

**A taxonomic revision of the genus *Cheilymenia* Boud. – 9.
The sections *Villosae* and *Obtusipilosae*, and a revision of the genus
Pseudoaleuria Lusk (Pezizales, Pyronemataceae)**

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MORAVEC J. 2003: Taxonomic revision of the genus *Cheilymenia* Boud. – 9. The sections *Villosae* and *Obtusipilosae*, and a revision of the genus *Pseudoaleuria* Lusk (Pezizales, Pyronemataceae). *Acta Musei Moraviae, Scientiae biologicae* (Brno) **88**: 37–73. – The section *Villosae* J. Moravec of the genus *Cheilymenia* Boud. is newly revised and comprises: *Cheilymenia villosa* Gamundi (the type species), *C. gemella* (P. Karst.) J. Moravec, *C. chionophila* T. Schumacher and *C. sclerotiorum* T. Schumacher. A lectotype (H) of *Peziza stercorea* subsp. *gemella* P. Karst. is designated. The section *Obtusipilosae* (J. Moravec, 1990) stat.nov., originally a series of the section *Villosae*, is reassessed here as a separate section with the type species *Cheilymenia magnifica* (W. Y. Zhuang et Korf) J. Moravec (based on *Coprobria magnifica* W. Y. Zhuang et Korf), and *Cheilymenia catenipila* J. Moravec sp.nov. described here. *Cheilymenia campestris* (P. Crouan et H. Crouan) J. Moravec (based on *Peziza campestris* P. Crouan et H. Crouan) is considered here a later synonym of *Cheilymenia fibrillosa* (Currey) Le Gal (based on *Peziza fibrillosa* Currey). The latter is transferred here to the genus *Pseudoaleuria* Lusk (with type species *Pseudoaleuria quinaultiana* Lusk) as *Pseudoaleuria fibrillosa* (Currey) J. Moravec comb.nov. All taxa are illustrated with line drawings or microphotographs and SEM photomicrographs.

Key words. *Cheilymenia* Boud., *Villosae*, *Obtusipilosae*, *Pseudoaleuria* Lusk, Pezizales, Pyronemataceae, taxonomy, revision

Introduction

Two of the sections of the genus *Cheilymenia* Boud., the sect. *Villosae* J. Moravec and the sect. *Obtusipilosae* (J. Moravec) stat.nov., within the infrageneric arrangement (MORAVEC 1990b,) modified in MORAVEC (1993, 2003), are treated here, ahead of a monograph on the genus. The obtuse hairs in the section *Obtusipilosae* indicate a link to the genus *Pseudoaleuria* Lusk, 1987, also revised here.

Material and methods

Material from various herbaria was examined on rehydrated apothecia by the usual methods. Only mature ascospores were measured. Extremely large ascospores, which occasionally mature together with aborted ones and are consequently present in reduced numbers in one ascus are considered abnormal and their size is given in brackets. The ascospores were stained with Cotton blue C4B [“Geigy s. 123” or 0.5 % Methyl blue (R.A.L.) in lactic acid] which stains directly without heating the slides. Such cold staining is necessary in the examination of ascospore ornamentation in *Cheilymenia* in order to avoid destruction of the delicate and easily separable outermost perispore membrane [as pointed out in all my papers, most recently in MORAVEC (1998, 2002a,

2002b)]. The samples for the SEM photomicrographs (pieces of hymenium) were taken from dried apothecia and directly coated with gold-palladium, without any previous manipulation, since any treatment of ascospores with an aggressive liquid may result in destruction of the perispore.

For microscopic examination of the anatomy, median sections through apothecia were mostly treated with 1% KOH and washed in distilled water before staining with C4B in lactic acid or with Trypan blue in lactic acid.

Abbreviations

AH	Herbario Departamento de Biología Vegetal, Universidad de Alcalá, Alcalá de Henares, Madrid, Spain
BHU	Museum für Naturkunde der Humboldt-Universität zu Berlin
CO (formerly CONC)	Herbier Crouan, Department of Marine Biology, Museum National d'Histoire Naturelle, Concarneau France
H	Botanical Museum, University of Helsinki, Finland
HMAS	Institute of Microbiology, Academia Sinica, Beijing, P. R. China
K(M)	The herbarium (Mycological) of the Royal Botanical Gardens, Kew, England
LPS	Instituto de Botánica C. Spegazzini, La Plata, Argentina
O	The Herbarium Botanical Museum, Blindern, Oslo, Norway
OSC	Department of Botany and Plant Pathology, Oregon State University, U.S.A
PC	Muséum National d'Histoire Naturelle, Laboratoire de Cryptogamie, Paris
PDD	Lancare Research, New Zealand Fungal Herbarium, Auckland, New Zealand (see also WELTU)
S	Naturhistoriska Riksmuseet, Section for Botany, Stockholm, Sweden
TAA	Institute of Zoology and Botany, Tartu, Estonia
UPS	Institute of Systematic Botany, University of Uppsala, Sweden
WAG-W	Herbarium Vadense, Biological Station Wijster, The Netherlands (now moved to WA, Wageningen)
WELTU	Herbarium of the Victoria University of Wellington, New Zealand (the fungal herbarium recently moved to PDD)
WU	Botanisches Institut und Botanischer Garten der Universität Wien, Austria
ZT	Eidgenössische Technische Hochschule Zürich, Switzerland (ex herbarium B. Senn-Irlet)

Taxonomy

Genus *Cheilymenia* Boud., *Bull. Soc. Mycol. France* **1**: 105, 1885

Section *Villosae* J. Moravec, *Mycotaxon* **38**: 475, 1990b

Type species: *Cheilymenia villosa* Gamundi, *Bull. Soc. Argent. Bot.* **14**: 173, 1972.

Other species:

C. gemella (P. Karst.) J. Moravec

C. chionophila T. Schumacher

C. sclerotiorum T. Schumacher

The section *Villosae*, in the sense introduced here, accommodates species possessing medium-sized to large apothecia with distinctly differentiated ectal and medullary excipulum and two types of apothecial hairs. The marginal hairs are rigid, thick-walled, simple to rooting, with obtuse, subacute to acute apices (all shapes occur in each of the species in the section). The receptacular hairs (called here lateral hairs), which densely cover the outer excipular layer on the flanks, are thinner, often flexuous or interwoven, but also bristle-like and thick-walled, with bulbous or rooting base (hyphoid hairs and hyaline hyphae are admixed with the “true” hairs and hyaline subicular hyphae are present near the base of the receptacle).

The ascospores are nearly smooth, or their easily separable perispore bears fine pustules or fine irregular crests when stained with C4B in lactic acid. The ascospore ornamentation is developed within the asci from the infracellular pigment, and the submature ascospores bear large cyanophilic pustules.

***Cheilymenia villosa* Gamundi** (Figs 1–4, 56)

Cheilymenia villosa Gamundi, *Bull. Soc. Argent. Bot.* **14**: 173, 1972.

Apothecia (Fig. 4) medium-sized, 3.2–7.00 mm in diam., sessile, fleshy, at first deeply cupulate, becoming irregularly expanded, with lobed or undulate margin, with concave or undulate, yellow to orange hymenium; outer surface concolorous with hymenium, densely covered with pale brown hairs, which are darker and longer on marginal area [these characters of fresh apothecia are adopted from GAMUNDÍ (1972, 1975)].

Apothecial structure (Fig. 3). Hymenium about 200–280 µm thick with paraphyses overlapping asci. Hypothecium about 25–35 µm thick, consisting of small cells of indefinite shape 4–9 µm in diam., indistinctly delimited from the medullary layer. Medulla about 90–130 µm thick, consisting of irregularly interwoven septate-articulate hyphae 6–9 µm thick, with slightly irregularly inflated articles, (textura intricata, articles partly resembling textura epidermoidea or angularis). Ectal excipulum about 90–140 µm thick (in marginal zone thinner, 60–90 µm thick), of a textura angularis or globulosa to angularis, composed of large subglobose to subangular cells 15–40 µm in diam., ochraceous in cortical zone; towards the margin the cells become smaller (10–25 µm in diam.), elongate to shortly clavate or pyriform, mixed with hair germs and protruding marginal hairs, and together forming marginal rim.

Hairs of two but not distinctly differentiated types: marginal hairs (Figs 5) superficial as originating from outermost excipular cells, or often simply rooting as originating among outer excipular cells, usually long and rigid, straight or curved, $150\text{--}520\text{--}(560)\times 15\text{--}30\ \mu\text{m}$ (width measured near hair bases), pale brown, with only one or more septa, thick-walled (walls $1.5\text{--}3.2\ \mu\text{m}$ thick), with blunt, subacute or acute apex and with mostly simple, rarely bifurcate base that is bulbous or often attenuated into narrow, simple root; lateral hairs (Fig. 6) on flanks are thinner, $120\text{--}200\text{--}(420)\times 11\text{--}22\ \mu\text{m}$, flexuous, occasionally interwoven, mostly superficial, originating from cells of ectal excipular layer, pale brown or luteous, with mostly subacute apices. Subhyaline hyphoid hairs and subicular hyaline hyphae occur at the apothecial base.

Asci (Fig. 1) $190\text{--}240\text{--}(265)\times 12\text{--}16.2\ \mu\text{m}$, cylindrical, with rounded apex, gradually constricted towards often flexuous base, eight-spored.

Ascospores (Figs 2, 56) uniseriate, broadly or globose-ellipsoid, $(14.2\text{--})15.0\text{--}18.0\text{--}(19.5)\times (9.6\text{--})11.0\text{--}13.5\text{--}(15.0)\ \mu\text{m}$, mostly $15.5\times 12\ \mu\text{m}$ (exceptionally distinctly subglobose, $18.5\times 15.0\ \mu\text{m}$), hyaline; mature ascospores possess a yellow refractive hue when stained with C4B; loosening perispore nearly smooth, with irregular patches of very fine cyanophilic powdering or small pustules.

Paraphyses (Fig. 1) overlapping asci and appearing as if confluent together, filiform, $2.0\text{--}3.2\ \mu\text{m}$ thick, straight, sparsely septate, apices moderately clavate-dilated $4.2\text{--}6.5\ \mu\text{m}$, filled with orange pigment.

Habitat and distribution. Terrestrial Subarctic species, on old leaves of liverwort *Noteroclada* sp., known only from the holotype collected in Tierra del Fuego, Argentina.

Type material examined. Argentina: “Tierra del Fuego, Depto Ushuaia, Paso Garibaldi, cascada cerca del camino, leg. G. Hässel de Menéndez – I. Gamundí, 14. II 1965, sobre suelo y sobre talluelos viejos y en descomposición de *Noteroclada*”, LPS 36718” – holotype.

Remarks. This type species of the section *Villosae* is distinguished from the other species of the section especially by the globose-ellipsoid ascospores.

Cheilymenia gemella (P. Karst.) J. Moravec (Figs 7–13, 57)

= *Peziza stercorea* * [ssp.] *Peziza gemella* P. Karsten, *Not. Sällsk. Fauna Flora Fennica Förh.* **10**: 126, 1869.

≡ *Lachnea stercorea gemella* P. Karst., *Myc. Fenn.*, **1**: 71, 1871.

≡ *Cheilymenia gemella* (P. Karst.) J. Moravec, *Mycotaxon* **37**: 469, 1990a.

Exclusions:

Non *Lachnea gemella* (P. Karst.) Velen., *Mon. Discom. Boh.* **1**: 313, **2**: Tab. 7, Fig. 21, 1934; *sensu* Velenovský, which is *Cheilymenia stercorea* (Pers.: Fr.) Boud.

Apothecia medium-sized to very large, (Fig. 8) scattered to gregarious, $(2.5\text{--})3.5\text{--}10.0\text{--}(18)$ mm in diam. (when dried usually up to 8 mm, but also up to 13 mm), sessile, at first deeply cupulate, orbicular, becoming expanded with slightly undulate margin, fleshy; hymenium deeply concave, yellow with orange-reddish tinge to orange; outer surface concolorous with hymenium, densely covered with inconspicuous pale yellowish to pale brownish hairs, which are denser and longer on flanks than on the margin.

Apothecial structure (Fig. 7). Hymenium about 200–220 μm thick with paraphyses overlapping asci. Hypothecium about 40–50 μm thick, consisting of small irregularly globose cyanophilic cells 4–8 (–12) μm diam., well differentiated from the medullary layer. Medulla about 100–200 μm thick, consisting of interwoven, 4.0–7.5 μm thick, often moderately swollen (up to 12 μm) hyphae with strongly cyanophilic septa, forming *textura intricata* (with irregularly, mostly slightly swollen articles occasionally resembling *textura epidermoidea* or *angularis*). Ectal excipulum about 90–150 (–180) μm thick (in marginal zone much thinner, 50–80 μm thick), composed of a *textura globulosa* to *angularis* of large subglobose to subangular cells 15–60 (–90) μm in diam., cyanophilic in cortical zone; towards the margin the cells are smaller (10–30 μm diam.), transformed into elongate, above clavate cells which form marginal rim and are mixed with hair germs and protruding marginal hairs.

Hairs differentiated: marginal hairs (Fig. 12) long, robust and rigid, straight or flexuous and often with undulate walls, 150–400 (–460) \times 15–27 (–30) μm (width measured near hair bases), either superficial as originating from bulbous or aborted cells of ectal excipular layer, or simply rooting and originating among the cells within the outer excipular tissue, yellow-brownish or pale brown, septate, thick-walled, walls 1.7–3.5 (–4.5) μm thick, with subacute or mostly pointed apex, enlarged near base, which is often attenuated into short, simple root, or rarely bifurcate-bulbous; lateral hairs (Fig. 13) much thinner but often keeping their bristle-like character, however also flexuous, very long, 200–750 \times 6–12 μm , pale brownish or luteous to subhyaline, usually with thinner walls which are 0.9–1.6 (–2.2) μm thick, mostly with simple bulbous bases, densely irregularly arranged on flanks. Hyaline, septate hyphae commonly occur at the apothecial base; conspicuous whitish loosing wads of fibrils composed of densely interwoven and branched thin hyphae (3 μm thick) are present near apothecial base and on the nearby substrate.

Asci (Fig. 11) 180–210 \times (9.8–)10.5–12.0 (–13.5) μm , cylindrical, with attenuated subtruncate apex, gradually and moderately constricted towards base, eight-spored.

Ascospores (Figs 9–10, 57) uniseriate, narrowly ellipsoid or ovoid, (12.0–)14.2–15.7 (–16.5) \times (7.0–)7.5–8.5 (–9.0) μm , mostly 15.0 \times 7.8 μm , hyaline; at maturity possessing a yellow refractive colour when stained with C4B; loosening perispore smooth, that of submature ascospores (Fig. 10) with cyanophilic pustules.

Paraphyses (Fig. 11) moderately overlapping asci, filiform, 2.5–3.2 μm thick, straight, sparsely septate, apices clavate-dilated 4.0–7.5 (–8.7) μm , filled with orange pigment.

Habitat and distribution. Coprophilous, growing mostly on horse and elk (*Alces alces*) excrement, or rarely on cow dung, occurring mostly in Fenoscandia (Finland, Sweden, Norway), and in Austria. The localities in Finland are situated in lowlands (20–120 m).

Type material examined. Lectotype of *Peziza stercorea** *Peziza gemella* P. Karst., designated here, deposited in H (ex Herb. P. A. Karsten), labelled: “Museum Botanicum Universitatis, Helsinki, Herbarium Petter Adolf Karsten (1834–1917), No. 2465, *Peziza fraterna* [crossed out] *gemella*, *aurantia* (lutea), Fennia, Tavastia australis, Tammela, Mustiala, ad fim. eqv., IX.1867, leg. et det. P. A. Karsten”. Isolectotype: H ex Herb. P.A. Karsten, the same label except “No 2502”. [These two type collections were previously considered by me to be holotype and paratype (MORAVEC 1990a)].

Note. The other collections in Herbar. P. A. Karsten with same labels but No 2463 (collected 26.IX.1866) and 2464 (collected 9.X.1866) as well as No 817 Fungi Fenniae Exsiccati (collected in 1869) are not the type material and they represent *Cheilymenia coprinaria* (Cooke ex Phill.) Boud. (det. J. Moravec).

Other material examined.

