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EDIČNÍ SDĚLENÍ

Ročníkem 47(1993) přechází časopis Česká mykologie na cizojazyčnou verzi. Současně došlo i ke změně názvu časopisu na Czech Mycology. Redakce přijímá články v angličtině, případně němčině či francouzštině. Předpokládáme, že budeme vydávat čtyři čísla ročně. Hlásíme se i nadále k tradici české a československé vědecké mykologie, jejíž publikační platformou byla od roku 1947 Česká mykologie, a jsme odhodláni v tradici pokračovat.

Mykologům, kteří chtějí publikovat výsledky svých výzkumů česky nebo slovensky, nabízíme prostor v Mykologických listech, které vydává rovněž Česká vědecká společnost pro mykologii.

Redakční rada se omlouvá za zpoždění vydání prvního čísla a vyzývá k publikování v Czech Mycology.

EDITORIAL

Czech Mycology is a continuation of the journal Česká mykologie, which has been published in the years 1947–1993. Czech Mycology is an international scientific journal publishing papers in all aspects of mycology, including taxonomy, ecology, physiology and mycofloristics as well as mycological topic in forestry, agriculture and medicine. Publication in Czech Mycology is open to members of the Czech Scientific Society for Mycology and non-members. Czech Mycology will publish full length papers and short communication reporting original research which makes a significant contribution to mycology. Review articles are also welcome. Manuscripts are to be submitted in English, German or French.

CZECH MYCOL. 47 (1), 1993

Veramyces, a new hyphomycete genus from Kumaon Himalayas

C. V. SUBRAMANIAN

Central Institulte of Medicinal and Aromatic Plants P.O. CIMAP,
Lucknow-226015, India

Subramanian C. V. (1993): Veramyces, a new hyphomycete genus from Kumaon Himalayas Czech Mycol. 47: 3–5

This paper describes the phialidic synanamorph of the Oedemium state of Thaxteria phaeostroma from a collection made on dead twigs from Kilbury, Naini Tal, U.P. in the Kumaon Himalayas. The phialidic form is accommodated in a new genus, Veramyces as a new species, V. elegans.

Key words: Thaxteria phaeostroma, Oedemium state, Veramyces elegans India

Subramanian C. V. (1993): Veramyces, nový rod hyfomycetů z Kumaonských Himálají Czech Mycol. 47: 3–5

Je popsána fialidická synanamorfa oedemiového stadia druhu Thaxteria phaeostroma (Dur. et Mont.) Booth, podle sběru z odumřelých větviček sbíraných v Kilbury, údolí Naini, U.P. v Kumaonských Himálajích. Fialidická forma je považována za nový rod Veramyces a druh Veramyces elagans.

This paper deals with the discovery and description of a phialidic synanamorph of the *Oedemium* state of *Thaxteria phaeostroma* (Dur. & Mont.) Booth. A collection assignable to this fungus was made by the author from Naini Tal, Uttar Pradesh in the Kumaon Himalayas in India. Apart from *Oedemium* conidiophores and conidia, the fungus was connected to a phialidic synanamorph; it also produced dark brown multicellular bodies (? gemmae). The following is a description of the fungus.

Colonies brown to black, effuse, velvety. Mycelium composed of stout, branched, septate hyphae 8–12 μm wide. Branches dichotomous, often later appearing subdichotomous; ultimate branches setose, septate, acicular and pointed, or non-setose, cylindrical, dark brown, smooth, up to 400 μm long, 8–12 μm wide. Conidiogenous cells integrated, apical, swollen, smooth, polyblastic, up to 27 × 15 μm in size. Conidia solitary, dry, developing simultaneously or successively on the conidiogenous cell (ampulla), ovoid, 1–2-euseptate, smooth, 19–23 μm long, 10–11 μm wide. Philophores arising from hyphae, lateral, simple, erect, straight or flexuous or curved, brown, stout, smooth, septate, up to 200 μm long, 9–12 μm wide, bearing a terminal cluster of branches and phialides. Branches or phialides arising from below septa and forming a cluster thereon; branches 0–2-septate, 19–23 μm long, 5–6 μm wide. Phialides terminal or lateral, lageniform, broad below, with conspicuous collarette, pale to golden brown, smooth. Conidia slimy, small, cylindric-bacillar, one-celled, hyaline, smooth, 3.0 × 1.5 μm.

Multicellular 'gemmae' common, formed mostly terminally on hyphae, sometimes intercalary, due to swelling of hypha or hyphal tips followed by branching and septation in a complex way; 'gemmae' irregular in shape, nondeciduous, 48–80 × 44–72 μm, often germinating to produce germ tubes from one or more cells.

The fungus is easily identifiable as the *Oedemium* state of *Thaxteria phaeostroma* (Dur. & Mont.) Booth. As far as known to me, a phialidic synanamorph has not so far been reported for this taxon. Also, I know of no phialidic genus in which this can be accommodated. A new genus *Veramyces* is proposed here to accommodate it.

The generic name is in honour of Dr. Věra Holubová-Jechová, distinguished for her work on many Dematiaceous Hyphomycetes and on tropical microfungi. Her recent demise is a great loss to tropical mycology.

Veramyces Subramanian anamorph gen. nov.

Dematiaceous hyphomycete producing phialidic conidia. Conidiophores simple, brown, septate, terminating in a cluster of short branches and characteristic phialides. Phialides terminal or lateral, single or forming clusters, golden brown, lageniform, with distinct collarette. Conidia slimy, solitary, one-celled, hyaline, cylindrical to bacillar.

Synanamorph: *Oedemium*

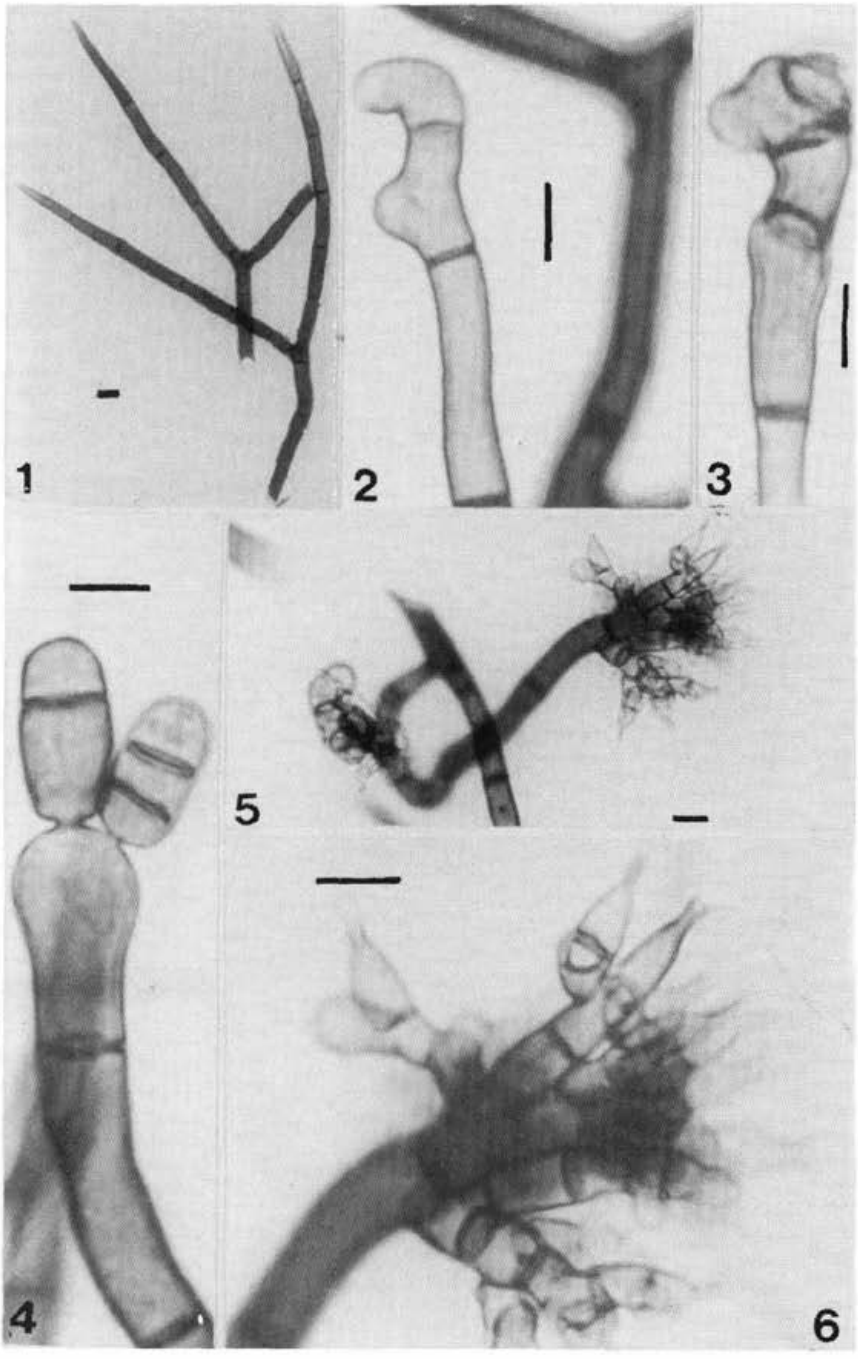
Hyphomycetes dematiacei conidia phialidica producentes. Conidiophora simplicia, brunnea, septata, in fasciculos ramorum et phialidum terminata. Phialides terminales vel laterales, aureo-brunneae, lageniformes; collare ("collarette") distincto. Conidia mucosa, solitaria, unicellularia, hyalina, cylindrica vel bacillaria.

Species typica: *Veramyces elagans* Subramanian

Veramyces elagans Subramanian sp. nov. anamorpha.

Coloniae brunneae vel atrae, effusae, velutinae. Mycelium ex hyphis ramosis, septatis, 8–10 μm latis compositum; ramis dichotomis, saepe posterius manifeste subdichotomis; rami terminales setosi, septati, aiculares vel acuminati vel non-setosi, cylindrici vel ad apicem rotundati. Setae usque ad 330 μm longae, 8–9 μm latae. Conidiophora simplicia, erecta, recta, flexuosa vel curvata, brunnea, laevia, septata, usque ad 200 μm longa, 9–12 μm lata, in fasciculis ramorum et phialidum terminata. Rami laterales, subseptati, 0–2-septis, 19–23 μm longi, 5–6 μm lati. Phialides terminales, vel laterales vel sub septis ortae, lageniformes, ad basim incrassatae, longicolles, aureo-brunneae, leaves, 15–20 μm longae, ad basim 4.5–6.0 μm latae vel ad apicem 1.5 μm latae. Conidia mucosa, unicellularia, hyalina, cylindrica vel bacillaria, 3.0–1.5 μm.

TYPUS lectus ad ramos emortuos, India, Kilbury, Naini Tal, Kumaon Himalayas, U.P., Coll. C.V. Subramanian, 10 Oct. 1991, sub numero NT 9.



Figs. 1–6. *Oedemium* and *Veramyces* anamorphs of *Thaxteria phacostroma*.
Fig. 1, setae. Figs. 2–3, development of hyphal branches and early stage in development of 'gemmae'. Fig. 4, *Oedemium* conidiophore, ampulla and conidia. Figs. 5, 6, conidiophore and phialides of the *Veramyces* state (*V. elegans*). Bars denote 10 μm.

Synanamorpha: *Oedemium* state of *Thaxteria phaeostroma* (Dur. & Mont.) Booth.

Acknowledgements

This work was carried out during the tenure of an INSA Senior Scientist Award to me. The CSIR sponsored a Project on Taxonomy and Distribution of Microfungi. I thank the Indian National Science Academy and the Council of Scientific and Industrial Research for he support and the Director, CIMAP, Lucknow for having me work here and for all facilities.

CZECH MYCOL. 47 (1), 1993

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

JIŘÍ MORAVEC

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

Moravec J. (1993): Taxonomic revision of the genus Cheilymenia – 5. The section Cheilymenia. Czech Mycol. 47: 7–37

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 'protype' 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 'protyp' pro C. sterorea 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 nomenclatorical 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. *Eluela 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 synoym 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 whatsover 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 chose 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, *'protype'* (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 'protype' 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 'protype' is designated, the holotype, lectotype or neotype that the 'protype' 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 'PROTYPE' to support that lectotype illustration, as provided under the new Article 7.9*bis*:

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 (ocassionally 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 ocassionally 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.

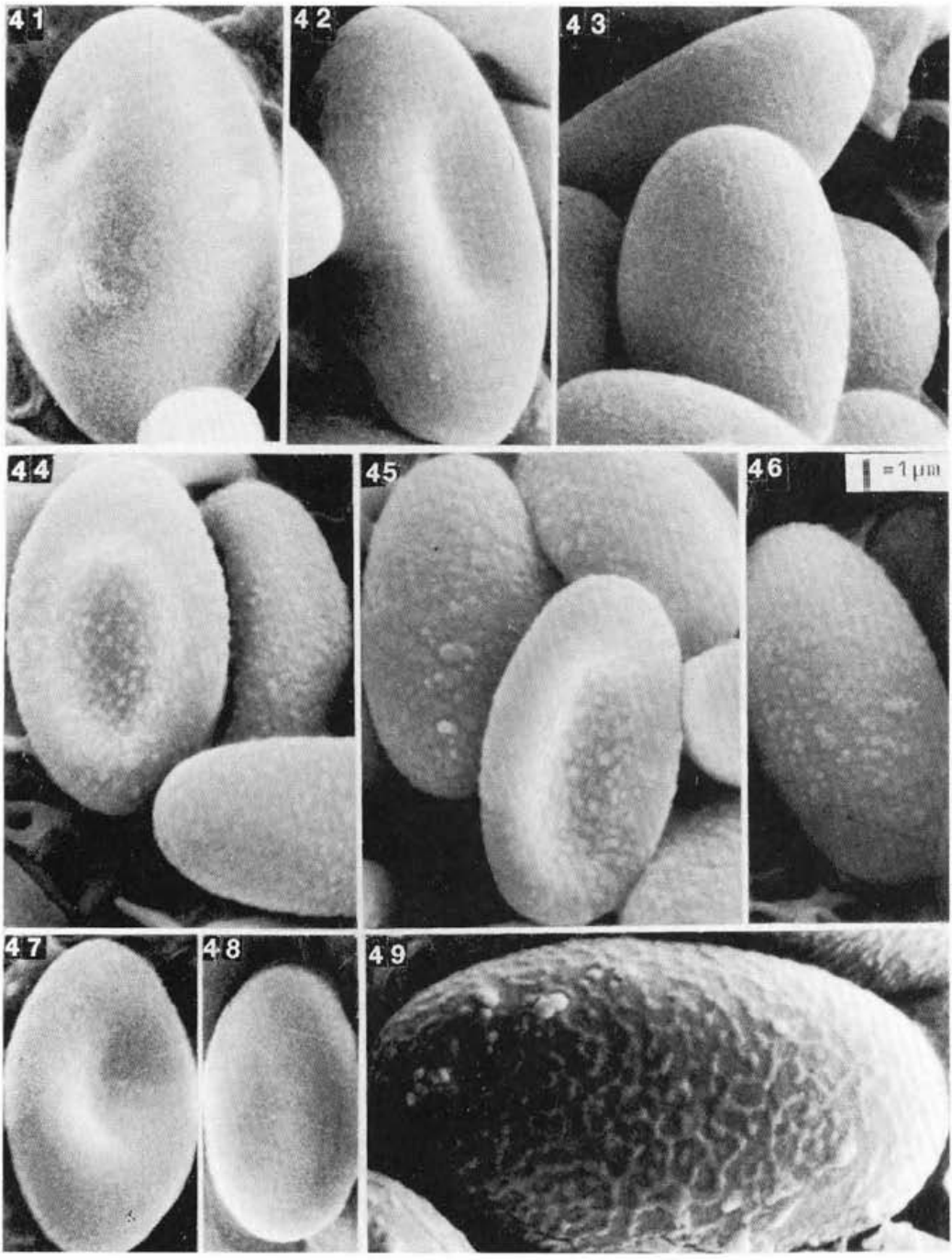
The apothecial structure of species of the section *Cheilymenia* is characterised by the sharply differentiated ectal excipulum consisting of textura angularis, and the medullary layer which consists of textura angularis to subintricata to almost intricata, or of short, thin-walled hyphae or cells of 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* ('protype', S); 42–43. ditto (Bohemia, Branžež, J. Moravec); 44–46. *C. asteropila* (isotype, BRA); 47. *C. parvispora* (holotype, S); 48. *C. pallida* (WELTU 209); 49. *C. insignis* (PRM ex LPOL).

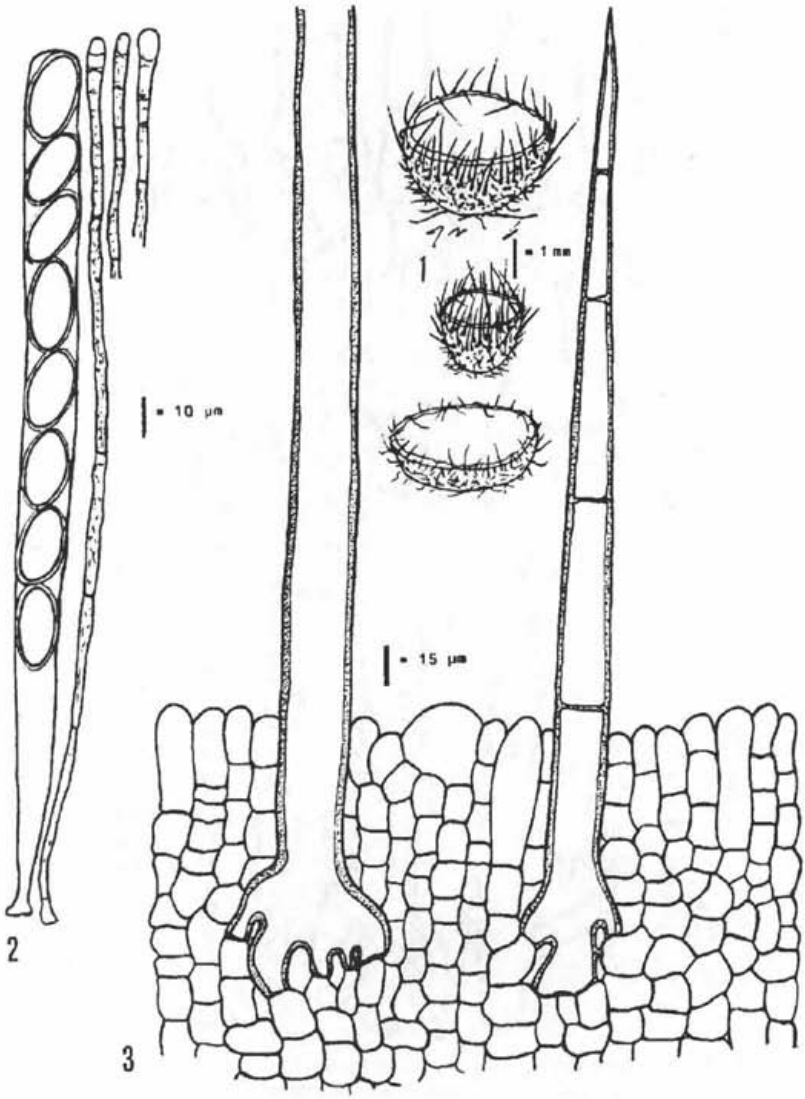
= *Lasiobolus stercoreus* (Pers.: Fr.) Karsten, Acta. Soc. Fauna Fl. Fenn. 2: 122, 1885.
= *Scutellinia stercorea* (Pers.: Fr.) Kuntze, Rev. Gen. Plant. 2: 869, 1891.
= *Humariella stercorea* (Pers.: Fr.) J. Schroeter, Kryptog. Fl. Schles. 3 (2): 37, 1893.
= *Patella stercorea* (Pers.: Fr.) Seaver, N. 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. Salzburgener 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) × (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.

