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Macromycetes of the NW Sörkapp Land, Spitsbergen

ABSTRACT: This paper reports the species of macromycetes collected on NW Sörkapp Land, Spitsbergen: all the species are new to the area. Brief notes on taxonomy, ecology and distribution of the species are provided.

Key words: Arctic, Spitsbergen, macromycetes.

Introduction

Several papers on Spitsbergen's fungi already appeared, among others those by Karsten (1872), Dobbs (1942), Skirgiełło (1961), Harmaja (1984), Gulden (1987 a. b). Huhtinen (1987). However, our knowledge on the macromycetes flora and their distribution in Spitsbergen is still insufficient.

This paper is the contribution to the knowledge of higher fungi of Sörkapp Land from where any data have been announced up to the present.

The material reported here was collected by the third of the authors during two expeditions of the Jagiellonian University to Sörkapp Land (Spitsbergen) in the years 1982 and 1985. Investigations were carried out within complex studies of the natural environment of the area, co-ordinated by the Laboratory of Polar Research of the Institute of Geography of the Jagiellonian University.

The description of the vegetation of NW Sörkapp Land is given in the paper by Dubiel and Olech (1990). Geographical position of the investigated area and a sketch of its topography are presented in Fig. 1.

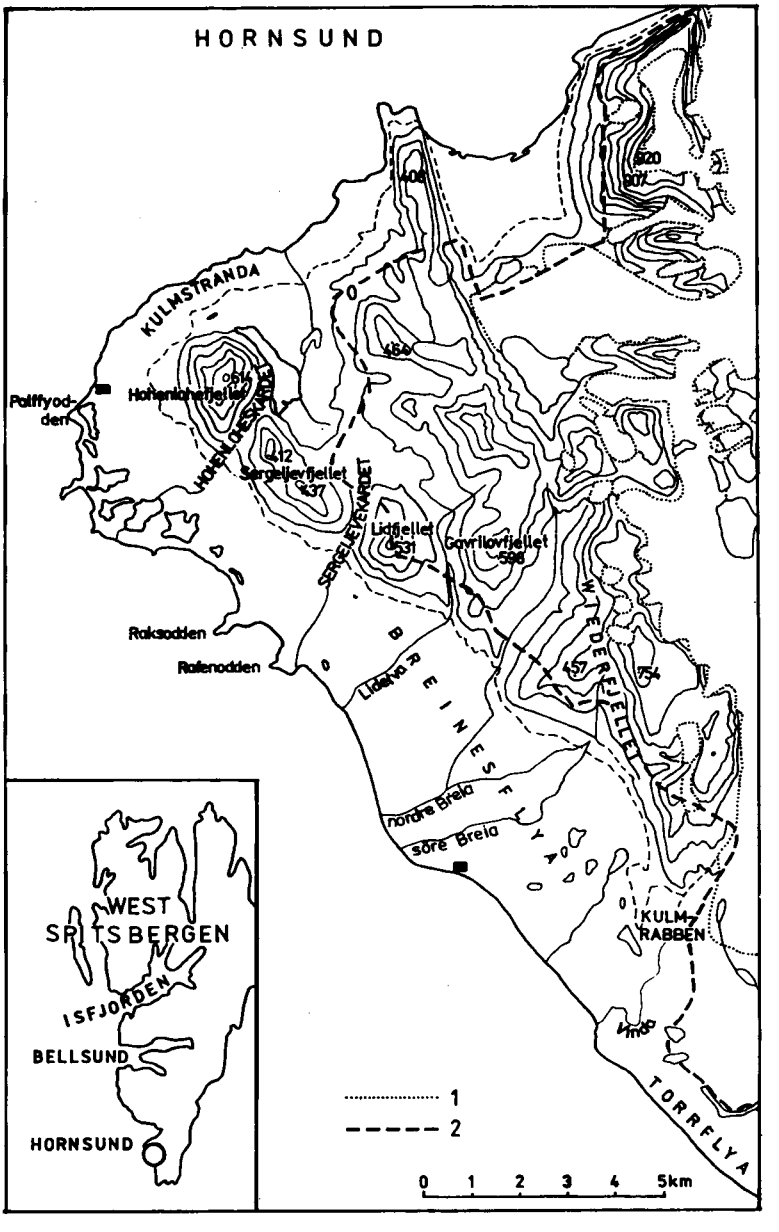

Fig. 1. Topographic sketch of NW Sörkapp Land
1 — limits of the glaciers, 2 — limits of the study area