Finland (all collections in H): Savonia borealis (Sb/PS), Rasila, on dung, 10.VIII. & 26.IX.1956, O. v. Schulmann; V. Rymättylä, Raula, on elk dung, 6.VIII.1979 Risto Tuomikoski; V. Rymättylä, Raula, on elk dung, 8.IX.1981, Risto Tuomikoski; The same locality except for 18.VIII.1981; the same locality, on elk dung in forested rock outcrops, 24.X.1981; U. Kirkkonummi, Evitskog, elk dung, 25.VIII.1979, Reima Saarenoksa (43679 4); U. Sipoo, Hindsby, on cow dung, 8.IX.1979, Reima Saarenoksa (53279 5); Ka. Vehkalahti, Pyhältö, Taipale [no substrate specified but it is elk dung], 6.VIII.1979, Lars Fagerström; Ka. Vehkalahti, Pyhältö, Ämmänmäki, Heinäniemenaho, on heaps of soil [the substrate appears to be mixed with the dung of a domestic animal], 10.IX.1982 Lars Fagerström; PP. Rovaniemi comm., Pisavaara Nat. Park, Sorvannulikka E, on elk dung, in *Picea abies* dominated luxuriant virgin forest, 20.IX.1981, Heikki Kotiranta 3580; EH. Lammi: Kilparisti, Mataramäen pellon S-puolella kangaskorvessa hirven lannalla - on elk dung in paludified mesic heath forest, 3.IX.1981 leg. Harri harmaja (11 collections det. J. Moravec).

Sweden: Jämtland: Ytterwallen Fäbod on dung, 30. VIII, 1931 leg. K.G. Ridechins; (S): Västmanland: Fagersta, "on old ? cow dung" [it is evidently horse dung], 13. IX. 1982, leg. B. Blomqvist (det. J. Moravec) (UPS).

Norway: Hedmark, Løten, Steinsåsen, on cow dung in a forest-pasture near an old farm, 22.IX.2000, leg. Gro Gulden, det Sigmund Sivertsen (O 63968).

Austria: Steiermark, Bez. Murau Oberwölz, Greim (MTB. 8751/3) altitude ca. 1200 m., on horse dung, 1.IX. 1990, leg. W. Klofac and A. Hausknecht (det. J. Moravec) (WU 9208).

Remarks. *C. gemella* differs from all other species in the section in having very narrow ascospores and a coprophilous habitat. Also highly conspicuous are the very long, thin and bristle-like lateral hairs (densely arranged together with flexuous hairs) on the flanks.

I have discussed the basionym termed by P. KARSTEN (1869) as "*Peziza stercorea* * *Peziza gemella* P. Karst." together with Professor Harri Harmaja (H), and in his opinion (pers. com.), also adopted by myself, the indication with asterisk and the repeated generic name in this original name combination did not refer to a new variety but to a new subspecies.

VELENOVSKÝ (1934) gave a new status and combination to this taxon at the rank of full species as *Lachnea gemella* (P. Karst.) Velen. His combination is formally valid but the fungus in his sense is *Cheilymenia stercorea* (Pers.: Fr.) Boud. and the generic name *Lachnea* Gillet is no more available in the taxonomy of operculate discomycetes. Most other authors, including SVRČEK (1949), also considered Karsten's taxon to be identical with *C. stercorea*. However, *C. gemella* differs considerably from the latter by a complex of diagnostic characters, especially in the different shape and arrangement of both marginal and lateral hairs, especially regarding the differently shaped bases of the marginal hairs. One of the diagnostic characters of *C. stercorea* is the presence of the stellate receptacular lateral hairs; such hairs are absent in *C. gemella* as well as in other species of the section *Villosae*. Moreover, the apothecia of *C. stercorea* are much smaller, with different excipular structure, and its dark marginal hairs possess multifurcate-rooting or usually coralloid-rooting bases (see MORAVEC 1990b).

***Cheilymenia chionophila* T. Schumacher (Figs 14–21, 58)**

Cheilymenia chionophila T. Schumacher, *Mycotaxon* **43**: 36, 1992.

Apothecia (Fig. 17) scattered to gregarious, 3–8 mm diam., sessile, at first deeply cupulate, orbicular, becoming irregularly expanded, with prominent, rather uneven or rarely split margin, fleshy; hymenium yellow-orange; outer surface concolorous, densely covered with mostly whitish to pale yellowish or pale brownish hairs, which are paler and denser on the receptacular surface.

Apothecial structure (Fig. 21). Hymenium about 200–240 μm thick, with paraphyses overlapping asci. Hypothecium about 40–60 μm thick, indistinctly differentiated from medulla, consisting of small, irregularly angular, densely-packed cyanophilic cells 4–9(–11) μm diam. Medulla about 60–160(–180) μm thick, consisting of interwoven, 4.0–8 μm thick septate-articulate hyphae forming *textura intricata* (arrangement of swollen articles occasionally resembles a *textura angularis*). Ectal excipulum about 70–200 μm thick (in marginal zone thinner, 50–100 μm thick), composed of a *textura globulosa* to *angularis* of large subglobose to subangular, often perpendicularly elongated cells which are 18–65 μm in diam; towards the margin the cells are smaller (8–35 μm diam.), transformed into elongate, thin-walled (walls 0.1–0.7 μm thick), hyaline, strongly cyanophilic hair germs, 80–120 \times 6–15 μm , with obtuse apex (Fig. 19), arranged in dense clusters thus forming marginal rim.

Hairs differentiated; copious hairs of two basic types are present: marginal hairs (Figs 18–19), pale yellowish, yellow-brownish or subhyaline, comparatively short but rigid, 90–210 \times 7–25(–32) μm (width measured near hair bases), straight or flexuous and often with uneven walls, 1–4 septate, mostly thick-walled (walls 0.8–2.1 μm thick), with obtuse, subacute or pointed apex, enlarged near base, superficial as originating from bulbous or aborted cells of ectal excipular layer, or often rooting and originating deeply among the cells, their base often attenuated into short, single simple root, or the bases are (more rarely) bifurcate; lateral hairs (Fig. 20) much thinner but much longer, 100–470 \times 4.5–9 μm , luteous to subhyaline, with thinner walls (1.0–1.5 μm thick), mostly with bulbous base, densely and irregularly arranged on flanks. Subicular hyaline hyphae occur at the apothecial base.

Asci (Fig. 14) 190–230 \times 11.0–13.5(–14.5) μm , cylindrical, with rounded apex, gradually constricted towards base, eight-spored.

Ascospores (Figs 15–16, 58) uniseriate, ellipsoid, (15.0–)14.0–17.0(–18.5) \times (7.8–)8.5–10.5(–11.0) μm , hyaline but at maturity possessing a yellow refractive colour when stained with C4B; loosening perispore wrinkled with fine cyanophilic crests and small irregular pustules; perispore of submature ascospores bears larger cyanophilic pustules.

Paraphyses (Fig. 14) moderately overlapping asci, filiform, 2.2–4.5 μm thick, straight, sparsely septate, apices clavate or capitate-dilated to 6.0–9.0(–10.5) μm , filled with orange pigment.

Habitat and distribution. The ecology and chorology of this arctic-alpine species was given in detail by SCHUMACHER (1992) and SCHUMACHER & JENSEN (1992). It is a terrestrial discomycete, occurring in the subalpine to mid-alpine zones of Fenoscandia and the central European Alps. According to SCHUMACHER (1992), it occurs on naked (mostly sandy) soils of river beds, road verges, associated with herb remnants and tufts of the grasses *Deschampsia caespitosa* and *D. alpina* (all collections I examined were

associated with a moss (*Hypnum* cf. *sauteri* or *Bryum* cf. *fimbriatum*). Its fruiting time is in early summer (late June) in snow-bed communities and continues until late August. A great number of collections from Norway, one from Switzerland, and one from Austria (Tyrol) are listed in SCHUMACHER (1992). I have recently identified one additional collection from Norway, one from Finland, and four from Switzerland (listed below).

Type material examined. Norway: Oppland, Dovre, Grimsdalen. Grimsa at Storberget, on silt of river terraces in the valley, 29.VI.1984, leg. T. Schumacher and K. Østomoe, No D 33/84 (O) – isotype (this specimen from the O herbarium bears the same number and collecting data as the holotype).

Other material examined.

Norway: One slide with a series of microtome sections mounted and loaned to me by T. Schumacher from the same locality as the holotype, on sandy soil in river bed, 980 m, 27.VI.1984, leg. T. Schumacher, No 16/84 (O); Oppland, Dovre, Grimsdalen, Tverråi, on river terraces and slopes towards the river, on rich calcareous soil, 910–940 m., 27.VI.1984, leg. T. Schumacher and K. Østomoe (O) (these collections originally mentioned by Schumacher (1992) may be considered paratypes); Fnm., Lebesby Kalak, Kalaktind – the top 364 m. s. m. on the bottom of the depression between the tops, the upper part of subalpine belt, moist willow shrub. 18.VIII.1971 leg. Pijro & Likka Katövuori, det. Jiří Moravec (H).

Finland: Ks. Kuusamo, Kirkonkylä, Ouluntien ja Kirkkotien kulman luona suolaidunniityllä – in a pastured meadow, 22.VI.1967, Teuvo Ahti 23014, det. Jiří Moravec.

Switzerland: Graubuenden, Tavetsch, Val Maighels, Vorfeld des Gl. Maighels, 2400 m. a.s.l., 27. VIII. 1988, leg. R. Senn, det. J. Moravec (ZT ex herb B. Senn-Irlet No 13458 (84/111); VS, St. Luc – Tsa du Touno, 2400 m a.s.l., Bachrand, auf Resten von *Cirsium spinosissimum* (among moss), 13.VIII.1984, leg. Beatrice Senn-Irlet, det. J. Moravec (ZT ex herb B. Senn-Irlet (84/122); VS, Val d'Anniviers Grimentz, 2000 m a.s.l., Montagnetta de St. Jean, (Waliser Alpen), among moss (*Bryum* sp. and *Pogonatum* sp.), 10.IX.1984, leg. B. Senn-Irlet, det. J. Moravec (BHU ex herb B. Senn-Irlet (84/281); GR, Poschiavo Laghi de Teo, 2419 m a.s.l., silt, among hygrophitic moss, 17. September 1985, leg. Beatrice Senn-Irlet, det. J. Moravec (BHU ex herb B. Senn-Irlet (85/202).

Remarks. *C. chionophila* is very similar to *C. gemella* but differs in having wider ascospores with ornamented perispore and a definite terrestrial habitat. Apothecia of the specimens I examined were collected on soil (mostly sand) mixed with debris but always among moss (on decaying moss debris). It differs only very slightly from *C. sclerotiorum* (see below). A good colour photograph of the apothecia was published in SCHUMACHER & JENSEN (1992).

***Cheilymenia sclerotiorum* T. Schumacher** (Figs 22–30, 59)

Cheilymenia sclerotiorum T. Schumacher, *Mycotaxon* 43: 38, 1992.

Apothecia (Fig. 24) scattered to gregarious, fleshy, 3–12 mm diam., sessile or substipitate, at first deeply cupulate or saucer-shaped, orbicular, becoming irregularly expanded with prominent, rather uneven, rarely split, margin, often with turbinate base, sometime attached directly to living moss or growing from tuberous brindled-brownish sclerotia (Fig. 24) which are 1.5–4.5 µm in diam. or the sclerotia may be present near to or distant from apothecia; hymenium bright yellow with orange tinge to vitelline or yellow-orange; outer surface concolorous, densely covered with mostly whitish to pale yellowish or pale brownish short hairs, which are paler and denser on the receptacular surface.

Apothecial structure (Fig. 23). Hymenium about 200–230 μm thick with paraphyses overlapping asci. Hypothecium about 30–60 μm thick, indistinctly differentiated from medulla, consisting of small irregularly angular, densely arranged cyanophilic cells 4–10 μm in diam.; Medulla about 40–130 μm thick, consisting of interwoven, 4.0–8 μm thick, septate-articulate hyphae (textura intricata), articles occasionally inflated up to 12 μm and forming a texture resembling textura angularis. Ectal excipulum about 90–220 μm thick of a textura globulosa to angularis, composed of large subglobose to subangular, often perpendicularly-elongated cells 15–70 μm in diam; towards the margin the cells are smaller (9–30 μm in diam.), passing into elongate, thin-walled, hyaline hair germs with rounded apex (Fig. 28), 70–100 \times 12–18 μm , forming marginal rim.

Hairs differentiated; as well as the obtuse hair germs, copious well developed hairs of two basic types occur: marginal hairs (Figs 28–29) pale yellowish, yellow-brownish or subhyaline, comparatively short but strong, 120–310 \times 12–26 μm (width measured near hair bases), straight, septate, with rounded or subacute, rarely acute apices, mostly thick-walled, (walls 0.7–1.5(–2.0) μm thick), either originating from bulbous or aborted cells of ectal excipular layer, or they are often rooting and originating deeply among the cells possessing hair bases often attenuated into a short, simple root, or the base is rarely bi- or tri-furcate; and lateral hairs (Fig. 30) densely interwoven on receptacular surface, much thinner and usually shorter, 110–300 \times 6–15 μm , subhyaline, with thinner walls (walls 0.4–1.5 μm thick), superficial, originating from aborted cells of outermost excipular layer. Subicular hyaline hyphae and very thin mycelium hyphae occur at the apothecial base.

Asci (Fig. 27) 180–220 \times (10–)11.0–13.0(–14.5) μm , cylindrical, with rounded apex, gradually constricted towards base, eight-spored (or with only 6 or 4 spores fully developed).

Ascospores (Figs 25–26, 59) uniseriate, ellipsoid, (13.5–)14.0–17.2(–18.5) \times (7.5–)8.5–9.7(–10.5) μm , hyaline; at maturity possessing a yellow refractive colour when stained with C4B; loosening perispore wrinkled with fine cyanophilic wavy crests or longer lines and irregularly covered with small irregular pustules; submature ascospores (Fig. 26) with large cyanophilic pustules.

Paraphyses (Fig. 27) moderately overlapping asci, filiform, 3.0–4.5 μm thick, straight, often branched, sparsely septate, apices elongate-clavate, dilated to 5.0–7.5(–10.5) μm , filled with orange pigment. Structure of sclerotia (Fig. 22) of textura angularis, composed of cells 15–45 μm in diam.

Habitat and distribution. The detailed ecology and distribution of this arctic-alpine discomycete was addressed by SCHUMACHER (1992) and SCHUMACHER & JENSEN (1992). According to these authors, it occurs in alpine zones at altitudes of 1100–1450 m among bryophytes in rich minerotrophic fens, frost holes and spring horizons. The sclerotia are attached to mosses (but, as I could observe, sometimes the apothecia are also directly attached to a moss thallus). The mosses mentioned by SCHUMACHER (1992) are: *Drepanocladus revolvens*, *D. exannulatus* and *Callieron* sp. *C. sclerotiorum* has been known from mountain areas of southern Norway and one collection has recently been reported from the Italian Alps (CACIALLI, CAROTI & DOVERI 1995).

Material examined. Norway: Dovre, Oppland, Kattuglehoi W., in rich minerotrophic fen, 1400 m., 11.VIII.1981, leg. et det. T. Schumacher No 103/81 (O) – type locality; Hordaland, Ulvik, Finse, 30.VIII.1981 (one slide with mounted microtome sections loaned by T. Schumacher) (O); Oppland, Dovre, Grimsdalen, Svartknattjønnin, in rich minerotrophic fen, 1410 m., No G18/89, leg. et det. T. Schumacher (O); the same locality and collector, 6.VIII.1989, No G13/89, det. T. Schumacher (O); Troms, Nordresia, Gaetkevuombe, EC 1008, 10.VIII.1975 Saetran leg., det. J. Moravec (O); Finnmark, Kautokeino, Avžžejokka, EB 8957, 1.VIII.1975, T. Schumacher leg., det. J. Moravec (O) (two latter records were reported under the misapplied name *Cheilymenia fibrillosa* by T. SCHUMACHER (1979).

Remarks. *C. sclerotiorum* is very similar to *C. chionophila*, especially in having similar ascospore size and ornamentation. It differs by the habitats as it is confined to moss, and by the developed outstanding sclerotia (which rarely may be absent and the identification of the species may then be difficult). Though the apothecia of *C. chionophila* are also mostly found among moss, they never are directly attached to a moss thallus, and no sclerotia were observed. The marginal hairs of *C. sclerotiorum* are more often obtuse, and the lateral hairs are shorter than those of *C. chionophila*.

A nice colour photograph of apothecia was published in SCHUMACHER & JENSEN (1992).

Section *Obtusipilosae* (J. Moravec) J. Moravec stat.nov.

Basionym: *Cheilymenia* sect. *Villosae* J. Moravec, ser. *Obtusipilosae* J. Moravec, *Mycotaxon* **28**: 475, 1990b.