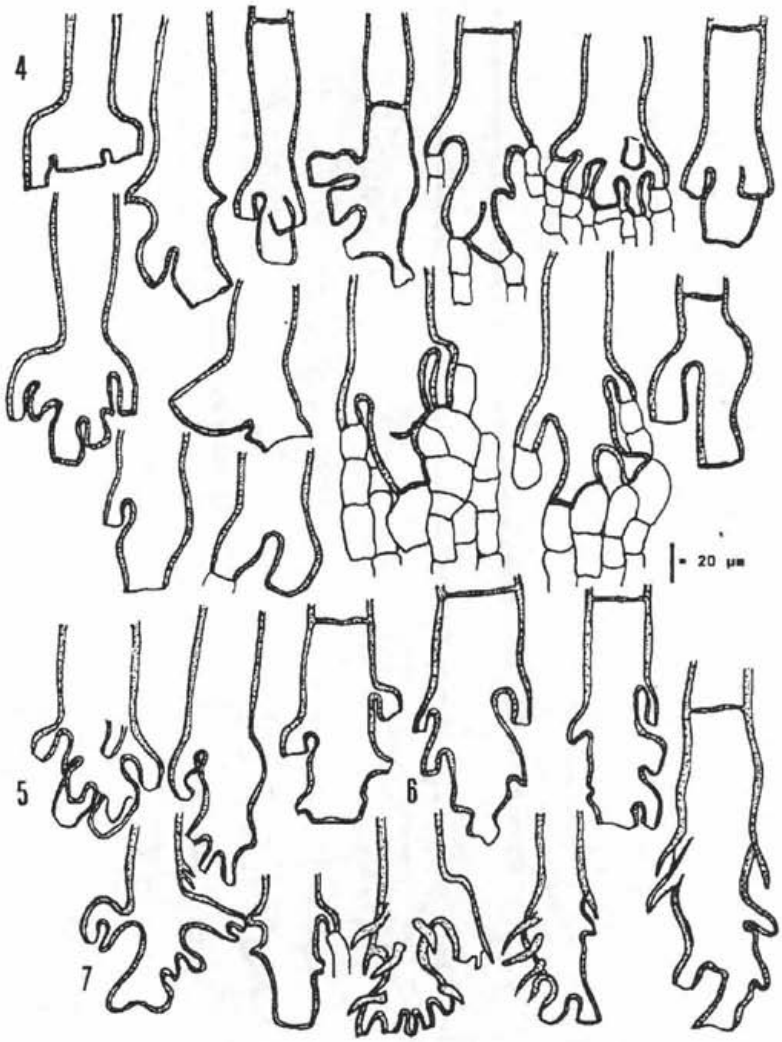
'Protypus': Suecia, Sudermania: Mariefred, prope Karlsborg in fimo vaccino, 7. VI. 1938 leg. Th. Arvidsson (ut *Cheilymenia* sp.) – neotypus in herbario Mus. Botan. Stockholm (S) asservatur, det. J. Moravec.

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 collarette. 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) × 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) × 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 collarette; 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 ('protype', 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 perisporium which is nearly smooth, or with



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

only ocassional spots, or ocassional 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.

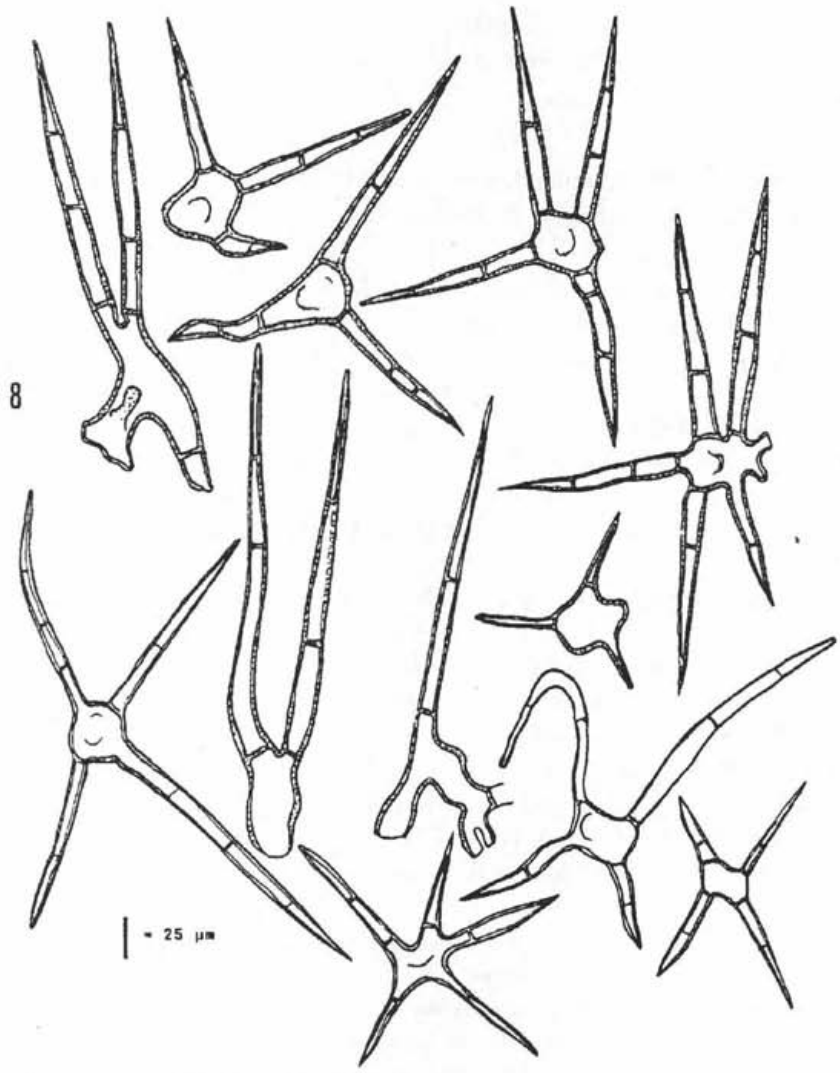


Fig. 8. *C. stercorea*: stellate hairs ('protype', S).

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) × (7.5–)8–10.5(–11) µm diam., and usually by smaller apothecia with a more reddish tinge of the hymenium.

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

Material examined:

[f. *stercorea*]:

'Protype': 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 acumulatis, 22. X. 1983, leg. L. Hagara, det. J. Moravec (herb. J. Mor.); Slovenské Rudohorie Mt., ad excrementua 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., Branžež (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: Nízké Tatry Mt., Králova hola, ad excrementa vaccina, VII. 1989, leg. J. Moravec (herb. J. Mor.); Nízké Tatry Mt., Magurka, ad excrementa cervina, 9. VIII. 1948, leg. J. Kubička, det. J. Moravec (PRM 622908).

Finland: Ka, Vehkalahti, Pyhältö, älgexkrementer i tät granskog mellan Heinäniemi och Saarainnen, 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. Liii-Pellinge, Tärnnäs S. millimeterlånge ljust orangefärgade "tappar" på gamla älg (hirvi-) exkrementer, 15. V. 1977 leg. G. Kvist, det. J. Moravec (H).

Germany: Distr. Brandenburg, Königswüsterhausen, margin of a meadow near Märkisch-Buchholz, on old cow dung, 3. VII. 1993, leg. et det D. Benkert (herb. J. Mor.).

India: Khillauma-Gulmarg briddle 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 'protype' 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 'protype' are well developed and abundant in each apothecium examined. The ascpospores measure 18–22(–24) × 8–10.5–12 μm. The features of the 'protype' 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. Nevertheles, 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 'protype') 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) × (8–)9–10.5 (–11) μm with smooth perisporium 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 × 8–10 μm.

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) × 10,5 μm whilst the ascospores of many collections (including the 'protype') reach up to 22 × 12 μm, (or even up to 24 × 12.5 μm 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. *aurantiaco-flava*. 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 'protype' 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 'protype' 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 conspicuos, 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 occurence 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) × 9–12 μm, 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 × 10–12.5 μm.

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) × 22–45 μm, crasse tunicati [tunica 1.5–4.5(–6) μm crassa], apice accuminati, basi saepe attenuati et truncati, 35–70 μm

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 × 9–10.5 μm, octospori, non amyloidei. Ascosporae 10.7–13,4 × 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 fimis 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) × 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 × 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 × 6–7.3(–8.3) μm, with a yellow refractive colour when stained with CB in lactic acid, with a loosening smooth perispore.

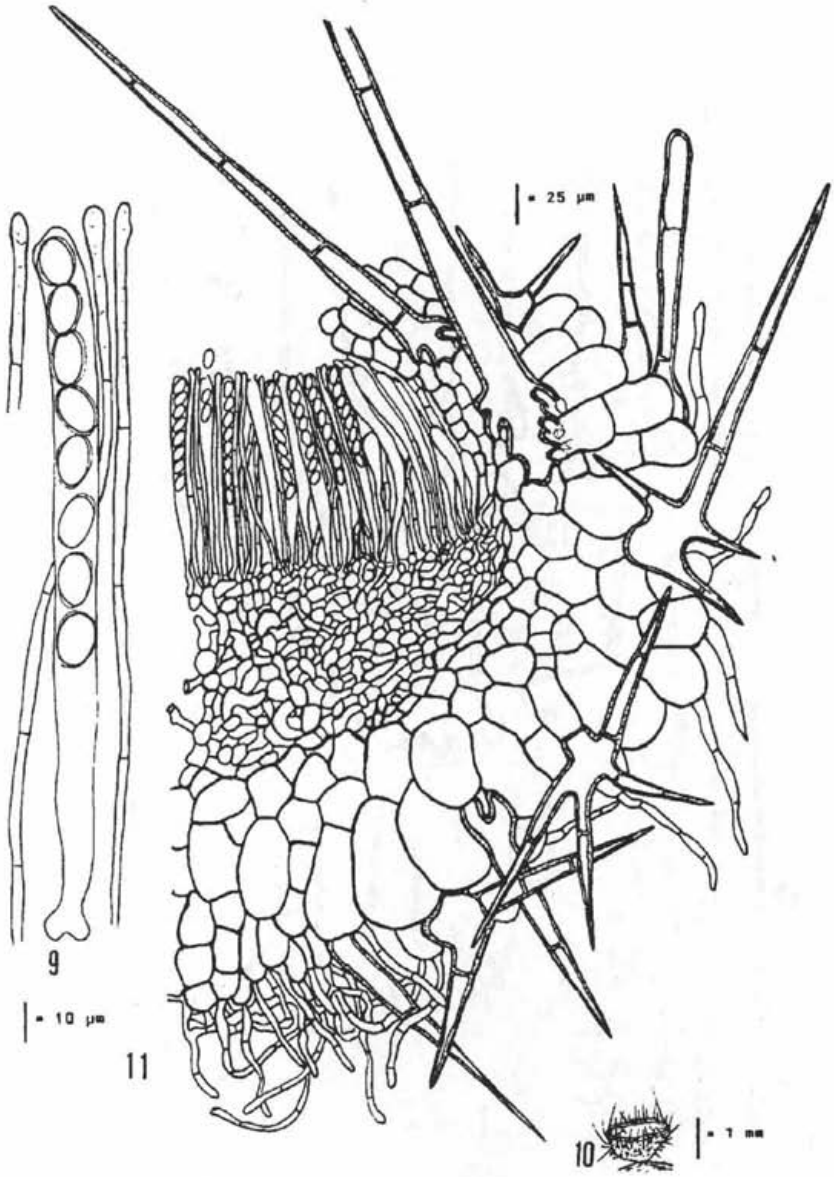
Habitat: on elk dung (in North Europe) and on a dung similar to a deer or moose animal (in North America).

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

Material examined:

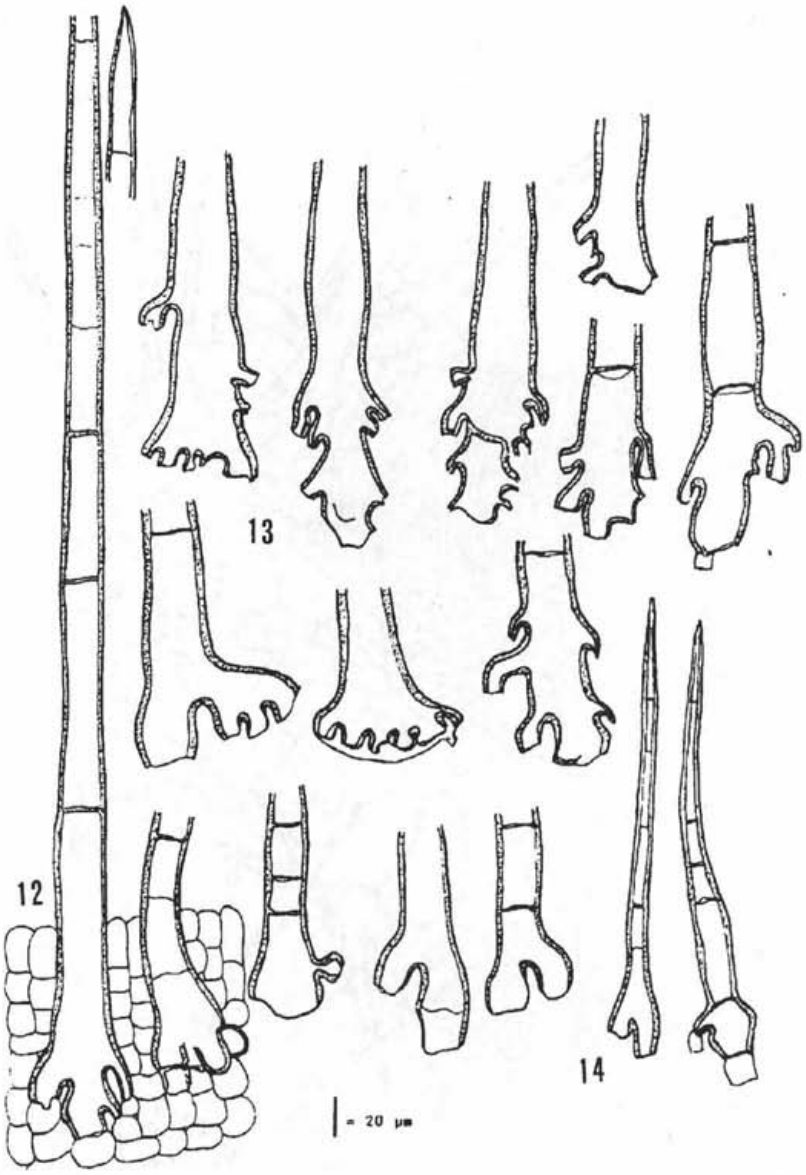
Holotype: Finland, Tavastia australis, Korpilahti, par. outside of Vaarunvuoret Nat. Res. at Korospohja Bay, S of Lake Särkijärvi (=14 km SE Korpilahti), on elk dung (*Alces alces*) in coniferous forest, 20. VIII. 1986 leg. Nils Lundqvist No 16127 c (S).

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, Helgträsk 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).

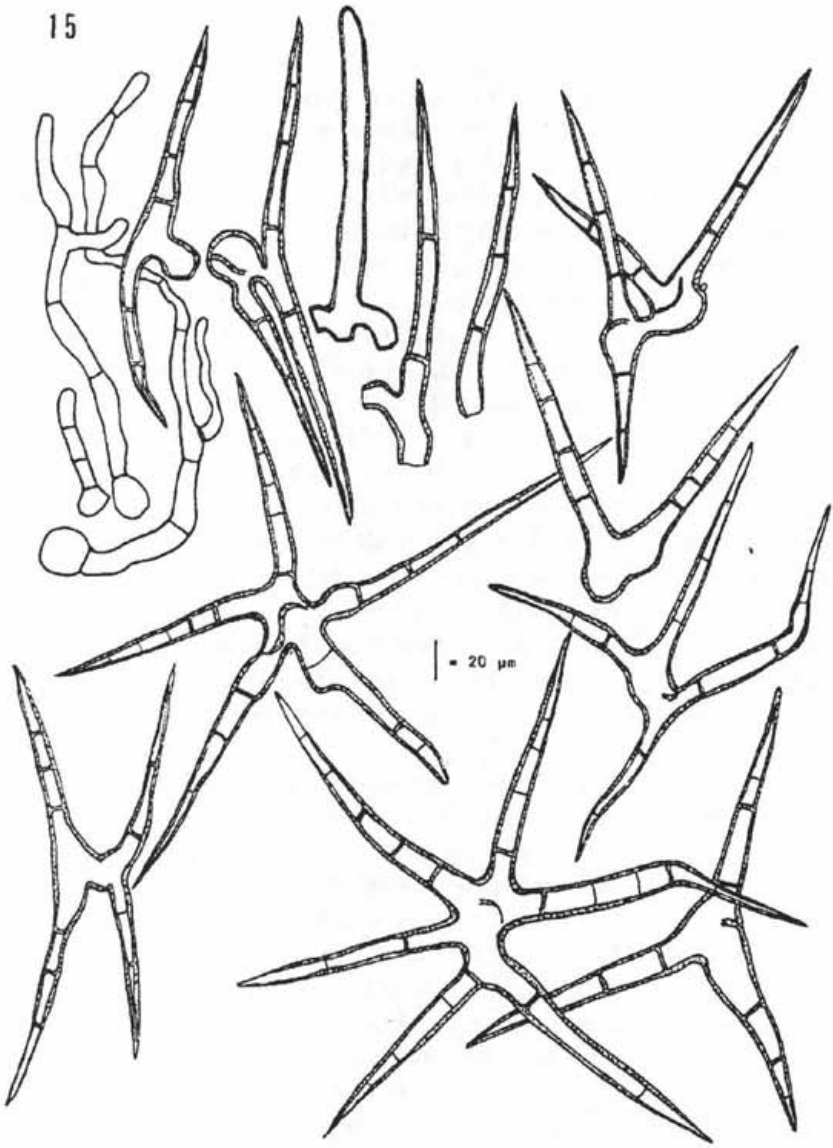


Fig. 15. *C. parvispora*: hyphae and stellate hairs (holotype, S).

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 smalest 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 interesing 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 *Pallidae*.

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) × (7.2–)8–9(–9.4) μm, 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*.

