

Taxonomic revision of the genus *Cheilymenia* – 5. The section *Cheilymenia*

JIRÍ MORAVEC

P.O.Box 17/A. CZ-67904 Adamov u Brna, Czech Republic

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Five species belonging to the section *Cheilymenia* – the type section of the genus *Cheilymenia* Boud. – are introduced. The section is divided into three series: ser. a. *Cheilymenia* with *Cheilymenia stercorea* (Pers.: Fr.) Boud. (type species), *Cheilymenia asteropila* J. Mor., and *Cheilymenia parvispora* spec. nov. described here; ser. b. *Pallidae* J. Mor. with *Cheilymenia pallida* Bell et Dennis; and ser. c. *Insigniae* (J. Mor.) comb. nov. [basionym: *Cheilymenia* sect. *Insigniae* J. Moravec (1990b)] represented by *Cheilymenia insignis* (Cr. et Cr.) Boud. The previously designated lectotype for *C. stercorea* is rejected, and an illustration mentioned in the sanctioning publication (an "iconotype") is here designated the lectotype of that name. A 'prototype' for *C. stercorea* is newly designated here and the taxonomy and nomenclature of this type-species of the genus is discussed in detail. Based on examination of the type and other relevant material, *Peziza stercorea* var. *aurantiacoflava* Fuck., as well as *Humaria alpina* Fuck. and also *Peziza fulvescens* Nyl., have proven to be conspecific with *C. stercorea*; a new combination *C. stercorea* f. *alpina* (Fuck.) J. Mor. is proposed. *Lachnea stercorea* var. *microspora* Kanouse is synonymised with *C. parvispora* J. Mor. In addition, a new name, *Cheilymenia lacteoalba* Arnolds et J. Mor. nom. nov. is proposed for the illegitimate homonym *Cheilymenia pallida* Arnolds (1982), a species of the sect. *Paracheilymeniae*. The paper comprises descriptions and illustrations, including SEM photomicrographs.

Key words: *Cheilymenia*, sect. *Cheilymenia*, taxonomy, nomenclature.

Moravec J. (1993): Taxonomická revize rodu *Cheilymenia* – 5. Sekce *Cheilymenia*. *Czech Mycol.* 47: 7–37

Je uvedeno pět druhů, patřících do sekce *Cheilymenia*, typové sekce rodu *Cheilymenia*. Sekce je rozdělena do tří sérií: ser. a. *Cheilymenia* s druhy *Cheilymenia stercorea* (Pers.: Fr.) Boud. (typový druh), *Cheilymenia asteropila* J. Mor. a zde popsaná *Cheilymenia parvispora* spec. nov.; ser. b. *Pallidae* J. Mor. s druhy *Cheilymenia pallida* Bell et Dennis; a ser. c. *Insigniae* (J. Mor.) comb. nov. [basionym: *Cheilymenia* sect. *Insigniae* J. Moravec (1990b)] reprezentovaná *Cheilymenia insignis* (Cr. et Cr.) Boud. Je zavržen dříve vybraný lektotyp *C. stercorea* a je zde vybrán nový lektotyp (ikonotyp). Zároveň je nově navržen 'prototyp' pro *C. stercorea* a je detailně diskutována taxonomie a nomenklatura tohoto typového druhu. Na základě studia typového a dalšího materiálu, *Peziza stercorea* var. *aurantiacoflava* Fuck., *Humaria alpina* Fuck. a *Peziza fulvescens* Nyl. jsou považovány za konspecifické s *C. stercorea*; je navržena nová kombinace *C. stercorea* f. *alpina* (Fuck.) J. Mor. *Lachnea stercorea* var. *microspora* Kanouse je synonymem *C. parvispora* J. Mor. V dodatku je navrženo nové jméno *Cheilymenia lacteoalba* Arnolds et J. Mor. nom. nov. pro neplatné homonymum *Cheilymenia pallida* Arnolds (1982), patřící do sekce *Paracheilymeniae*. Článek obsahuje popisy a ilustrace včetně fotografií z elektronového mikroskopu.

INTRODUCTION

The type section *Cheilymenia* of the genus *Cheilymenia* Boudier 1907 was introduced with two series, ser. a. *Cheilymenia* and ser. b. *Pallidae* J. Mor. (J. Moravec (1990b)). A later examination of the type and other material of *Cheilymenia insignis* (Cr. et Cr.) Boud., which was considered the only species of the section *Insigniae* J. Moravec (1990b), has revealed that this species is a natural member of the section *Cheilymenia* (see also J. Moravec 1992). Consequently, the section *Insigniae* is superfluous. I now consider it to form a third series of the section *Cheilymenia* and a new combination is proposed here. Five species of the three series of the section are introduced below.

The most complicated problem is that of the taxonomy and nomenclature of *C. stercorea*, the type species of the genus.

DISCUSSION AND TAXONOMIC RESULTS

Problems in the taxonomy and nomenclature of *Cheilymenia stercorea* were discussed by Maas Geesteranus (1969). He considered the name *Patella stercorea* Wigg. a nomen dubium and consequently replaced *C. stercorea* with newly combined *Cheilymenia ciliata* (Bull.) Maas G. based on *Peziza ciliata* Bulliard (Herb. France pl. 438, fig. 2, 1790). As the description of *P. ciliata* Bull. was in fact not published until 1791, I thought earlier (Moravec 1990b) that Bulliard's name from 1790 was a nomen nudum. Besides, the supposed older homonym *Peziza ciliata* Hoffmann (Veg. Crypt. 2: 25, 1970) moved the nomenclatorial starting-point of *P. ciliata* Bull. to 1969, when Maas Geesteranus was the first to transfer the name to another genus, and thus formally created a new name (ICBN 72.2). However, we considered it highly desirable to maintain the well-known name *C. stercorea* in the present sense, although one solution would have been to reject the name as dubious. Nevertheless, we proposed (J. Moravec 1990b) to cite just Fries as the author of the name *P. stercorea* as sanctioned by Fries, and thus preserve the epithet which has been applied to and in use for so many years for a stellate-setose species of *Cheilymenia*. This proposal was made with the assistance and advice of Prof. Nils Lundqvist (Stockholm), as I realised from the beginning that it was impossible to solve the problem myself.

Unfortunately, the problem appears to be more complicated. As noted above, *P. ciliata* Bulliard 1790 was said to be a nomen nudum and not validated until 1791 by Bulliard himself. However, the Code, Art. 42.2 says: "Prior to 1 Jan. 1908 an illustration with analysis, or for non-vascular plants a single figure showing details aiding identification, is acceptable, for the purpose of this Article, in place of a written description or diagnosis." That means that *P. ciliata* Bulliard 1790 could

be valid, as also would Maas Geesteranus's combination mentioned above. However, another question is: does the plate show "details aiding identification"? The stellate hairs are not visible and thus we can still consider *P. ciliata* technically a nomen dubium, since it could represent any of several species of *Cheilymenia*. Moreover, the nomenclature of *P. stercorea* is even more complicated. Prof. Nils Lundqvist (Stockholm) and Prof. Richard P. Korf (Ithaca) have been very helpful to me over many months in sorting out the confusing synonymy and sanctioning provisions as they apply to this critical species, *C. stercorea*, the type species of the genus. We consider it necessary to provide the readers with the following detailed notes on our use of the name *Cheilymenia stercorea*:

1.) Wiggers (sometimes cited as Weber in Wiggers, or Weber ex Wiggers, see Stafleu and Cowan, Taxonomic literature, ed. 2, 7: 129, 1988) published the following new name: "1131. *Patella stercorea*, flava, extus hirsutula. *Elvela lentiformis* Scop, n. 164". In accordance with Art. 63.1 of the International Code of Botanical Nomenclature (ICBN), Wiggers's name is superfluous, since he cited Scopoli's *Elvela lentiformis* as a synonym and did not adopt Scopoli's epithet in *Patella*. It is automatically typified by Scopoli's material.

2.) When Wiggers published his new name, he extended Scopoli's description by adding "stercoreus" as a substrate, whereas Scopoli's material was lignicolous.

3.) Persoon (Obs. Myc. 2: 89, 1799) effectively published a new name, *Peziza stercorea* Pers. and at the same time (l.c. 2: 86) placed Scopoli's *E. lentiformis* as a synonym of *Peziza lenticularis* Bull., thus effectively selecting Wigger's description as applicable to the dung-inhabiting fungus, and restricted Scopoli's name for a wood-inhabiting fungus.

4.) Fries (Syst. Myc. 2, 1822) accepted (sanctioned) Persoon's treatment of Wiggers's name, citing the species as *Peziza stercorea* Pers. [l.c. 3 (index): 127, 1832], and making no mention whatsoever of Wiggers's *Patella stercorea*.

5.) Fries (l.c. 2: 133) sanctioned *Peziza lenticularis* Bull., but did not accept Persoon's synonymy of Scopoli's name with Bulliard's.

6.) Fries (l.c. 2: 170) instead placed *Elvella lentiformis* Scop. as a synonym of *Ditiola radiata* (Alb. et Schw.: Fr.) Fr., now considered a member of the *Dacrymycetaceae*, on wood.

7.) It is thus clear that the Fries's concept of sanctioned name *Peziza stercorea* Pers.: Fr. is not based on Scopoli's material but on material on dung, and on the descriptions in Wiggers and in Persoon. The superfluous status of Persoon's name (or Wigger's name, if one prefers that attribution) is cancelled by the sanctioned status given to the name in Fries's *Systema Mycologicum*.

8.) We lack any type material of *Patella stercorea* Wiggers, as well as of *Peziza stercorea* Persoon. My studies of the authentic material in the Persoon herbarium at Leiden show that this material, collected long after Persoon redescribed the fungus, does not represent a *Cheilymenia*, and thus would be highly unsuitable for

choice as neotype material. The material from L 8984 ex herb. Persoon, labelled "*Peziza stercorea* Pers., Herb. Lugd. Bat. No 910. 261-575, super stercum equini, Moug. in herb. Pers." contains three fragments of horse dung. I have found no apothecia of *Cheilymenia* on these three fragments. There are only apothecia of an *Ascobolus* sp. and a *Lasiobolus* sp. (the latter is confirmed by the presence of non septate hairs and ascospores distributed on the substrate, but no apothecia were found). The result is that the possible "type" of *Peziza stercorea* from the Mougeot herbarium has nothing to do with the species we now call *Cheilymenia stercorea*. No apothecium with stellate hairs is present on the substrate. Also the two other envelopes: 910. 261-578-9 from Persoon's herbarium, contain apothecia of a *Lasiobolus* sp. and no *Cheilymenia* was found; the second, L 8853-1, ex herb. Lugd. Bat. 90 O.H. No 910. 261-579, labelled *Peziza stercorea* Pers., was designated by Denison (1964) as the lectotype of *P. stercorea*. However, I have found only apothecia of a *Lasiobolus* sp. and there is present also a label marked with the same number with the determination "*Lasiobolus equinus*" as determined by Nannfeldt 1932. Denison's photographs added to the envelope clearly show a *Lasiobolus* sp., not only on the first photograph but also what is called by him "a fragment of apothecium of *Cheilymenia*" on another picture is of a *Lasiobolus* sp. mixed with a fragment of horse dung. The hairs are clearly without any septa and possess a base characteristic for *Lasiobolus*, and the ascospores belong to *Lasiobolus* sp. Therefore, the specimen cannot serve as a lectotype for the taxon of *Cheilymenia* with stellate hairs, and we reject Denison's lectotypification.

One could choose an iconotype cited in the protologue as a lectotype, and Fries (1822) did cite Bulliard's 1790 figure of *Peziza ciliata* Bull., a name he placed in synonymy with *P. stercorea*. We wanted to avoid such a choice on two grounds: a) the illustration does not show the diagnostic stellate hairs and might in fact represent any of several other species of *Cheilymenia*, and, b) we believe that iconotypes contradict the spirit of the ICBN, and do not serve the interest of stability, which neotypes do.

A remarkably useful concept has just been introduced into the International Code of Botanical Nomenclature, and a new Article 7.9*bis* (which may bear a different designation when the Code is published) was accepted at the recent International Botanical Congress held at Tokyo in August, 1993. There is now a new term introduced, 'prototype' (the actual term for this concept that will appear in the Code has not yet been decided), which allows one to fix the application of demonstrably ambiguous original material, covering exactly our problem. The Article accepted reads as follows:

"7.9*bis* A 'prototype' is a specimen or illustration selected to serve as an interpretative type when the holotype, lectotype or previously designated neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified for purposes of the precise application

of the name of a taxon. When a 'prototype' is designated, the holotype, lectotype or neotype that the 'prototype' supports must be explicitly cited."

