata*** Berk. et Curt.

Grevillea **3**; 150 (1874); Cooke, Mycographia **4**; 150 pl. 66 fig. 254 (1877).

(Text fig. 20 A-D)

Apothecia sessile, cup-shaped with inrolled, then recurved entire margin, 3–8 mm. diameter, wholly ochraceous, exterior smooth. Asci very long, 280–300×19–21 μ, J+ (dried material), J— (Formalin specim.), with eight uniseriate spores. Spores ellipsoid, 19–20×13–14 μ, finely warted, hyaline, with two small oil drops. Paraphyses simple septate, 4 μ thick, apically slightly thickened, 9–10 μ thick, pale ochraceous.

Hab. In dense clusters on fibrous matters among trash heap, A.R.L., Barrow, Aug. 15. (Specimen. No. 79)

Distr. N. America (Texas).

Although I have examined the isotype specimen (Wright **256**) preserved at the Farlow Herbarium, with appreciably smaller spores, I am not convinced that this represents a distinct species from the arctic material collected by Kobayasi. (R.P. Korf)

Humariaceae

47. ***Aleuria aphanodictyon*** Kobayasi sp. nov. (Text fig. 20 I-L)

Apothecia cupuliformia, sessilia, 3–8 mm in diam., margine irregulariter dentata, hymenio plano vel paulo concavo, clare aurantia (ut *Aleuria aurantia*), externe levia, concolorata. Ascki 220–230×14–16 μ, J—, 8-spori. Ascosporae ellipsoideae 20–22× 11–13 μ, obscuriter et subtiliter reticulatae, hyalinae, 2-guttulatae. Paraphyses simplices, filiformes 2–3–septatae, 3 μ crassae, apice clavatae 6–7 μ crassae, aurantiacae.

Apothecia cup-shaped, seessile, 3–8 mm. diameter, margin irregularly dentate, hymenium plane or slightly concave, bright orange red as in *Aleuria aurantia*; outer surface septate, smooth, concolorous.

Asci 220–230×14–16 μ, J— (Formalin specim.). Spores ellipsoid 20–22×11–13 μ, with very low reticulations and two oil drops, hyaline. Paraphyses simple, 2–3–3 μ thick, apically clavate 6–7 μ thick, orange-yellow with carotin-pigments.

Hab. Scattered on bare peat soil, L. Peters, Aug. 19. (Specimen No. 80–Type preserved in Herb. Smithsonian Institution)

The surface reticulation of the ascospores is very low and almost undistinguishable except by using material stained in cotton blue. (Y. Kobayasi)

48. ***Fimaria porcina*** Svr. et Kub.

Česka Mykologie **19** (4): 212 (1965). (Text fig. 21 A-D)

Apothecia cup-shaped, sessile, 3–5 mm. across; hymenium concave, yellowish gray, outer surface concolorous with purplish-brown tint, furfuraceous, margin almost entire, scaly with purplish-brown tint. Asci 155–165×7–10 μ, J—. Spores uniseriate, ellipsoid, 12–14×6.5–9 μ, smooth or very finely marked, hyaline. Paraphyses very slender, simple, 2 μ thick, apically not thickened, hyaline.

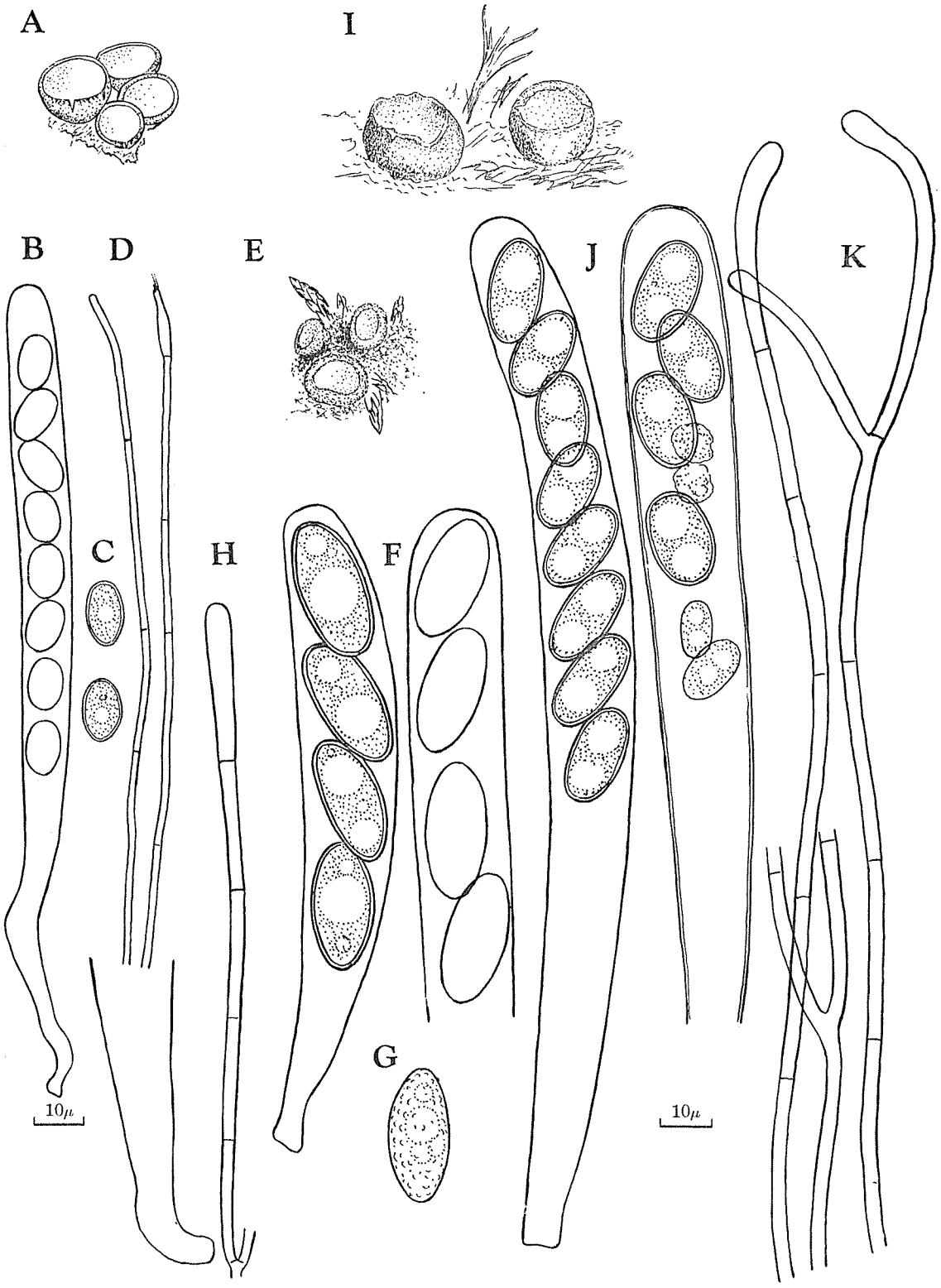

Fig. 21. A-D. *Fimaria porcina* A. Apothecia (×2) B. Ascus C. Ascospores D. Paraphysis
E-H. *Octospora tetraspora* E. Habit (×7) F. Asci G. Ascospore H. Paraphysis
I-K. *Octospora leucoloma* I. Habit (×3) J. Asci K. Paraphyses.

Hab. Growing in small groups among trash-heap, A.R.L., Barrow, Aug. 15. (Specimen No. 82).

Distr., Europe (Czechoslovakia)

J. van Brummelen could make a series of a very fine microtome-sections of the material Kobayasi sent. It should be remarked that the drawing by Svrček of a section of the apothecium does not fully agree with the description. The outside of the fruitbody is densely "furfuraceo-fusco-floccosa" and not as smooth as in the drawing. (J. van Brummelen)

49. ***Octospora leucoloma*** Hedwig ex S.F. Gray

Nat. Arrangement Brit. Plants I: 667 (1821); Dennis, Brit. Cup Fungi p. 33 (1960); Gamundi, in Liloa **30**: 298 pl. 9 (1960).

Syn. *Humarina leucoloma* (Hedw.) Seaver, N. Am. Cup-fungi (Operc.) p. 129 (1928). (Text fig. 21 I-K)

Apothecia minute, cup-shaped, turbinate or expanded saucer-shaped, 2–3 mm. (rarely up to 5 mm.) across, with irregularly denticulate, incrassate margin: disc flat or slightly concave, orange yellow; exterior white, downy. Tissue of ectal excipulum composed of thick, intricated, loosely woven, thin-walled, hyaline hyphae. Asci 230–240×18–21 μ, J—, operculate, with eight obliquely uniseriate ascospores. Spores ellopsoid or oblong, 22–24×10–12 μ, smooth, hyaline with two large frequently unequal oil-drops. Paraphyses longer than asci, 260–280×2.5–3 μ, simple or forked at base or near apical end, wholly orange-yellow with carotin granules, thickened at the tip, 6–8 μ thick.

Hab. Scattered in tundra, partially buried in peat soil, Barrow, Aug. 7. (Specimen No. 14)

Distr. Europe, N. America, S. America (Argentina). (R.P. Korf)

50. ***Octospora tetraspora*** (Fckl.) Korf

Mycologia **46**: 838 (1954).

Syn. *Ascobolus tetrasporus* Fuckel, in Hedwigia **5**:4 (1866). *Humarina tetraspora* (Fuckl.) Seaver, N. Am. Cup-fungi (Operc.) p. 134 (1928). (Text fig. 21 E-H)

Apothecia cup-shaped, sessile, 1–1.5 mm. across, disc concave, grenadine red, margin thick, outer surface densely hairy, farinaceous. Asci comparatively short, 110–130–160×15–18 μ, J—, with four uniseriate ascospores. Spores large 26–31×11–13 μ (longest ones up to 33 μ, smallest ones 23 μ in length) with one large oil-drop, hyaline, surface roughened. Paraphyses simple, septate, 2–3 μ thick at base, apically clavate, 4–6 μ thick, with red pigments.

Hab. Gregarious among mosses, lower half imbedded in sandy soil, near Eskimo-hut, C. Thompson, Aug. 18. (Specimen No. 62)

Distr. Europe, N. America (R.P. Korf)

51. ***Psilopezia*** sp. (Text fig. 22 A-C)

Young fruitbody small globose or hemispherical, hyaline, soft fleshy, more or less

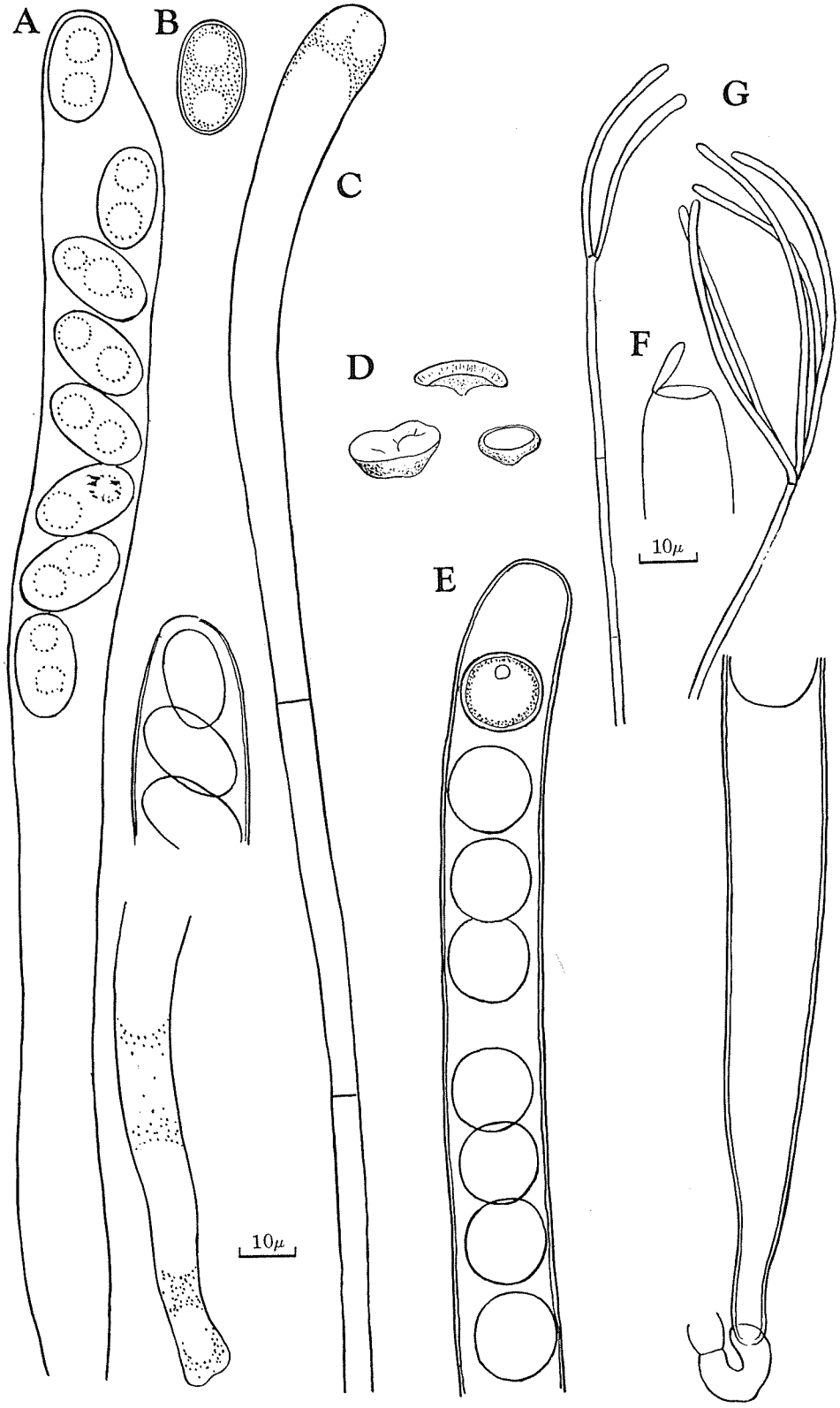

Fig. 22. A-C. *Psilopezia* sp. A. Asci B. Ascospore C. Paraphysis D-G. *Pulvinula constellatio* D. Apothecia (×6) E. Ascus F. Operculum G. Pharaphyses.

pellucid, composed of radially arranged foam-like cells, producing clavate cells at marginal part. Mature one tubercular 2.5 mm. diameter, 2 mm. high, white; surface hygrophanous, finely rugulose, covered with hymenium except for the basal part. Asci 370–400×19–21 μ, operculate, J— (tested with fresh material), with eight, uniseriate spores. Spores ellipsoid, hyaline, smooth, slightly thick-walled, with two oil-drops, 19–20×12–13 μ. Paraphyses simple, 2–3 septate, hyaline, contents scarce, 2.5–3 μ thick, clavately enlarged at the tip, 11–17 μ thick, forming an epithecium.

Hab. Growing solitary on moose dung, L. Peters, Aug. 19. (Specimen No. 132) The material is too scanty to serve as the type of a new species. (R.P. Korf)

52. ***Pulvinula constellatio*** (Berk. et Br.) Boudier

Hist. Class. Discom. d'Europe p. 70 (1907); Dennis, Brit. Cup Fungi p. 35 pl. 6 T (1960).

Syn. *Peziza constellatio* Berk. et Br., in Ann. Mag. Nat. Hist. IV, **17**: 142 (1876). (Text fig. 22 D-G)

Apothecia very small, pulvinate, sessile, 1.5–2.5 mm.; disc concave then convex, grenadine red, margin undulate, outer surface pinkish, smooth; flesh white, thin. Asci long, cylindric, 260–325×16–25 μ. Spores globose, smooth, 14–16 μ diameter, hyaline, with one large oil drop. Paraphyses slender, 1.5–2 μ thick, septate, simple, apically forked or branched in tuft, slightly thickened, strongly curved, with red granules.

Hab. Gregarious on soil among mosses, Umiat, Aug. 13. (Specimen No. 31).

Distr. Europe, N. America. (Mien A. Rifai)

53. ***Scutellinia scutellata*** (L. ex Fr.) Lambotte.

Fl. Myc. Belg. Suppl. **1**: 299 (1887); Le Gal, Discom. de Madagascar, p. 116 (1954); Denison, Mycologia **51**:623, figs. 1A, 4F (1959); Dennis, Brit. Cup Fungi p. 25 pl. 6 G (1960). (Text fig. 23 A,B)

Apothecia saucer-shaped, 5–7 mm. diameter, disc bright red; margin and outer surface densely ornamented with dark-brown, rooting hairs. Asci 250–260×19–21 μ, J—. Spores ellipsoid, 21–22.5×13–16 μ, minutely verrucose, hyaline, without large oil drops. Paraphyses longer than asci, 2.5–3 μ thick, septate, simple or apically forked and thickened, 6–8 μ thick, with red granules.

Hab. Gregarious among mosses (*Tetraprodon mnioides*), L. Thompson, Aug. 18. (Specimen No. 63)

Distr. Europe, Faeröes, Lappland, Iceland, Greenland, Madagascar, Mexico, N. America, Japan. (R.P. Korf)

54. ***Scutellinia trechispora*** (Berk. et Br.) Lambotte.

Fl. Myc. Belg. suppl. **1**, p. 299 (1887); Denison, in Mycologia **51**: 616 (1959).

Syn. *Peziza trechispora* Berk. et Br., in Ann. Nat. Hist. **18**: 77 (1846). (Text fig. 23 C-G)

Apothecia cup-shaped, then flat, sessile, 2–4 mm. diameter; disc flat, bright orange red, outer surface yellow or orange with brown or dark brown, rooting hairs. Hairs

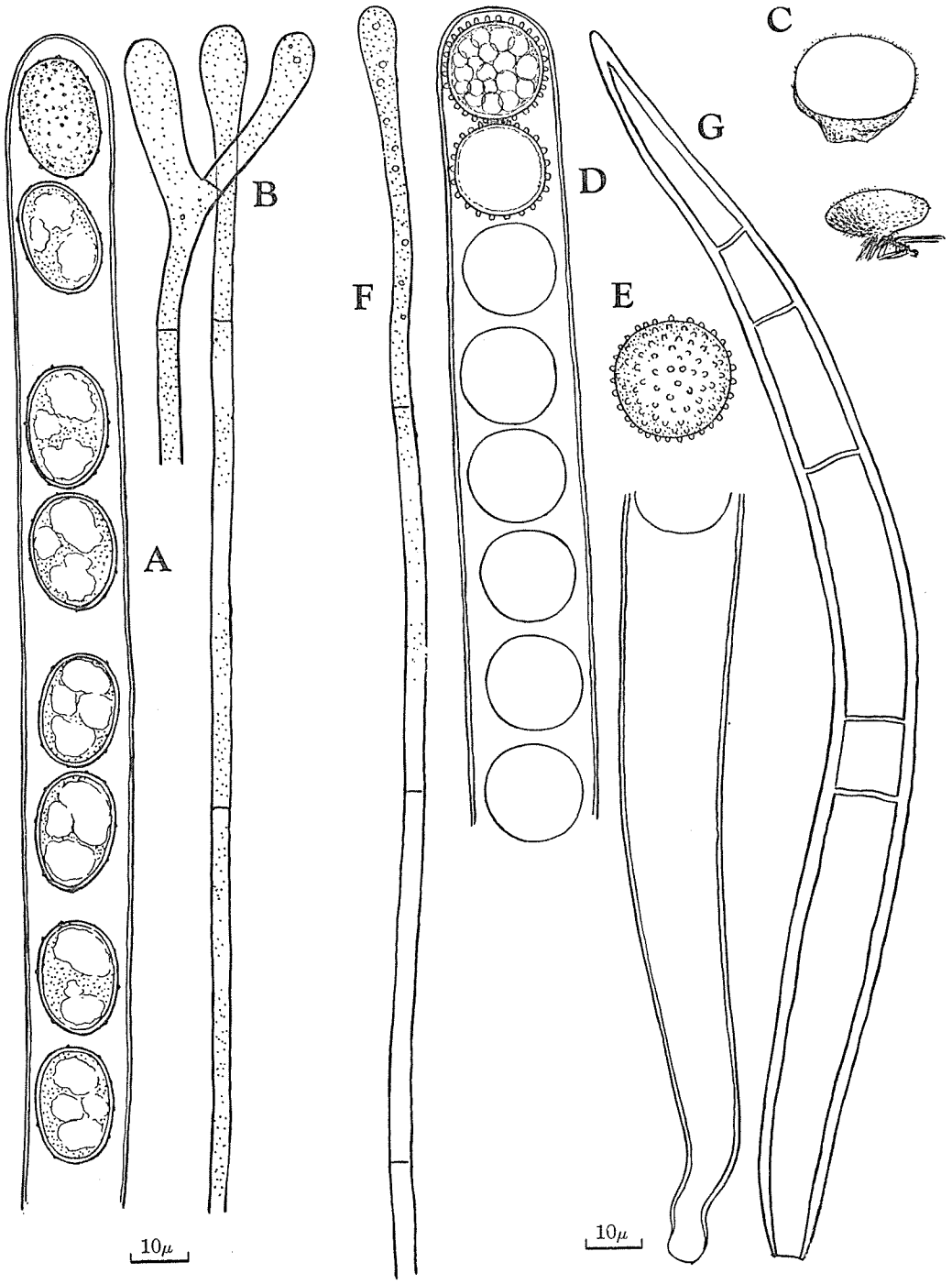

Fig. 23. A,B. *Scutellinia scutellata* A. Ascus B. Paraphyses C-G. *Scutellinia trechispora* C. Apothecia (×4) D. Ascus E. Ascospore F. Paraphysis G. Seta.

lanceolate, straight or curved, 200–400×16–22 μ, brown, thick-walled with several thin septa, paler toward the tip. Asci 260–280×24–26 μ, J—. Spores globose, ornamented with minute warts, 19–21 μ diameter, hyaline, with many granular oil drops. Paraphyses simple, 2.5–3.5 μ, septate, apically thickened 6–13 μ (commonly 8 μ), with orange-coloured pigments.

Hab. Solitary among decaying mosses and plant debris on peat soil, L. Peters, Aug. 19. (Specimen No. 81)

Distr. Europe. (R.P. Korf)

55. ***Sepultaria arenosa*** (Fckl.) Boudier. Hist. Class. Discom. d'Europe p. 59 (1907), sensu Seaver, N. Amer. Cup Fungi (Operc.) p. 151 (1928); Dennis, Brit. Cup Fungi p. 21 pl. 5F (1960). (Text fig. 24)

Apothecia cup-shaped, then radially splitting, 5–7 mm. diameter, disc whitish or pale cream-coloured, outer surface dark brown, minutely hirsute, margin thin, scaly. Hairs clavate, cylindric or subulate, 50–200×10–13 μ, thick-walled, septate, brown. Asci cylindric with short slender stalk, 210–220×19–20 μ, operculate, J—. Spores ellipsoid, 23–25×14–16 μ, smooth, hyaline, with one large and several small oil drops. Paraphyses simple, 4–5 μ thick, septate, slightly clavate at the tip, hyaline.

Hab. Scattered among decaying mosses on wet sandy soil, L. Peters, Aug. 19. (Specimen No. 87)

Distr. Europe, N. America. (R.P. Korf)

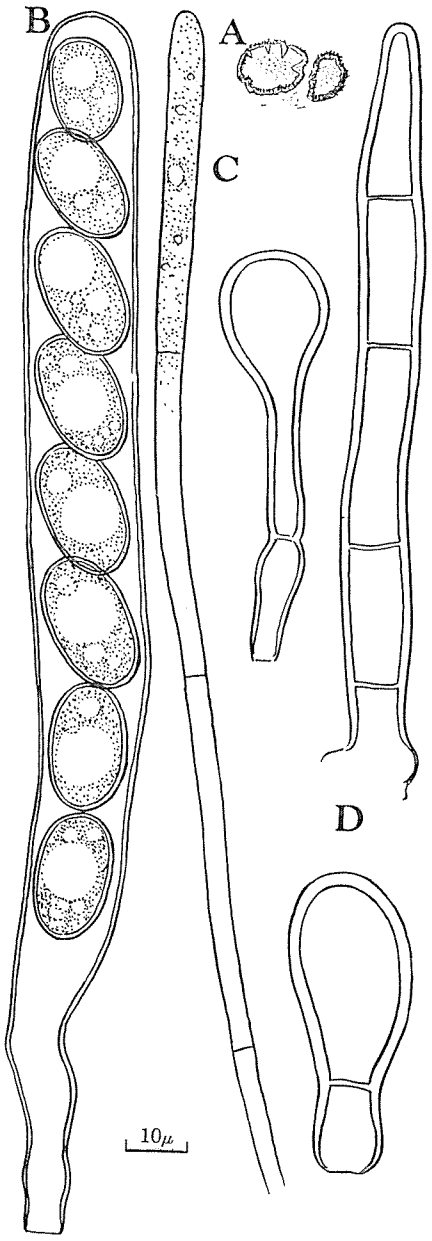

Fig. 24. *Sepultaria arenosa* Apothecia (×1), ascus, paraphysis & setae.

Ascobolaceae

56. ***Ascobolus doliiformis*** Y. Kobayasi sp. nov. (Text fig. 25 A-D)

Apothecia doliformia, sessilia 0.8–1 mm alta, 0.5–0.7 mm in diam., molliter carnosa vel multo gelatinosa, semipellucida, hyalina, externo furfuracea; disco plano vel convexo hyalino, ascis parum superantibus nigro-papillato, margine integro. Asci cylindrici 130–150×17–21 μ, operculati, J—, 8 spori. Ascosporae ellipsoideae vel oblongae, 19–

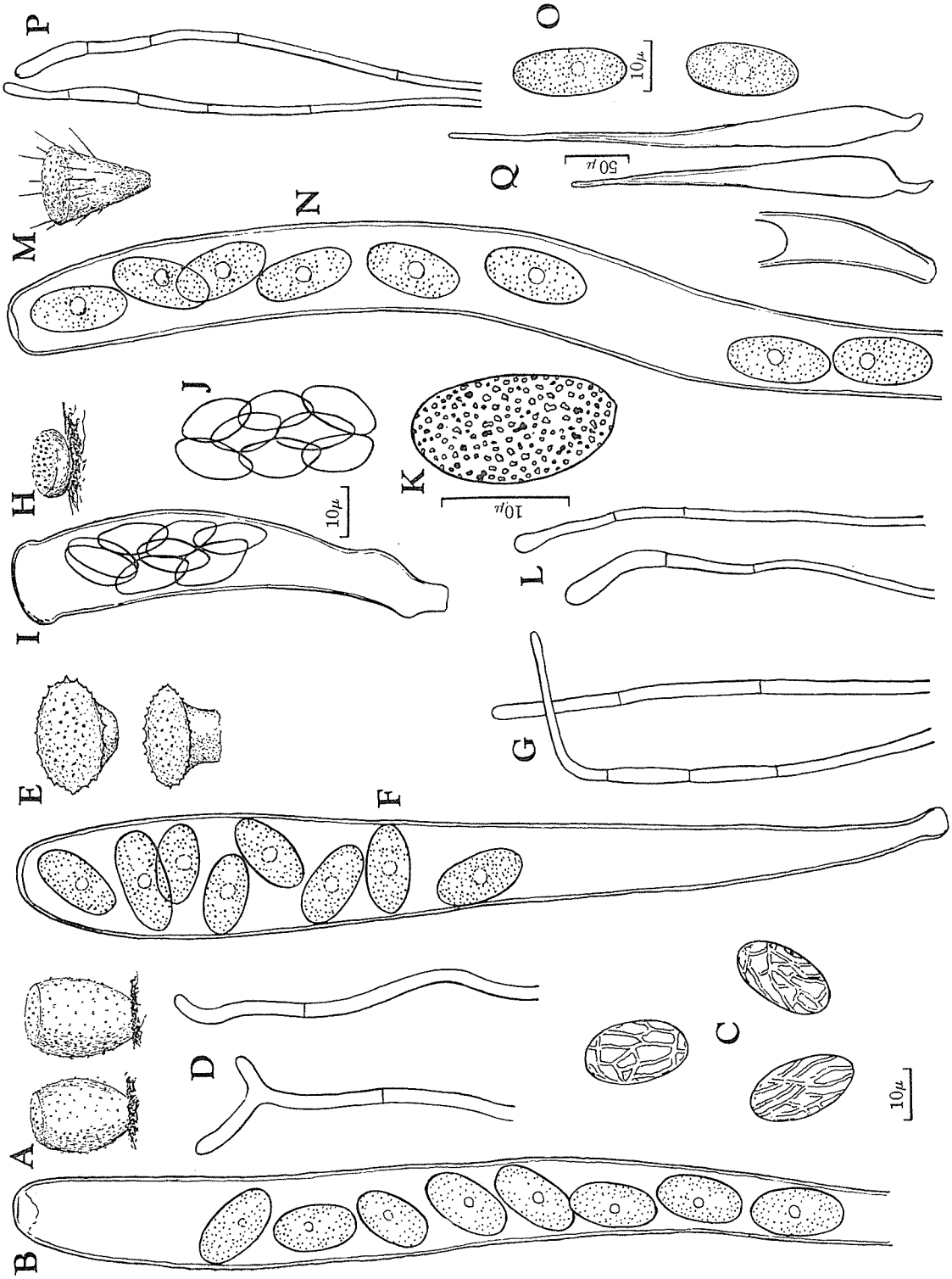

Fig. 25. A-D. *Ascobolus doliiformis* A. Apothecia (×13) B. Ascus C. Ascospores D. Paraphyses E-G. *Ascobolus stercorarius* E. Apothecia (×13) F. Ascus G. Paraphyses H-L. *Saccobolus* sp. H. Apothecium (×30) I. Ascus J. Ascospores K. Ascospore L. Paraphyses M-Q. *Lasiobolus ciliatus* M. Apothecium (×13) N. Ascus O. Ascospores P. Paraphyses Q. Setae.

22×9–11 μ, violaceo-purpurae, longitudinaliter ramosae vel anastomosim striatules. Paraphyses filiformes, simplices vel irregulariter furcatae, 2–3 μ crassae, septatae, hyalinae.

Apothecia barrel-shaped, 0.8–1 mm. high, 0.5–0.7 mm. diameter, soft fleshy or more gelatinous, semitranslucent, entirely white, outer surface sparsely furfuraceous, disc flat or convex, hyaline, dotted with black spore-masses, margin entire. Furfuraceous matters of outer surface composed of aggregation of bubble-like cells. Asci cylindric, 130–150×17–21 μ, operculate, J—, with 8 uniseriate ascospores. Spores ellipsoid or oblong, 19–22×9–11 μ, dark violet with homogeneous contents, ornamented with longitudinal, forked or occasionally anastomosing striations. Paraphyses filiform, simple or irregularly forked, 2–3 μ thick, septate, hyaline, not swollen at the tip.

Hab. Scattered on caribou dung (no. 4), L. Peters., collected on Aug. 19. (Specimen No. 104-Type preserved in Herb. Smithsonian Institution).

Material was placed in moist chambers on Oct. 20, left in room temperature (ca. 23°C) and mature apothecia were found on Oct. 27. (Y. Kobayasi)

57. ***Ascobolus stercorarius*** (Bulliard) Schröter.

Krypt. Fl. Schles. **3** (2): 56 (1893); Olive, in Mycologia **46**: 105 figs. 1, 2 (1954). (Plate 17 B; Text fig. 25 E-G)

Apothecia saucer-shaped, sessile or substipitate, 2 mm. high and wide, with flat disc, soft-fleshy or gelatinous, pale yellowish-green, outer surface almost smooth, downwards paler or almost white, clad with hyaline, hairy hyphae, margin pruinose. Asci clavate, 160–182×17–18 μ, J—. Spores oblong, 19–21×9–11 μ, smooth or faintly marked with several forked striations, purplish-brown, without oil drops. Paraphyses filiform, simple, 4 μ thick, septate, hyaline, not thickened at the tip.

Hab. On caribou dung (no. 2), L. Peters, Aug. 19. (Specimen No. 105)

Distr. Europe, N. America. (Y. Kobayasi)

58. ***Lasiobolus ciliatus*** (Schmidt ex Fr.) Boudier

Hist. Discom. Europe p. 78 (1907); Dennis, Brit. Cup fungi p. 40 pl. 8A (1960). (Text fig. 25 M-P)

Apothecia obconic, 0.6–1 mm. high, 0.3–0.5 mm. wide, disc flat, almost hyaline, rough, outer surface roughened, pale yellow or almost white, with 10–20 scattered setae, especially on the margin. Setae aculeate or obclavate, 200–380×20–25 μ, acute at the tip, non-septate, hyaline, changing to pale reddish-brown with J. Asci 210–240×19–21 μ, J—, with 8 uniseriate ascospores. Spores ellipsoid or oblong, smooth, 19–21×9–10.5 μ, hyaline or very slightly cinereous, without oil drops. Paraphyses simple or forked near the base, 2–5 μ thick, septate, hyaline, slightly thickened at the tip.

Hab. On caribou dung, L. Peters (no. 4) collected on Aug. 19, found on Nov. 8; Umiat (no. 7), collected on Aug. 13, found on Nov. 7. (Specimen No. 117)

Distr. Europe, N. America.

Compared with the fungi reported from temperate regions, the fruitbody of this arctic fungus is paler in color and higher. (Y. Kobayasi)

59. ***Saccobolus depauperatus*** (Berk. et Br.) E.C. Hansen

in Vidensk. Meddel. Soc. Hist. Nat. Copenhagen 1876, p. 66 and 292 (1877). Seaver, N. Am. Cup-fungi (Operc.) p. 95 (1928).

Syn. *Ascobolus depauperatus* Berk. et Br., in Ann. Mag. Nat. Hist. ser. 3, **15**; 448 (1865). (Text fig. 26 A-D)

Apothecia discoid or irregularly globose by fusing to each other, up to 1.7 mm. diameter, 1.2 mm. high, gelatinous-fleshy, pale ochraceous, then darker with black minute dots of spore-masses. Asci clavate with long stalk, 190–200×15–17 μ, truncate

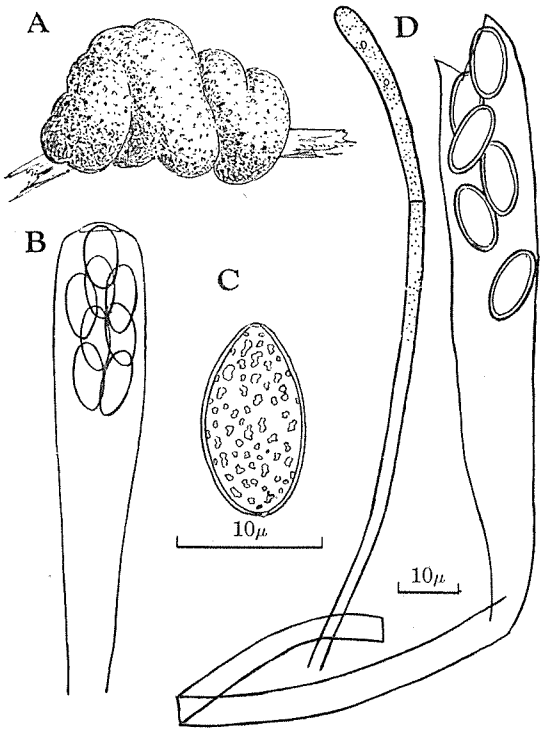

Fig. 26. *Saccobolus depauperatus* A. Fruit-bodies (×17) B. Ascus C. Asco-spores D. Paraphysis

at the tip, entire young asci turning to pale blue by J, containing 8 ascospores conglomerated into one. Spores broad fusiform or oblong, 10–11×5–6 μ, purplish-brown, surface irregularly and minutely wrinkled or warted, with a thin, gelatinous covering. Paraphyses simple or forked, septate, 2.5 μ thick, slightly protruding and enlarged above, 4 μ thick, pale ochraceous.

Hab. On moose dung (no. 6), collected on Aug. 19, grown on Nov. 6. (Specimen No. 113)

Distr. Europe, N. America.

"Collection "Kobayasi No. 113" contains a fragment of a number of coalesced apothecia of a *Saccobolus*-species. In *Saccobolus,* apothecia sometimes aggregate to form

larger units and even rather homogeneous crusts. This often occurs in a very early stage of development, and at maturity it is then impossible to distinguish smaller units. The name of the species is *Saccobolus depauperatus* (Berk. et Broome) E.C. Hansen. Characteristic are the size and form of the ascospores, the arrangement of the spores in the sporeclusters and the pigment-layer surrounding the ascospores, which may be smooth or finely perforated. The length of the asci in this collection (100–150 μ) is at the long side of the scale, but it is not a good specific character in this group. Especially in *Saccobolus depauperatus* the marginal asci of a disk may be considerable longer than the central ones, which can be declared from the development of the fruitbody in this species". (J. van Brummelen)

60. ***Saccobolus*** sp. (Text fig. 25 H-L)

Apothecia minute, discoid, 300–400 μ diameter, almost white, gelatinous-fleshy, disc flat or convex, dotted with blackish spore-masses. Asci very short, clavate, broadly truncate or convex 75–95 $\times$ 16–26 μ with 8 conglomerate ascospores. Spores broadly fusiform, biseriate at first, then conglomerated, minutely and densely granulated, 15–16 $\times$ 7–8 μ, dark brown. Paraphyses simple, septate 3 μ thick, thickened toward the tip, up to 4.5 μ thick, hyaline.

Hab. On moose dung (no. 10), Umiat, collected on Aug. 11. (Specimen No. 116)

Although there are several slight differences compared with *Saccobolus depauperatus*, this may be included at least in the group near *S. depauperatus*. (Y. Kobayasi)

61. ***Thelebolus crustaceus*** (Fuckel) Kimbrough comb. nov.

Syn. *Ascobolus crustaceus* Fuckel, in Hedwigia **5**: 4 (1866).
Streptotheca obscura Seaver, N. Amer. Cup-Fungi (Op.) p. 143 (1928).

(Plate 17 A)

Colony composed of hyaline, submerged mycelium, more or less restricted, with scarce aerial mycelium, white to pale pinkish brown. Apothecia developed within two weeks at 20°C, minute, hardly visible to naked eye, scattered or gregarious, globose to subglobose becoming discoid on expansion, externally glabrous, 100–130 μ in diam., hyaline to pale yellowish brown. Peridium composed of two layers of short-celled, thick walled hyphae, yellowish brown, whole wall 6–8 μ thick. Asci broad-clavate, not blued by iodine, 64-spored or more, stipitate below, constricted 6–10 μ below apex marking position of ring or collar, arising in parallel fashion from base of apothecium, 30–90 μ in length (usually 40–60 μ) and 20–25 μ at widest dimension, hyaline; ascus wall stained reddish below constriction by Congo-Red. Ascospores ellipsoid, smooth-walled, 6.5–7.0 (—8.0) $\times$ 2.5–3.0 μ, hyaline. Paraphyses slender, septate, 2.0–2.5 μ in diam.

Optimum temperature for the growth is 20–24°C; growth occurs even at 5°C. Growth is best on V-8 agar medium (18%), and on malt agar growth is equal to that on the potato agar, while on the horse-dung agar growth is much reduced; apothecia developed on sterilized rabbit-dung in abundance.

Three strains were isolated from the dead leaves and the tundra of South Meadow Lake (701–1, 703–2) and also from the scum-sample of North Meadow Lake (901–2).

By courtesy of Dr. C.T. Rogerson, New York Botanical Garden, Tubaki had an opportunity to examine the type specimen of *Streptotheca obscura* Seaver and no visible difference was found. His fungus also agreed with the specimen TRTC. 39420 of *S. obscura*, kindly offered from Dr. R.F. Cain, University of Toronto. The type and succeeding collection were made from dung, while the present three strains were isolated by the dilution method from the dead leaves, the tundra soil and from the scum.

(Korf, Kimbrough & Tubaki).

62. ***Thelebolus microsporus*** (Berk. et Br.) Kimbrough comb. nov.

Syn. *Ascobolus microsporus* Berk. et Br., in Ann. Mag. Nat. Hist. ser. 3, **15**: 449 (1865).

Ascophanus microsporus (Berk. et Br.) Phill. Brit. Discom. p. 307 (1887); Seaver, N. Amer. Cup Fungi (Operc.) p. 120 pl. 11 fig. 9 (1928); Dennis, Brit. Cup Fungi p. 42 pl. 8G (1960). (Text fig. 27 A-E)

Apothecia minute, discoid, like convex-plane lens, 150–250 μ diameter, disc pale gray, fimbriated with dark brown minute scales, underside flat. Ectal excipulum pseudoparenchymatous, dark olive-brown. Asci clavate 35–42 × 8–10 μ, J—, with very faint ring (in congo red). Spores obliquely biseriate, ellipsoid, smooth, 6.8–8.2 × 3.5–4.0 μ, hyaline, with homogeneous contents. Paraphyses septate, irregularly swollen at the tip, almost hyaline.

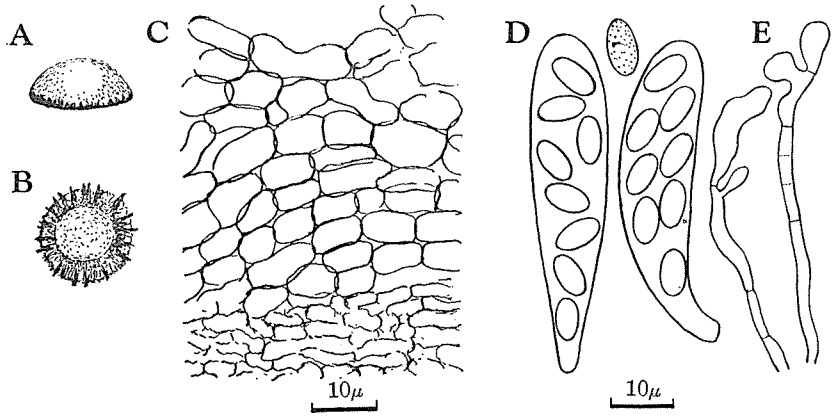

Fig. 27. *Thelebolus microsporus* A. Apothecia (×66) B. Apothecium seen from under side C. Outer exipular cells D. Asci and ascospore E. Paraphyses.