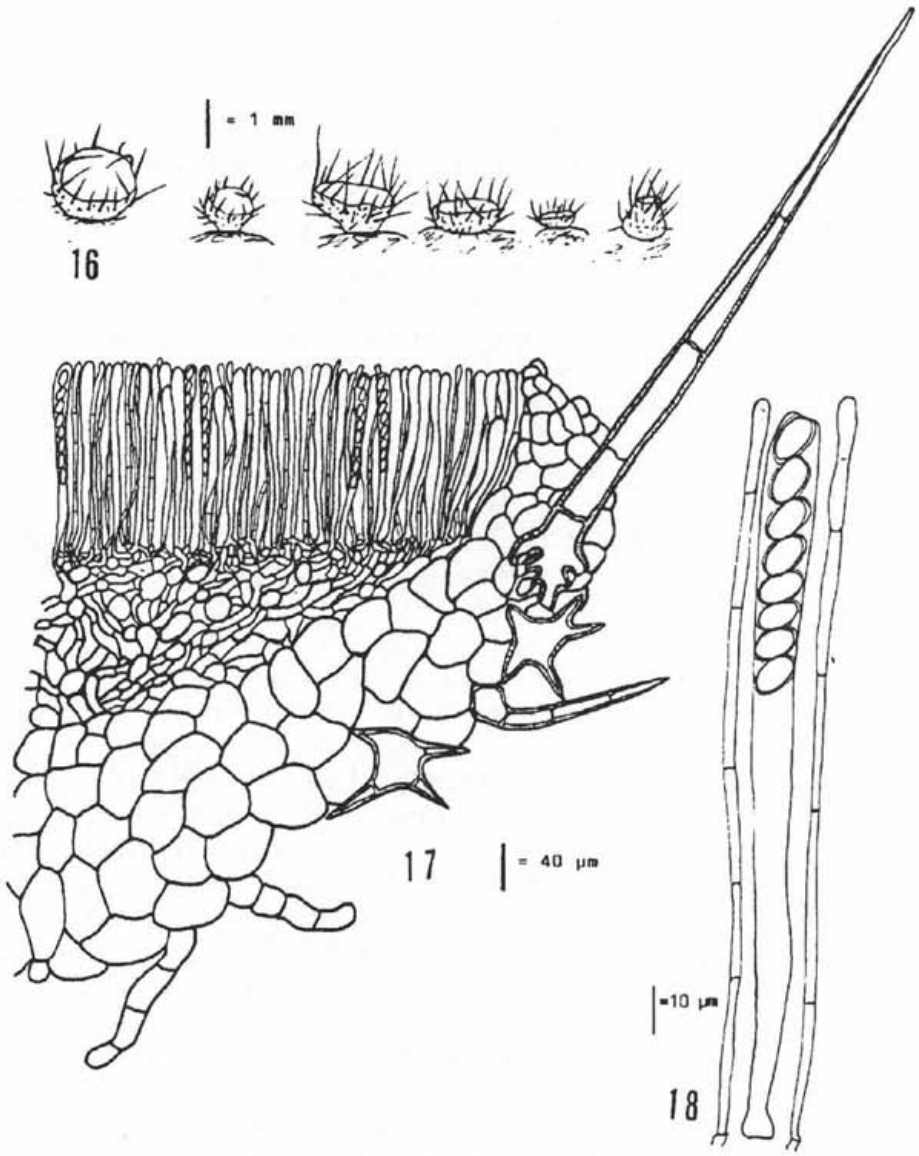
C. asteropila differs also from *Scutellinia crucipila* (Cooke et Phill. in Cooke) J. Mor., a species with apothecia also possessing stellate hairs which has been considered to be a species of *Cheilymenia* by many recent authors. It was transferred to the genus by Le Gal (1953) as *Cheilymenia crucipila*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

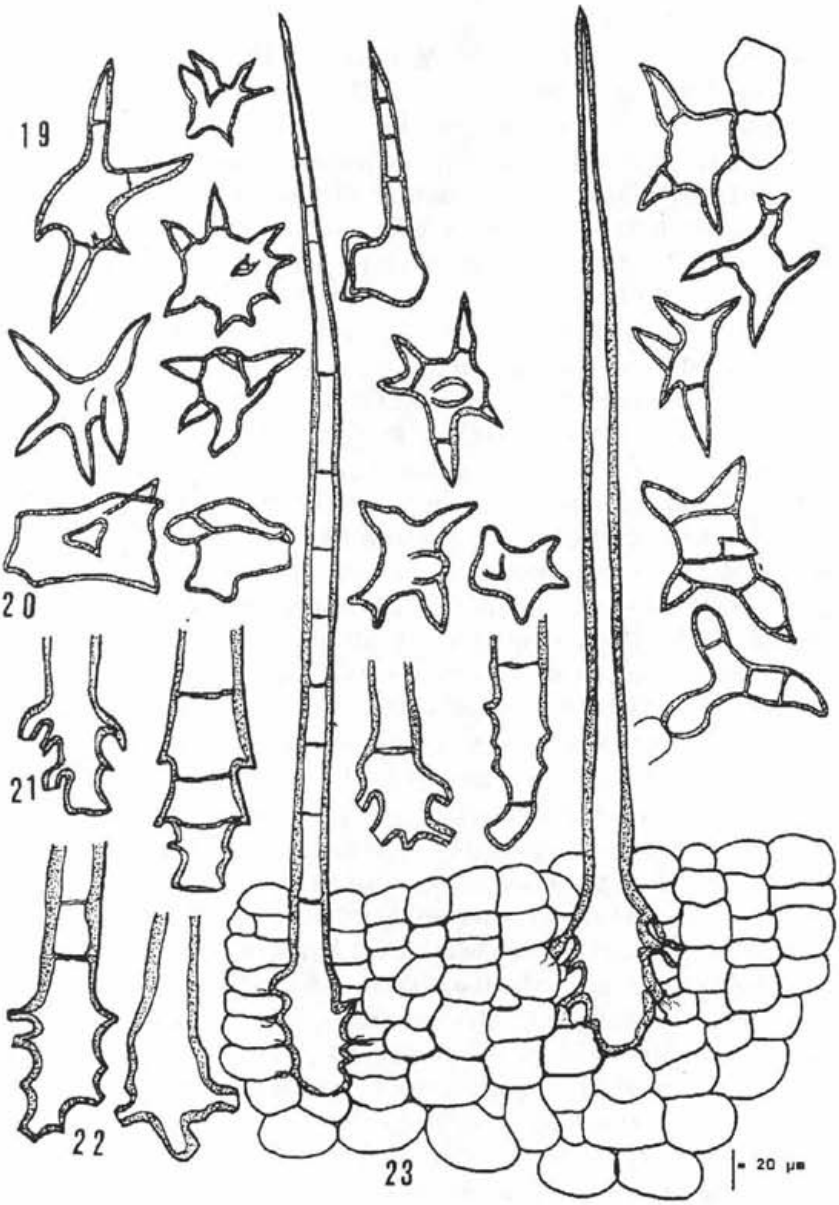
Apothecia scattered to gregarious, (0.6–)1.5–2(–3) mm diam., (usually not exceeded 2 mm), at first turbinate to convex with a flat hymenium, becoming very shallowly cupulate to saucer shaped, with an inconspicuous margin. Hymenium grayish-white, to whitish-buff, [shading to a light brownish tint (the 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, arrising 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 (Orongorongo Valley, Dr. Mahoney, J. Moravec).

eguttulate, with a yelow 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 all. (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 μm, except that when ascospores develop in 4–6-spored asci, the length may reach up to 11.8 μm. 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 oportunity to study specimens of *C. pallida* in the WELTU herbarium of the Victoria University of Wellington, New Zealand, and on one ocassion 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 25–50 μm long, with brownish walls up to 3 μm 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.

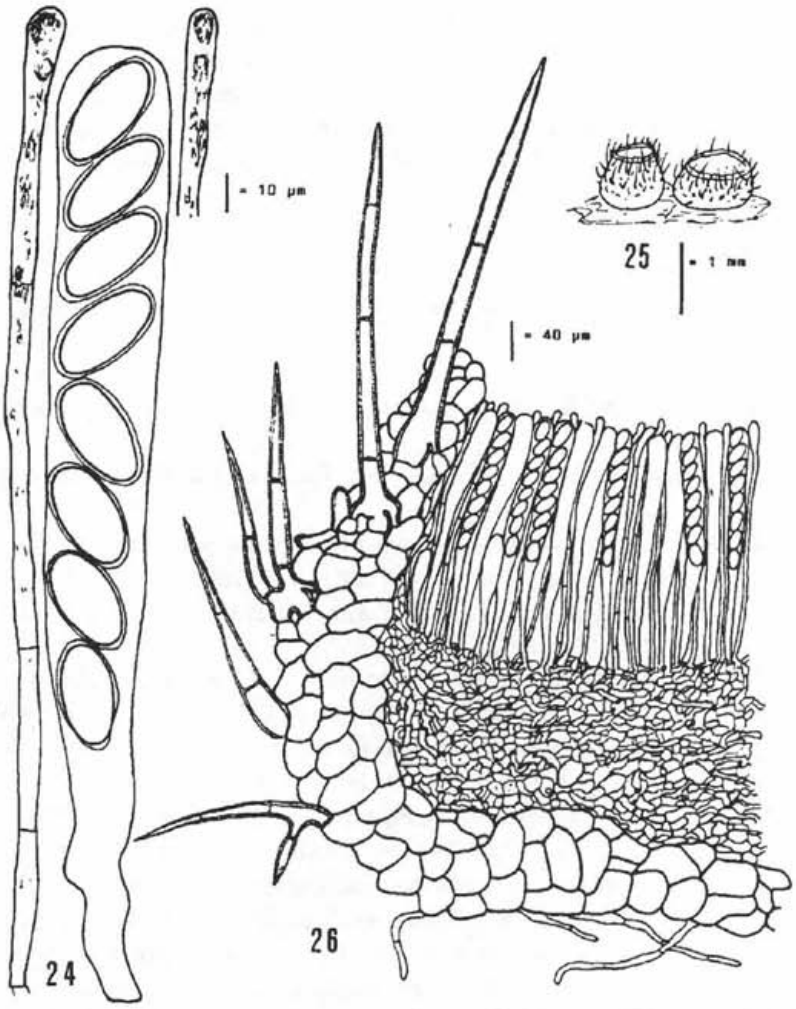
= *Ascobolus insignis* Crouan et Crouan, Ann. Sci. Natur. (Bot.) IV. 10: 196, pl. 13 H f, 38–43, 1858.

= *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) × 12–28–37 μm, straight, rigid, apices usually acuminate, redish-brown, thick-walled, the walls 1–3.5(–4.2) μm thick, with a wide, simple, usually shortly attenuate and truncate, but mostly rooting, bifurcate or multifurcate base 28–45(–60) μm 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, ocassionally 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 μm diam., smaller towards the margin of the apothecia. Medullary excipulum consisting of irregularly angular to elongated, very thin-walled cells 10–25 μm diam., densely mixed with smaller cells of a very indefinite shape and also with short, 4–7 μm wide hyphae (textura angularis to subintricata). Hypothecium not clearly differentiated. Asci 240–290 × 20–27 μm, eight-spored, cylindrical, rounded above, shortly attenuated at the base, non-amyloid. Ascospores uniseriate, ellipsoid, 22–27–30(–32) × 10.5–16.5(–18) μm, (usually 25 × 15 μm), 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).

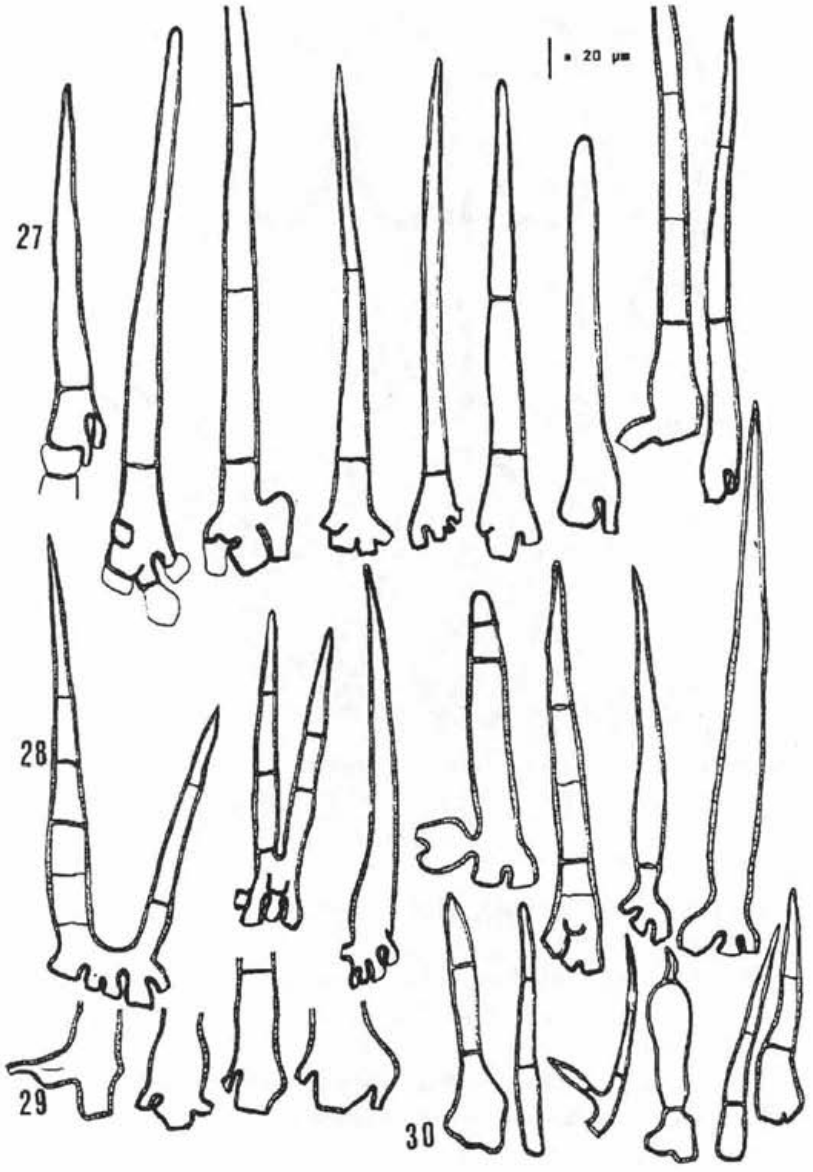
arranged cyanophilic, isolated or elongated and irregularly connected warts which occasionally form an incomplete reticulum. Paraphyses filiform, 3.5–5 µm wide, apex slightly or more enlarged (3.5–9 µm), containing orange granules.

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

Distribution: Europe: France, Germany, England,

Material examined:

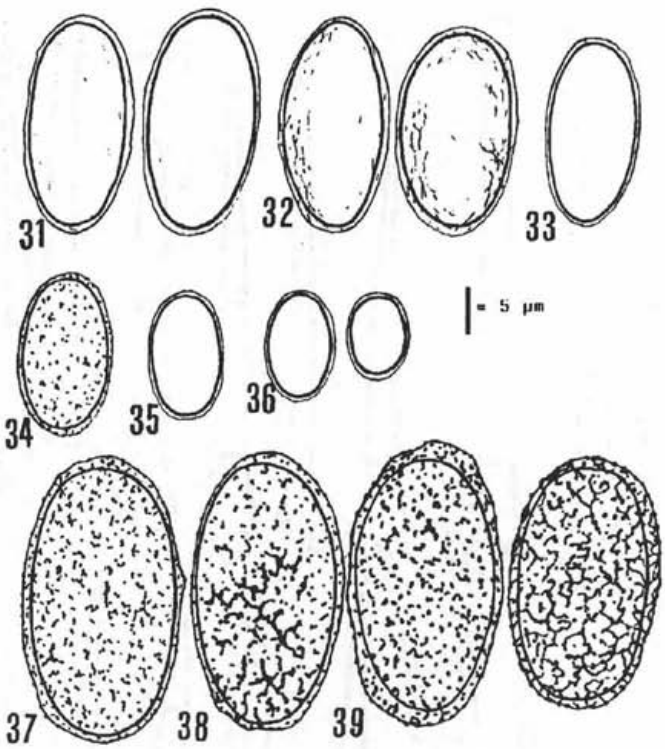
France: Finistère, sur des bouzes de vaches, XII. 1857 leg. Crouan (isotype of *Ascobolus insignis* Crouan et Crouan, UPS ex CONC, two slides only); Finistère,



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* ('protype', 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,

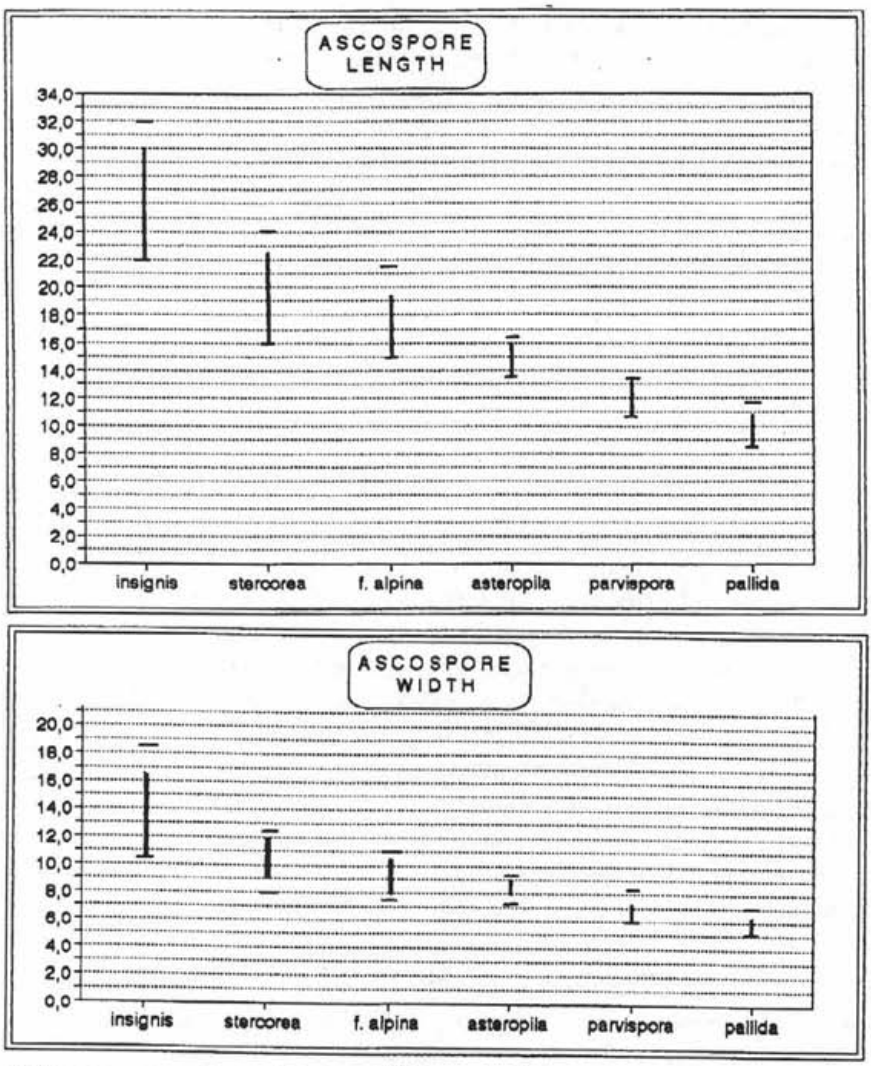


Fig. 40. Ascospore size of taxa of the sect. *Cheilymenia*: diagrams plotting dimensions of ascospore length and width (horizontal bars = abnormal spore size).

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 perisporium, my observations differ from that given by Brummelen (1986). The easily separable perisporium 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 × 18.5 μm, I have not seen any ascospore length 36 μm as stated by Brummelen (1986). Except for the type collection, ascospore lenght does not exceed 27 μm in ascospores developed normally in 8-spored asci. The collection from England (PRM ex LPOL) has ascospores measuring 22–25(–26) × 10.5–13 μm 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 illegimate 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).