The collection has been deposited in the Herbarium of the Institute of Botany of the Jagiellonian University (KRA) and in W. Szafer Institute of Botany, Polish Academy of Sciences (KRAM-F).

Species determinations are based on dry material and on few notes made in situ from fresh material.

Results and discussion

Asomycetes

Helotiales

Geoglossaceae

Bryoglossum gracile (Karsten) S.A. Redhead
= *Mitrula gracilis* Karst.
= *Gymnomitrula gracilis* (Karst.) Imai

Ascocarps very small, growing singly or 2–3 together, consisting of a fertile head and a stipe. Head of pileate form (Kankainen 1969) with a distinct overhanging margin. Under the head is the sterile, slightly reticulated or fibrillose area. Head 0.5–1.3 mm height, 0.5–1 mm broad, light pinkish-yellow (more orange when dry), smooth or very slightly folded, full inside (Fig. 2). Stipe filiform, 5–8 × 0.2–0.3 mm, at the top thickened up to 0.5 mm, at the base rugged (magnifying glass!), somewhat higher than the head. Ascocarps covered with mucilaginous matter when wet. Asci clavate 60–80 × 6 µm, 8 spores, Ascospores cylindric, sometimes curved, 10–11,5 × 2–3 µm, one-celled or rarely 1-separate (Fig. 2), multiguttulate inside. Paraphyses filiform, slightly thickened above.

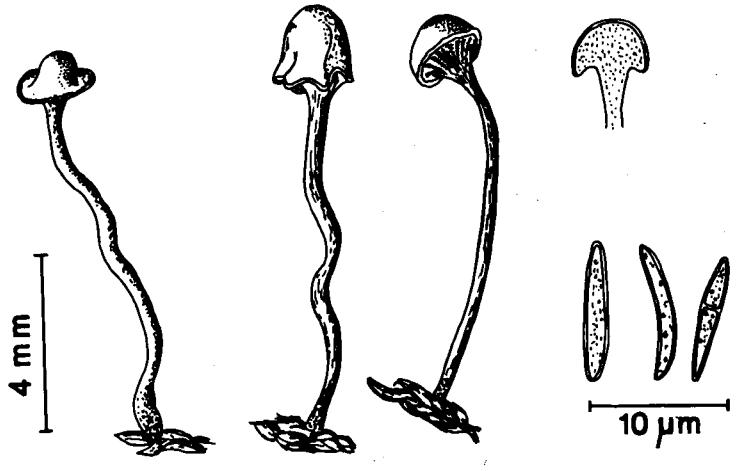

Fig. 2. Ascocarps and spores of *Bryoglossum gracile*

Ascocarps grow on the top or lateral on the living mosses: *Calliergon richardsonii, Scorpidium turgescens, Aulacomnium palustre.* They were found in the community of *Dupontia pelligera* (Dubiel and Olech 1990). Localities: depression at the foot of W. Sergeijevfjellet, c. 40 m, 5.08.1982.

Bryoglossum gracile has a true arctic-alpine distribution (Eckblad 1963). It has been also reported from Spitsbergen by Skirgiełło (1961) and Kankainen (1969).