Hab. Gregarious on caribou dung (no. 7), collected on Aug. 13, found apothecia on Nov. 8, Umiat. (Specimen No. 115)

"After examining the arctic disco collected by Dr. Kobayasi, I am convinced that it is a 8-spored *Thelebolus*. An olive-brown excipulum is common for the group, and not found in *Coprotus*. The formalin treatment also made the congo red reaction hard

to distinguish. However, in several asci there were the faint apical rings with hyaline tips. Most young asci have the peculiar thickened wall typical of *Thelebolus* spp. Also, the small, relatively thick-walled ascospores without deBary bubbles are unlike *Coprotus*. Having examined most of the NYBG collections of *Ascophanus*, I feel now that there are good 8-spored species of *Thelebolus*. Most are angiocarpic early, but asci are exposed later and the paraphyses are usually swollen and pigmented; sometimes appearing as a brownish epithecium. This appears the case in the Kobayasi collection. In most every respect this is the same as some NYBG specimens labelled *Ascophanus microsporus* (Berk. et Br.) Phill. It differs from *A. subfuscus* in a number of features. But whether *A. microsporus, A. minutissimus*, and *A. cesatii* should by synonymized is another question. In any case, "microsporus" will be the earliest name, thus leaving *Thelebolus microsporus* (Berk. et Br.) comb. nov." (J.W. Kimbrough)

Sclerotiniaceae

63. ***Myriosclerotinia sulcata*** (Whetz.) Buchwald

Friesia **3**: 301 (1947).

Syn. *Sclerotinia sulcata* Whetzel, in Mycologia **21**: 15 (1929); Dennis, Brit. Cup Fungi p. 61 pl. 11D (1960). (Text fig. 28 A-E)

Fructifications arising from minute, black, tuberoid sclerotia, stalked, wholly dark brown. Apothecia cup-shaped, 7–15 mm. diameter, outer surface roughened. Stalk more or less firm, 5–10 mm. long. Asci with 8 uniseriate ascospores, 160–170×13–14 μ, opening by a pore at the tip, J+ (in dried specimen), J− (in formalin). Spores oblong, smooth, 14–18×6–7 μ, hyaline with two oil drops. Paraphyses simple, septate, 2 μ broad, and thickened above, 3–3.5 μ broad, containing dark brown pigments.

Hab. Gregarious among *Carex* sp. in wet tundra, Aug. 6, Barrow. (Specimen No. 11)

Distr. Europe (Denmark), N. America. (R.P. Korf)

Helotiaceae

64. ***Calycella citrina*** (Hedw. ex Fr.) Boudier

Bull. Soc. Mycol. Fr. **1**: 112 (1885); Dennis, Rev. Brit. Helotiaceae, p. 42 fig. 35 (1956) et Brit. Cup Fungi p. 74 pl. 13 A (1960).

Syn. *Peziza citrina* Hedw. ex Fr. Syst. Myc. **1**: 131 (1822). (Text fig. 28 P-S)

Apothecia cup-shaped with obconic base, short-stipitate, 0.6–2 mm. diameter, disc slightly concave, pale yellow, drying deep or orange yellow, outer surface smooth, concolorous. Asci cylindric with long stalk, 120–130×6–7 μ, J−, with 8 uniseriate ascospores. Spores oblong or fusiform, smooth , 10–11×4 μ, 1-septate, hyaline. Paraphyses simple or forked at base, filiform, very slender, ca 1.5 μ thick, slightly thickened toward the tip, yellow-coloured.

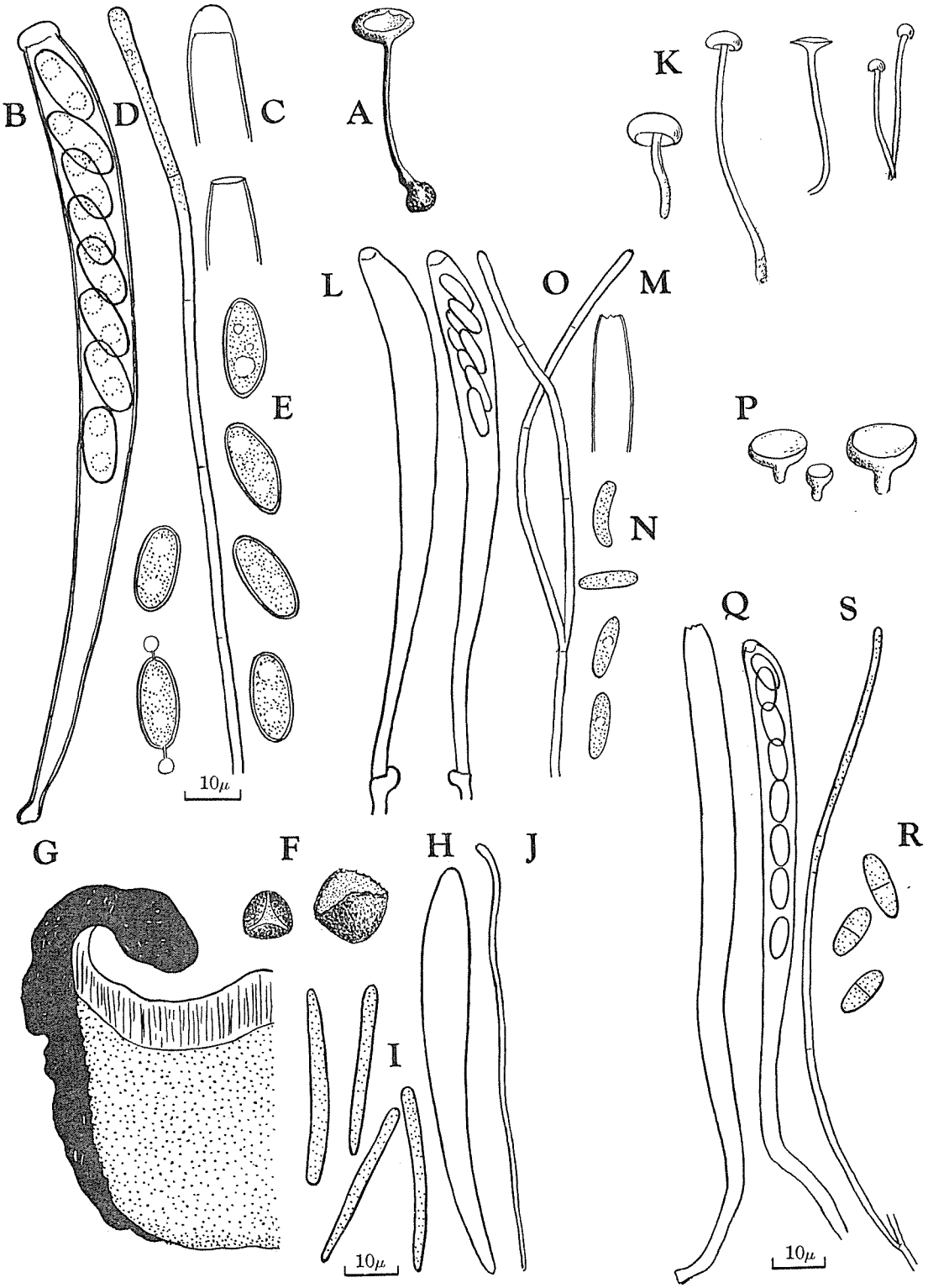

Fig. 28. A-E. *Myriosclerotinia sulcata* A. Fruitbody (×2) B. Ascus C. Apical point of asci D. Paraphysis E. Ascospores F-J. "*Cenangium arcticum*" F. Apothecia (×6.6) G. Section of apothecia H. Ascus I. Ascospores J. Paraphysis K-O. *Cudoniella stagnalis* K. Fruitbodies L. Asci M. Apical part of ascus N. Ascospores O. Paraphysis P-S. *Calycella citrina* P. Apothecia (×5) Q. Asci R. Ascospores S. Paraphysis.

Hab. Gregarious on decorticated dead branch of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 45)

Distr. Europe. (R.P. Korf)

65. ***"Cenangium" arcticum*** (Ehrenb.) ex Fr.

Syst. Myc. **2**: 186 (1822); Sacc. Syll. Fung. **8**: 573 (1889).

Syn. *Tryblidiopsis arcticum* Ehrenb. Fung. Chamisso no. 33 pl. 20 fig. 17 (1820).

(Text fig. 28 F-J)

Apothecia cup-shaped, sessile, 1–1.5 (–2) mm. diameter, margin finely denticulate and granulate, after maturity incurved as three obtuse flaps: flesh thick, pale grayish, hymenium concave or almost flat, pale grayish white or almost white, outer surface black, not glossy, finely granulate. Ectal excipulum pseudoparenchymatous, grayish, composed of 6.5–13 μ wide globose cells. Asci fusiform with long base, 75–80 $\times$ 9–10 μ. Spores cylindric, attenuated toward the base, with obtuse ends, 30–33 $\times$ 2–2.5 μ, continuous, hyaline. Paraphyses filiform, simple, ca 1.5 μ thick, non septate, hyaline, not enlarged at the tip.

Hab. Scattered on stem of *Cassiope tetragona* (L.) D. Don, C. Thompson, Aug. 16. (Specimen No. 136)

Distr. St. Lawrence Isl. (Type Loc.) in Bering Sea, Lappland.

So far as the up-to-date definition of the genus *Cenangium* is concerned, the members of *Cenangium* are confined only to conifers. Accordingly the present species should be transferred to a genus of Encoelioideae of the Helotiaceae. (Y. Kobayasi)

66. ***Cudoniella stagnalis*** (Quél.) Sacc.

Syll. Fung. **8**: 42 (1889); Rehm, in Rabenh. Krypt. Fl. ed. 2, **1** (3): 1168 (1895).

Syn. *Cudonia stagnalis* Quél., in Assoc. Fr. Avance Sci. Congr. de Rouen 12 suppl. p. 13 pl. 7 fig. 10 (1883). (Text fig. 28 K-O)

Apothecia hemispherical or discoid, 4–7 mm. across, with long stalk, disc convex with strongly recurved margin or almost flat with straight margin, smooth, yellowish gray, outer surface concolorous, smooth. Stalks cylindric, curved, 10–50 mm. long, 1–1.5 mm thick, upper part pale yellowish, ochraceous toward the base, slightly thickened, hairy. Asci long clavate, attenuated toward the apex, 100–120 $\times$ 6.5–8 μ, inoperculate, slightly curved at the apex, with croziers at base, J+ (faintly), containing 8 uniseriate or aggregated spores. Spores oblong, frequently curved, 10–12 $\times$ 4 μ, continuous hyaline, contents amorphous or 1–2 guttulate. Paraphyses filiform, simple or forked 2 μ thick, septate.

Hab. Growing on plant debris submerged in very cold (2°C) spring water of stream, wholly immersed or with only upper part above water, L. Peters, Aug. 19. (Specimen No. 75)

Distr. Europe (France).

According to original description, based on fungi collected in Alsace, France, the stalks were much shorter (10–15 mm.). D.H. Linder has reported two new species,

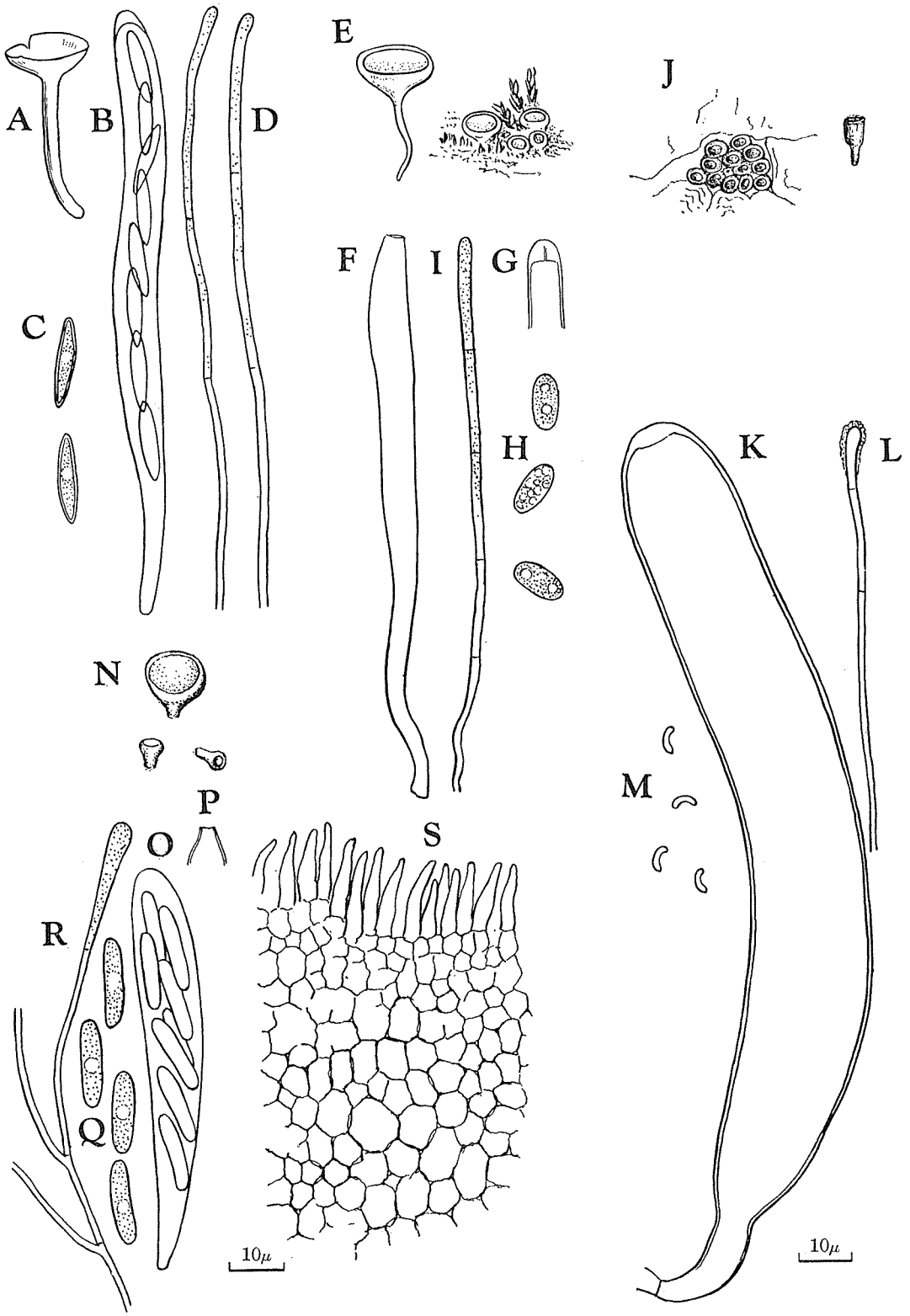

Fig. 29. A-D. *Hymenoscyphus conscriptus* (×2) A. Fruitbody B. Ascus C. Ascospores D. Paraphyses E-I. *Hymenoscyphus* sp. E. Habit and a fruitbody (×2) F. Ascus G. Apical point of ascus H. Ascospores I. Paraphysis J-M. *Tympanis alnea* J. Fruit-bodies (×6) K. Ascus L Paraphysis M. Secondary ascospores N-S. *Calycellina* sp. N. Apothecia (×27) O. Ascus P. Apical part of ascus Q. Ascospores R. Paraphysis S. Section of peripheral layer of apothecium.

C. borealis and *C. muscorum*, from the Canadian Eastern Arctic, both of which are provided with septate ascospores. (Y. Kobayasi)

67. ***Hymenoscyphus conscriptus*** (Karst.) Korf, comb. nov.

Syn. *Peziza conscripta* Karst., Fungi Fenn. Exs. fasc. VII No. 638 (1867) et in Not. Sallsk Faun. Flor. fenn. **10**: 134 (1869).

Helotium conscriptum (Karst.) Karst. in l.c. **11**:236 (1871).

Helotium calyculus (Sow. ex Fr.) Fr. Summa Veg. Scand. p. 355 (1849) sensu Dennis, pro parte, Rev. Brit. Helotiaceae p. 84 fig. 75B (1956). (Text fig. 29 A-D)

Apothecia cup-shaped, stipitate, 5 mm. diameter, with more or less incurved margin, hymenium pale cream-coloured, outer surface almost white, floccose, sparsely provided with minute brown hairs. Stalks cylindric, 5 mm. long, white, floccose with minute hyaline hyphae. Asci long, attenuated toward the base, 130–145×6.5–8 μ, inoperculate, J—, containing uni- or biseriate ascospores. Spores fusiform, slightly inaequilateral, non septate, 15.5–18×4–4.5 μ, hyaline. Paraphyses very slender, filiform, ca 1.5 μ thick, simple, septate, slightly thickened toward the tip, 2–3 μ thick, pale cream-coloured.

Hab. Solitary on dead branch of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 43, 93)

Distr. Europe. (R.P. Korf)

68. ***Hymenoscyphus*** sp. (Plate 11 D; Text fig. 29 E-I)

Apothecia cup-shaped with long stalk, 3–5 mm. across, margin thick, more or less farinaceous, disc concave, pale purplish-brown, externally concolorous or ochraceous, becoming paler when dried. Stalk cylindric, thinner toward the base, 400–700 μ thick, almost smooth. Asci inoperculate, 100–110×6–7 μ, J— (faintly blue), with 8 uniseriate spores. Spores oblong, 10–11×5–5.5 μ, hyaline, smooth, with two small oil drops. Paraphyses simple, septate, 1.5–2 μ thick, apically not enlarged.

Hab. Growing gregariously among mosses with wholly buried long stalk, Barrow, Aug. 7. (Specimen No. 17) (Y. Kobayasi)

69. ***Tympanis alnea*** (Pers. ex Fr.) Fr.

Syst. Myc. **2**: 174 (1822): Groves, in Canad. J. Bot. **30**: 611 (1952).

Syn. *Peziza alnea* Pers. Syn. p. 673 (1801). (Text fig. 29 J-M)

Apothecia cup-shaped, stipitate, 0.5 mm. across, 1 mm. high, gelatinous-fleshy, dark bluish gray or almost black, disc flat. Asci thick cylindric with obtuse tip and short, slender stalk, 170–230×19–26 μ, containing eight spherical primary ascospores which are replaced by innumerable secondary spores. Sec. spores minute, allantoid, smooth, 4–5×1.5 μ, hyaline. Paraphyses slender filiform, simple, ca 1.5 μ thick, septate, terminal cell thickened, incrusted with pale olivaceous brown materials.

Hab. Compactly gregarious, emerging from bark crevices of dead branches of *Alnus cripa*, Umiat, Aug. 13. (Specimen No. 164)

Distr. Europe, N. America, Philds Glacier of Alaska. (R.P. Korf)

Hyaloscyphaceae

70. ***Calycellina*** sp. (Text fig. 29 N-S)

Apothecia cup-shaped, short stipitate, 100–300 μ across, pale ochraceous or almost white, disc concave, outer surface smooth. Ectal excipulum pseudoparenchymatous, pale brown, surface layer composed of obclavate cells. Asci clavate 100–120 × 7–10 μ with croziers, opening by a pore, J—, with 8 uni- or biseriate ascospores. Spores fusoid, 19–20 × 3–4 μ, continuous, smooth, hyaline with one oil drop. Paraphyses branched, 2–3 μ thick, septate, slightly thickened at the apex, 4–4.5 μ thick, hyaline.

Hab. Scattered on decaying leaves of grass, submerged in pond of wet tundra, Barrow, Aug. 6. (Specimen No. 101) (R.P. Korf)

Orbiliaceae

71. ***Orbilia coccinella*** (Sommerf.) Fr.

Summa Veg. Scand. p. 357 (1849); Sacc. Syll. Fung **8**: 628 (1889); Rehm, in Rabenh. Krypt. Fl. **1**(3): 1261 (1896).

Syn. *Peziza coccinella* Sommerf. Lapp. p. 276 (1826).

Calloria coccinella (Sommerf.) Phil. Brit. Disc. p. 328 (1893). (Text fig. 30 A-D)

Apothecia minute, saucer or dish-shaped, 100–200 μ across, disc concave, outer surface smooth, wholly "light coral red". Hypothecium slightly rosy yellow. Asci clavate-cylindric, 40–45 × 3–4 μ, J—, containing eight uniseriate ascospores. Spores ellipsoid, ca 4 × 2 μ, smooth, hyaline, with granular contents. Paraphyses simple, 1–1.5 μ thick, septate, irregularly enlarged at the tip, almost hyaline.

Hab. Scattered on decorticated branch of *Salix alaxensis*, L. Peters, Aug. 19. (Specimen No. 163) (R.P. Korf)

72. ***Orbilia*** sp. (Text fig. 30 E-H)

Apothecia minute, saucer-shaped, 300–500 μ across, soft fleshy, purplish red, outer surface smooth. Asci clavate cylindric, 40–45 × 2.5–3 μ, J—. Spores ellipsoid, smooth, ca 2 × 1 μ, continuous, hyaline. Paraphyses branched at base, 1–1.5 μ thick, septate, pale rosy.

Hab. Gregarious on branches of *Salix alaxensis*, L. Peters, Aug. 19. (Specimen No. 85) (R.P. Korf)

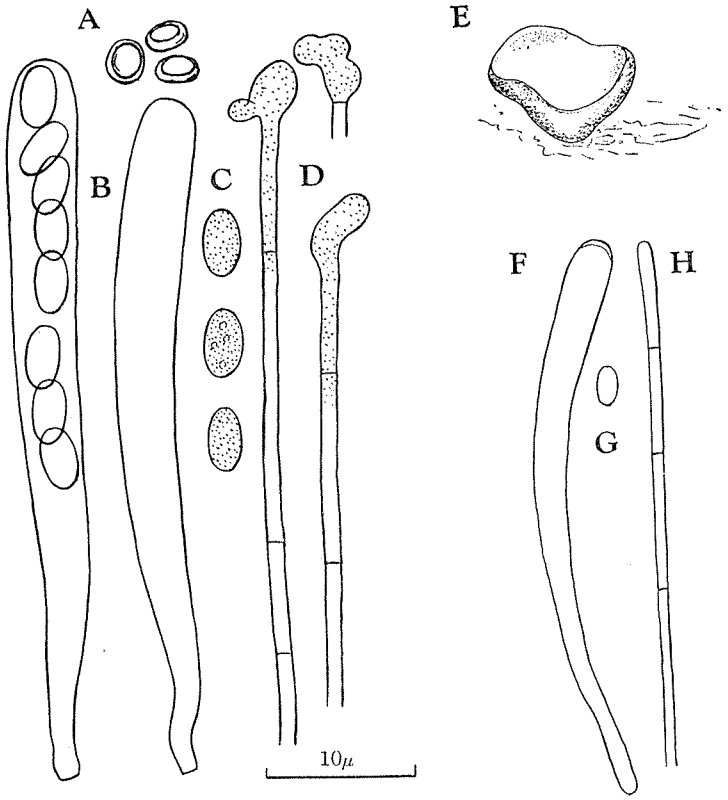

Fig. 30. A-D. *Orbilia coccinella* A. Apothecia (×20) B. Asci C. Ascospores D. Paraphyses E-H. *Orbilia* sp. E. Apothecium (×17) F. Ascus G. Ascospore H. Paraphysis.

Dermateaceae

73. ***Hysteropezizella*** sp. (Text fig. 31 A-D)

Apothecia cup-shaped, circular or somewhat elliptic in outline, attached to substratum with broad base, 100–300 μ across, disc flat or slightly concave. Ectal excipulum grayish brown, composed of dark coloured textura angularis, marginal part composed of fine, lanceolate, hair-like, 2.5–3 μ thick, brown hyphae. Asci clavate, curved, with short stalk, 60–68×10–12 μ, pore J+ (faintly) with eight uni- or biseriate ascospores. Spores oblong, one end frequently narrower, sometimes slightly curved, continuous, hyaline, with two oil drops, 14–16×4–5 μ. Paraphyses simple or forked at lower part, 1–2-septate, hyaline, 2 μ thick, terminally lanceolate, 3–4 μ thick, slightly exceeding asci.

Hab. Growing gregariously under epidermal layer of dead leaves of *Alopeculus alpinus* L., Barrow, Aug. 7. (Specimen No. 148) (R.P. Korf)

74. ***Mollisia*** sp. (Text fig. 32 A-E)

Apothecia minute, discoid, sessile, attached to substratum with broad base, 200–

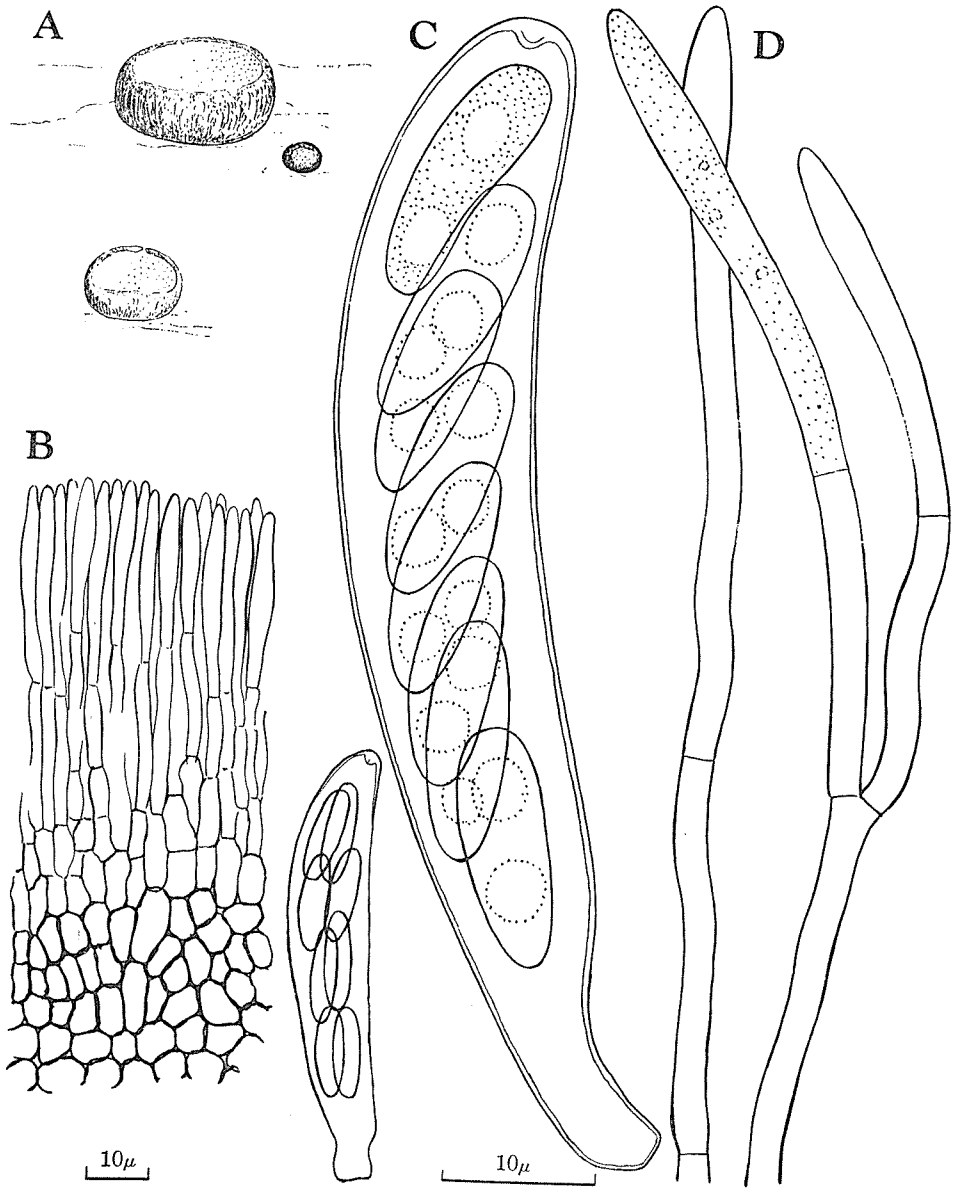

Fig. 31. *Hysteropezizella* sp. A. Apothecia (×90) B. Section of peripheral layer of apothecium C. Asci D. Paraphyses.

800 μ across, disc flat or convex, white, outer surface pale brown, almost smooth, margin minutely fimbriate. Ectal excipulum pale brown, composed of textura angularis, margin of palisade-like clavate cells. Asci cylindric with short slender stalks, 100–120×7–10 μ, arising from croziers, with 8 irregularly biseriate ascospores, J—. Spores fusiform, slightly curved with pointed ends, 19–20×3–4 μ, smooth, hyaline. Paraphyses slender, branched at base or at middle part, 2–3 μ thick, septate, apically clavate, 4–4.5 μ thick, hyaline.

Hab. Aquatic. Scattered on decaying leaves of grass submerged in pond of wet

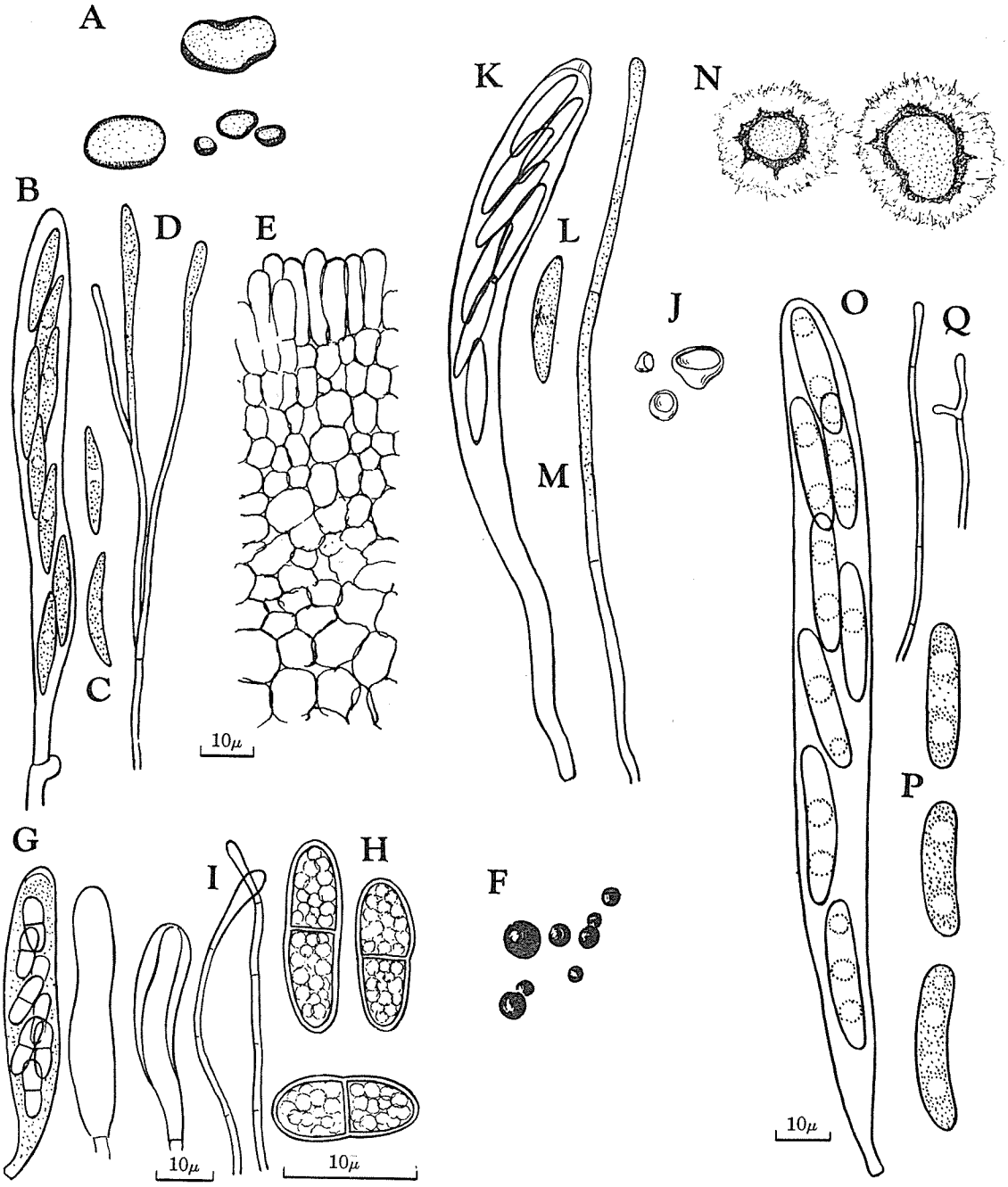

Fig. 32. A-E. *Mollisia* sp. A. Apothecia (×15) B. Apothecium C. Ascospores D. Paraphysis E. Peripheral layer of apothecium F-I. *Karschia lignyota* F. Apothecia (×3.3) G. Asci H. Ascospores I. Paraphyses J-M. *Tapesia* sp. J. Apothecia (×10) K. Ascus L. Ascospores M. Paraphysis N-Q. *Propolis versicolor* N. Apothecia (×10) O. Ascus P. Ascospores Q. Paraphyses.

tundra, eastern part of Barrow Eskimo Village, Aug. 6. (Specimen No. 100, 13′) (R.P. Korf)

75. ***Propolis versicolor*** (Fr.) Fr., Summa Veg. Scand. p. 372 (1849); Dennis, Brit. Cup Fungi p. 122 pl. 23E (1960).

Syn. *Propolis faginea* (Schrad.) Rehm, in Rabenh. Krypt. Fl. **1**(3): 149 (1888). (Text fig. 32 N-Q)

Apothecia immersed in host tissue, surrounded by elevated torn margin of tissue and again by white tomentose mycelial mat. Disk flat, orbicular or slightly elongated, 0.5–1.8 mm., gray, pruinose. Asci cylindric with obtuse tips and short, slender stalks, 130–155×12–14 μ, with 8 uni- and partially biseriate ascospores, J—. Spores allantoid, smooth, 25–35×5–6.5 μ, hyaline, with two oil drops. Paraphyses very slender, ca 1 μ thick, simple or branched, spetate, slightly thickened at the tip, 1.5 μ thick, hyaline.

Hab. Gregarious on decorticated trunk of *Salix alaxensis*, L. Peters, Aug. 19. (Specimen No. 166)

Distr. Europe, N. America. (R.P. Korf)

76. ***Tapesia*** sp. (Text fig. 32 J-M)

Apothecia cup-shaped, 300–800μ diameter, subiculum wholly white, margin entire, outer surface smooth. Asci clavate with long stalks, 130–145×9–10.5 μ, inoperculate, curved, J—. Spores fusiform, inaequilateral, 20–21×4–5.5 μ, with a coarse surface, hyaline. Paraphyses simple, 1.5–2 μ thick, septate, hyaline, apically not enlarged.

Hab. Gregarious on bark of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 50) (R.P. Korf)

"So far I investigated your No. 50 which you found on the host *Salix*. After my opinion this is *Pyrenopeziza caesia* (Fuck.) Gremmen, which is a rather common fungus on this plant." (J. Gremmen)

Patellariaceae

77. ***Karschia lignyota*** (Fr.) Sacc.

Syll. Fung. **8**: 779 (1889); Nannf. Morph. Syst. Disco. p. 323 pl. 20 fig. 2 (1932); Dennis, Brit. Cup Fungi p. 141 fig. 11C (1960).

Syn. *Patellaria lignyota* Fr. Syst. Myc. **2**: 150 (1922). (Text fig. 32 F-I)

Apothecia superficial, sessile, thin cup-shaped or disk-like, convex, 0.5–1.3 mm. across, dark brown or almost black. Asci 50–60×6–7–12 μ, with upwardly incrassate wall, J+, with eight, uni- or biseriate ascospores. Spores elliptic-clavate, 1-septate, upper cell slightly wider than the other, 11–14×4–4.5 μ, brown, contents granular. Paraphyses simple, septate, 2 μ thick, dark brown at the end, forming an epithecium, slightly enlarged at the tip, 3 μ thick.

Hab. Scattered on decorticated trunk of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 49)

Distr. Europe, Boreal America. (R.P. Korf)

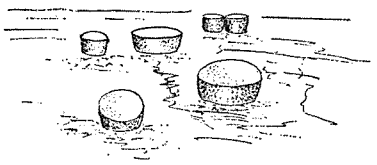

Fig. 33A. *Vibrissea sporogyra* Habit (×12).

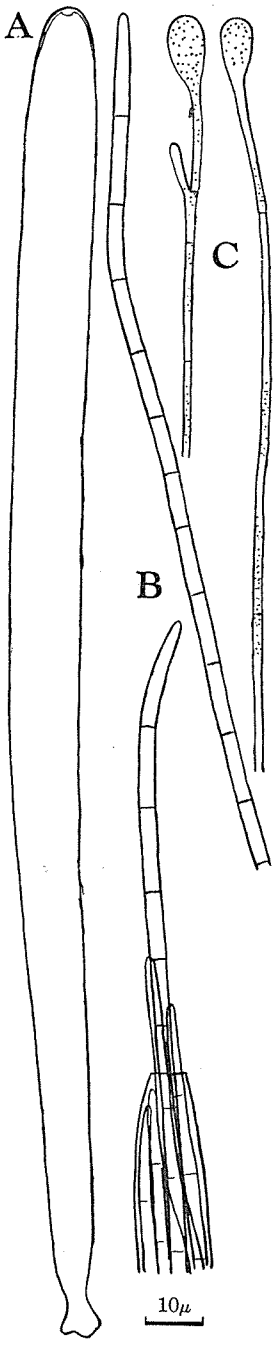

Fig. 33B. *Vibrissea sporogyra* A. Ascus B. Apical part of ascus and ascospores C. Paraphyses.

Ostropaceae

78. ***Vibrissea sporogyra*** (Ingold) Sánchez, in Sánchez et Korf, Mycologia **58**(5): 734 (1966).

Syn. *Apostemidium sporogyrum* Ingold, in Trans. Brit. Myc. Soc. **37** (1): 13, fig. 14 (1954). (Text fig. 33 A,B)

Apothecia discoid, with almost vertical lateral wall, sessile, attached to substratum with broad base, 400–800 μ thick, soft fleshy; disc flat or slightly convex, outer surface dark gray, smooth. Asci long clavate, 230–240×11–12 μ, inoperculate, J+, containing eight spirally twisted spores. Spores filiform, 190–200× 3–3.5 (–4) μ, with attenuated terminal cells, hyaline, with 13–15 septa at intervals of 13–15 μ. Paraphyses simple, rarely forked near the apex, 1.5 μ thick, septate, hyaline, capitate at the apex, 5–8 μ thick.

Hab. Aquatic. Gregarious on the dead culms of grass submerged in pond of wet tundra, Eastern part of Barrow Village, Aug. 6. (Specimen No. 13)

Distr. England. (R.P. Korf)

Dacrymycetaceae

79. ***Dacrymyces deliquescens*** (Mérat) Duby Bot. Gall. **2**: 729 (1830); Y. Kobayasi, in Sc. Rep. Tokyo Bunrika Daigaku no. 70: 114 fig. 3 A, pl. 9 E, pl. 11 F (1939). (Plate 8 A)

Conidial fructifications gregarious, pulvinate, pale citron-yellow, growing to orange to reddish when dried, smooth, frequently anastomosing, 1.2–3 mm in diameter; conidia catenate, cylindric, commonly 2 celled, pale yellowish, 6–14×3.5–5 μ.

Basidial fructifications pulvinate, 5–10 mm in diameter, cerebriform, pale citron-yellow; basidiospore allantoid, pale yellow, 3-septate, 13–14×5–5.5 μ.

Hab. On coniferous drift timber at seashore, C. Thompson, Aug. 16. On log of abandoned Eskimo hut. (Specimen No. 42)

Distr. Cosmopolite (Y. Kobayasi)

80. ***Dacrymyces ellisii*** Coker

Journ. Mitchell Soc. **35**: 167 (1920); Martin, in St. Nat. Hist. Univ. Iowa **19** (3): 32 fig. 8 (1952).

Syn. *Dacrymyces harperi* Bres., in Ann. Mycol. **18**: 53 (1920).

(Plate 3 E; Text fig. 34 A-C)

Fructifications erumpent breaking bark of host, pulvinate to cerebriform, 3–8 mm in diameter, tough gelatinous at first, then pellucid, orange yellow, glossy, internal hyphae loosely woven, 2.5–3 μ thick, with clamp connections. Basidia 25–30 μ long, 3–3.5 μ thick; epibasidia 5–18 μ long, yellowish. Basidiospores allantoid, 1–3 septate, apiculate, 10–12×4–5 μ, pale yellow.

Hab. Scattered on twigs of *Alnus crispa*, Umiat, Aug. 13. (Specimen No. 24)

Distr. N. America, Columbia, Europe. (Y. Kobayasi)

Tremellaceae

81. ***Exidia glandulosa*** Fr.

Syst. Myc. **2**: 224 (1822); Neuhoff, Pilze Mitteleurop. **2**: 32 pl. 5 fig. 3–16 (1936); Martin, Revision N. Cent. Trem. p. 82 (1952). (Plate 3 C)

Fructifications tuberculate, thick, 5–10 mm in diameter, often spreading and effused attaining 30 mm in dimension, dark brown or almost pitch black, glistening, cerebriform, almost glabrous or with scattered low papillae. Basidia 10–11 μ in diameter. Basidiospores allantoid, 11–12×4 μ.

Hab. Gregarious on branches of *Salix alaxensis*, Umiat, Aug. 13, L. Peters, Aug. 19. (Specimen No. 33)

Distr. Throughout the temperate regions.

In Arctic Alaska, Llano has already collected this in Anaktuvuk Pass. No report is from Greenland and Iceland. I collected this in Abisco of Lappland in Aug. 1966. (Y. Kobayasi)

82. ***Sebacina arctica*** Y. Kobayasi sp. nov. (Text fig. 34 D-G)

Fructificationes effusae, margine determinatae, ceraceo-gelatinosae, hyalinae, 0.5–1 mm. crassae, superficie plus minusve pruinosae, nec cystidia nec gloeocystidia. Hyphae irregulariter contextae, 1.5–2.5 μ crassae, tenuiparietales, "clamp." formantes.