Aknowledgements

I wish to thank Prof. Dr. Richard P. Korf (Ithaca) and Prof. Dr. Nils Lundqvist (Stockholm) for helpful advice to me in sorting out the confusing synonymy and sanctioning provisions as they apply to the type species, *C. stercorea*, and reviewing the manuscript. I am obliged to Prof. Nils Lundqvist also for the arrangement of loans of a number of specimens from S and UPS herbaria. I thank also Dr. Dieter Benkert (BHU), Prof. Harri Harmaja (H), Dr. Brian M. Spooner (K), and curators of other herbaria (WBS, NY, K) for an arrangement of loans of type and other material. My special thanks belong to Dr. Ann Bell and her husband, Dr. Dan

Mahoney, for the kind invitation, generous hospitality and permission to study collections of *Cheilymenia* in WELTU herbarium during my stay in Wellington, New Zealand. I am obliged to Dr. Mirko Svrček (Prague) for kindly correcting the Latin diagnosis. I thank also to Dr. Eef Arnolds for his kind information regarding field notes on the type collection of *C. pallida* Arnolds (= *C. lacteoalba* Arnolds et J. Mor.). Mr. Jiří Lhotecký (Brno) kindly provided the SEM photomicrographs, and Dr. V. Antonín (Brno) kindly read the manuscript.

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CZECH MYCOL. 47 (1), 1993

First European records of Hohenbuehelia angustata (Berk.) Sing.

VLADIMÍR ANTONÍN[1] and ANTON HAUSKNECHT[2]

[1]Moravian Museum, Dept. of Botany, Zelný trh 6, 659 37 Brno, Czech Republic
[2]Sonndorferstraße 22, 3712 Maissau, Austria

Antonín V. & Hausknecht A. (1993): First European records of Hohenbuehelia angustata (Berk.) Sing. Czech Mycol. 47: 39–40

First European records of Hohenbuehelia angustata (Berk.) Sing. from Austria and the Czech Republic are published. Macroscopical and microscopical features are described according to collected specimens. European findings are compared with North American collection and with description in recent literature.

Key words: Basidiomycetes, Tricholomataceae, *Hohenbuehelia angustata*, Austria, the Czech Republic

Antonín V. a Hausknecht A. (1993): První nálezy hlívy úzkolupenné – Hohenbuehelia angustata (Berk.) Sing. v Evropě. Czech Mycol. 47: 39–40

Autoři publikují první evropské nálezy hlívy úzkolupenné – Hohenbuehelia angustata (Berk.) Sing. z Rakouska (Dolní Rakousko) a České republiky (jižní Morava). Je dán podrobný makroskopický a mikroskopický popis a srovnání znaků nalezených plodnic s materiálem sbíraným v USA a americkou literaturou.

A very interesting *Hohenbuehelia* species has been collected during mycofloristical researchin the reverside forests near Vienna (Austria), and in southern Moravia (the Czech Republic). Macroscopically, it resembled more intensive-coloured *H. mastrucata* (Fr.) Sing. or pale-coloured *H. atrocoerulea* (Fr.) Sing., but it differs especially by very small spores. In comparison with the own collection from the U.S.A. of the first author, and with literature, we determined this species as *Hohenbuehelia angustata* (Berk.) Sing. This species grows in North America, and, our collections represent the first records in Europe.

Collections from Danubial riverside forests in Austria has already been described, and a colour photo has been publieshed in the macromycetes flora of Vienna (Krisai-Greilhuber 1992). The small difereneces between North-America and European collections are discussed below.

Description of European collections of *Hohenbuehelia angustata* (Berk.) Sing.:

Pileus 15–45(–60) mm broad, hemispherical when young, then subflabelliform to spathuliform, with inflexed to involute, not striate margin, slightly white tomentose in young stages only, old speciments (almost) absolutely smooth, hygrophanous; very young and fresh pilei pale ochraceous brown (near 5D4, Kornerup & Wanscher 1975), soon pallescent (ochraceous, 4A3) to nearly yellowish white (3A2) or carneous, never pure white. Lamellae moderately to very close, with lamellulae, decurrent to one point near pileus attachement, or, if short stipe developed, then

decurrent in low veins, white to pale yellowish grey, with white, slightly pubescent edge. Stipe absent or very short (up to 10 × 5 mm), white tomentose. Context whitish, with indistinct to quite distinct farinaceous smell.

Basidiospores 4.8–5.7(–6.3) × 3.4–4.2 μm, E = 1.3–1.7, Q = 1.4, subglobose to broadly ellipsoid, thin-walled, non-dextrinoid, hyaline. Basidia 15.2–20.2 × 5.1–7.6 μm, clavate, 4-spored. Basidioles 11.4–20.5 × 2.5–7.0 μm, clavate or cylindrical-clavate. Cheilocystidia (11.4–)14.6–24.7×5.7–8.5(–10.1) μm, clavate, sublageniform, broadly fusoid, often irregular, often with capitate or strangulate rostrum, thin-walled, in rostrum sometines slightly thick-walled (adpressed dry gelatinous cap ?). Metuloids 44.3–65.8 × (9.0–)12.0–18.4 μm, fusoid to sublageniform, thick-walled (up to 2.5(–4) μm), with (rarely without) a distinct crystalliferous cap. Hyphae non-dextrinoid, clamped, thin-walled, up to 11 μm wide. Pileipellis a trichoderm, terminal hyphae erect to suberect, thin-walled to thick-walled, rounded to furcate at apex, clamped, hyaline, non-dextrinoid, 2.5–5.0 μm wide. Gelatinous layer in pileus 140–160 μm deep.

MATERIAL STUDIED

AUSTRIA: Vienna, Lobau, N. Uferhaus (MTB 7865/1), on decaying logs and stumps of *Ulmus*, possibly also *Fraxinus* or *Populus*, 13. VIII. 1982 leg. A. Hausknecht (WU 2195); ditto, 21. IX. 1983 leg. A. Hausknecht (WU 3060); ditto, 27. VII. 1984 leg. A. Hausknecht (WU 3452); ditto, 10. VIII. 1984 leg. A. Hausknecht (herb. Hausknecht 1883.1); ditto, 14. VI. 1985 leg. A. Hausknecht (herb. Hausknecht 1883.2); ditto, 12. VI. 1987 leg. A. Hausknecht (WU 6111); Lower Austria, Großenzersdorf, Herrnau (MBT 7865/1), on dead log of broadleaved tree, 27. VII. 1984 leg. A. Hausknecht (WU 4120); ditto, 9. VI. 1989 leg. A. Hausknecht (WU 7522); Lower Austria, Krems, Grafenwörth (MTB 7560/3), on dead stump of broadleaved tree in Danube riverside forest, 16. VII. 1989 leg. A. Hausknecht (WU 7726).

CZECH REPUBLIC: Lanžhot (distr. Břeclav), riverside forest Ranšpurk, on decaying stem of a broadleaved tree, 26. VI. 1992 leg. & det. V. Antonín 92.28, A. Hausknecht & A. Vágner, BRNM 576441.

U.S.A.: Georgia, Rabun Co., Blue Ridge, Big Creek Area, on decaying stem of *Carya*, 11. VII. 1991 leg. & det. V. Antonín 91.161 BRNM 552745.

Hohenbuehelia angustata is characterized especcially by very small spores, rather narrow gelatinized layer in pileus and moderately to very crowded lamellae. According to its features, it belongs in subgen, *Hohenbuehelia*, stirps *Petaloides* (Singer 1975).

This species does not seem to be extremely rare in southern regions of the Czech Republic and Eastern Austria in riverside forests. However, it probably is

confused with apparently similar and rather common *H. atrocoerulea*. All European *Hohenbuehelia* species need other detailed monographic studies.

Miller (1984) published this species as *H. stratosa* (Atk.) Sing. and mentioned its probable conspecifity with *H. angustata*. His description differs by describing paler coloured pileus (dull white to pale tawny), and slightly smaller spores (3.5–5.5 × 3.0–4.4 μm); he has not desribed any presence of metuloids, however, metuloids without terminal incrustation are drawn in an accompanying table.

Singer & Kuthan (1980) synonymized *H. angustata* with *H. stratosa* and with *Pleurotus petaloides* f. *americana* Pilát. They described *Hohenbuehelia recedens* Sing. & Kuthan as a new species from Mexico nad Russia also with small spores (5.5–6.5(–7) × 3.5–4.0(–5.5) μm). However, it distinctly differs from our fungus especially by darker (fuscous, ochraceous- or melleous-fuscous, and macroscopically glabrous pileus (except for near base), well-developed stipe, more thick-walled and acute metulois and narrower gelatinous layer (70–80 μm).

Thorn & Barron (1986) also synonymized *H. angustata* with *H. stratosa* based on type studies. Their description of *H. angustata* agrees very well with our fungus except for slightly smaller spores (2.5–)3–5.5 × (2.5–)3.0–4.0 μm, and slightly deeper gelatinous layer (180–250 μm).

Singer (1989) published a new combination *H. tenuissima* (Schw.) Sing. which is very close to *H. angustata*. It should differ by the less deep gelatinous zone (10–50 μm) and very diluted pigment in pileipellis. Also close is *H. delasotae* Sing. (Singer 1989) from Argentina but it differs especcially by having acute and very thick-walled (up to 5 μm) metuloids, narrower gelatinous layer (20–30 μm) and slightly larger spores (5–6.7 × 3–4.5 μm).

Hohenbuehelia spathulina Huijsm, (Huijsman 1961) described in France differs especially by smaller pileus (up to 5 mm broad), well-developed stipe, different shape of cheilocystidia, very acute metuloids, and narrower gelatinous layer (40–50 μm).

Pegler (1977) described *H. aurantiopsis* Pegler from East Africa which differs especially by having pale brown coloured pileus, slightly smaller spores (4–6 × 3–4 μm), different shape of cheilocystidia, and reddish metuloids.

The North-American collection of *H. angustata* of the first author agrees well the original description and European fungi. The European findings show broader variability of size and form of carpophores. However, microfeatures are rather constant except for the gelatinized layer which seems to be wider in moist conditions. Therefore, we believe that collections from the Czech Republic and Austria belong to American *Hohenbuehelia angustata*, and differences discussed by Krisai-Greilhuber (1992) are too small for the delimitation of a separate species.

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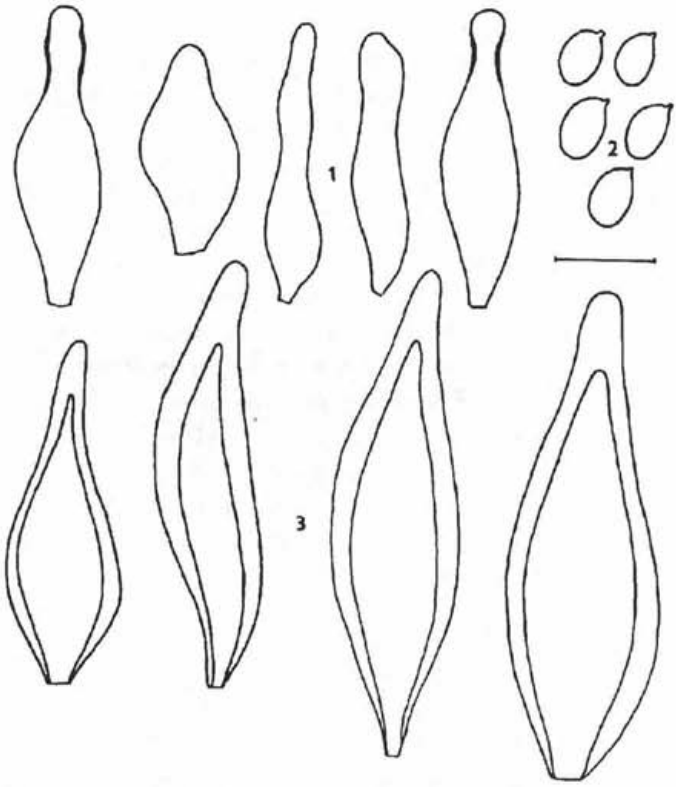

Fig. 1. *Hohenbuehelia angustata* (Lobau, Ranšpurk): 1. cheilocystidia; 2. basidiospores; 3. metuloids. Scale bar – 10 μm.

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Bookreview

PENIMAT: A computer assisted identification scheme for terverticillate Penicillium isolates. By P. D. BRIDGE, Z. KOZAKIEWICZ AND R. R. M. PATERSON. Mycological paper 165, Kew, International Mycological Institute, 1992. 59 pages + 3,5″ disk. Price £ 27.50, available from IMI, Bakeham Lane, Egham, Surrey TW20 9TY, UK.

Penicillium is commonly encountered genus of a significant role in natural ecosystems and in addition of a great economic importance. Although major progress in Penicillium systematics has been made during the last 15 years, identification of penicillia is still not always easy and requires experience. Especially the terverticillate penicillia belong to a critical group, within which clear-cut morphological characters are often lacking.

As the authors pointed out, the identification program PENIMAT was produced as a result of broad-based multi-disciplinary approach to the study of the terverticillate penicillia that started at IMI in 1984. During this study over 200 physiological, biochemical and morphological features of nearly 350 strains were examined and the results were subjected to numerical analysis. The package PENIMAT (PENicillium Identification MATrix) represents computer assisted probabilistic identification scheme. It differs from computer based dichotomous keys in achieving a quantified identification. It consists of two files, one containing the identification matrix and the other containing the identification program. The data matrix is based on 300 strains, including ex-type cultures and consists of 57 characters and 37 fungal groups. The characters are presented in five groups: 13 physiological characters (growth at 37° C, growth on several organic acids, growth on nitrite and creatin agar, yellow colour on CZ NH_4, etc.); 15 morphological characters from Czapek agar plate (colour of spores, texture of colony, size of colony etc.); eight microscopic features (conidiophore branching, spore length and width, surface structure of conidiophores); 13 secondary metabolite characters (for example brevianamid A, citrinin, chaetoglobosin C, penitrem A, terrein); and eight scanning electron microscopy characters (form a surface structure of conidia). The fungal groups represent 27 species and varieties and three distinct groups still without firm taxonomic status. The majority of the species belongs to the subgenus *Penicillium* (*P. atramentosum*, *P. aurantiogriseum* clusters 4 and 6, *P. aurantiogriseum* var. *neoechinulatum* and var. *melanoconidium*, *P. brevicompactum*, *P. camembertii*, *P. chrysogenum*, *P. claviforme*, *P. clavigerum*, *P. echinulatum*, *P. expansum*, *P. granulatum* var. *globosum*, var. *granulatum* and var. *mononematosum*, *P. griseofulvum*, *P. hirsutum*, *P. hirsutum* var. *allii*, *P. hordei*, *P. olivinoviride*, *P.*

roquefortii, *P. solitum* var. *solitum* and var. *crustosum*, *P. verrucosum*, and *P. viridicatum*). Three species belong to the subgenus Furcatum (*P. citrinum*, *P. corylophilum*, and *P. raistrickii*). Noteworthy, one critical terverticillate species, namely Penicillium commune, is not included in the identification matrix nor any authors' remarks on the taxonomic position of this species are mentioned. Use of the computer based key is very simple. Negative, positive, or unknown results are typed in the lists of characters on the screen as 0, 1, or 2, respectively. The identification is completed by the displaying of the most likely species name of the treated strain and of the likelihood score. After experience of the authors the "good" identification score will be in excess of 0.85. A screen may display the names and identification scores for the next two most likely species and full test results. If the score is lower, additional warnings about the quality of the identification are given and discrepant characters may be displayed. Certain characters, though, especially SEM and secondary metabolites features, are no doubt useful, but for many laboratories they may be difficult to achieve. Although the identification can be attempted from restricted numbers of characters, the result in this case is often failure in identification. Use of PENIMAT may also be complicated by the preparation of many different media for physiological tests. Of great value are descriptions of species, unfortunately they are somewhat brief. The brochure is completed three appendixes: data matrix, calculation of identification scores, and laboratory methods used including physiological, biochemical, and SEM methods.

This brochure is very valuable for the new approach of the authors, which is rarely used in filamentous fungi. It is very useful for mycologists working with Penicillium in the food industry, soil microbiology, mycotoxicology, etc.

Alena Kubátová

CZECH MYCOL. 47 (1), 1993

Some species of Cortinariaceae and Russulaceae in the alpine belt of the Belaer Tatras – II

ROSTISLAV FELLNER and JAROSLAV LANDA

Forestry and Game Management Research Institute, Strnady, 156 04 Praha 5 – Zbraslav, Czech Republic

Fellner R. and Landa J. (1993): Some species of Cortinariaceae and Russulaceae in the alpine belt of the Belaer Tatras – II. Czech Mycol. 47: 45–55

Nine agarics are reported from alpine, mostly calcareous habitats in the Belaer Tatras, Slovakia. Russula norvegica Reid, R. saliceticola (Sing.) Kühn. ex Knudsen & Borgen, R. pascua (Moell. & Schaeff.) Kühn. and R. cupreola Sarnari are recorded for the first time from Slovakia, Lactarius nanus Favre for the first time from the High Tatras. Illustrations and comments on their characters, delimitation and ecology are presented. Additional notes are given to differential characters between Russula dryadicola Fellner & Landa and Russula maculata Quél.

Key words: alpine fungi, *Russulaceae, Cortinariaceae*, Slovakia

Fellner R. and Landa J. (1993): Některé druhy Cortinariaceae a Russulaceae v alpinském pásmu Belánských Tater – II. Czech Mycol. 47: 45–55

Ve druhé části studie je pojednáno o devíti druzích lupenatých hub z alpinských, převážně vápencových poloh Belanských Tater na Slovensku. Poprvé jsou tu pro území Slovenska uváděny jako nové tyto druhy: Russula norvegica Reid, R. saliceticola (Sing.) Kühn. ex Knudsen & Borgen, R. pascua (Moell. & Schaeff.) Kühn. a R. cupreola Sarnari. Poprvé z Vysokých Tater je rovněž uváděn druh Lactarius nanus Favre. Studie obsahuje poznámky k jednotlivým druhům, jejich vymezení a ekologii a vyobrazení většiny diskutovaných taxonů. Současně je zařazen klíč ke všem druhům rodu Russula dosud známých z alpinských poloh Belanských Tater. V závěru jsou rozvedeny rozdíly mezi nedávno nově vymezeným druhem Russula dryadicola Fellner & Landa 1993, význačného svým výskytem pro arkto-alpinské oblasti, a teplomilným druhem Russula maculata Quél., charaketristickým pro vápencové oblasti nižších poloh.

The Belaer Tatras are situated in the most eastern calcareous part of the High Tatras Mts., northern Slovakia. In 1990–1991 the authors collected macromycetes growing in close association with dwarf-willow and *Dryas* plant communities in the alpine belt of the mountains (Fellner & Landa 1989, 1990, 1991; Fellner & al. 1990). First results of their study included a full description of two new taxons *Cortinarius tatrensis* Fellner & Landa and *Russula dryadicola* Fellner & Landa (Fellner & Landa 1993). Some other mycorrhizal species of *Inocybe*, *Hebeloma*, *Russula* and *Lactarius* are submitted here. But while all *Russula* and *Lactarius* species known to the authors from the alpine belt of the Belaer Tatras are described here in details, only two examples from genera *Inocybe* and *Hebeloma* are included. A more comprehensive study of cortinarioid fungi from the Tatras is in preparation. Exsiccata of all taxa recorded here are kept in personal herbaria of Fellner and Landa or in PRM.

CORTINARIACEAE

Inocybe geraniodora Favre, Champ. Sup. Zone Alp. Parc Nat. Suisse: 83, 200, 1955

Pileus 1–1.4 cm, convex, sometimes with a small papilla, dark brown, squamulose, fibrillose-squamulose to appressed fibrillose. – Lamellae ascending, ventricose, dark olivaceous brown, edge brown, fimbriate. – Stipe 2.5–3.5 × 0.2–0.25 (–0.35) cm, equal or curved, solid, fibrillose to fibrillose-squamulose, dark brown. – Context brown, sometimes with a pink tinge or even reddening on exposure. – Smell reminding one of *Pelargonium*, sometimes absent. Spores 13–15.7 × 7–8 μm, ellipsoid to subphaseoliform, smooth. – Basidia 40–50 × 9–11 μm, 4-spored. – Cheilocystidia 30–40 × 11.5–12.2 μm, clavate, thin-walled. – Caulocystidia similar to cheilocystidia, present only at apex of stipe.