Having rejected Denison's (1964) lectotypification of *Peziza stercorea*, we now choose Bulliard's figure of *Peziza ciliata* Bull., Herb. France 109: t. 438, f. 2, 1790, cited by Fries in the sanctioning work (Fries, *Systema Mycologicum* 2: 87. 1822) as illustrative of *P. stercorea* Pers.: Fr., to be the LECTOTYPE of *P. stercorea* Pers.: Fr. Moreover, as pointed out above, that illustration is demonstrably ambiguous. Hence, we designate at this time the following specimen as 'PROTOTYPE' to support that lectotype illustration, as provided under the new Article 7.9bis:

Sweden: Södermanland: Mariefred, S.W. of Karlsborg, on cow dung, 7. VI. 1938, leg. Th. Arwidsson, det. J. Moravec (S).

CHARACTERISTICS OF THE SECTION

The type section *Cheilymenia*, comprises species which are characterised by rigid, thick-walled, septate (occasionally aseptate), yellow-brown marginal hairs possessing a multifurcate rooting base deeply buried among the cells of the ectal excipulum.

The base of hairs of all species of ser. *Cheilymenia* and *Pallidae* is very conspicuous, though variable. The shape of the base of well-developed marginal hairs is unique in the genus. The base is elongated, conically shortly attenuated and truncate, simpler or with almost regular hooked roots on both sides (harpoon-like) or possessing a number of irregular and irregularly furcate small roots (coralloid), or the base is shorter, very wide and widely furcate to multifurcate. The base of marginal hairs of *C. insignis* (ser. *Insigniae*) is shorter, simpler, but in several well-developed marginal hairs resembles the shape of that of the series *Cheilymenia* and *Pallidae*. (The marginal hairs of species of these two series may be very rare or missing, or may also possess a similar, simpler base, especially in old apothecia or those developed under stress of poor conditions, and may, on the contrary, resemble those of *C. insignis*.) The apothecial hairs distributed towards the external surface of the apothecia of all species of the section *Cheilymenia* possess a much more reduced base, which may be simple, truncate, or with usually two short, truncate or rarely rounded roots. Thus they may resemble apothecial hairs of several species belonging to other sections of the genus. Hyphoid, flexuous, superficial hairs and septate hyaline hyphae originating from the outermost cells of the ectal excipulum are commonly present at the base of apothecia.

In the series *Cheilymenia*, these superficial hairs are mixed with stellate hairs (asteropili according to Svrček 1948) which represent another important feature. These stellate hairs may be abundant or very rare and are 2-6-rayed and consist usually of long, septate, acute arms. *C. pallida* of the monotypic series *Pallidae*

possesses apothecia which lack any stellate hairs, or they possess thick-walled coloured cells of a stellate shape; rarely well-developed stellate hairs are present in fully developed apothecia. These stellate hairs are of an outstanding 3-8-rayed shape, having much shorter arms than those of the section *Cheilymenia*. The stellate hairs originate from the outermost cells of the ectal excipulum. No typically stellate hairs were seen in apothecia of *C. insignis*. Instead, superficial hairs occasionally forked above into two arms, some of them at angles resembling 2-rayed stellate hairs were seen in the type and BHU material. However, the species is very rare and only a few apothecia were examined.

The apothecial structure of species of the section *Cheilymenia* is characterised by the sharply differentiated ectal excipulum consisting of *textura angularis*, and the medullary layer which consists of *textura angularis* to *subintricata* to almost *intricata*, or of short, thin-walled hyphae or cells of an indefinite shape.

The separable ascospore perisporium (an extremely delicate outermost membrane) of all species of the section is almost smooth or with irregular patches or striae, or irregularly finely warted; the warts are very low, isolated or elongated and irregularly connected, occasionally forming an incomplete reticulum. The yellow refractive colour of the ascospore contents is well seen when they are stained with cotton blue in lactic acid (CB) and represents a characteristic feature of all species of the genus. The habitat of the species of the section *Cheilymenia* is dung except for *C. asteropila*, which was collected only on soil.

A SYNOPSIS OF THE SERIES AND SPECIES OF THE SECTION *Cheilymenia*

Sect. 8. *Cheilymenia* (type section of the genus *Cheilymenia* Boud. em. J. Mor.)

ser. a. *Cheilymenia*

C. stercorea (Pers.: Fr.) Boud. (type species), *C. parvispora* J. Mor., *C. asteropila* J. Mor.

ser. b. *Pallidae* *C. pallida* Bell et Dennis

ser. c. *Insigniae*

C. insignis (Cr. et Cr.) Boud.

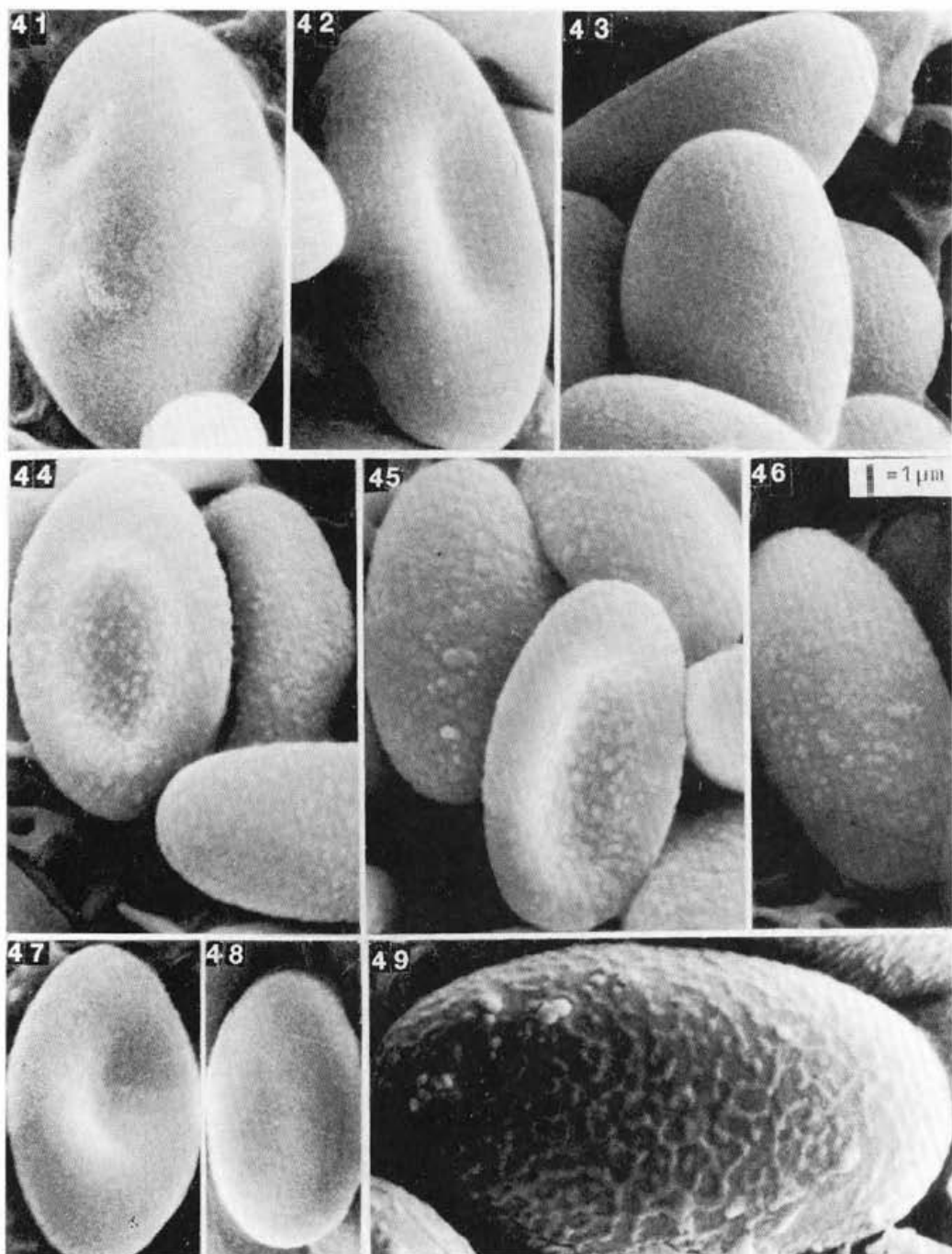
1. *Cheilymenia stercorea* (Pers.: Fr.) Boudier, Hist. classific. discomyc. Europe 63, 1907.

= *Peziza stercorea* Pers.: Fries, Syst. Mycol. 2: 87, 1822.

= *Peziza stercorea* Pers., nom. illeg., Obs. Mycol. 2: 89, 1799; non in Gmelin in C. Linnaeus, Systema Naturae 2: 1457, ed. 13, 1791.

= *Humaria stercorea* (Pers.: Fr.) Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24: 321, 1870.

= *Lachnea stercorea* (Pers.: Fr.) Gillet, Champ. France discomyc. 76, 1880.



Figs. 41–49. SEM of ascospores of species of the sect. *Cheilymenia*: 41. *C. stercorea* ('prototype', S); 42–43. ditto (Bohemia, Branžej, J. Moravec); 44–46. *C. asteropila* (isotype, BRA); 47. *C. parvispora* (holotype, S); 48. *C. pallida* (WELTU 209); 49. *C. insignis* (PRM ex LPOL).

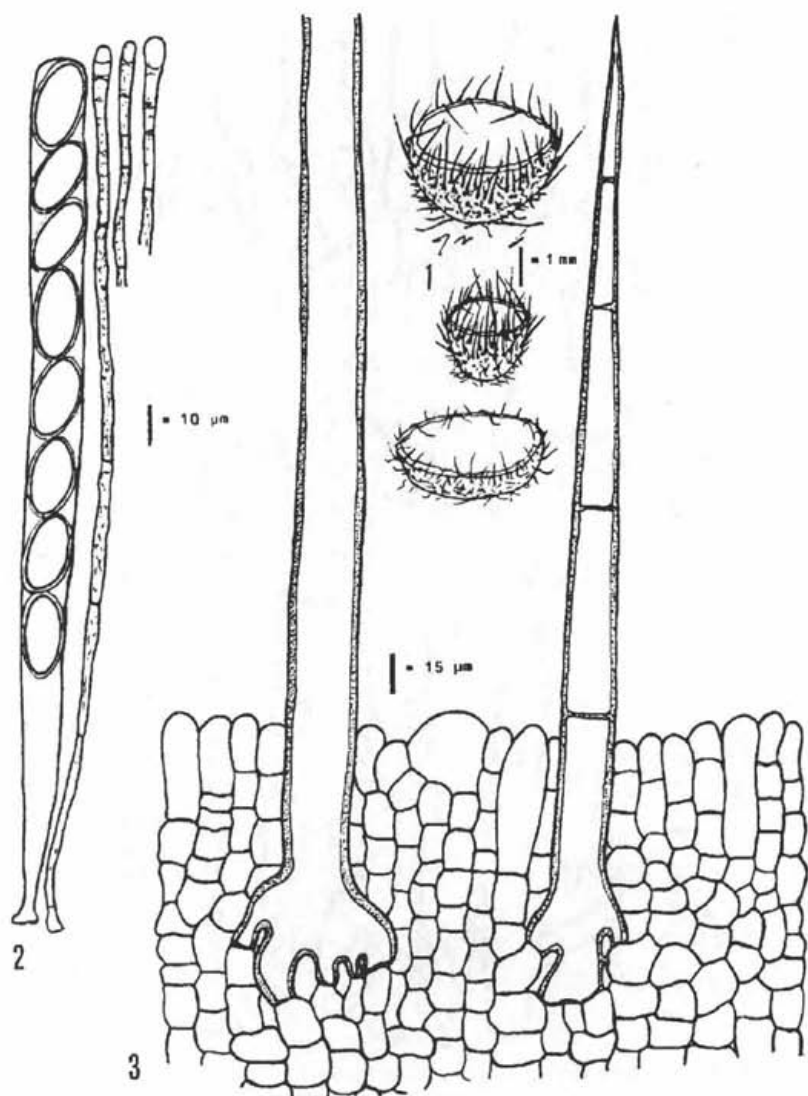
- = *Lasiobolus stercoreus* (Pers.: Fr.) Karsten, Acta. Soc. Fauna Fl. Fenn. 2: 122, 1885.
- = *Scutellinia stercorea* (Pers.: Fr.) Kuntze, Rev. Gen. Plant. 2: 869, 1891.
- = *Humariella stercorea* (Pers.: Fr.) J. Schroeter, Kryptog. Fl. Schles. 3 (2): 37, 1893.
- = *Patella stercorea* (Pers.: Fr.) Seaver, N. Amer. Cup-fung., (Operc.) 169, 1928. (Non *Patella stercorea* Weber in Wiggers, Prim. fl. holsat. 106, 1780 - nomen superfluum pro synonymo *Elvela lentiformis* Scopoli, Fl. carniol., ed., 2: 481, 1772, nomen dubium.)
- = *Peziza ciliata* Bulliard, Herb. France, pl. 438, fig. 2, 1790; Bulliard, Hist. champ. France 275, 1791. (Non *Peziza ciliata* Hoffmann, Veg. crypt. 2: 25, 1790).
- = *Cheilymenia ciliata* (Bull.) Maas Geesteranus, Proc. Kon. Ned. Akad. Wetensch. 72C: 313, 1969.
- = *Peziza scubalonta* Cooke et Gerard apud Cooke, Grevillea 4: 92, 1875.
- = *Lachnea scubalonta* (Cooke et Gerard ap. Cooke) Saccardo, Syll. fung. 8: 179, 1829.
- = *Scutellinia scubalonta* (Cooke et Gerard apud Cooke) O. Kuntze, Revis. Gen. pl. 2: 869, 1891.
- = *Humaria stercorea* var. *aurantiaco-flava* Fuckel, Jahrb. Nassauischen, Vereins Naturk. 27-28: 64, 1873.
- = *Humaria alpina* Fuckel, Fungi Rhen. exs. No. 2687, 1874; Jahrb. Nassauischen Vereins Naturk. 29-30: 32, 1875.
- = *Peziza alpina* (Fuck.) Cooke, Mycographia, 81. pl. 38, fig. 148, 1876 (non *Peziza alpina* Sauter, Mitt. Ges. Salzburger Landensk. 18: 105, 1878).
- = *Humaria stercorea* var. *alpina* (Fuck.) Quelét, Enchir. fung. p. 286, 1886.
- = *Lachnea alpina* (Fuck.) Saccardo, Syll. fung. 8: 180, 1889.
- = *Scutellinia alpina* (Fuck.) O. Kuntze, Revis. gen., pl. 2: 869, 1891.
- = *Cheilymenia alpina* (Fuck.) Boudier, Hist. classific. discomyc. Europe 63, 1907.
- = *Peziza fulvescens* Nylander, Not. Sällsk. Fauna Fl. Fenn. Förh. 10: 20, 1869.
- = *Humaria fulvescens* (Nyl.) Karsten, Acta Soc. Fauna Fl. Fenn. 2: 121, 1885.
- = *Lachnea fulvescens* (Nyl.) Saccardo, Syll. fung. 8: 183, 1889.
- = *Scutellinia fulvescens* (Nyl.) O. Kuntze, Revis. gen. pl. 2: 869, 1891.
- = *Cheilymenia fulvescens* (Nyl.) Boudier, Hist. Classific. Discomyc. Europe, p. 63, 1907.
- ?= *Humaria stercorea* var. *glacialis* Rehm, Ascomyceten, No. 506. 1879, Ber. Naturhist. Vereins Augsburg 26: 122, 1881.
- ?= *Lachnea stercorea* var. *glacialis* (Rehm) Saccardo, Syll. fung. 8: 183, 1889.