Basidia ovoidea, cruciatim septata, 13.5–18×9–11 μ, epibasidiis 25–33 μ longis interdum longioribus, 2.5 μ crassis. Basidoisporae allantoideae 13.5–14×5–5.5 μ,

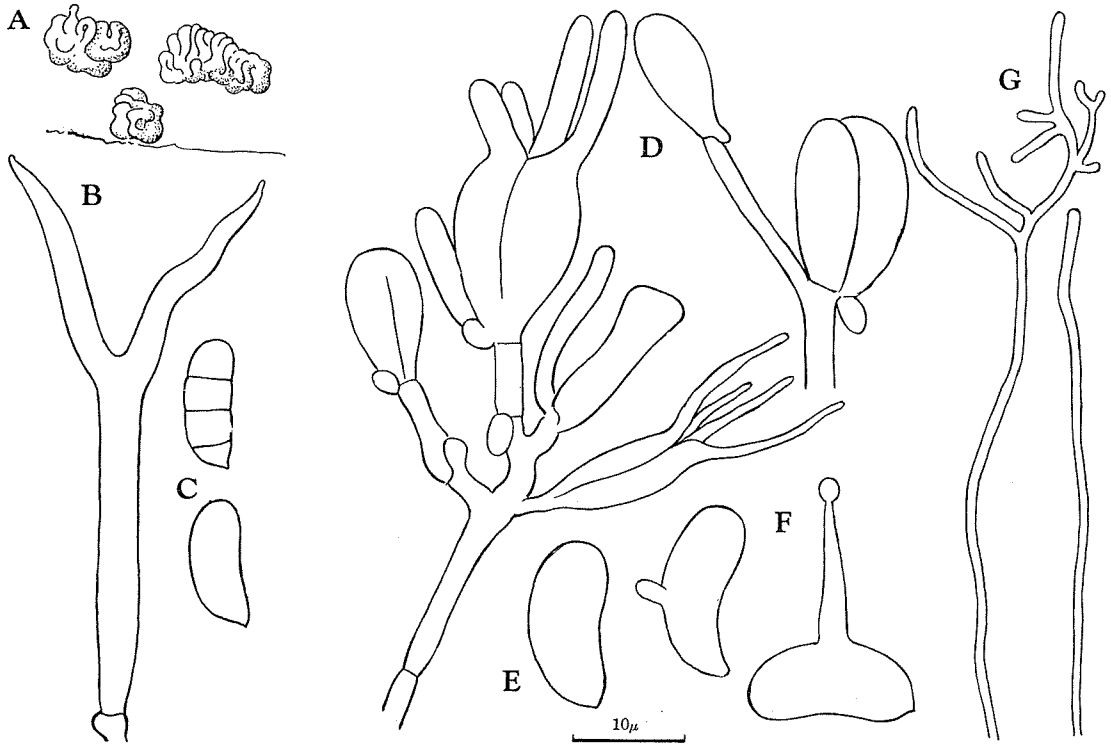

Fig. 34. A-C. *Dacrymyces ellisii* (×2) A. Fructifications (×1.5) B. Basidium C. Basidiospores D-G. *Sebacina arctica* D. Basidia E. Basidiospores and their germination F. Ballistospore formation G. Paraphyses.

hyalinae. Dendrophyses abundantes simplices vel apice irregulariter ramosae, 1–1.3 μ crassae, hyalinae.

Fructifications broadly effused with thick, distinct margin, waxy gelatinous, hyaline, 0.5–1 mm thick, surface uneven, somewhat pruinose, possessing neither cystidia nor gloeocystidia. Hyphae of inner tissue irregularly woven, 1.5–2.5 μ thick, thin-walled, with clamp connections. Basidia ovoid, cruciately septate, 13.5–18×9–11 μ, proliferating from a clamp at the base of each basidium. Basidiospores allantoid, 13.5–14×5–5.5 μ, hyaline. Dendrophyses copious, simple or irregularly branched at the tip, 1–1.3 μ thick, hyaline. Calacreous concretion not seen.

Hab. Superficial on bark of *Salix alaxensis*, C. Thompson, Aug. 16 (Specimen No. 46 -Type preserved in Herbarium Smithsonian Institution). *Sebacina calcea* (Pers.) Bres. has some resemblances to the present new species, although the former is distinct in thinner fructifications, calcareous concretion and longer basidoispores (18–22×7–9 μ by McGuire).

(Y. Kobayasi)

Pucciniaceae

83. ***Uromyces lapponicus*** Lagerheim

Bot. Notiser. (1890): 274, 1890.

Hab. I. on leaves of *Astragalus* sp. Umiat (Aug. 12). (Specimen No. 220)
This specimen has only the aecidiosorial stage. (N. Hiratsuka)

84. ***Puccinia asteris*** Duby

Bot. Gall. **2**: 888, 1830. (Plate 13 A)

Hab. III. on leaves of *Aster pygmaea* (?). Umiat (Aug. 13). (Specimen No. 221) (N. Hiratsuka)

85. ***Puccinia conglomerata*** (Strauss) Rohling

Deutsch. Fl. Ed. 2, **3**-3: 130, 1813. (Plate 13 B)

Syn. *Uredo conglomerata* Strauss in Ann. Wett. Ges. **2**: 100, 1810.

Puccinia conglomerata (Strauss) Schmidt et Kunze, Deutsch. Schwamme. **8**-4: 191, 1818.

Hab. III. on leaves and petioles of *Petasites frigidus* (L.) Fr., Pt. Barrow (Aug. 7) (Specimen No. 222)
This species is one of the typical arctic-alpine species. (N. Hiratsuka)

86. ***Puccinia heucherae*** (Schw.) Dietel var. ***saxifragae*** Savile

Canadian Jour. Bot. **32**: 408, 1954. (Plate 13 C)

Syn. *Puccinia saxifragae* Schelchtendal, Fl. Berol. **2**: 134, 1824.

Hab. III. on leaves of *Saxifraga hieracifolia* Waldst. et Kit. Pt. Barrow (Aug. 7) (Specimen No. 223) (N. Hiratsuka)

87. ***Puccinia ustalis*** Berkeley

Jour. Bot. **6**: 207, 1854.

Hab. III. on leaves of *Ranunculus pygmaeus* (?). Pt. Barrow (Aug. 7). (Specimen No. 224)

The present species is new to the arctic circumpolar district. It is a microcyclic species, and its general character is as follows: Teleutosori amphigenous, long covered by the epidermis, with few rudimentary paraphyses, chocolate brown to brownish black in colour, compact; teleutospores cylindrical, truncate or obtuse above, not or slightly constricted at septum, attenuated below, 42–60×13–20 μ; epispore cinnamon-brown, 1–1.5 μ thick at sides, thicker at apex (2.8–6 μ), smooth; pedicels short, persistent, coloured. (N. Hiratsuka)

88. ***Puccinia volkartiana*** Ed. Fischer

Beitr. Krypt. Schweiz. II-2: 381 & fig. 274, 1904. (Plate 13 E)

Hab. III. on leaves of *Androsace chamaejasme* Host. subsp. *lehmanniana*. Cape Thompson (Aug. 16). (Specimen No. 225)
The present fungus is one of the typical arctic-alpine species. (N. Hiratsuka)

Melampsoraceae

89. ***Melampsora arctica*** Rostrup

Medd. Grønland. **3**: 535, 1888. (Plate 13 F,G)

Hab. II. on leaves of *Salix pulchra* Chem. (?). Umiat (Aug. 13). II, III. on leaves of *Salix* sp. Cape Thompson (Aug. 16, 1965). (Specimen No. 226) (N. Hiratsuka)

90. ***Melampsora bigelowii*** Thümen

Mitth. Forstl. Vers. Oest. **2**: 37, 1879. (Plate 14 I)

Hab. II, III. on leaves of *Salix ovalifolia* Trautv. Umiat (Aug. 13). II. on leaves of *Salix* sp. Umiat (Aug. 12, 1965). (Specimen No. 227) (N. Hiratsuka)

91. ***Thekopsora sparsa*** (Wint.) Magnus

Dalla Torre & Sarnth., Fl. Tirol. **3**: 118, 1905. (Plate 14 J)

Syn. *Melampsora sparsa* Winter in Pilze Deutschl. **I**: 245, 1882.

Pucciniastrum sparsum Ed. Fischer in Beitr. Krypt. Schweiz. II-2: 469, 1904.

Hab. II. on leaves of *Arctostaphylos alpina* Spreng. Umiat (Aug. 12). (Specimen No. 228)

The specimen has the uredosorial stage only. It is an arctic-alpine species. (N. Hiratsuka)

Ustilaginaceae

92. ***Cintractia caricis*** (Pers.) Magnus

Verhandl. Bot. Ver. Prov. Brandenb. **37**: 79, 1895.

Syn. *Uredo caricis* Persoon, Syn. Meth. Fung. 225, 1801.

Hab. In ovaries of *Carex* sp. Umiat (Aug. 13). (Specimen No. 229)

Exobasidiaceae

93. ***Exobasidium vaccinii-uliginosi*** Boudier

Boud. et Fisch., Bull. Soc. Bot. Fr. **41**: 244 (1894); Linder, Fungi Canad. E. Arctic p. 273 (1947). (Plate 3 B; Text fig. 35. A, B)

Infected leaves of host plant caused a rapid enlargement, one and a half times as long as normal one, upper surface becoming deep red, waxy and under surface white bloomy.

Basidia 2–sterigmate, longer than 26 μ, 10–13 μ thick. Basidiospores large, oblong, 17–23 $\times$ 8–11 μ.

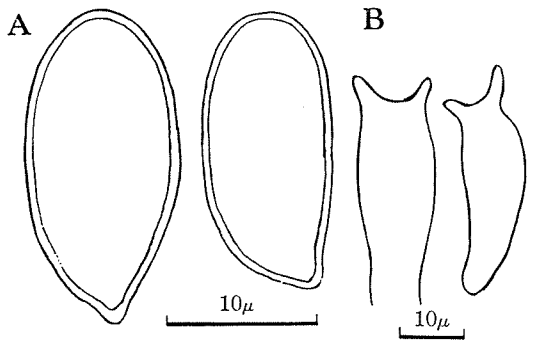

Fig. 35. *Exobasidium vaccinii-uliginosi*
A. Basidiospores B. Basidia.

Hab. Parasiting on leaves of young shoot of *Vaccinium uliginosum,* Umiat, Aug. 11 and *V. vitis-idaea* subsp. *minus,* Umiat, Aug. 11. (Specimen No. 134)

Distr. Europe, N. America, Japan, Canad. Arc., Greenland.

Linder published *Exobasidium angustisporum* Linder on *Arctostaphylos alpina* and *Exobasidium vaccinii* var. *myrtilli* (Fuckel) Juel on *Cassiope tetragona* and other *Vaccinium* spp. from Canadian Eastern Arctic. The former has (3)–4–6 sterigmata on basidium and the latter 4 steigmata. These fungi will be found also in Arctic Alaska in near future. I could not find *Exobasidium vaccinii* with 4 sterigmata on *Vaccinium vitis-idaea* subsp. *minus* in this chance. (Y. Kobayasi)

Clavariaceae

94. ***Clavariadelphus pistillaris*** (Fr.) Donk

Med. Bot. Mus. Utrecht, **9**: 73 (1933); Corner, Monogr. Clav. p. 279 fig. 14 B, 17, 18, 105 pl. 3 (1950); Ito, Myc. Fl. Japan **2**(4): 73 fig. 58 (1955).

(Plate 8 C; Text fig. 36 A–D)

Fructifications clavate, simple, fleshy, 40–50 mm long, 15–18 mm thick in upper part, 7–8 mm at stalk, longitudinally grooved or broken, surface smooth, white at stalk, other part pale bright ferruginous, covered with hymenium, internally stuffed, white.

Hyphae of fructifications much septate, branched, 3–9 μ thick, with clamp connections. Basidia very long, 65–85×7–9 μ, 4–sterigmate, with clamp at base. Basidiospores ovoid or oblong, 9–12×5–6.5 μ, often curved and mucronate at base, hyaline, with granular contents. Paraphyses composed of two types, clavate one 70–85× 8–9 μ and linear one 3 μ in thickness.

Hab. Scattered among heath, mainly consisted of *Dryas octopetala,* C. Thompson, Aug. 16. (Specimen No. 51)

Distr. Europe, E. Asia, N. America. (Y. Kobayasi)

95. ***Clavulinopsis arctica*** Y. Kobayasi sp. nov. (Plate 8 B; Text fig. 36 E–H)

Fructificationes minutae, 2–5 mm latae, plerumque dense caespitosae, cylindricae

vel spathulatae 0.5–1 mm crassae, saepe dichotomosim vel irregulatirer ramosae, apice acutae, rotundatae vel truncato-dentatae, externe aurantiae, deorsum pallidiores vel albae. Textura solida, carnosa, elastica, alba. Hyphae texturae graciles, tenuiparietales 1.5–2.5 μ crassae, "clamp" formantes. Basidia clavata, breves, 15–16×3–4.5 μ, 4–sterigmata. Basidiosporae ovoideae vel oblongae, leves, 5.5–7×2.5–3 μ, hyalinae. Paraphyses clavatae, saepe capitatae, 15–16×4.5 μ.

Fructifications minute, 2–5 mm high, commonly densely caespitose and connate at base, cylindric or somewhat flattened or spathulate, 0.5–1 mm (flattened one up to 2 mm) thick, frequently forked or irregularly branched at the middle part, apically acute, rounded or dentate into few sharp teeth, colour white at base, other parts orange yellow with pale brownish tint. Flesh brittle, solid, white, odor none. Hyphae of texture slender, thin-walled, 1.5–2.5 μ thick, with clamp connections. Basidia short clavate, 15–16×3–4 μ, 4–sterigmate. Basidiospores ovoid or oblong, smooth, 5.5–7×2.5–3 μ, hyaline. Paraphyses clavate, frequently capitate, 15–16×4.5 μ.

Hab. Growing on the bare peat soil in heath, Barrow, Aug. 9. (Specimen No. 18. Type preserved in the Herbarium of Smithsonian Institution)

The present species has some resemblances to *Clavulinopsis vernalis* (Schw.) Corner and *Cl. hastula* Corner. (Y. Kobayasi)

96. ***Lentaria mucida*** (Fr.) Corner

Monogr. Clav. p. 442 (1950).

Syn. *Clavaria mucida* Fr., Syst. Myc. **1**: 476 (1821); Coker, Clav. U.S. Canada p. 30 pl. 3, 81 (1923). (Plate 8 D; Text fig. 36 M-P)

Fructifications minute, simple, tough, flesyh, fusiform, clavate or cylindric, 4–8 mm high; stalk slender cylindric, always white, almost half as long as fructification, 0.4–0.8 mm long, fertile part cylindric, clavate, rarely dilated, acute, truncate or incised in 2–4 parts at the apex, 0.8–1 mm thick (rarely 0.4–3.5 mm), pale cream or pale orange-yellow. Hyphae of texture thin-walled with clamp connections, 3.5–4.5 μ thick. Basidia clavate 1-sterigmate, 15–23×4–4.5 μ. Basidoispores oblong, obliquely with short pedicells at base, 5.5–8×2–2.5 μ, smooth, hyaline. Paraphyses clavate, 17–18×3 μ.

Hab. Gregarious on peat soil among mosses, not accompanied with Chlorococcoid algae, Umiat, Aug. 13. (Specimen No. 32)

Distr.. Europe, Siberia, E. Asia, N. & S. America.

According to Corner, one of the generic characters of *Lentaria* is "lignicolous", but the present arctic fungus was clearly terrestrial. There was only one terrestrial case in N. America by Doty (1944). (Y. Kobayasi)

97. ***Pistillaria*** sp. (Text fig. 36 I-L)

Fructifications minute, 1–1.5 mm high, constituted of slender stalk and fusiform head. Stalk cylindric 640–1.000×90–100 μ, stuffed cartilaginous fleshy, hyaline, semipellucid, sparsely pilose; hyphal cells of texture 2.5–5 μ thick, thin-walled, septate, without clamp connections; hairs (caulocystida) septate, 35–40×3 μ, hyaline. Fertile

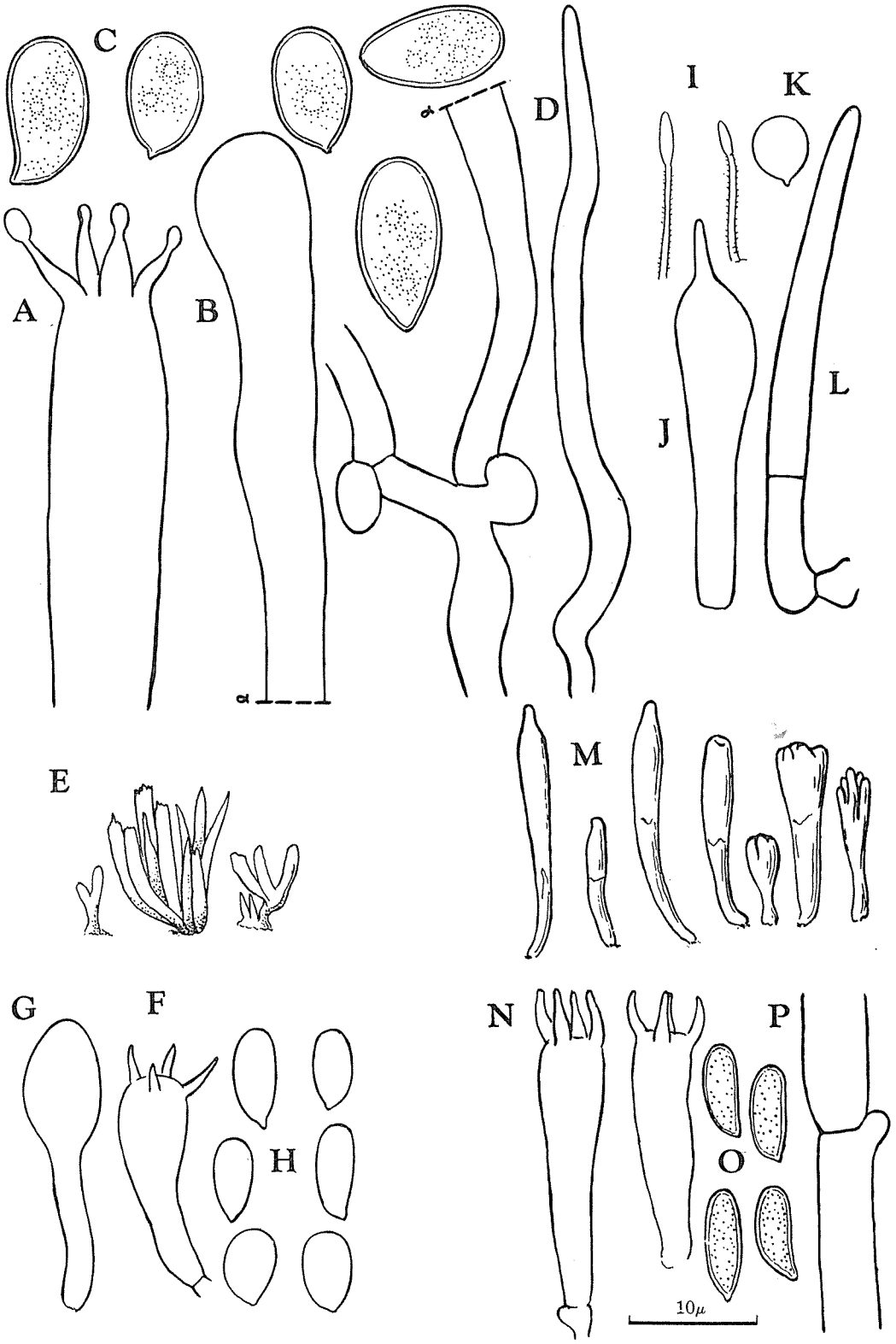

Fig. 36. A-D. *Clavariadelphus pistillaris* A. Basidium B,D. Paraphyses C. Basidiospores E-H. *Clavulinopsis arctica* E. Fructifications (×5) F. Basidium G. Paraphysis H. Basidiospores I-L. *Pistillaria* sp. I. Fructifications (×15) J. Basidium K. Basidiospore L. Caulocystidium M-P. *Lentaria mucida* M. Fructifications (×3) N. Basidia O. Basidiospore P. Clamp of hypha.

part 380–400×120–140 μ, white, covered with hymenium. Basidia clavate 20–25×5–7 μ, with one sterigma; Sterigma 2.5–4 μ long. Basidiospores ovoid, 4–4.5×3.5 μ, smooth, hyaline.

Hab. Scattered on decorticated twig of *Salix alaxensis*, L. Peters, Aug. 19. (Specimen No. 76)

According to Corner's Monograph (1950), there is only one species *Pistillaria maculaecola* Fckl. with one sterigma on each basidium, but this seems to be distinct from the arctic fungus in yellowish head and longer (6–7 μ) basidiospores.

(Y. Kobayasi)

Hydnaceae

98. ***Odontia cristulata*** Fr.

Epicr. Myc. p. 529 (1838); Miller, in Mycologia **26**: 20 (1934). (Plate 15 A,B)

Basidiocarps thin, soft subceraceous, pruinose, white to cream, teeth conical, short and fragile. Subiculum hyphae thin-walled, sometimes branched, with numerous clamps, 3–5 μ wide, cystidia irregular in shape, loosely fascicled at the apex of the teeth, with sphaerical clusters of crystals, with or without cross-walls. Basidia clavate, 4-spored, 15–20×4–5 μ. Basidiospores 5–6×2.5–3 μ, fusiform-elliptical to reniform, hyaline, smooth.

Hab. Growing on dead wood of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 157)

Distr. Europe, N. America, Alaska (Koyukuk). (K. Aoshima)

Corticiaceae

99. ***Corticium*** sp.

Hymenophore perennial, membranaceous, coriaceous, adherent, effused forming elongate band-like areas, 10×1.5 cm in dimension.

Hymenial surface olivaceous brown (Tawny olive), margin distinct, adherent. Context 100–150 μ, thick, brown. Hymenium ca 10 μ thick, brown, immature. Gloeocystidia none.

Hab. On stem of *Alnus crispa*, Umiat, Aug. 13. (Specimen No. 158)

(Y. Kobayasi)

100. ***Cytidia salicina*** (Fr.) Burt

Ann. Mo. Bot. Gard. **11**: 10 (1924).

Syn. *Thelephora salicina* Fr., Syst. Myc. **1**: 442 (1821). (Plate 15 C)

Hab. Growing on dead branches of *Salix alaxensis*, L. Peters, Aug. 19. (Specimen No. 153 & 156)

Distr. Europe, N. America, Alaska (Anaktuvuk Pass; C. Hope) N. Eastern Asia (Japan; Kamtschatka).

From Arctic Alaska, this species has already been enumerated in a check list of Alaskan fungi by Cash (1953). (K. Aoshima)

101. ***Hymenochaete tabacina*** (Fr.) Lév.

Ann. Sci. Nat. ser. 3, **5**: 152 (1846); Ito, Myc. Fl. Jap. **2** (4): 155 fig. 131 (1955).

(Plate 15 E)

Hab. On decorticated branches of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 53)

Distr. Europe, N.E. Asia (Siberia, Kamtschatka, China, Japan), N. America, Alaska (Sitka, Pr. Wales Isl., Koyukuk, Russian Lake), Australia. (K. Aoshima)

102. ***Peniophora aurantiaca*** (Bres.) Höhn. et Litsch.

K. Akad. Wiss. Wien Math.-Nat. Kl. Sitzungsb. **115** (1): 1583 (1906).

Syn. *Corticium aurantiacum* Bres., Fung. Trid. **2**: 37 (1892). (Plate 3C, 15 H)

Basidiocarps light pinkish cinnamon to red, membranous when young, when mature crustose and firm. Subiculum hyphae thin-walled, branched with clamps, 5–7.5 μ wide; subhymenial hyphae thin-walled, branched, without clamps, 2.5–5 μ wide. Cystidia abundant, sometimes heavily incrusted, thin-walled, 35–75 $\times$ 5 μ, protruding up to 50 μ. Gloeocystidia clavate, 35–55 $\times$ 9–13 μ. Basidia clavate, 38–75 $\times$ 10–15 μ. Basidiospores hyaline, smooth, subglobose to ovate, apiculate, nonamyloid, 12.5–17.5 $\times$ 7.5–10 μ.

Hab. On dead wood of *Alnus crispa*, Umiat, Aug. 13 (Specimen No. 155).

Distr. Europe, N.E. Asia (Kamtschatka by Palmast), N. America, Alaska (Kodiak, Koyukuk, Skagway) (K. Aoshima)

103. ***Peniophora violaceo-livida*** (Sommerf.) Massee

Journ. Linn. Soc. Bot. **25**: 152 (1889).

Syn. *Thelephora violaceo-livida* Sommerf., Suppl. Fl. Lapp. p. 283 (1826).

(Plate 15 G)

Basidiocarps grayish violaceous, waxy, surface cracking. Subiculum hyphae thin-walled, branched, septate, without clamps, 2.5–5 μ wide. Cystidia conical or fusiform, not incrusted, 35–50 $\times$ 5–6.5 μ, protruding up to 25 μ. Gloeocystidia rare, clavate, 4-spored. Basidiospores cylindrical, 8–10 $\times$ 3.5–4 μ, hyaline, smooth, apiculate, non-amyloid.

Hab. Growing on decorticated branches of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 154)

Distr. Europe, N. E. Asia (Japan, Kamtschatka by Palmast), N. America. (K. Aoshima)

Phylacteriaceae

104. ***Thelephora anthocephala*** [Bull.] Fr.

Epicr. Myc. p. 535 (1836).

Syn. *Phylacteria anthocephala* Pat. Ess. Tax. p. 119 (1900); Konrad et Maubl. Ic. Sel. Fung. **5**: pl. 80 f. 1 (1930). (Text fig. 37 A-C)

Fructifications flabelliform, stipitate, 7–10 mm high, coriaceous, becoming entirely dark purplish (Russet-vinaceous) when dried. Stipe half as long as fructifications, terete or slightly compressed, stuffed, fuscous-floccose. Pileus radially rugose on both sides, irregularly divided and serrate at margin, grayish brown, darker on dorsal side, paler at margin. Papillae not so distinct. Hyphae of texture 3–4 μ thick, with distinct clamp connections. Basidia clavate, 38–42$\times$7–8 μ, 2 or 4-sterigmate. Basidiospores ellipsoid or ovate, somewhat angular with short spines, 7–7.5$\times$5.5–6.5 μ, brown.

Hab. Scattered on wet peat soil in tundra, Umiat, Aug. 13. (Specimen No. 40)

Distr. Europe, Japan, N. America.

The arctic fungus is conspicuously smaller than those of temperate region, which is 2–5 cm high. (Y. Kobayasi)

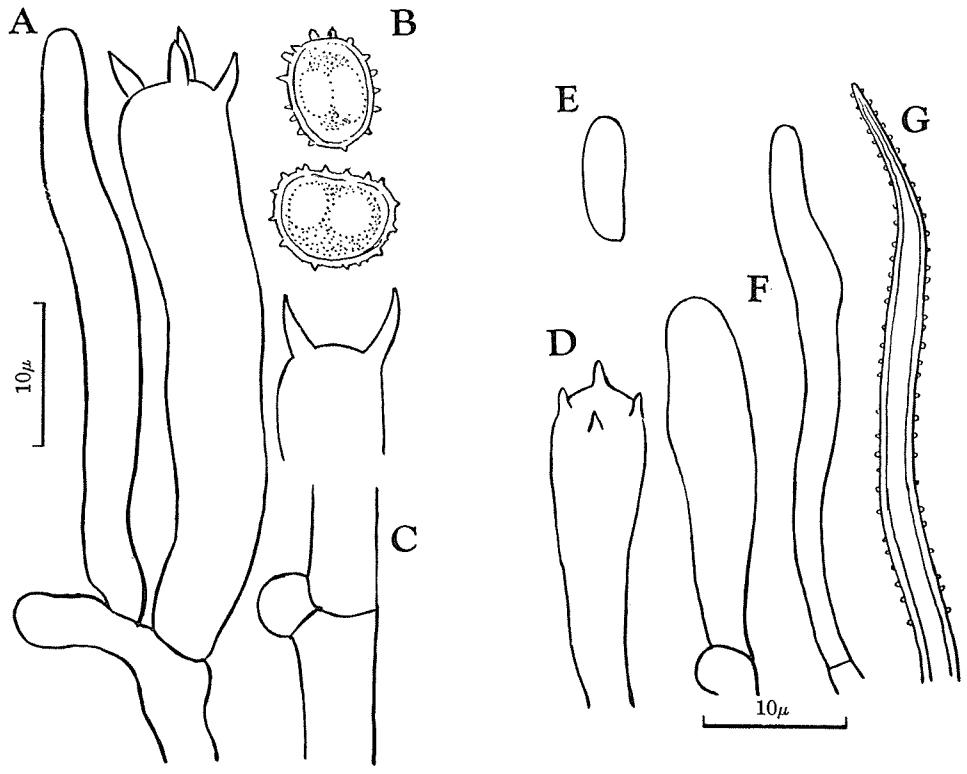

Fig. 37. A-C. *Thelephora anthocephala* A. Basidia B. Basidiospores C. Clamp of hypha D-G. *Cyphellopsis anomala* D. Basidium E. Basidiospore F. Paraphysis G. Hairs on outer side of fructification.

Porotheleaceae

105. ***Cyphellopsis anomala*** (Fr.) Donk

Med. Nederl. Mycol. Ver. **18-20**: 128 (1931); Cooke W.B., in Beih. Sydowia **4**: 96 (1961).

Syn. *Solenia anomala* (Fr.) Fckl., Jahrb. Nass. Ver. Nat. **25-26**: 290 (1871). (Plate 14 K; Text fig. 37 D-G)

Fructifications cup-shaped with short stipe, ca. 1 mm high, forming subiculum. Stipe about 0.2 mm thick. Receptacles fleshy or more coriaceous, bright brown, densely clad with hairs, margin entire or fissured, strongly incurved especially when dried, densely incrusted with granules, internally white. Hairs fibrillose, thick-walled, without septum, 2.5–4 μ thick, 150–200 μ long, finely granulated, attenuated toward the tip, brown, apically paler. Basidia clavate 17–25 $\times$ 5–6 μ, 4-sterigmate. Basidiospores allantoid, 8–9 $\times$ 2.5 μ, hyaline. Paraphyses clavate, mixed with filiform one.

Hab. Densely packed by several tens or more on decorticated twig or at broken part of bark of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 44)

Distr. Almost cosmopolite, Anaktuvuk Pass (by Llano). (Y. Kobayasi)

106. ***Glabrocyphella*** sp. (Text fig. 38)

Fructifications solitary, scutellate or cupulate, attached to substratum with broad dorsal side, 4–8 mm in diameter, membranaceous with somewhat in curved margin, almost white or alutaceous, dorsal side scaber or rugose, not hairy, inner side (hymenium) irregularly costate. Hyphae of texture coarse, 2.5–5 μ in diameter, thin-walled, septate, with very large clamp connections. Basidia clavate, 17–20 $\times$ 3–3.5 μ, 4-sterigmate, with clamp at base. Basidia clavate, 17–20 $\times$ 3–3.5 μ, 4-sterigmate with clamp at base. Basidiospores allantoid, 4–5 $\times$ 1–1.5 μ, smooth, hyaline.

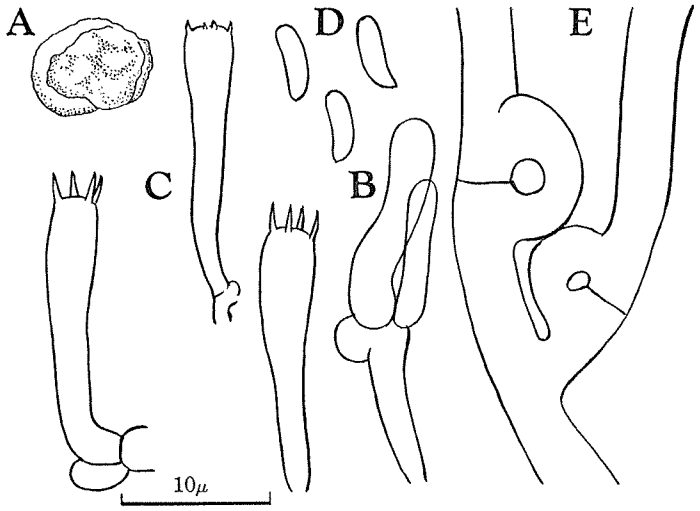

Fig. 38. *Glabrocyphella* sp. A. Fructification ($\times$2) B. Young basidium C. Basidia D. Basidiospores E. Clamp connections of hypha.

Hab. Scattered on twig of *Alnus crispa* (?), Umiat, Aug. 12. (Specimen No. 35)

In "the Cyphellaceous fungi" by Cooke, there are enumerated thirteen species of *Glabrocyphella*, which are all distinct from this arctic fungus. (Y. Kobayasi)

Leptoglossaceae

107. ? ***Leptoglossum muscigenum*** (Fr.) Lundell
in Lundell et Nannfeldt, Fung. Suec. Exs. 44 (1934); Cooke W.B., in Beih. Sydowia **4**: 133 (1961).

Syn. *Cyphella muscicola* Fr. Syst. Myc. **2**: 202 (1822).

Fructifications cupulate, membranous, 1.5 mm in diameter, almost sessile, white or alutaceous. Hymenium immature.

Hab. Growing on moss (*Polytrichum* sp.), Barrow, Aug. 6. (Specimen No. 15)

Distr. Europe, N. America, Behring Straits (by Cooke). (Y. Kobayasi)

Polyporaceae

108. ***Antrodia stereoides*** (Fr.) Bond. et Sing.
in Ann. Myc. **39**: 61 (1941).

Syn. *Polystictus stereoides* Fr., Syst. Myc. **1**: 369 (1821).

Trametes stereoides (Fr.) Bres., in Atti Ac. Agiate ser. 3, **3**: 92 (1897); Eriksson, in Symb. Bot. Upsal. **16** (1): 146 (1958).

Polyporus planus Peck, in N.Y. State Mus. Ann. Rept. **31**: 37 (1879) (non *P. planus* Wallr. 1833).

Coriolus planellus Murr., in Torrey Bot. Club Bull. **32**: 649 (1905).

Polyporus planellus (Murr.) Overh., in Wash. Univ. Studies **3**, 1: 29 (1915). (Plate 15 F)

Hab. On *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 160)

Distr. N. Europe, Kamtschatka, N. America, Alaska (Kodiak, Koyukuk).

Lloyd (in Myc. Writ., L. 63: 14 (1916)) discussed Fries's original specimens and illustration of *Polystictus stereoides* Fr., and he thought it should be best to delete the name *Polystictus stereoides* and preferred to call the fungus *Polyporus planus* Peck (=*P. planellus* (Murr.) Overh.). The specific epithet "stereoides" has been traditionally used by all the European mycologists and by Baxter and Shope in the United States. (K. Aoshima)

109. ***Polyporellus elegans*** (Bull. ex Fr.) Karst.
in Krit. Finl. Basidsv. p. 292 (1889).

Syn. *Polyporus elegans* Bull. ex Fr., Epicr. Myc. p. 440 (1838); Overh., Polyp. p. 263 (1953). (Plate 15 D)

Hab. On *Salix alaxensis*, L. Peters, Aug. 18. (Specimen No. 159)

Distr. Europe, N. America, Alaska (Anaktuvuk Pass, Skagway, Prince of Wales Isl.). (K. Aoshima)

Hygrophoraceae

110. ***Hygrocybe miniata*** [Scop. ex Fr.] Karst.

Hattsv. **1**: 234 (1879).

Syn. *Hygrophorus miniatus* Fr. var. *miniatus* Hesler et Smith, N. Am. *Hygrophorus* p. 156 (1963).

P (pileus) 1–3 cm in diameter, broadly convex to plane, smooth, brilliant orange or reddish orange at center, brilliant scarlet toward margin, margin thin, expanded.

St (stipe) 2.5–4 cm×2.5–4 mm, curved, almost equal, orange to reddish orange. Gills yellow to reddish. Basidia 4 (rarely 1–2) spored. Basidiospores ellipsoid, 7–9.5 ×4–4.5μ.

Hab. Among mosses in swamp, L. Peters, Aug. 20. (Specimen No. 92)

Distr. Europe, Faeröes (by Möller 1945), India, Japan, N. America, Canadian E. Arctic (by Linder), Australia.

From Greenland is reported *Hygrocybe turunda* (Fr.) Karst., which is very near the present species except for the sizes of spores (11.5–13.8×6.2–7.8μ). (Y. Kobayasi)

111. ***Hygrophorus citrinopallidus*** Smith et Hesler

Sydowia **8**: 327 (1954) et N. Am. *Hygrophorus* p. 238 (1963).

(Plate 9 C; Text fig. 39 A, B)

Whole fructifications lemon-yellow. P 4–15 (–18) mm in diameter, expanded plane, umbilicate, margin slightly curved or expanded. St 10–20×1.5–2.5 mm, almost equal, stuffed, surface finely pubescent, growing orange-yellow when dried. Cuticle composed of 3–4.5μ thick hyphae arranged in parallel, not differentiated from inner texture. Gills distant, somewhat thick, decurrent, mixed with short one and reticulated costae. Basidia 4-spored, 39–46×7–8μ.

Basidiospores variously shaped, broadly fusoid, ovoid, oblong, pyriform or rarely trigonal, 6.5–9×4–5.5μ, non-amyloid.

Hab. Scattered on peat soil of tundra, Barrow, Aug. 5. (Specimen No. 3)

Distr. N. America.

Hesler and Smith noted that this would be identical with *H. vitellinus*, although, so far as the arctic fungus is concerned, this seems to be discriminated from *H. vitellinus* in smaller fructifications, lemon-yellow and slender stipes and broadly fusoid spores. (Y. Kobayasi)

112. ? ***Hygrophorus lilacinus*** (Laest.) M. Lange

Macromyc. **3** Greenland Agar. p. 63 (1957).

Syn. *Hygrophorus violeipes* M. Lange, l.c. 2: 18 fig. 14 (1955).

(Plate 9 D; Text fig. 39 C-E)

P 5–13 mm in diameter, expanded umbilicate, with slightly incurved and dentate margin, radially striated, hygrophanous, viscid, cream-yellow with greenish or purplish tint. St 7–15×2–2.5 mm, curved or striaght, equal, very finely farinaceous or floccose, almost smooth with naked eyes, pale purplish, upwardly deep coloured, solid. Gills remote, decurrent, broad, almost white or pale purplish. Basidia 2 and 4 (rarely 1)-spored, 27–30×5–6.5μ. Basidiospores ovoid, smooth, 6–7.5×4–6μ, non-amyloid.

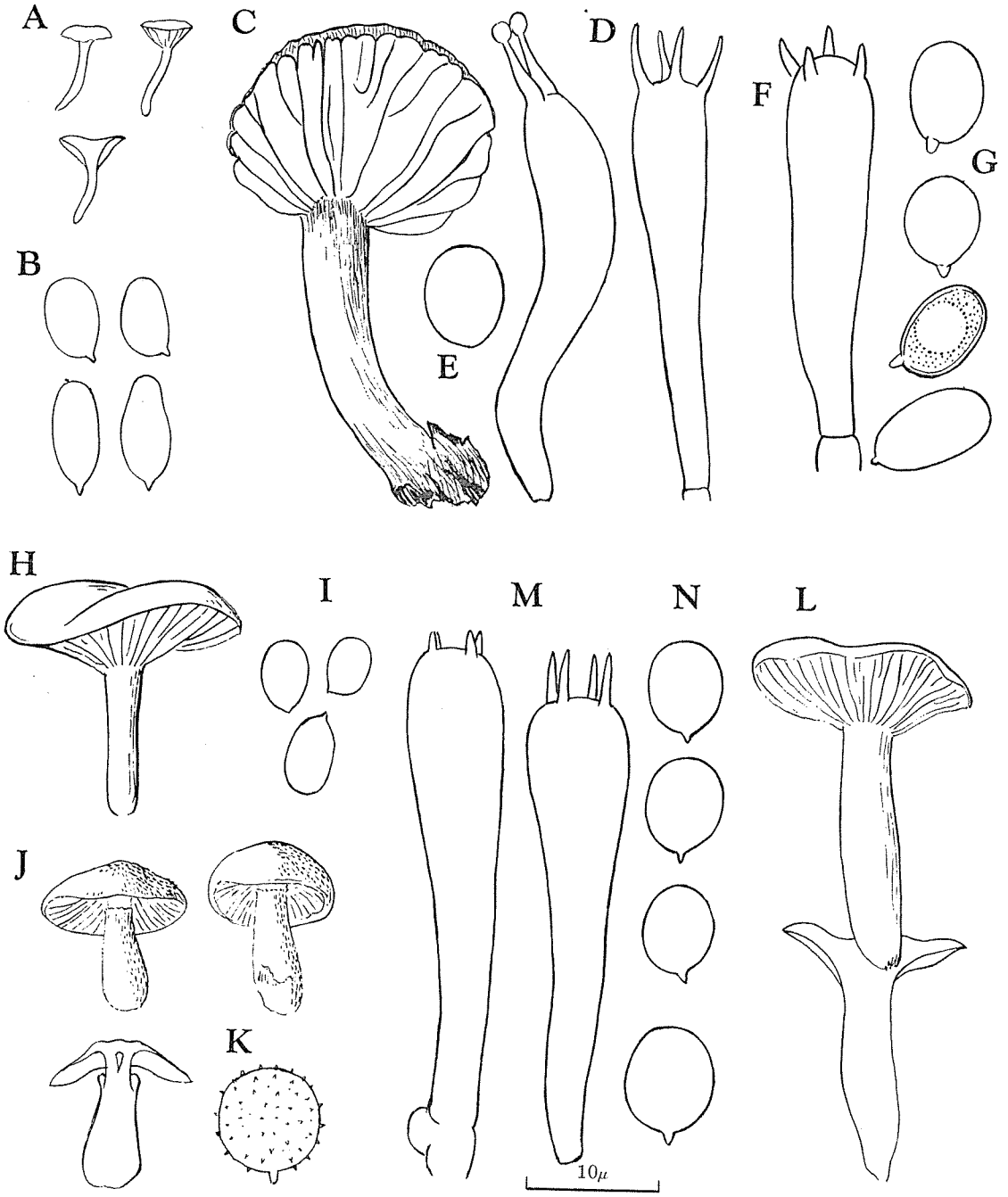

Fig. 39. A,B. *Hygrophorus citrinopallidus* A. Fructifications (×1/2) B. Basidiospores C-E. *Hygrophorus lilacinus* C. Fructification (×4) D. Basidia E. Basidiospore F,G. *Hygrophorus vitellinus* F. Basidium G. Basidiospores H, I. *Clitocybe angustissima* H. Fructification (×1) I. Basidiospores J, K. *Clitocybe* sp. J. Fructifications (×2/3) K. Basidiospore L-N. *Clitocybe multiceps* L. Fructification (×2/3) M. Basidia N. Basidiospores.