Material examined:

Košiare, eastern slope – 1 960 m, *Dryas octopetala*, 23.8. 1990; Bujačí vrch, northeastern slope – 1 860–1 940 m, *Dryas octopetala*, 20.8. 1991.

Notes.

The question very often discussed is the absence of smell of *Pelargonium*. Both for Favre (1960) and Nespiak (1990) it was the reason to describe a new taxon. *Inocybe geraniodora* var. *depauperata* Favre differs in being larger and paler, the absence of smell and a reddening context. *Inocybe tatrae* Nespiak differs in being paler, with much longer stipe, earthy smell and pale context with an olivaceous-pink tinge. In the Belaer Tatras we were not able to find any pale specimens but the smell and the colour of context varied a little. While Kuyper (1986) or Nespiak (1990) rejected reddening of the context of stipe by *I. geraniodora*, Schmid-Heckel (1985) confirmed our observation. On the other hand we are not able to confirm any bluish green tinge in the lower half of the stipe as mentioned by Senn-Irlet (1987). *I. geraniodora* was first recorded from the Belaer Tatras by Kubička (1971) on the basis of his collections from August, 1957. Both his collections and ours were made in calcareous sites of a *Caricion firmae* Gams with pH 6.8–7.0, either in connection with *Salix jacquiniana* Willd. (= *S. alpina* Scop. p.p.) or with *Dryas octopetala* L. Our observations – in agreement with Favre's (1955) and Schmid-Heckel's (1985) data – do not confirm an acidophilous character of this species as it was proposed by Senn-Irlet (1987). *I. geraniodora* var. *velifera* (Kühner 1988) is another acidophilous taxon with a well developed white veil from *Salix herbacea* sites in the National Park of Vanoise which is not known yet from the Tatras.

Hebeloma marginatulum (Favre) Bruchet, Bull. Soc. Linn. Lyon, Suppl, 6:43, 1970 – Fig. 1, a–c.

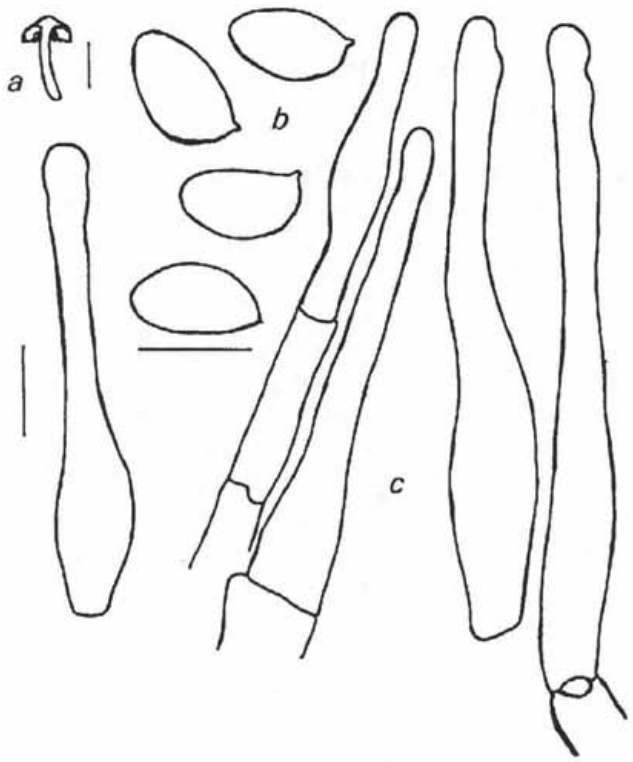

Fig. 1. *Hebeloma marginatulum* Favre: a. Fruit body. – b. Spores. – c. Cheilocystidia. Scale bar for illustrations: 1 cm – fruit body, 10 μm – microscopic characters.

Pileus 1–1.5 cm, convex, with a broad umbo, margin slightly involuted, not viscid, dark brown, without velar remnants near the margin. – Lamellae emarginate, narrowly attached to the stipe, broad, moderately crowded, ochraceous brown, edge white, fimbriate, without droplets. – Stipe 1.5–2 × 0.2–0.4 cm, cylindric, whitish, discolouring to brown with age from below. – Veil whitish, fugacious. – Context soon pale brownish in the pileus to darker brown in the stipe. – Smell raphanoid. – Taste slightly raphanoid or bitter.

Spores 10–13.8(–15) × 6–7.7(–8.7) μm, ellipsoid, only very slightly rugulose, indextrinoid. – Basidia 27–37 × 9.5–13 μm, 4-spored, subclavate, sterigmata 4.5–5 × 1.5–2 μm. – Cheilocystidia (33–)45–67 × (4.4–)4.7–6(–6.4) μm, ventricose, apical part cylindric or slightly capitate, near the base widened to 7.3–9.2 μm. – Caulocystidia similar. – Pleurocystidia absent. – Pileipellis up to 40 μm thick, of hyaline, narrow, partly gelatinised hyphae, subpellis of irregular elements with dark brown pigmentation.

Material examined:

Bujačí vrch, northwestern slope – 1 920 m, *Salix reticulata*, 23.8. 1990.

Notes.

The species was first recorded for Slovakia by Bruchet (1970). He collected it both in the granite part of the High Tatras (Predné Solisko by Štrbské pleso, 16.8. 1967) and in the calcareous sites in the Belaer Tatras (Hlúpy and Bujačí vrch, 22.8. 1967). In his opinion the species does not prefer calcareous sites to granite ones. Different views of some authors on the ecology of the species could be explained perhaps by this fact. Even the same author characterizes it once as the acidophilous species (Senn-Irlet, 1987), another time as a constant species for calciphilous snow-bed communities (Senn-Irlet, 1988). In addition to *Salix reticulata* particularly *Dryas octopetala* (Debaud, 1987) and *Salix herbacea* (Eynard, 1977) are assumed to be its most important hosts. A similar taxon, *Hebeloma bruchetii* Bon from the same section and subsection *Indusiata* (Fr.) Sacc. was described recently by Fellner & Landa (1989, 1990, 1991) from the western part of the High Tatras (as *Hebeloma repandum* Bruchet). It can be separated from *H. marginatulum* by the smaller spores, paler colours, the larger size and the early expanded pileus (cf. Vesterholt, 1989).

RUSSULACEAE

A short survey of alpine species of the genus *Russula* known from the Belaer Tatras:

Lamellae white, taste acrid

– Pileipellis blood red, discolouring to white, context becoming greyish, taste moderately acrid ..... *R. nana (Emeticinae)*

Lamellae creame to ochre, taste mild

– Pileipellis violet to purple, context not greying, taste very acrid ..... *R. norvegica (Atropurpurinae)*

– Pileipellis violet, not or slightly discolouring, stipe red flushed ..... *R. saliceticola (Sphagnophilinae)*

– Pileipellis ochre and pink, context becoming brown, smell of *Russula xerampelina* ..... *R. pascua (Viridantinae)*

Lamellae ochre to yellow, taste ± acrid

– Pileipellis vinaceous to purple, context fragile, taste acrid and persistent ..... *R. cupreola (Urentinae)*

– Pileipellis copper red-brown to yellow, context firm, taste slightly acrid or even mild ..... *R. dryadicola (Maculatinae)*

Russula nana Killermann, Denkschr. Bayer. Bot. Ges. Regensburg 20: 38, 1936

Material examined:

Hlúpy vrch – 2 020 m, *Salix reticulata*, 1.9. 1991 – 2 000 m, *Salix herbacea*, 1.9. 1991 – 1 980 m and 1 960 m, *Salix reticulata*, *Polygonum viviparum*, 1.9. 1991; Zadné Jatky, saddle – 1 950 m, *Dryas octopetala*, *Salix reticulata*, 1.9. 1991 – 1 940 m, *Salix herbacea*, 1.9. 1991; Predné Jatky – 2 000 m, *Dryas octopetala*, *Salix reticulata*, 1.9. 1991; Košiare – 2 000 m, *Salix reticulata*, 20.8. 1991; Košiare, eastern slope – 1 960 m, *Salix reticulata*, 23.8. 1990 – 1 940 m, *Salix reticulata*, 6.9. 1990; Bujačí vrch, northeastern slope – 1 880 m, *Salix reticulata*, 30.8. 1991 – 1 860 m, *Dryas octopetala*, *Salix reticulata*, 30.8. 1991.

Notes.

Russula nana is a common arctic-alpine species. Its distribution and ecology is treated by Gulden & al. (1985) and Skifte (1989). From Slovakia it is recorded from the West Tatras – Roháče (Tondl, 1988) and from the High Tatras – Červené vrchy (Fellner & Landa, 1989, 1990, 1991) and Furkota valley (Fellner & al. 1990). In the Belaer Tatras it is found frequently in different alpine stands with dwarf-willows, *Dryas octopetala* or *Polygonum viviparum*.

Russula norvegica Reid, Fung. Rar. Icon. Color. VI: 36, 1972 – Fig. 2, a–d.

Pileus 2–4.5 cm, convex, then plane or somewhat depressed, margin thin, on occasion slightly tuberculate striate; pileipellis dark violet to purple, discolouring along the margin to paler purplish red, old specimens finally discolouring to very pale purple overall or in spots, glabrous, slightly viscid when young, cuticle removable up to the middle of the cap. – Lamellae free to adnexed, moderately close, 3–5 mm broad, white, edge smooth, concolorous. – Spore print whitish. – Stipe 2.5–4.5 × 0.5–1.1 cm, subclavate, at apex narrower, fragile, stuffed, glabrous, slightly pruinose at apex, faintly veined, white, not becoming greyish but slightly wax yellowish. – Context fragile, white, with a narrow purple zone beneath the pileipellis, not greying, rapidly becoming pink with $FeSO_4$. – Taste very acrid. – Smell faintly fruity, distinctly fruity if the flesh is desiccated.

Spores 6.5–9 × 5.5–7 μm, medium size 8 × 6.3 μm, Q = 1.25, ellipsoid, coarsely verrucose and finely reticulated, warts 0,4–0.6 μm high, plage amyloid. – Basidia 34–42 × 10–12 μm, 4-spored. – Cystidia 60–95 × 10–12 μm.

Material examined:

Zadné Jatky, saddle – 1 940 m, *Salix herbacea*, *S. reticulata*, 1.9. 1991; Košiare – 2 000 m, *Salix reticulata*, 20.8. 1991; Košiare, eastern slope – 1 940 m, *Salix reticulata*, 6.9. 1990; Bujačí vrch, northeastern slope – 1 880 m, *Salix reticulata*, 30.8. 1991.

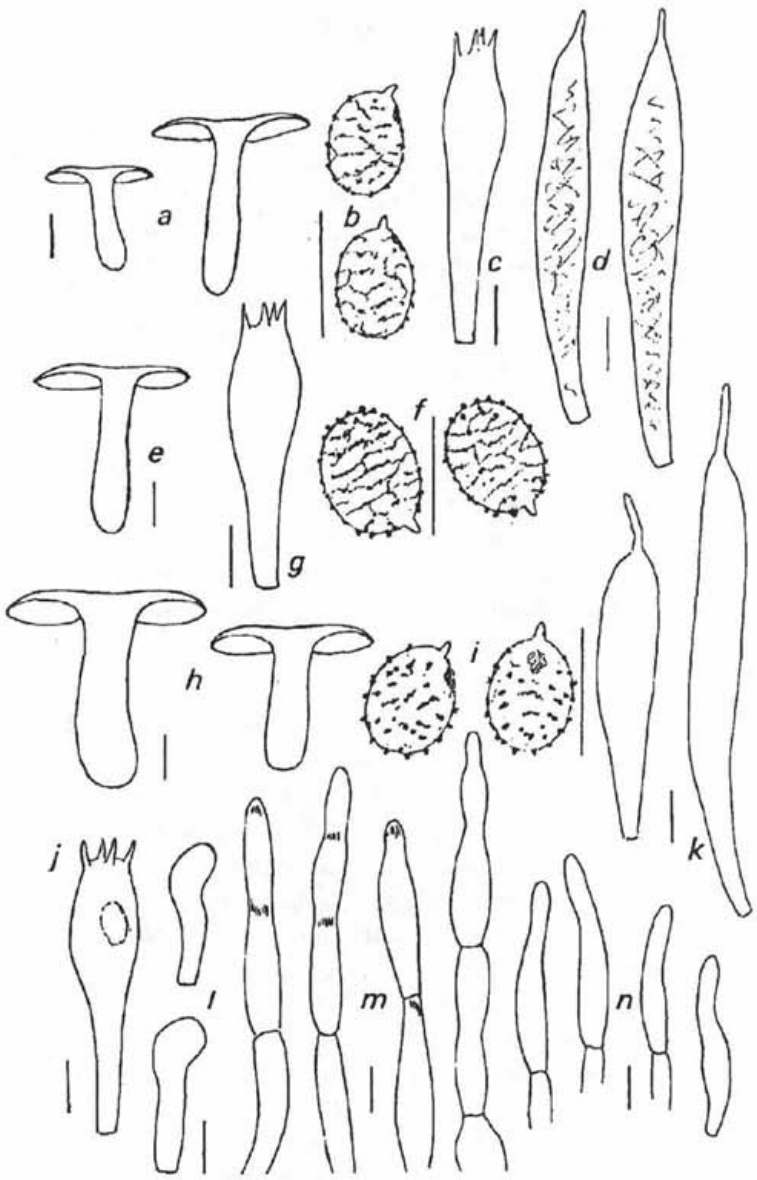

Fig. 2. *Russula norvegica* Reid: a. Fruit body. – b. Spores. – c. Basidia. – d. Cystidia. *Russula saliceticola* (Sing.) Kühn. ex Knudsen & Borgen: e. Fruit body – f. Spores. – g. Basidia. *Russula pascua* (Moell. & Schaeff.) Kühn.: h. Fruit body. – i. Spores. – j. Basidia. – k. Cystidia. – l. Extremities of hymenial hyphae. – m. Pileocystidia. – n. Hairs of pileipellis. Scale bar for illustrations: 1 cm – fruit bodies, 10 μm – microscopic characters.

Notes.

This is the first record of *Russula norvegica* from Slovakia. Its arctic-alpine distribution and ecology have been discussed by Gulden & al. (1985) and Skifte (1989). In the Belaer Tatras it is found mostly in mountain saddles (Zadné Jatky, Košiare – Bujačí vrch) in association with *Salix herbacea* and *S. reticulata*.

Russula saliceticola (Singer) Kühner ex Knudsen & Borgen in Laursen & Ammirati, Arctic and Alpine Mycology: 224, 1982 – Fig. 2, e–g.

Pileus 3–4 cm, plano-convex, margin thin, slightly striate; pileipellis dark violet, deep vinaceous purple, with a slight brownish tinge, not discolouring, glabrous, dry, almost mat, easily removable. – Lamellae free to adnexed, moderately close to subdistant, narrow, anastomosing, ca. 5 mm broad, deep cream to ochre, edge concolorous, pale. – Spore print cream or pale ochre. – Stipe 3.5 × 0.8–1.1 cm, equal, solid, mat, slightly pruinose at apex, white, slightly red flushed. – Context white, becoming brownish towards the base, with a purple zone beneath the pileipellis, rapidly becoming deep pink with $FeSO_4$. – Taste mild. – Smell reminding of *Clitocybe gibba* when the flesh is desiccated.

Spores 8.7–12 × 7–9.5 μm, medium size 10.4 × 8.4 μm, Q = 1.23, ellipsoid, densely verrucose, warts 0.5–0.8 μm high, more prominent towards the apices of the spores, connected with lines which form a more or less distinct net. – Basidia 43–48 × 11.3–15 μm, 4-spored.

Material examined:

Zadné Jatky, saddle – 1 940 m, *Salix herbacea*, *S. reticulata*, 1.9. 1991.

Notes.

Russula saliceticola is recorded for the first time from Slovakia. In the Belaer Tatras it was found only once, in the saddle Zadné Jatky in an acid site mixed with *Salix herbacea* and *S. reticulata*. Though our collection has slightly larger spores its other features agree well with literature data referenced below. The distribution and ecology is discussed by Kühner (1975), Schmid-Heckel (1985) and Skifte (1989).

Russula pascua (Moell. & Schaeff.) Kühner, Bull. Soc. Mycol. France 91: 331, 1975. – Fig. 2, h–n.

Pileus 2.5–5.5 cm, plano-convex, somewhat depressed and more fleshy in the centre, margin slightly striate; pileipellis ochre to ochre-yellow, towards the margin often pink, glabrous, margin mat, removable up to two thirds of the radius of pileus. – Lamellae adnexed, somewhat ventricose, 3–8 mm broad, moderately close to subdistant, cream, then pale ochre; edge smooth, concolorous. – Stipe 2–4.5 × 0.8–

1.5 cm, base 1.6–2 cm thick, subequal to clavate, solid, fleshy, stuffed, whitish to yellowish, slowly becoming brown, glabrous, mat faintly pruinose. – Context solid at first, slowly becoming brown, greyish green with $FeSO_4$. – Taste mild. – Smell of *Russula xerampelina*.

Spores 6.7–9.5 × 5.7–7.7 μm, medium size 7.9 × 6.6 μm, Q = 1.19 broadly ellipsoid, covered by isolated conical warts, 0.5–1(–1,3) μm high, rarely connected with short lines. – Basidia 34–45 × 10.5–12 μm, 4-spored. – Cystidia 9.5–11 μm broad. – Pileocystidia thin-walled, without any differentiated contents, not easily recognizable from hairs; terminal or subterminal articles of pileocystidia ventricose, 4–9 μm broad, apex obtuse, often constricted. – Hairs of pileipellis subcylindric, slightly flexuose, subventricose, 2.5–5(–6) μm broad.

Material examined:

Hlúpy vrch – 2020 m, *Salix reticulata*, 1.9. 1991 – 2 000 m, *Salix reticulata*, *Polygonum viviparum*, 1.9. 1991 – 1 980 m, *Salix reticulata*, 1.9. 1991; Zadné Jatky, saddle – 1 950 m, *Salix reticulata*, *Dryas octopetala*, 1.9. 1991; Predné Jatky – 2 000 m, *Salix reticulata*, 1.9. 1991; Košiare, eastern slope – 1 940 m, *Salix reticulata*, *Dryas octopetala*, 23.8. 1990 – 1 940 m, *Salix reticulata*, 23.8. 1990 and 6.9. 1990; Bujačí vrch, northeastern slope – 1 860 m, *Salix reticulata*, *Dryas octopetala*, 30.8. 1991; Kopské sedlo – 1 750 m, *Salix reticulata*, 1.9. 1991.

Notes.

Russula pascua is recorded for the first time from Slovakia. In the Belaer Tatras it is found in different alpine sites. Mostly it is associated with *Salix reticulata*. Singer (1975) considered his "inodore" *Russula oreina* Singer (1938) from Altai to be a synonym of *Russula pascua* (Moell. & Schaeff.). Knudsen & Borgen (1982) and Gulden & al. (1985) followed his opinion. On the contrary Bon (1988) treated these taxons separately. On the basis of our collections from the Belaer Tatras we are not able to decide upon this problem. At the time we prefer to follow the species concept of Kühner (1975).