This species was described by Karsten (1883) as *Mitrula gracilis.* The descriptions given later by various authors are sometimes different because of the large variability of the ascocarps. Redhead in 1977 proposed for this species the new generic name: *Bryoglossum.*

Basidiomycetes

Agaricales

Tricholomataceae

Arrhenia lobata (Pers.: Fr.) Redhead
= *Leptoglossum lobatum* (Pers.: Fr.) Ricken

Basidiocarp flabelliform or spathulate, grey-brown, with lobed margin, up to 3.5 cm high, with stipelike, paler than the pileus, sterile base. Hymenophor cantharelloid, consisting of distinct veins often dichotomously branched, reticulate towards the margin of pileus. The main veins are connected with numerous sinuose small lateral ones. Basidiospores very variable in shape and size, most often lacrymoid 8 × 5 μm, distinct apiculus. Clamp connections present.

Basidiocarps were found growing between mosses: *Calliergon richardsonii, Drepanocladus revolvens, Scorpidium turgescens, Aulacomnium palustre, Drepanocladus uncinatus,* mainly in *Dupontia pelligera* and *Carex subspathacea* communities. Localities: central part of Breinesflya, alt. 25 m, 7.08.1985; near sore Breia, alt. 25 m, 7.08. 1985; depression at the foot of W Lidfjellet, alt. 30 m, 7.08.1985; Hohenloheskardet, alt. 110 m, 21.08.1982.

Arrhenia lobata is a typical species of circumpolar and alpine distribution. It has been many times reported from Spitsbergen, but not yet from Sørkapp Land. After Redhead (1984) *Arrhenia lobata* is a very abundant species in the Arctic region. Høiland (1976) mapped the distribution of this species in Svalbard. Very good coloured photograph of this interesting species is given by Gulden and Jenssen (1988).

Omphalina alpina (Britz.) Bresinsky & Stangl
= *O. luteovitellina* (Pilát & Nannf.) M. Lange

Pileus 0.5–2.0 cm, at first semiglobate, becoming plane, with depressed centre and crenulate margin, bright yellow, more paler when dry. Gills decurrent, distant, concolorous with the pileus. Stipe 0.8–2.5 × 0.1–0.2 cm, concolorous with the

pileus, rising from a moss cushion. Spores ellipsoid or amygdaloid, 6.5–10 × 3.5–5 μm, hyaline, fine guttulate inside. Clamp connections absent.

The specimens were growing between mosses and lichens: *Dicranum elongatum, Rhacomitrium lanuginosum, Ptilidium cilliare, Polytrichum alpinum, Cetraria islandica, C. cucullata, C. nivalis* and *Cladina mitis*. Localities: at the foot of Hohenlohefjellet, alt. 100 m, 21.08.1982; alt. 75 m, 31.07.1982. Mainly in the community of *Cetraria nivalis — Cladina rangiferina.*

Omphalina alpina grows from June to August mainly in high-alpine areas and subarctic-arctic regions. It is known also from Svalbard (Gulden, Jenssen and Stordal 1985). The specimens may grow both in moss cushions and in sites with poor vegetation cover.

Cortinariaceae

Cortinarius alpinus Boud.
(subgenus *Myxacium*)

Pileus 20–40 mm, convex or subumbonate, slimy to viscid, shining, reddish, golden yellow, sometimes brunneous centre, margin pale. Gills emarginate, straw-coloured to cinnamomeous. Stem 20–30 × 5–8 mm, whitish, apex striate. Spores 15.5–20.6 × 7.3–8.6 μm, ellipsoid, to broadly ellipsoid, rugulose, rusty brown (Fig. 3a,b). Basidia 43–54 × 10.3–11 μm, 4-spored, with basal clamp. Cystidia absent. The gelatinous layer on cap 140–180 μm thick, hyphae flexuous 1.7–3.4 μm. Epicutis hyphae 6–7.7 μm, with conspicuous, irregular, granular incrustations, pileus trama ± irregular hyaline hyphae 15–19 μm thick. (Microscopic features examined in 5% KOH).