Hab. Growing solitary among *Sphagnum* in swampy places, Barrow, Aug. 8. (Specimen No. 12)

The present fungus seems to be conspecific with *H. lilacinus* sensu M. Lange which has slightly larger fructifications with bright yellow pileus and concolorous gills. (Y. Kobayasi)

113. ***Hygrophorus vitellinus*** Fr., sensu Möller

F. Faeröes pt. 1: 151 fig. 60 B, Pl. 2 b (ut *Hygrocybe vitellina* Fr.) (1945); M. Lange, Macromyc. 2 Greenland Agar. p. 17 fig. 13 (1955).

(Plate 3 A, 9 A, B; Text fig. 39 F, G)

P 7–14 (–27) mm, convex with incurved margin, thin, expanded almost flat, umbilicate, viscid, margin plicate, entire or slightly sinuate, lemon-yellow, smooth. St centric or eccentric, 10–16–20 mm long, longer than the diameter of pileus, 2–3 mm thick, slightly curved, frequently compressed, equal or upwardly incrassate, stuffed, white, almost smooth or downwards very finely pubescent. Gills dedurrent, distant, comparatively broad, margin entire, concolorous with pileus or whitish when dried. Tramal hyphae 3–4 μ thick, branched, without clamp connections. Basidia 4-spored, 27–35 $\times$ 5.5–7 μ. Basidiospores ovoid, 6.5–7.5 $\times$ 4–5.5 μ, smooth, hyaline, non amyloid. Cystidia none.

Hab. Gregarious among mosses on peat soil of tundra, Barrow, Aug. 5 and L. Peters, Aug. 19. (Specimen No. 99)

Distr. (Arctic form) Greenland, Faeröes, Iceland (by Larsen).

Arctic fungus seems to be distinct from that of temperate region of Europe in smaller sizes of fructifications and slender stipes. As this is found very commonly in Arctic Alaska, it is probable that this may be distributing also in Canadian Arctic. M. Lange notes that *H. hudsonianus* Jennings from Canadian Arctic may be identical with the above species. (Y. Kobayasi)

Tricholomataceae

114. ***Clitocybe angustissima*** (Lasch) Fr.

Hym. Eur. p. 105 (1874); Bres. Icon. Myc. 4 pl. 183 (1928); J. Lange, Fl. Ag. Dan. **1**: 86 pl. 37 E (1940). (Text fig. 39 H,I)

P 2.5–4.5 cm in diameter, slightly depressed at center, margin thin, expanded, not hygrophanous, smooth, somewhat glossy, pale alutaceous. St 3–4.5 cm long, 2.5–4.5 mm thick, equal, stuffed, smooth, concolorous, tomentose at base. Gills decurrent or somewhat sinuate-decurrent, narrow, crowded, thin, concolorous or paler. Basidia 4-spored, 25–30 $\times$ 5–6 μ Basidiospores ovoid or ellipsoid, 4.5–5 (–6) $\times$ 2.5–3 μ, hyaline, non-amyloid.

Hab., Among mosses, C. Thompson, Aug. 17. (Specimen No. 41)

Distr. Europe, Siberia. (Y. Kobayasi)

115. ***Clitocybe multiceps*** Peck

in Ann. Rep. N.Y. State Mus. **43**: 17 (1890); Murrill, in A. Amer. Fl. **9** (6): 405 (1916). (Plate 2D, 7A, 12A; Text fig. 39 L-N)

P 2–4.5 cm in diameter, convex, slightly umbilicate or flat at center, incurved at margin, surface with very fine adpressed scales, apparently almost smooth, hygrophanous, greyish, flesh thick.

St thick, cylindrical, 2.5–5 cm long, 5–12 mm thick, equal or downwards incrassate or compressed, fibrillose, pale ochraceous grey. Gills decurrent, thin, narrow, compact, almost white. Basidia 4-spored, 30–33×7–8 μ. Basidiospores subglobose, 5.5–7.5 μ, mostly 6.5×5.5 μ, smooth, hyaline, non-amyloid.

Hab. Densely clustered on bare peat soil or among heath of tundra, Barrow, Aug. 5–10 (Specimen No. 1); Umiat, Aug. 13.

Distr. N. America (New York, Pacific N. West, Sitka), Canada.

Compared with the fungus in temperate region, this arctic fungus seems to be very small.

116. ***Clitocybe*** sp. (Text fig. 39 J, K)

P 2.5 cm in diameter, convex, margin incurved, then expanded, scattered with reflexed fine scales, somewhat fibrillose at margin, edges entire without appendages, ochraceous or pale brown (testaceous). St 25×5–10 mm, downwards incrassate, clad with hairy ochraceous fibrills up to ring, smooth above, ring narrow. Gills adnate, narrow, somewhat distant, pale ogange-coloured.

Basidia 4-spored, 40–50×6–7 μ. Basidiospores globose, 7–7.5 μ in diameter, finely spiny.

Hab. Only two fruitbodies found on peat soil, L. Peters, Aug. 19. (Specimen No. 97) (Y. Kobayasi)

117. ***Collybia cirrhata*** [Schum.] Quél.

Champ. Jura Vosg. p. (1872); Sacc. Syll. Fung. **5**: 224 (1887); Bres. Icon. Myc. **5**: 205 pl. 205 (1928); J. Lange, Fl. Ag. Dan. **2**: 15 pl. 44 E (1936).

Syn. *Agaricus cirrhata* Schumacher, Fl. Saell. p. 308 (1803); Fr. Hymen. Europ. p. 119 (1874).

P 4–7 mm in diameter, somewhat glossy, pale ochraceous. St 10–15 mm long, slightly hairy. Gills sinuate, white. Basidiospores ovate, ellipsoid, 4–5×3 μ.

Hab. Gregarious on decaying *Leccinum scabrum*, among *Carex-Betula* thicket in swamp, Umiat, Aug. 13. (Specimen No. 38)

Distr. Europe, E. Asia (Japan), N. America

According to M. Lange (1955), the present fungus is commonly found on *Leccinum scabrum* in Greenland and Lappland. In Cash's list is reported only *Collybia tuberosa* from Skagway of S.E. Alaska, which is very near the present fungus except for the presence of sclerotium. (Y. Kobayasi)

118. ***Laccaria laccata*** (Scop.) Berk. et Br. var. ***proxima*** (Boud.) Maire, in

Bull. Soc. Myc. Fr. **24**: 55 (1908); Möller, F. Faeröes **1**: 271 fig. 129 (1945).

Syn. *Clitocybe proxima* Boud. in Bull. Soc. Myc. Fr. (1881) p. 91 pl. 2.
Clitocybe laccata Scop. var. *proxima* (Boud.) Bers., Icon. Myc. **4**: 188 pl. 188 (1928). (Plate 9 E; Text fig. 40 A,B)

P large expanded, 3–6 cm in diameter, frequently lobed, deep ochraceous or rusty. St 4–6 cm long, 5–8 mm thick, incrassate at base, striate fibrillose, darker than pileus. Gills adnate-decurrent with decurrent teeth, broad, distant, rosy. Basidia 4-spored, 33–35×10–11 μ. Basidiospores ovate-globose, 7–8×6–7 μ.

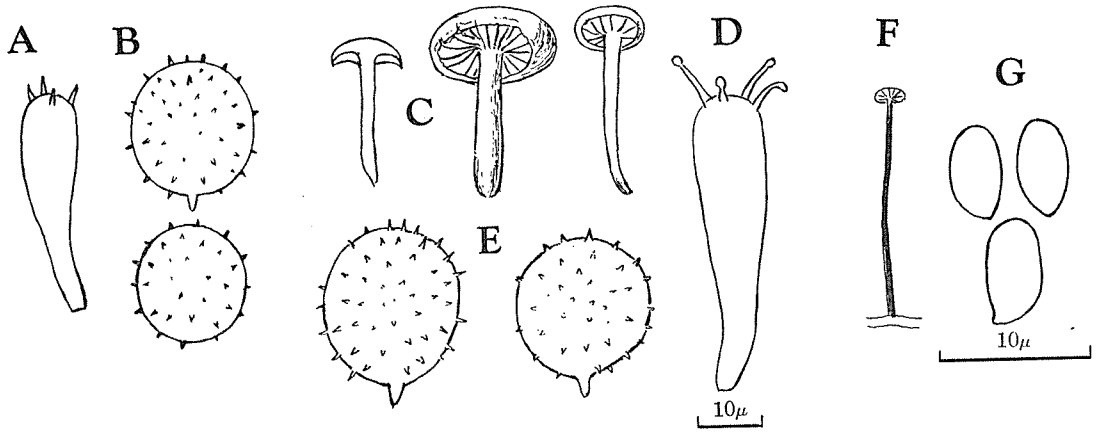

Fig. 40. A,B. *Laccaria laccata* v. *proxima* A. Basidium B. Basidiospores C-E. *Laccaria tetraspora* C. Fructifications (×1.2) D. Basidium. E. Basidiospores F,G. *Marasmius androsaceus* (×1) F. Fructification G. Basidiospores.

Hab. Scattered on peat soil, Umiat, Aug. 13. (Specimen No. 6)

Distr. Europe, Faeröes, Greenland, E. Asia (Japan), Africa (Tunisia).

(Y. Kobayasi)

119. ***Laccaria tetraspora*** Singer

Mycologia **38** (6): 689 (1946); M. Lange, Macromyc. 2 Greenland Agar. p. 28 fig. 17 b (1955). (Text fig. 40 C-E)

P 8–11 mm in diameter, convex with slightly inrolled margin, then flattened, coarse, rosy ochraceous. St 10–17×1–3 mm, almost equal, stuffed, fibrillose. Gills adnate-decurrent, distant, thick, rosy (incarnadine). Basidia 4-spored, 42–46×10–11 μ; sterigmata 5–6 μ long. Basidiospores ovoid, rarely globose, 8–12×8–9.5 μ.

Hab. Gregarious on peat soil, Barrow, Aug. 8 (Specimen No. 7); L. Peters, Aug. 19.

Distr. Greenland, Eastern N. America, S. America (Uruguay, Tierra del Fuego by Singer).

The present species is probably same with *Laccaria laccata* (Scop.) Berk. et Br. var. *montana* Möller, F. Faeröes **1**: 269 fig. 128 (1945) and also with the fungus which was reported from Canadian Eastern Arctic by Linder (1947) in the name *Clitocybe laccata* var. *rosella* Batsch Lange. (Y. Kobayasi)

120. ***Laccaria tortilis*** [Secretan] Boud.

Icon. Myc. pl. 59 (1911); Konrad et Maubl. Icon. Sel. Fung. **6** 237 (1934); M. Lange, Macromyc. 2 Greenland Agar. p. 29 fig. 17 C (1955).

Syn. *Clitocybe tortilis* Gillet (1878); Bres. Icon. Myc. **4**: 187 pl. 187–3 (1928); Sacc. Syll. Fung. **5**: 198 (1887).

(Text fig. 41)

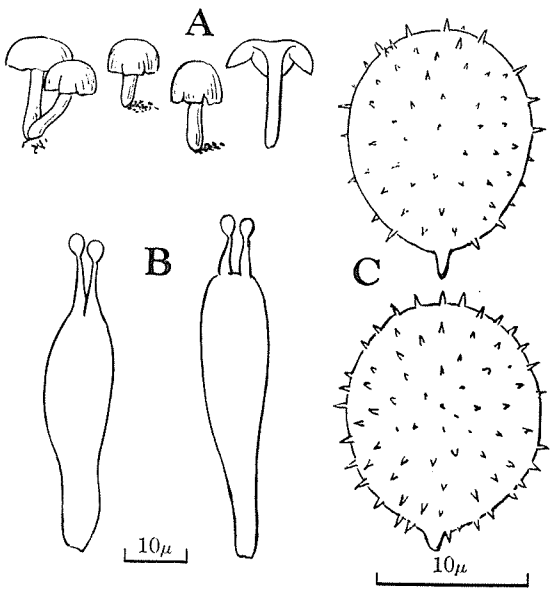

Fig. 41. *Laccaria tortilis* A. Fructifications (×1/2). B. Basidia C. Basidiospores

P minute, 10–15 mm in diameter, not expanded, campanulate, hygrophanous, radially striated, rosy brown. St 10–15×3–4 mm, equal or downwards incrassate, surface finely fibrillose., Gills adnate or decurrent, broad, pink coloured. Basidia 2-spored, 39–45×11–12 μ. Basidiospores ovoid or subglobose, 13.5–15×11–12.5 μ (excluding spines), spiny.

Hab. Gregarious in heath, Barrow, Aug. 4. (Specimen No. 4)

Distr. Europe, Greenland, E. Asia (Japan), N. America.

Compared with the fungus found in temperate region, the arctic one seems to have some special characteristics adapted to hard climate such as unexpanded pileus and shorter stipe. (Y. Kobayasi)

121. ***Marasmius androsaceus*** [L.] Fr.

Epicr. Myc. p. 385 (1838); J. Lange, Fl. Ag. Dan. **2**: 27 pl. 48 A (1936); Möller, F. Faeröes **1**: 265 fig. 125 B (1945); M. Lange, Macromyc. 2 Greenland Agar. p. 40 (1955).

(Text fig. 40 F,G)

P 3–4 mm in diameter, surface wrinkled striate, grayish with flesh coloured. St 2.5–4 cm long, thinner than 1 mm, rigid, black, smooth. Gills adnate without collar, broad, distant. Basidiospores ovoid or more pip-shaped, 6–7×3–4 μ.

Hab. On dead branch of *Alnus crispa*, Umiat, Aug. 13. (Specimen No. 27)

Distr. Europe, Faeröes, Greenland, E. Asia (Japan), N. America. Horse hair blight was found on the same branch. (Y. Kobayasi)

122. ***Omphalina umbratilis*** Fr. var. ***minor*** Fr.

sensu Möller, F. Faeröes **1**: 256 fig. 120 B (1945); Favre, Champ. Alp. Suisse p. 50 fig. 28 pl. 4 fig. 2 (1955). (Plate 9F; Text fig. 42 A-C)

P 5–14 mm in diameter, convex, almost flat in center, very thin, almost membranous at edge, surface coarse or smooth, distinctly striate, hygrophanous, dark purplish brown. St 15–20×1.5–2.5 mm, attenuated downwards, solid, concolorous, finely hairy, fibrillose silky. Gills adnate or decurrent, distant, entirely grayish. Pleuro- and cheilocystidia

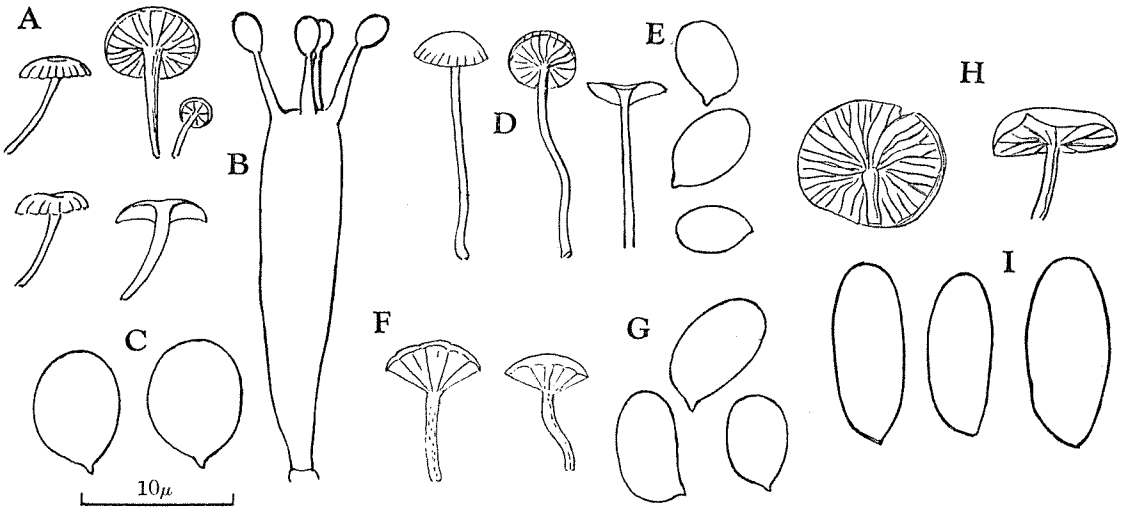

Fig. 42. A-C. *Omphalina umbellata* v. *minor* A. Fructifications (×1) B. Basidium C. Basidiospores D,E. *Omphalina* sp. D. Fructifications (×2/3) E. Basidiospores H,I. *Pleurotus* sp. H. Fructifications (×2/3) I. Basidiospores.

very few, clavate, large. Basidia 1, 2, 3, 4-spored, 18–22×4–6μ. Basidiospores ovoid, 7–9×5–6.5μ, 1-guttulate, hyaline.

Hab. Gregarious on wet peat soil, Barrow, Aug. 7. (Specimen No. 231)

Distr. Europe (Alpine), Faeroes.

It is very interesting that this arctic fungus has some resemblances with *Omphalina antarctica* Singer found in South Shetlands of Antarctica. (Y. Kobayasi)

123. ***Omphalina*** sp. (Text fig. 42 D,E)

P 3–12 mm in diameter, convex at first, then slightly umbilicate, striated at margin, pale ochraceous, darker at center, flesh very thin, margin entire. St 15–30×0.8–1.5 mm, very slender, stuffed, smooth, concolorous. Gills decurrent, edge entire, white. Basidia 4-spored, 18–20×4–5μ. Basidiospores ovoid, 4.5–6×3–3.5μ, smooth, hyaline.

Hab. Gregarious among mosses, Umiat, Aug. 13. (Specimen No. 28)

(Y. Kobayasi)

124. ***Omphalina*** sp. (Text fig. 42 F, G)

P 5–7 mm in diameter, convex, thin, almost flat or slightly umbilicate, radially sulcate, grayish brown, entirely covered with fine felty hairs; hair composed of simple hypha, 2–4μ thick, septate, branched, warty, pale brown. St 6–7 mm long, thinner than 1 mm, fleshy, curved, equal, covered with cinereous felty hairs, dark brown. Gills decurrent, distant, pale cinereous. Basidia 4 (rarely 1, 2, 3)-spored, 20–25×4–5μ. Basidiospores variable in size, ovoid or ellipsoid, 6–7.5×3.5–4.5μ.

Hab. Gregarious on peat soil, L. Peters, Aug. 19. (Specimen No. 90) This seems to have some resemblances to *Omphalina griseo-pallida.* (Y. Kobayasi)

125. ***Pleurotus*** sp. (Text fig. 42 H,I)

P 1.5–2.4 cm in diameter, expanded almost flat, margin slightly undulated, surface

smooth, slightly viscid, pale ochraceous. St short, slender, centric or excentric, 1–1.5 cm long, 2 mm thick, almost equal, stuffed, surface finely tomentose, with grayish brown short hairs, upper part glabrous, paler, almost white. Gills sinuate, slightly distant, mixed with plenty short gills, pale ochraceous. Basidiospores oblong, 10–12×4–4.5μ, hyaline.

Hab. Scattered on dead branches of *Salix alaxensis*, C. Thompson, Aug. 16. (Specimen No. 54) (Y. Kobayasi)

Amanitaceae

126. ***Amanita vaginata*** [Bull. ex Fr.] Quél.

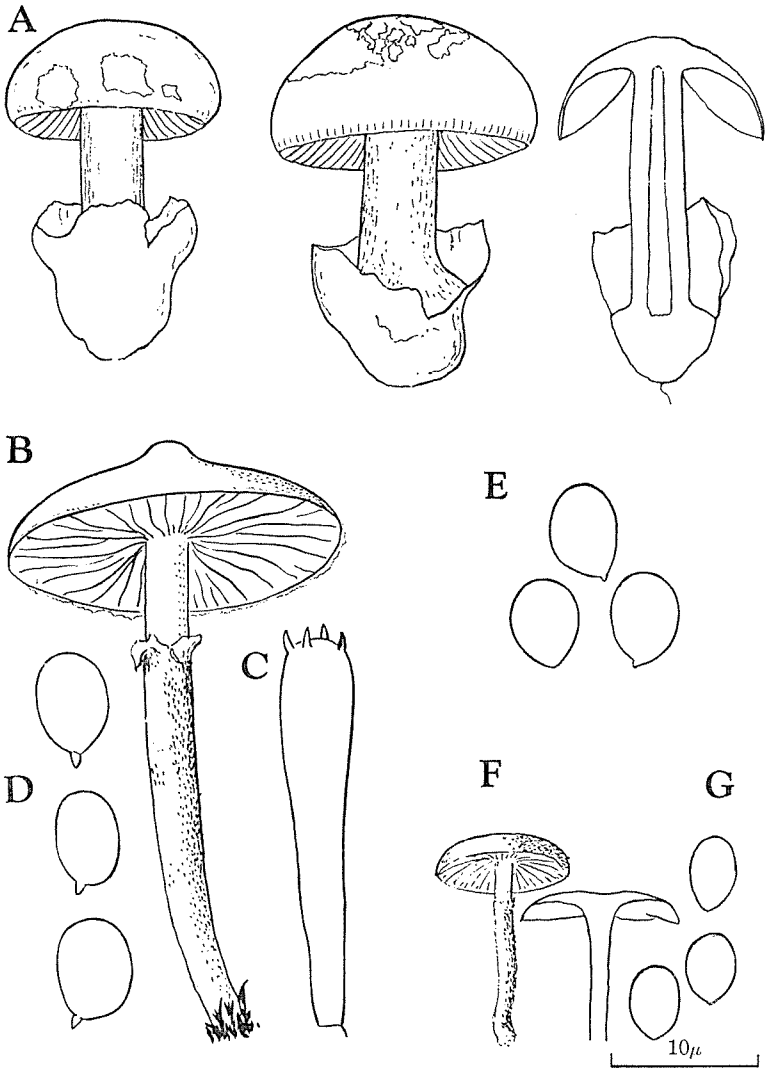

Fig. 43. A. *Amanita vaginata* Fructifications (×2/3) B-D. *Cystoderma* sp. (×2/3) B. Fructifications C. Basidium D. Basidiospores E. *Cystoderma amianthinus* E. Basidiospores F,G. *Lepiota echinella* v. *eriophora* F. Fructifications (×1) G. Basidiospores.

Champ. Jura Vosg. **1**: 66 (1872); J. Lange, Fl. Ag. Dan. **1**: 17 pl. 6 fig. B (1940); M. Lange, Macromyc. 2 Greenland Agar. p. 52 fig. 29 (1955). (Plate 3D; Text fig. 43 A)

P 3.6–4.5 cm in diameter, surface pale ochraceous gray, smooth, glossy, with cinereous, membranaceous fragments of universal veil. St 5–5.5 cm long, 8–12 mm thick, hollow, volvate at base, surface white, with fine tomentose scales; volva membranaceous, white. Gills adnexed, dense, white. Basidiospores globose, 10–12 μ in diameter.

Hab. Solitary among mosses in heath, L. Peters, Aug. 19. (Specimen No. 64)

Distr. Arctic regions (Greenland, Iceland, Lappland), temperate region of N. Hemisphere, Australia.

As shown in the illustrations by M. Lange, this arctic fungus has some special features such as low fruitbodies, thick stipes and remnants of velum on pileus. From St. Laurence Island of Alaska, this had been recorded in the name *Amanitopsis vaginata* var. *livida* Pk. (Y. Kobayasi)

Agaricaceae

127. ***Cystoderma amianthinum*** (Fr.) Fayod

Prodrome Ann. Sc. Nat. Bot. **7** (9): 351 (1887); M. Lange, Macromyc. 2 Greenland Agar. p. 56 (1955).

Syn. *Lepiota amianthina* Fr.; J. Lange, Fl. Ag. Dan. **1**: 39 pl. 15C (1940).

(Text fig. 43 E)

P 2–2.5 cm in diameter, low convex, without warts, granulate or farinaceous, pale ochraceous or alutaceous, margin radially furrowed, with membranous particles of universal veil at margin. St 2.5–3.5 cm long, 3–4 mm thick, almost equal, stuffed, granulate, concolorous, with felty scales up to narrow obscure ring, paler and smooth above. Gills adnexed or more adnate, narrow, pale ochraceous, with entire edge. Basidia 4-spored, 20–25 $\times$ 6–7 μ. Basidiospores ovoid, 4.5–6 $\times$ 4–5 μ, hyaline, weakly amyloid.

Hab. Among mosses, L. Peters, Aug. 19. (Specimen No. 74)

Distr. Europe, Greenland, Iceland, N. America. (Y. Kobayasi)

128. ***Cystoderma*** sp. (Plate 4C; Text fig. 43 B-D)

P 3.5–6 cm in diameter, convex with incurved margin, expanded umbonate, with thick flaps of veil remnants at margin, margin almost entire, not rimose, surface dull, finely tomentose with fine granulose scales, almost smooth by naked eyes, frequently radially grooved, wholly deep ochraceous to ferruginous (like *Lactarius volemus*), growing xanthine orange-amber brown when dried, dark brown to almost black with additions of KOH sol.; odor not distinct. St 5–10 cm long, 8–10 mm thick, equal, solid, basal part not thickened, white, floccose; about 3/4 of stipe from base surrounded with sheath, upper part of which ending in ring; sheath orange brown, densely covered with fine

greyish brown scales; ring fragile, irregularly lobed, under surface orange brown, upper surface almost white; upper part of stipe fibrillose, pale brown, paler or almost white toward apex. Gills sinuate, moderately broad, almost white, edges even.

Cuticle of pileus composed of chained, globose to ellipsoid, ochraceous cells (19–40×15–20 μ) and cylindric hyphal cells (10–13 μ thick). Gill trama composed of parallel hyphae (4–10 μ thick). Pleurocystidia and Cheilocystidia not differentiated. Sphaerocyst (epithelium) intermixed with elongated elements on surface of pileus. Basidia 4 (rarely 2)-spored, 18–21×5–6 μ. Basidiospores ovoid or ellipsoid, 5–7×3–4 μ (dried material), 6–7.5×4–4.5 (5) μ (immersed material), smooth, white, weakly amyloid.

Hab. Growing fasciculated among sedges in swampy place, Umiat, Aug. 13. (Specimen No. 37)

The present fungus seems to be distinct from *Cystoderma cinnabarinum, C. fallax* and *C. poderosum*, shown in the monographic studies of *Cystoderma* by Smith and Singer (1945). (Y. Kobayasi)

129. ***Lepiota echinella*** Quél. var. ***eriophora*** (Peck) J. Lange

Fl. Ag. Dan. **1**: 27 pl. 12 fig. H (1940). (Text fig. 43 F,G)

P 1.5–2 cm, convex, then almost flat, pale ochraceous to alutaceous, densely covered with fine pyramidal, alutaceous scales. St. 3–3.5 cm long, 2–3 mm thick, stuffed, clad with felty ochraceous-salmon coloured scales up to obscure, narrow ring, farinaceous upwards. Gills adnexed, narrow, distant, pale creamy. Basidiospores ovoid or ellipsoid, 4.5–5.5×2.5–3 μ, smooth, hyaline.

Hab. Scattered or grouped among mosses, L. Peters, Aug. 20. (Specimen No. 68)

Distr. Europe, N. America.

Compared with the fungus in temperate region, the pileus of the arctic one seems to be smaller and paler. (Y. Kobayasi)

Coprinaceae

130. ***Coprinus angulatus*** Peck

Report 26, State Mus. N.Y. **60** (1877); Sacc. Syll. Fung. **5**: 1113 (1887); J. Lange, Fl. Ag. Dan. **4**: 115 pl. 157 D (1939). (Text fig. 44 A-C)

P 3–5 cm in diameter, thin membranous, with 14–16 radial striations, pale brown, farinaceous especially at center. St 13–16×0.3–0.4 mm, bulbous at base, transparent, hyaline, glabrous, downwards farinaceous. Gills 14–16, adnexed or free, remote, almost black. Basidia 4-spored, 20–22×12–13 μ. Basidiospores pentangular with prominent apical wart, ellipsoid in side view, 7.5–9.5×5–7 μ, thick-walled, deep brown.

Hab. Gregarious on lemming's dung dropped among *Sphagnum*, near Eskimo Village, Barrow, Aug. 10. (Specimen No. 21)

Distr. Europe, N. America.

The arctic fungus is very small, compared with that of temperate region. (Y. Kobayasi)

131. ***Coprinus atramentarius*** [Bull. ex Fr.] Fr.

Epicr. Myc. p. 243 (1838). (Plate 12 D)

Hab. Scattered on swampy peat soil under *Salix* thicket along Colville River, Umiat, Aug. 11. (Specimen No. 22)

Distr. Almost cosmopolite.

As shown in the photograph, the fruitbody of this arctic fungus is small in size and has short stipes. (Y. Kobayasi)

132. ***Coprinus ephemerus*** Fr.

Epicr. Myc, p. 252 (1838); J. Lange, Fl. Ag. Dan. **4**: 117 pl. 160 fig. H (1939). (Text fig. 44 D,E)

P 1.5 cm in diameter, reflexed in maturity, thin membranous, with 45–50 radial striations, almost glaborous, pale ochraceous brown. St 40×1 mm, equal, pure white. Gills adnexed, narrow, moderately remote, black. Basidiospores ellipsoid, 12–15×7–8 μ, dark brown.

Hab. Growing singly on decaying branch in *Salix alaxensis* copse, C. Thompson, Aug. 15. (Specimen No. 59)

This arctic fungus agrees to *Coprinus ephemerus* f. *saturatus* J. Lange in the size of pileus and habitat. (Y. Kobayasi)

133. ***Coprinus lagopus*** Fr.

Epicr. Myc.. p. 250 (1838); J. Lange, Fl. Ag. Dan. **4**: 110 pl. 158 fig. F (1939).

Hab. On decaying logs in dark and wet interior of abandoned hut of Eskimo, C. Thompson, Aug. 16. (Y. Kobayasi)

134. ***Coprinus velox*** Godey

in Gill. Ch. France p. 614 (1878); Sacc. Syll. Fung. **5**: 1107 (1887); J. Lange, Fl. Ag. Dan. **4**: 114 pl. 159 C (1939). (Text fig. 44 F-H)

P minute, 2–2.5 mm in diameter, convolute, pallid or almost white, surface furfuraceous, with globose or ellipsoidal cells which are granulate, 20–33×26–33 μ, white. St very long, 0.2–0.3 mm thick, downwards incrassate, transparent, pale grayish, glabrous except for villose base, not rooting, without ring. Gills 55–65 in number, adnexed, black, rolled up after maturity. Paraphyses vacuole-like, 12–18 μ in diameter, hyaline. Basidia 4-spored, clavate, 18–20×5–6 μ. Basidiospores ellipsoidal, 7–8.5×4–4.5 μ, dark purplish brown.

Hab. On moose dung, collected on Aug. 19, found on Oct. 27, L. Peters. (Specimen No. 103)

Distr. Europe. (Y. Kobayasi)

135. ***Psathyrella atomata*** (Fr.) Quél.

Champ. Jura Vosg. **1**: 153 (1872); Bres. Icon. Myc. **18**: pl. 889 fig. 1 (1931).

Syn. *Psathyra atomata* (Fr.) J. Lange, Fl. Ag. Dan. **4**: 102 pl. 156 f,c (1939).

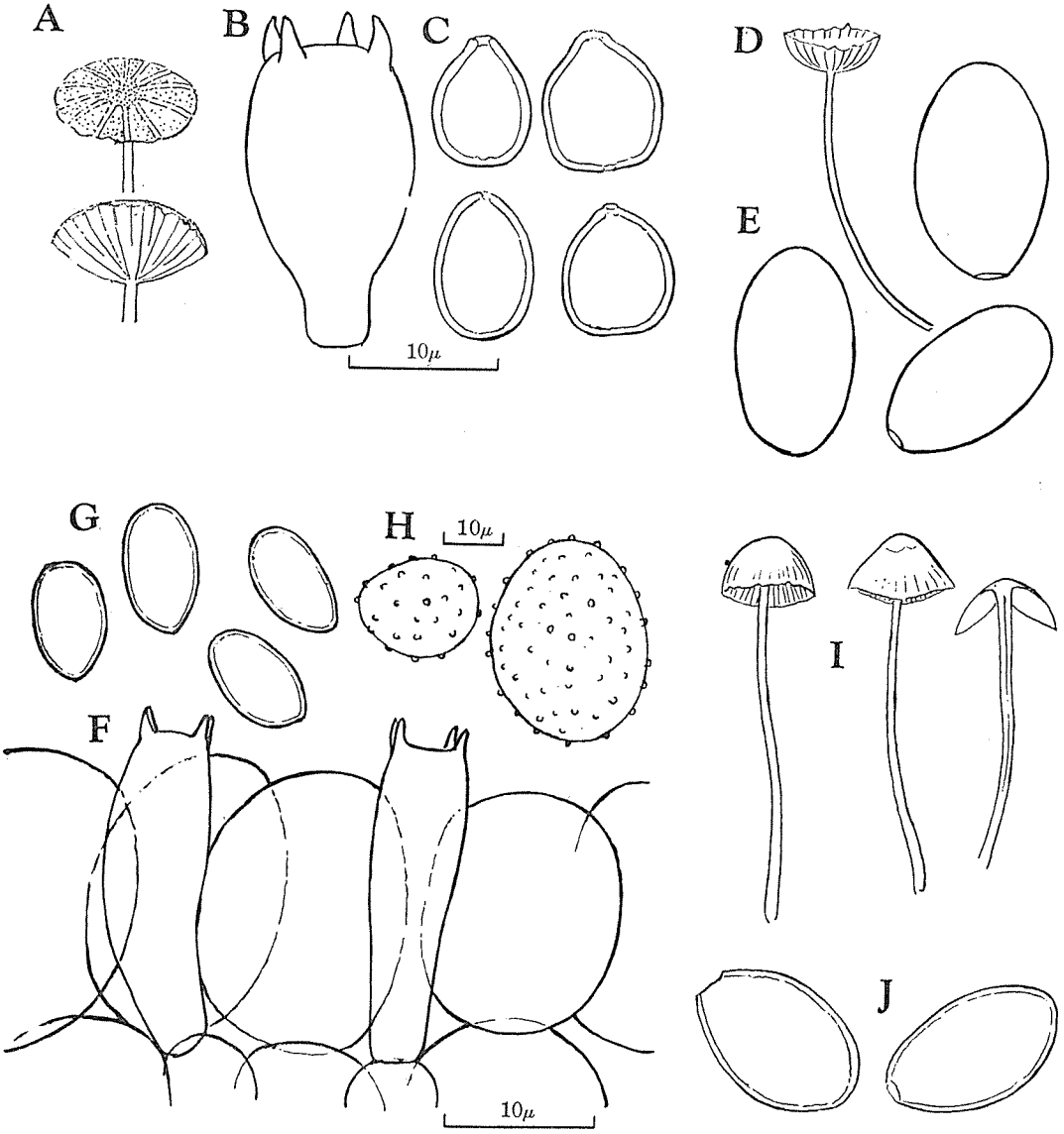

Fig. 44. A-C. *Coprinus angulatus* (×3) A. Fructifications B. Basidium C. Basidiospores D, E. *Coprinus ephemerus* D. Fructification (×2/3) E. Basidiospores F-H. *Coprinus velox* F. A part of hymenium G. Basidiospores H. Free cells on pileus I, J. *Psathyrella atomata* I. Fructification (×2/3) J. Basidiospores.

(Text fig. 44 I,J)

P 12–17 mm in diameter, campanulate or conical, micaceous, smooth or cracked into irregular patches, radially striated, silvery gray or pale ochraceous gray, pale stramineous in center. St slender, rather tall, 4.5–6.5 cm long, 1.5–2 mm thick, smooth, hollow, whitish or pale ochraceous. Gills adnate, broad, moderately crowded, deep purplish brown. Basidia 27–30×10–11 μ. Basidiospores ovoid, 11–12.5×6–7.5 μ, purplish brown.

Hab. Scattered among mosses of tundra, L. Peters, Aug. 19. (Specimen No. 96)

Distr. Europe, E. Asia (Japan), N. America. (Y. Kobayasi)

Strophariaceae

136. ***Flammula*** sp. (Plate 12C; Text fig. 45 A,B)

P 2–3.2 cm in diameter, convex or hemisphaerical, expanded to almost flat, smooth, slightly viscid, somewhat glossy, deep alutaceous.

St 3.5–4 cm long, 4–8 mm thick, curved and slightly contorted, downwards slightly incrassate, fibrillose, pale alutaceous or whitish, with ring on upper part; ring distinct, fibrillose, covering hymenium when young, alutaceous. Gills adnate, broad, not so compact, ochraceous, entire at margin. Basidiospores ovoid or citriform, 9.5–12×5.5–7 μ, smooth, brown. Pleurocystidia present, clavate.

Hab. Solitary or fasciculated on peat soil, Barrow, Aug. 19. (Specimen No. 19) (Y. Kobayasi)

137. ***Naematoloma squamosum*** [Pers. ex Fr.] Singer

Lilloa **22**: 503 (1951).

Syn. *Stropharia squamosa* [Pers. ex Fr.] Quél., Champ. Jura Vosges **2**: 348 (1873); Konrad et Maubl. Icon. Sel. Fung. **1**: 52 (1930); J. Lange, Fl. Ag. Dan. **4**: 66 pl. 141 D (1939). (Plate 2A, 7C; Text fig. 45 C,D)

P 2.5–5 cm in diameter, conic or broadly umbonate, with slightly incurved margin, then expanded convex or almost flat, surface glossy, somewhat viscid, ochraceous brown, hygrophanous in marginal part, then growing vinaceous gray from margin, dark vinaceous brown when dried, with whitish membranaceous scales of remnant velum on marginal part. St slender, 6–8 cm long, 4–6 mm thick, equal, fragile, hollow, grayish, fibrillose with dense hairy whitish scales up to the ring, striated, farinaceous above; ring on upper part of stipe, hairy, indistinct. Gills adnexed, ventricose with decurrent denticles, pale grayish brown, becoming dark bistre when dried. Pleurocystidia clavate, 40–50×12–14 μ, hyaline, changing to orange yellow with addition of NH_4OH. Basidia 4-spored, 28–32×9–10 μ. Basidiospores obovate to elliptical 14–15.5×7–8 μ, ochraceous brown.

Hab. Growing gregariously or fasciculated on bare peat soil, Umiat, Aug. 13 (Specimen No. 26), C. Thompson, Aug. 15.

Distr. Europe, N. America. (Y. Kobayasi)

138. ***Pholiota*** sp. (Text fig. 45 E., F)

P 6–16 mm in diameter, convex, frequently umbonate, with slightly incurved margin, hygrophanous, somewhat viscid, amber-coloured. St 15–30×2–3 mm, equal, fibrillose, stuffed, grayish ochraceous, with membranous, narrow ring on upper part.

Gills sinuate, broad, pale grayish ochraceous. Basidiospores ovoid, 8.5–12×6.5–7.5 μ, ochraceous or brown.

Hab. Growing singly among mosses, Barrow, Aug. 5 and Umiat, Aug. 13. (Specimen No. 9) (Y. Kobayasi)

139. ***Psilocyce atrorufa*** [Schaeff.] Fr.

Epicr. Myc. p. 230 (1836); Bresadola, Icon. Myc. **18**: pl. 865 (1931).

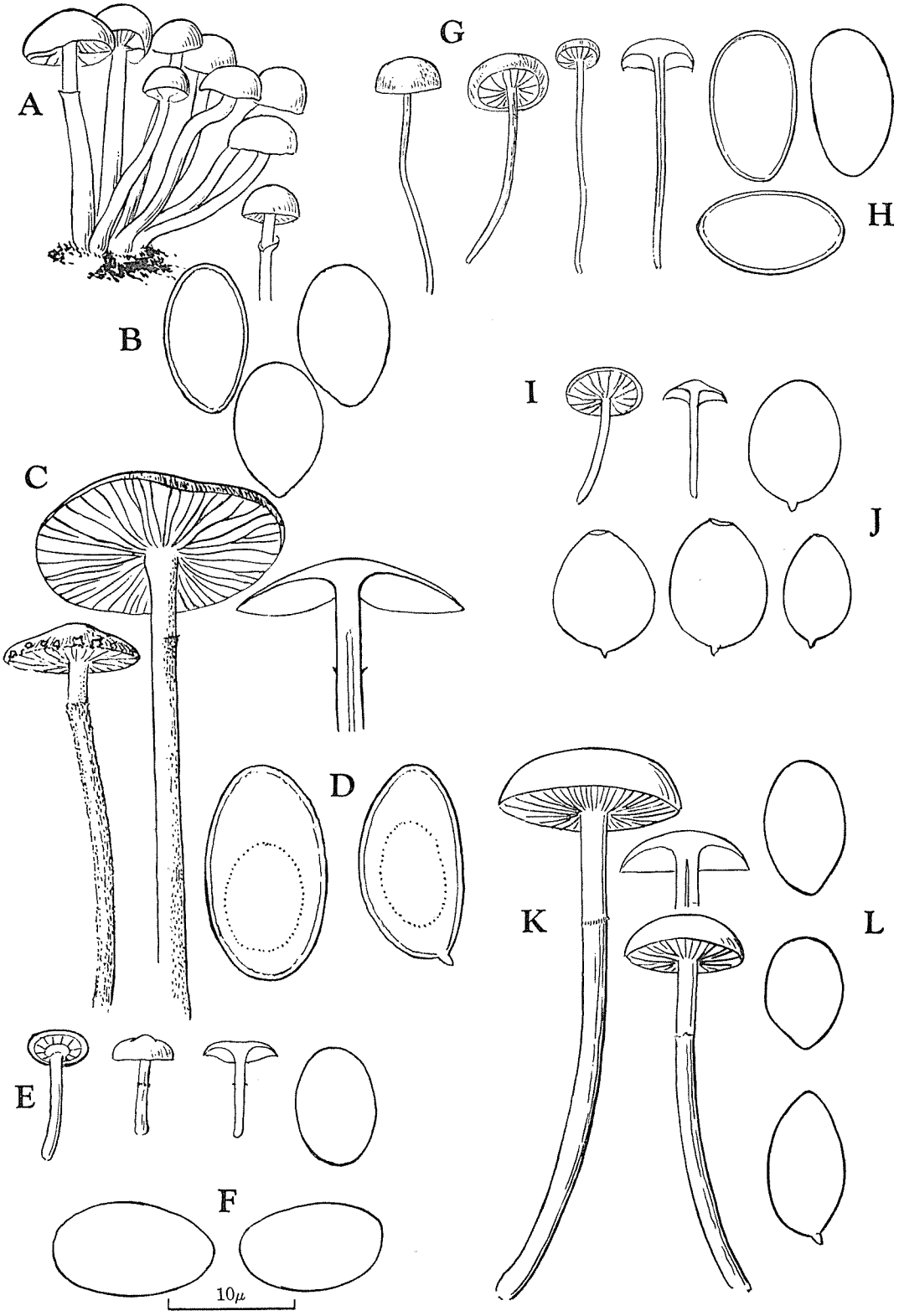

Fig. 45. A,B. *Flammula* sp. A. Fructifications (×1) B. Basidiospores C,D. *Naematoloma squamosum* C. Fructifications (×2/3) D. Basidiospores E,F. *Pholiota* sp. (×2/3) E. Fructifications F. Basidiospores G,H. *Psilocybe* sp. G. Fructifications (×1) H. Basidiospores I,J. *Psilocybe atrorufa* I. Fructifications (×2/3) J. Basidiospores K,L. *Galerina* sp. K. Fructifications (×1) L. Basidiospores.