Species typica generis *Cheilymenia* Boud. sectio *Cheilymenia*. Apothecia 0.5 - 3.5(-4.5) mm diam, sessilia, orbicularia, convexa, usque leniter patellaria, hymenio vitellino, aurantiaco vel aurantiaco-rubro, rare fulvo, pars externa apothecii pilis stellatis (asteropili) ad marginemque setis longis, 140-1200 × 10-30 μm, crasse

tunicatis, basi radicatibus (et 30–45 (–70) μm crassis) obsita. Limbus marginalibus e cellulis parvis, prismaticis, in seriebus verticalibus ordinatis. Excipulum externum textura globuloso-angularis, excipulum internum textura subintricata. Paraphyses filiformes apice sensim incrassatae. Asci octosporae, non amyloideae. Ascosporae ellipsoideae, subluteolae, 16–22.5 (–24) \times (8–)9–12(–12.5) μm , perisporio separabili, laevi vel sublaevi, saepe maculis et striis irregularibus cyanophilis instructae. Habitat: Ad excrementa vaccina (in cumulo stercoris), equina, cervina, capreolina, cuniculina, leporina etc., rare ad terram stercoratam et in sedimentis stercoratis.

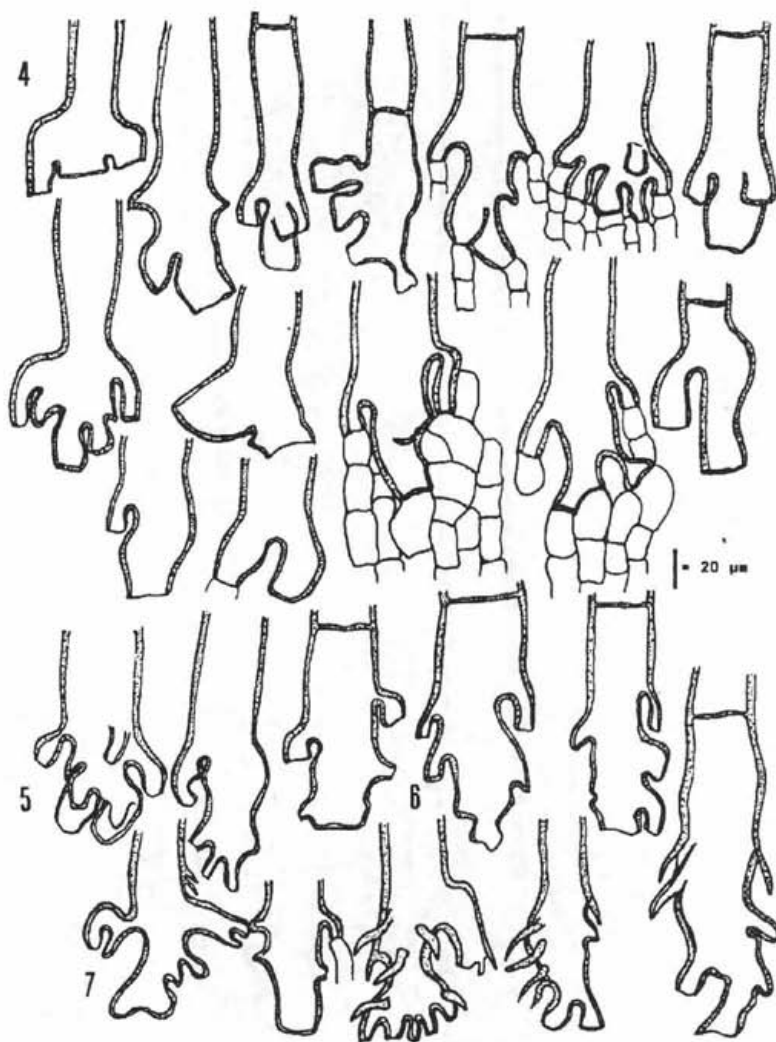
'Prototypus': Suecia, Sudermania: Mariefred, prope Karlsborg in fimo vaccino, 7. VI. 1938 leg. Th. Arvidsson (ut *Cheilymenia* sp.) – neotypus in herbario Mus. Botan. Stockholm (S) asservatur, det. J. Moravec.

Apothecia scattered or gregarious, 0.5–3.5(–4.5) mm in diam., sessile, at first subglobose to shortly concave with long hairs closing the hymenium, becoming shallowly cupulate to irregularly discoid with an undulate elevated margin, the margin forming a slightly crenulate collarete. Hymenium egg-yellow, orange to orange-red, rarely yellowish, external surface concolorous but appearing brownish from apothecial hairs which covert the external surface whilst the margin is bordered by long, rooting, rigid marginal hairs. Hairs of several (but of two main) types: (a) Rooting, marginal, bristle-like hairs 140–700(–1020) \times 10–18–24(–30) μm , straight, rigid, apex blunt or usually acuminate, yellow-brown with dark reddish-brown walls, (the walls 2.5–3.5(–5.5) μm thick), septate, rarely aseptate, with a wide, compact, usually elongated, rooting, 30–45(–70) μm wide base; the base may be simple, conically shortly attenuate (coffin-like), but more often with several small hooked roots regularly or very irregularly distributed on both sides of the elongated base (harpoon-like shape), or with many small irregularly furcate roots (coralloid), or the base may also be shorter, wide and widely rooting having 1–3 wide hooked roots and usually many smaller ones; (b) the excipular hairs often stellate (asteropili), yellow-brown to reddish-brown, 2–6 rayed; the arms usually acuminate, septate or aseptate, 35–160(–180) \times 6–14 μm , with walls 1–3 μm thick, originating from superficial polygonal cells of the ectal excipulum. Besides these two types of hairs, also superficial, simple or bifurcate, straight or flexuous, thick-walled, yellowish hairs are present towards the base of the ectal excipulum, where copious hyaline, septate hyphae are commonly present. Excipulum clearly differentiated into two distinct layers: ectal excipulum of textura angularis, composed of one or two or more layers consisting of polygonal, subcuboidal, elongated, subhyaline cells, 16–45(–70) μm diam. which are larger and subglobose near the base of the apothecia, becoming smaller, elongated and regularly arranged in vertical rows (textura prismatica) towards the margin of the apothecia (as seen from the outside of the apothecia), forming the marginal collarete; medullary excipulum of textura subintricata composed of irregularly arranged hyphae which



Figs. 1-3. *Cheilymenia stercorea*: 1. apothecia; 2. ascus and paraphyses; 3. texture of marginal part of excipulum with rooting hairs seen from outside ('prototype', S).

are 4-11 μm wide, septate, mixed with small, inflated, elongated or lobed cells. Subhymenium of smaller, irregular cells and hyphae. Asci 180-240 × 11-14 μm, cylindrical, eight-spored, non-amyloid, gradually narrower at the base, rounded to obtuse above. Ascospores ellipsoid, uniseriate, 16-22(-24) × (8.5-)9-12(-12.5) μm, without guttules, with a yellow refractive colour when stained with cotton blue in lactic acid (CB), with a loosening perispodium which is nearly smooth, or with



Figs. 4-7. Base of marginal rooting hairs: 4. *C. stercorea* f. *stercorea* ('prototype', S); 5. *f. alpina* (isotype, K); 6. *f. alpina* (syntype, S); 7. *f. stercorea* (Bohemia, Branžč, J. Moravec).

only occasional spots, or occasional irregular, mostly transverse and incomplete cyanophilic striation (CB). Paraphyses filiform, septate, straight, 3-3.5 μm thick, with apex slightly enlarged to 3.5-6 μm , containing orange granules.

Habitat: on dung, mostly of cow (also manure) and horse, but also on pellets of rabbit, hare, deer, goats, roe, etc., rarely on manured soil.

f. alpina (Fuck.) comb. nov.

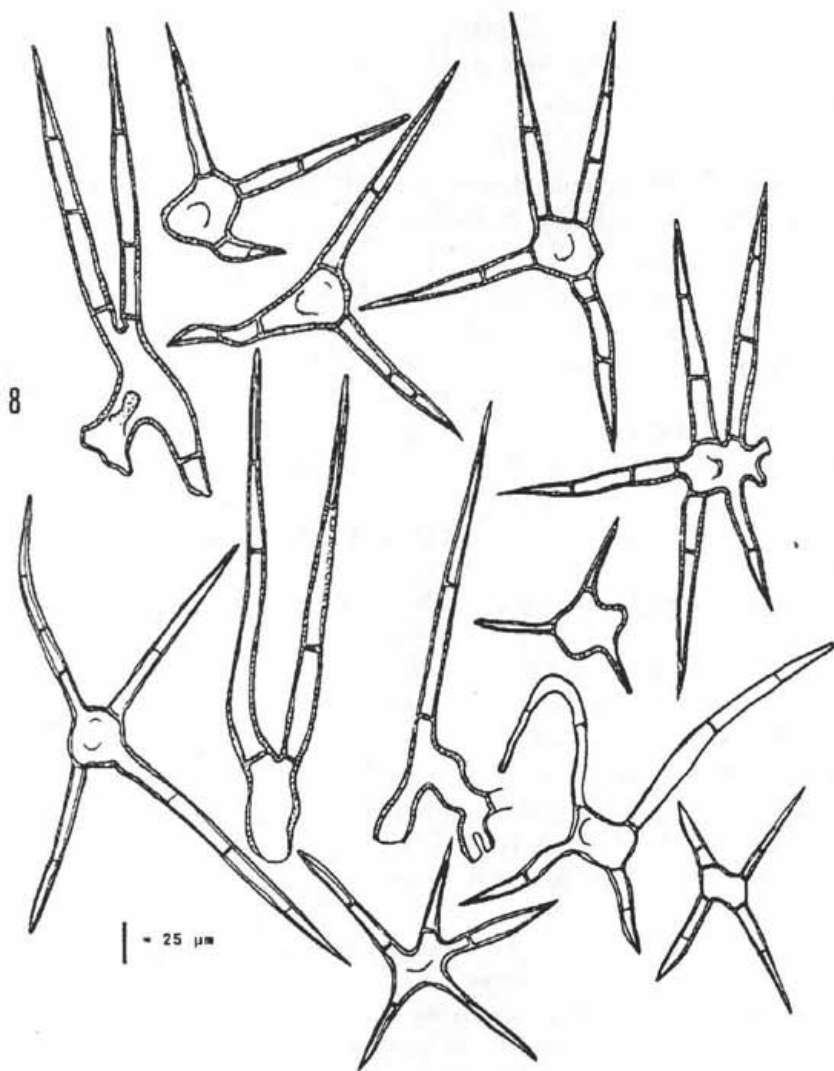


Fig. 8. *C. stercorea*: stellate hairs ('prototype', S).