Russula cupreola Sarnari, Boll. Ass. Mic. Ecol. Romana 20–21: 64, 1990 – Fig. 3, a–e.

Pileus 2.5–4.5 cm, convex, soon plano-convex, fragile, margin slightly striate, pileipellis deep vinaceous, vinaceous purple, when old somewhat discolouring, glabrous, viscid, removable. – Lamellae adnexed, rather close, thin, fragile, soon cream to ochre, then ochre to yellow, edge smooth, concolorous. – Spore print yellow. – Stipe 2–3.5 × 0.7–1.2(–1.4) cm, equal, fragile, white, glabrous, slightly veined. – Context very fragile, white colour not changing, pink with $FeSO_4$. – Taste slowly

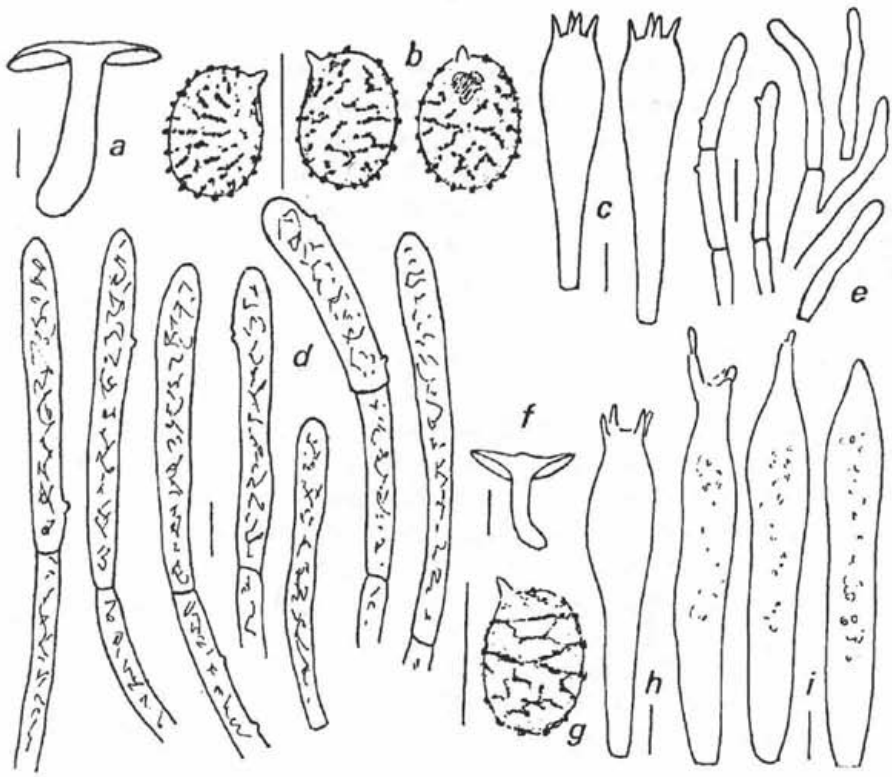

Fig. 3. *Russula cupreola* Sarnari: a. Fruit body – b. Spores. – c. Basidia. – d. Pileocystidia. – e. Hairs of pileipellis. *Lactarius nanus* Favre: f.Fruit body. – g. Spores. – h. Basidia. – i. Cystidia. Scale bar for illustrations: 1 cm – fruit bodies, 10 μm – microscopic characters.

acrid, not extremely but persistent. – Smell faintly fruity, if the flesh is desiccated then distinctly fruity.

Spores 7.7–9.5 × 6.2–7.8 μm, medium size 8.9 × 7 μm, $Q = 1.25$, with the exception of giant spores (5–20 %) ca. 11.5 × 9 μm, ellipsoid, densely covered by small obtuse warts, 0.4–1 μm high, arranged often in chains or connected with short lines, plage small, amyloid. – Basidia 40–53 × 11–16 μm, 4-spored.– Cystidia 10.5–13 μm broad. – Pileocystidia up to 150 × 4.2–9.3 μm, numerous, septate, occasionally diverticulate. – Hairs of pileipellis 1,8–4(–4.7) μm, often septate, occasionally diverticulate.

Material examined:

Zadné Jatky, saddle – 1 950 m, *Dryas octopetala, Salix reticulata*, 1.9. 1991; Predné Jatky – 2 000 m, *Dryas octopetala, Salix reticulata*, 1.9. 1991; Košiare – 2 000 m, *Salix reticulata*, 1.9. 1991.

Notes.

This is the first record of *Russula cupreola* from Slovakia. In the Belaer Tatras it is found rarely on calcareous soil with *Dryas octopetala* and *Salix reticulata*. The species is known (Sarnari 1990, 1991) only from the Swiss Alps, (Val Corno) and from Italy (Conca delle Pisse near Monte Rosa). Our collections differ from the original description (Sarnari 1990) by the absent olive tinge of the pileipellis, and spores with a little higher ornamentation. We assume that these differences are within the range of variability for this species.

Lactarius nanus Favre, Champ. Sup. Zone Alp. Parc Nat. Suisse: 205, 1955 – Fig. 3, f–i.

Pileus small 1.8–3 cm, then plane, depressed, in the centre subpapillate, pale brown to slightly vinaceous brown, glabrous, not zonate, margin plane when old. – Lamellae cinnamomeous to cinnamomeous brownish, adnexed or shortly decurrent, dense, narrow, with numerous lamellules, with drops of unchangeable watery white milk when damaged, milk slightly acrid. – Stipe 2–2.5 × 0.5–0.6 cm, pale ochre to cinnamomeous, frequently fistulose, fragile. – Context pale cream to cinnamomeous, ± mild, only milk acrid.

Spores 7.5–9.5 × 6–7.7 μm, medium size 8.5 × 6.7 μm, Q = 1.28, ellipsoid, crested, crests 0.4–1 μm high. – Basidia 36–46 × 9.2–12.3 μm, 4-spored. – Cystidia 48–65 × 7.5–9.5 μm, fusoid-mucronate.

Material examined:

Košiare – 1 980 m, *Polygonum viviparum*, 20.8. 1991 and 1.9. 1991.

Notes.

In the Belaer Tatras this species is found on acid soil in association with *Polygonum viviparum*. In Slovakia it is also reported from the Ďumbier Nature Reserve in the Low Tatras (Fellner & Landa 1989, 1990, 1991).

Lactarius salicis-reticulatae Kühner, Bull. Soc. Mycol. France 91: 389, 1975.

Material examined:

Zadné Jatky, saddle – 1 950 m, *Salix reticulata, Dryas octopetala*, 1.9. 1991; Košiare – 2 000 m, *Salix reticulata*, 20.8. 1991; Bujačí vrch, northeastern slope – 1 880 m, *Dryas octopetala, Salix reticulata*, 20.8. 1991.

Notes.

In the Belaer Tatras it is found on calcareous soil, mostly in association with *Salix*

reticulata. In Slovakia it is also reported from Červené Vrchy Mts. in the western part of the High Tatras (Fellner & Landa 1989, 1990, 1991).

ADDITIONAL NOTES TO RUSSULA DRYADICOLA

In the first part of this study (Fellner & Landa 1993) a full description of *Russula dryadicola* Fellner & Landa was given. We decided to describe it as a new taxon on the basis of our comparison between the collection from the Belaer Tatras in alpine *Dryas* sites and collections of typical specimens of *Russula maculata* Quél. from the Czech Karst in planar oak sites (Central Bohemia: Prostřední vrch by Karlštejn, 310 m, in association with *Quercus pubescens*, 16.7. 1992).

In comparision to *Russula dryadicola* the main characters of *Russula maculata* are size of pileus 8–10 cm, bright orange colours of pileipellis, taste very acrid, fluorescence in UV light more intensive, spores (medium size 9.1 × 8.0 μm) covered with warts, 0.4–1.5 μm high, connected with occasional short lines, cystidia 8–13 μm broad, pileocystidia very variable in their breadth: 2.4–14.4 μm, caulocystidia 2.6–16.0 μm broad, very numerous, in fascicles, hairs of pileipellis and stipitipellis very narrow, cylindric to filiform, flexuose, obtuse, in pileipellis 1.5–4 μm broad, in stipitipellis 1.7–3.4 μm broad and scattered. – Fig. 4, a–h.

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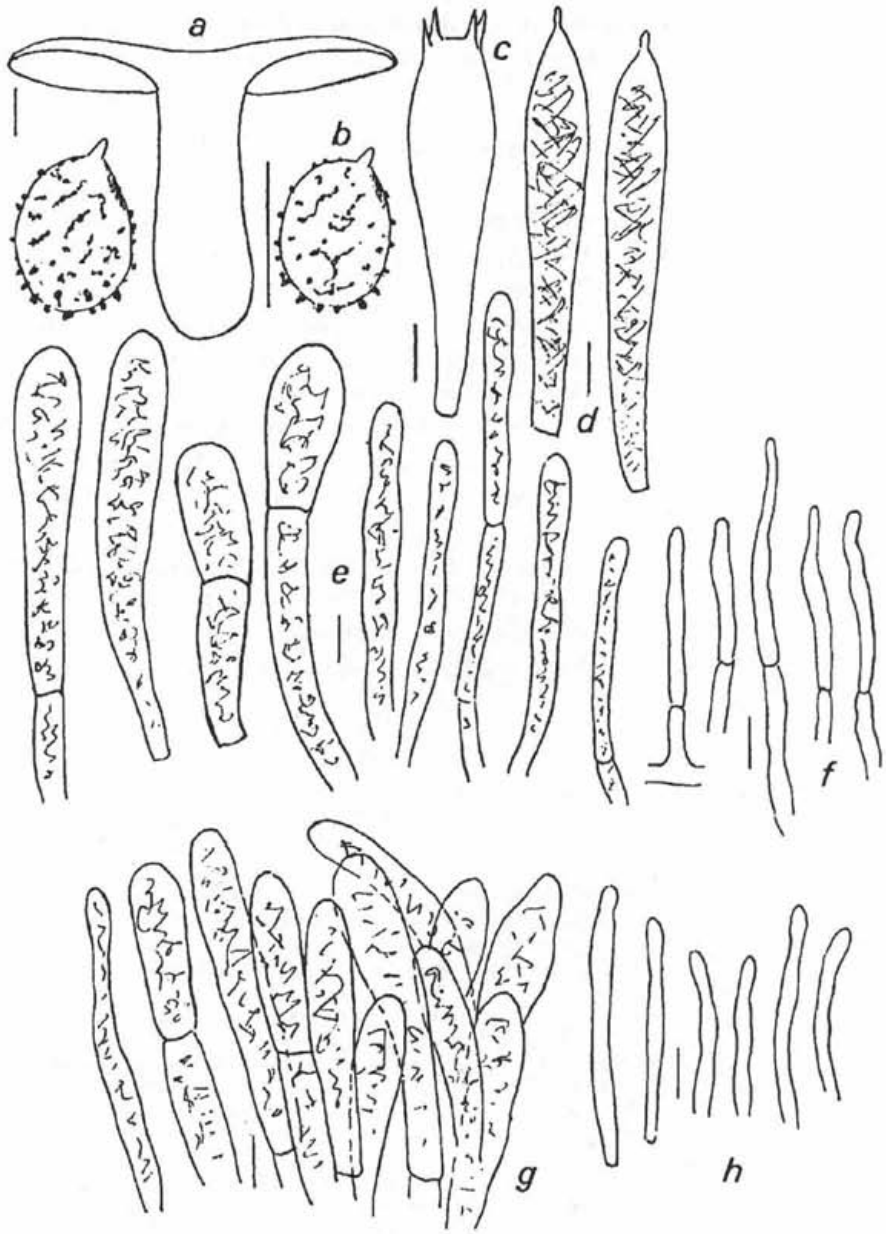

Fig. 4. *Russula maculata* Quél.: a. Fruit body. – b. Spores. – c. Basidia. – d. Cystidia. – e. Pileocystidia. – f. Hairs of pileipellis. – g. Caulocystidia. – h. Hairs of stipitipellis. Scale bar for illustriations: 1 cm – fruit body, 1 μm – microscopic characters.

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Oligoporus folliculocystidiatus, a new polypore species allied to Oligoporus cerifluus

FRANTIŠEK KOTLABA[1] and PETR VAMPOLA[2]

[1]Na Petřinách 10, 162 00 Praha 6, Czech Republic;
[2]Žižkova 87, 586 01 Jihlava, Czech Republic

Kotlaba F. and Vampola P. (1993): Oligoporus folliculocystidiatus, a new polypore species allied to Oligoporus cerifluus. Czech Mycol. 47: 59–62

A new species of the Polyporaceae, Oligoporus folliculocystidiatus Kotl. et Vampola is described from a collection of several carpophores near Borovsko in Central Bohemia (Czech Republic). This species is remarkable for its numerous small lustrous drops of resinous matter on the pileal surface and on the pore edges as well as the thin-walled hymenial cystidia with a widely clavate to globose shape of upper parts.

Key words: *Polypores, Oligoporus folliculocystidiatus*, Czech Republic

Kotlaba F. and Vampola P. (1993): Oligoporus folliculocystidiatus, nový druh choroše z příbuzenstva Oligoporus cerifluus. Czech Mycol. 47: 59–62

Je popsán nový druh chorošů Oligoporus folliculocystidiatus Kotl. et Vampola podle nálezu několika plodnic na pařezu smrku ztepilého (Picea abies) v údolí řeky Želivky u Borovska ve středních Čechách (24. V. 1964, leg. F. Kotlaba).

Tento druh tvoří jednoleté, až 2,5 cm široké kloboukaté plodnice, které jsou v mládí kápovité, v dospělosti okrouhle terčovité a v jednom místě hřbetem přirostlé k substrátu. Plodnice rostou jednotlivě nebo 2–4 srůstají dohromady. Povrch klobouků i rourky jsou nejprve bělavé nebo krémové, později bledě žluté.

Význačnými rozlišovacími znaky jsou četné drobné lesklé kapičky resinózní hmoty na povrchu klobouků a ostří rourek a zejména unikátní tenkostěnné hymeniální cystidy, které jsou v horní části široce kyjovité až nápadně kulovité. I když tyto znaky téměř vylučují možnost omylu při determinaci, autoři přesto diskutují nejdůležitější rozlišovací znaky několika podobných druhů.

The first author collected an interesting polypore in the valley of the river Želivka near the village Borovsko at Dolní Kralovice (an serpentine area) in Central Bohemia (Czech Republic) in 1964, which was at that time identified as *Tyromyces revolutus* and was published as *T. cerifluus*, being one of the three Czechoslovak finds (Kotlaba 1984).

Almost 30 years later, the second author studied the types of *Polyporus cerifluus* Berk. et Curt. (K) and *Polystictus revolutus* Bres. (S), simultaneously revising the collections from the territory of the former Czechoslovakia. This revision showed that the collection from near Borovsko belonged to another species, which is here described as new.

Oligoporus folliculocystidiatus Kotlaba et Vampola, sp. nov.

Carposomata annua, solitaria vel duo usque quatuor concrescentia, pileata, rotundato-discoidea, dorso umbonato adnata, margine distincte involuto, albida,

cremea vel pallide lutea; superficies pilei adpresse velutina usque fibrillosa, in recentibus alba, in siccatis lutea, cum guttulis resinosis lucidis melleis (praecipue ad marginem pilei).

Hymenophorum tubulosum, poris irregulariter angulatis, parvis (3–5 per 1 mm), ostiolis oculo lente armato distincte laciniatis et guttulis parvulis resinosis, lucidulis, pallide melleis praeditis.

Trama in recentibus alba, mollis, in siccatis eburnea, fragilis; sapor lenis.

Systema hypharum monomiticum; hyphae generativae sparse remificatae, fibulatae, tenuiter usque crasso-tunicatae (nonnumquam subsolidae), 2–6 μm crassae. Subhymenium tenue, parum evolutum. Basidia angusto-clavata, tetraterigmatica, 10–16 × 4–6 μm. Basidiosporae oblongo-ellispoideae usque breviter cylindricae, apice rotundatae, ad apiculum celeriter contractae, laeves, tenuiter tunicatae, hyalinae, nec amyloideae, nec dextrinoideae neque cyanophilae, 4.3–6.3 × 2–2.8 μm. Cystidia robusta (raro tenera), aliquantum polymorpha, plerumque pedicellato plus minusve late-obovata, tenuiter tunicata, 15–25 × 3–13 μm. Chlamydosporae ellipsoideae, crasso-tunicatae, laeves, hyalinae, 4–6.5 × 3–4.3 μm.

Holotypus: Bohemia, Borovsko prope Dolní Kralovice, in valle rivi Želivka, ad codicem *Piceae abietis*, 24. V. 1964, leg. F. Kotlaba, in herbario Musei Nationalis Pragae asservatur (PRM 604499).

Carpophores are annual, pileate, solitary or 2–4 growing together, rounded or elongated, up to 2.5 cm wide, attached by a dorsal constriction of the pileus and adpressed at maturity, with an involute margin, whitish, then cream or pale yellow, nearly cucullar when young and elongated into some sort of a false stipe up to 0.5 cm long at the point of attachment. Pileal surface is finely velutinous to adpressed hairy-felty with small lustrous resinous drops of a light honey colour, whitish when fresh, cream to pale yellow when dried (herbaria), with young carpophores somewhat wrinkled, especially at the margin, later finely radially furrowed. A membranaceous sterile margin of pilei of young cucullate carpophores is loosely hanging but adult carpophores have a margin rather repandous and strikingly involute. Tubes are thin-walled, up to 5 mm long, with laciniate edges. Pores are irregularly angulate, 3–5 per mm, whitish when young, later pale yellow and up to deep yellow in exsiccates; context is whitish, soft when fresh, without any change from the context to the tubulotrama; taste mild (on exsiccate). The imperfect state, as a whitish, initally finely arachnoideus, later a powdery layer, is often possible to observe on wood near the perfect carpophores.

Hyphal system monomitic with clamped generative hyphae, which are 2–6 μm wide, sparsely ramified, locally sparsely and coarsely encrusted. The hyphal walls swell inwardly in KOH solution with the lumen gradually disappearing. Similar hyphae occur in both context and tubulotrama with only the tips of the thin-walled hyphae on the tube edges sometimes differing by their clavate-dilated shape and up to 8 μm thick. The hymenium is formed of basidia, basidiola and rather

plentiful cystidia. Basidia are tetrasterigmatic, clavate-like, with a basal clamp, 10–16 × 4–6 μm. Cystidia, which are the most striking microfeature, are locally plentiful, thin-walled, mostly widely clavate to globose in their upper parts; exceptionaly it is possible to find deformed cystidia which are constricted-clavate or irregularly cylindrical.

Basidiospores are elongated ellipsoid to short-cylindrical with a sharply pointed apiculus, smooth, thin-walled, hyaline, inamyloid, indextrinoid and acyanophilous, 4.3–6.3 × 2–2.8 μm. Chlamydospores are ellipsoid, thick-walled, under the microscope pale yellow, 4–6.5 × 3–4.3 μm.

As mentioned above, quite unique and for correct identification, the most important features are the small lustrous drops of a resinous matter on the pileal surface and edges of pores as well as thin-walled, clavate-spherical to globose cystidia in the hymenium. These features are very significant and in *Oligoporus* this species cannot be mistaken during identification. In spite of this fact, we list several species of polypores, in which some distinguishing features may be similar.

Oligoporus balsameus (Peck) Gilbn. et Ryv. exceptionally may possess carpophores of a similar discoid shape. Microscopically, however, it differs in the shape of the cystidia which are most often spindle-like, sometimes with a more thickned wall. As, however, already mentioned by Kotlaba and Pouzar (1968), the cystidia of *O. balsameus* are rather variable in shape and, moreover, it is often necessary to examine several preparations under microscope to find them.