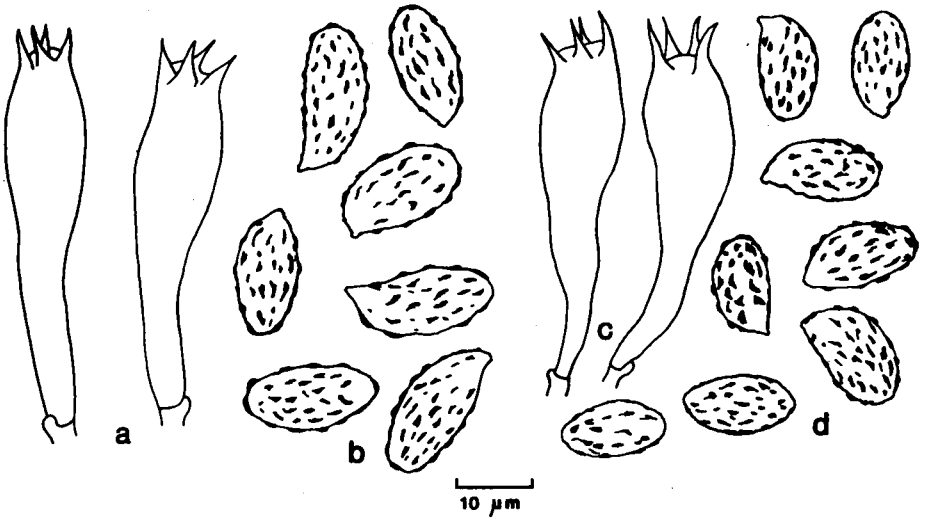

Fig. 3. *Cortinarius alpinus:* a — basidia, b — spores; *Cortinarius favrei:* c — basidia, d — spores

The specimens were found growing between *Salix polaris* and mosses: *Drepanocladus revolvens* and *Campylium polygamum*. Locality: central part of Breinesflya, 7.08.1985. This species hitherto not known from Spitsbergen.

Cortinarius favrei Mos. ex Henders.
(subgenus *Myxacium)*

Pileus 20–40 mm, hemisphaerical to convex , glutinous, yellow brown to red brown, with darker centre. Gills adnate to broadly emarginate, crowded, young cream to greyish, old rusty brown. Stem 20–35 × 3–10 mm, cylindric, somewhat bulbose, with rusty brown remnants of cortina. Spores 14.6–16.3 × 7.7–9 μm, broadly ellipsoid to amygdaliform, rugulose (Fig. 3c, d). Basidia 35–43 × 10–12 μm, 4-spored, sometimes with brown content. Cystidia absent. The gelatinous layer on cap 150–165 μm thick, hyphae flexuous 2–3.4 μm. Epicutis hyphae 6–8.6 μm, with conspicuous, irregular, granular rusty brown incrustations, pileus trema ± irregular, hyaline hyphae, 10.3–17.2 μm thick. (Microscopic features examined in 5% KOH).

The specimens were found growing between mosses: *Drepanocladus uncinatus, Aulacomnium plaustre, Polytrichum alpinum* and *Tomenthypnum nitens*. Locality: central part of the Breinesflya plain, 0.08.1985.

Cortinarius favrei is one of the early and common mushrooms in arctic and alpine habitats (Gulden, Jenssen and Stordal 1985).

Cortinarius pauperculus Favre
(subgenus *Telamonia*)

Pileus up to 1 cm broad, campanulate, with papille on the top, smooth or fibrillose, red brown, a little paler towards the margin. Gills adnate or emarginate, concolorous with cap. Stipe 1.5–2 × 0.1–0.2 cm, paler than the cap, cylindric, with the base ± white tomentose. The ring in the very apex part of the stipe, whitish, fibrillose from veil remnants. Spores 7.5–10 × 5–6.5 μm, brown, ellipsoid or amygdaloid, with suprahilar depression (Fig. 4), fine verruculose, sometimes nearly smooth (Nespiak 1981). Clamp connections present.

The specimens were found growing between mosses: *Calliergon sarmentosum, Drepanocladus uncinatus, Dicranum elongaum, Aulacomnium palustre, Plagiomnium ellipticum*, as well as *Salix polaris* and *Saxifraga hyperborea*. Locality: at the foot of W Sergeijevfjellet, c. 40 m, 5.08.1982.