Basionym: *Humaria alpina* Fuckel, Fungi Rhen. exs. No 2687, 1874; Jahrb. Nassauischen Vereins Naturk. 29-30: 32, 1875.

= *Humaria stercorea* var. *aurantiaco-flava* Fuckel, Jahrb. Nassauischen Vereins Naturk. 27-28: 64, 1873 (an illegitimate protonym).

This differs especially by slightly smaller ascospores, $15-19.5(-21.5) \times (7.5-8-10.5(-11)) \mu\text{m}$ diam., and usually by smaller apothecia with a more reddish tinge of the hymenium.

Distribution: Cosmopolitan, known from Europe, North and South America, Asia, Australia, Oceania (New Zealand), Africa (Madagascar).

Material examined:

[f. *stercorea*]:

'Prototype': Sweden: Södermanland, Mariefred, S.W. of Karlsborg, on cow dung, 7.VI. 1938, leg. Th. Arvidsson, det. J. Moravec (S).

Other material revised:

Sweden: Gotland, Näs par., on old cow dung, 14. V. 1993 leg Bengt Petterson, det. J. Moravec (UPS); Västerbotten, Umeå, in fimo vaccino, VII. 1905, leg. J. Vleugel, det. J. Moravec (S); Östergötland, Skedevi s:n, Rejmyra, 9. V. 1868, leg. H. von Post, rev. J. Moravec (S, associated with *C. gemella*).

Czech Republic: Bohemia bor., Branžež (distr. Mladá Boleslav), ad excrementa vaccina, 20. III. 1967, leg. J. Moravec (herb. J. Mor.); Bohemia sept., Krkonoše Mt., Vítkovice ap. Jilemnice, sub via Vítkovice – divortium Rezek-Jestřabí, ad excrementum cervinum, 5. VIII. 1984, leg. F. Kotlaba, det. J. Moravec (herb. J. Mor.).

Slovakia: Spišská Magura Mt., prope Ždiar, 1000 m, on deer dung, 21. IX. 1967, leg. J. Moravec (herb. J. Mor.). Slovakia bor., Mt. Velká Fatra, ad fimis vaccinis accumulatis, 22. X. 1983, leg. L. Hagara, det. J. Moravec (herb. J. Mor.); Slovenské Rudohorie Mt., ad excrementa cervina in silva, leg. E. Záhorovská, det. J. Moravec (herb. J. Mor.).

Finland: EH, Janakkala, Koljala, Suursuo, hirven lannalla, 2. IX. 1982, leg. K. Karttunen (H); Fennia, Tavastia australis, Tammela, Mustiala, ad fimis vaccinis, 18. IX. 1868, leg. et det. P. A. Karsten (H ex herb. P. A. Karst. No. 3532); *ibid.*, No. 3530 H); Tavastia australis, Hollola, on a mass of soil, 25. V. 1863, J. P. Norrlin 96 (H, type of *Peziza fulvescens* Nyl.).

USA: Ohio, on dung, 1903, leg. Lloyd, det. J. Moravec (S); Catskill Mts., on horse dung, no date (type of *P. scubalonta*, K).

New Zealand: Orongorongo Valley near Wellington, on cow dung, 22. II. 1973, leg. et det. A. Bell (WELTU 36); *ibid.*, 6. II. 1970; *ibid.*, 4. IX. 1970 (WELTU); Ohariu Valley Rd., on cow dung, 16. IX. 1980, leg. A. Bell (WELTU 315); *ibid.*, 17. IX. 1980 (WELTU 317); Wainuiomata Road near Wellington, on cow dung, 5. VIII. 1971, leg. A. Bell (WELTU 93); *ibid.*, 24. VI. 1971 (WELTU 99).

[f. *alpina* (Fuck.) J. Mor.]:

Type: Austria, ca. St. Moritz, ad fimum vaccinum putridum, aestate – ex herb. C. E. Broome 2687 – isotype of *H. alpina* Fuck. (K); syntype (S). Switzerland, Oberhalb Vilters bei Ragatz, auf Kuhmist, ex herb. Fuckel et Barbey-Bossier 1339 – syntype of *H. stercorea* var. *aurantiaco-flava* Fuck.(S).

Other material revised:

- Czech Republic: Bohemia bor., Branžej (distr. Mladá Boleslav), ad excrementa vaccina, 20. III. 1967, leg. J. Moravec (herb. J. Mor.); ditto, 14. IV. 1967, leg. J. Moravec (herb. J. Mor.); Bohemia centr., Mnichovice-Božkov, in fimo vaccino vetusto, 20. X. 1928, leg. et det. J. Velenovský (ut *Cheilymenia gemella*), det. J. Moravec (PRM 147250); Silesia, Hrubý Jeseník Mt., in silva virginea infra "Ovčárna", in valle rivi Bílá Opava, ad excrementa cervina, 3. IX. 1969, leg. M. Svrček, det. J. Moravec (PRM 684917).
- Slovakia: Nízke Tatry Mt., Kráľova hola, ad excrementa vaccina, VII. 1989, leg. J. Moravec (herb. J. Mor.); Nízke Tatry Mt., Magurka, ad excrementa cervina, 9. VIII. 1948, leg. J. Kubička, det. J. Moravec (PRM 622908).
- Finland: Ka, Vehkalahti, Pyhäntö, älgexkrementer i tät granskog mellan Heinäniemi och Saarainen, m. rikl., 14. VIII. 1979, leg. L. Fagerström, det. U. Söderholm (H); EH, Lempäälä, Hietaniemi, ruudun Lempäälän puolisesta kulmasta, dung of *Odocoileus virginianus*, Peuran kasasta, leg. P. Salo 325, 6802:322 (H); Fennia, Nylandia, Helsingfors, Mjölö, leg. et det. W. Nylander (H); N. Borga lk. Liip-Pellinge, Tärnäs S. millimeterlänge ljust orangefärgade "tappar" på gamla älg (hirvi-) exkrementer, 15. V. 1977 leg. G. Kvist, det. J. Moravec (H).
- Germany: Distr. Brandenburg, Königswusterhausen, margin of a meadow near Märkisch-Buchholz, on old cow dung, 3. VII. 1993, leg. et det D. Benkert (herb. J. Mor.).
- India: Khilluama-Gulmarg bridle path, J&K., 25. VI. 1967, leg. K. S. Waraith, det. K. S. Thind & K. S. Waraith (herb. J. Mor. ex U.S.D.A.P.L. 480 Project-Fungi, No. 2211).
- Nepal: Ghorapani, on cow dung, 6. VI. 1992, leg. J. Moravec (herb. J. Mor.).
- Chile: Prov. Valdivia, Piedra Blanca, on cow dung in an open field, 14.IX.1940, leg. R. Santesson, det. N. Lundqvist (UPS, associated with *C. coprinaria*).

The 'prototype' of *C. stercorea* consists of about 60 apothecia scattered or aggregated on several fragments of old cow dung. The marginal rooting hairs are well developed especially in young apothecia, possessing the outstanding shape of the base which is described and illustrated in this paper. The majority of (particularly old) apothecia of this Swedish collection possess mostly shorter and feebler hairs having the rooting base less compact and less elongated. The stellate hairs (asteropili) of the external surface of the apothecia of the 'prototype' are well developed and abundant in each apothecium examined. The ascospores measure 18-22(-24) × 8-10.5-12 μm. The features of the 'prototype' are well within the range of variability of the typical form of this type species. The ascospores, marginal hairs (though variable), stellate excipular hairs and all other features agree well with the concept of the species in Cooke (1879), Boudier (1907), Seaver (1928), Svrček (1948), Le Gal (1953), Denison (1964), Rifai (1968), J. Moravec (1969, 1990),

Gamundí (1975), Otani (1973), Breitenbach and Kränzlin (1984), and others. Some of the cited authors stated the ascospore size as in f. *alpina*.

C. stercorea is a species possessing stellate apothecial hairs. However, in some collections we can find apothecia which are without these stellate hairs or the hairs are very rare. Nevertheless, when we can examine a greater number of apothecia in individual collections, we usually find at least one apothecium bearing stellate hairs, which seem to be more common in mature and larger apothecia. The stellate hairs may be absent especially in immature or small apothecia or in apothecia developed in higher altitudes under low temperatures. Usually we can recognize *C. stercorea* also by the shape of the outstanding base of the rooting marginal hairs. However, the base may not be elongated and not so compact, but merely shortly rooting, when the apothecia are old or developed under stress of poor conditions, and there are several collections (including the 'prototype') where the stellate hairs are common but the base of the marginal hairs is often not so outstanding.

Although the majority of collections bear relatively constant features, certain variability is seen. A variable feature is also the ascospore size of *C. stercorea*.

The type (syntype) of *Humaria stercorea* var. *aurantiacoflava* Fuck. has ascospores measuring $(15-16-19.5 (-21) \times (8-9-10.5 (-11)) \mu\text{m}$ with smooth perispodium and apothecial hairs well developed. The type material of *Humaria alpina* Fuck. ex Herb. C. E. Broome 2687 (K) consists of two apothecia on cow dung, one of them released from the substrate. Stellate hairs are present but asci and paraphyses were not seen. The other (syntype) collection from Fuckel's herbarium No 1896 ex herb. Barbey-Bossier is conspecific with *C. stercorea* too. The apothecia have copious stellate hairs and the ascospores measuring $16-19.5 \times 8-10 \mu\text{m}$.

There are many collections (besides those of the type material of var. *aurantiacoflava* and *H. alpina*) in which the ascospore size also does not exceed $19.5(-21) \times 10.5 \mu\text{m}$ whilst the ascospores of many collections (including the 'prototype') reach up to $22 \times 12 \mu\text{m}$, (or even up to $24 \times 12.5 \mu\text{m}$ when they are developed in asci with a reduced number of ascospores). Because all other features are identical with *C. stercorea*, I consider such a slight difference in the ascospore size as a variability in the range of the species only. However, we can possibly recognize an infraspecific taxon, but in my opinion merely a form, represented by *H. alpina*, based on the protonym *C. stercorea* var. *aurantiacoflava*. After the examination of the type and other material, it is possible to say that besides the slightly different ascospore size, also the apothecia of the f. *alpina* are usually smaller, more reddish and possess usually (but not always) darker, better developed marginal rooting hairs with an elongated, compact base, and all these features including the ascospore size correspond well with the original diagnoses.

Therefore, I have designated the 'prototype' for *C. stercorea* not only because it comes from the country of Persoon, but also because of the ascospore size is different (though slightly) from that of Fuckel's variety and *H. alpina*. The ascospore

size of the 'prototype' of *C. stercorea* corresponds well with that stated by Cooke (1879).

One of the most distinct collections is that of the holotype of *C. stercorea* var. *glacialis* Rehm 1881. The apothecia lack stellate hairs and also the marginal hairs are atypical for *C. stercorea*. Some of them resemble those of *C. stercorea* and the ascospores of this collection are similar in the size and character to *C. stercorea* too. Consequently, var. *glacialis* is still supposed here to be a form of *C. stercorea*, as already proposed in J. Moravec (1990a). However, the type material is too scanty for any taxonomic result.

The type of *L. stercorea* var. *microspora* Kanouse (1938) differs, however, by much smaller ascospores and is identical with *C. parvispora* described below.

C. stercorea var. *gemella* Karst. is a good species, *Cheilymenia gemella* (Karst.) J. Moravec 1990a, belonging to the section *Villosae* J. Mor. Besides the type material, I have examined several other also more recent collections from Finland and Sweden, and on the copious well-preserved apothecia we can see that *C. gemella* is a very outstanding species. It is therefore surprising that except for the original diagnosis it has escaped notice by recent mycologists (particularly perhaps because of an erroneous consideration of its identity with *C. stercorea*). *C. gemella* is well recognisable by its very conspicuous, large, orange-yellow apothecia with short, villose, mostly flexuous, pale hairs densely to sparsely distributed on the margin and external surface. The margin appears villose.