Oligoporus cerifluus (Berk. et Curt.) Gilbn. et Ryv. differs by somewhat smaller spores and by the absence of cystidia. We can confirm that this species is really identical with *Polystictus revolutus* Bres., and from *O. folliculocystidiatus* it is distinguishable also by the subhymenial layer, which is formed by strikingly twisted hyphae with plentiful short excrescences; this layer is well figured by David (1980).

Oligoporus leucomalellus (Murrill) Gilbn. et Ryv. has softer carpophores when fresh, which are very fragile after drying and, in herbaria, are often crushed. Microscopically it differs by the slender spores and by the presence of gloeocystidia in the hymenium. Gloeocystidia are mostly clavate and contain a yellowish, light-refracting substance.

Oligoporus lowei (Pil. ex Pil.) Gilbn. et Ryv. differs primarily by its slender spores and the absence of cystidia in the hymenium.

Perfect carpophores of *Oligoporus ptychogaster* (F. Ludwig) R. et O. Falck may sometimes also have a similar shape. The imperfect state, with chlamydospores, of this species is better known and also more abundant then the perfect carpophores, which are only rarely found. From *O. folliculocystidiatus* it is distinguishable by hyphae, which are always thin-walled, and, also, the hymenium, which contains no other elements apart from the basidia.

Oligoporus minusculoides (Pil. ex Pil.) Gilbn. et Ryv. has carpophores, which also develop from one very small place but are strikingly smaller and the hymenophore

is often only formed of a few tubes. Microscopically, it differs mainly by narrowly spindle-like cystidioles in the hymenium and its consistently thin-walled hyphae.

Regarding the distribution and ecology of *O. folliculocystidiatus*, it is impossible to form any conclusions from the single collection. Nevertheless we suppose that this polypore occurs on conifers in the whole northern temperate zone; it most probably causes a brown rot of wood. In spite of the fact that this new polypores is described on the basis of a single find of only a few carpophores from one locality in Bohemia, we suppose that it surely grows also in other countries, but has been confused with other similar species. The revision of herbaria or further new collections may confirm our assumptions.

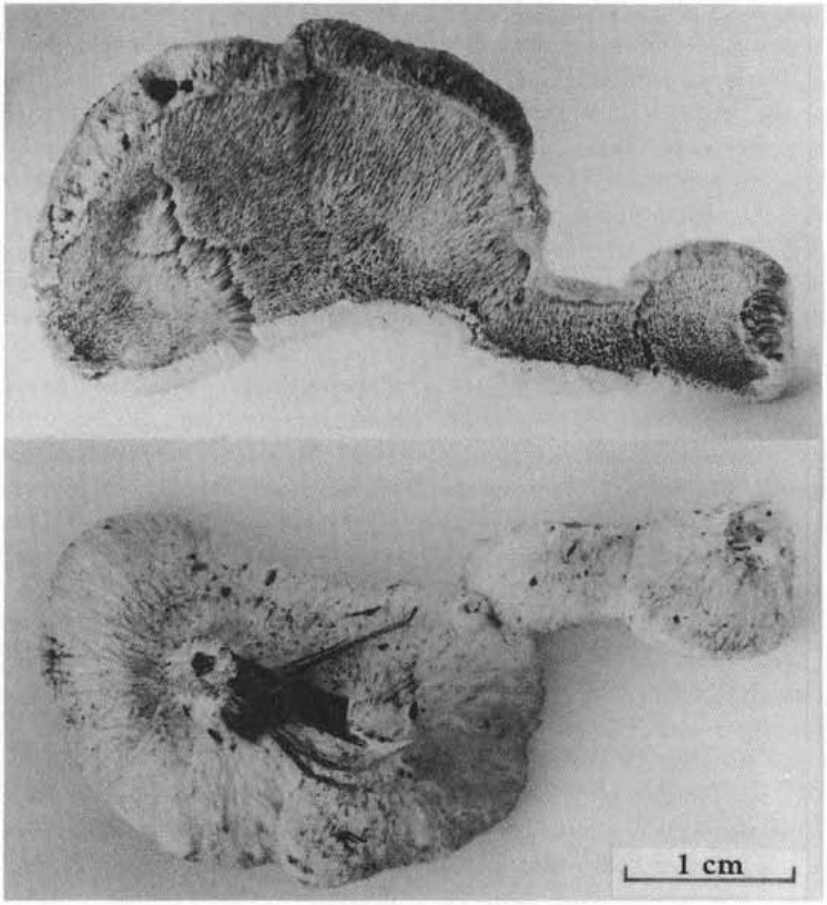

Fig. 1. *Oligoporus folliculocystidiatus* Kotl. et Vampola – Holotypus. Borovsko at Dolní Kralovice (Central Bohemia), on a stump of *Picea abies*, 29. V. 1964, leg. F. Kotlaba (PRM 604499). Photo P. Vampola

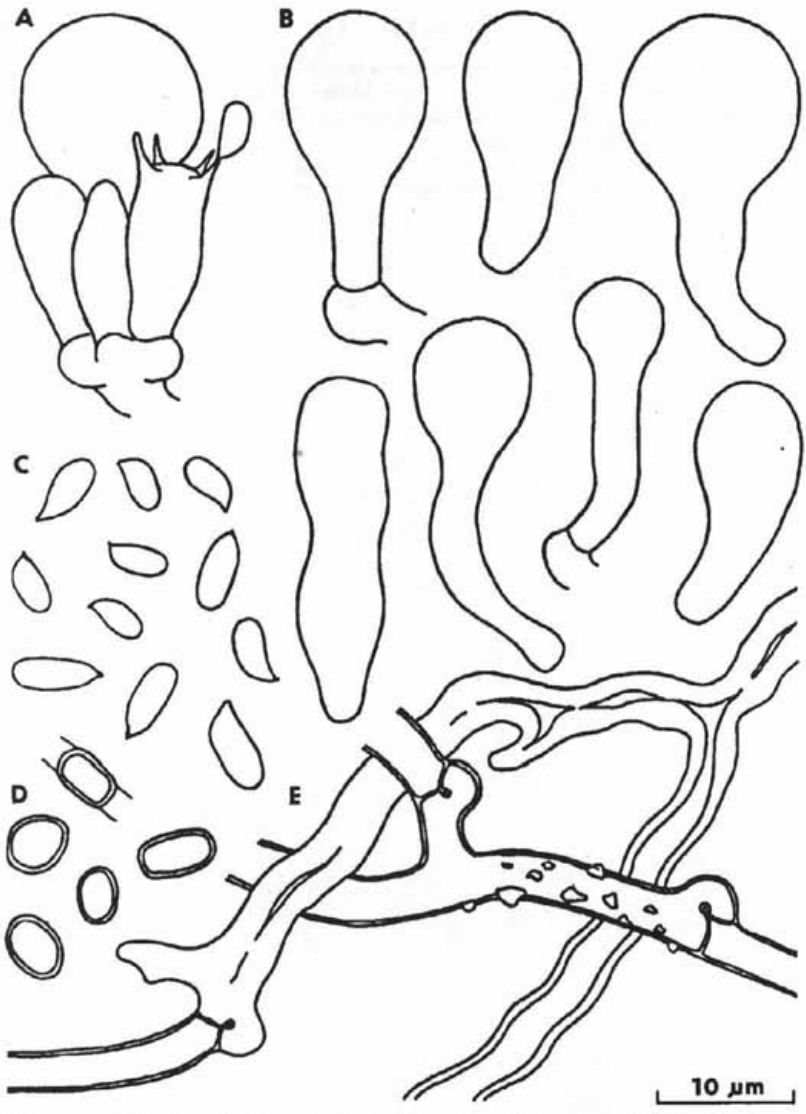

Fig. 2. *Oligoporus folliculocystidiatus* Kotl. et Vampola. A) fragment of hymenium, B) cystidia, C) basidiospores, D) chlamydospores, E) generative hyphae
Del. P. Vampola

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Enzyme N-acetyl-β-D-glucosaminidase (NAG) as an early marker of intoxications by the Cortinarius species (nephrotoxic syndrom)

JAROSLAV KLÁN and DANA BAUDIŠOVÁ

Institute of Toxicology and Forensic Chemistry, Charles University, National Labor. for Mushroom Toxins, Na bojišti 3, 121 08 Prague 2, Czech Republic

Klán J. and Baudišová D. (1993): Enzyme N-acetyl-β-D-glucosaminidase (NAG) as an early marker of intoxications by the Cortinarius species (nephrotoxic syndrom). Czech Mycol. 47: 65–70

The enzyme N-acetyl-β-D-glucosaminidase (EC 3.2.1.30; NAG) was evaluated as a marker of intoxications by the Cortinarius mushroom (nephrotoxic syndrom). Enzyme activity was measured in the urine after i.p. applications of Cortinarius orellanus (Fr.) Fr. and C. rubellus Cooke species, respectively, by fluorimetric and/or colorimetric methods. Considerably higher level of the enzyme (up to 50 times) was observed already on the first day after intoxication, when others markers of renal damage (e.g. hematuria) were without changes. The high level of enzyme activity was detected up to 4th day after intoxication. The picture of intoxication was completed by determination of the urea level in serum and by histological examinations.

Key words: *Cortinarius* species, nephrotoxic syndrom, enzyme N-acetyl-β-glucosaminidase

Klán J. and Baudišová D. (1993): Enzym N-acetyl-β-D-glucosaminidázy (NAG) jako časný marker intoxikace druhy rodu Cortinarius (nefrotoxický syndrom). Czech Mycol. 47: 65–70

Enzym N-acetyl-β-D-glucosaminidasa (EC 3.2.1.30) byl posuzován jako časný marker intoxikace nefrotoxickými druhy rodu Cortinarius. Aktivita enzymu byla měřena v moči laboratorních potkanů po intraperitoneální aplikaci druhů Cortinarius orellanus (Fr.) Fr. a C. rubellus Cooke fluorimetricky a kolorimetricky. K významnému zvýšení aktivity (až padesátinásobnému), došlo již první den po intoxikaci, kdy další markery renálního poškození (např. hematurie) ještě změněny nebyly. Zvýšená hladina aktivity enzymu byla u neuhynulých zvířat zaznamenána až do 4. dne po intoxikaci. Výsledky jsou doplněny stanovením močoviny v séru a histologickým vyšetřením ledvin.

INTRODUCTION

A severe poisoning resulting in acute renal failure and several cases of fatal intoxications can be caused by certain *Cortinarius* species (Lincoff and Mitchel 1977, Rumack and Salzman 1978). It have been firstly reported by Grzymala (1957). Post mortem microscopic examination revealed tubular necrosis and interstitial nephritis. A slightly acidic crude substance was isolated from *Cortinarius orellanus* and demonstrated to be toxic in animal experiments (Grzymala 1962). Antkowiak and Gessner (1979) reported the structure of orellanine as 3,3',4,4',-tetrahydroxy-2,2'-bipyridine-N,N',-dioxide which was later confirmed by other authors (Holmdahl et al. 1987, Prast et al. 1988, Rapior et al. 1989, Richard et al. 1988). Kürnsteiner and Moser (1981) express some doubts with respect to some physical and chemical

properties of drug, but they isolated orellanine as Na-salt. In addition to orellanine Prast et al. (1988) found a nonfluorescent compound of minor toxicity. Quite different conclusions were published by Testa (1970) and Tebett and Caddy (1983) who assumed that the toxic compounds are polypeptides – cortinarins. Matthies and Laatsch (1991) and Matthies et al. (1991) were not able to reproduce the isolation of fluorescent or any other cyclic peptides related to cortinarins.

Nephrotoxic syndrom belongs to the most serious mushroom poisoning. The toxicity was proved in two species – *Cortinarius orellanus* (Fr.) Fr. and *C. rubellus* Cooke (Syn.: *C. speciosissimus* Kühn. et Romagn., *C. orellanoides* Henry) and it is also probable in *C. gentilis* (Fr.) Fr. and *C. splendens* Henry. Poisonings caused by nephrotoxic *Cortinarius spp.* were noted in our country (Bouška et al. 1980, Středová et al. 1978).

The selective damage of kidney was studied by a number of authors using histological methods. Two days after intoxication Nieminen et al. (1976) observed first symptoms of kidney damage intersticial infiltrates occuring mainly in the outer medullary zone and necrotic changes mainly in tubuli of the corticial zone. Richard et al. (1988) administered pure orellanine isolated from *Cortinarius orellanus* fruit bodies to mice. Histological examinations revealed tubular necrosis in the cortex corticis, frequent in distal convulated tubules. Glomeruli and proximal tubules were undamaged. Holmdahl et al. (1987) who also used pure orellanine isolated from *Cortinarius speciosissimus* described the histological picture of kidneys of experimental animals as intersticial nephritis and tubular necrosis. The proximal tubules were dilated and flattened. Pigment casts were found in the collecting tubules and in the proximal tubules of the cortex. Bouška and Klán (1987) described histological changes in rat kidney after i.p. administration of powdered *Cortinarius speciosissimus* as tubulointerstitial nephritis. Epitelium of the proximal tubule was first damaged and inflammatory changes in the intersticium occured later. Human intoxications by *Cortinarius* species has a very long latency period (more than 48 h). In experimental intoxications in rats by *Cortinarius orellanoides* histological changes in kidney could be observed already on the first day after intoxication (Bouška and Klán 1987, Prast and Pfaller 1988). Therefore, a biochemical marker reflecting the above mentioned changes and which could be used as an early indication of intoxication is looked for.

Urinary enzymes are particularly useful for the detection of acute renal damage, as e.g. in acute renal tubular necrosis (Price 1982, Bernard et al. 1984). For instance, decreasing of alkaline phosphatase level in urine on the first day after intoxication by *Cortinarius orellanus* is described (Prast and Pfaller 1988, Moser 1981).

Since the proximal tubule seems to be primary target site N-acetyl-β-D-glucosaminidase (NAG) was chosen as a marker of tubular damage. In the kidney it accumulates in the proximal tubule cells and also in the papilla and glomeruli; its increase level in urine could indicate cell damage. Although the enzyme is

ubiquitous, it is not filtered through the glomerulus due to its high molecular weigh (300–400 kD) and its presence in urine has to stem from the cells of tubules. The enzyme exists in the form of two isoenzymes: isoenzyme A, which amounts to 95 % of the total and occurs in the soluble contents of lysosomes, whereas isoenzyme B (5 %) is bound to lysosomal membranes and its excretion indicates a severe renal damage. We examined the total amount of the enzyme in urine after an intraperitoneal application of suspensions of homogenized fruit bodies *Cortinarius orellanus* (Fr.) Fr. and *C. rubellus* Cooke (Syn. *C. orellanoides* Henry, *C. speciosissimus* Kühn. et Romang.).

MATHERIAL AND METHODS

Suspensions of dried homogenized fruit bodies of *Cortinarius orellanus* Fr.: Fr. and *C. rubellus* Cooke in 0.2 % agar were applied intraperitoneally at doses of 177 ± 9.5 mg/kg and 124 ± 13 mg/kg body wt to male Wistar rats ($n = 22$, preclinical data: weight (g) $\bar{x} = 166.45$, S_D 24.35; NAG in urine (nkat/1) 2.115, S_D 1.85; urea in serum (mmol/1) 3.52, S_D 0.328; pH of urine 6.5–7.5; proteinuria less than 0.1 g/1; hematuria less that 5.10^6 ery/1. Controls received the same amount of nontoxic Cortinarius armillatus (Fr.) Fr. ($n = 6$) or the only 0.2 % agar suspension (2 ml) ($n = 6$). The animals were housed individually in metabolic cages. They were allowed water ad libidum. Urine was collected twice a day in intervals 12 hrs and frozen to −25° C.

Total NAG activity was assayed in intervals 24 hrs fluorimetrically using 4-methyl-umbelliferyl-N-acetyl-β-D-glucosaminidase as substrate (excitation 360 nm, emission 450 nm), incubation was at pH 5.0 (Na-citrate buffer) and 37° C (Leaback and Walker 1961), modification by Haragsim et al. (1990), and colorimetrically using p-nitrophenyl-N-acetyl-β-D-glucosaminidase as substrate ($A_{max} = 420$ nm). Urea in serum was assayed using the o-phtaldialdehyde method (Statim test Urea 13F), hematuria was measured in intervals 24 hrs using diagnostic test stirps "Hexaphan". In the end of experiment kidneys were examined histologically, paraffine slices stained with hematoxyline-eosine according to Bouška and Klán (1987).

Statistical evaluation was performed in a Vectra computer using methods of the program block Statgraphics, version 2.6 (Two sample analysis, standard deviation, t-test, HO hypothesis).

RESULTS AND DISCUSSION

Activities of NAG after intoxication by *Cortinarius orellanus* and *C. rubellus* species are summarized in Tables 2 and 3. It follows from the tables that the remarkable increase of activity of N-acetyl-β-D-glucosaminidase was proved after intoxication by both species studied. The activity increased 6–7 times as compared with controls (day 0) and control groups with nontoxic Cortinarius armillatus application (tab. 1) or without mushroom application already on the first day after introxication (see Fig. 1). Absolute activity values were up to 40–50 nkat/1. In all experimental animals the absolute activity increased at least 4 times (as compared with values before intoxication), in more that 50 % at least 10 times, in 80 % animals this increase could be observed 24 h after intoxication.

Hematuria occured in most animals in about 48–60 h after intoxication. The increase (as compared to controls) was not proved on the first day (see Tab. 4).

Determination of urea in serum on the 4th day after intoxication served as biochemical control of renal damage. A 7-fold increase $\bar{x} = 26.80$ mmol/1, S_D 8.35, $t = 9.63$, $P < 0.001$) with respect of values before intoxication could be observed.

Six rats of 22 experimental animals (i.e. 27 %) died 3–4 day after intoxication.

Dissections at the end of experiments showed hypertrophy of kidney (Fig. 2) in majority of animals, histological examination proved dystrophic changes of proximal tubules (Fig. 3) in all animals in agreement with Holmdahl et al. (1987), while control animals had no changes in their proximal tubules.

Any significant correlation between the absolute value of activity of the excrete enzyme and intensity of renal damage (histological findings, urea level in the serum, death) was not observed.

Renal of damage after application of Cortinarius rubellus appeared to be more serious, however, the amount of toxins in fruit bodies was not determined quantitatively.

When investigating the enzyme kinetics three possibilities were found:

1. In 32 % of animals ($n = 8$) majority of the enzyme was excreted in 24 h after intoxication ($\bar{x} = 21.69$ nkat/1, S_D 13.86, $P < 0.001$) and the excretion decreased continuously later on. Increasing of NAG activity was not proved on the 5th day after intoxication as compared with controls ($P>0.05$). In such cases, in spite of the fact, that absolute activity values of the excreted enzyme were higher (71 % of animals more than 20 nkat/1), percentage of dead animals was low (only 14 %) (see Fig. 4., curve A).

2. In 41 % of animals ($n = 9$) the enzyme excreted in two waves after 1 d ($\bar{x} =$ 10.4 nkat/1, $S_D = 7.27$, $P < 0.001$) and after 3 d ($\bar{x} = 11.11$ nkat/1, $S_D = 7.27$, $P < 0.001$) after intoxication. Such cases were the most frequent, but the activity peaks were low (more that 20 nkat/1 in only 44 % of animals). Lethality was 33 %. In these cases a gradual damage of the tubule probably occured (Fig. 4, curve B).