Type species: *Cheilymenia magnifica* (W. Y. Zhuang et Korf) J. Moravec, *Mycotaxon* **28**: 475, 1990b.

Basionym: *Coprobia magnifica* W. Y. Zhuang et Korf, *Mycotaxon* **35**: 298, 1989.

Other species: *Cheilymenia catenipila* J. Moravec **sp.nov.**

The section *Obtusipilosae* (originally a series of the section *Villosae*) comprises in the present sense only two species which differ from species of the sect. *Villosae* in having simpler anatomy of apothecia and lacking acute hairs. Both the marginal and lateral hairs are obtuse and of a similar size, comparatively short. Moreover, the lateral hairs are sparsely distributed, and thus differing from the densely interwoven hyphoid lateral hairs of the genus *Pseudoaleuria* Lusk. Interwoven subicular hyphoid hairs are present only at the base of the receptacle, not on the flanks. Nevertheless, despite these differences, which also include the simpler anatomy of the apothecia, I consider the section *Obtusipilosae* to be a transiting link to the genus *Pseudoaleuria*.

Cheilymenia magnifica (W. Y. Zhuang et Korf) J. Moravec (Figs 31–34, 60)

≡ *Coprobia magnifica* W. Y. Zhuang et Korf, *Mycotaxon* **35**: 298, 1989.

≡ *Cheilymenia magnifica* (W. Y. Zhuang et Korf) J. Moravec, *Mycotaxon* **28**: 475, 1990b.

Apothecia (no picture of fresh apothecia exists) large (4.0–)9.0–16.0 mm in diam., substipitate, hymenium dirty-orange, receptacular surface concolorous with hymenium, faintly woolly, more distinctly at margin as sparsely covered with mostly whitish to pale yellowish or pale brownish short hairs, which are paler on the receptacular surface [description of fresh apothecia after ZHUANG & KORF (1989)].

Apothecial structure (Fig. 31). Hymenium about 170–210 μm thick with paraphyses overlapping asci. Hypothecium about 25–40 μm thick, differentiated from medulla as consisting of much smaller, irregularly angular or elongated and densely packed and irregularly arranged cyanophilic cells 4–12 μm in diam.; Medulla about 90–120 μm thick, of a *textura angularis* to *subintricata*, consisting of irregularly angular cells 12–30 μm in diam. mixed with septate, 6–10 μm thick hyphae with swollen articles (up to the size of neighbouring angular cells) and usually with strongly cyanophilic septa. Ectal excipulum about 60–170 μm thick of a *textura globulosa* to *angularis* composed of large subglobose to subangular cells 15–50 μm in diam; in the marginal zone the cells become elongate and passing into thin-walled, hyaline hair germs, forming marginal rim together with protruding hairs.

Hairs (Figs 32) not differentiated, originating from bulbous or aborted cells of ectal excipular layer, comparatively sparsely distributed on whole receptacular surface (both marginal and lateral hairs are of similar shape), pale brownish or subhyaline, straight or curved, often with undulate walls, septate, mostly thick-walled (walls 0.7–1.5 μm thick), with rounded, dilated or slightly attenuated but always obtuse apex; marginal hairs are mostly shorter but strong, 60–120 \times 10–15 μm (width measured near hair bases); lateral hairs are mostly longer, 60–160(–220) \times 8–15(–18) μm ; they cover large surface area on flanks but their distribution is restricted on area distant from the receptacular base. Subicular hyphae (Fig. 33) occur copiously at the apothecial base; they are flexuous and densely interwoven, hyaline, mostly thin-walled (with walls 0.1–0.7 μm thick).

Asci (Fig. 34) 170–200 \times 9.5–10.5(–11.0) μm , cylindrical, with rounded apex, gradually constricted towards simple or bilobed base, eight-spored.

Ascospores (Figs 35–36) uniseriate, ellipsoid, (12.0–)13.5–15.0(–16.5) \times (7.5–)8.0–9.0(–10.0) μm (mostly 14.0–8.6 μm) hyaline, at maturity possessing a yellow refractive colour when stained with C4B; loosening perispore densely covered with fine wavy crests forming irregular cyanophilic ornamentation; submature ascospores (Fig. 36) with large cyanophilic pustules.

Paraphyses (Fig. 34) moderately overlapping asci, filiform, 2.0–2.5(–3.0) μm thick, straight, sparsely septate, apices distinctly capitate or clavate-dilated to 4.0–7.5(–8.0) μm .

Habitat and distribution. Coprophilous species, on cow dung. Known only from the type locality in Yunnan, China, at an altitude of 3170–3270 m. The very high altitude of the type locality is noteworthy.

Type material examined. China: Ganhaizi, Lijiang, Yunnan, 3170–3270 m, on cow dung, leg. R. P. Korf, L.-s. Wang, and W.-y. Zhuang (399), 2.XI.1988, HMAS 57687 – holotype of *Coprobria magnifica*.

Remarks. No picture of fresh apothecia was published by ZHUANG & KORF (1989). *C. magnifica* differs from the species of the section *Villosae* in having simpler anatomy of the apothecia and, especially, by the very different character of the hairs. These are obtuse above and of only a single type (apart from being somewhat shorter on the apothecial margin than the sparsely distributed hairs on the flanks). The wads of

interwoven hyphae, which occur at the receptacular base, I considered a subiculum – such hyphae are not present on the flank towards the margin.

ZHUANG & KORF (1989) described a horizontal striation of the ascospore perispore in this species. However, the transversely wrinkled perispore seen on their line drawings is a deformation caused by the staining method. When C4B in lactic acid, without heat, is employed, such a secondary deformation occurs on only some ascospores.

Species of the section *Coprobia* (Boud.) J. Moravec (MORAVEC 1990b) clearly differ in having an even simpler apothecial structure, only hyphoid thin-walled hairs, and ascospore perispore ornamented with distinct cyanophilic longitudinal rib-like striation. In contrast, ascospores of *C. magnifica* bear fine, irregular and densely arranged crests, which are more obvious (as blunt crests) on the SEM photomicrographs (Fig. 60). The obtuse hairs of *C. magnifica* indicate a relational link to the genus *Pseudoaleuria* Lusk.

***Cheilymenia catenipila* J. MORAVEC sp.nov.** (Figs 37–42, 61–62)

Diagnosis. *Apothecia* 1.5–3.5 mm diam., sessilia, primum hemisphaerica, dein breviter doliiformia, crasse leniter patellaria, usque discoidea, applanata vel lobato-pulvinata, marginemque subtiliter fimbriata, in hymenio laete aurantiaca; extus pallide aurantia, dense minute granulata. Excipulum internum (medulla) e textura angulari usque subintricata. Excipulum externum e textura globulosa usque globuloso-angulari. Pili brevi, 25–50×6–12 µm, catenulati vel articulati, subhyalini. Asci 140–160×10–13 µm, crasse cylindranei, octospori. Ascosporae (9.5–)10.2–13.0(–14.5)×(4.3–)4.7–5.8(–6.9) µm, (plerumque 12.0×5.5 µm), elongato-ellipsoideae, saepe angustatae, perisporio separabile, sublaevi, subtiliter ornato cum verrucis cyanophilis, perexiguis, irregulariter distributis donatae. Paraphyses filiformes, 1.7–2.7 µm crassae, apice clavato-incrassatae [4.5–7.5(–9) µm].

Habitat. In excremento vaccino, New Zealand, Orongorongo Valley (districtus Wellington), 6.XI.1970 Ann Bell legit. Holotypus in PDD 73217 (ex WELTU No 57) asservantur.

Apothecia (Fig. 37) small to medium sized, 1.5–3.5 mm in diam., first subglobose, becoming shortly doliiform, then shallowly saucer-shaped and finally applanate to moderately pulvinate; hymenium pale orange, receptacular surface slightly paler, minutely granulate, faintly fimbriate at margin with protruding, very short, subhyaline hairs only sparsely distributed on the receptacular surface.

Apothecial structure (Fig. 38). Hymenium about 140–165 µm thick. Hypothecium about 20–45 µm thick, differentiated from medulla as consisting of much smaller, mostly rounded, densely-packed cyanophilic cells 3–8 µm in diam.; medulla about 70–90(–130) µm thick, of a textura angularis to subintricata, consisting of irregularly angular cells 8–25 µm in diam. occasionally mixed with septate, 6–10 µm thick hyphae. Ectal excipulum about 45–80(–120) µm thick, becoming thinner towards margin, of a textura globulosa to subangularis composed of large subglobose, rarely subangular, yellowish,

strongly cyanophilic cells 10–40 µm in diam; towards the margin the cells become elongate-clavate forming marginal rim together with protruding catenulate hairs.

Hairs (Figs 39) short, 25–50×6–12 µm, originating from globose cells of ectal excipular layer, comparatively sparsely distributed on whole receptacular surface; both marginal and lateral hairs are of similar size and shape, mostly catenulate, consisting of hyaline or subhyaline globose or elongate cells or subcylindrical articles, rarely with continuous walls and septate, thin-walled, each hair terminating in globose or often elongate or pyriform cell with irregularly thickened and often yellow-brownish darkened wall (0.1–0.7 µm). Subicular hyphae (Fig. 40) occur at the apothecial base; they are hyaline, flexuous, interwoven, mostly thin-walled (walls 0.1–0.3(–0.8) µm thick).

Asci (Fig. 41) 140–160×10–13 µm, widely cylindrical, with rounded or mostly moderately constricted and subtruncate apex, gradually constricted towards simple or bilobed base, eight-spored.

Ascospores (Figs 42, 61–62) uniseriate or mostly biseriata, narrowly ellipsoid, often very narrow, occasionally subcylindrical, rarely wider, (9.5–)10.2–13.0(–14.5)×(4.3–)4.7–5.8(–6.9) µm, (mostly 12.0×5.5 µm), hyaline; at maturity possessing a feeble yellow refractive colour when stained with C4B; loosening perispore nearly smooth, densely and irregularly covered with extremely fine cyanophilic ornamentation which is clearly recognisable only on SEM photomicrographs (Fig.) as densely arranged, blunt, vermicular, fine crests. Paraphyses (Fig. 41) filiform, 1.7–2.7 µm thick, straight, sparsely septate, apices clavate-dilated to 4.0–7.5(–8.0) µm.

Habitat and distribution. Coprophilous, on cow dung. Known only from the type locality in New Zealand.

Type material examined. New Zealand: Orongorongo Valley (district of Wellington), 6.XI.1970, leg. Ann Bell. [originally standing as "*Coprobria granulata* (Bull.) Boud., det. Ann Bell"]. Holotype in PDD 73217 (ex WELTU, No 57).

Etymology. Derived from the Latin *catenulatus* (catenulate, arranged in series of chains) and *pilus* (hair), referring to the hairs, which are composed of cells that are mostly arranged in chains.

Remarks. *C. catenipila* is rendered a rather peculiar species by the catenulate shape of the hairs. However, some hairs are articulate-septate and closely resemble hairs of *C. magnifica*. The new species probably indicates a further link to the genus *Pseudombrophila* BOUD., but the absence of a dark brown or violaceous-purple amorphous pigment in the excipulum, in the hairs and paraphyses, as well as the clavate shape of the paraphyses and the loosening ascospore perispore, confirm the classification in *Cheilymenia*. The shape of the apothecia makes it easily confused with a species of the section *Coprobria*. However, as mentioned above, all species of the section *Coprobria* (Boud.) J. Moravec (1990b) differ in having only hyphoid hairs, and ascospore perispore covered with distinct longitudinal rib-like striation.

Thus, like other genera of Pyronemataceae, *Cheilymenia* also does not appear to be a sharply delimited genus but, obviously, several phylogenetic links are indicated. As already mentioned, the sect. *Obtusipilosae* is very close to the genus *Pseudoaleuria* Lusk, which has been revised and is addressed below.

Genus *Pseudoaleuria* Lusk, *Mycotaxon* 30: 419, 1987.

Type species: *Pseudoaleuria quinaultiana* Lusk, *Mycotaxon* 30: 419, 1987.

Other species: *Pseudoaleuria fibrillosa* (Currey) J. Moravec **comb.nov.**

When the genus *Pseudoaleuria* was established (LUSK 1982) the author compared the type species *Pseudoaleuria quinaultiana* to *Tricharina fibrillosa* (Currey) Yang et Korf but considered the two taxa separate, even with respect to their generic classification. The author described the structure of the ectal excipulum of *P. quinaultiana* as “textura angularis” and considered it different from “a textura globulosa” in *Tricharina fibrillosa*. However, this is only a varying interpretation of the anatomical terms by different authors, as both these taxa possess the same structure of the ectal excipulum. It is in fact composed of subglobose to angular cells forming thus a textura globulosa to angularis, as is obvious even from the illustrations in LUSK (1987, Fig. 2a,b) and GALAN & RAITVIIR (1995, Figs 5, 7).

Sclerotia were observed in only the type species (LUSK 1987).

SCHUMACHER (1992) has noted that *P. quinaultiana* shares characteristics with *Cheilymenia sclerotiorum* (probably in the presence of the sclerotia in both taxa) and that the generic limits between *Pseudoaleuria* and *Cheilymenia* are not clear. I keep the genus *Pseudoaleuria* separated from *Cheilymenia* especially for its different type of hairs and their distribution on the receptacular surface. Nevertheless, these two genera are closely related, especially for the common ascospore character, as I have found that the ascospores of *Pseudoaleuria* bear an analogous delicate and easily separable outermost sheet with a similar cyanophilic ornamentation.

The type material (OSC) of *Pseudoaleuria quinaultiana* Lusk, *Peziza campestris* P. Crouan et H. Crouan (1867) (CO) [= *Cheilymenia campestris* (P. Crouan et H. Crouan) J. Moravec (1992)] and *Peziza fibrillosa* Currey, 1863 [= *Cheilymenia fibrillosa* (Currey) Le Gal, 1947] from K(M), was examined. *C. campestris* proved to be conspecific with *C. fibrillosa* which has also been treated as *Tricharina fibrillosa* (Currey) Yang et Korf (1985). However, for the presence of the same type of hairs, I consider *Peziza fibrillosa* congeneric with *Pseudoaleuria quinaultiana* and therefore I transfer it here to the genus *Pseudoaleuria*. These two species of *Pseudoaleuria* possess very large apothecia with a distinctly differentiated excipular layer. Their outstanding common diagnostic character is the thick, obtuse, thin-walled, septate to articulate-septate marginal hairs differentiated from much thinner and densely interwoven, long, hyaline hyphae which densely cover the receptacular surface on flanks as a tightly appressed layer. Paraphyses of these two species are distinctly clavate to capitate.

***Pseudoaleuria quinaultiana* Lusk (Figs 43–46)**

Pseudoaleuria quinaultiana Lusk, *Mycotaxon* 30: 419, 1987.

Detailed description and illustrations have been given by LUSK (1987). However, the dimensions of the marginal hairs (namely their width) were not described in detail and the ascospores were misleadingly described as smooth as the author heated the slides for

staining. Any staining method using heat inevitably destroys the outermost easily-separable sheet and consequently the ornamentation cannot be observable. My examination of the holotype (OSC) has revealed that when the ascospores are stained with C4B Geigy s. 123 without heating, the separable perispore is distinctly covered with mostly rounded cyanophilic pustules of uneven size (Fig. 44). Mature ascospores possess a feeble obscure-yellow refractive colour and measure (15.5–)16.0–18.0(–19.5)×(7.5–)8.0–9.6(–10.5), mostly 16.5×9.0 μm. The marginal hairs (Fig. 45) are much longer and thicker, (200–600×9–25(–30) μm) than lateral hairs on the flanks (Fig. 46) which are densely interwoven and only 3–6 (–9) μm thick.

P. quinaultiana possesses the largest apothecia in the genus (up to 35 mm in diam.) and much longer and denser marginal hairs than those of *P. fibrillosa*.

Habitat and distribution. According to LUSK (1987) it is a “soil and wood saprobe, or mycorrhizal”. Known only from the western slopes of the Olympic Peninsula, U.S.A. According to LUSK (1987); apothecia of all specimens were repeatedly found on soil near the stump end of fallen conifers in temperate rainforests.

Type material examined. U.S.A.: Olympic Peninsula, Lake Quinault, Washington State, T23N R9W Sec. 29, 1984 (OSC 45,764) holotype.

Pseudoaleuria fibrillosa (Currey) J. Moravec comb.nov. (Figs 47–55)

Basionym: *Peziza fibrillosa* Currey, *Trans. Linn. Soc. London* **24**: 153, 1863.

≡ *Cheilymenia fibrillosa* (Currey) Le Gal, *Ann. Sci. Nat. Bot. sér.* **11**, **8**: 287, 1947.