A reexamination of the type of *Peziza fulvescens* Nylander (1869) has confirmed Schumacher's (1988) opinion that this taxon is identical with *C. stercorea*. The collection is remarkable by its occurrence on soil (about five apothecia 2-3 mm diam. on a mossy mass of substrate (manured soil ?). However, the ascospores are of the same type as those of *C. stercorea*, 17-21.5(-24) \times 9-12 μ m, smooth, and stellate hairs are commonly present.

The type of *Peziza scubalonta* Cooke et Ger. apud Cooke (Grevillea 4: 92, 1875) falls within our concept of *C. stercorea*, although the stellate hairs have shorter arms (see also Denison 1964). The ascospores measure 16-23 \times 10-12.5 μ m.

2. *Cheilymenia parvispora* J. Moravec spec. nov.

Syn. *Lachnea stercorea* var. *microspora* Kanouse, Pap. Michigan Acad. Sci. 23: 152, 1938.

Apothecia 0.5-1.5(-2.5) mm diam., solitaria, orbicularia, sessilia, carnosa, primum leniter convexa usque leniter patellaria, marginemque elevato limbata, limbus marginalis crenulatus. Hymenio pallide luteolo-ochraceo vel aurantiaco, pars externa apothecii pilis stellatis, margine setis rigidis, longis, brunneolis obsita. Pili marginales recti, rigidi, 180-800 (-1150) \times 22-45 μ m, crasse tunicati [tunica 1.5-4.5(-6) μ m crassa], apice acuminati, basi saepe attenuati et truncati, 35-70 μ m

crassi, radicati vel multiradicati, partim etiam pili superficiales simplices vel stellati (asteropili), 2-6 ramosi, septati, luteo-fusci vel rubro-fusci. Excipulum externum textura globuloso-angularis, limbus marginalibus e cellulis parvis, prismaticis in seriebus verticalibus ordinatis, clavato-terminatis instructus. Excipulum internum (medulla) textura subintricata usque intricata, e cellulis prismaticis, globosis, hyphis septatis mixta. Asci cylindracei, 120-185 \times 9-10.5 μm , octospori, non amyloidei. Ascosporeae 10.7-13.4 \times 6-7.3 μm , ellipsoideae, eguttulatae, perisporio laevi vel sublaevi. Paraphyses filiformes, 3 μm crassae, apice sensim incrassatae (4-5 μm), granulis luteolis impletae.

Habitat: In fimo alcis.

Holotypus: Finlandia, Tavastia australis prope Korpilahti, in firmis speciei *Alces alces* in silva conifera, 20. VIII. 1986 leg. Nils Lundqvist No 16127 c. Holotypus in herbario Mus. Botan. Stockholm (S) asservatur.

Apothecia 0.4-1.5(-2.5) mm in diam., sessile, at first slightly concave, becoming shallowly cupulate to discoid, with an elevated margin; the margin of mature apothecia seen as a slightly crenulate collarette. Hymenium pale ochraceous to pale yellowish orange, external surface concolorous, covered by brownish hairs. Hairs of several, but two main types: (a) rooting marginal hairs 180-800(-1150) \times 22-45 μm of the same colour and type including the base as described above for *C. stercorea*; (b) excipular hairs also of the same type and shape as those of *C. stercorea*. The arms of the copious stellate 2-6 rayed hairs are usually very long (80-240 μm) and often acuminate. The excipulum sharply differentiated; ectal excipulum similar to that of *C. stercorea*, the cells 15-45-70 μm diam., the medullary excipulum of textura subintricata but mostly of textura intricata consisting of hyphae 4-10 μm wide. Asci 120-180 \times 9-10.5 μm , cylindrical, eight-spored, rounded to truncate above, gradually narrowed at the base, non-amyloid. Paraphyses filiform 3-4.5(-6) μm wide, apex slightly enlarged, 3-4.5(-6) μm , containing subhyaline to yellow granules. Ascospores 10.7-13.4 \times 6-7.3(-8.3) μm , with a yellow refractive colour when stained with CB in lactic acid, with a loosening smooth perispore.

Habitat: on elk dung (in North Europe) and on a dung similar to a deer or moose animal (in North America).

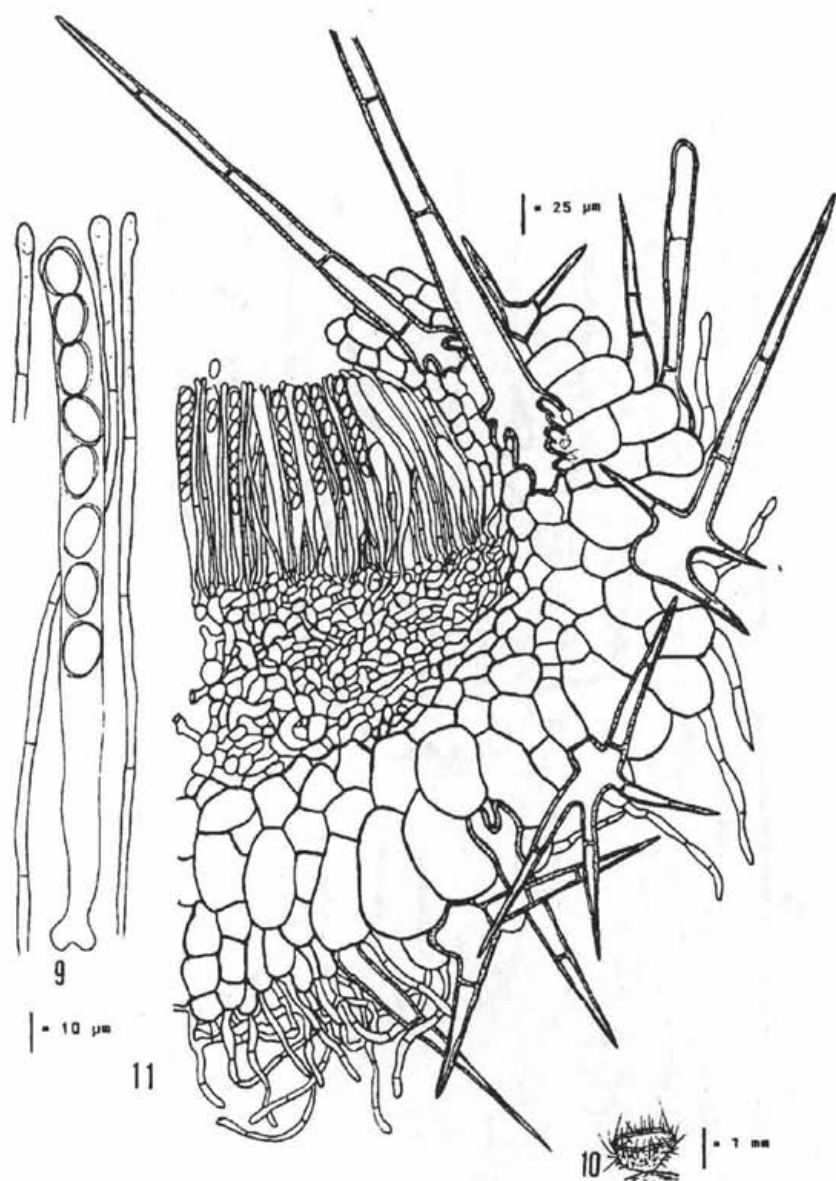
Distribution: Boreal zone of Europe - Finland, Estonia, and North America.

Material examined:

Holotype: Finland, Tavastia australis, Korpilahti, par. outside of Vaarunvuoret Nat.

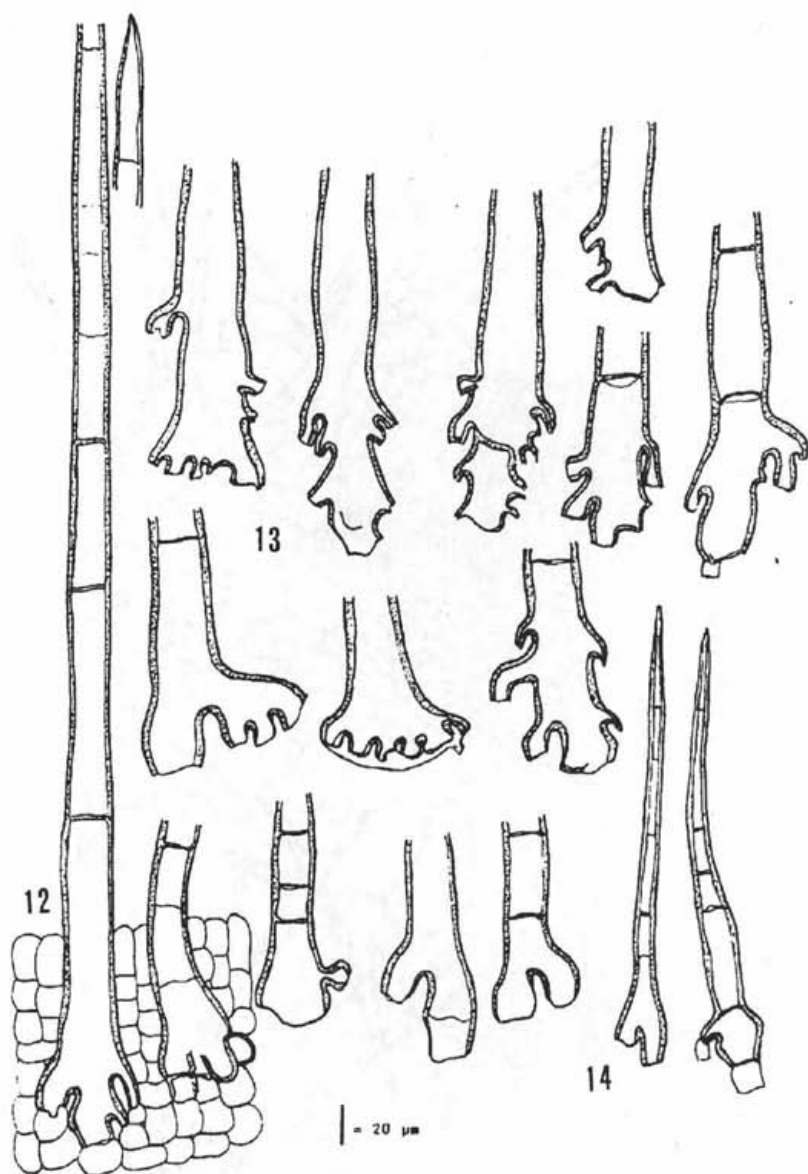
Res. at Korospohja Bay, S of Lake Särkijärvi (=14 km SE Korpilahti), on elk dung (*Alces alces*) in coniferous forest, 20. VIII. 1986 leg. Nils Lundqvist No 16127 c (S).

Paratypes: Finland: EH. Hatula, Vuohiniemi, NE of Pitkälampi- on dung of elk in spruce wood, 11. VIII. 1979 leg. Pertti Uotila 28582, det. J. Moravec, (paratype



Figs. 9-11. *C. parvispora*: 9. ascus and paraphyses; 10. apothecium; 11. medial section of margin (holotype, S).

H); U. Sipoo, Hindsby - Östersundom, Helgräsk Saniaiskorven reuna, OMT-kangas (*Acer, Betula, Corylus, Picea, Pinus*), Kostea sammaliko, Ulostepapanoilla *Alces alces*, 30. VIII.1987 leg. Reima Saarenoksa 2347, det. J. Moravec (paratype H).



Figs. 12-14. *C. parvispora*: 12. texture of marginal part of excipulum and rooting hairs as seen from outside; 13. base of marginal rooting hairs; 14. hairs of ectal surface of excipulum (holotype, S).

Estonia: Pine-spruce forest near Surju, on elk dung, 28. VIII.1989 leg. D. Benkert (ut *C. ciliata*), det. J. Moravec (paratype BHU).