Supraapicular depression on the spores is a characteristic feature of this species (Horak 1987). It grows usually associated with *Dryas* or *Salix herbacea, S. retusa* and *S. serpyllifolia* — known also from Spitsbergen (Gulden and Jenssen 1988).

Cortinarius cf. *norvegicus* Høiland
(subgenus *Dermocybe*)

Pileus up to 2 cm broad, semiglobulose, reddish-brown, with the curved and slightly involute margin. Gills broadly adnate, cinnamon to rust-brown. Stipe up

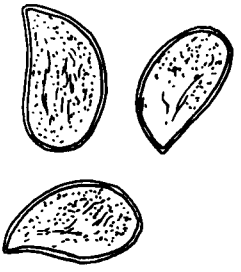

Fig. 4. Spores of *Cortinarius pauperculus* — supraphilar depression is visible

to 2.5 cm high, 0.2–0.5 cm broad, subclavate at the base. Spores 6.5–8 × 4–5 μm (average), amygdaloid or ellipsoid, punctate, yellow-brown. The details of the structure of fruit-bodies agree well with these given by Høiland (1983).

The specimens were found growing between mosses: *Tomenthypnum nitens, Drepanocladus uncinatus, Distichium capillaceum.* Locality: Sergieijevfjellet, alt. 100 m. 10.08.1982.

In the size of spores *C. norvegicus* is similar to *C. croceus*, but the larger stipe, yellow gills and seldom curved caps margin of the latter separate it from the former. In the colour of cap and habit of carpophores *C. norvegicus* is similar to *C. polaris* (Gulden, Jenssen and Stordal 1985) the latter has much greater spores.

According to Høiland (1983) *Cortinarius norvegicus,* just as *C. polaris*, has an arctic distribution. It is known from the upper boreal zone to the middle arctic zone. It has its main season in August and the first part of September, forming mycorrhiza with *Betula nana, B. pubescens* and *Salix* spp. It was hitherto not known from Svalbard.

Galerina clavata (Vel.) Kühn.
= *G. fragilis* Vel. var. *clavata* Vel.

Pileus 5–18 mm. conic, campanulate-umbonate or convex, translucently striate almost to centre, fulvous to ochre, paler and more yellow at margin, in age becoming dull, red-brown, centre usually darker, hygrophanous. Gills adnexed, subdistant, yellow to ochre, becoming ± concolorous with cap, edge minutelly white fimbriate, old ± brown spotted. Stem 15–60 × 1–2 mm, flexuous, somewhat clavate at base, cream to pale ochre, distinctly white silky fibrillose. Veil white, remaining as fibrils on the stem. Spores 11.6–15.4 × 6.8–9.5. μm, ellipsoid to amygdaliform, with suprahilar depression, verrucose, plage absent, no callus. Basidia 26.6–42.5 × 8.6–12.4 μm, 4-spored, becoming yellow brown in age. Cheilocystidia 36–64 × 6.8–18 × 2.1–3.8 × 2.6–9.8 μm, tibiiform, occasionally septate, hyaline, becoming yellow brown. Pleurocystidia absent. Caulocystidia scattered, tibiiform or without ventral inflation. Clamps absent. (Microscopic features examined in 5% KOH).

The specimens were found growing between mosses: *Drepanocladus revolvens, Aulacomnium palustre, Bryum pseudotriquetrum, Plagiomnium ellipticum, Calliergon richardsonii* and others plants, such as: *Carex subspathacea, Equisetum arvense, Saxifraga hirculus*. Mainly in the community of *Carex aubspathacea*. Localities: Breinesflya, near söre Breia, 5.08.1985, 7.08.1985; Breinesflya near nordre Breia, 10 m, 6.08.1985; S part of Breinesflya, 7.08.1985; depression at the foot of W Sergeijevfjellet, 30 m. 8.08.1985.