≡ *Tricharina fibrillosa* (Currey) Yang et Korf, *Mycotaxon* **24**: 487, 1985.

≡ *Otidea fibrillosa* (Currey) Massee, *Brit. Fung. FL* **4**: 449, 1895.

= *Peziza campestris* P. Crouan et H. Crouan, *Fl. Finist.* p. 53, 1867.

≡ *Cheilymenia campestris* (P. Crouan et H. Crouan) J. Moravec, *Mycotaxon* **44**: 69, 1992.

Misapplications:

Cheilymenia cornubiensis (Berk. et Broome) Le Gal, *sensu* LE GAL, *Rev. Mycol.* **18**: 82, 1953 and *sensu* ARNOLDS (1982) [non *Peziza cornubiensis* Berkeley et Broome, *Ann. Mag. Nat. Hist.*, ser. **2**, **13**: 463 (n. 767), 1854, which is *Aleuria (Melastiza) cornubiensis* (Berk. et Broome) J. Moravec (1994).

Non *Cheilymenia fibrillosa sensu* T. SCHUMACHER (1979), which is *Cheilymenia sclerotiorum* T. Schumacher.

Non *Cheilymenia campestris sensu* ORTEGA ET ESTEVE-RAVENTÓS (2001), which is *Cheilymenia cf rubra* (Cooke in Phill.) Boud.

Exclusions:

Non *Peziza fibrillosa* Currey in *Rabenhorst Fungi europeai*: 715 [pro parte? – examined specimens deposited in the W herbarium are *Octospora vivida* (Nyl.) Dennis].

P. fibrillosa is distinguished from *P. quinaultiana* merely by its less red and smaller apothecia, much shorter marginal hairs, and ascospores with a less distinctly ornamented perispore. A detailed description of *P. fibrillosa* accompanied by colour photograph of apothecia and microphotographs of characters, including SEM, has been given by GALÁN & RAITVIIR (1995), based on one collection from Spain. I have examined another collection from Spain – the dried apothecia are of the same shape and consistency as those of *P. quinaultiana*, but the marginal hairs are shorter, and correspond closely to the hairs of the holotype of *P. fibrillosa*. This Spanish collection possesses distinctly capitate

paraphyses and smaller ascospores [(10.5–)12.5–15.0(–16.5×(7.0–)7.5–8.7(–9.0) μm] with less distinct yellow refractive colour (when stained with C4B) than the ascospores of the holotype.

I have found, however, a great range of ascospore size in *P. fibrillosa*. Moreover, in some collections (including the holotype) the asci contain a variable number of mature ascospores (four, six or eight). Such ascospores, which mature within an ascus in reduced numbers, are usually much larger. Moreover, submature ascospores are usually conspicuously swollen and much larger than mature ones. Released mature ascospores, which possess a stronger yellow refractive colour and are mostly side-deformed (Fig. 47), are usually much smaller. Due to the variability in ascospore size, I consider *Peziza campestris* to be conspecific with *P. fibrillosa* as all other characters (compare Figs 47–50 to Figs 51–55) of these two taxa are identical.

The holotype of *Peziza fibrillosa* in K (M) consists of only one incomplete apothecium glued to a card. The ascospores of the holotype (Figs 47–48) are nearly smooth, with only very fine cyanophilic wrinkles and micropustules, and they measure (15.0–)15.5–18.7(–19.3)×(7.5–)8–9(–10.5) μm, thus being larger than those of the Spanish collection but slightly narrower than those in the holotype of *Peziza campestris*. The mature ascospores of the holotype of *P. campestris* (Figs 51–52) measure (12.0–)15.0–18.5(–21.0)×(8.2–)9.0–11.5(–13.5) μm, and immature ascospores are more swollen and confluent with cyanophilic pigment within the asci; such ascospores were probably measured by LE GAL (1953) who stated their ascospore size as the larger “17–22(–23.5)×11–12(–13.0) μm”. I have found that the most common sizes of fully mature ascospores in the holotypes of these two taxa are similar: 16.5×8.5 μm in *Peziza fibrillosa*, 17.0×10.0 μm in *Peziza campestris*. The ascospore size of other collections (cited below) of *P. fibrillosa* and *P. campestris* falls between these dimensions. Therefore, I consider the only slight differences in ascospore width in these two taxa insufficient for distinguishing them as separate species, and consider *Peziza campestris* a later synonym of *Peziza fibrillosa*. Alternatively, it may be considered an infraspecific taxon of the latter.

The hymenial surface of the apothecium of the holotype of *P. fibrillosa* is probably damaged, as the apices of the paraphyses are not properly observable. The paraphyses of all other collections examined possess clavate to capitate apices.

The holotype (CO) of *Peziza campestris* and that of the synonymous *Peziza arvensis* (merely an herbarium name given by the Crouan brothers) are not in good condition either – the apothecia are slightly mouldy and their characters impacted. Therefore, some features, including the cyanophilic ornamentation on the ascospore perispore (Figs 51–52) are observable but less obvious than what was illustrated by LE GAL (1953) under the misapplied name *Cheilymenia cornubiensis*. The Cotton blue (C4B) which stains promptly without heat (Geigy s 123 or Methyl blue (R.A.L.) in lactic acid originally also used by LE GAL 1948) is needed for staining in order to observe the ornamentation. GALÁN & RAITVIIR (1995) has also described the ascospores of their collection as smooth under the light microscope but having an obvious finely wrinkled perispore on SEM photomicrographs. However, these authors used CB in lactophenol (with heat) for

staining, and consequently the perispore, with its very faint irregular cyanophilic ornamentation, could well vanish in response to such an aggressive staining method.

The two types of obtuse hairs of *P. fibrillosa* well conform nearly with those demonstrated by DENNIS (1979). The marginal hairs (Figs 49, 53) measure 150–270×9–23 µm [their width was erroneously stated in GALÁN & RAITVIIR (1995) as only 8 µm], in contrast to the flexuous and much thinner hyphoid lateral hairs on the flanks (Figs 50, 55), which measure 100–180×6–9 µm.

The generic concept of *P. fibrillosa* has been variously interpreted. It was treated as *Otidea fibrillosa* by MASSEE (1895) whilst YANG & KORF (1985) transferred this taxon to the genus *Tricharina* Eckblad. The latter authors examined only one collection from Lisbon (PC, see below), not the holotype of *Peziza fibrillosa*. They argued that “unlike other species of *Cheilymenia*, the perispore does not loosen when heated in lactic acid, and the yellow refractive colour of the spore wall disappears in 2% KOH”, and that the obtuse marginal hairs are “born in fascicles”. However, the hairs of *Peziza fibrillosa* are actually arranged in a different way than those of most species of *Tricharina* – and the perispore is separable. In my experience, the constancy of the yellow refractive colour of fully mature ascospores when stained with CB is not as reliable a character as it may depend not only on the stage of spore maturity but also on other factors.

Although GALÁN & RAITVIIR (1995) adopted the generic concept as *Tricharina fibrillosa*, they have noted that the fungus, which resembles a species of *Aleuria* [as already mentioned by COOKE (1876), PHILLIPS (1893), MASSEE (1895) and GRÉLET (1932–1959)] or a *Melastiza* respectively, remains an atypical member among other species of *Tricharina*. The misapplication of the name *Cheilymenia cornubiensis* (Berk. et Broome) Le Gal, based on *Peziza cornubiensis* Berk. et BROOME [which is *Aleuria* (*Melastiza*) *cornubiensis* (Berk. et Broome) J. Moravec] by LE GAL (1953), was explained in MORAVEC (1992, 1994).

Habitat and distribution. Only a few collections of *P. fibrillosa* are known from Europe and one from Maroc – all collected mostly in lowlands at altitudes of up to 600 m, three Estonian collections come from 20–50 m, two of them from soil in coniferous forests. It has been reported from various habitats, mostly from bare soil (COOKE 1876, PHILLIPS 1893). The collection reported by GALÁN & RAITVIIR (1995) was found on the soil of a river bank in an oak forest (*Quercus suber*) and two other Spanish collections, including that examined by me also possess a similar habitats (ORTEGA & VIZOSO 1991). GRÉLET (1932–1959), cited a collection from Loire, France, collected on bare soil and among moss on a path in an oak forest, and also two other specimens examined by me (PC) come from soil among moss, one of them (from Lisbon, no substrate noted), standing as *Tricharia fibrillosa* (handwritten by Boudier on the envelope), examined and reported previously by YANG & KORF (1985) (as *Tricharina*), consists of only one apothecium with remnants of reddish soil and some moss at its base. Other collections are referred to as being from the soil of pastures and fields. The apothecia of the holotype of *Peziza campestris* grew on soil among moss in a field, the collection of the synonymous *Peziza arvensis* was collected on soil in a field furrow after harvest. Two collections treated by ARNOLDS (1982) under the misapplied name *Cheilymenia cornubiensis* come from a

manured soil characterised by ARNOLDS (1982 part 2) as “a bare soil of fertilised pastures, on moderately acid to subneutral, moderately humose sand”. One collection referred to by ARNOLDS (1982) as *Cheilymenia fibrillosa* was collected on “contaminated earth near rabbit dung in *Agrostietum tenuis*” (the latter collection also possesses smaller ascospores than those of the holotype, so the ascospore size is not confined to the substrate).

Obviously, *Pseudoaleuria fibrillosa* is not a coprophilous species – the occasional occurrence on a rich or manured soil or near excrement is also usual in other terrestrial discomycetes.

It should be mentioned here that the two collections, reported from river beds of Norwegian mountains by SCHUMACHER (1979) as *Cheilymenia fibrillosa*, proved to be *Cheilymenia sclerotiorum*.

C. campestris sensu ORTEGA & ESTEVE-RAVENTÓS (2001), reported from Spain and collected on cow dung, has nothing to do with Crouans' fungus. My examination of these Spanish collections has revealed that they represent quite a different species of *Cheilymenia* which is very close to *Cheilymenia rubra* (Cooke in Phill.) Boud. belonging to the sect. *Pseudoscutellinae* J. Moravec (erected in MORAVEC 1990b). The misleading line drawings of hairs in ORTEGA & ESTEVE-RAVENTÓS (2001, Fig. 11) were adopted from LE GAL (1953) and do not reflect the true hairs of these Spanish collections. In fact, the apothecia of these collections possess the subacuminate to acuminate, thick-walled, mostly simply rooting marginal and submarginal hairs that are typical of the sect. *Pseudoscutellinae*.

Type material examined.

1. Holotype of *Peziza fibrillosa* Currey: England: Near Hanham Wood, F. Currey, Oct. 1861, K(M)
2. Holotype of *Peziza campestris* H. Crouan et P. Crouan: France: Finistère, sur la terre des champs parmi les mousses, 22. Oct. 1861, –(CO); France: Finistère, dans les sillons des champs après la moisson – holotype of *Peziza arvensis* (CO – an herbarium name synonymous with *P. campestris*).

Other material examined.

Spain: Finca "El Reguengo", Sierra de Aracena, Aracena, Huelva, 620 m (UTM: 29SQB1395), on soil in open forest of *Quercus suber*, 13.XI.1997; leg. et det. R. Galán (AH 7123).

Portugal: Lisbon, Fevereiro 1908, M. Torrend (PC ex herb. Boudier, under *Tricharia fibrillosa*) – [This specimen was examined by YANG & KORF (1985) and treated as *Tricharina fibrillosa*].

Morocco: “Environs de Tanger, a terre dans la mousse, 14 Janvier 1956, M. Bertault leg.” (PC 755).

The Netherlands: Havelte, Havelterberg Nature Reserve. In poor, moss-rich grassland, short-grazed by rabbits, on dry sandy soil; on soil near concentration of rabbit dung, 28.XI.1976 leg. et det. E. Arnolds (as *Cheilymenia fibrillosa*) (WAG-W 3796); Westerbork, south of the Mantinge village, on soil in strongly manured and intensively grazed hay-meadow on dry, humus-rich sand, 22.X.1975 leg. E. Arnolds (WAG-W 3462) [published under the misapplied name *Cheilymenia cornubiensis* by ARNOLDS (1982)]; Beilen, along Linthorst Homan Canal between the Wijster and Holthe villages, on a patch of bare soil in a rather intensively grazed grassland, on fairly dry sandy soil rich in humus, 4.X.1978, leg. E. Arnolds (WAG-W 4041) [published under the misapplied name *Cheilymenia cornubiensis* by ARNOLDS (1982)].

Estonia: Saaremaa (County), Kuuse, on soil under young *Picea abies* trees in mixed *Pinus-Picea* forest, 20. IX 1966, coll K. Kalamees, det A. Raitviir (TAA-6501); Saaremaa, Viidumäe Nature Reserve, on sandy soil in pine forest with *Cladonias*, 04. VIII 1960, coll. H. Rebassoo, det A. Raitviir. (TAA).

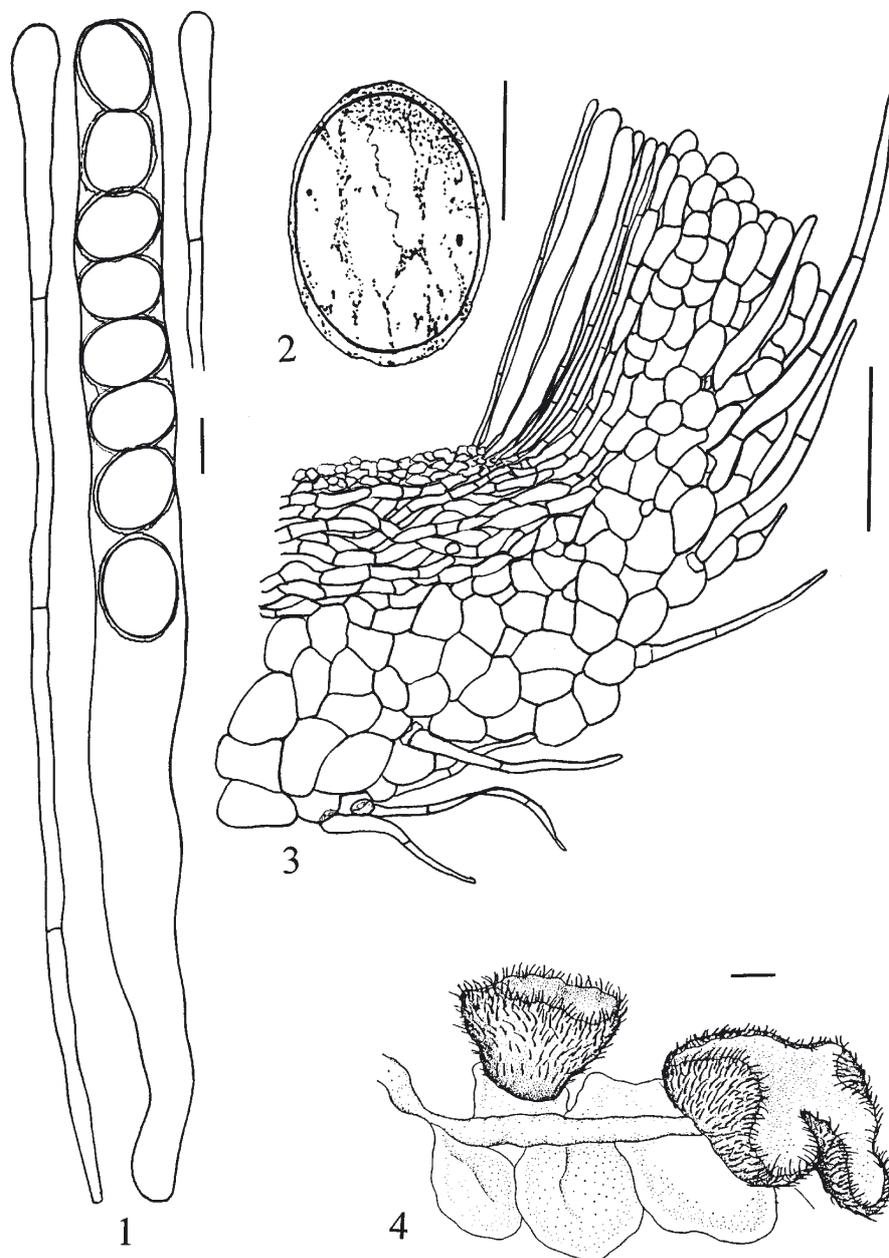
Acknowledgements

I would like to thank Dr. Anna-Lena Anderberg (Stockholm), Dr. Barassa (Madrid), Dr. Ann Bell and Dr. Dan Mahoney (Wellington), Prof. Harri Harmaja (Helsinki), Dr. Irma Gamundi de Amos (La Plata), Dr. Gro Gulden (Oslo), Dr. Beatrice Senn-Irlet (Bern), Dr. Eef Arnolds (Wijster), Dr. Dieter Benkert (Berlin), Prof. Alain Coute and Dr. Bart Buyck (Paris), Prof. William C. Denison (Corvallis), Dr. Ricardo Galán Marquez (Madrid), Dr. Ives Le Gal, Dr. Jean Lambert and Dr. Florence Levu (Concarneau) Prof. Nils Lundqvist (Stockholm), Dr. Ain Raitviir (Tartu), Prof. Brian B. Spooner (Kew), Dr. Helmut Voglmayr (Vienna) and the curators of the herbaria mentioned in “Abbreviations” for their kind loans of type and other specimens or arrangement of my visits, and for invaluable data. Prof. Harri Harmaja (Helsinki) kindly also provided valuable data and advice connected with the lectotype designation of Karsten’s taxon. Dr. Irma Gamundi de Amos (La Plata) kindly permitted me to publish her line drawings of the fresh apothecia of *C. villosa* and Dr. Wen-ying Zhuang (Beijing) loaned a microtome apothecial section of *C. magnifica*. Dr. Vladimír Antonín (Brno) made one microtome section photograph. I am obliged to Prof. Trond Schumacher (Oslo) for the loan of specimens and microtome sections, valuable data and his kind permission to publish the SEM photomicrographs of *C. chionophila* and *C. sclerotiorum* (Figs 58–59) made by him. Dr. Jiří Lhotecký (Brno) and Dr. Helmut Voglmayr (Vienna) kindly took the other SEM photomicrographs. I owe a considerable debt to gratitude to Dr. Zdeněk Pouzar (Prague) for his critical comments and review of the manuscript. The Grant Agency of the Czech Republic is gratefully acknowledged for financial support for my work on the monograph of the genus *Cheilymenia* (project No 206/01/1261/B).