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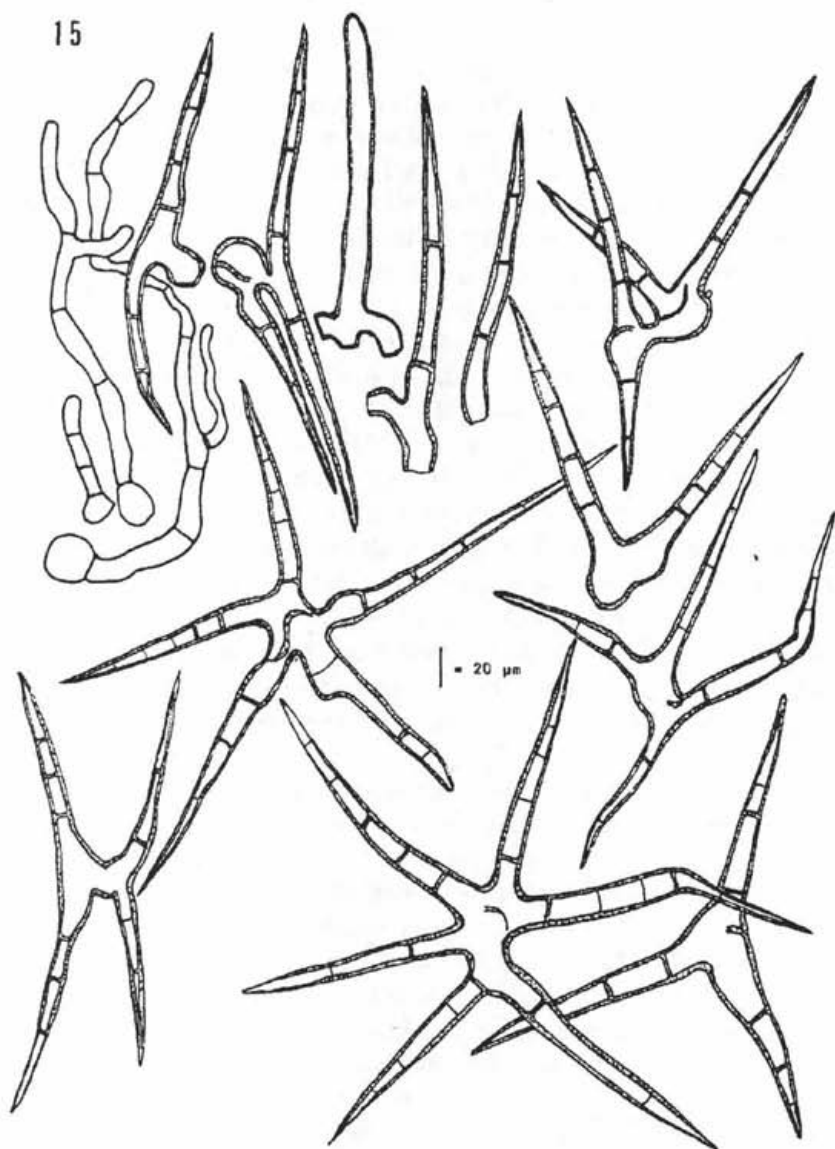


Fig. 15. *C. parvispora*: hyphae and stellate hairs (holotype, S).

USA: Michigan, Halbert, on dung, 27. VIII.1933 leg. E.B. Mains and A.H. Smith (MICH 33-522, holotype of *Lachnea stercorea* var. *microspora* Kanouse).

The colour of fresh apothecia of *C. parvispora* was not annotated in either the holotype or the two other Finnish collections, but it was probably pale yellowish. The hymenium of the Estonian collection from BHU was stated to be orange.

Also Kanouse (1938), who described this species as a variety, *C. stercorea* var. *microspora*, has written that it agrees in all features with *C. stercorea* except ascospore size. *C. parvispora* is really very similar to *C. stercorea* and other species of the section, but differs especially in ascospore size. The ascospores of *C. parvispora* are much smaller and never reach even the size of the smallest ascospores of *C. stercorea*. Ascospore size of this new taxon is surprisingly constant in all individual collections examined by me. Also, the more definite structure of *textura intricata* of the medullary excipulum of *C. parvispora* seems to represent another (though slightly) distinct feature. It is very significant that several other stellate-setose species exist in the genus *Cheilymenia* (and one species now also in the genus *Scutellinia*), each of them having similar, but also importantly distinct features. It appears from the above that *C. parvispora* is a good species well separated from *C. stercorea* and from *C. pallida* (see below). Moreover, the new species is known from Finland, Estonia, and North America where *C. stercorea* also occurs. It is interesting that *C. parvispora* is confined on elk excrements in the boreal zone of Europe. The only American collection (*C. stercorea* var. *microspora* Kanouse) was collected on dung without exact determination of an animal, but it resemble dung of deer or moose. At first I compared and considered *C. parvispora* to be identical with *C. pallida* Bell et Dennis as I found stellate cells and hairs in the excipulum of *C. pallida*, too. However my further studies of *C. pallida* in New Zealand has revealed that it is a well-separated species of the series *Pallidac*.

3. *Cheilymenia asteropila* J. Moravec, Mycotaxon 37: 463, 1990.

For a detailed description, illustration and specimens examined see J. Moravec (1990a).

This species is known from three collections from three different places in central and northern Bohemia which were made in October to November 1968 only.

C. asteropila differs from *C. stercorea* especially by smaller ascospores which measure $(13.5-14-16(-16.5) \times (7.2-8-9(-9.4)) \mu\text{m}$, bearing a perisporium covered by fine but conspicuous cyanophilic warts, well shown also in SEM photomicrographs, by bright yellow to egg-yellow flattened apothecia of a terrestrial habitat (the apothecia were collected on mossy soil in a garden, on mossy soil of a forest path, and on soil near a burnt place). The marginal collarette of the apothecia of *C. asteropila* is lower and not as conspicuous. These features easily separate it from all other species of the section *Cheilymenia*.

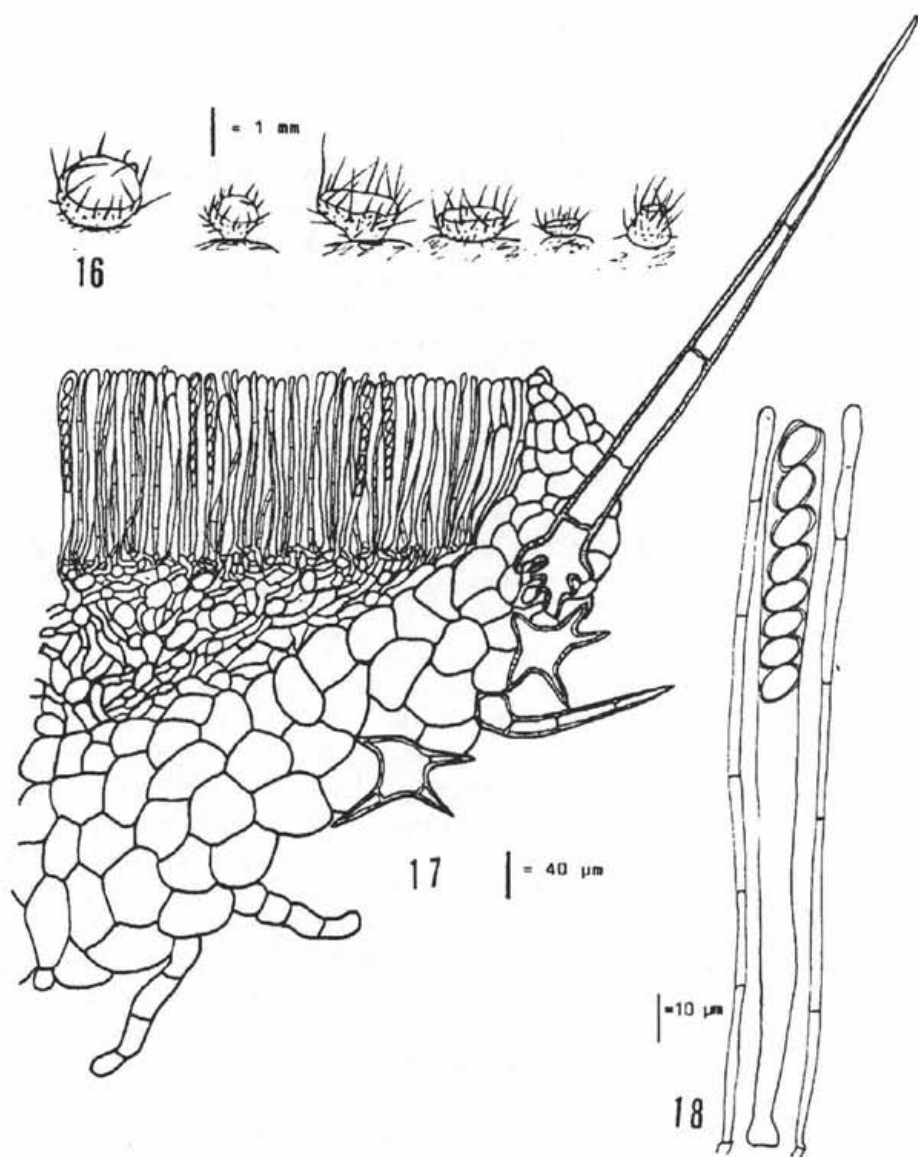
C. asteropila differs also from *Scutellinia crucipila* (Cooke et Phill. in Cooke) J. Mor., a species with apothecia also possessing stellate hairs which has been considered to be a species of *Cheilymenia* by many recent authors. It was transferred to the genus by Le Gal (1953) as *Cheilymenia crucipila* (Cooke et Phill. in Cooke) Le Gal. It differs by shorter and paler hairs and by larger ascospores. The ascospores of *C. crucipila* possess a loosening perisporium covered by much

coarser warts and crests which are larger, and higher especially at the ascospore poles. Such ornamentation represents a typical ornamentation of species of the genus *Scutellinia*. Moreover, the mature ascospores lack a yellow refractive colour when stained with CB in lactic acid. Based on these features *Peziza crucipila* was transferred to the genus *Scutellinia* (Moravec 1984), and the generic concept was accepted by Schumacher (1990). *S. crucipila* has been placed in the section *Minutae* Svrček 1971 of the genus *Scutellinia* (Moravec 1984; Schumacher 1990). The species of *Scutellinia* of the section *Minutae* possess ascospores bearing a loosening perisporium (first mentioned in *Scutellinia* by Svrček et Moravec 1969), resembling that of ascospores of *Cheilymenia*. This indicates the very close relationship between *Scutellinia* and *Cheilymenia*, as was discussed by J. Moravec (1984, 1989, 1990b) and by Schumacher (1990).

Series b.) *Pallidae* J. Moravec, Mycotaxon 38: 486, 1990a.

4. *Cheilymenia pallida* Bell et Dennis, Trans. Brit. Mycol. Soc. 57: 180, 1971. (Non *Cheilymenia pallida* Arnolds, Bibliotheca Mycol. 90: 466, 1982 - illegitimate homonym).