Syn. *Deconia atrorufa* [Schaeff.] Sacc.; Möller, F. Faeröes **1**: 189 fig. 85 (1945).
Geophila atrorufa [Schaeff.] Quél.; Favre, Champ. Alp. Suisse p. 153 (1955).
Psilocybe montana (Fr.) Kummer; M. Lange, Macromyc. 2 Greenland Agar. p. 66 (1955). (Plate 12B; Text fig. 45 I,J)

P 10–17 mm, convex, sometimes umbonate, almost smooth, margin entire, dark purplish brown, isabeline when dried; flesh grayish brown. St 15–25×2–2.5 mm, equal, smooth, concolorous or paler. Gills adnate or decurrent, somewhat distant, mixed with short ones, broad, concolorous, edge denticulate. Basidia 4-spored, 20–25×7–8 μ. Basidiospores ovoid, 7–9×4.5–7.5 μ, apically with distinct germ pore, purplish brown.

Hab. Gregarious on wet peat soil, Barrow, Aug. 6 (Specimen No. 10); Umiat, Aug. 13.

Distr. Europe, S. Africa, Australia. (Y. Kobayasi)

140. ***Psilocybe*** sp. (Text fig. 45 G,H)

P 0.5–1 cm in diameter, convex, non hygrophanous, dull, partly cracked, pale ochraceous, gradually pale olivaceous toward margin, with membranous velum at margin. St 2–3 cm long, 1–1.5 mm thick, with obscure pale grayish hairy ring white, fine scaly or tomentose above, pale brown, fibrillose below. Basidisopores ovoid, slightly asymmetric, 9–11×5.5–7μ, purplish brown.

Hab. Gregarious among mosses on peat soil, Barrow, Aug. 7. (Specimen No. 16)

In appearances, this looks like small strain of *Naematoloma fasciculare*.

(Y. Kobayasi)

Cortinariaceae

141. ***Cortinarius*** (Myxacium) ***alpinus*** Boud.

Bull. Soc. Bot. Fr. (1894); 246 et Bull. Soc. Myc. (1895): 27 pl. 2 fig. 1; Favre, Champ. Alp. Suisse p. 125 fig. 112 (1955); M. Lange, Macromyc. 3 Greenland Agar. p. 29 fig. 13 (1957). (Plate 2C, 7B, 10A; Text fig. 46 A,B)

P 1.5–2.5 cm in diameter, convex, frequently low umbonate, margin almost entire, surface distinctly slimy, brown to dark brown, glossy when dried, frequently discolouring to ochraceous toward margin. St very short and thick, 10–30×7–9 mm, firm, stuffed, viscid, whitish, maculated with brownish tint, finely floccose or scaly, with white arachnoid cortina above, leaving fine ring-like remnants. Flesh whitish. Gills adnate, broad, ochraceous, without cheilocystidia. Basidia 4-spored, 35–40×10–11μ. Basidiospores ovoid, rarely inaequilateral, 10–13×6.5–7.5μ, ochraceous, with irregular warts.

Hab. Gregarious among heath of *Salix rotundifolia* and other grasses, Barrow, Aug. 4. (Specimen No. 8)

Distr. Swiss, Lappland, Greenland, Spitsbergen.

According to M. Lange, this seems to be a truly specialized member of the arcto-alpine flora, apparently confined to *Salix herbacea*. In Barrow, this fungus grows among dry heath of *Salix rotundifolia* and forms rarely the fairy ring, with stipes hidden

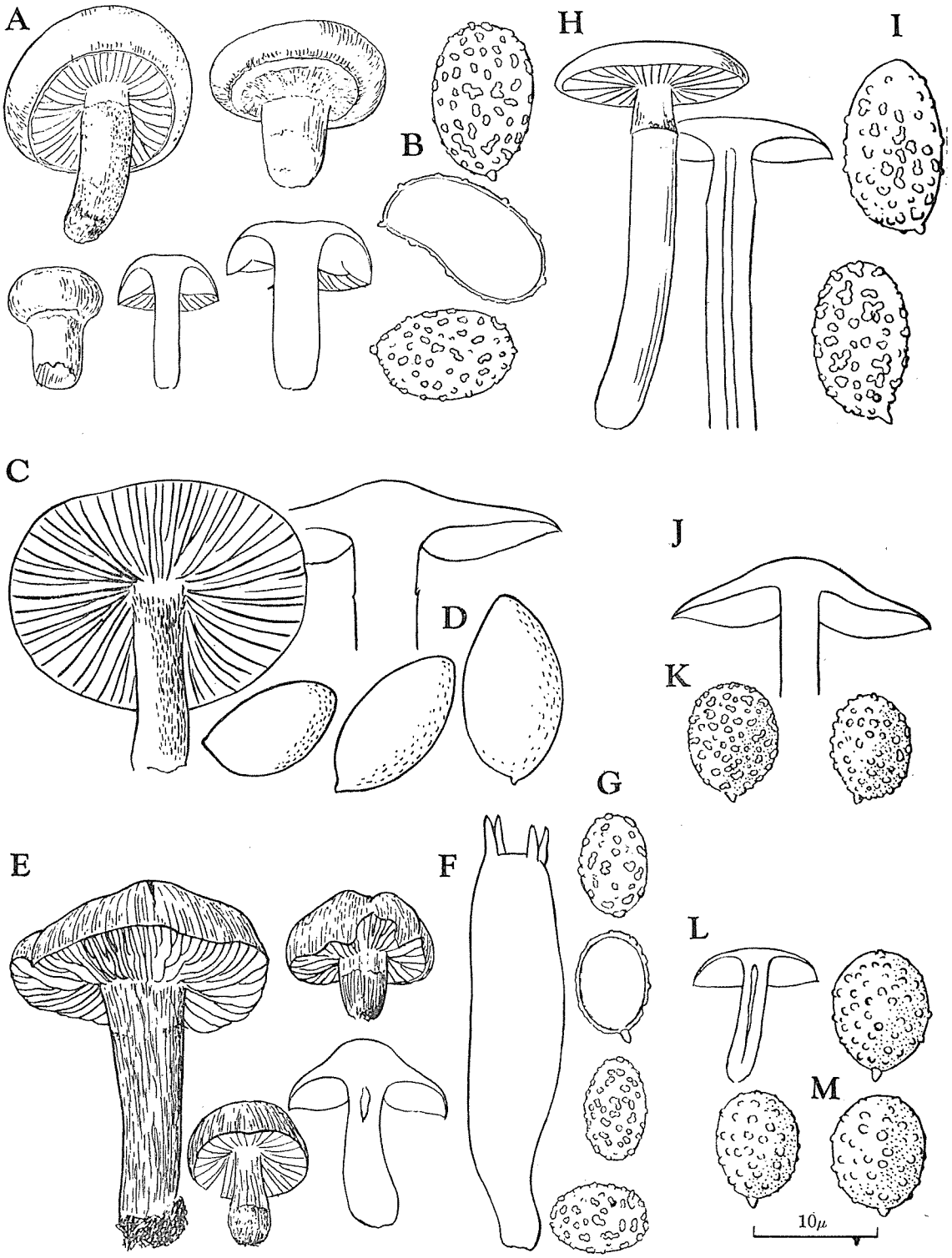

Fig. 46. A,B. *Cortinarius alpinus* A. Fructifications (×1) B. Basidiospores C,D. *Cortinarius* sp. C. Fructifications (×3/4) D. Basidiospores E-G. *Cortinarius cinereoviolaceus* E. Fructifications (×3/4) F. Basidium B. Basidiospores H,I. *Cortinarius* sp. H. Fructifications (×2/3) I. Basidiospores J,K. *Cortinarius decoloratus* J. Section of Fructification K. Basidiospores L,M. *Galerina* sp. L. Section of Fructification (×2/3) M. Basidiospores.

wholly among heath. Perhaps, this may be the mycorrhizal fungus coexisting with *Salix*.

Salix rotundifolia is distributing in Arctic Asia, Novaya Zemlya, Aleutian and Arctic Alaska, and, on the other hand, *Salix herbacea* in Canada, Greenland, artctic and alpine regions of Europe. It is interesting that these two palnts are related to each other and have the mycorrhiza of common fungus. It is reasonable that this fungus will be found also in Siberia in near future. (Y. Kobayasi)

142. ***Cortinarius*** (Inoloma) ***cinereoviolaceus*** (Fr.) J. Lange

Fl. Ag. Dan. **3**: 28 pl. 91C (1938). (Plate 10 B; Text fig. 46 E-G)

P 2.5–4 cm in diameter, convex, broadly umbonate, with incurved serrate margin, dull, not viscid, dry, violaceous brown, finely fibrillose, covered with arachnoid, white, silky cortina when young, pale grayish at center. St thick, 2–3 cm long, 5–8 mm thick, stuffed, downwards incrassate to 13 mm, frequently with inconspicuous ring-like appendages, surface fibrillose, pale violaceous gray or whitish, downwards floccose, pale ochraceous; flesh dark purplish gray. Gills sinuate, slightly distant, broad, mixed with short ones, violaceous fuscous, with entire ridges. Basidia 4-spored, 27–36×7.5–8μ. Basidiospores small, ovate, 6.5–8×4–5.5μ, pale brown, with irregular warts.

Hab. Gregarious or frequently fasciculated on peat soil, Barrow, Aug. 4. (Specimen No. 2)

Distr. Europe.

The arctic fungus seems to be characteristic in smaller fructifications and umbonate pileus. (Y. Kobayasi)

143. ***Cortinarius*** (Dermocybe) ***decoloratus*** Fr.

Epicr. Myc. p. 270 (1836); J. Lange, Fl. Ag. Dan. **3**: 31 pl. 86 D (1938); M. Lange, Macromyc. 3 Greenland Agar. p. 30 (1957). (Plate 10C; Text fig. 46 J,K)

P 2.5–4.5 cm in diameter, convex, slightly umbonate, margin almost expanded, surface smooth, dry, neither striated nor scaly, clay-coloured, dark brown at center. St comparatively short, 25–50×4–8 mm, curved, equal, stuffed, not viscid, white silky, finely fibrillose. Gills adnate, crowded, broad, edge slightly eroded or entire, concolorous or darker, becoming grayish brown when dried. Cystidia none. Basidia 4-spored, 28–32×7–8μ. Basidiospores subglobose or ovoid, 7.5–9×6–7μ, ochraceous.

Hab. Scattered and hidden among heath of *Cassiope tetragona, Empetrum nigrum* and lichens, C. Thompson, Aug. 16. (Specimen No. 72)

Distr. Europe, Greenland.

The arctic fungus is smaller in size and has shorter stipes than those of the fungus in Europe. (Y. Kobayasi)

144. ***Cortinarius*** (Inoloma) sp. (Plate 10 D; Text fig. 46 C,D)

P (3)–5–6 cm in diameter, expanded broadly umbonate, margin almost expanded, entire, thin, somewhat viscid at first, then dry, ochraceous, with very fine brown,

adpressed scales and fine wrinkles, almost smooth by naked eyes, becoming whitish when dried. St 4–5 cm long, 8–15 mm (commonly 10 mm) thick, curved, equal, stuffed, with hairy, inconspicuous ring near upper end, felty cinereous above, densely with fine brown, recurved scales downwards. Gills adnexed, crowded, ochraceous. Basidia 4-spored, 20×4–5μ. Basidiospores citriform, 10–13.5×6–7.5μ, obscurely coarse, ochraceous.

Hab. Scattered among heath of *Betula glandulosa*, C. Thompson, Aug. 16. (Specimen No. 56) (Y. Kobayasi)

145. ***Cortinarius*** (Myxacium) sp. (Text fig. 46 H,I)

P 4 cm in diameter, low convex, viscid, without striations, ochraceous, dark brown at center, edge even, glossy when dried. St comparatively long, 4–7 cm long, 1–1.2 cm thick, equal, smooth, viscid, white, with hairy, inconspicuous ring near apex; flesh white. Gills adnate, moderately broad, ochraceous; cheilocystidia none. Basidia 4-spored, 18–42×11–13μ. Basidiospores large, citriform, 11–12.5×7–8μ, ochraceous, irregularly warted.

Hab. Solitary among mosses and lichen (*Dactylina arctica*) in heath, L. Peters, Aug. 20. (Specimen No. 70)

This is very near *Cortinarius* (Myxacium) *collinitus* Fr., except for the features of stipe. (Y. Kobayasi)

146. ***Galerina*** sp. (Plate 7C; Text fig. 45 K,L)

P 24–37 mm in diameter, convexed, glossy, slightly viscid, hygrophanous, pale grayish brown, darker in center, flesh thin, accordingly the gills semitransparent from upper surface. St long, slender, 60–99×4.5–5.5 mm, hollow, fibrillose, dark grayish brown, upwards paler and silky, with ring; ring on upper part of stipe, vary narrow, membranous. Gills adnate, broad, moderately crowded, ochraceous brown, growing ferruginous when dried, ridges almost entire or slightly sinuate. Basidia 2-sterigmate, 30–35×9–10μ. Basidiospores elongate ovoid, inaequilateral, 9–10.5×6–7μ, smooth, ochraceous.

Tramal hyphae with clamp connections. Cheilo- and pleurocystidia copious, fusiform, ventricose, 45–60×11–13μ, protruding with long neck.

Hab. Gregarious on swampy peat soil, C. Thompson, Aug. 15. (Specimen No. 57) (Y. Kobayasi)

147. ***Galerina*** sp. (Text fig. 46: L,M)

P 20–25 mm in diameter, convex, not umbonate, finely squamate, almost smooth by naked eyes, dry, non viscid, dull, grayish alutaceous. St comparatively short, 20–30× 4–5 mm, almost equal, hollow, smooth, whitish, without ring. Gills adnate, moderately crowded, broad, mixed with short ones, ferruginous, ridges almost entire. Basidia 4-spored, 22–24×6–7μ. Basidiospores ovoid or ellipsoid, 7.5–10×6–7.5μ, with low warts, ochraceous brown, no purplish tint. Tramal hyphae without clamp connections.

Cheilo- and pleurocystidia rare, fusoid ventricose, 30–35×7–8μ, with long protruding neck.

Hab. Gregarious among mosses in wet tundra, L. Peters, Aug. 20. (Specimen No. 71) (Y. Kobayasi)

Boletaceae

148. ***Boletus edulis*** [Bull.] Fr.

Syst. Myc. **1**: 392 (1821). (Plate 2E)

P convex, attaining to 10 cm in diameter, viscid, glabrous, glossy, ochraceous brown. Flesh white, not changing in colour. Tubes yellowish olivaceous; orifice of pores round, small. St fuscous, distinctly reticulate.

Hab. Growing in wet tundra constituted of *Vaccinium, Ledum, Carex* and mosses, Umiat, Aug. 13.

Distr. Europe, Asia, N. America, Africa, Australia.

The present species has no relation in habitato with *Betula glandulosa.*

(Y. Kobayasi)

149. ***Leccinum scabrum*** (Bull. ex Fr.) S.F. Gray

Nat. Arr. Brit. Pl. **1**: 647 (1821); M. Lange, Macromyc. 3 Greenland Agar. p. 44 (1957).

Syn. *Boletus scaber* Bull., Champ. Fr. p. 319 pl. 132 (1872); Coker et Beers, Bolet N. Carolina p. 25 (1943).

Krombholzia scabra Karst., in Rev. Myc. **3** (9): 17 (1881).

(Plate 4A; Text fig. 47)

P. attaining to 9 cm in diameter, convex, slightly viscid in wet condition, finely areolated without scale, reddish brown, grayish brown or dark brown. Flesh white, tubes 10–15 mm long, adnexed or nearly free to stipe, pores pale ochraceous or almost white, 0.2–0.4 mm in diameter. Stipe almost equal or tapering upwards, pale ochraceous, fibrillose, with minute grayish brown scales or dots. Basidiospores fusiform, 18–20×6–7μ, pale brown.

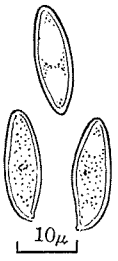

Fig. 47 *Leccinum scabrum* Basidiospores.

Hab. Among mosses in swampy places near *Betula glandulosa*, probably forming mycorrhizas with the roots of the latter, Umiat, Aug. 13. (Specimen No. 98)

Distr. Almost circumpolar, connected with *Betula.*

Greenland (by M. Lange), Iceland (by Larsen, Christiansen), Svalbard (by Hasselman), Lappland (by M. Lange, Y. Kobayasi), Arctic Canada (Herschel Island by Dearness), Arctic Siberia (by Lebedeva).

As for the connections with *Betula glandulosa*, Bacilkov (1955) published very good illustration in his "Outline of geographic distribution of fungi in USSR".

According to Lebedeva, the following four Boletioid species was found in Arctic Siberia.

Boletus (Leccinum) *scabrum*
Boletus edulis
Boletus (Leccinum) *versipellis*
Boletus versipellis var. *arcticus* Lebed.
Boletus (Suillus) *luteus*

One more species *Leccinum testaceoscabrum* Singer is reported from Siberian tundra by Singer and also from Greenland by M. Lange. This is also reported in birch woods of southern Alaska, but not yet found in Arctic Alaska. (Y. Kobayasi)

Russulaceae

150. ***Lactarius pallidus*** [Pers.] Fr.,

Epicr. Myc. p. 343 (1836); Bres. Icon. Myc. **8**: 375 pl. 375 (1928); J. Lange, Fl. Ag. Dan. **5**: 39 pl. 175 E (1940); Neuhoff, Milchlinge p. 133, pl. 7–27, 17–23, 19–5 (1956). (Text fig. 48 A,B)

P 3–7 cm in diameter, flat or slightly infundibuliform, with somewhat incurved margin, without zones, distinctly viscid, alutaceous, growing ochraceous when dried. St thick, 2.5–4×1.5–2 cm, equal or downwards attenuated, stuffed, viscid, concolorous; flesh whitish. Gills narrow, moderately compact, cream-coloured. Cheilocystidia densely packed, 170–75×6–6.5μ, fusiform. Basidia 4-spored, 60–65×7–8μ. Basidiospores subglobose, ovoid or rarely ellipsoid, 9–10.5 (12)×7.5–9.5μ, warted, lined or partly reticulated, hyaline. Milk white, no changing in colour, mild or slightly acrid, never bitter.

Hab. Solitary in heath of *Dryas* and *Salix*.

Distr. Europe, N. America.

Compared with the fungus in temperate region, the arctic fungus has smaller fruitbodies and slightly larger basidiospores. (Y. Kobayasi)

151. ***Lactarius tabidus*** Fr.

sensu J. Lange, Fl. Ag. Dan. **5**: 47 pl. 176 B (1940); M. Lange, Macromyc. 3 Greenland Agar. p. 51 (1957). (Text fig. 48 C.,D)

P 1–1.5 cm in diameter, papillate, slightly depressed at center, rolled downwards at margin, surface finely tomentose and rugulose, alutaceous with orange-yellow tint. St 16–23×4–6 mm, equal or downwards slightly thickened, stuffed, almost smooth, whitish or pale alutaceous. Gills decurrent, narrow, pale ochraceous, with entire margin. Pleurocystidia copious, fusiform, 52–67×8–10μ. Lactiferous hyphae distinct in gill trama and subperidial tissue, 4–5μ thick, milk white. Basidia 4-spored, 36–40×8–9μ. Basidiospores ovoid or subglobose, 7.5–10×6–7μ, hyaline, with low warts or netted.

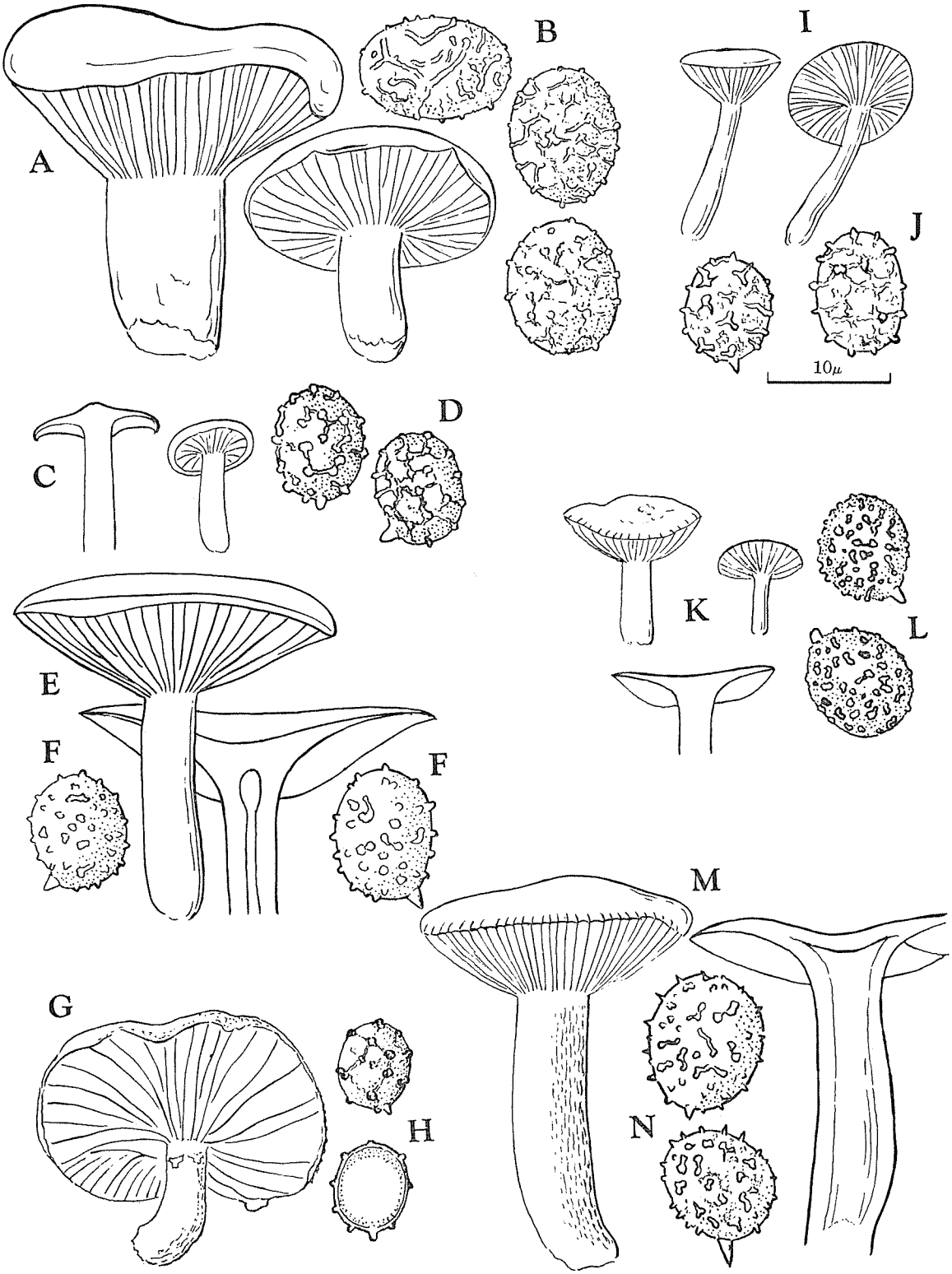

Fig. 48. A,B. *Lactarius pallidus* A. Fructifications (×3/4) B. Basidiospores C,D. *Lactarius tabidus* C. Fructifications (×1) D. Basidiospores E,F. *Lactarius theiogalus* E. Fructifications (×2/3) F. Basidiospores G,H. *Lactarius* sp. (No. 153) G. Fructification (×2/3) H. Basidiospores I,J. *Lactarius* sp. I. Fructifications (×2/3) J. Basidiospores K,L. *Russula fragilis* K. Fructifications L. Basidiospores M,N. *Russula nitida* M. Fructifications N. Basidiospores.

Hab. Scattered in swampy places among *Betula glandulosa* thicket, Umiat, Aug. 13. (Specimen No. 25)

Distr. Europe. (Y. Kobayasi)

152. ? ***Lactarius theiogalus*** Fr.

sensu Konrad et Maubl., Icon. Sel. Fung. **4**: 340 (1924–37).

(Plate 2B; Text fig. 48 E,F)

P 7 cm in diameter, depressed at center, expanded at margin, surface smooth, not viscid, dull, alutaceous, pale grayish brown at center. St 5 cm long, 8–13 mm thick, equal, hollow, almost smooth, white or with yellowish tint. Gills adnexed, pale yellowish, milk white. Basidia 4-spored, $50\times9\mu$. Basidiospores ovoid or ellipsoid, $8–10\times7–7.5\mu$, with pyramidal warts.

Hab. Solitary among mosses, L. Peters, Aug. 20. (Specimen No. 69)

Distr. Europe

The writer has some hesitation to identify the present fungus as *L. theiogalus*, because Neuhoff included *L. theiogalus* sensu Konrad et Maubl. into *L. decipiens* which has reddish tint on the surface of pileus, whereas he included *L. tabidus* sensu Lange into his *L. theiogalus*. (Y. Kobayasi)

153. ***Lactarius*** sp. (Text fig. 48 G,H)

P 7 cm in diameter, slightly infundibuliform, with incurved margin which is brimmed with membranous appendages, surface somewhat viscid, felty, pale cream-coloured or ochraceous. St short, curved, 40×8 mm, downwards incrassate, surface coarse, concolorous. Gills adnate, compact, narrow, yellowish. Milk copious, white, no change in colour. Basidiospores ovoid or globose, $6.5–7\times5–5.5\mu$, low warted, frequently connected.

Hab. Only one fruitbody found among mosses in heath, Umiat, Aug. 13. (Specimen No. 30) (Y. Kobayasi)

154. ***Lactarius*** sp. (Text fig. 48 I,J)

P 15–35 mm in diameter, flat or slightly depressed, without umbo, margin expanded, viscid, smooth, deep ochraceous. St $20–30\times4–5$ mm, equal or attenuated above, concolorous or paler. Gills decurrent, compact, narrow, pale ochraceous. Milk white, mild. Basidiospores ovoid or ellipsoid, $7.5–9\times6–7\mu$, warted, partly reticulated.

Hab. Among mosses, L. Peters, Aug. 19. (Specimen No. 95)

In appearances, this looks like *Lactarius tabidus*, differing, however, in the colour and structure of the surface of pileus. (Y. Kobayasi)

155. ***Russula delica*** Fr.

Epicr. Myc. p. 350 (1838); Schaeffer, Russula Monogr. p. 66 pl. 2 (1952); M. Lange, Macromyc. 3 Greenland Agar. p. 46 (1957). (Text fig. 49)

P concave with expanded or slightly incurved margin, 6–7 cm in diameter, provided with neither hairs nor concentric ring, strongly viscid, pale yellowish or almost white.

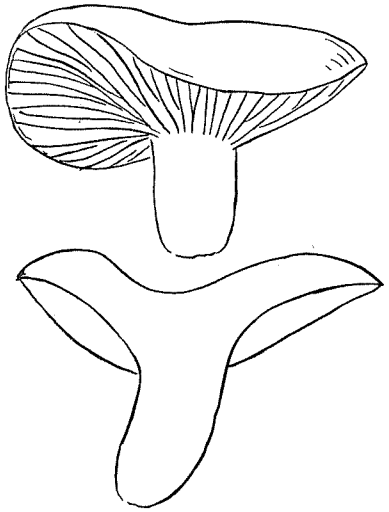

Fig. 49. *Russula delica* Fructifications (×2/3).

St thick, 2–5×1.7 cm, stuffed, strongly viscid, concolorous. Gills slightly decurrent, not so distant, pale creamy, taste mild. Cheilo- and pleurocystidia plenty, large lanceolate, 80–85×15–16 μ. Basidia 4-streigmate, 58–65×11–13 μ. Basidiospores ovoid or subglonose, 10–12×9–10 μ, short spiny, partly reticulated, hyaline.

Hab. Solitary among heath, C. Thompson, Aug. 16. (Specimen No. 52)

Distr. Almost cosmopolite. Greenland, Lappland, Iceland. (Y. Kobayasi)

156. ***Russula fragilis*** [Pers.] Fr.

Epicr. Myc. p. 359 (1838); Schaeffer, Russula Monogr. p. 214 (1952).

(Plate 4 B; Text fig. 48 K,L)

P 1.5–4.5 cm in diameter, expanded almost flat or slightly concave, margin entire, thin, frequently with striation, deep purplish red, darker at center. St 15–40×3–8 mm, equal, stuffed or with narrow lumen, surface silky, sometimes grooved, pure white. Gills adnate or slightly sinuate, pure white, margin entire. Pleurocystidia copious, fusiform, 60–70×10–11 μ. Basidia 4-spored, 42–45×10–11 μ. Basidiospores subglobose or ovoid, 7–9×5.5–7.5 μ, warted or obscurely anastomosed, hardly reticulated.

Hab. Scattered in wet tundra, Umiat, Aug. 13 and L. Peters, Aug. 20. (Specimen No. 23)

Distr. Europe, Asia, N. America, Australia. S. Baffin Island (by Linder).

M. Lange reported *Russula alpina* from Greenland and Spitsbergen, which is very near the present fungus., but the writer will accept the opinion of Schaeffer and Möller to discriminate *R. alpina* from *R. fragilis* by the following characteristics.

Russula alpina (Blytt et Rostrup) Möller et Schaeffff., in Ann. Myc. **38**: 333 (1940); Möller, F. Faeröes **1**: 157 fig. 66 pl. 2d; Schaeff., *Russula* Monogr. p. 222 (1952).

P dark purple, darker in center. St slightly reticulated. Gills whitish with yellowish tint. Spores minutely echinulated, with partial reticulations.

The writer collected one more strain of small *Russula* with reddish stipe in C. Thompson (Specimen No. 23′). The present fungus seems to be the same with or at least very near *Russula altaica* (Sing.) Singer, in Lilloa **22**: 715 (1951). (Y. Kobayasi)

157. ? ***Russula nitida*** Fr.

Epicr. Myc. p. 361 (1838); Schaeffer, *Russula* Monogr. p. 149 pl. 10 fig. 33 (1952).

(Plate 2B; Text fig. 48 M,N)

P 5.5–7 cm in diameter, expanded almost flat, slightly concave and viscid, deep purplish red, darker at center, later faded to yellow, margin sinuated, slightly striated. St 5–6 cm long, 15 mm thick, equal or slightly incrassate downwards, fragile, surface

white, with many fine longitudinal ridges or reticulations; internal texture cottony frequently making cavity, white, turning to pale grayish. Gills adnate or adnexed, moderately distant, narrow, pale lemon-yellow. Basidiospores 8.5–10×7–8μ, ovoid or subglobose, spiny, slightly anastomosing.

Hab. Scattered among heath, L. Peters, Aug. 19. (Specimen No. 66).

Distr. Europe.

The writer identified this as above with some hesitation, because the North American *Russula sphagnophila* Kauffm. seems to be very near this fungus. (Y. Kobayasi)

Lycoperdaceae

158. ***Calvatia cretacea*** (Berk.) Lloyd

Myc. Writ. **5**: 650 fig. 929 (1917); Coker et Couch, Gastr. p. 66 (1928); Linder, Fungi Canad. E. Arctic p. 280 (1947); M. Lange, Macromyc. 1 Gaster. Greenland p. 8 fig. 4b pl. 1 fig. 2 (1948).

Syn. *Lycoperdon cretaceum* Berk. (1878)

Calvatia borealis Th. Fries (1914) (Plate 11 A; Text fig. 50 A,B)

Peridium pyriform, subglobose or depressed, 2.5–5 cm in diameter, pure white or pale ochraceous in young stage, furfuraceous, then broken into pyramidal warts which composed of fascicles of slender spines united at their tips, grayish brown, falling off after maturity, leaving thin, membranous silvery gray inner peridium; sterile base present or none, almost smooth, furfuraceous or plicate. Apical part of peridium irregularly peeled off, forming very large openings. Gleba dark lilaceous brown (Snuff brown). Capillitium brown, 2.5–5μ thick, pitted with thin wall, fragmented into pieces of 85–290μ long. Basidiospores globose, 5–5.5μ in diameter, echinulated, brown, with short pedicel, containing one large oil drop.

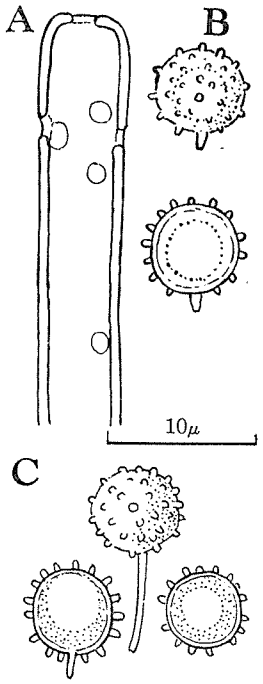

Fig. 50. A, B. *Calvatia cretacea* A. Capillitium B. Basidiospores C. *Lycoperdon umbrinum* Basidiospores.

Hab. Scattered in heath, L. Peters, Aug. 20. (Specimen No. 67)

Distr. Greenland, Spitsbergen, Lappland (as *Calvatia borealis*), Arctic N. America. Bellot Isl (type), Herschell Isl. of Mackenzie River Delta, Baffin Isl., Bernard Harbour, Cape Lisburne, Nome, Anaktuvuk Pass.

One more species of *Calvatia* has been reported from Greenland with the name *Calvatia arctica* Ferdinandsen et Winge (1910), which was taken as the same with *C. cretacea* by Lloyd and others. The writer

takes these two species as distinct to each other by the following characteristics.

C. cretacea	*C. arctica*
Exop. brownish gray, with clusters of spines	Exop. cinnamon. with pyramidal warts
Gleba dark brown	Gleba paler, snuff brown
Chamber of subgleba large	Chamber of subgleba small
Spores dark yellowish brown	Spores pale honey yellow
Capil. darker	Capil. paler

159. ***Lycoperdon umbrinum*** Pers.

Syn. Meth. Fung. p. 147 (1801); Hollós, Gast. Hung. p. 96, 166 pl. 21 fig. 8–10 (1904); Coker et Couch, Gastr. p. 76 pl. 48, 113 (1928); M. Lange, Macromyc. 1 Gaster. Greenland p. 16 pl. 3 fig. 1–2 fig. 4e, c on p. 19 (1948). (Plate 11B; Text fig. 50 C)

Peridium turbinate or obconic with short stalk, 2–2.5 cm in diameger, at first pale grayish brown with whitish basal part, then brownish buff, minutely scurfy, without spine, partly worn away at maturity, exposing silvery gray endoperidium. Gleba purplish brown. Capillitium 2–5μ thick, pitted, brown, fragmented into long threads. Basidiospores spherical, 4.5–5.5μ in diameter (excl. warts), warted, ochraceous; pedicels very long, 7.5–12.5μ long, 1μ lor lesser in thickness, pale ochraceous, falling away from spores after maturity.

Hab. Gregarious among mosses and lichens of dry peat soil along small pond, Umiat, Aug. 12. (Specimen No. 39)

Distr. Europe, Lappland, Iceland, Greenland, E. Asia (Japan), N. America, Mackenzie River Delta. (Y. Kobayasi)

Nidulariaceae

160. ***Crucibulum vulgare*** Tul.

in Ann. Sci. Nat. **3** (1): 89 pl. 6 fig. 9–24, pl. 7 fig. 1, pl. 8 fig. 13–17 (1844); Coker et Couch, Gastr. p. 181 pl. 61, 99, 101, 122 (1928); M. Lange, Macromyc. 1 Gaster. Greenland p. 28 pl. 4 fig. 2 (1948). (Plate 11 C)

Hab. Gregarious on board of abandoned Eskimo hut, C. Thompson, Aug. 15. (Specimen No. 61)

Distr. Cosmopolite. Greenland, Lappland, Iceland, Bear Isl. (Y. Kobayasi)

Sphaeropsidaceae

161. ***Phoma*** sp.

Fast growing, floccose, grayish brown with white margin. Pycnidia globose with a small papilla at the apex, carbonaceous, black, 200–400μ in diam. or more. Conidia oblong, 3–4$\times$1–5–2μ, hyaline. Good growth at 20–24°C. (Specimen No. 205)

One strain (Specimen No. 205) was isolated from the tundra of Umiat (E-2-4).

The present fungus differs from *Phoma terrestris*, isolated from the Alaskan tundra by Cooke & Fournella (1960) in the smaller conidia. (K. Tubaki)

162. ***Septoria pyrolata*** Rostrup

Saertryk of Meddellelser on Grónland **3**: 626 (1888); Palmellee, in Canad. J. Botany **36** (6): 878 fig.-13 (1958). (Text fig. 51)

Hyphae thick-walled, 5–8 μ thick, septate, brown. Pycnidia gregarious or scattered, hemispherical, 100–120 μ in diam., black, glossy. Conidiophore dacryoid, 7–8 $\times$ 2.5–3 μ. Conidia cylindrical, 15–16 $\times$ 2–3 μ, continuous, rounded at both ends, hyaline.

Hab. On dead leaves of *Pyrola grandiflora*, L. Peters, Aug. 19. (Specimen No. 135) Distr. (Y. Kobayasi)

Fig. 51. *Septoria pyrolata* Pycnidium and pycnospores

Melanconiaceae

163. ***Truncatella truncata*** (Lev.) Steyaert (Plate 18 C; Text fig. 52)

Acervuli developed on colony which consists of hyaline to light brown spreading mycelium. Conidia somewhat obclavate, inequilateral, 15–25 $\times$ 5–6μ; usually three septate; central cell dark brown, thick walled, lower cell often broader than upper one; basal cells narrowed to truncate base, rarely bearing nipple-like short central seta; apical cell tapered to apex bearing branched seta; apical seta 10–20 $\times$ 1μ, usually with one to several branches. Good growth at 15–25°C.

Four strains (Specimen No. 129) were isolated from the tundra of L. Peters (B-4-4, B-4-6, B-5-6, 1901-2).

The present characteristic species of *Pestalotia* was described as a conidial stage of *Broomella acuta* Shoemaker et Muller (Canad. Jour. Bot. **41**: 1235, 1963) which was found on stems of *Clematis flammula* in France. The description of these authors agree closely with that in the present isolates. Steyaert proposed the new genus *Truncatella* to embrace this species, known as *Pastalotia truncata* Lév. (1961). (K. Tubaki)

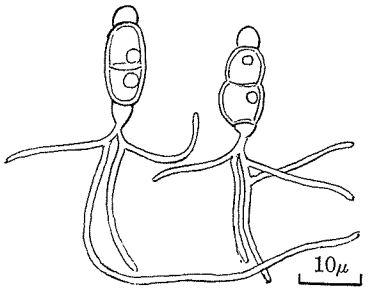

Fig. 52. *Truncatella truncata* Conidia

One more strain is added. Separated from soil D1, C. Thompson, Aug. 16, obs. Nov. 14.

Linder (1947) has already reported this from S. Baffin of Canadian E. Arctic. (Y. Kobayasi)

Pseudosaccharomycetaceae

164. ***Cryptococcus albidus*** (Saito) Skinner

Henrici's Mold, Yeasts and Actiomycetes, 2nd ed., p. 286 (1947)

Syn. *Torula alba* Saito 1934 (Text fig. 53)

Morphological properties: After 3 days in malt extract at 20°C, cells are globose or ovoid (2.3–6.5)×(3.0–8.3)μ, single or in pairs. There is not much growth, a ring and a sediment are formed. After one month at 20°C, a mucous ring and a slimy sediment are formed abundantly, but no pellicle is formed. The cells are surrounded by capsule. After one month at 20°C, the streak culture on malt agar is whitish, moist, mucous, somewhat glistening, soft, smooth, occasionally raised with smooth margin.

Slide culture on potato agar, no pseudomycelium is formed.

Physiological properties:

Oxidative and no fermentating ability, assimilate glucose, galactose, maltose, saccharose, no assimilate lactose, potassium nitrate is not assimilated, ethanol is assimilated, pellicle is not formed, no split arbutin, starch like compounds is formed under appropriate conditions.

Hab. Dung (Peters). (Specimen No. 212) (M. Soneda)

165. ***Cryptococcus diffluens*** (Zach) Lodder et Kreger van Rij

The yeasts, p. 391 (1952).

Syn. *Torulopsis diffluens* Zach

Torulopsis nadaensis Saito et Oda (Text fig. 54)

Morphological properties: After 3 days in malt extract at 20°C, cells are globose or ovoid (3.4–7.4)×(3.4–7.8)μ, single or in pairs. There is not much growth, a thin ring, and sediments are formed. After one month at 20°C, a ring and mucous islets are formed. The cells are sorrounded by capsule. After one month on malt agar at 20°C, the streak is yellowish white to whitish yellow (some strains have pink tinge), smooth, glistening and mucous with smooth margin.

Slide culture on potato agar, not mycelial cells are formed.

Physiological properties: No fermentation, assimilate glucose, galactose, maltose and saccharose, lactose and ethanol are not assimilated, potassium nitrate is assimilated, under appropriate conditions "Starch" is formed, sprit arbutin.

This strain grows slightly at 25°C, and have longer lag phase than type species of *Cr. diffluens*. The other isolates of arctic region of Araska are scarcely different from this strain, in color on streak culture of malt agar and size of cells.