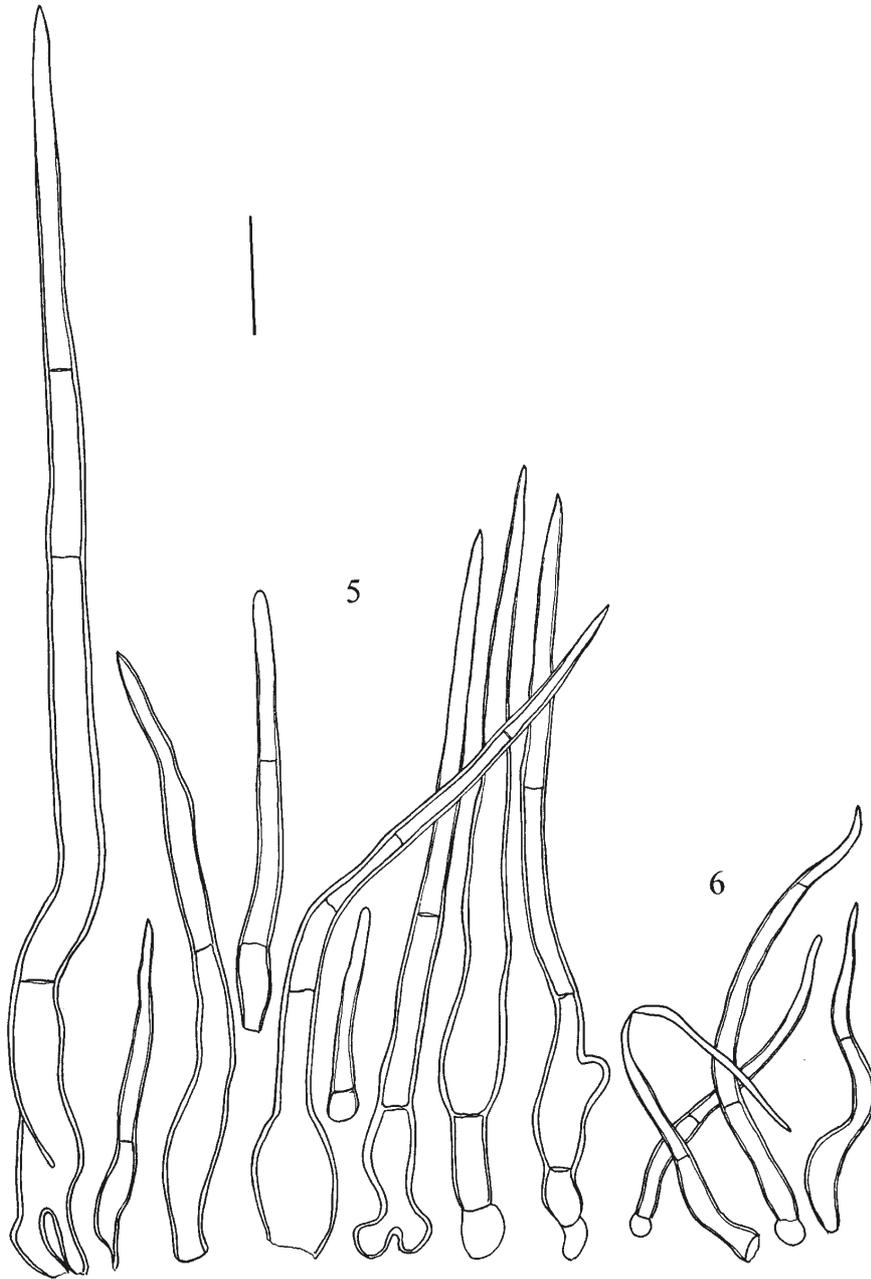
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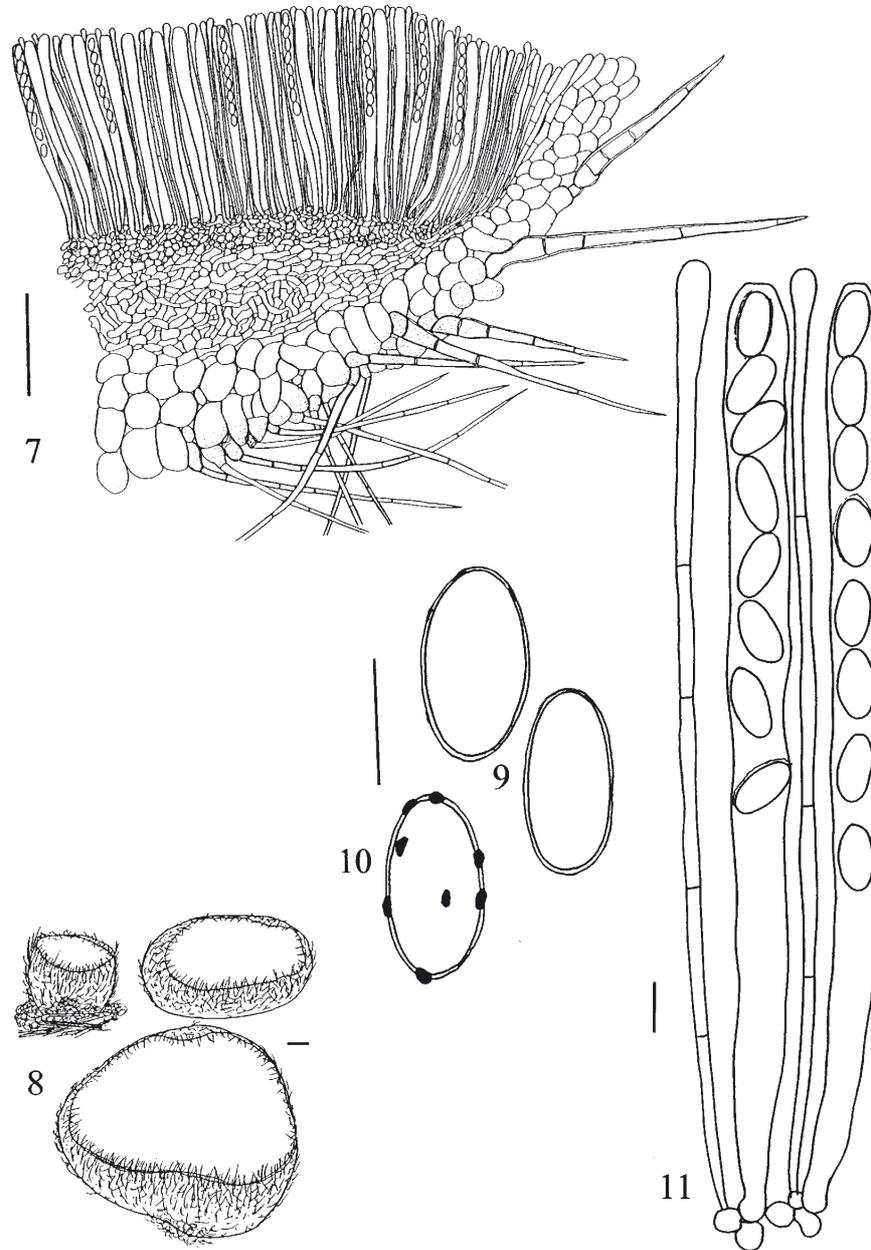
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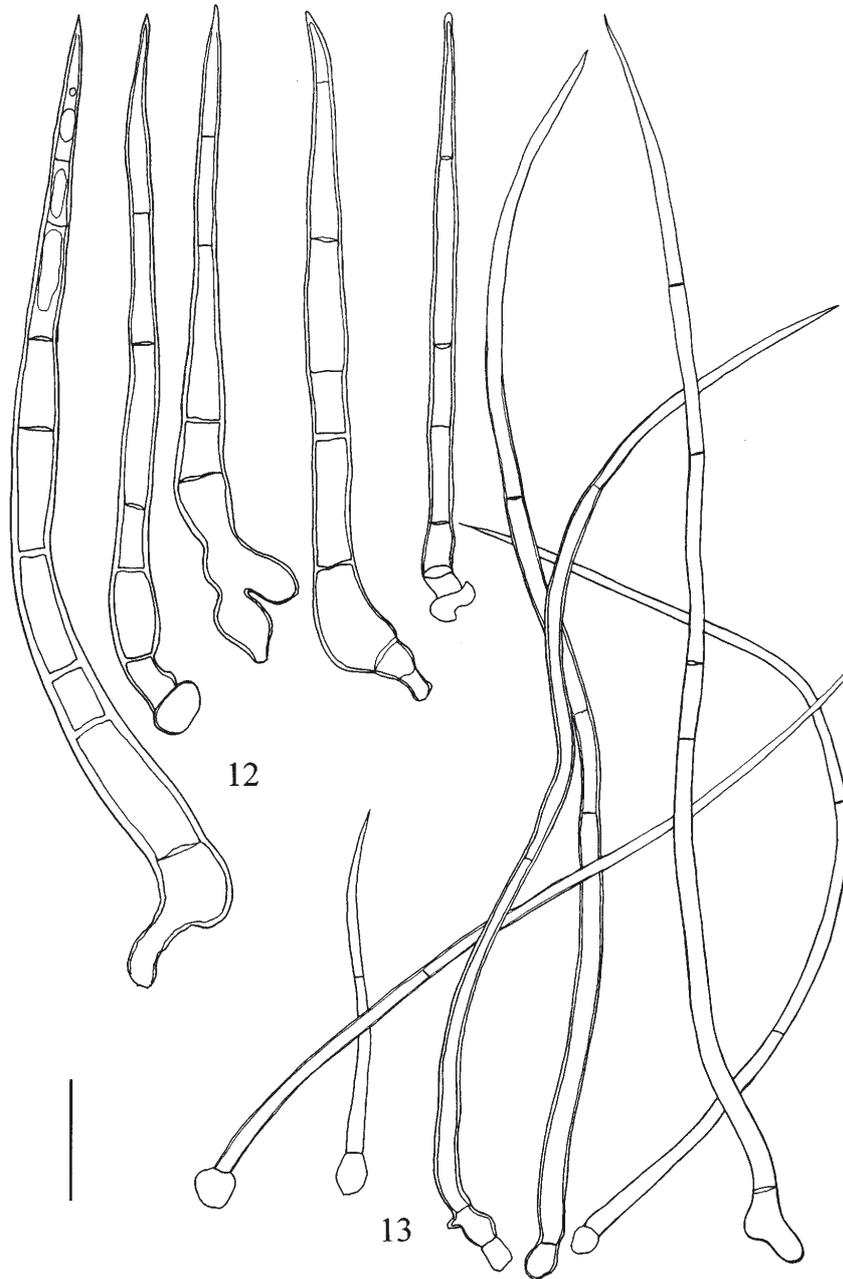
Figs 1–4. *Cheilymenia villosa* Gamundi: 1 – paraphyses and ascus (scale bar = 10 μ m); 2 – ascospore, oil immersion, C4B; scale bar = 10 μ m); 3 – median section through marginal portion of apothecium (scale bar = 100 μ m); 4 – apothecia on old leaves of *Noteroclada* (scale bar 1 mm) – Figs 1–3 original J. Moravec; Fig. 4 adopted from Gamundi 1972, 1975). Holotype (LPS).



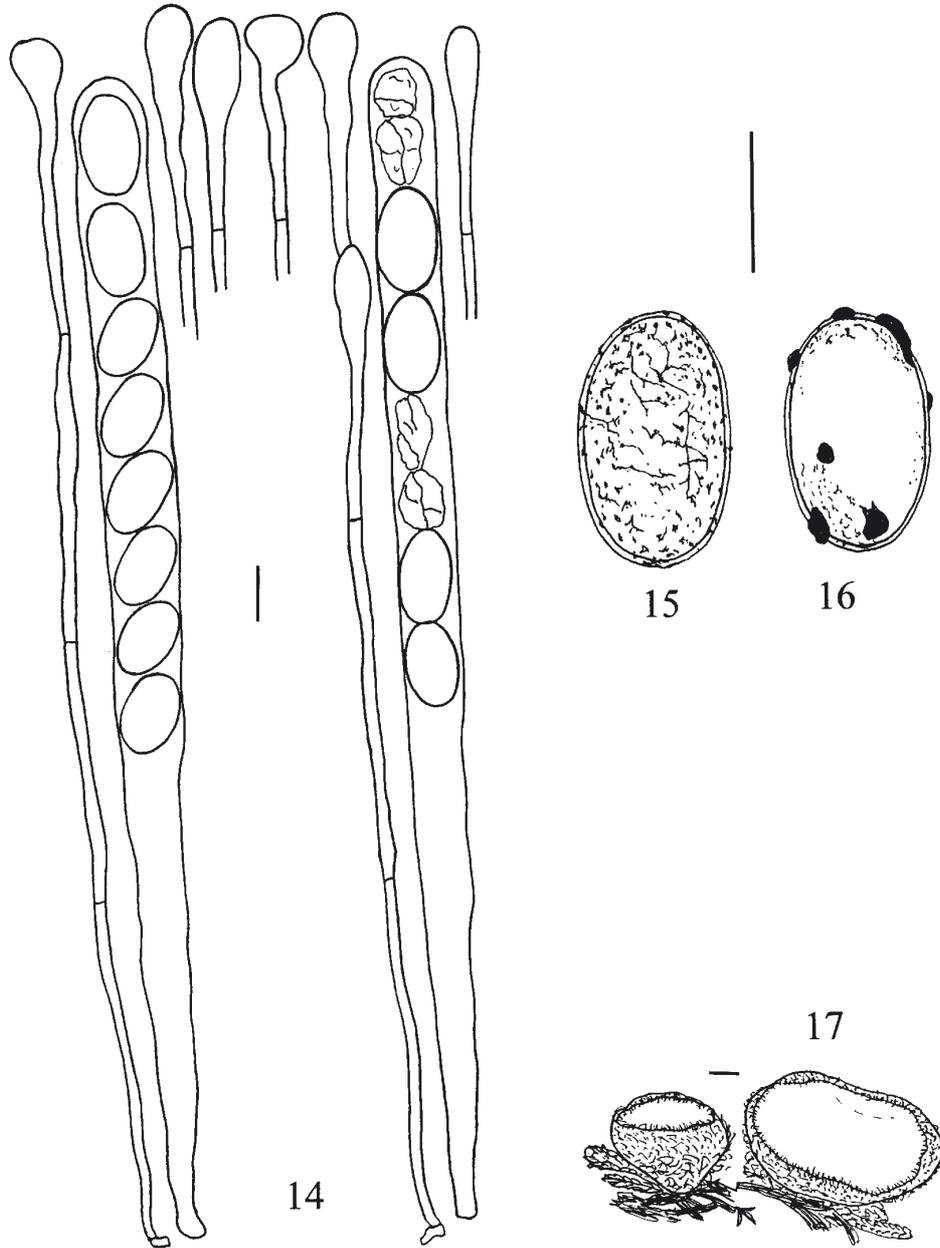
Figs 5–6. *Cheilymenia villosa* Gamundi: 5 – marginal hairs; 6 – lateral hairs (scale bar = 50 μ m). Holotype (LPS).