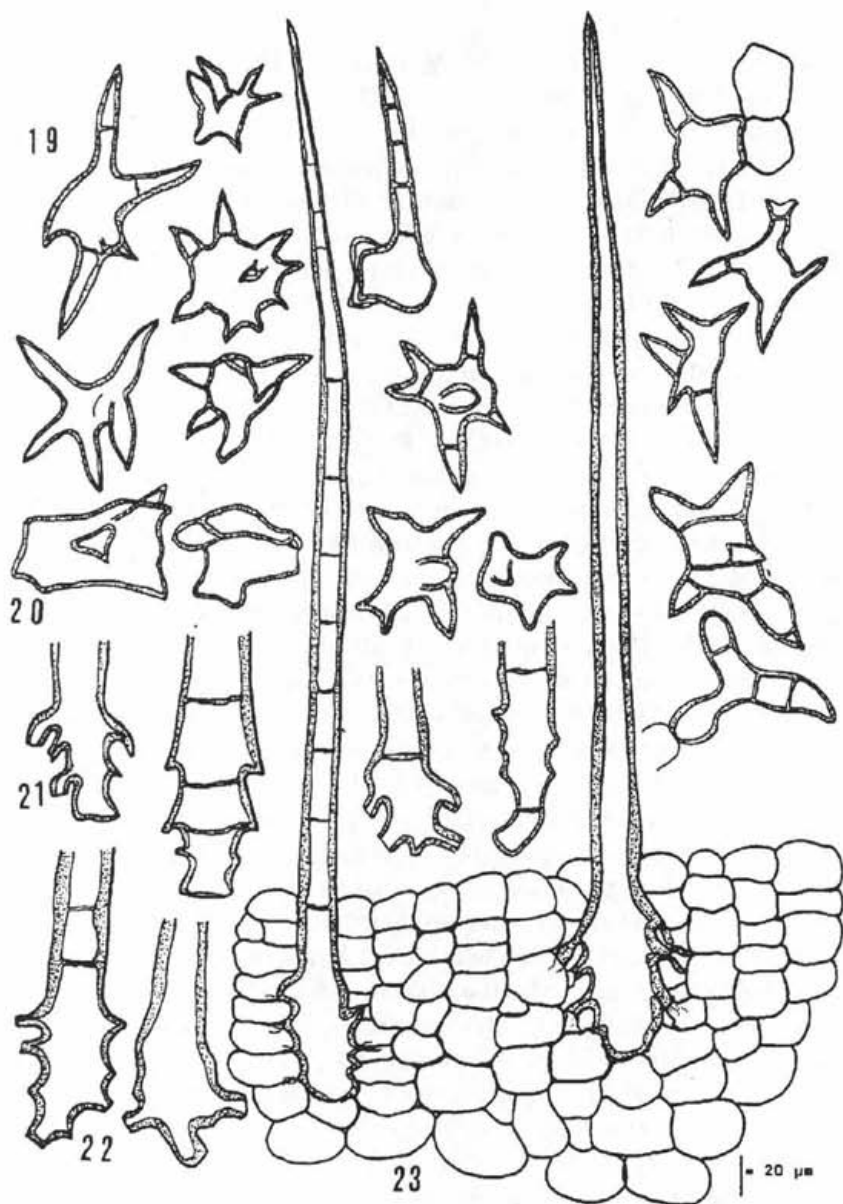
Apothecia scattered to gregarious, (0.6-)1.5-2(-3) mm diam., (usually not exceeded 2 mm), at first turbinate to convex with a flat hymenium, becoming very shallowly cupulate to saucer shaped, with an inconspicuous margin. Hymenium grayish-white, to whitish-buff, [shading to a light brownish tint (the colour coming from brownish hairs which cover the transparent apothecia from the outside of the excipulum)], on drying the hymenium becoming almost white; dried apothecia pale brownish; external surface covered by brownish hairs which are usually very long at the margin, rarely apothecia covered by shorter hairs. Rooting marginal hairs 180-800 × 25-40 μm, brown, septate, straight, acuminate, rigid, thick-walled, walls 1.5-5(-7) μm thick with outstanding elongated (harpoon-like), or wide (40-65 μm) rooting base of the same type and shape as that in *C. stercorea*. Excipular hairs of the external surface towards the base of apothecia are much simpler, superficial, rigid to hyphoid, arising from excipular cells; stellate hairs very rarely developed, seen in larger mature apothecia, appearing mostly as stellate thick-walled brownish 3-8 rayed cells (germs of stellate hairs) or rarely as completely developed 4-8-rayed stellate hairs having septate and aseptate 25-50 μm long arms. Excipulum clearly differentiated. Ectal excipulum of *textura angularis* consisting of subglobose or polygonal cells 20-60 μm diam., larger towards the base and smaller towards the margin of apothecia. Medullary excipulum of *textura subintricata* to *intricata*, consisting of irregular often inflated hyphae, which are mixed with small globose cells. Asci 120-185 × 8 μm, cylindrical, tapering to a narrower base and with a blunt apex, eight-spored, non-amyloid. Ascospores 8.5-10.7(-11.8) × 5.2-6.4(-7) μm,



Figs. 16–18. *C. pallida*: 16. apothecia; 17. medial section of margin; 18. ascus and paraphyses (Orongorong Valley, Dr. Mahoney, J. Moravec).

eguttulate, with a yellow refractive colour when stained with CB in lactic acid, bearing a smooth loosening perisporium. Paraphyses filiform, 3–4 µm wide, apex slightly enlarged to 4–5 µm, containing hyaline granules.

Habitat: on excrement of brush-tailed opossum (*Trichosurus vulpecula*).



Figs. 19-23. *C. pallida*: 19. stellate cells and stellate hairs (Orongorongo Valley, Dr. Mahoney, J. Moravec); 20. ditto (WELTU 209); 21. base of marginal rooting hairs (J. Moravec); 22. ditto (WELTU 209); 23. texture of marginal part of excipulum with rooting hairs seen from outside (WELTU 209).

Distribution: Antarctic zone, known only from New Zealand.

Material examined:

New Zealand: Orongorongo Valley near Wellington, DSIR Field Station, on opossum dung, 7. XI. 1970, leg. A. Bell (isotype, WELTU 56); *ibid.*, 16. III. 1971, leg. A. Bell (WELTU 70); *ibid.*, 16. III. 1993, leg. D. Mahoney et al. (herb. J. Mor.); DSIR Research Station, trap site 6075, on opossum dung, 19. III. 1971, leg. A. Bell (WELTU 67); Crawley Creek, near DSIR Field Station, 26. I. 1971, leg. et det. A. Bell (WELTU 63); Mt. Kaukau, on opossum dung, no date, leg. A. Bell (WELTU 209); Te Mimi Track, on opossum dung, 24. X. 1974, leg. et det. A. Bell (paratypus, WELTU 269).

C. pallida differs from *C. stercorea* and other species of ser. *Cheilymenia* especially in the absence of a marginal collaret of the apothecia and by the whitish hymenium. These features were important for the erection of the series *Pallidae* (J. Moravec 1990b). It differs also in the extremely small ascospores. Spore length usually does not exceed $11\ \mu\text{m}$, except that when ascospores develop in 4–6-spored asci, the length may reach up to $11.8\ \mu\text{m}$. The other features, particularly the type of marginal hairs (especially the shape of their base) correspond well with those of *C. stercorea* and the other species of ser. *Cheilymenia*. In the original description (Bell et Dennis 1971), the authors did not mention the stellate hairs. Such stellate hairs are only rarely present in apothecia of this species and were probably missing in the apothecia examined which were developed after incubation. However, in one collection (WELTU), I have found stellate cells (mentioned and illustrated in J. Moravec 1990b) resembling an early stage of stellate hairs. Finally, in March 1993, I had a rare opportunity to study specimens of *C. pallida* in the WELTU herbarium of the Victoria University of Wellington, New Zealand, and on one occasion even to examine copious fresh apothecia of *C. pallida* collected at the type locality by Dr. Dan Mahoney during a joint excursion with Dr. Mahoney, Dr. Ann Bell and me in the Orongorongo Valley. I could see that the colour of the hymenium of fresh apothecia was whitish and that the pale brownish tinge was caused by the external brown hairs shading through the transparent wet apothecia. It was clearly seen that when apothecia were getting drier (but still soft and living), the colour of the hymenium became pure white to whitish-grey. I also found a number of stellate cells and stellate excipular hairs, since I could examine many apothecia in the fresh state. These stellate hairs differ in their size and shape from those of *C. stercorea* and the other species of the ser. *Cheilymenia*. They are 4–8(–9)-rayed and the arms are only $25\text{--}50\ \mu\text{m}$ long, with brownish walls up to $3\ \mu\text{m}$ thick. I have found the stellate hairs also in other collections examined.

This examination has been very important for me and I am convinced that the European species *C. parvispora* treated above is an independent taxon distinguished by yellowish-orange apothecia, slightly larger ascospores, much longer arms of the stellate excipular hairs, and, especially by the presence of the conspicuous marginal collaret of the apothecia.

It is very interesting that *C. pallida* is undoubtedly confined to excrements of opossum and occurs in New Zealand only, whilst *C. parvispora* is restricted to excrements of elk (or a cervid dung) in boreal zone of the northern hemisphere. It is also significant that *C. stercorea* is common also in New Zealand. Surprisingly there is no record of *C. pallida* from Australia, the homeland of the brush-tailed opossum.

ser. c. *Insigniae* (J. Mor.) comb. et stat. nov.

Basionym: gen. *Cheilymenia* Boud., sect. 6. *Insigniae* J. Moravec, Mycotaxon 38: 476, 1990b.

5. *Cheilymenia insignis* (Cr. et Cr.) Boudier, Hist. classific. discomyc. Europe 63, 1907.

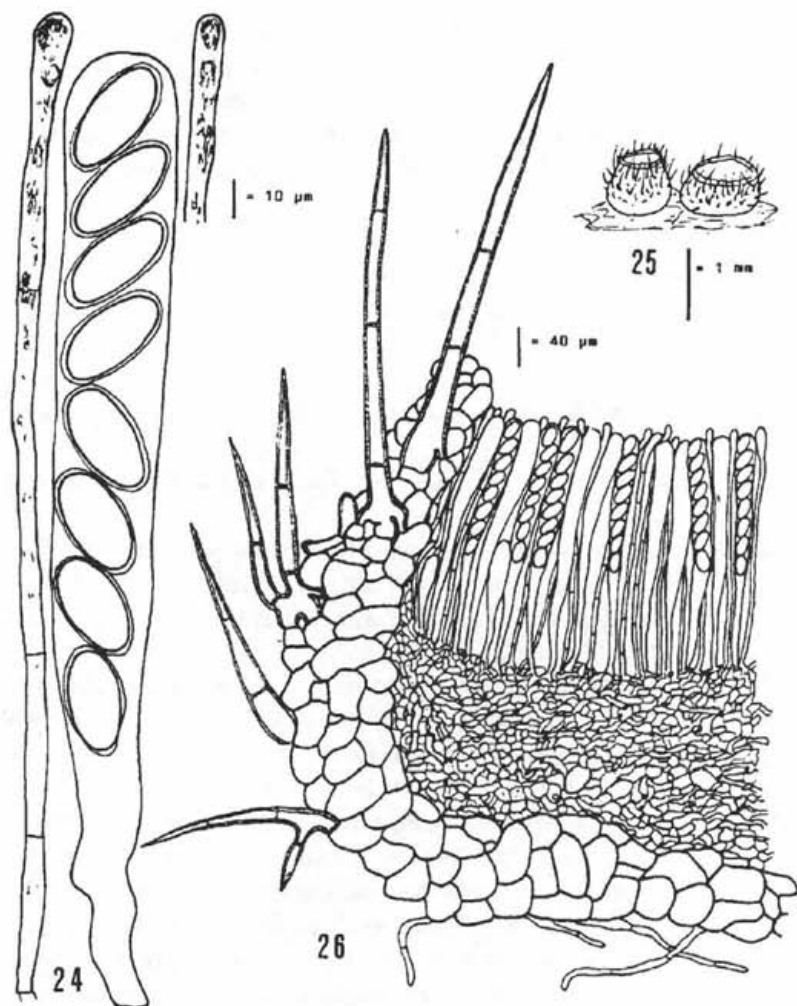
= *Ascobolus insignis* Crouan et Crouan, Ann. Sci. Natur. (Bot.) IV. 10: 196, pl. 13 H f, 38-43, 1858.

= *Humaria stercorea* var. *insignis* (Crouan) Quélet, Enchir. fung. 286, 1886.

= *Lachnea insignis* (Crouan) Sacc., Syll. fung. 5:181, 1887.

= *Dasyobolus insignis* (Crouan) Le Gal in Ann. Sci. Natur. (Bot.) XII.1:455, 1961.

Apothecia scattered to gregarious, sessile, (0.3-)0.6-1.5 mm [according to Brummelen (1986) up to 4 mm] diam., at first ovoid-subglobular to barrel-shaped, yellow-orange, with margin and outer surface covered by brown bristle-like hairs; hymenium bright yellow-orange, margin elevated, forming a narrow slightly hyaline collarette. Hairs of two types: (a) marginal hairs 60-380(-400) \times 12-28-37 μ m, straight, rigid, apices usually acuminate, redish-brown, thick-walled, the walls 1-3.5(-4.2) μ m thick, with a wide, simple, usually shortly attenuate and truncate, but mostly rooting, bifurcate or multifurcate base 28-45(-60) μ m wide; the roots short or longer, almost always truncate; (b) hairs of the external surface towards the base of the apothecia shorter, with much simpler base, mostly superficial, occasionally forked to two arms; hyphoid flexuous hairs and flexuous hyaline hyphae commonly present at the base of the apothecia. Excipulum sharply differentiated. Ectal excipulum of textura globulosa-angularis consisting of subglobose to polygonal or angular cells, 25-65 μ m diam., smaller towards the margin of the apothecia. Medullary excipulum consisting of irregularly angular to elongated, very thin-walled cells 10-25 μ m diam., densely mixed with smaller cells of a very indefinite shape and also with short, 4-7 μ m wide hyphae (textura angularis to subintricata). Hypothecium not clearly differentiated. Asci 240-290 \times 20-27 μ m, eight-spored, cylindrical, rounded above, shortly attenuated at the base, non-amyloid. Ascospores uniseriate, ellipsoid, 22-27-30(-32) \times 10.5-16.5(-18) μ m, (usually 25 \times 15 μ m), eguttulatae, mature ascospores with a yellow refractive colour when stained with CB in lactic acid, bearing a loosening perisporium which is covered with fine, irregularly



Figs. 24–26. *C. insignis*: 24. ascus and paraphyses (isotype, UPS ex CONC); 25. apothecia (BHU); 26. medial section of margin (isotype, UPS ex CONC).