Hab. Soil 2 (Barrow), dung 6 (Barrow), dung 1 (Peters), dung 1 (Umiat).

(M. Soneda)

166. ***Cryptococcus laurentii*** (Kuff.) Skinner var. ***magnus*** Lodder et Kreger van-Rij

The yeasts p. 384 (1952). (Text fig. 55)

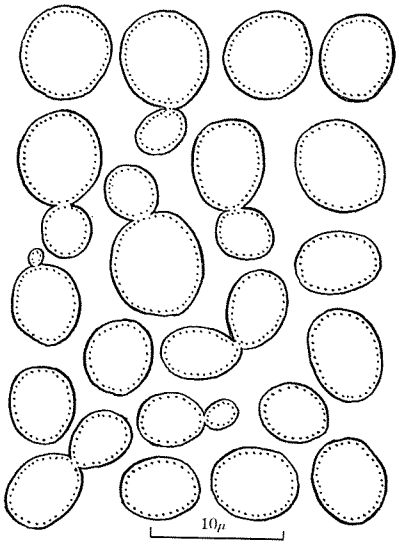

Fig. 53. *Cryptococcus albidus*

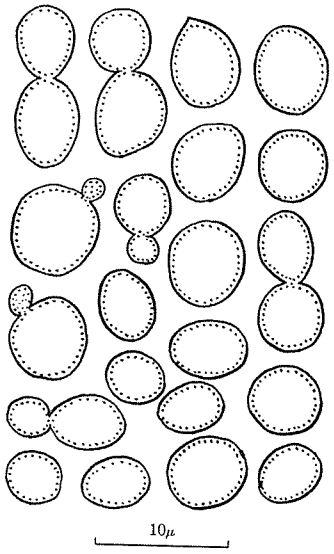

Fig. 54. *Cryptococcus diffluens*

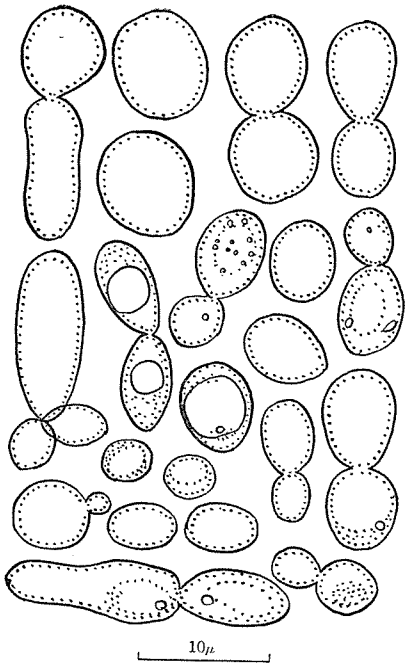

Fig. 55. *Cryptococcus laurentii* v. *magnus*

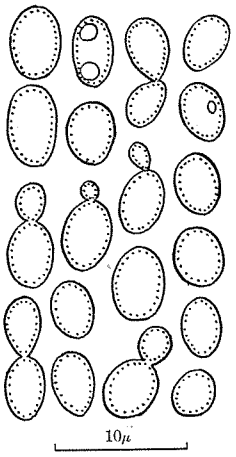

Fig. 56. *Cryptococcus luteolus*

Morphological properties: After 3 days in malt extract at 20°C, cells are globose or slightly ovoid (4.0–6.0)×(4.0–7.0)μ, oil drop inside, single or in pairs, a thin ring and sediment are formed slightly. There is not much growth, after one month at 20°C, a ring and heavy sediment are formed. The cells are surrounded by capsule. After one month at 20°C, the streak culture on malt agar is whitish yellow to pale yellow, mucous, glistening, soft and smooth; margin is smooth.

Slide culture on potato agar, pseudomycelium is not observed.

Physiological properties:

No fermentation; assimilate glucose, galactose, maltose, scacharose and lactose; potassium nitrate is not assimilated; ethanol is not assimilated; the arbutin is split. Starch like compound is formed under appropriate conditions.

Hab. Dung (Barrow). (M. Soneda)

167. ***Cryptococcus luteolus*** (Saito) Skinner

Henrici's Mold, Yeasts and Actinomycetes, 2nd ed., p. 286 (1947).

Syn. *Torula luteola* Saito 1922 (Text fig. 56)

Morphological properties:

After 3 days in malt extract at 20°C, cells are almost ovoid, (3.0–5.0)×(3.4–7.0)μ, single or in pairs, a ring and sediment are formed, but a pellicle is not formed. After one month, a mucous ring, a few islets and heavy sediment are formed, sometimes thin pellicle is formed. The cells are surrounded by capsule. After one month at 20°C, the streak culture on malt agar is whitish yellow to whitish orange, mucous, smooth, soft, glistening with a smooth margin.

Slide culture on potato agar, no pseudomycelium is formed.

Physiological properties:

Oxidative and no fermenting ability, assimilate glucose, galactose, maltose, saccharose and lactose, no assimilate ethanol, potassium nitrate is assimilated, usually split arbutin, occasionally weak, starch like compound is formed under appropriate conditions.

The cells of this strain is somewhat smaller than type strain of this species and there is scarecely growth at 25°C.

The difference between this strain and type strain is in the shape of the cells and splitting of arbutin; almost ovoid with this strain, ovoid to elongate with the type strain, no split arbutin with this strain and slightly split arbutin with type strain.

Hab. Soil 4 (Barrow 2, Peters 1, C. Thompson 1), polygon 3 (Barrow 2, North Meadow Lake 1), Dead Leaves 3 (North Meadow Lake 2, South Meadow Lake 1), Moss 1 (Barrow 1), Scum 1 (North Meadow 1). (M. Soneda)

168. ***Cryptococcus terreus*** di Menna

J. Gen. Microboil., **11**: 195 (1954). (Text fig. 57)

Morphological properties:

After 3 days in malt extract at 20°C, cells are globose or short ovoid (3.8–6.8)×

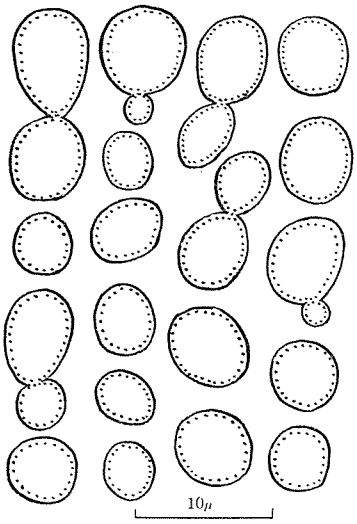

Fig. 57. *Cryptococcus terreus*

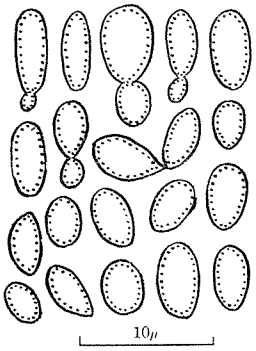

Fig. 58. *Rhodotorula glutinis*

(4.0–8.2)μ, single or in pairs, a sediment and a ring are formed; after one month at 20°C, an abandant sediment and slimy pellicle are produced, often the entire contents of the test tube change into slimy mass. The cells are surrouded by capsule.

After one month at 20°C, the streak culture on malt agar is yellowish white, glistening, soft, raised and smooth; margin is smooth.

Slide culture on potato agar, no pseudomycelium is formed.

Physiological propoeties:

No fermentation; assimilate glucose, maltose and lactose; galactose, saccharose and ethanol are not assimilated; potassium nitrate is assimilated; arbutin is split; starch like compounds is formed under appropriate conditions.

Hab. Moulding mushroom (Umiat). (M. Soneda)

169. ***Rhodotorula glutinis*** (Fres.) Harrison

Trans. Roy. Soc. Canada, V, **22**: 187 (1928).

Syn. *Cryptococcus glutinis* Fresenius 1852 (Text fig. 58)

Morphological properties:

After 3 days in malt extract at 20°C, sediment is formed, cells are almost ovoid, (3.2–5.2)×(3.8–6.6)μ, single or in pairs. After one month at same condition, a heavy ring, some isolates and mucous sediment are formed.

After one month at 20°C, streak culture on malt agar is red to yellowish red or pink, smooth, soft, glistening, somewhat mucous; margin is smooth.

Slide culture on potato agar, a prititive pseudomycelium is formed in old culture.

Physiological properties:

No fermentative, assimilate glucose, galactose, maltose, saccharose, not assimilate lactose, potassium nitrate is assimilated; in the test of ethanol as sole souce of carbon, growth is very weak; arbutin is split.

Hab. Dung 11 (Barrow 6, Peters 2, Umiat 3). (M. Soneda)

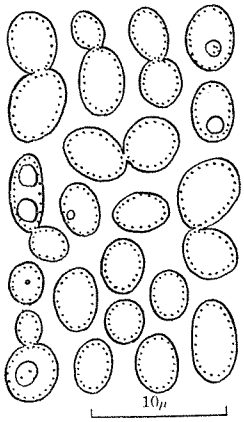

Fig. 59. *Rhodotorula rubra*

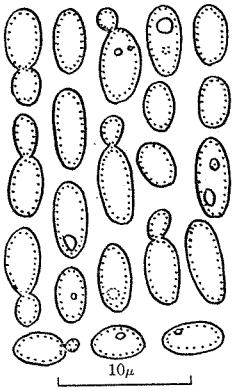

Fig. 60. *Torulopsis gropengiesseri*

170. ***Rhodotorula rubra*** (Dumme) Lodder

apud T. Hasegawa, I. Banno et S. Yamauchi, in Jour. Gen. Appl. Microliol., **6**: 209 (1960).

Syn. *Saccharomyces ruber* Dumme *Rhodotorula mucilaginosa* (Jörg.) Harrison

(Text fig. 59)

Morphological properties:

After 3 days in malt extract at 20°C, cells are short-ovoid or ovoid, (2.8–4.8)× (3.8–6.8)μ, single or in pairs, a sediment is formed, after one month at 20°C a ring and red sediment are formed. After one month at 20°C, the streak culture on malt agar is flat, glistening and mucous; the color is red to yellowish red.

Slide culture on potato agar, no pseudomycelium is consisted.

Physiological properties:

No fermentation, assimilate glucose, galactose, maltose and saccharose, lactose is not assimilated, potasium nitrate is not assimilated, ethanol is not utilized, arbutin is split. This strain does not form pseudomycelial cells and elongated cells, but Hasegawa identified this as *Rhodotorula rubra*.

Hab. Polygon 4 (South Meadow Lake 2, Barrow 1, Lake Peters 1),
Dead Leaves 2 (South Meadow Lake 1, North Meadow Lake 1).

(M. Soneda)

171. ***Torulopsis gropengiesseri*** (Harrison) Lodder

Die anaskosporogenen Hefen, I Hälfte, Verhandel. Koninkl. Akad. Wetenschap. Afd. Natuurkunde, sect. II, **32**: 1 (1934). (Text fig. 60)

Morphological properties:

After 3 days in malt extract at 20°C, cells are oval to elongate, small (1.8–3.0)× (3.4–6.0)μ, single or in pairs, a sediment and a thin ring are formed; after one month at 20°C a ring and a sediment are formed. After one month at 20°C, the streak culture on malt agar is yellowish white, glistening, smooth with smooth margin.

Slide culture on potato agar, no pseduomycelium is formed.

Physiological properties: glucose and saccharose are fermented weakly, galactose, maltose and lactose are not fermented; glucose, galactose and saccharose are assimilated, maltose, lactose and ethanol are not assimilated; arbutin is split weakly.

Hab. Soil (Umiat). (M. Soneda)

Moniliaceae

AQUATIC SPORA (No. 172–174) Two scum-samples were collected in North Meadow Lake (Aug. 5 and Aug. 9, 1965) respectively. Because no previous report on the aquatic spora in Alaska was found so far, these scum-samples were examined in detail. These samples on the lake (Pl. 4 E) appeared as small amounts of dirty water when offered to the Institute for Fermentation. As a result, there were no more than very few spores in the samples and the following only two fungi were recognized, however, the data seemed to be noteworthy because they are the northmost scum-samples.

172. ***Articulospora tetracladia*** Ingold (Plate 19 D)

Only two spores were found in the sample of North Meadow Lake. This species is one of the most common species distributed through the world and this is the northmost record. (Specimen No. 209) (K. Tubaki)

173. ***Anguillospora longissima*** (Sacc. et Syd.) Ingold (Plate 19 E)

Several spores were found. This species is also very common one in the world. (Specimen No. 210) (K. Tubaki)

174. ? ***Alatospora acuminata*** Ingold

Spore shown in Plate 19 fig. C is uncertain in the classification, but seems to be a *Alatospora acuminata* Ingold. (Specimen No. 211)

Consequently, at least, three species of the aquatic Hyphomycetes are present in the scum-samples collected. (K. Tubaki)

175. ***Allescheriella*** sp. (Plate 17 C)

Hyphae branched, septate, 5–7μ in diam., hyaline. Conidiophores not well differentiated from the hyphae, erect, simple or often branched, variable in length, 8–30μ or more long, 4–7μ in width, hyaline or pale colored. Conidia are of the aleuriospore-type, initiated as blown-out ends of apices of conidiophores of branches, subglobose, ovoid, pyriform or inverted flask-shaped, thick walled, with markedly truncate bases, smooth, containing coarsely granular contents, 24–30$\times$15–20μ, sometimes develope to large globose cells measuring 35μ in diam., hyaline or pale colored. At maturity, conidium-wall is thick measuring 2–3μ, and two-layered, the outer and the inner hyaline.

Hab. On soil, (No. 902).

Above description was made from the mounted slide, No. 127.

Thick walled, single aleuriospore-formation can be seen in the genus *Humicola* Traaen and *Coccospora* Wallroth, but the present fungus differs from *Humicola* in not dark colored conidia. Though Höhnel cited *Allescheriella* as a synonym of the latter, *Coccospora*, Hughes (1951) prefered to use the former name until the type species of *Coccospora* is rediscussed because Höhnel did not see a species of *All. uredinoides* P. Henn. The genus *Allescheriella* is a monotypic and the aleuriospores of the present fungus are not reddish, differing from the type of *Allescheriella, A. crocea* (Mont.) Hughes. (K. Tubaki)

176. ***Beauveria*** sp. (Plate 17 D)

Colony consists of interwoven mycelium, white to slightly colored with a white fluffy to powdery appearance. Conidia formed on short laterals, referred to as conidiophores. Conidiophores variable in shape and size, simple or branched; unbranched one oblong or cylindrical, with constricted bases, bearing thin thread-like filamentous section on which conidia develope, $2–3\times2–2.5\mu$; branched conidiophores develope spherical-shaped vesicles, 2.5μ in diam., producing secondary vesicle which in turn give rise to another series of vesicles. Sterigmata, referred to as unbranched conidiophores, on last-formed vesicles or on sporogenous cells, singly, in pairs or in small clusters, globose or cylindrical, $2–3\times1.5–2\mu$, extend thread-like filamentous terminal section; terminal sections, $1–3\mu$ long, draw-out as the conidia develope, but in pronounced zigzag is very difficult to see. Conidia are of the terminous-radulaspore type, globose or ovoid, $1.2–1.5\times1.2–1.8\mu$, grouped in a mass.

Eight strains were isolated from the tundra soil of Eskimo Village, P. Barrow (A-3-1, A-4), Peters Lake (B-5-9, 1903–3, 2001–5), Barrow Village (407–1, 407–2, 501–7).

According to MacLead (Canad. Jour. Bot. **32**: 818, 1954), among the species of *Beauveria*, only two species, *B. bassiana* and *B. tenella*, warrant species status and other so-called *Beauveria* species are considered to be simply strains of both species. The present eight strains are similar in thier morphological characteristics and can be included in the genus *Beauveria* though the zigzag of the sporogenous thread is very difficult to see, and are fairly related to if not identical with Benham's strain of *B. densa* (Mycologia **45**: 727, fig. 4-D, 1953.).

Since such many strains were isolated from the Alaskan area, further studies are necessary, especially of the pathogenicity of these strains, before conclusions as identification can be drawn. (K. Tubaki)

177. ***Botrytis cinerea*** Pers.

Syn. Meth. Fung. p. 690 (1801).

Hab. On *Crepis nana*, Umiat, Aug. 13.

Distr. Cosmopolite. (Y. Kobayasi)

178. ***Calcarisporium*** sp. (Plate 17 F; Text fig. 61 A)

Hyphae septate, $2–4\mu$ in diam., hyaline. Conidiophores erect from hyphae at

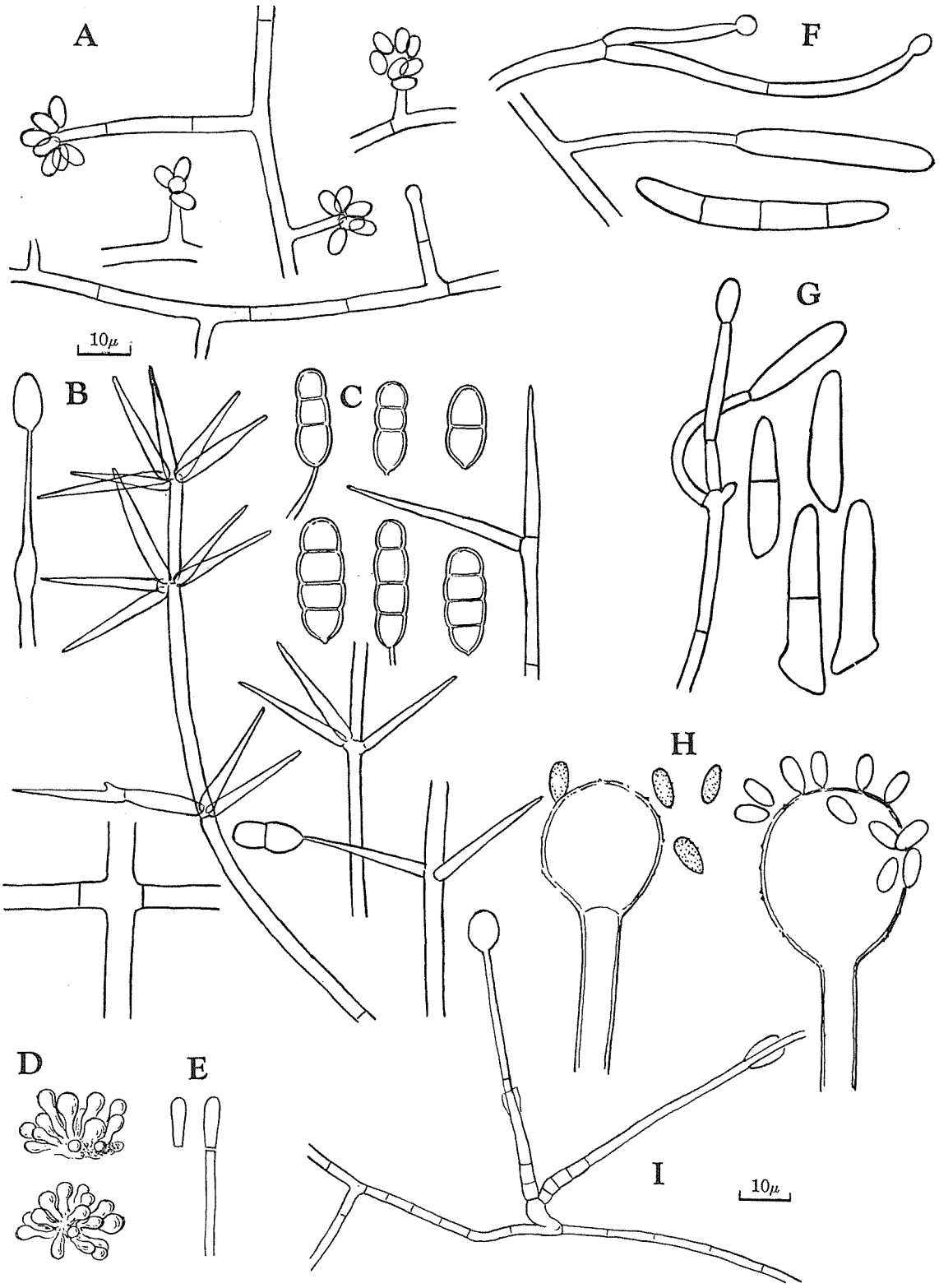

Fig. 61. A. *Calcarisporium* sp. Hyphae and conidia B, C. *Dactylium dendroides* B. Hyphae and phialides C. Conidia D,E. *Stilbum* sp. D. Synnemata (×18) E. Conidia F. *Fusarium* sp. Hyphae and conidia G. *Heliscus lugdunensis* Hyphae and conidia H,I. *Oedocephalum* sp. Conidiophores and conidia.

almost right angles, straight and short, unbranched, usually 12–40μ long, 2–4μ wide, hyaline; slightly capitated at apices bearing a head of conidia; sterigmata indistinct. Conidia ellipsoid or ovoid, acute at bases, 4–6 (8)$\times$2–3μ, hyaline.

Hab. Caribou dung, Lake Peters. (Specimen No. 106)

Above description was made from the mounted slide. The branchlet of the conidiophores of the present fungus differs from the most common species, *C. arbuscula* Preuss, and rather nears *C. pallidum* Tubaki. Though the conidia of the latter species are also similar to those of the present fungus, the enlarged apices are more larger in the latter species. (K. Tubaki)

179. ***Cephalosporium coremioides*** Raillo

Colony more or less restrict, loosely floccose, forming coremia, white to pale greyish white; reverse white to pale brown colored. Aerial hyphae delicate, 1–2μ in diam., hyaline. Conidiophores unbranched, 10–20 (30)μ in length, often branched oppositely or verticillately; each branch 10–15μ in length. Conidia are of the phialospore-type, ellipsoid or long cylindrical, 3–6 (8)$\times$1.5–2μ, hyaline.

Four strains were isolated from the tundra soil of Barrow Village (406–3), North Mead Lake (1003–4) and of Peters Lake (2001–9); dung (FN 22–1; isolated by M. Soneda).

Though identification of these strains was somewhat difficult because of the brief original description, formation of the coremia, shape and size of the conidia, and also the repeated isolations by Cooke (1959) lead them to the present species. This species was already found in Glacier Bay and Mendenhall of Alaska by Cooke & Lawrence (1959). (K. Tubaki)

180. ***Cephalosporium mycophilum*** (Cda.) Tubaki

Colony velvety, grey olive to yellow olive colored; reverse and agar dark olive to almost black. Phialospores globose, ovoid or ellipsoid, 4–8$\times$1–3μ.

Two strains were isolated from the tundra soil near L. Peters Lake (B–4–5, B–5–1). (K. Tubaki)

181. ***Chrysosporium pannorum*** (Link) Hughes (Plate 17/E)

Colony more or less restrict, depressed floccose, with radial groves and sterile submerged margin, powdery, pale green-grey colored with yellowish tint; reverse yellow. Conidiophores branched verticillately at an acute angle, bearing aleuriospores at the tips or in an intercalary position. Conidia are of the aleuriospore-type, cuneiform or pyriform, smooth, 3–4$\times$2–3μ, hyaline. Keratin was not digested; no growth at 37°C.

Two strains were isolated from the tundra soil of Point Barrow (a–2–1) and the dung of arctic ground squirrel (FN 14).

Other strains, isolated from the tundra soil of Barrow Vill. (407–3) and of North Meadow Lake (1001–1), showed brown-red and powdery colonies. The branching of

the conidiophores are similar to the present species, but they attack human hair. This species is fairly common in Antarctica (Tubaki, 1961, 1965). (K. Tubaki)

182. ***Dactylium dendroides*** (Bull.) Fr. (Plate 17 G; Text fig. 61 B, C)

Hyphae thin walled, septate, branched, thickened at branching points, hyaline. Conidiophores erect from areial hyphae, septate, branched in whorls with two or three side branches at each branchlets, hyaline; end branches tapering to apices, 14–35μ long, hyaline. Conidia, 2–3–celled, scarcely constricted at septa, single, sessile, 22–24 $\times 10\mu$, hyaline. Chlamydospores abundant, several celled, constricted at septa, 20–30μ long.

Hab. On tundra soil, North Mead Lake, Barrow, Aug. 10.

Above description was made from the mounted slide.

The conidia appeared to be immatured and slighlty smaller than those in the literatures, however, the verticillated conidiophores and 2–3–celled conidia lead the fungus to the present species. (K. Tubaki)

183. ***Fusidium*** sp.

Strain E–3–5: Colony restrict with short aerial mycelium, velvety, olive-gray to dark grey colored; reverse dark olive to almost black. Conidiophores not well differentiated from the hyphae, 4–6μ in diam, hyaline. Conidia rectangular-cylindric, catenulate, 5–10$\times$3.5–4μ, pale brown.

This strain was isolated from the tundra soil of Umiat. It nears *Fusidium humicola* Oud. in the colony character and the conidia size, however, the conidia of the latter species is ellipsoid or spindle-shaped differing from the present fungus.

Strain 405–2: Colony consisted of more or less restrict substrate mycelium, velvety, white to pale brown; reverse brown. Conidia cylindric, 6–9(15)$\times$1.5μ. This strain was isolated from tundra soil of Barrow Vill. (K. Tubaki)

184. ***Oedocephalum*** sp. (Text fig. 61 H, I)

Hyphae thin walled, 6–10μ in diam., hyaline. Conidiophores erect from basal hyphae at almost right angles, 250–300μ or more long, 10μ wide at base, tapering gradually below enlarging apices, straight, septate, with or without foot cells; vesicles ovoid or globose, 25–30μ in diam., bearing a head of conidia; scars indistinct; conidia sessile, 1–celled, long-ovoid, thin walled, rough-walled, pale brown colored, 8–9$\times$3μ.

Hab.: On moose dung, Umiat, Aug. 11. (Specimen No. 128)

Above description was made from the mounted slide. Because the conidia of the present fungus are shorter than those of the common *Oedocephalum*-species, the specific name is uncertain. *O. beticola* Oudem. and *O. fimetarium* (Riess) Lindau are both resemble to the present fungus in shape and size of the conidia. The present fungus also nears *Rhopalomyces*-species in the general appearance, but no hexagonally areolate vesicle present and conidia are more smaller than those of all species of *Rhopalomyces*. (K. Tubaki)

185. ***Paecilomyces farinosus*** (Dicks ex Fr.) Brown et G. Smith

Brit. Mycol. Soc. Trans. **40**: 50 (1957).

Colony on malt agar, floccose funiculose with irregular margin, becoming somewhat powdery at center as the condia develope, pure white then with yellowish tint; reverse pale bright yellow. Sporulating structures in complexity; phialophores arise from aerial hyphae or funicles; phialides in whorls of up to 5, 5–15×1–2μ; phialospores elliptical, 1.5–2.5 (3)×1–1.5μ, in divergent or tangled chains. Coremia developed in one or two month culture, 7–25 mm length, 1–1.5 mm in width, pale orange yellow with whitish sporulating heads. Good growth at 15–24°C.

One strain was isolated from the tundra soil of L. Peters (2001–8).

This fungus has been recorded frequently on various insects, usually as *Isaria farinosa,* therefore, the present fungus might be associated with as insect in the tundra. (K. Tubaki)

186. ***Penicillium lanosum*** Westling

Raper & Thom, The Penicillia p. 431 (1949).

Colony on Czapek agar attaining to a diameter of 25 mm in 14 days at 25°C, with deeply floccose; central area gray; marginal area white; exudate abundant; reverse yellowish drab shades. Penicilli irregularly branched, consisting of slightly rough-walled conidiophores, measuring 2.5–3.0μ in diam.; sterigmata, 7–8 × 2.0–2.5μ; conidia globose to subglobose, slightly rough, 2.5–3.0μ in diam.

One strain was isolated from the decayed mushroom, Umiat (D–1–3).

This species was already found by Cooke & Lawrence (1959) from the soil of Glacier Bay, Alaska. (I. Asano)

187. ***Penicillium lilacinum*** Thom

Raper & Thom, The Penicillia p. 285 (1949).

Colony on Czapek agar attaining a diameter of 30 mm, loosely floccose, with raised central area and radiate furrow, at first white, then becoming lilac to vinaceous shades with the production of the conidia; reverse hyaline. Conidiophores arise from stratum and aerial hyphae; penicilli variable in complexity, consisting of whorls of metulae arising at two or more nodes below terminal clusters; sterigmata 5–6μ wide, tapering abruptly to a spore-bearing tube; conidia in a tangled chain, elliptical, 2.5–3.0× 2–3μ, light vinaceous in mass.

Two starins were isolated from the scum of North Meadow Lake (901–1) and from the dung of Caribou, L. Peters (FN 3).

Though the reverse of the colony is uncolored, they are identified as the above because the morphological characters are representative. (I. Asano)

188. ***Penicillium purpurogenum*** var. ***rubri-sclerotium*** Thom

Raper & Thom, The Penicillia p. 636 (1949).

Colony on Czapek agar attaining a diameter of 40 mm in 10 days at 24°C, with

smooth, velvety or slightly floccose surface; central area yellow-green or blue-green to dark olive-green; marginal area yellowish, 2 mm wide; exudatae lacking; reverse deep red. Penicilli biverticillate and symmetrical, with erect conidiophores, measuring 75–160×2.5–4.0μ; consisting of a terminal verticil of 6–12 metulae, 9–15×2.2–3.3μ; sterigmata, in verticil of 4–7, lanceolate, 10–13×2.0–3.0μ; conidia, elliptical to subglobose, sometimes apiculate, smooth or lightly rough, 2.5–3.8×1.8–3.0μ. On potato sucrose agar, sclerotia are in abundance, dark red or reddish brown.

One strain was isolated from the tundra soil of L. Peters (1902–1). (I. Asano)

Other seventeen isolates of *Penicillium* have not yet been identified to species. Ten isolates of them resemble *Pen. trzebinskii* Zaleski, but the penicilli of them are different. One strain, 1003–1, isolated from the tundra of L. Peters, rsembles *Pen. brefeldianum* Dodge in the monoverticillate arrangement of the penicillus and the conidia with the measurements. But the clear connectiones between the conidia and no growth on Czapek agar are quite different from the latter.

189. ***Sporotrichum roseum*** Link

Colony on malt agar fast growing, somewhat hard, wrinkled or with radiate furrow; aerial hyphae developed poorly, pale orange-pink colored; reverse same colored. Conidiophores variable, some as short protuberances along hyphae, others hyphae-like. Conidia are of the radulaspore-type, singly or in loose clusters on the tips of conidiophores, globose or obovate, 3–6×2–5μ. Good growth at 20°C.

One strain was isolated from the tundra soil of L. Peters (B–4–3). (K. Tubaki)

190. ***Verticillium malthousei*** Ware

Fassatiova, in Preslia **37**: 363, 1965. (Plate 19 B)

Growth on malt agar pure white. Conidiophores branched generally in whorls, often single only, 1–2μ in diam. Phialides slightly enlarged at lower parts and narrowed at terminal, 18–24(30)×1–1–5(2.5)μ, hyaline, generally 2 or 3 in a whorl. Phialospores convexo-concave or planoconvex, slightly rounded at the points, 4–10×1–2μ, hyaline; each phialospore characteristically attached by the longitudinal axis transversally on the phialide. No aggregation in a globose spore-mass noticed. Good growth at 20°C.

One strain was isolated from the tundra soil of Point Barrow, Eskimo Vill. (A–1–5).

In 1941, Fassatiova studied comparatively the authentic strains of *V. psalliotae* Tres. and *V. malthousei* Ware and he concluded that there is no difference between the shape and size of conidia. Consequently the latter name was adopted on the basis of the International Rule on priority of specific epithet. The formation of conidia in a characteristic way is also homogeneous among all strains. The conidial dimentsion is emended by Fassatiova as 3–5×1–2.6μ (early stage) to 5–16×1.9–5μ (maturity) and it fits closely to that of the present fungus. Present fungus is seemed to be derived from the mushroom in tundra. (K. Tubaki)

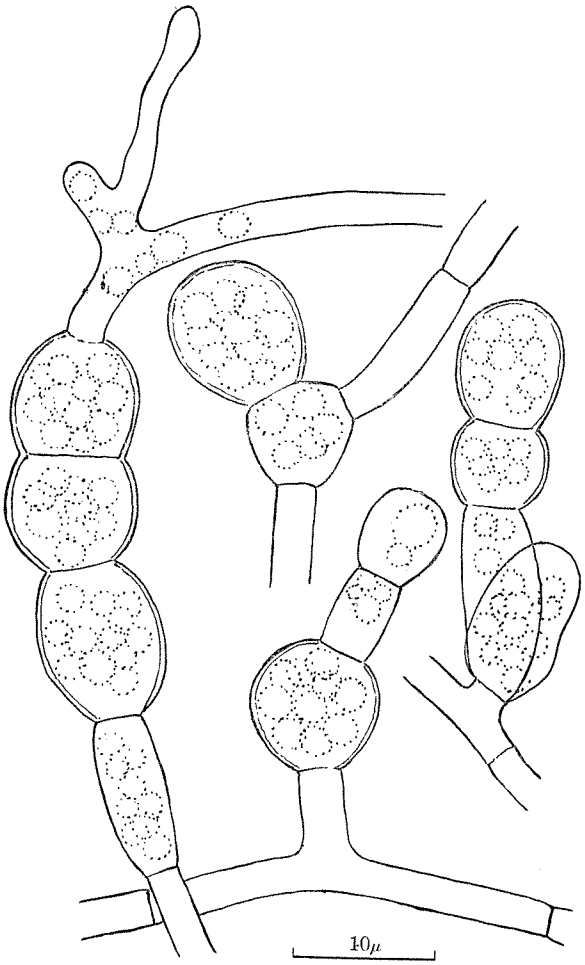

Fig. 62. Chlamydospore bearing hyphomycetous water mould Hyphae and chlamydospores.

191. **Chlamydospore-bearing hyphomycetous water mould** (Text fig. 62)

Hyphae much branched, septate, not constricted at septa, 2.5–5μ thick, hyaline. Chlamydospores produced on short lateral branches or intercalar, solitary or more catenate, globose, ovoid, doliform or elongate, 6–9μ in diam., slightly thick-walled, pale ochraceous.

Hab. Isolated from soil, C. Thompson (D 3) on Oct. 18 using hemp seed as bait, observed Nov. 9. (Specimen No. 121) (Y. Kobayasi)

Dematiaceae

192. ***Cladosporium herbarum*** [Pers.] Link ex Fr.

Three species were isolated from the dead leaves of North Meadow Lake (503–2), scum of the steam (502–1) and from the tundra soil of South Meadow Lake.

(K. Tubaki)

193. ***Phialophora lagerbergii*** (Melin et Nannf.) Conant

Mycologia **29**: 497, 1937.

Colony spreading, compact-wooly with sparce aerial mycelium, dark brown to almost black; reverse dark olive-brown. Phialophores single or branched, hyaline to the above, with hyaline tube-like collarettes. Phialospores long-elliptical or reniform, 3–5(7)×1.5μ, accumulating in a ball. Good growth at 24°C.

One strain was isolated from the tundra soil of L. Peters (B–5–8). (K. Tubaki)

194. ***Phialophora lignicola*** (Nannf.) Goidanich

Van Beyma, in Antonie v. Leew. **9**: 62 (1943)

Colony on malt agar, spreading, flat, composed of dark brownish gray to dark olive brown aerial mycelium; reverse and agar reddish brown. Phialide not well differentiated, developed as short branches of the hyphae, with indistinct collarettes. Phialospores elliptical, 2–3×1.5μ, hyaline, accumulating in a ball. Good growth at 20°C.

Two strains were isolated from the tundra soil of C. Thompson (D–4–2) and Umiat (E–4–7). (K. Tubaki)

195. ***Phialophora*** sp. B–2–3

Colony on malt agar, consisted of compact-cottony substrate mycelium, somewhat mucoid, aerial mycelium scarse, dark brown to dark purplish brown; reverse and agar dark purplish brown. Phialides aggregated in clusters on penicillately branched phialophores, brownish colored, mostly 8–10×2–3μ excluding collarettes. Phialospores hyaline to light brown, ovate to elliptical, 4–5×2–2.5μ. In old culture on malt agar, dark purplish brown, gelatinous spherical bodies developed in abundance.

This strain was isolated from the tundra soil of L. Peters (B–3–2). (K. Tubaki)

196. ***Phialophora*** sp. 1003–3

This resembles the strain B–2–3 in the purplish pigmentation of the reverse of colony and agar; aerial mycelium is more abundant and pale brown colored; phialophores unbranched at first, then branched monopodially or penicillately; phialospores globose, 1.5–2μ or oval, 4×2μ.

This strain was isolated from the tundra soil of North Meadow Lake.

Above two strains, B–2–3 and 1003–3, are unique among the other *Phialophora*-species isolated in their dark purplish brown colored reverse and the completely pigmented agar. From the cultural characteristics, these isolates approach to imperfect states of the Discomycetes-Helotiaceae-Ombrophiloideae, especially of *Coryne* or *Neobulgaria*. It was commonly known that the helotiaceous fungus produce the *Phialophora*-type imperfect states. Cultural states of the present isolates are similar to those of *Coryne sarcoides* offered from Dr. R.T. Bourchier, Canada (C–420, 423) and also of several Japanese isolates. Consequently they might possibly be regarded as the conidial states of the Discomycete. (K. Tubaki)

Stilbellaceae

197. ***Pirobasidium sarcoides*** (Dicks. ex Fr.) von Höhnel

Sitzb. Akad. Wiss. Wien, Math.-nat. Cl. I, **111:** 1002 (1902); Sacc., Syll. Fung. **18:** 638 (1906); Morris, Synnematous Genera p. 94 pl. 41 (1963).

Syn. *Tremella sarcoides* (Dicks.) ex Fr. Syst. Myc. **2:** 217. 1822.

Coryne sarcoides (Dicks. ex Fr.) Bonorden, Handb. Myk. p. 149 No. 3 pl. 11 fig. 233 (1851); Tulasne, Sel. Fung. Carp. **3:** 175 p. 17 fig. 6 (1865, 1931 Edition); Möller, Fungi Faeröes **2:** 114 fig. 36 (1958). (Text fig. 63 A–C)

Synnemata irregularly pulvinate, 2 mm high, gelatinose, cartilaginous, dull vinaceous purple, darker toward base, externally glossy, wholly covered with conidiophores; internal hyphae loosely woven, branched, septate 2–2.5μ thick. Conidiophore 2–2.5μ

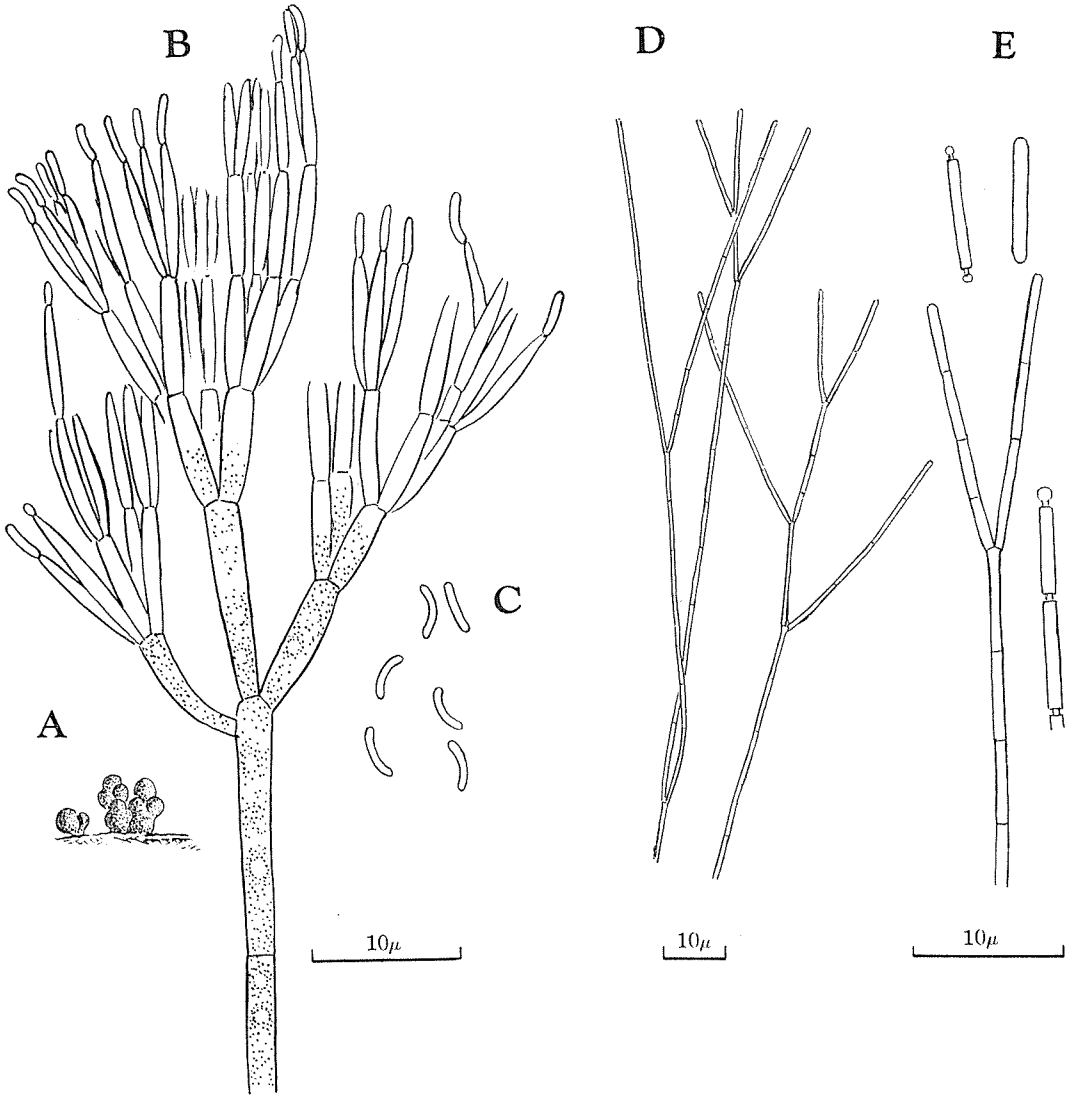

Fig. 63. A,C. *Pirobasidium sarcoides* A. Sporodochium (×3) B. Conidiophore C. Conidia D,E. *Cylindrocolla urticae* D. Hyphae E. Hyphae and conidia.

thick, septate, 3–4 times verticillately branched; terminal phialides fusiform 7–10μ long, producing single conidium on each end. Conidia in mucous, sausage shaped, 3–3.5μ long, thinner than 1μ, smooth, hyaline.