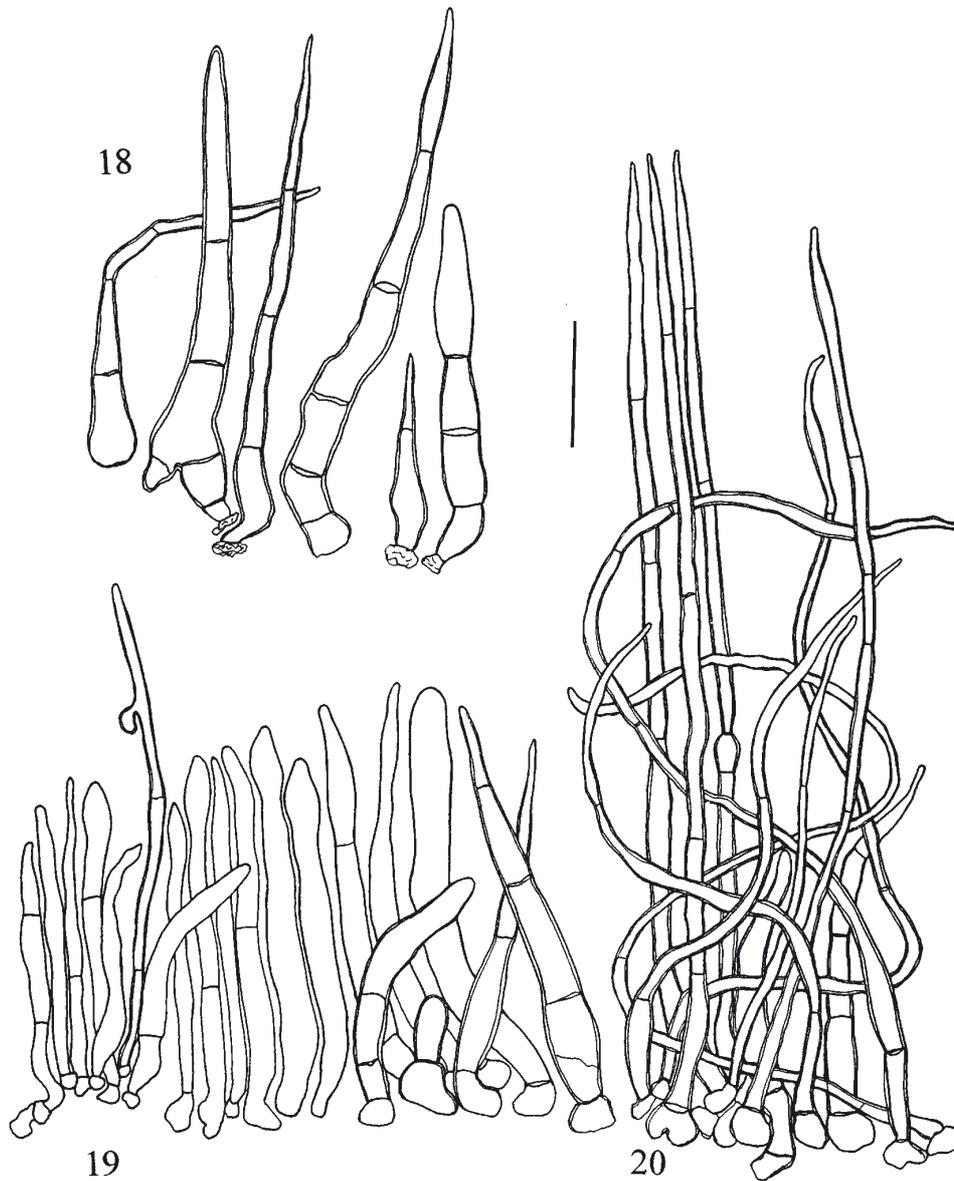
Figs 7–11. *Cheilymenia gemella* (P. Karst.) J. Moravec: 7 – median section through marginal portion of apothecium (scale bar = 100 μ m); 8 – revived (rehydrated) apothecia (scale bar = 1 mm); 9 – mature ascospores; 10 – submature ascospore (oil immersion, C4B; scale bar = 10 μ m); 11 – paraphyses and ascus (scale bar = 10 μ m) [Figs 7, 9, 10, 11 – from lectotype (H); Fig. 8 – from Steirmark, Austria, WU 9208].



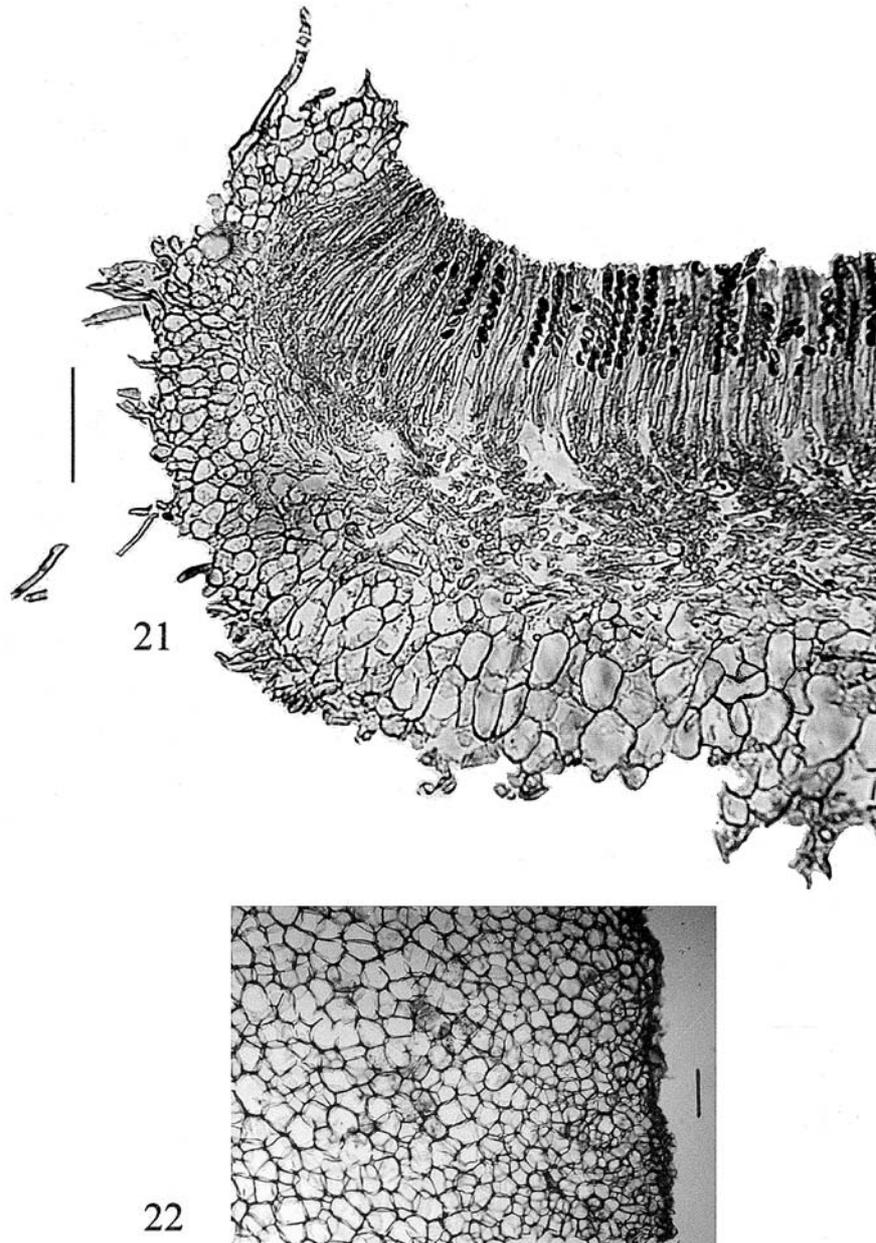
Figs 12–13. *Cheilymenia gemella* (P. Karst.) J. Moravec: 12 – marginal hairs; 13 – lateral hairs (scale bar = 50 μ m). Lectotype (H).



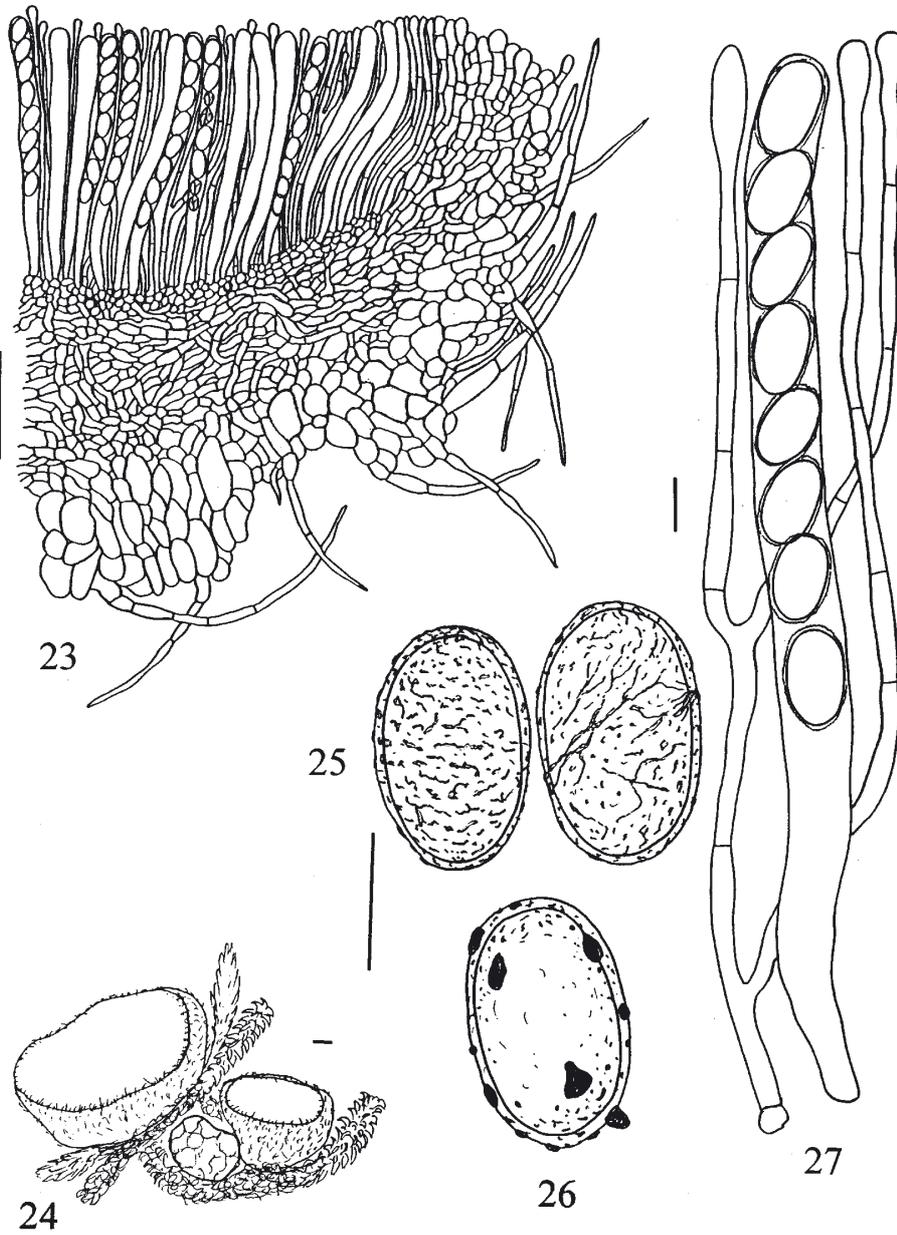
Figs 14–17. *Cheilymenia chionophila* T. Schumacher: 14 – paraphyses and asci (scale bar = 10 μ m); 15 – mature ascospore; 16 – submature ascospore (oil immersion, C4B; scale bar = 10 μ m); 17 – revived (rehydrated) apothecia on sandy, mossy soil (scale bar = 1 mm). From isotype ex O, No D 33/84).



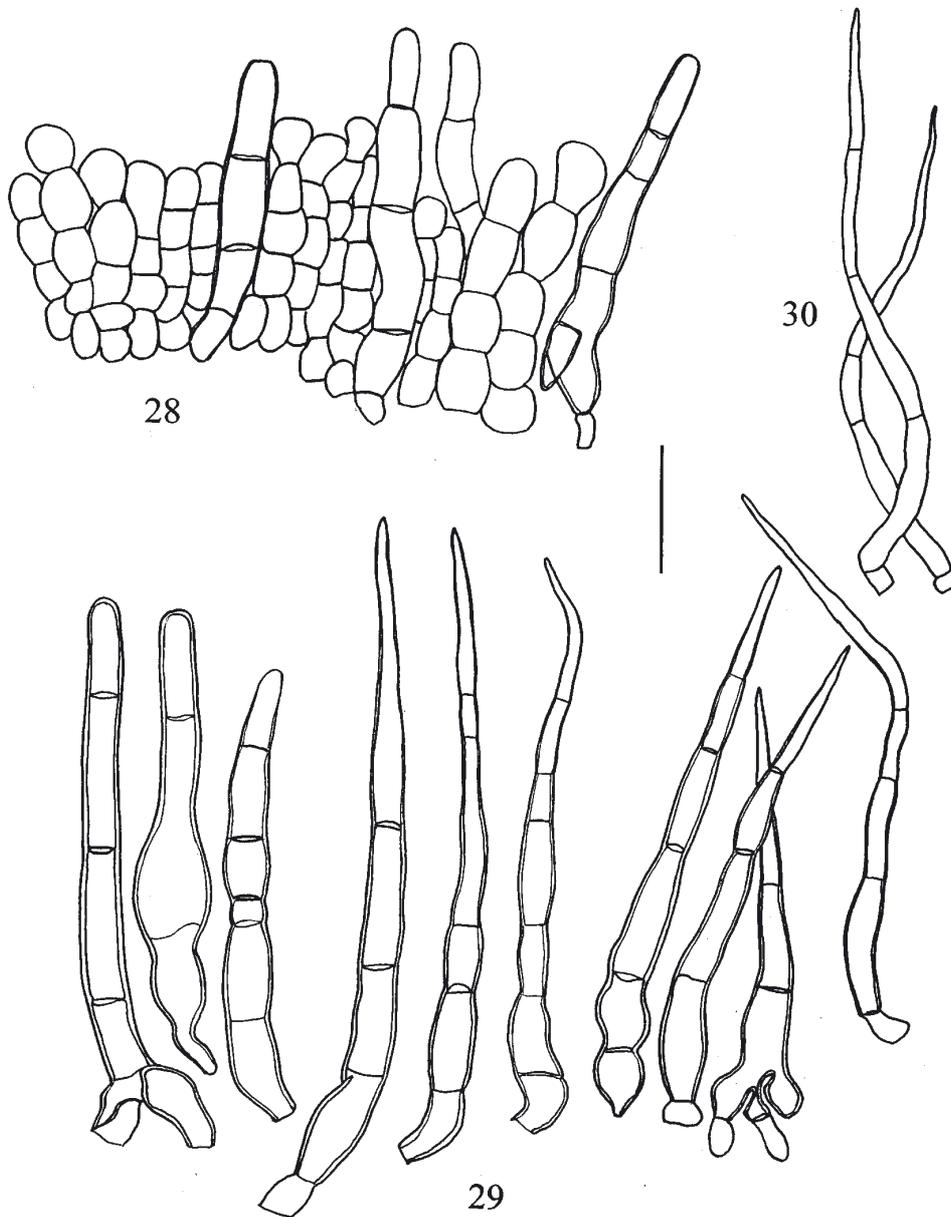
Figs 18–20. *Cheilymenia chionophila* T. Schumacher: 18 – marginal hairs; 19 – hair germs and short marginal hairs in apothecial margin; 20 – lateral hairs (scale bar = 50 μ m). From Norway, No D 33/84 (ex O – isotype).