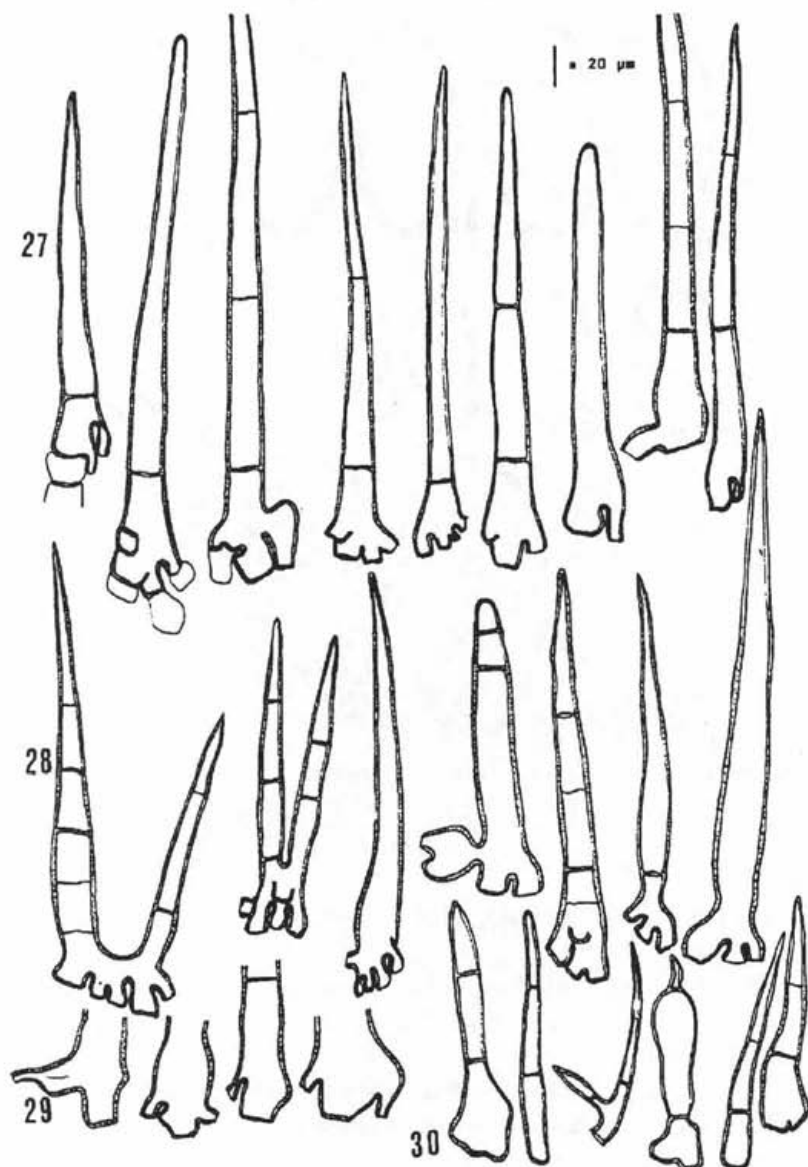
arranged cyanophilic, isolated or elongated and irregularly connected warts which occasionally form an incomplete reticulum. Paraphyses filiform, $3.5\text{--}5\ \mu\text{m}$ wide, apex slightly or more enlarged ($3.5\text{--}9\ \mu\text{m}$), containing orange granules.

Habitat: On dung of cattle, deer, rabbit etc.

Distribution: Europe: France, Germany, England,

Material examined:

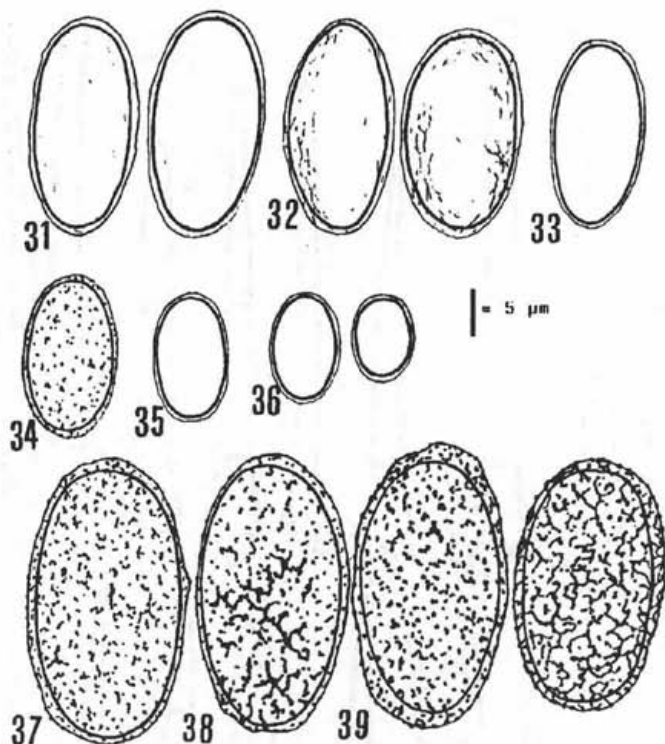
France: Finistère, sur des bouzes de vaches, XII. 1857 leg. Crouan (isotype of *Ascobolus insignis* Crouan et Crouan, UPS ex CONC, two slides only); Finistère,



Figs. 27-30. *C. insignis*: 27. rooting marginal hairs (isotype, UPS ex CONC); 28. ditto (isotype, UPS ex CONC); 29. base of marginal rooting hairs (BHU); 30. superficial hairs of ectal excipulum.

sur bouzes de vache anciennes, 4 fevrier 1869 leg. Crouan, (ut *Ascobolus insignis*, ? paratype UPS ex CONC).

Germany: Annaberg, Fichtelburg Gebiet, im Tal der Grossen Mittwirda, bei 700



Figs. 31-39. Ascospores of species of sect. *Cheilymenia*: 31. *C. stercorea* ('prototype', S); 32. ditto (Bohemia, Branžež, J. Moravec); 33. *C. stercorea* f. *alpina* (isotype, K); 34. *C. asteropila* (isotype, J. Moravec); 35. *C. parvispora* (holotype, S); 36. *C. pallida* (WELTU 57); 37. *C. insignis* (isotype, UPS ex CONC); 38. ditto (BHU); 39. ditto (PRM ex LPOL).

m, auf Losung von Wildschwein, 24. IX. 1986, leg. D. Benkert, det. J. Moravec (BHU).

England: Broad Clough, Kinder Scout, Derbyshire, on sheep pellets amongst Sphagnum, 17. IV. 1960, leg. J. T. Palmer, det. J. Moravec (PRM 723860 ex Myc. LPOL 1360).

Azores: Monte Brasil, Terceira, in fimo vaccino, 24. III. 1975 (associated with *C. granulata* and *C. raripila*, holotype of *C. theleboloides* var. *microspora* Dennis, K).

C. insignis differs from all other species of the section *Cheilymenia* in the absence of stellate hairs. However, it is a very rare species and only a few apothecia have been examined in detail. I have found several apothecial hairs which were forked into two arms, resembling two-armed stellate hairs. The marginal hairs have a simple base, but in well developed hairs the base fairly resemble that of hairs of *C. stercorea*. The roots of the base of the marginal hairs are nearly always truncate,

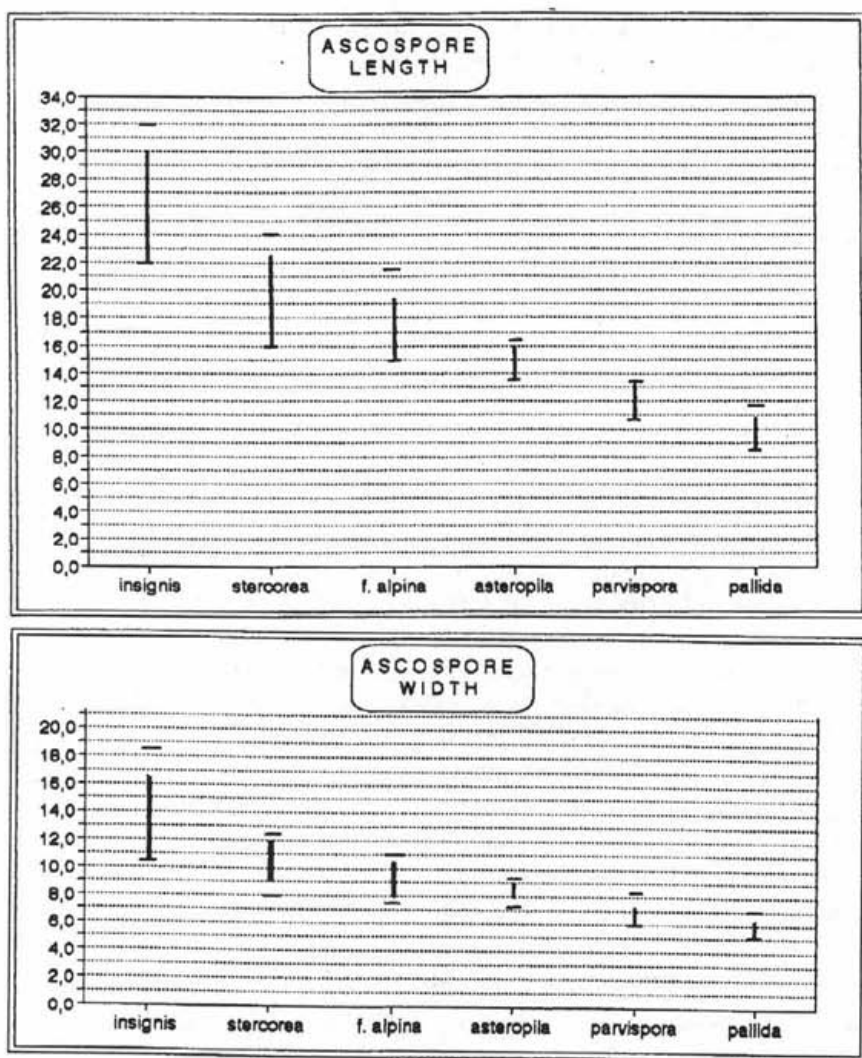


Fig. 40. Ascospore size of taxa of the sect. *Cheilymenia*: diagrams plotting dimensions of ascospore length and width (horizontal bars = abnormal spore size).

only very rarely oblong. The medullary excipulum differs from species of series *Cheilymenia* and *Pallidae* because of the very indefinite shape of the cells and hyphae, which hardly resemble a *textura subintricata*. In these features and in regard also to the cyanophilic ornamentation of the ascospore perispodium, my observations differ from that given by Brummelen (1986). The easily separable perispodium is destroyed and separated when the slides are heated (in lactophenol, as it is used by many mycologists), and consequently the ascospores appear to be

smooth as in other species of *Cheilymenia*. However, the ornamentation is clearly seen under oil immersion + CB, and well recognisable also when a 40× objective is used. It is necessary, of course, to use CB which stains promptly without heating the slides (J. Moravec 1984, 1989). The type collection has ascospores up to $32 \times 18.5 \mu\text{m}$, I have not seen any ascospore length $36 \mu\text{m}$ as stated by Brummelen (1986). Except for the type collection, ascospore length does not exceed $27 \mu\text{m}$ in ascospores developed normally in 8-spored asci. The collection from England (PRM ex LPOL) has ascospores measuring $22\text{--}25(-26) \times 10.5\text{--}13 \mu\text{m}$ only.

I am convinced that the relation of *C. insignis* with species of the section *Cheilymenia* is well proven and that the monotypic series *Insigniae* is justified.

ADDITIONAL NOTE

Cheilymenia palida Arnolds 1982 is a later illegitimate homonym. My examination revealed that it has nothing to do with *C. pallida* Bell et Dennis 1971. In my opinion, it is a species belonging to the section *Paracheilymeniae* J. Moravec (1990b, 1992), very close to *Cheilymenia pulcherrima* (Cr. et Cr.) Boud. The species of the section *Paracheilymeniae* were treated by J. Moravec (1992). *C. pallida* Arnolds differs from *C. pulcherrima* in the absence of marginal hairs, and also excipular hairs (of the same type as those of *C. pulcherrima*) are extremely rarely present just near the base of the apothecia. Also, the milky white colour of the hymenium differentiates this species from *C. pulcherrima* and the other two species of the section. The ascospores are of a similar size and type as those of *C. pulcherrima*. The holotype consists of a great number of apothecia which were growing under normal conditions. Therefore, we consider the species well-distinguished, and as it was validly published [for description and Latin diagnosis see Arnolds (1982)], we propose a new name for it:

***Cheilymenia lacteoalba* Arnolds et J. Moravec nom. nov.**

Basionym: *Cheilymenia pallida* Arnolds, Bibliotheca Mycologica, 90: 466, 1982 (illegitimate homonym of *Cheilymenia pallida* Bell et Dennis).

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