Hab. Gregariously erumpent on twig of *Salix alaxensis*, C. Thompson, Aug. 16. 1965. (Specimen No. 60)

Note by R.P. Korf: "The Tulasne brothers combined both the imperfect fungus and the Discomycete state (which was based on *Bulgaria sarcoides* (Bolt. ex Pers.) Fries, Syst. myc. **2:** 168. 1822) under a single name, *Coryne sarcoides*. Since that time the generic name *Coryne* "Tulasne" has been used almost exclusively for Discomycetes. In fact, however, the name *Coryne* Nees ex S.F. Gray (1821) is much older,and based on the imperfect state. Technically, then, *Pirobasidium* v. H. is a later synonym of *Coryne* Nees ex Gray, and should disappear. The Discomycete state cannot be called *Coryne* Tulasne unless the name is conserved for that state over the earlier homonym; under the present Code it requires a different generic name."

According to Tulasne & v. Höhnel, the present species is the imperfect state of *Coryne sarcoides* (Jacquin ex Fr.) Tul. (Y. Kobayasi)

198. ***Stilbum*** sp. (Plate 19 A; Text fig. 61 D, E)

Synnema erect, crustered, stipe tapering gradually upward, capitate, bearing head of conidia, 200–300μ high, the heads gelatinous, globoid to broadly obovoid, 200μ or more in diam.; stipes consisting of parallel, longitudinal hyphae, thin walled, sparsely septate, 1.5–2μ in diam., colorless. Conidiophores not well differentiated, slender, unbranched, forming a very dense peripheral layer of head, at nearly right angles to surface, 1.5–2μ in diam. Conidia produced singly at apices of conidiophores, covered with a gelatinous layer, adhering to form a white covering over head upon drying, of the aleuriospore-type, long club-shaped, with truncate bases, 7–9$\times$1.5—2μ, hyaline.

Hab.: on Caribou dung, Peters Lake. (Specimen No. 107) (K. Tubaki)

Tuberculariaceae

199. ***Cylindrocarpon*** sp.

Colony spreading, consists of floccose aerial mycelium, white to pale yellowish brown as the develope of the conidia; reverse and agar dark brown. Conidiophores develope from aerial hyphae, usually unbranched, straight, 20–50μ long, 3–4μ wide, bearing conidia successively. Conidia are of the phialospore-type, cylindrical with obtuse ends, usually one-septate,rarely two or three septate, straight or slightly curved, aggregated loosely at the top of the conidiophores, 16–30$\times$3–4(5)μ, hyaline. Chlamydospores in abundance, attenuate, brown colored.

One strain was isolated from the tundra soil of Peters Lake (B–3–1).

Systematic position of the present strain is uncertain. Cylindrical, septate phialospores approach those of *Cylindrocladium* or *Moeszia*, however, unbranched conidiophores

lead it to the genus *Cylindrocarpon* Wr. *Cylindrocarpon radicicola* Wr. is closely agreeable to it in the conidial measurement, but conidiophores of the former branch in penicillate manner. So the present strain cannot be reconciled completely with any species so far described. (K. Tubaki)

200. ***Cylindrocolla urticae*** (Pers.) Lindau

Rabenhorst, Krypt. Fl. Pilze **9**: 478 (1910). (Plate 18 A; Text fig. 63 D,E)

Sporodochia scattered, single or grouped, sessile, mostly flattened, globose, rough, with a metallic luster in appearance, elastic to some extent, pale pinkish yellow, 250–300μ in diam.

Conidiophores not well differentiated from mycelium, developed apically or laterally around sporodochia, branched dichotomously, slender, bearing conidia in basipetal succession, 0.8–1.0μ in diam., hyaline. Conidia are of the arthrospore-type, in a chain, long cylindrical, somewhat extend at both ends, 5.0–8.0$\times$0.5–1.0μ, hyaline or pale yellow in mass.

Hab. On decorticated dead twig of *Salix alaxensis*, L. Peters, Alaska, Aug. (Specimen No. 86)

The present fungus is characteristic in sessile, subglobose sporodochia and also in dichotomously branched conidiophores. Though the conidia are smaller than that of the original description given by (10$\times$1–1.5μ), the dichotomous conidiophores lead the fungus to the present species. *C. miniata* Sacc. is also similar to the present fungus in the conidial diameter (7–10$\times$1.5μ), but differes in alternately branched conidiophores. No culture was made. (K. Tubaki)

201. ***Fusarium*** sp. (Text fig. 61 F)

Conidia cylindrical, curved, 45–55$\times$5–7μ, 3 septate.

Hab. Found in soil (0404), Barrow, on Nov. 12. (Y. Kobayasi)

202. ***Geotrichella arctica*** Tubaki, sp. nov. (Plate 18 B; Text fig. 64)

Sporodochiis superficialibus, solitariis, sublobosis vel applanato-globosis, pallide flavis, 1–2 mm crassis; condiophoris fasciculatis, linearibus, dichotomosim ramosis, 10–14μ diam., fertiles ad apices, producentes conidiis in catenis remulosis productis, ellipticus, cylindricis vel elongato-cylindricis, utrinque truncatis, glabris, 26–35$\times$14–18μ.

Sporodochia superficial, sessile, solitary, hemispherical, composed of thick walled aerial mycelium, pale yellow brown colored, measuring 1–2 mm. Conidiophores grow apically or laterally around sporodochia, dichotomously branched becoming arborescent toward apices, septate transversely in upper branches, neighbouring or alternate cells develop thicker walls, 10–14μ in diam.; intermediate cells lose their contents entirely and lateral walls remain thin, colorless inwards, finally break to free conidia. Conidia are of the arthrospore-type, endogenous, with a minute frill at each end, cylindrical, 26–35$\times$14–18μ. No culture was made.

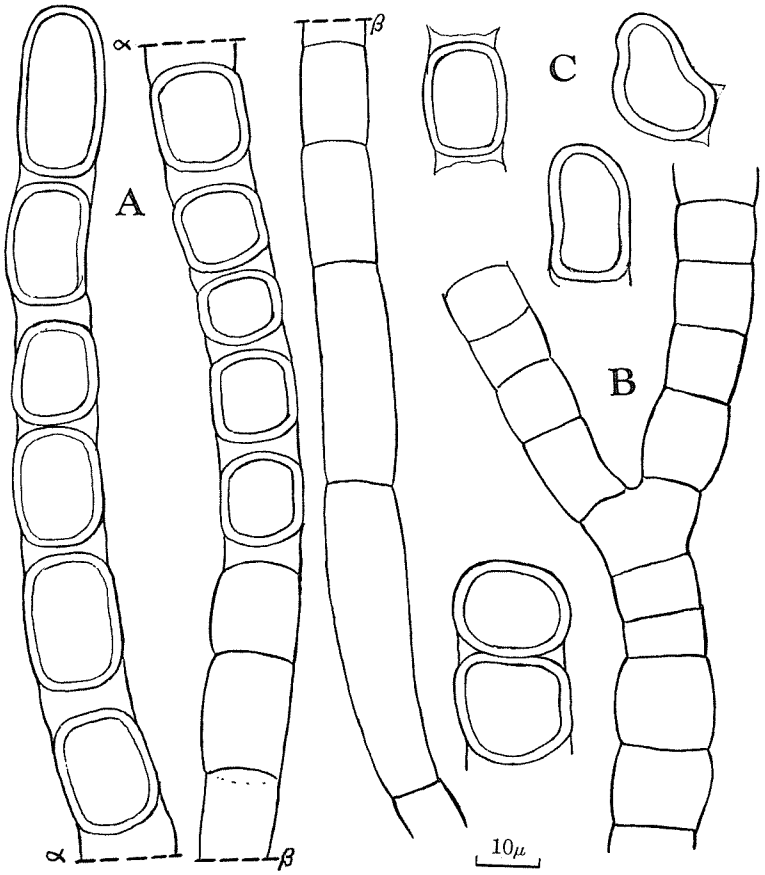

Fig. 64. *Geotrichella arctica* A. Upper part of hypha B. Basal part of hypha C. Conidia.

Hab: On dung of Barrow, Aug. 5. (Specimen No. 20—Type preserved in Herb. Smithsonian Institution)

Isotype, Herb. Intsitute for Fermentation, Osaka, No. 11587.

The identification of the present fungus found here has presented some difficulties because endogenous formation of the arthrospores occuring in such a globose, light-colored sporodochial body is very rare in the literature. Only a fungus having such characteristics is *Geotrichella* Arnaud (Bull. Soc. mycol. France **49**: 27, 1953, fig. 3A, B) and the original figure fairly approaches to the morphological features of the present fungus. Our fungus, therefore, should be put in the genus *Geotrichella*, a monotypic genus. This genus was established by Arnaud (1953) basing on *G. alternata* A., which was found in a moist wall paper in France. It forms a cushion-like globose or hemispherical sporodochia, differing from the present fungus in shorter conidia (3–5μ). The cylindric endogenous arthrospore can be found also in the *Coremiella*-species which, however, developes coremium instead of the sporodochia.

Since there is no described species to which the present fungus can readily be referred, a new species is proposed. (K. Tubaki)

203. ***Heliscus lugdunensis*** Sacc. et Therry (Text fig. 61 G)

Hyphae thin walled, slender, septate, 2–5μ in diam., pale ochraceous. Conidia simple, 2-celled, cylindrical to clavate, wedge-shaped with truncate bases, 30–40×6–8μ, hyaline.

Hab. On the fruit of *Rubus* sp. from soil (D 4), C. Thompson, Aug. 16, obs. on Oct. 20. (Specimen No. 130)

The present fungus is known to have both aquatic and aerial conidia. The conidia found at present have not pronounced processes at apices like that in the original description, but they are rather thought to be the aerial conidia as described by Ingold (1942) and Nilsson (1964). The aquatic conidia are known as allantoid and not be found in the present material. The present fungus was growing on the fruit of *Rubus* species and the growth is certainly of the aerial. (K. Tubaki)

Lycogalaceae

204. ***Lycogala epidendrum*** (L.) Fr. (Plate 4 D)

Hab. Only young plasmodial stage (pink coloured), found on drift timber near seashore, C. Thompson, Aug. 16. (Specimen No. 170) (Y. Kobayasi)

Plate 1. A. Southward view from a hill (ca 200 m high) near Umiat, showing *Salix alaxensis* thicket in front. B. Brooks Range covered with fresh snow near Lake Liberator, snapped from arctic side (Aug. 14, 1965). C. South-east view from a cliff near Cape Thompson. D. Northward view at Lake Peters. E. Highland heath (ca 1200 m) on Mt, Chamberlin near Lake Peters. F. Southward view from Lake Peters, shown Carnivore Creek in the center.

Plate 2. A. *Naematoloma squamosum* at Umiat. B. *Russula nitida* (left) and *Lactarius theiogalus* (right) at Lake Peters. C. *Cortinarius alpinus* among *Salix rotundifolia* heath at Barrow. D. *Clitocybe multiceps* at Barrow. E. *Boletus edulis* at Umiat.

Plate 3. A. *Hygrophorus vitellinus* at Barrow. B. *Exobasidium vaccinii-uliginosi* parasiting on *Vaccinium uligonosum* at Umiat. C. *Exidia glandulosa* and *Peniophora aurantiaca* on *Alnus crispa* at Umiat. D. *Amanita vaginata* at Lake Peters. E. *Dacrymyces ellisii* on *Alnus crispa* at Umiat. F. *Myriosclerotinia sulcata* among sedges at Barrow.

Plate 4. A. *Leccinum scabrum* with *Betula glandulosa* at Umiat. B. *Russula fragilis* (left) and *Lactarius tabidus* (right) at Umiat. C. *Cystoderma* sp. at Umiat. D. Young fructifications of *Lycogala epidendrum* grown on driftwood. E. Foam on water surface of pond near Barrow. F. *Papaver radicatum*, host plant of *Mycosphaerella tassiana* (No. 35) at Barrow.

Plate 5. A. Aerial view of tundra along arctic sea (under right), showing polygons and lakes. B. Swamp near Barrow where the *Simulium* larvae parasited by *Stachylina* (No. 21) were collected. C. Spring water (2°C) near Lake Peters, in which *Cudoniella stagnalis* (No. 66) was found. D. Polygons associated with upland tundra, Barrow.

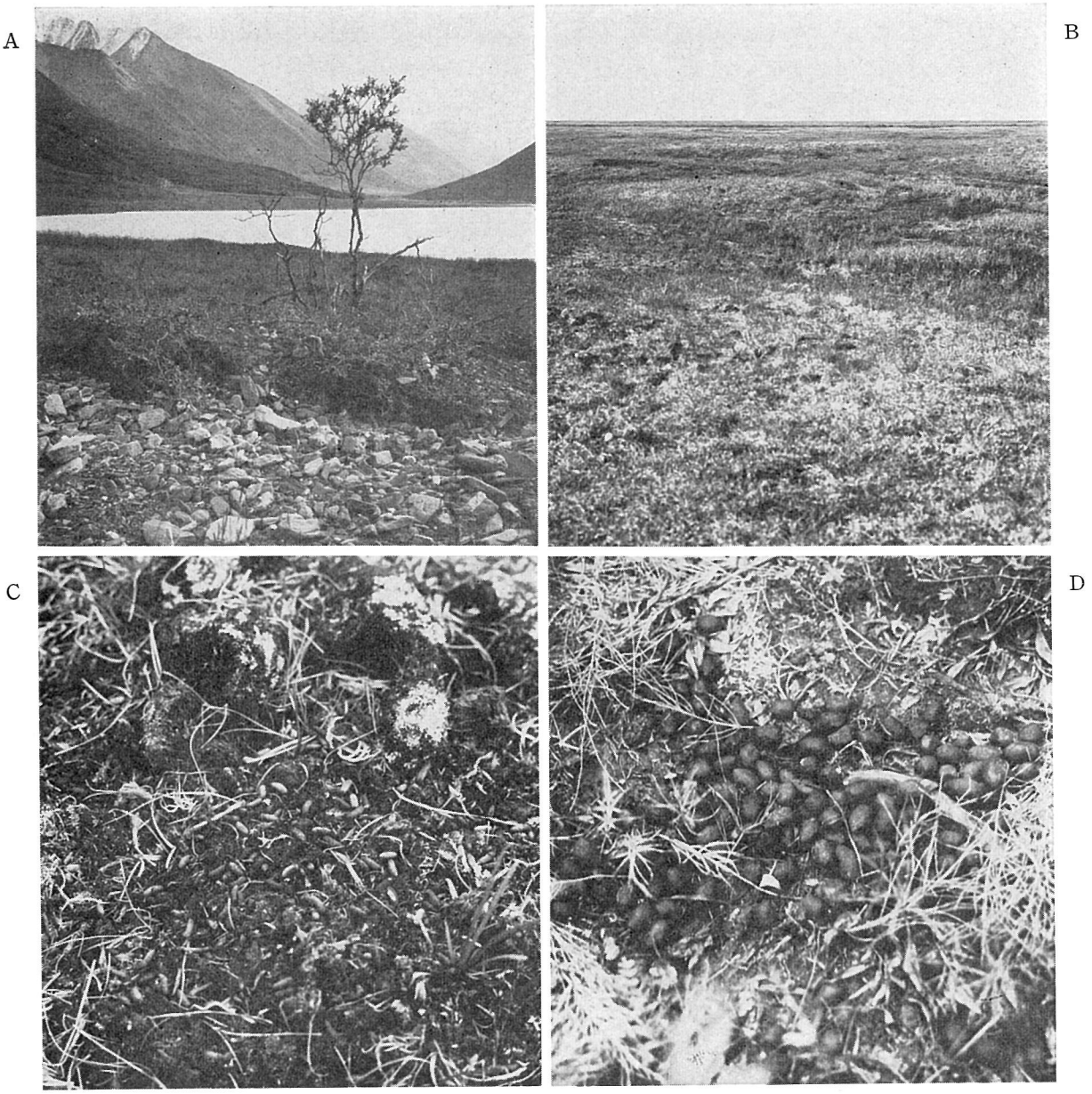

Plate 6. A. Southward view at Lake Peters. Several species of higher fungi were found on *Salix alaxensis* in the front. B. Complex of dry and wet tundra, Barrow. C. Entrance of arctic ground squirrel nest with their droppings in the front, Barrow. D. Droppings of moose, Umiat.

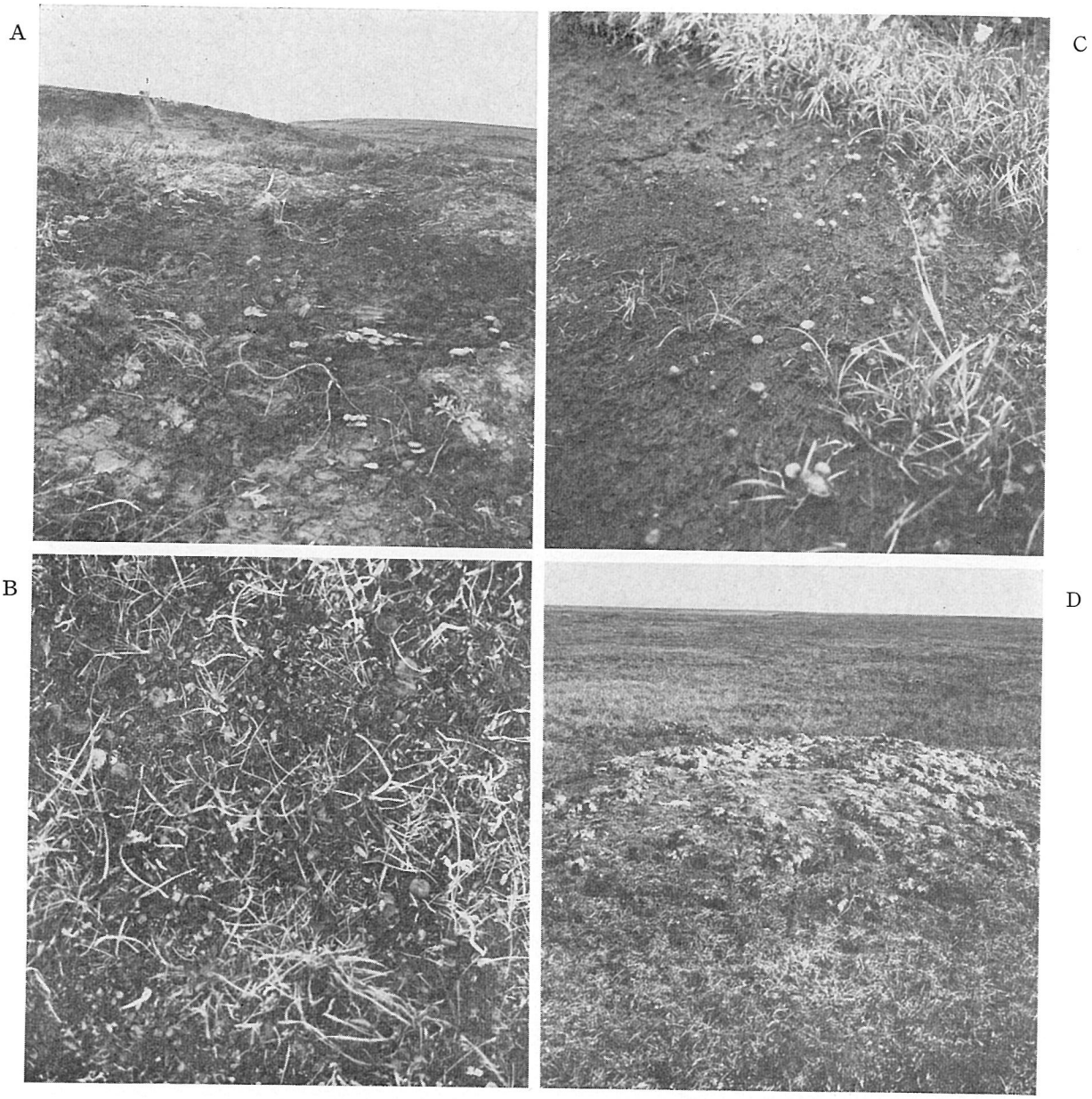

Plate 7. A. *Clitocybe multiceps* growth on bare peat soil of tundra, Umiat. B. Fairy ring of *Cortinarius alpinus* among *Salix roundifolia* heath, Barrow. C. Growth of *Naematoloma squamosum* and *Galerina* sp. in wet tundra, Cape Thompson. D. A knoll composed of the debris of *Sphagnum*, covered with many polster-like masses of dead moss on which white crustaceous imperfect lichen are found. On such a knoll, several species of *Cortinarius* are also found.

Plate 8. A. *Dacrymyces deliquescens* growth on driftwood, Cape Thompson. B. *Clavulinopsis arctica* on peat soil in the center, Barrow. C. *Clavariadelphus pistillaris* among *Dryas octopetala-Cassiope tetragona* heath, Cape Thompson. D. *Lentaria mucida* on peat soil, Umiat.

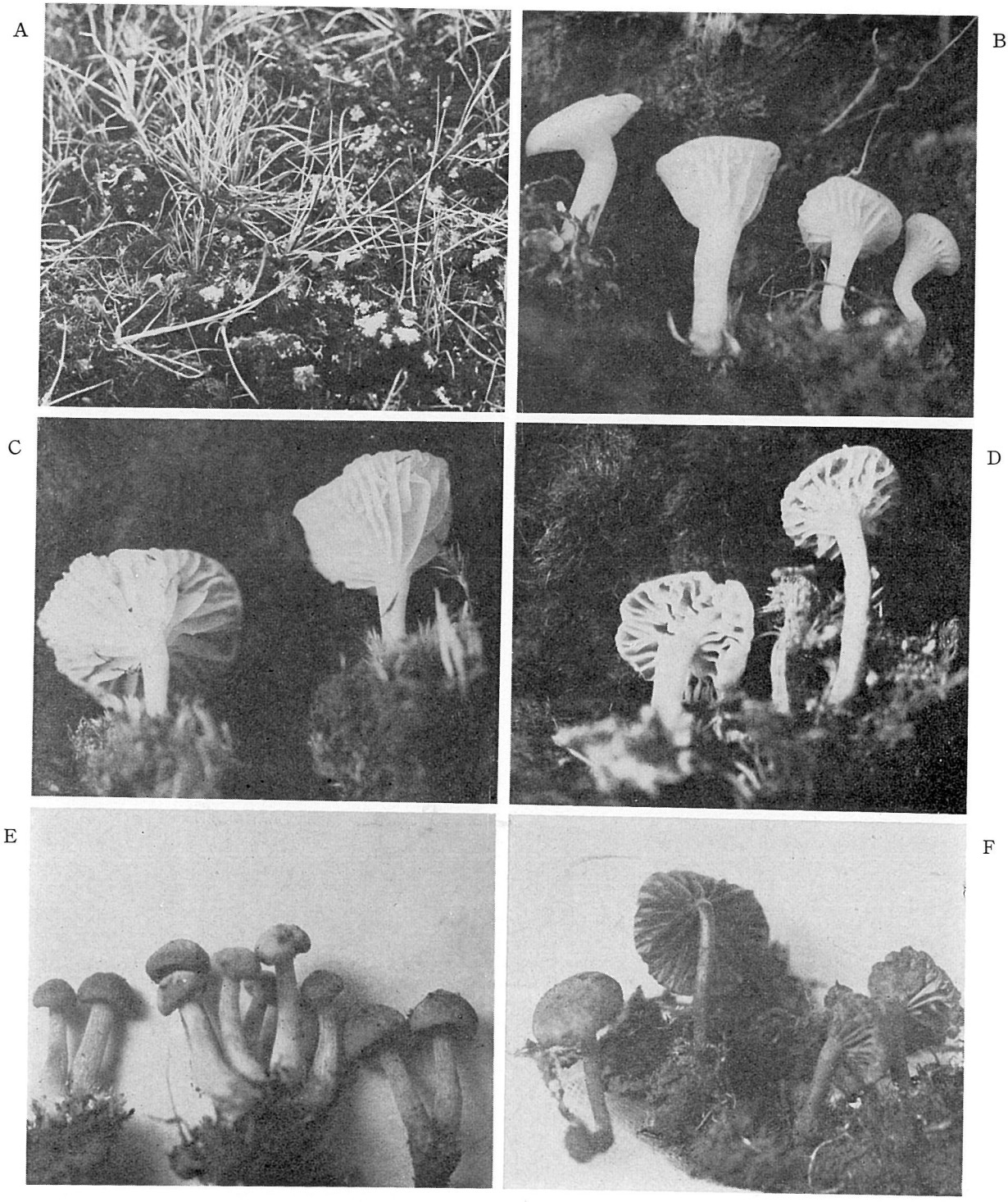

Plate 9. A-B. *Hygrophorus vitellinus*, Barrow. C. *Hygrophorus citrinopallidus*, Barrow. D. *Hygrophorus lilacinus*, Barrow. E. *Laccaria laccata* var. *proxima*, Barrow. F. *Omphalina umbratilis* var. *minor*, Barrow.

Plate 10. A. *Cortinarius alpinus*, Barrow. B. *Cortinarius cinereoviolaceus*, Barrow. C. *Cortinarius decoloratus* among *Empetrum nigrum-Cassiope tetragona* heath, Cape Thompson. D. *Cortinarius* sp. among *Betula glandulosa-Cassiope tetragona* heath, Cape Thompson.

Plate 11. A. *Calvatia cretacea*, Lake Peters. B. *Lycoperdon umbrinum*, Umiat. C. *Crucibulum vulgare*, Cape Thompson. D. *Hymenoscyphus* sp., Barrow.

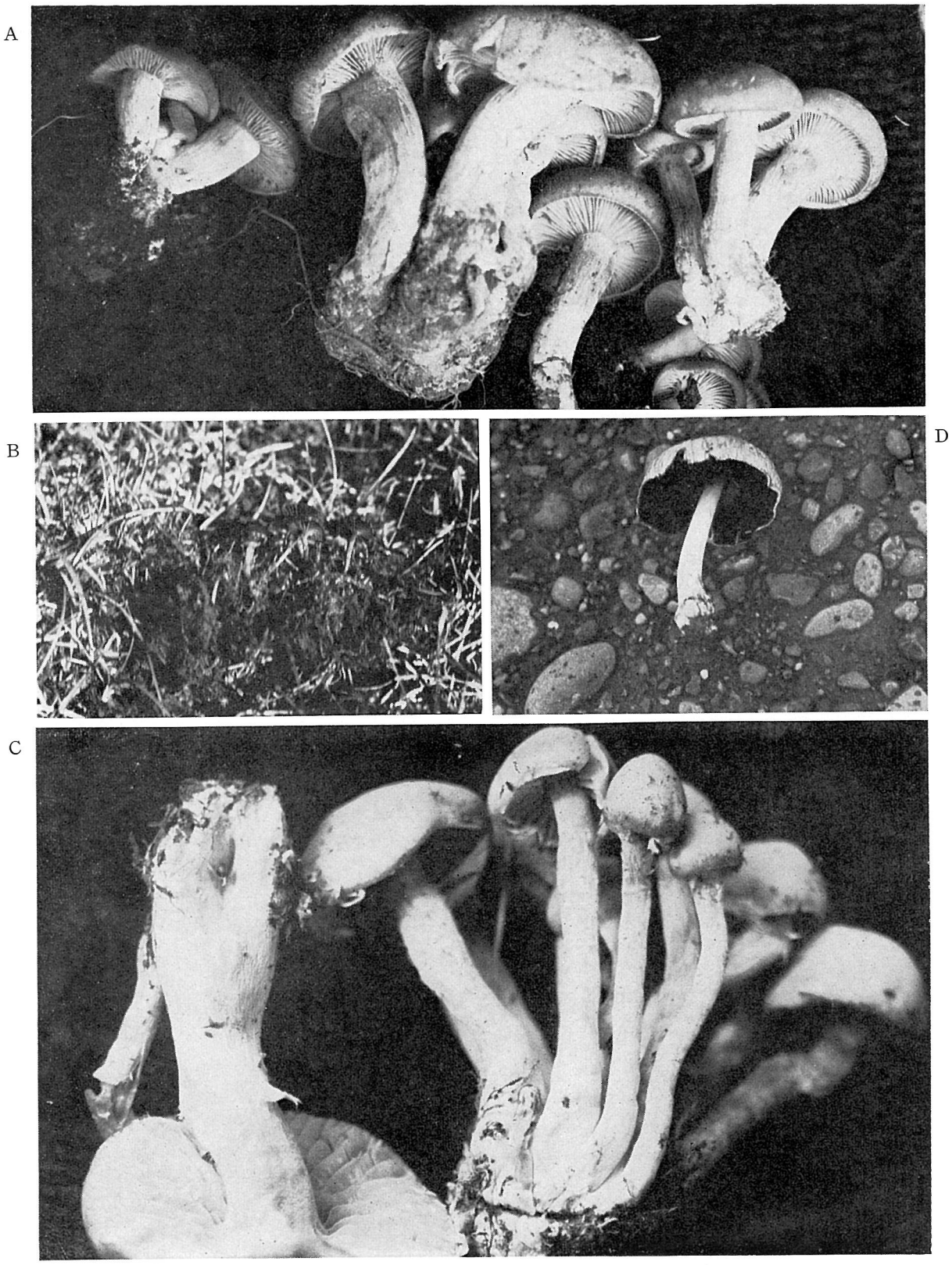

Plate 12. A. *Clitocybe multiceps*, Barrow. B. *Psilocybe atrorufa*, Barrow. C. *Flammulina* sp., Barrow. D. *Coprinus atramentarius*, Umiat.

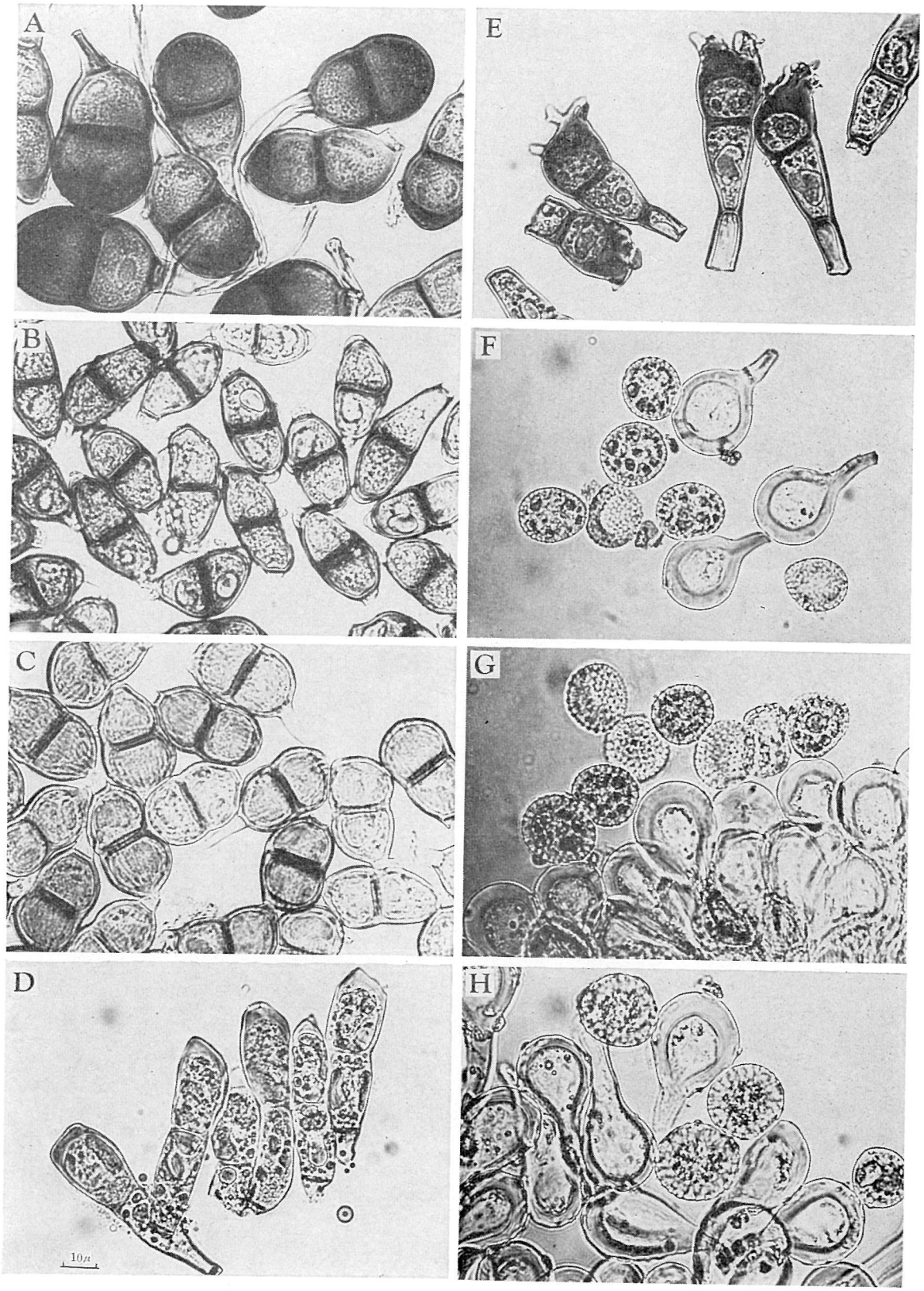

Plate 13. A. Teleutospores of *Puccinia asteris* on *Aster pygmaea* (?). B. Teleutospores on *Puccinia conglomerata* on *Petasites frigidus*. C. Teleutospores of *Puccinia heucherae* var. *saxifragae* on *Saxifraga hieracifolia*. D. Teleutospores of *Puccinia ustalis* on *Ranunculus pygmaeus* (?). E. Teleutospores of *Puccinia volkartiana* on *Androsace chamaejasme* subsp. *lehmanniana*. F. Uredospores and paraphyses of *Melampsora arctica* on *Salix pulchra*. G. Uredospores and paraphyses of *Melampsora arctica* on *Salix* sp. H. Uredospores and paraphyses of *Melampsora bigelowii* on *Salix ovalifolia*.

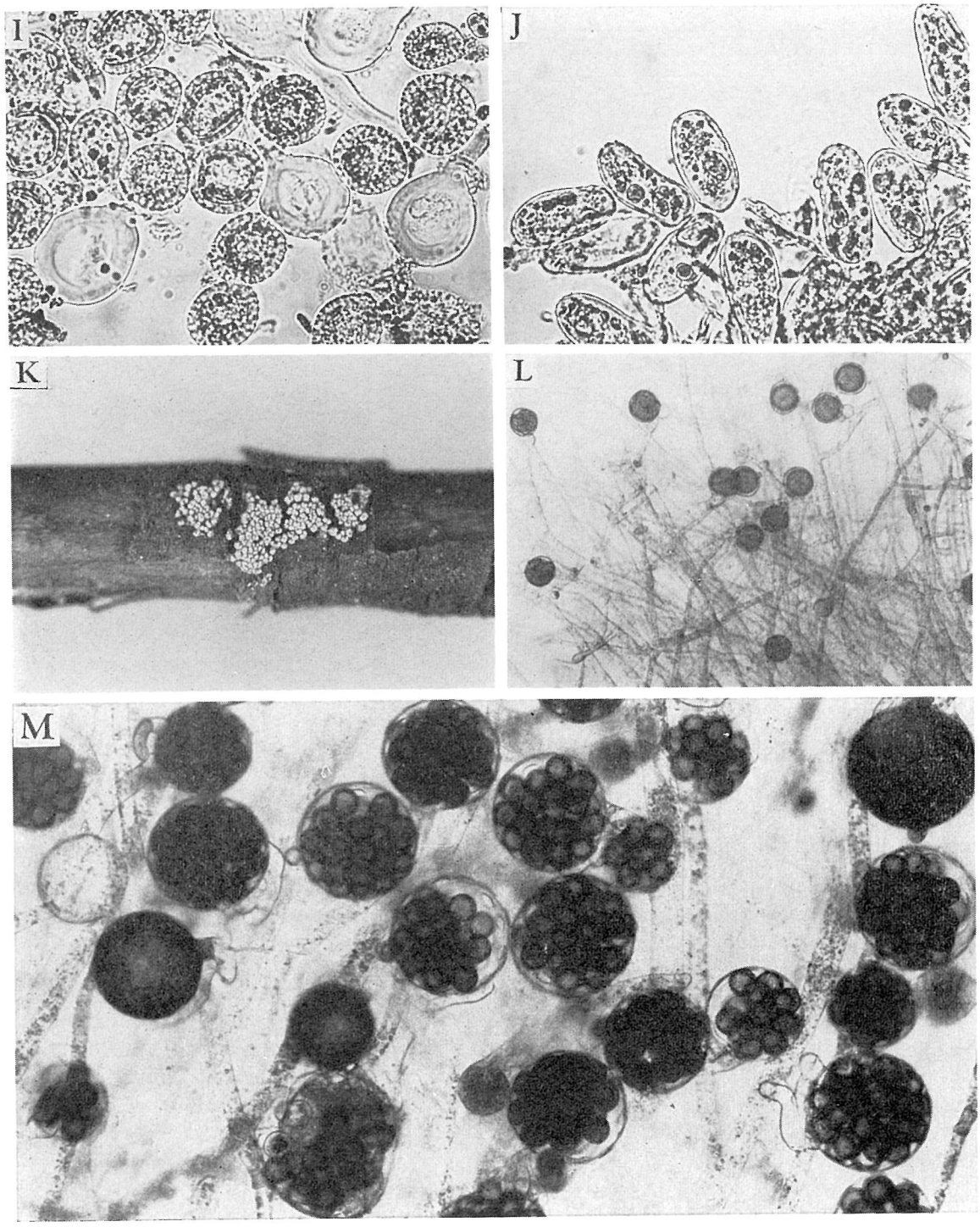

Plate 14. I. Uredospores and paraphyses of *Melampsora bigelowii* on *Salix* sp. J. Uredospores of *Thekopsora sparsa* on *Arctostaphylos alpina*. K. *Cyphellopsis anomala*. L. *Apodachlya brachynema*. M. *Aplanes turfosus*.

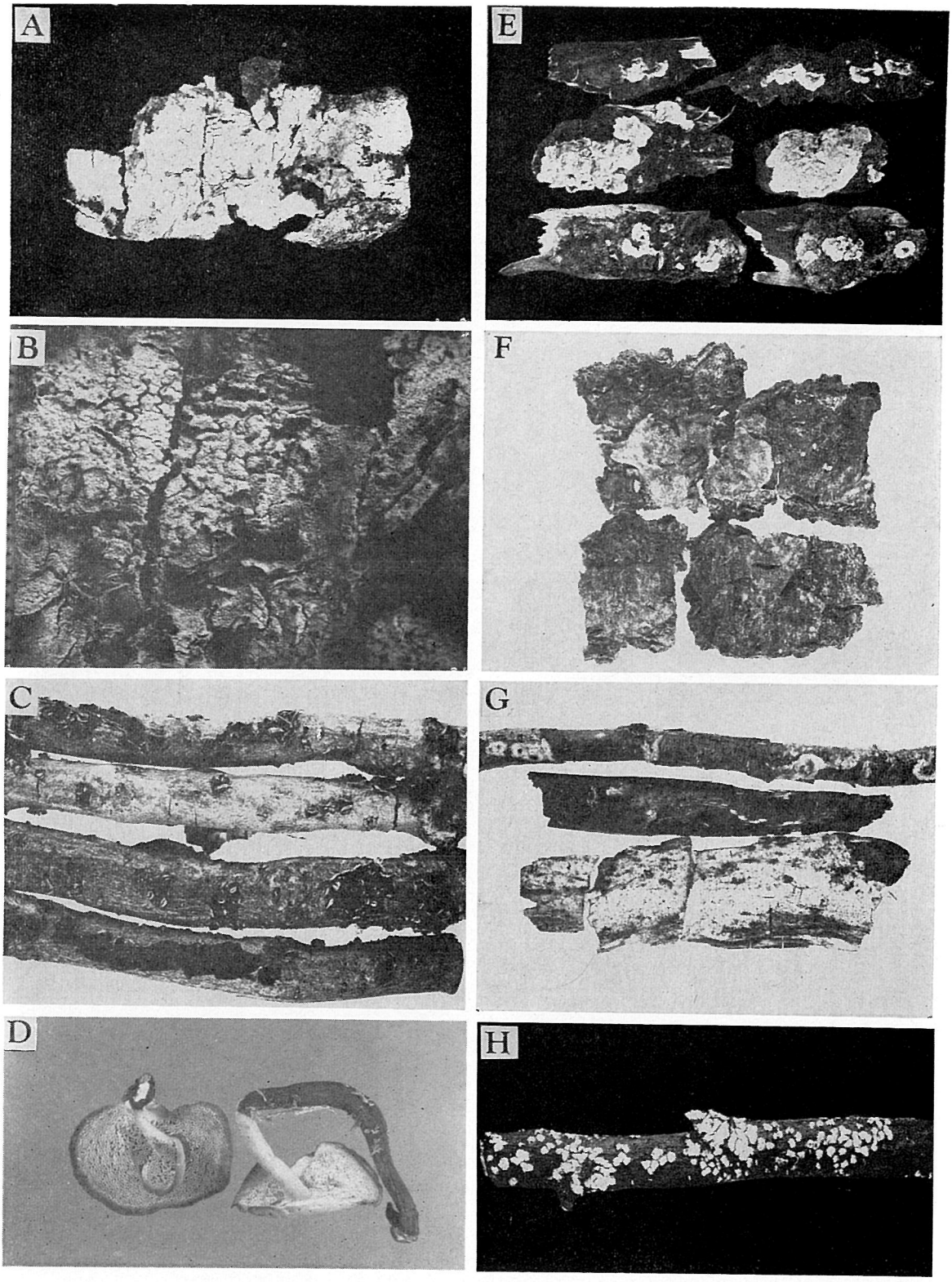

Plate 15. A-B. *Odontia cristulata* C. *Cytidia salicina* D. *Polyporellus elegans* E. *Hymenochaete tabacina* F. *Antrodia stercoides* G. *Peniophora violaceolivida* H. *Peniophora aurantiaca*.