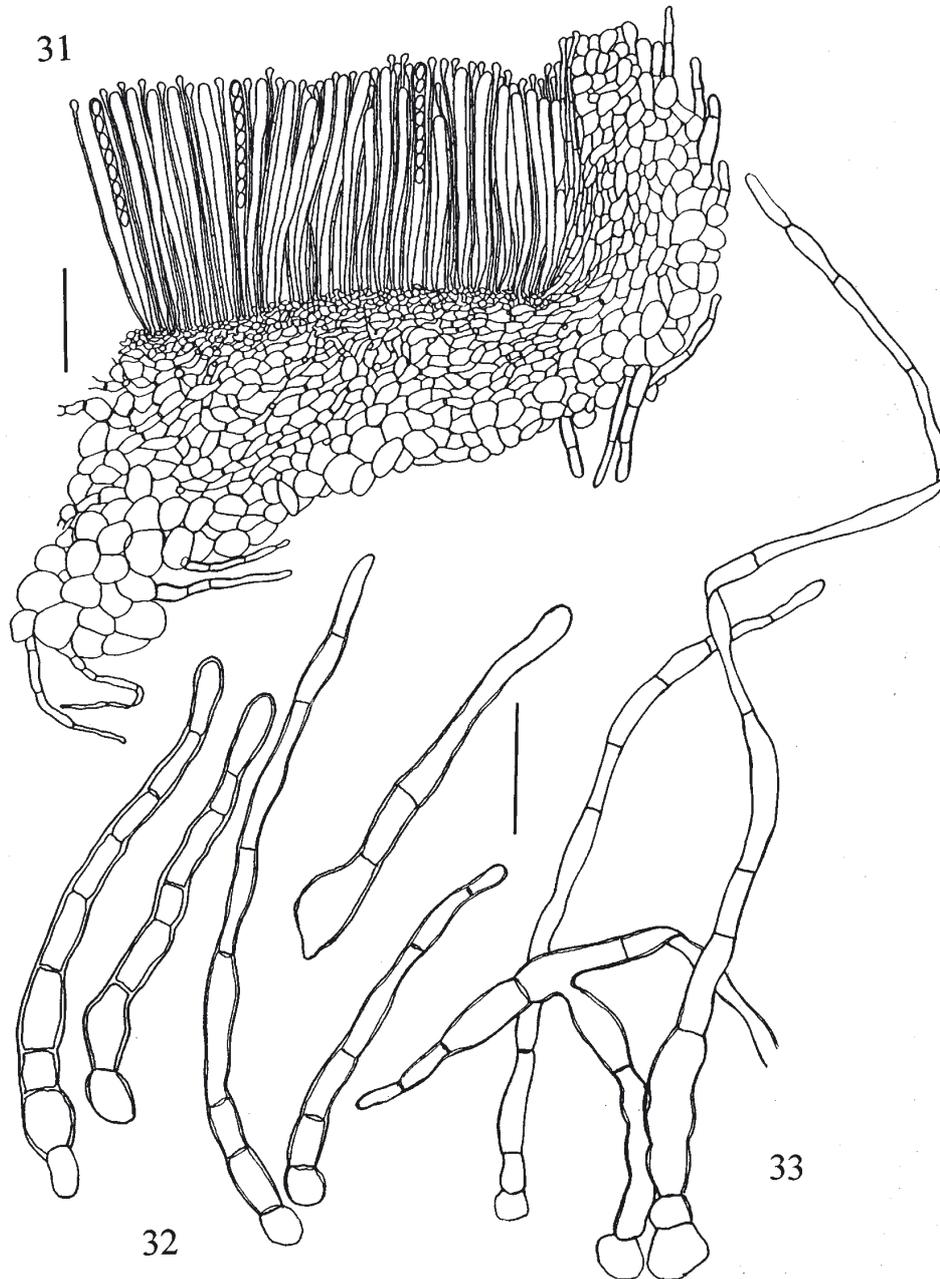
Figs 21–22. Microphotographs of *Cheilymenia*: 21 – *Cheilymenia chionophila* T. Schumacher: median section through apothecium (hairs not obvious as they are broken away; scale bar = 100 μ m). From Norway (type locality), No 16/84 (O) – from the slide with sections mounted by T. Schumacher (photo V. Antonín). 22 – *Cheilymenia sclerotiorum* T. Schumacher: median section through tuberous sclerotium (scale bar = 50 μ m); from holotype (O) – photo by T. Schumacher.



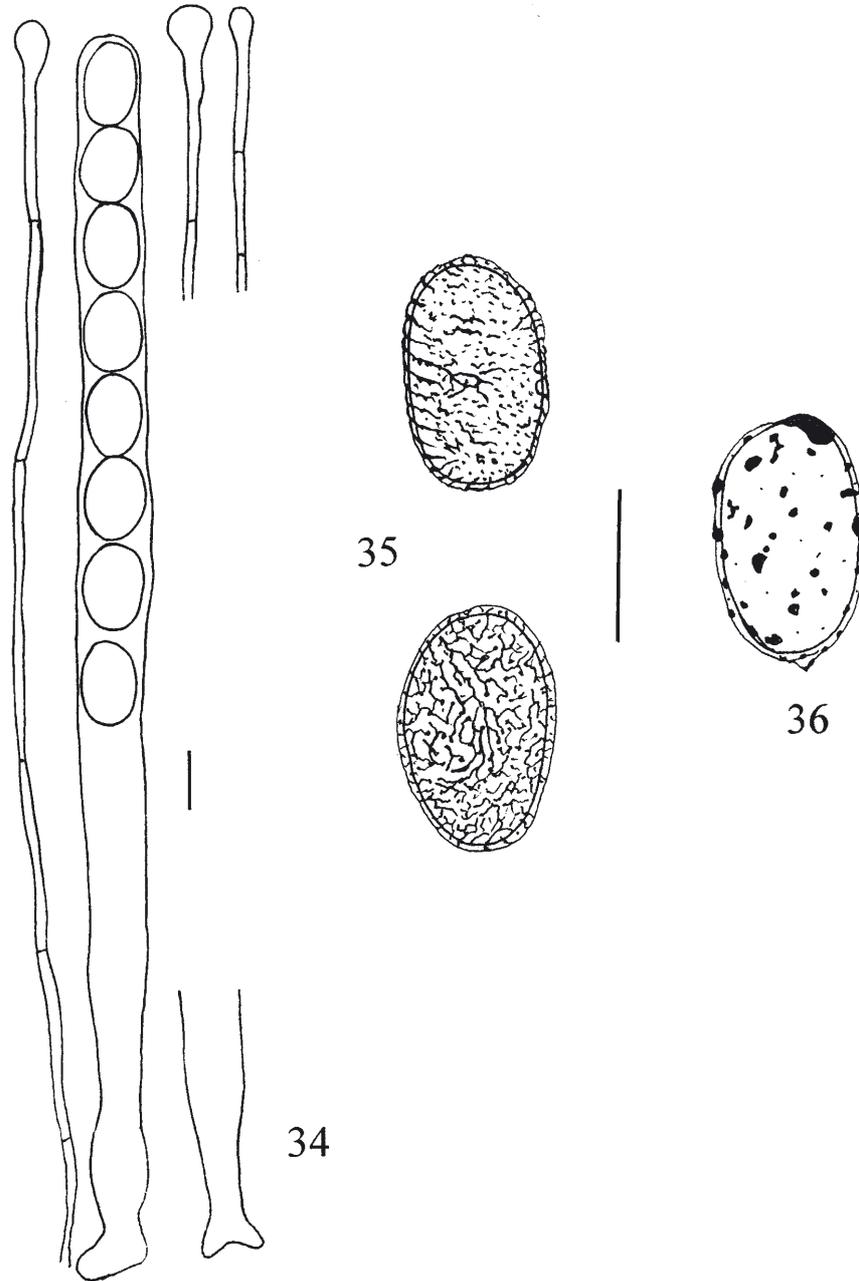
Figs 23–27. *Cheilymenia sclerotiorum* T. Schumacher: 23 – median section through apothecial margin (scale bar = 100 μ m); 24 – rehydrated apothecia attached to moss with one tuberous sclerotium in the middle (scale bar = 1 mm); 25 – mature ascospores; 26 – submature ascospore (oil immersion, C4B, scale bar = 10 μ m); 27 – paraphyses and ascus (scale bar = 10 μ m). Specimen from Norway (type locality) No 103/81 (O).



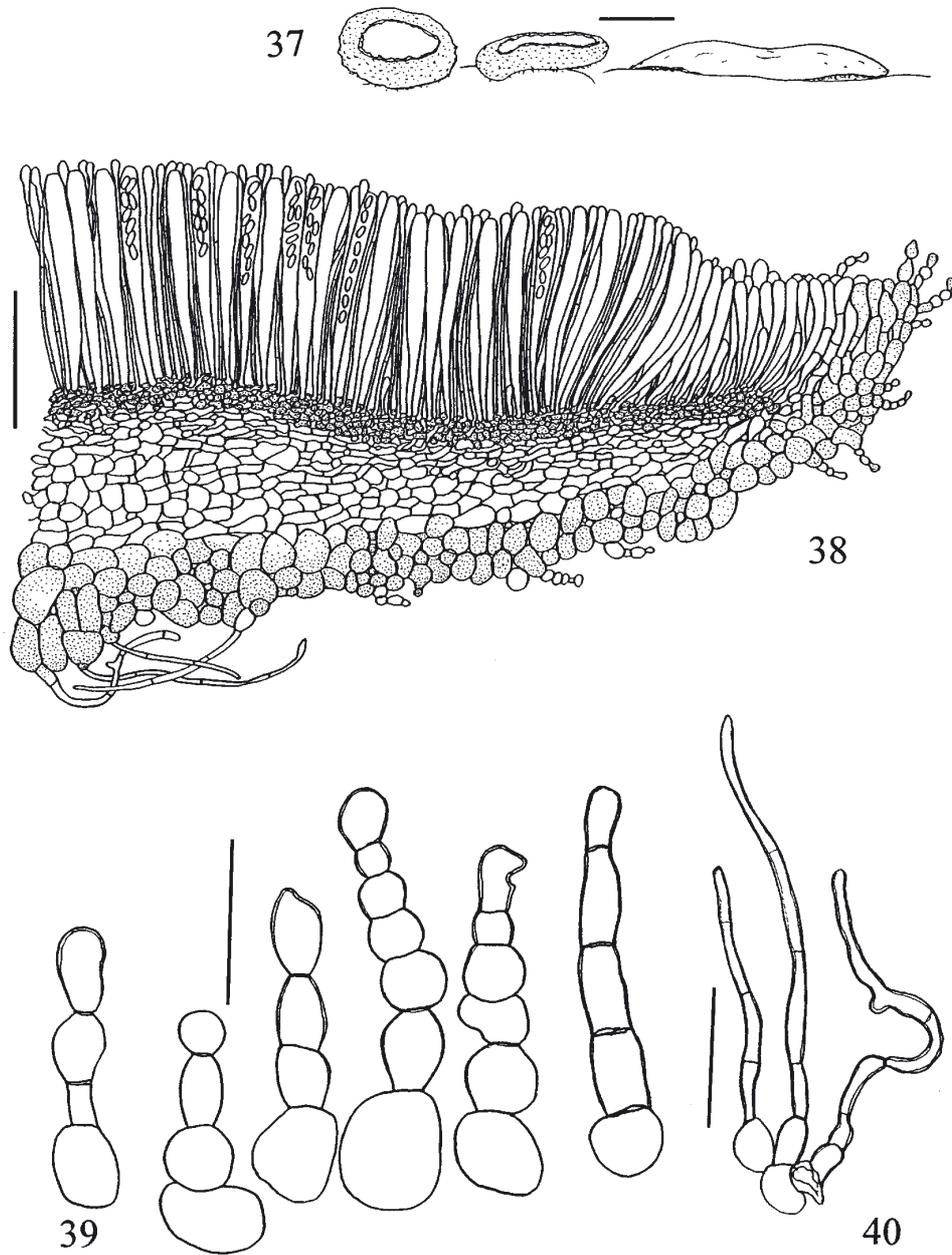
Figs 28–30. *Cheilymenia sclerotiorum* T. Schumacher: 28 – apothecial margin with marginal cells, hair germs and short marginal hairs; 29 – marginal hairs; 30 – lateral hairs (scale bar = 50 μ m). Specimen from Norway (type locality) No 103/81 (O).



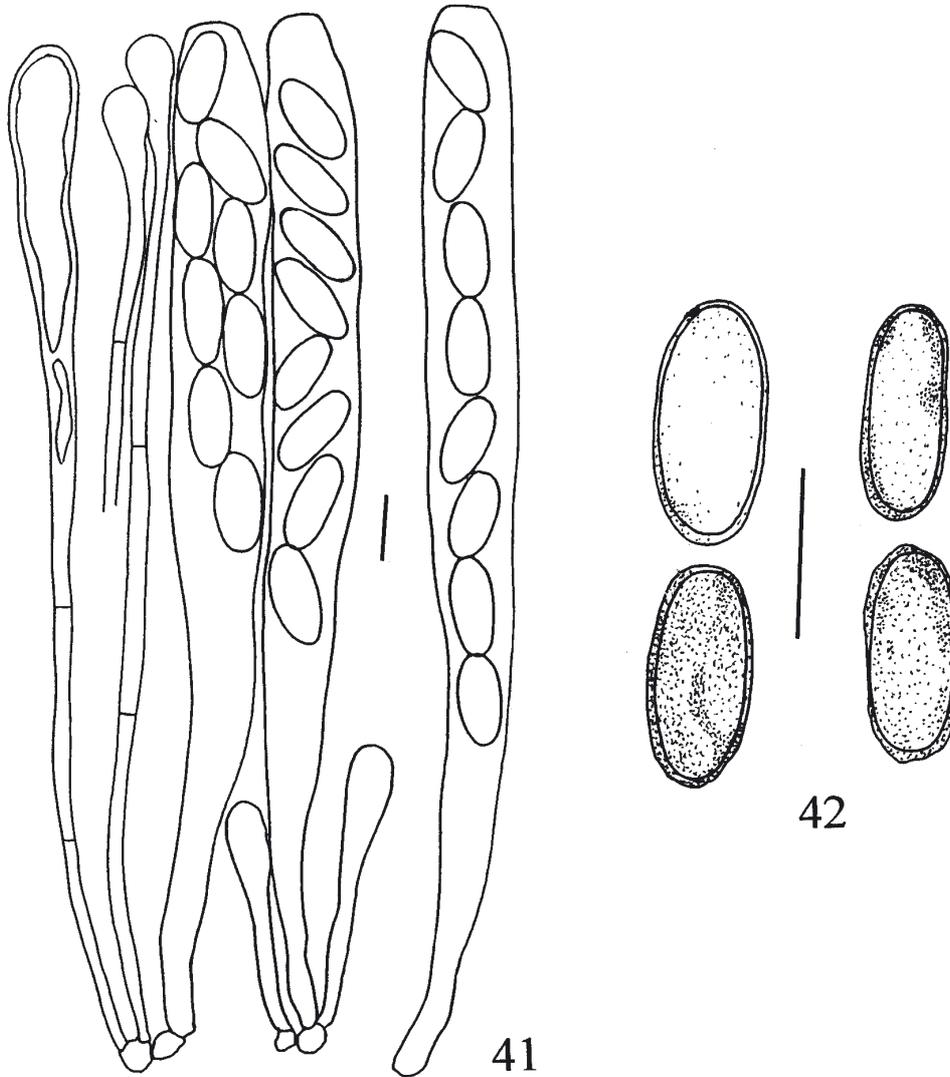
Figs 31–33. *Cheilymenia magnifica* (W. Y. Zhuang et Korf) J. Moravec: 31 – median section through apothecium (scale bar = 100 μ m); 32 – marginal and lateral hairs (both of the same pattern); 33 – subicular hairs (scale bar = 50 μ m). Holotype (HMAS 57687).