Galerina clavata is one of the most common *Galerina* species in alpine and arctic areas (Gulden 1987).

Galerina pseudocerina Smith & Sing.

Pileus 6–10 mm, conic to campanulate, ± umbonate, with incurved margin, sometimes translucently striate, hygrophanous, fulvous, ochre to red brown. Gills adnate, distant, ventricose, pale ochre, yellow brown to rusty brown. Stem 25–32 × 1.5–2 mm, cylindric, fistulose, pruinose in upper part, white fibrillose, colour paler than the cap, darkening to red brown from base. Spores 9.4–11.2 × 6.8–8.2 μm broadly ellipsoid to amygdaliform, ornamented, without plage and pore, tawny to rusty brown. Basidia 26.6–38.7 × 8.6–12.9 μm, 4-spored. Cheilocystidia 27–42 × 6–10.3 × 1.7–3 × 2.5–4.7 μm, tibiiform. No pleuro- and pileocystidia. Caulocystidia tibiiform or without ventral inflation. Clamps at all septa. (Microscopic features examined in 5% KOH).

The specimens were found between *Drepanocladus uncinatus, Distichium capillaceum, Polygonum viviparum, Saxifraga aizoides*. Locality: W Sergeijevfjellet, 100 m, 17.07.1985.

This species is undoubtedly circumpolar, known from Colorado (North America), alpine sites in Scandinavia and Central Europe, Greenland, Scotland, Svalbard and Arctic Soviet Union (Gulden 1987). Known also from few lowland sites (Gulden, Jenssen and Stordal 1985).

Galerina stordalii A.H. Smith
= *G. propinqua* Bas
= *G. frigida* Wells & Kempton

Pielus 5–15 mm, convex to broadly conic, sometimes campanulate or subumbonate, striate nearly to centre, clear yellow to fulvous, ochre to pale brown, margin paler. Gills adnexed to adnate, ventricose, rather narrow, subdistant, pale yellow to warm ochre. Stem 10–25 × 1–1.3 mm, cylindric, white to pale yellow, latter slightly reddish brown, apex paler. Spores 8.6–11.2 × 4.3–5.6 μm, amygdaliform, verruculose, with suprahilar depression an apical pore, plage absent. Basidia 21–29 × 6.8–9.4 μm, 4-spored. Cheilocystidia 25–40 × 6–10.5 × 2–3 × 2–2.5 μm, tibiiform, hyaline, becoming yellow brown with age. Caulocystidia numerous, tibiiform. Clamps present at base of basidia and occasionally in the subhymenial hyphae. (Microscopic features examined in 5% KOH).

The specimens were found growing between mosses: *Calliergon richardsonii, Drepanocladus revolvens, Campylium polygamum.* Localities: Breinesflya, near söre Breia, 7.08.1985; S part of Breinesflya, 27.07.1985.

Galerina stordalii is known from boreal to low-alpine habitats: Scandinavia, Greenland, from Arctic Alaska (Gulden, Jenssen and Stordal 1985). Probably also occurs in Scotland and Iceland (Gulden 1980). Hitherto not known from Spitsbergen.

Galerina terrestris Wells & Kempton

Pileus 4–11 mm, broadly conic to convex, sulcate, distinctly translucently striate near to centre, margin crenulate, bright tawny to red brown, drying ochre from centre. Gills adnate, subdistant, ventricose, ochre to more yellow-brown. Stem 13–15 × 0.5–1 mm, equal, flexuous and ± filiform, densely pruinose in upper part, with white remnants appressed veil in the lower part, yellow brown to red-brown at the base; base with white mycelial fibrils. Spores 8.6–10.7 × 5.1–6.4 μm, amygdaliform, pore absent, plage rather small, verruculose-rugulose, yellow brown. Basidia 25.8–34.4 × 6.4–8.6 μm, 4-spored. Cheilocystidia 32–35 × 6–19.7 μm, scattered, ventricose-fusoid with obtuse apex. Pleurocystidia similar, caulocystidia numerous in upper half, scattered and few in basal part of stem, similar to the hymenial cystidia. Clamps at all septa. (Microscopic features examined in 5% KOH).