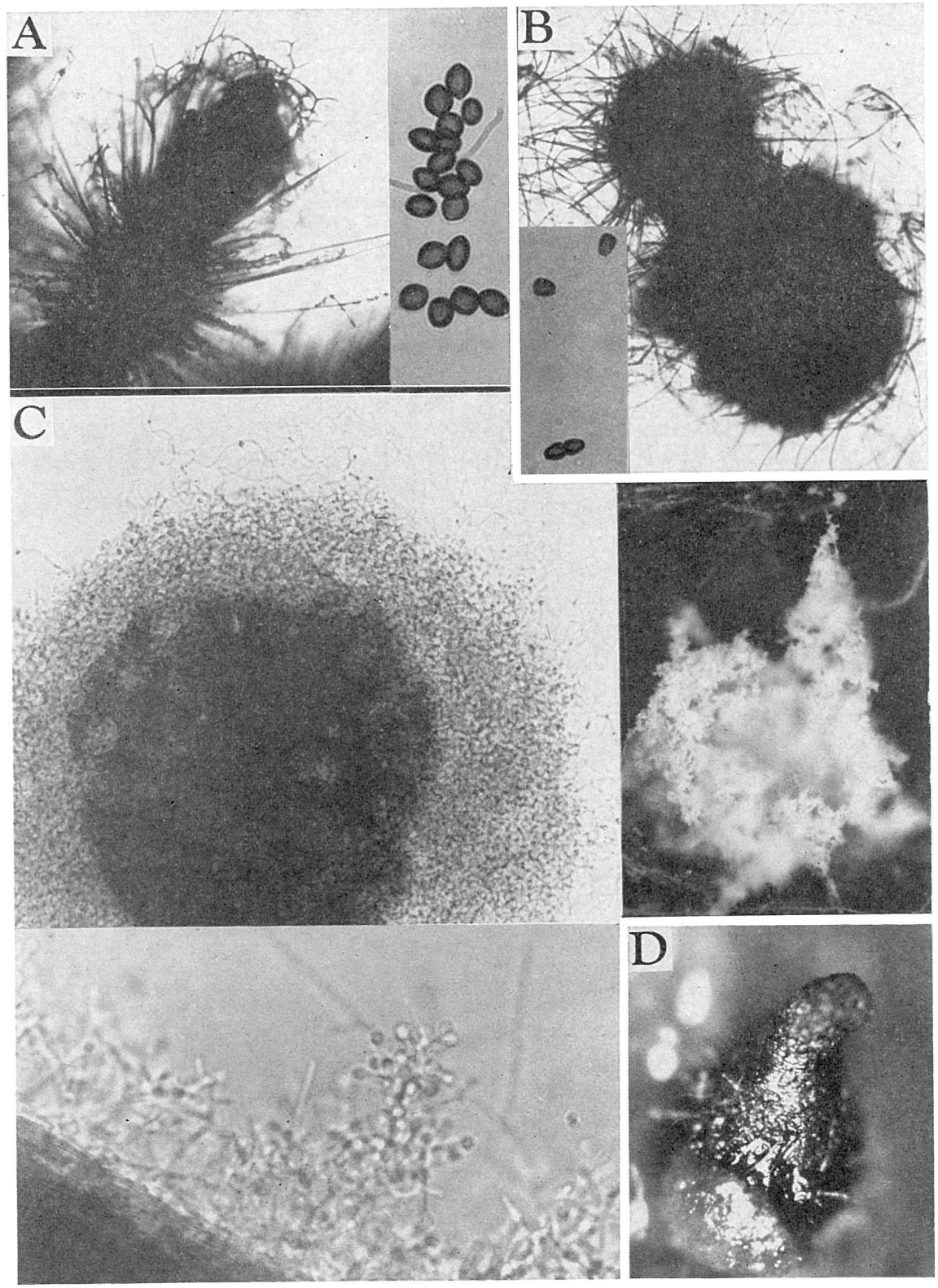

Plate 16. A. *Chaetomium funicola*, perithecium (×110) and ascospores (×450).; B. *Phaeotrichum* sp., perithecium (×110), and 2-celled and separate cells of ascospores (×450); C. *Shanorella* sp., ascocarp (Upper Left, ×110), the natural habit (Upper Light, ×65) and conidial stage (Lower, ×450); D. *Pleurage minuta* f. *tetraspora* (×65).

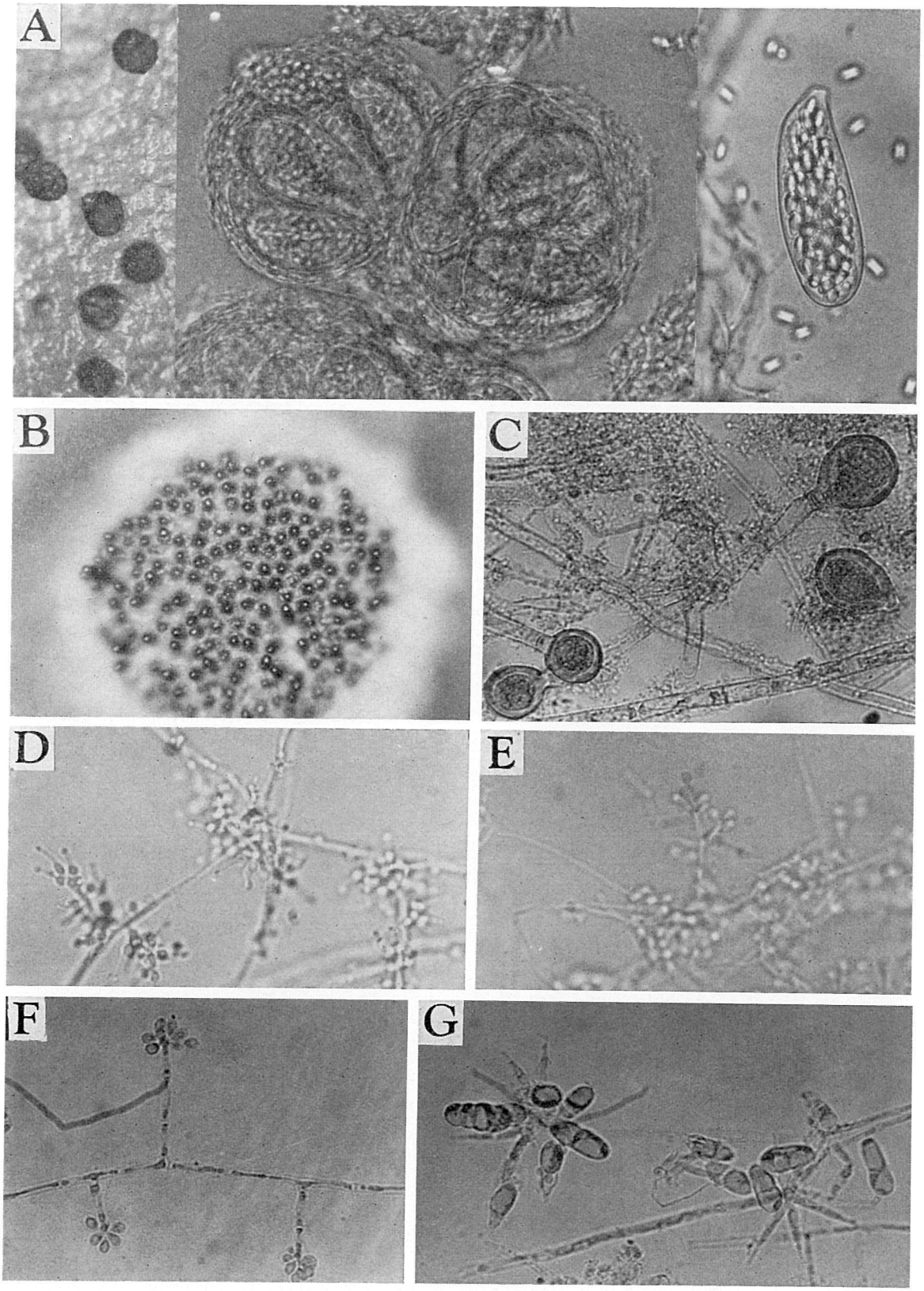

Plate 17. A. *Thelebolus crustaceus*, apothecia developed on the V-8 agar medium (Left, ×65), apothecia (Center, ×110) and ascus (Right, ×110); B. *Ascobolus stercorarius* (×65); C. *Allescheriella* sp. (×450); D. *Beauveria* sp. (×450); E. *Chrysosporium pannorum* (×450); F. *Calcarisporium* sp. (×450); G. *Dactylium dendroides* (×450).

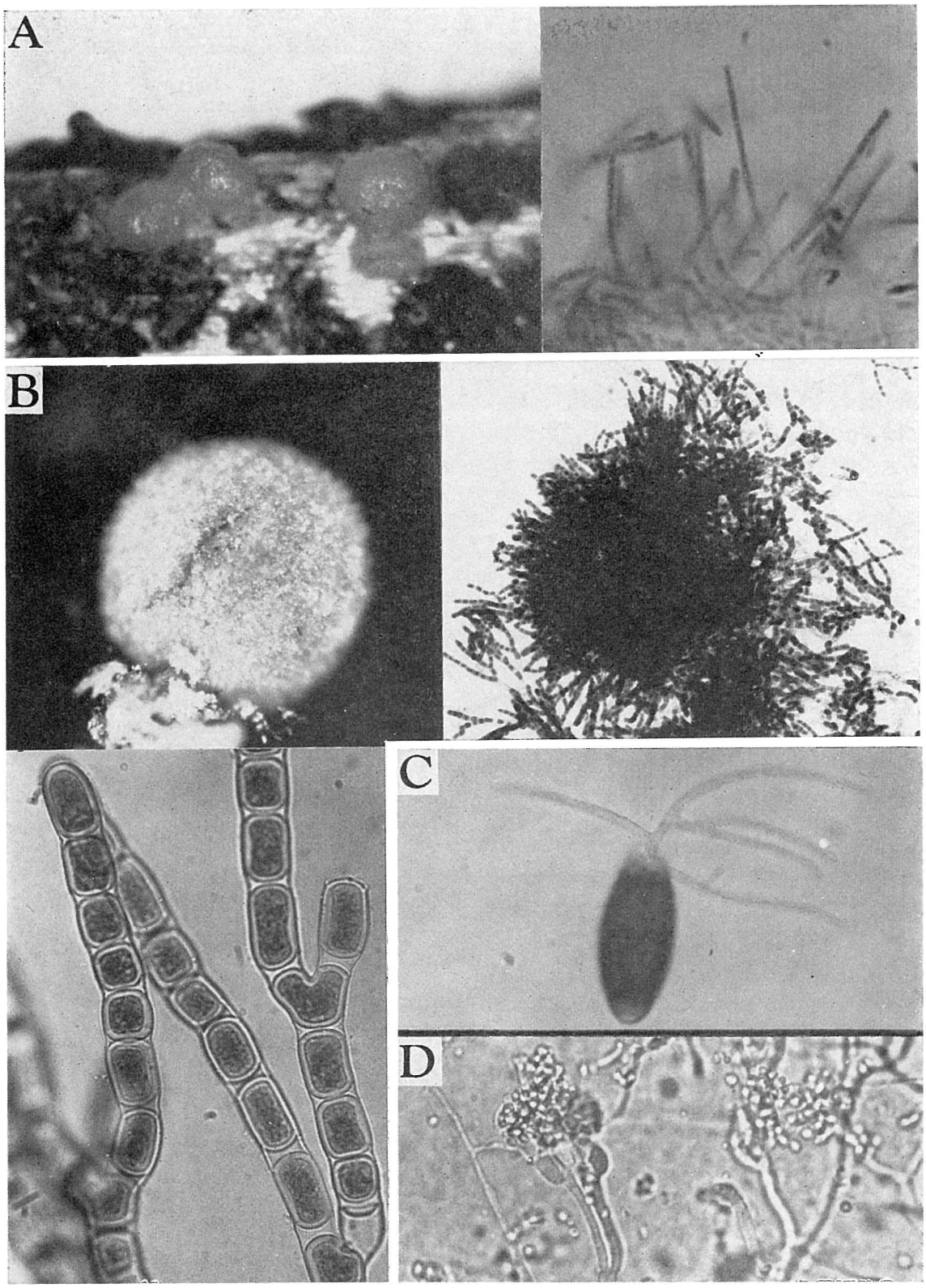

Plate 18. A. *Cylindrocolla urticae*, sporodochia on the host twig (Left, ×65) and conidial head (Right, ×450); B. *Geotrichella arctica*, natural habit of sporodochium (Upper Left, ×65) conidial head (Upper Light, ×110) and endogenous formation of conidia (Lower, ×450); C. *Truncatella truncata*, conidia (×450); D. *Phialophora* sp. 1003–3 (×450).

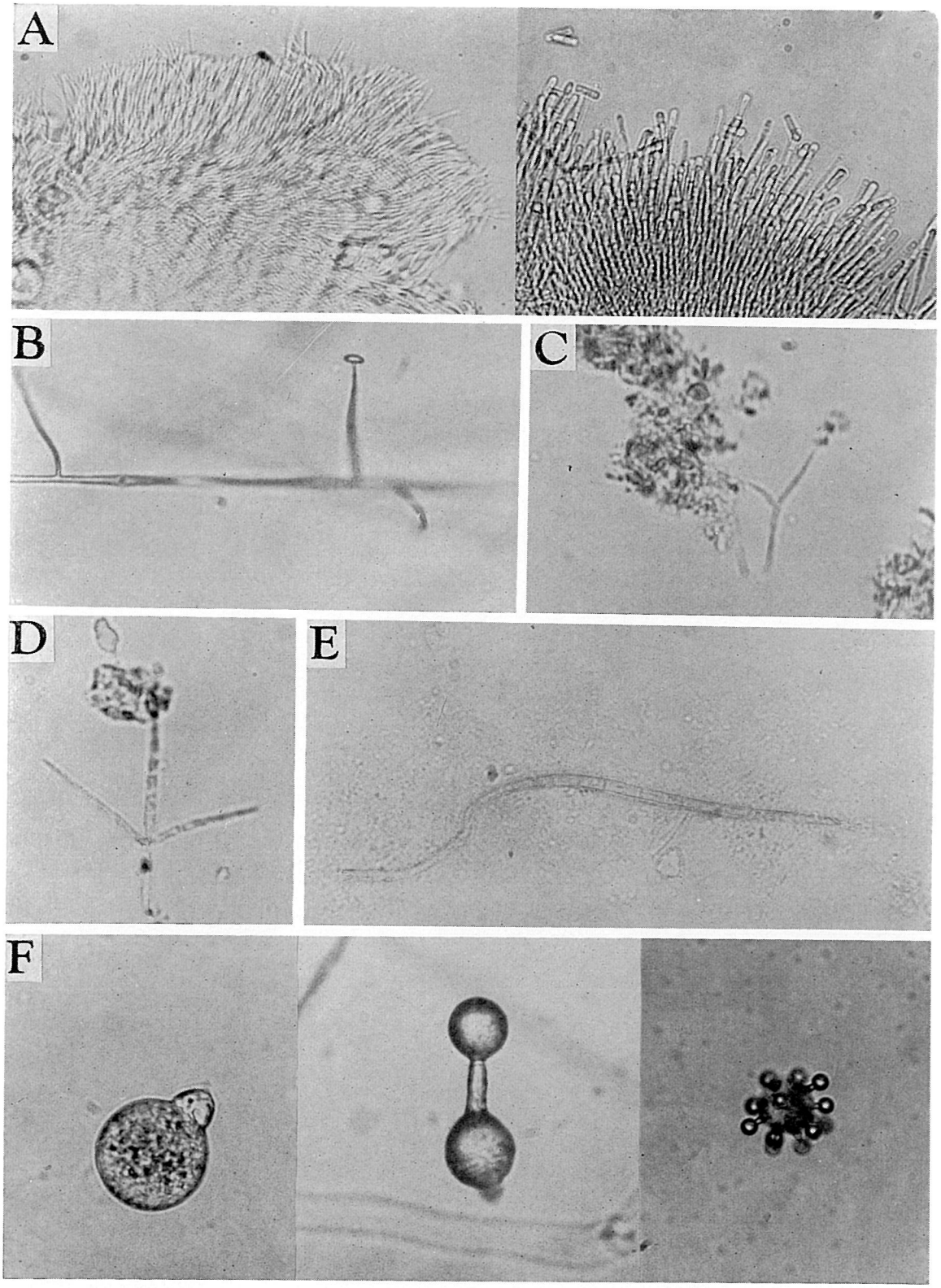

Plate 19. A. *Stilbum* sp , head of synnema (×110 and 450); B. *Verticillium malthousei* (×450); C. *Alatospora acuminata*?, conidium (×450); D. *Articulospora tetracladia*, conidium (×450); E. *Anguillospora longissima*, conidium (×110); F. *Delacroixia coronata*, conidium (Left, ×450); repetition of conidial formation (Center, ×450) and microconidia (Right, ×450).

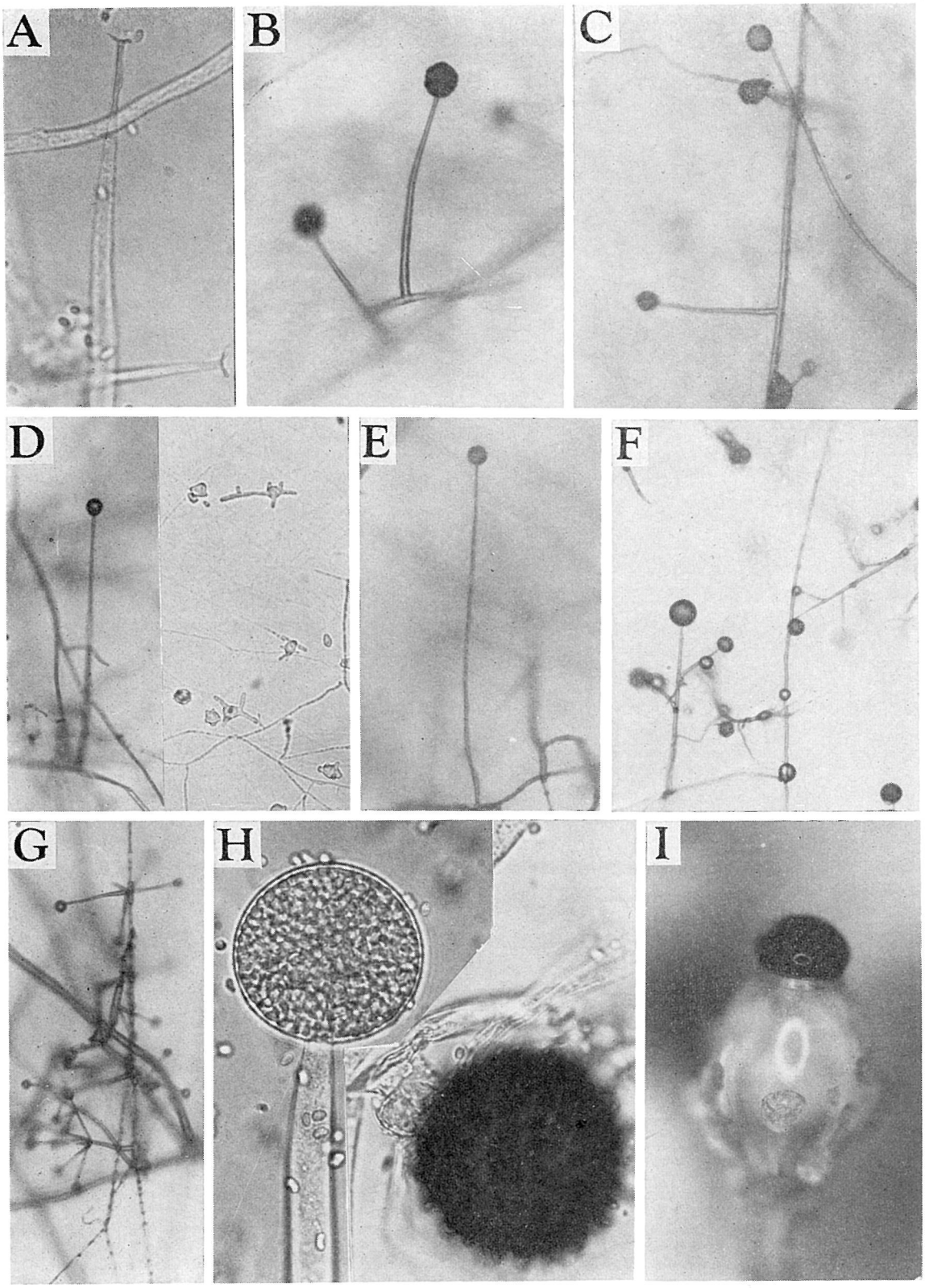

Plate 20. A. *Mortierella alpina*, showing definite collar (×450); B. *Mort. bainieri* (×110); C. *Mort. elongata* (×110); D. *Mortierella* sp. B-3-6 (*M. exigua*?). sporangiophore (Left, ×110) and peculiar gemmae-formation (×110); E. *Mort. minutissima* (×110); F. *Mort. parvispora* (×110); G.*Mort. verticillata* (×110); H. *Mucor hiemalis*. sporangium (×110) and zygospore (×450); I. *Pilobolus crystallinus* (×65).

Ann. Rep. Inst. Fermentation, Osaka
No. 3, 139~143, 1967 (February)

JAPANESE CULTURE COLLECTIONS OF MICRO-ORGANISMS IN THE FIELD OF INDUSTRY— THEIR HISTORIES AND ACTUAL STATE*

Takezi HASEGAWA

The economic significance of micro-organisms has been pointed out by a great number of microbiologists in many countries since the middle of the nineteenth century. It is abundantly attested by them that fungi, yeasts and bacteria are agents which cause fermentation, decay, and even diseases. Today, there is nobody who does not realize how important they are. They are utilized not only in the brewing industry but also in the manufacture of a lot of such chemicals as antibiotics, vitamins, amino acids, nucleotides, enzymes and other organic compounds. On the other hand, they cause various kinds of spoilage and deterioration to agricultural and industrial products. A good many microbiologists have been studying on the projects mentioned above and, at the same time, on the microbial diseases in animals and plants. In these investigations, scientists must clear up the names of the microbes that they are concerned with. In addition, they are often troubled over how to obtain cultures of the species needed for their purposes. Many of the culture collections of fungi, bacteria, and even viruses in the world have been playing an important role of filling this demand. For instance, the Centraalbureau voor Schimmelcultures in Netherlands, and the American Type Culture Collection in the United States and some other organizations have been accepting this responsibility on a world-wide scale.

In Japan, there have been developed unique fermentation industries, that is, the brewing of Sake and the preparation of Miso, Soy sauce, etc. From these circumstances, scientific researches were instituted towards the end of the nineteenth century into this particular field as the first wedge driven into the applied microbiology. In the first place, the Komaba Agricultural College was founded in 1876. It was renamed the Faculty of Agriculture, University of Tokyo in 1890. Next, the Brewing Experimental Station was established by the Tax Administration Agency of the Goverment in 1899. One of the main research projects of this Station was the microbiological regulation of Sake-brewing, and for this purpose it was closely connected with the Department of Agricultural Chemistry of the University of Tokyo. The above project is still now maintained and quite a lot of the cultures of microorganisms useful in this field of activity have hitherto been collected and preserved in the laboratories of the Station.

For the early thirty years of the twentieth century, the microbiological studies had

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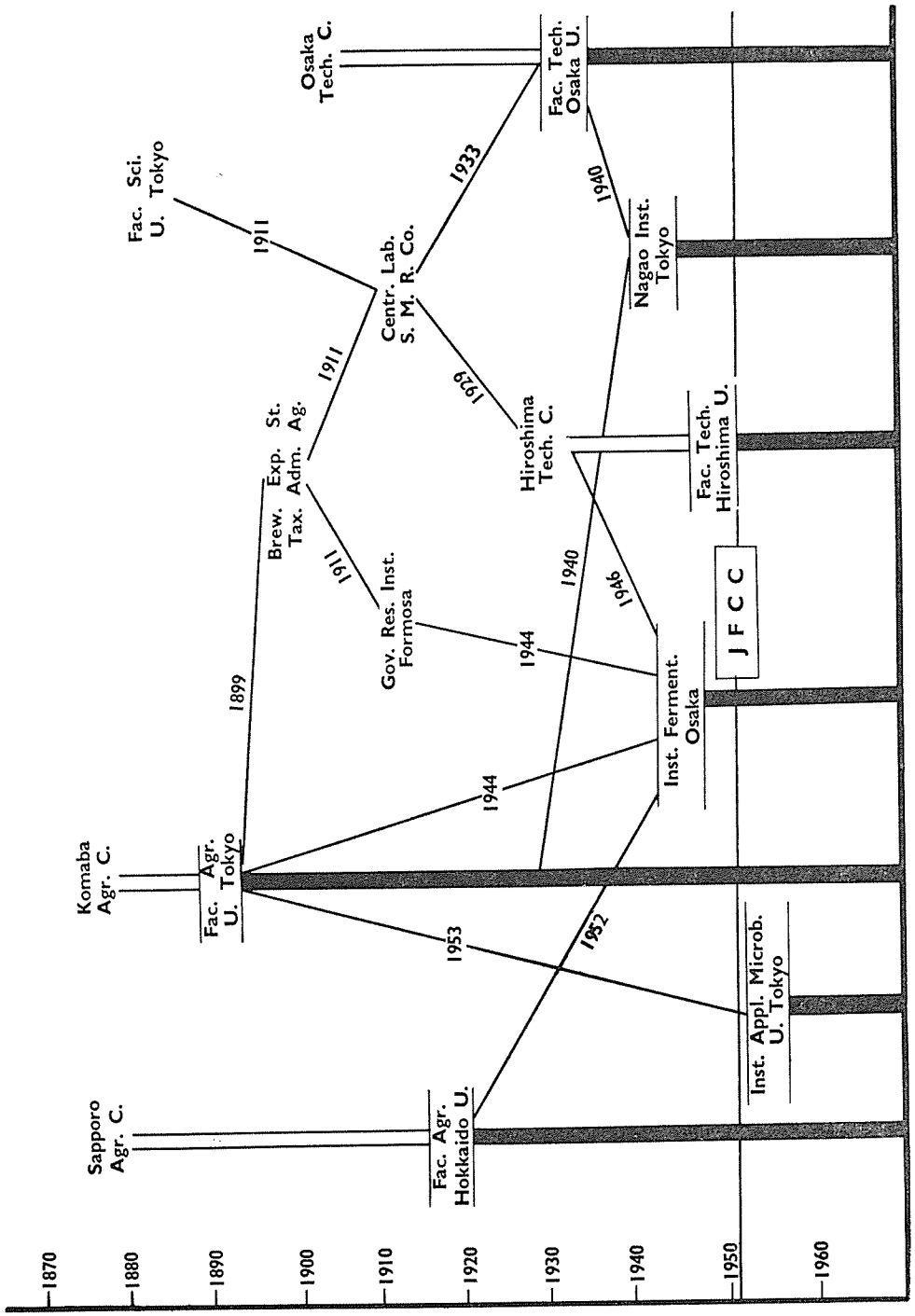
* This paper was presented by the writer at the Symposium No. 58 "On the data center" of the 11th Pacific Science Congress held in Tokyo on the 25th of August, 1966.



A GENEALOGICAL CHART OF JAPANESE CULTURE COLLECTIONS

made great progress in mycology, bacteriology and in the industrial and pathological fields. Many research organizations were established in Japan and its territory, and a lot of talented microbiologists showed up during the period. Among these scholars, Professors Yoshinao Kozai and Teizo Takahashi in the Faculty of Agriculture, University of Tokyo, Prof. Jun Hanzawa in the Faculty of Agriculture, Hokkaido University, Profs. Kendo Saito and Hirosuke Naganishi in the Central Laboratory of the South Manchuria Railway Company, and Prof. Ryodi Nakazawa in the Government Research Institute of Formosa bent their efforts to maintain collections of authentic cultures in their research laboratories. Prof. Saito moved into the Faculty of Technology of the Osaka University in 1933 with the Saito-Naganishi's collection, and, following his retirement under the age limit, he established the Nagao Institute at Tokyo in 1940 on the Kinya Nagao Foundation. In the year 1944 Prof. Nakazawa founded the Institute for Fermentation in Osaka aided by subsidies from the Government and Takeda Chemical Industries Ltd. in order to pursue the state policy at that time. The functions of this Institute, however, have been exercised under the financial protection of the latter company since the termination of the War. In 1953, Prof. Kin'ichiro Sakaguchi, successor to Prof.Takahashi, established the Institute of Applied Microbiology in the University of Tokyo. Besides studies on fundamental and applied microbiology these three institutes were bound in duty to develop their culture collections. Prof. Naganishi of this South Manchuria Railway Company moved to the Hiroshima Technical College in 1929 with all the cultures of microorganisms that he had collected together with Prof. Saito in the Company. He retired in 1955 after the college was renamed the Faculty of Technology of Hiroshima University.

The maintenance of an authentic collection of microorganisms stands in need of much more expensive facilities than that of dried specimens of plants because the collection consists of living cells. Further, experts in charge even nowadays are troubled over spontaneous mutation or death of cultures in collection in spite of recent marked progress in the methods of preservation—preparation of media, physico-chemical control of liophylization and other freezing methods. Towards the end of 1940, many Japanese laboratories for microbiology had their own culture collections though on a limited scale, but most of such collections could not be maintained carefully and properly for lack of expert curators. In 1953, Dr. Kiyoshi Kominami of Nagao Institute, successor to Prof. Saito, published a general catalogue of the microbial cultures preserved in Japan after inquiry relative to their sources and histories seconded by the government assistance.

World-wide damage of culture collections of microorganisms during the second World War paved the way for the establishment of an international union, and in 1946 the International Federation of Culture Collections of Microorganisms was founded by the International Association of Microbiological Societies (IAMS). The IAMS was itself the Microbiological Section of the International Union of Biological Sciences and associated with UNESCO through the International Council of Science Unions. This

Federation was operated for several years by the Standing Committee appointed by the Nomenclature Committee of IAMS, but it ceased to be functioned in 1954 under certain circumstances.

Table 1.
The members of the Japanese Federation of Culture Collections of Microorganisms.*

(1) Non-pathogenic culture collections
Institute of Applied Microbiology, University of Tokyo (IAM)
Nagao Institute, Tokyo (NI)
Institute for Fermentation, Osaka (IFO)
Faculty of Agriculture, Hokkaido University (AHU)
Faculty of Agriculture, University of Tokyo (FAT)
Faculty of Technology, Osaka University (OUT)
Faculty of Technology, Hiroshima University (HUT)
(2) Pathogenic culture collections
Institute of Infectious Diseases, University of Tokyo (IID)
Research Institute for Microbial Diseases, Osaka University (RIMD)
National Institute of Animal Health (NIAH)
Faculty of Medicine, University of Tokyo (FMT)

* The office of JFCC is located in the Institute of Applied Microbiology, University of Tokyo.

In response to the world situation the Japanese Federation of Culture Collections of Microorganisms (JFCC) was established in 1951. This national federation consisted of several Japanese institutes maintaining culture collections of industrial or pathogenic microorganisms (Table 1). In 1955, Prof. Sakaguchi, one of the organizers of JFCC, launched upon his work to reconfirm and rearrange the whole of the cultures listed in the Kominami's general catalogue with the cooperation of many Japanese microbiologists. This joint research resulted in the publication of the JFCC Catalogue of Cultures in 1962, and its supplemental edition in 1966. In addition to this general catalogue, each member of JFCC published its own list of cultures. The literature thus published has been highly beneficial to microbiological studies and useful for the international exchange of cultures. Tables 2 and 3 show activities of members of JFCC throughout the year of 1965.

Table 2.
Numbers of cultures preserved by members of JFCC at the end of 1965.

Members	Molds	Yeasts	Bacteria	Actinomycetes
IAM	886	305	372	70
IFO	3536	1571	686	196
OUT	961	1357	286	16
HUT	485	239	0	149

In 1963, Japan proposed to UNESCO several programs for the promotion of research on microorganisms including that for bringing up an international network of

Table 3.
Cultures distributed by members of JFCC throughout the year of 1965.

	To domestic organizations		To foreign organizations		Total	
	Cases	Cultures	Cases	Cultures	Cases	Cultures
IAM	385	1401	22	54	407	1455
IFO	410	2209	61	281	471	2490
OUT	53	412	8	29	61	441
HUT	21	165	2	6	14	171

culture collections. These proposals were adopted in the Twelfth General Meeting of UNESCO. On the other hand, the International Association of Microbiological Societies reorganized a new committee of IAMS Section on Culture Collections in 1962. The activities on the subject are recovering in the existing state of these international affairs, and this is supposed to have a favorable influence upon functions of the Japanese culture collections.

Culture Catalogues of Microorganisms published in Japan.

List of Cultures 1950, Nagao Institute, Kinutacho, Setagayaku, Tokyo. 51p. Supplement I, II, 1952. III, 1954.

List of Cultures 1953, Institute for Fermentation, Juso nishinocho, Higashiyodogawaku, Osaka. 67p. Second Ed. 1956, 115p. Third Ed. 1962, 165p.

General Catalogue of the Cultures of Microorganisms Maintained in the Japanese Collections 1953, Higher Education & Science Bureau, Ministry of Edution, Kasumigaseki, Chiyodaku, Tokyo. 186p.

List of Cultures 1955, Research Institute for Microbial Diseases, Osaka University, Dojimanishi-machi, Osaka. 23p.

List of Cultures, Aspergilli & Yeasts 1955, The Research Institute of Fermentation, Yamanashi University, Kofu, Yamanashi. 16p.

List of Cultures 1956, National Institute of Animal Health, Ministry of Agriculture and Forestry, Kamimizumotomachi, Kodaira, Tokyo. 29p.

List of Cultures 1958, Institute for Infectious Diseases, University of Tokyo, Shibashiroganedai-machi, Minatoku, Tokyo. 23p. Second Ed. 1966, 23p.

List of Cultures 1959, Department of Fermentation Technology, Osaka University, Higashinoda-cho, Miyakojimaku, Osaka. 74p.

JFCC Catalogue of Cultures 1962, The Japanese Federation of Culture Colledtions of Micro-organisms, Institute of Infectious Diseases, University of Tokyo, Shibashiroganedaimachi, Minatoku, Tokyo. 282p.

List of Culture Collection, Actinomycetes in Japan 1962, The Society for Actinomycetes, National Institute of Health, Kamiosakichojamaru, Shinagawaku, Tokyo. 45p.

JFCC Catalogue of Cultures, Additional Edition 1966, The Japanese Federation of Culture Collections of Microorganisms, Institute of Applied Microbiology, University of Tokyo, Yayoi, Bunkyoku, Tokyo. 242p.

ADMINISTRATIVE REPORT

REPORT OF THE DIRECTOR

It is most gratifying to the Institute to obtain the publication of its Annual Report 1965–1966. In the summer of 1965, Dr. Yosio Kobayasi, a councilor of the Institute made a mycological expedition into the arctic zone of Alaska with the financial support of the Takeda Science Foundation. The fungi collected were assorted and identified with the cooperation of several mycologists. We feel highly honored that the scientists engaged in the work all have agreed to report upon the results in this issue.

With regard to the activities of the IFO culture collection, 952 strains of fungi and bacteria were obtained from natural sources and through the courtesy of other organizations. With these additions the cultures preserved and maintained in our collection amounted in the aggregate to 6263 at the end of 1966. Out of them 5600 sub-cultures were distributed among domestic and foreign organizations throughout two years. A new issue of "List of Cultures, Institute for Fermentation, Osaka" (4th Edition) is being compiled and will be made available towards the end of the year 1967.

February, 1967

Takezi HASEGAWA

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Kikiti	SATO	ex-Director, Institute for Fermentation
Sueo	TATSUOKA	General Manager, Research and Development Division, Takeda Chemical Industries Ltd.

RESEARCH PROGRAM FOR 1965-1966

1. Studies on *Rhodotorula* yeasts
   Persons in charge: Takezi Hasegawa, Dr. Ag. & Isao Banno, Dr. Ag.
2. Lactic acid bacteria and their application
   Person in charge: Reijiro Kodama, Dr. Ag.
3. Insect and acid-producing bacteria
   Person in charge: Reijiro Kodama, Dr. Ag.
4. Taxonomic studies on micro-fungi
   Person in charge: Keisuke Tubaki, Dr. Sc.
5. Genetic studies on temperate phages
   Person in charge: Teiji Iijima, Dr. Sc.

JOINT RESEARCHES SUPPORTED BY A GRANT-IN-AID FROM THE MINISTRY OF EDUCATION

1. Fundamental studies on the application of lactic acid bacteria (1962–1965)
   Chief: Prof. Kakuo Kitahara, University of Tokyo
   Personnel: Reijiro Kodama
2. Studies on the Antarctic organisms (1964——)
   Chief: Prof. Shigekichi Shimoizumi, Tokyo University of Education
   Personnel: Keisuke Tubaki
3. Studies on the molecular basis of heredity (1966—)
   Chief: Dr. Tetsuo Iino, National Institute of Genetics
   Personnel: Teiji Iijima

ABSTRACTS OF SCIENTIFIC PAPERS

Yosio KOBAYASI and Keisuke TUBAKI

Studies on Cultural Character and Asexual Repropuction of Heterobasidiomycetes I

Trans. Mycol. Soc. Japan **5**: 29–36 (1965)

Cultural observations of *Tremella fuciformis, Naematelia encephala* and *Holtermannia corniformis* were described. These asexual stages are of the yeast type and phylogenetic relationships between these fungi and the asporogenous yeast, especially of *Cryptococcus*, was discussed. Fruitbody of *Tremella fuciformis* was obtained on the potato-sucrose agar and it appeared that *T. fuciformis* is heterothallic and typically tetrapolar.

Keisuke TUBAKI

Short Note on Aquatic Spora in East New Guinea

Trans. Mycol. Soc. Japan **6**: 11–16 (1965)

The foam sample collected from Dengalu near Bulolo, East New Guinea was examined, and eighteen species of the aquatic Hyphomycetes were described and short notes on frequency were added. Many terrestrial spores were also found.

Keisuke TUBAKI and Isamu ASANO

Additional Species of Fungi Isolated from the Antarctic Materials

JARE 1956–1962. Sci. Reports (ser. E) No. 27–28, 1–16 (1965)

From the Antarctic materials, the following fungi were isolated. *Aspergillus repens, Asp. restrictus, Penicillium adametzi, Pen. canescens, Pen. charlessii, Pen. corylophilum, Pen. crustosum, Botryotrichum piluliferum, Chrysosporium pannorum, Ch. verrucosum, Dendryphiella salina, Monodictys austrina* and *Mucor mucedo*. Among them,

Dendryphiella salina was isolated from many samples and its relationship to the marine environments was discussed; a new species of Fungi Imperfecti, *Monodictys austrina,* was also described.

Keisuke TUBAKI

An Undescribed Species of *Hymenoscyphus*, a Perfect Stage of *Varicosporium*

Trans. British Mycol. Soc. **49**(2): 345–349 (1966)

A *Varicosporium*-type conidial stage appeared in culture of a semi-aquatic discomycete, *Hymenoscyphus*. The finding confirmed that the two states are genetically identical, and *Hymenoscyphus varicosporoides* sp. nov. is described.

Teiji IIJIMA

Specialized Transduction of the Galactose Markers by a Temperate Phage ϕ170 in *Escherichia coli* K 12

Japan. J. Genetics **41**: 121–130 (1966)

A temperate phage ϕ 170 which is dismune to lambda, attaches to the chromosome of *Escherichia coli* K 12 at a site adjacent to the galactose locus, and can transduce the galactose markers specifically. When a nonlysogenic recipient is used for transduction, a heterogenote (lysogenic syngenote) is isolated. The heterogenote produces an HFT (high frequency of transduction) lysate after the induction by UV irradiation. When lambda-lysogenic strains are used as recipients the resulted doubly lysogenic transductants are unstable and segregate Gal^- progenies. Preferential elimination of exogenote and transducing phage is observed in this segregation. The unstable lysogeny is also observed in doubly lysogenic strain of non transductant type, such as $Gal^-(\lambda)$ (ϕ170). In this case, elimination of prophage is not preferential; the segregants are singly lysogenic of each parental type and a small number of doubly lysogenic and nonlysogenic. The segregation of non lysogenic strain from the unstable doubly lysogenic strain is a useful method for the isolation of nonlysogenic derivatives from various K 12 strains.

MISCELLANEOUS SCIENTIFIC PAPERS

1. Keisuke Tubaki 1966. Sporulating structure in Fungi Imperfecti, in Ainsworth, G. C. & Sussman, A. C., The Fungi vol. **2**, p. 113–131, Academic Press Inc., New York.

2. Reijiro Kodama 1966. Lactic acid bacteria related to a silkworm disease, p. 138–151: Nutritional aspects of the lactic acid bacteria, p. 243–270. In Kakuo Kitahara, Studies of the lactic acid bacteria, Tokyo University Press, Tokyo. [In Japanese]

3. Takezi Hasegawa 1966. Outline of fungi—their merits and demerits. Chemistry **21**: 779–785 [In Japanese]

PRESENTATION OF PAPERS AT SCIENTIFIC MEETINGS, 1965-1966

Author(s)	Title	Scientific Meeting
T. Hasegawa	On the classification of anascosporogenous yeasts	Regular Meeting of the Mycological Society of Japan in Tokyo (February, 1965)
Y. Nakasuji, M. Nishio and R. Kodama	Pathogenicity of lactic streptococci and gram-negative bacteria for the aseptically reared silkworm larvae	General Meeting of the Society of Sericultural Science of Japan in Tokyo (April, 1965)
R. Kodama, Y. Nakasuji, Y. Yamauchi and M. Nishio	Cultural and physiological characters of the lactic streptococci and the gram-negative bacteria pathogenic for the aspetically reared silkworm larvae	*The same as above*
I. Banno	Taxonomic position of the perfect stage of some *Rhodotorula* yeasts	General Meeting of the Agricultural Chemical Society of Japan in Tokyo (April, 1965)
K. Tubaki and I. Asano	Fungus flora of Australia and New Zealand I, II	General Meeting of the Mycological Society of Japan in Tokyo (April, 1965)
K. Tubaki	On Japanese lignicolous marine fungi I	General Meeting of the Botanical Society of Japan in Tokyo (October, 1965)
T. Iijima	High frequency transduction of *Gal* markers by temperate phage ϕ170	General Meeting of the Genetics Society of Japan in Matuyama (October, 1965)
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