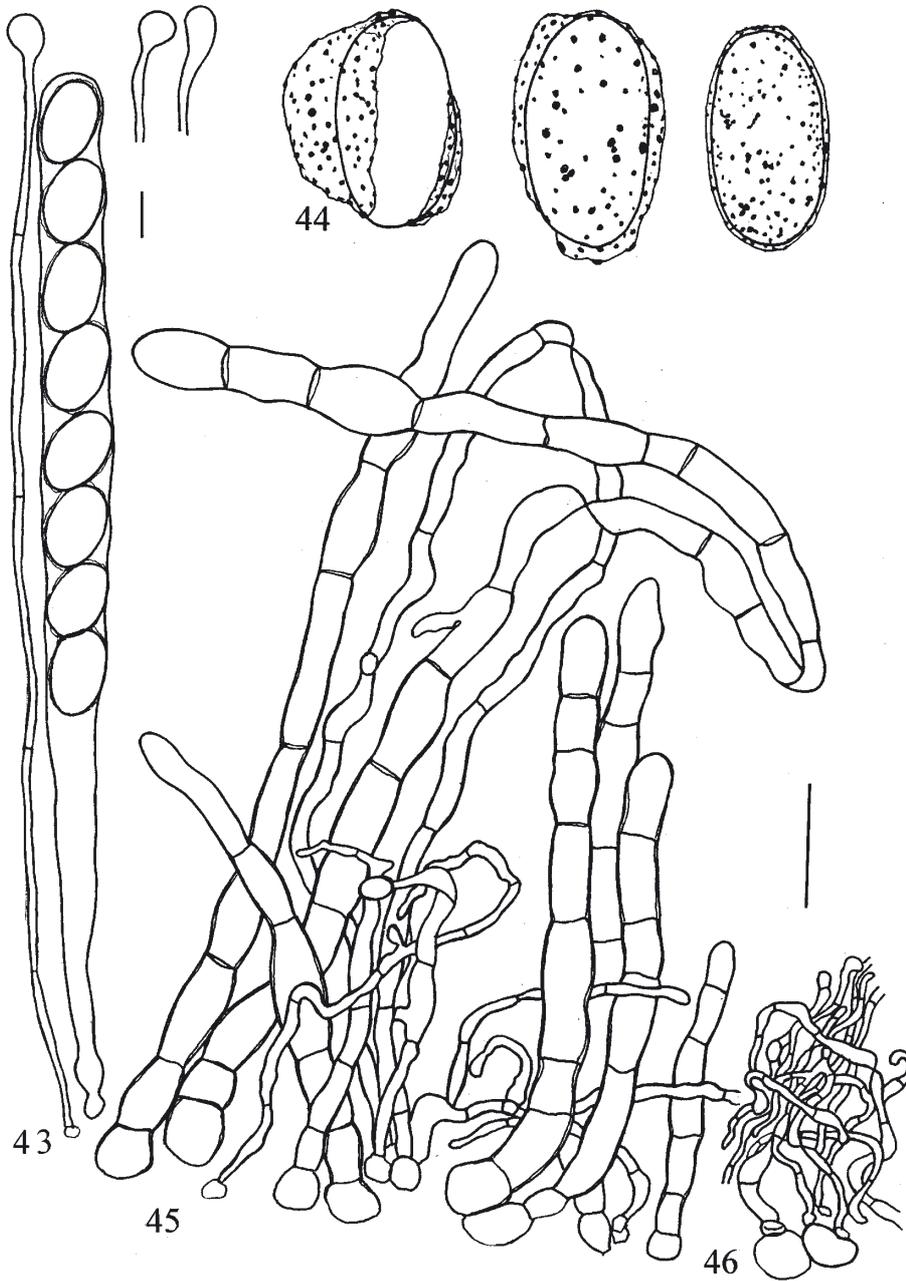
Figs 34–36. *Cheilymenia magna* (W. Y. Zhuang et Korf) J. Moravec: 34 – paraphyses and ascus (scale bar = 10 μ m); 35 – mature ascospores; 36 – submature ascospore (oil immersion, C4B, scale bar = 10 μ m). Holotype (HMAS 57687).



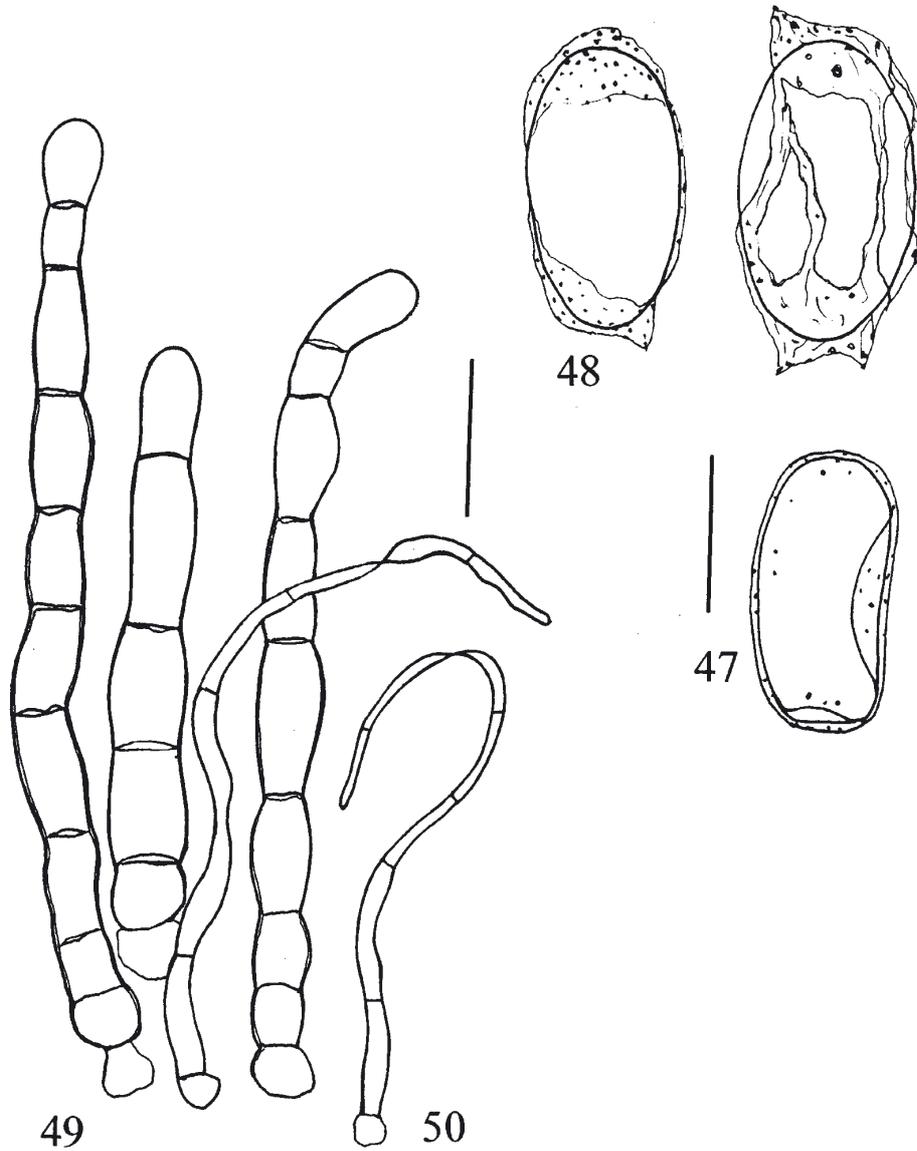
Figs 37–40. *Cheilymenia catenipila* J. Moravec sp. nov. 37 – revived (rehydrated) apothecia (scale bar = 1 mm); 38 – median section through apothecium (showing cyanophilic cells of hypothecium and ectal excipulum stained with C4B) (scale bar = 100 μ m); 39 marginal and lateral hairs (both of the same pattern); 40 – subicular hairs (scale bar = 50 μ m). Holotype (WELTU 57).



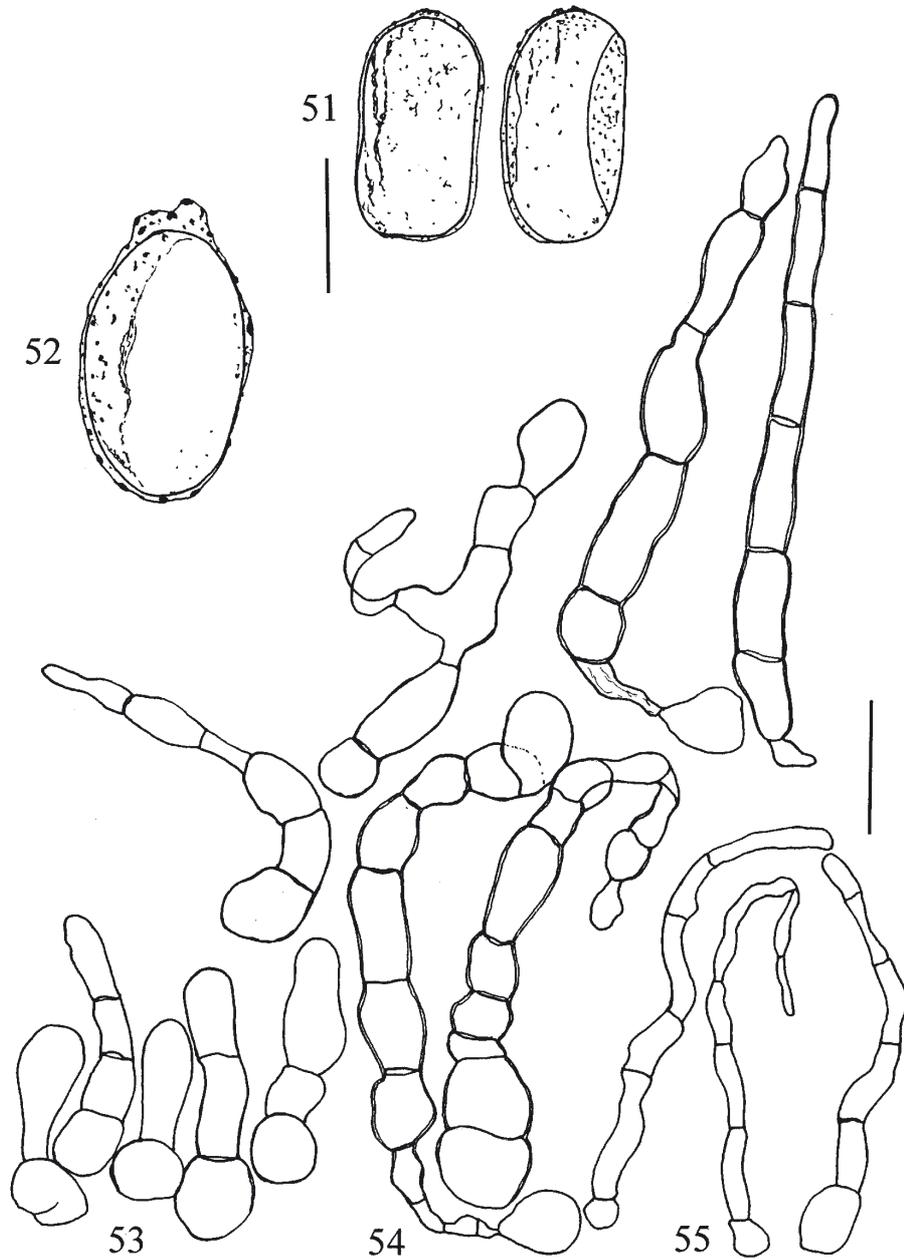
Figs 41–42. *Cheilymenia catenipila* J. Moravec sp.nov.: 41 – paraphyses and asci (scale bar = 10 μ m); 42 – ascospores (oil immersion, C4B, scale bar =10 μ m). Holotype (WELTU 57).



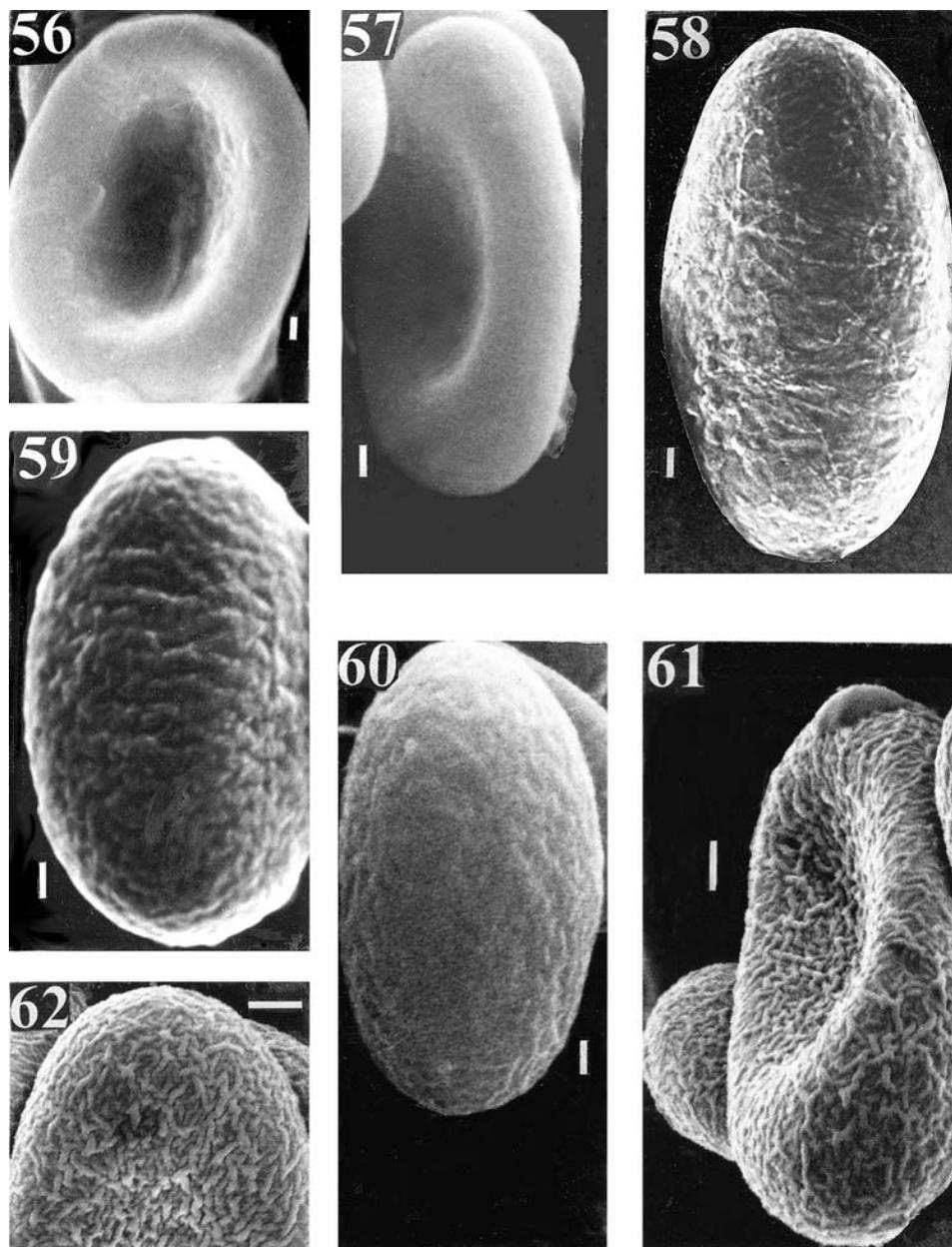
Figs 43–46. *Pseudoaleuria quinaultiana* Lusk: 43 – paraphyses and ascus (scale bar = 10 μ m); 44 – ascospores – note loosening perispore (oil immersion, C4B, scale bar = 10 μ m); 45 – marginal hairs; 46 – receptacular lateral fibrous hairs forming densely interwoven layer on flanks (scale bar = 50 μ m). Holotype (OSC).



Figs 47–50. *Pseudoaleuria fibrillosa* (Currey) J. Moravec: 47 – deformed mature ascospore; 48 – ascospores with loosening perispore (oil immersion, C4B; scale bar = 10 μm); 49 – marginal hairs; 50 – receptacular lateral fibrous hairs which form interwoven layer on flanks (scale bar = 50 μm). Holotype – K(M).



Figs 51–55. *Pseudoaleuria fibrillosa* (Currey) J. Moravec: 51 – deformed mature ascospores; 52 – ascospore with loosening perispore (oil immersion, C4B; scale bar = 10 μ m); 53 – hair germs at apothecial margin; 54 – marginal hairs; 55 – receptacular lateral hairs which form interwoven layer on flanks (scale bar = 50 μ m). Holotype (CO) of *Peziza campestris* P. Crouan et H. Crouan.



Figs 56–62. SEM photomicrographs of ascospores of *Cheilymenia*: 56 – *C. villosa* Gamundi (holotype LPS); 57 – *C. gemella* (P. Karst.) J. Moravec (lectotype H); 58 – *C. chionophila* T. Schumacher (Norway, D 16/84, O); 59 – *C. sclerotiorum* T. Schumacher (holotype O); 60 – *C. magnifica* (W. Y. Zhuang et Korf) J. Moravec (holotype HMAS); 61–62 – *C. catenipila* J. Moravec sp.nov. (holotype WELTU). 56–57 – photo J. Lhotecký; 58–59 – photo T. Schumacher; 61–62 – photo H. Voglmayr. Scale bars = 1 μ m.