The specimen was found growing between mosses: *Aulucomnium palustre, Calliergon richardsonii, Plagionmium ellipticum.* Locality: below Kulmrabben, 5.08.1985.

This species is known from boreal and alpine sites in Alaska, Norway ant the Swiss Alps (Senn-Irlet, Jenssen and Gulden 1990). It was hitherto not known from Svalbard.

Galerina vittaeformis (Fr.) Sing.

Pileus 6–18 mm, obtusely conic to campanulate, becoming expanding to plano-umbonate, striate to sulcate, hygrophanous, to centre tawny brown, betweeen striate more yellowish. Gills broadly adnate, distant, ochre, tawny at maturity. Stem 20–30 × 1–2 mm, equal and flexuous, pruinose, somewhat fibrillose, ± glabrous from base, dull tawny above, darker below. Spores 8.1–10.7 × 5.5–7.3 μm, amygdaliform, at apex ± protracted, punctate-rough, with plage and callus, tawny in KOH. Basidia 21.5–35.2 × 8.1–9.4 μm, 4-spored, hyaline, becoming brown. Cheilocystidia 40–70 × 6.4–15.4 × 3.4–5.5 μm, fusoid-ventricose, hyaline. Pleuro- and caulocystidia (scattered) similar to cheilocystidia. Pileocystidia none or rare. Clamps at all septa. (Microscopic features examined in 5% KOH).

This specimens were found in the community of *Dupontia pelligera,* between mosses: *Drepanocladus revolvens* and *Calliergon richardsonii.* Localities: Breinesflya, söre Breia, 7.08.1985.

Lycoperdales

Lycoperdacae

Calvatia cretacea (Berk.) Lloyd

Basidiocarp ovate, with short tapering base, 4–5 cm broad, 4.5–5.5. cm in height, with the upper part breaking away in irregular flakes. Exoperidium in the lower part of basidiocarp composed of slender spinules arranged in stellate groups. Near the upper part of basidiocarp, exoperidium is very thick and shows polygons with single warts ornamented with distinct fibrils. Endoperidium very thin. Capillitium of septate, branched, thick-walled and pitted hyphae. Spores globulose, 5–6.5 μm, verrucose, occasionally two fused together, what is visible even with the light microscope.

Calvatia cretacea was found growing between mosses: *Drepanocladus unicinatus, Ptillidium cilliare, Dicranum elongatum* and lichens: *Cladonia amaurocraea, Peltigera didactyea.* Locality: Sergeijevfjellet, W, alt. 100 m, 10.08.1982.

Some authors (Eckblad 1955, Jülich 1984) distinguish two similar species: *Calvatia cretacea* (Berk.) Lloyd and *C. arctica* Ferd. & Winge, basing on the different appearence of exoperidium.

However Miller, Burdsall and Laursen (1980) on the base of scrupulous examination of rich material indicate that stages of maturity and variable weather conditions in polar regions produced changes in the appearance of the exoperidium of the sporocarp. These authors conclude that 4 species described from tundra, namely *Calvatia tatrensis* Hollós, *C. arctica* Ferd. & Winge, *C. borealis* Th. C.E.Fries and *C. tatrensis* var. *groenlandica* M. Lange are conspecific with *C. cretacea* (Berk.) Lloyd. It is circumpolar species known also from Spitsbergen (Fries 1914, Hagen 1950, Skirgiełło 1961, 1968).

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Streszczenie

Materiały zostały zebrane podczas dwu ekspedycji Uniwersytetu Jagiellońskiego na Spitsbergen w latach 1982 i 1985, w rejonie NW Sörkapp Land.

W pracy podano stanowiska 13 gatunków grzybów, w tym 12 gatunków z klasy Basidiomycetes i jeden gatunek należący do klasy Ascomycetes. Podane gatunki są nowe dla tego obszaru.