3. In 37 % ($n = 6$) of animals a "delayed" enzyme excretion occured 3 d after intoxication ($\bar{x} = 21.64$ nkat/1, $S_D = 16.25$, $P < 0.005$). Such cases were observed least frequently, however, lethality was the same as in case B (33 %). In 66 % of animals maximum NAG activity values reached more than 20 nkat/1. (see Fig. 4, curve C).

When evaluating results it should be kept in mind that a model is involved which only resembles the state in human pathology. However, it is clear already now that NAG activity cannot be used in diabetes, high blood pressure and in renal damage of other fungal origin. Theoretically even Retinol binding protein (RPB) in urine is more reliable, stable and probably more specific index of proximal tubular dysfunction. However this assumption would have to be demonstrated experimentally.

Generally, it can be concluded, that intoxications by nephrotoxic *Cortinarius* species are associated with decreasing of the level of alkaline phosphatase (measured by Prast and Pfaller 1988, Pfaller et al. 1991) and increasing of NAG activity in urine already on the first day after administration. In this time, all others markers of renal damage (e.g. hematuria) are without changes.

Tab. 1
NAG activity after application of nontoxic *Cortinarius armillatus* (control group) ($n = 6$)

Day	$\bar{x}$ (nkat/1)	S_D	t-test	P-values
0	2.48	2.51		
1	3.00	1.18	0.460	more than 0.05
2	2.74	2.69	0.165	more than 0.05
3	3.10	3.63	0.564	more than 0.05
4	2.99	2.51	0.224	more than 0.05

Tab. 2
NAG activity after intoxication by *Cortinarius orellanus* ($n = 16$)

Day	$\bar{x}$ (nkat/1)	S_D	t-test	P-values
0	2.48	1.89		
1	14.87	12.49	3.983	less than 0.001
2	6.93	4.19	3.848	less than 0.01
3	7.87	6.80	3.047	less than 0.01
4	5.74	4.20	2.733	less than 0.05
5	5.74	4.24	2.723	more than 0.05
6	7.29	4.53	3.715	less than 0.01

Tab. 3
NAG activity after intoxication by *Cortinarius rubellus* ($n = 6$)

Day	$\bar{x}$ (nkat/1)	S_D	t-test	P-values
0	1.40	2.04		
1	13.67	11.15	2.406	less than 0.05
2	11.36	7.13	2.996	less than 0.05
3	22.16	12.89	3.534	less than 0.01
4	8.50	2.12	4.121	less than 0.01

Tab. 4
Hematuria after intoxications by the *Cortinarius orellanus* and *C. rubellus species* (day 1–4 $n = 22$, day 5–6 $n = 16$)

Day	$\bar{x}$ (ery10^6/1)	S_D	t-test	P-values
1	0.26	0.73	1.54	more than 0.05
2	5.78	9.47	2.66	less than 0.05
3	10.22	11.52	3.76	less than 0.01
4	6.46	11.08	2.25	less than 0.05
5	6.36	12.06	1.75	more than 0.05
6	1.11	3.33	1	more than 0.05

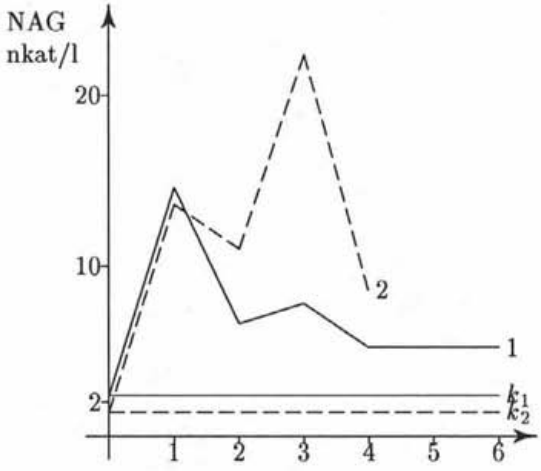

Fig. 1. The activity of NAG in rat urine after intoxications by *Cortinarius orellanus* (1) and *C. rubellus* (2) (k_1 and k_2 are values before intoxication).

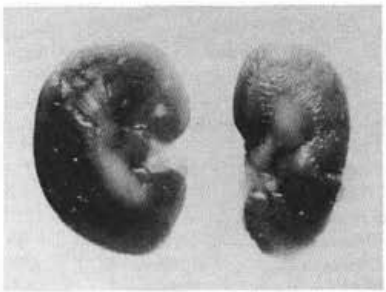

Fig. 2. Hypertrophy of kidney on the 5th day after intoxication by *Cortinarius rubellus* species (to the left of the control kidney).

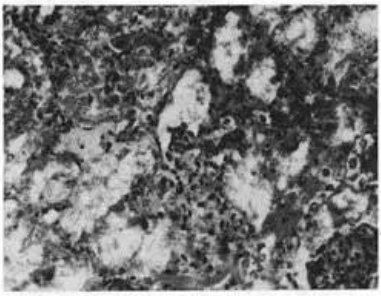

Fig. 3. Dystrophic changes of proximal tubule on the 5th day after intoxication by *Cortinarius rubellus* species.

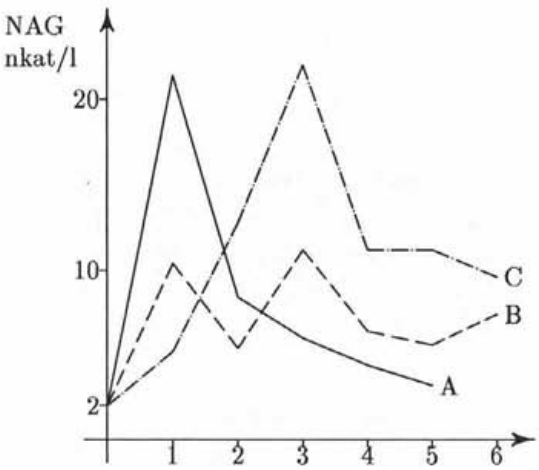

Fig. 4. Kinetics of NAG excretion after *Cortinarius* intoxications (curves A, B, C show different way of excretions the enzyme in rats).

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Distribution and characteristic of the fungus Tilletia controversa Kühn in the stands of winter wheat in eastern Slovakia

PETER PAULECH,[1] CYPRIÁN PAULECH[1] and MILAN LIŠKA[2]

[1]Botanický ústav SAV, Dúbravská 14, 842 23 Bratislava; [2]Ústredný kontrolný a skúšobný ústav poľnohospodársky, Švermova 3, 041 39 Košice, Slovakia

Paulech P., Paulech C. and Liška M. (1993): Distribution and characteristic of the fungus Tilletia controversa Kühn in the stands of winter wheat in eastern Slovakia. Czech Mycol. 47: 73–78

Tilletia controversa is strongly distributed in the stands of winter wheat (Triticum aestivum L.) in the eastern Slovakia. During the years 1957–1992 the fungus was found in 307 localities (communes, cadastral territories) in 12 districts. Its occurrence was mostly abundant in the following districts: Bardejov, Humenné and Prešov. Lower occurrence was detected in districts: Svidník and Vranov nad Topľou, too. It occurrs also in the districts Rožňava, Košice, Trebišov, Poprad, Spišská Nová Ves, Stará Lubovňa, and Michalovce in some degree. The contribution contains the list of localities, years and intensity of its occurrence, morphological and ecophysiological characteristics of the chlamydospores of the fungus. The knowledge of T. controversa occurrence will contribute to increase efficiency of the protection of wheat against the cited pathogen.

Key words: *Tilletia controversa* Kühn, distribution, Slovakia, characteristics, winter wheat

Paulech P., Paulech C. a Liška M. (1993): Rozšírenie a charakteristika sneti trpasličej (Tilletia controversa Kühn) v porostoch ozimej pšenice na východnom Slovensku. Czech Mycol. 47: 73–78

Mazľavka trpasličia je v porastoch ozimnej pšenice (Triticum aestivum L.) na východnom Slovensku silne rozšírená. V priebehu rokov 1957–1992 sme zaevidovali jej výskyt na 307 lokalitách (katastrálnych územiach) v 12 okresoch. Najrozšírenejšia je v okresoch Bardejov, Humenné a Prešov. Vyskytuje sa tu v rôznom stupni každoročne. O niečo slabší výskyt sme zaevidovali v okresoch Svidník a Vranov nad Topľou. Ojedinele až slabo je huba rozšírená i v okresoch Rožňava, Košice, Trebišov, Poprad, Spišská Nová Ves, Stará Lubovňa a Michalovce. V práci uvádzame menný zoznam lokalít, roky a intenzitu zistených výskytov, morfologickú a ekofyziologickú charakteristiku chlamydospór huby. Poznatky o rozšírení umožnia organizovať cieľavedomejšie a efektívnejšie ochranu pšenice voči uvedenému patogénovi.

Occurrence of the fungus *T. controversa* in winter wheat stands in the eastern Slovakia was first described by Paulech in the year 1957. Great attention was put on finding out its distribution in this region since this time. Results of field investigation showed that its distribution and intensity of occurrence in winter wheat stands were much higher, than it was supposed (Paulech, 1964; Rácz, 1972; Moravčík et Zácha, 1985). Further spreading out of the fungus in our territory has not been stopped by relatively extensive precuations and precise instructions made for wheat protection against the mentioned pathogen. It is evident that for increasing of their efficiency we are in need of knowing the whole area of its distribution and wheat protection have to be organized on the base of this knowledges. This is the reason why our

paper was aimed on study of distribution of the fungus *T. controversa* in the area of eastern Slovakia. Results of our work are documented in this contribution.

MATHERIALS AND METHODS

The area of our investigation of the fungus Tilletia controversa distribution can be limited up to the eastern Slovakia frontiers. We were looking for occurrence of smutty spikes infected by mentioned fungus and classifying intensity of its occurrence in winter wheat stands (*Triticum aestivum* L.) from the time of milk ripeness till the harvest. The number of smutty spikes was investigated in every stand from 4 to more plots in the area per 100 m^2, chosen from different parts of the field. One to four stands were classified in every locality by this way and the degree of local infection was classified according to the highest infection degree of its stands.

Intensity of infection was classified according to 5 points scale:

a = stand free of infection;

b = sporadic occurrence (less than 1 smutty spike per 100 m^2);

c = week occurrence (up to 3 smutty spikes per 100 m^2);

d = medium occurrence (3–15 smutty spikes per 100 m^2);

e = strong occurrence (more than 15 smutty spikes per 100 m^2).

Percentage of smuty spikes in the strongest infected stands was obtained by counting healthy and infected spikes per 1 m^2, in 5 repetitions, chosen at different parts of the field.

As a locality cadastral territories (village, community) are identified. Obtained localities of occurrence are divided, according to our results into districts, in the district they are divided in groupe according to the highest obtained degree of infection intensity of its stands in alphabetical order. We noted: Years of occurrence (only the last couple of numbers) and in brackets other degree of occurrence with years in which stands were infected on a lower degree than in their classification group.

Fungus identification was done by using visual symptoms of plants, light microscopy of chlamydospores and by measurement of their hyaline sheath, as well as by study of their shape in dried propanol (Trione et Krygier, 1977). Determination of samples obtained after year 1981 was done on the base of ecophysiology of spore germination (Paulech, 1991). Chlamydospores diameter, thickness of hyaline sheath, number of meshes of reticulation per spore diameter, as well as percentage of hyaline (smooth) spores obtained from 300 spores.

Cardinal temperatures for chlamydospores germination were obtained on evaluated clayey soil (Paulech, 1991) in climatized chambers (KTLK, ILKA, Germany),

at 12 hours daily light period, 12 000 lux intensity of illumination and at 65 ± 5 % relative air humidity.

Photography of chlamydospores was made by scanning electron microscope Tesla BS 301.

Results

Occurrence of the fungus *T. controversa* was found in 307 localities (cadastral territories) from 12 districts in the eastern Slovakia up to now. The strongest occurrence was found in districts Bardejov, Humenné and Prešov. It occurred there in different degrees every year. Lower occurrence was detected in districts Svidník, and Vranov nad Topľou. Sporadic and weak dwarf bunt occurrence was detected in following districts: Rožňava, Košice, Trebišov, Poprad, Spišská Nová Ves, Stará Lubovňa and Michalovce. Summary of the number of obtained localities in different districts and the intensity of fungus are shown in Tab. 1.

Name list of localities of the *T. controversa*, years of their occurrence and degree of infection intensity are introduced in the following review.

Review of obtained localities

District Bardejov

e (strong occurrence): Bardejov 1986 (c: 82, 83); Brezov 71 (c: 86; b: 80, 83); Dubinné 84, 86, 90 (c: 92; b: 80); Kuková (c: 86; b: 80, 84); Lascov 83 (c: 82); Lopuchov 86 (c: 82); Lučka 82 (d: 81; c: 84, 86); Marhaň 82 (c: 84, 89, 92); Mičákovce 83 (c: 86); Rokytov 86; Roveň 89; Stuľany 82; Vyšné Rastislavice 83, 84, 86 (c: 90); Želmanovce 86 (b: 82).

d (medium occurrence): Bardejovská Nová Ves 82 (c: 86, 92); Brezovka 86; Giraltovice 85 (c: 84, 86, 92; b: 83); Kračunovce 86 (c: 92; b: 84); Nižné Raslavice 82, 85 (c: 92); Richvald 83,84.

c (weak occurrence): Abrahamovce 92; Gaboltov 92 (b: 82); Hankovce 80, 81, 86; Hažlín 92; Chmeľová 92; Jankovce 92; Jedlinka 92; Kľušov 86 (b: 82); Kobilnice 86; Koprivnica 82, 86, 92 (b: 84); Lužany pri Topli 81, 86; Malcov 82; Mihaľov 86; Mokroluh 86; Ortuťová 92; Poliakovce 86; Smilno 82, 92; Vaniškovce 86; Zborov 92 (b: 82); Železník 86 (b: 84).

b (sporadic occurrence): Bucľovany 82; Gerlachov 82; Kurima 84; Tarnov 82.

District Humenné

e: Černina 84 (c: 89, 90); Čukalovce 90; Hažin nad Cirochou 90; Chlmec 85 (c: 86, 89; b: 84); Koškovce 85; Nižné Čabiny 90 (d: 92); Ohradzany 85 (c: 83; b: 84); Oľka 91 (b: 90); Pichné 90 (d: 89, 92; c: 91); Ptičie 83 (c: 86, 89, 90, 92; b: 84); Repejov 91 (d: 90); Svetlice 90 (d: 89); Zubné 91 (d: 92; c: 89, 90).

d: Dlhé nad Cirochou 91 (b: 89, 90); Hankovce 89, 90; Nižné Ladičkovce 91; Papín 89 (c: 90); Pčolinné 90; Vyšný Hrušov 86 (c: 84, 90).

c: Dedačov 90; Habura 90; Humenné 89; Jankovce 89; Kamenica nad Cirochou 84 (b: 89); Karná 92; Krásny Brod 90; Ľubiša 90, 91; Lukáčovce 90; Osadné 90; Radvaň nad Laborcom 90; Rokytov 89; Slovenská Volova 91 (b: 89); Veľkopolie 89; Výrava 89; Udavské 92.

b: Brekov 89; Brestov 89; Hrabovec 89.

District Košice

e: Čečejovce 59 (c: 88); Haniska 82 (c: 85); Rozhanovce 84; Slanec 80 (d: 83, 84, 85; c: 87).

d: Hraničná pri Hornáde 84.

c: Klatov 88; Kysak 88.

District Michalovce

d: Strážské 84.

c: Budkovce 61; Lesné 89; Nancina Ves 80; Tibava 89.

b: Trhovište 71; Voľa 80; Závadka 89; Zemplínska Široká 71.

District Poprad

b: Jánovce 83; Mlynčeky 83; Svit 83; Vrbov 83.

District Prešov

e: Chmeľov 86 (b: 82); Jarovnice 85, 86 (d: 91; b: 82); Medzany 86 (b: 82, 91); Nemcovce 83, 86 (c: 90); Šarišská Poruba 86; Tulčík 83, 86 (d: 83, 85; c: 84, 91, 92); Uzovce 86 (d: 81, 82; c: 82, 83, 90, 91).

d: Bretejovce 86 (c: 92; b: 84); Daletice 86 (b: 82); Jakubovany 89, 92 (c: 87; b: 89); Kapušany 85 (c: 90); Kojatice 86 (c: 82; b: 83); Lada 86; Lemešany 85, 86 (c: 82, 87); Lesíček 92; Malý Šariš 83 (c: 81, 82, 86); Prešov 85 (b: 82); Rokycany 86; Svinia 84, 86 (c: 91; b: 81, 82); Šarišské Michaľany 84, 85, 86, 92 (c: 82, 88, 92); (c: 82, 88, 91); Šarišské Sokolovce 91 (c: 82, 87, 92); Široké 86, Terňa 86, 92 (b: 81, 82); Veľký Slivník 92 (c: 82); Veľký Šariš 86 (c: 83).

c: Demjata 83 (b: 81, 82); Drieňov 86 (b: 83); Hubošovce 87; Fulianka 86; Klenov 91; Malý Slivník 86 (b: 82); Ostrovany 86 (b: 82); Ražňany 86, 88, 89; Rožkovany 88; Solivar 90; Šarišské Dravce 92 (b: 82); Župčany 82, 86 (b: 83).

b: Bodovce 83; Červenica 82; Krivany 89; Lipany 82; Orkucany 82; Pečovská Nová Ves 82; Radatice 91; Rybník 89; Sabinov 82; Suchá Dolina 91; Šarišské Bohdanovce 82; Žipov 81.

District Rožňava

d: Gemerská Hôrka 84; Jelšava 85.

c: Brzotín 88.

b: Čoltovo 63; Rožňava 83.

District Spišská Nová Ves

d: Smižany 83; Studenec 83.

b: Spišské Podhradie 78; Spišský Štvrtok 82.

District Stará Lubovňa

c: Jarabina 88, 92; Kamienka 88 (b: 83); Plavnica 88 (b: 82); Stará Lubovňa 90 (b: 82);

b: Orlov 82; Plaveč 83.

District Svidník

e: Vyšný Mirošov 82 (d: 90; c: 88).

d: Breznica 82; Havaj 90.

c: Bukovce 90; Kružľová 90 (b: 89); Ladomírová 90 (b: 82); Nižná Jedľová 90; Nižná Pisaná 90; Nižný Orlík 88; Sitník 90; Stropkov 90; Šandal 90; Vyšná Jedľová 90.

b: Fijaš 82; Nižný Mirošov 82; Radoma 90; Ruský Kručov 82; Stročín 82; Svidník 82.

District Trebišov

d: Bôľ 84; Streda nad Bodrogom 84; Trebišov 84; Zemplínska Teplica 84.

c: Čeľovce 80.

District Vranov nad Topľou

e: Ďurďoš 83 (d: 92); Soľ 85, 86.

d: Kvakovce 85, 86; Skrabské 91; Petkovce 91.

c: Čičava 91; Babie 91; Dlhé Klčovce 90; Hanušovce nad Topľou 90, 86; Hancovce 90; Košarovce 80; Nižný Hrabovec 86 (b: 81); Poša 86 (b: 82); Radvanovce 87, 88; Remeniny 91; Sečianska Polianka 82, 89; Slovenská Kajňa 91; Štefanovce 89, 90; Továrné 91; Továrňanská Polianka 89; Vyšný Žipov 89 (b: 91); Závada 89.

b: Bystré 91.

This review shows the distribution of fungus *T. controversa* mainly in the northern and higher situated regions of wheat cultivation. We detected its occurrence every year from 1979 in the eastern Slovakia. The strongest infected stand was detected at Vyšný Mirošov, district Svidník in the year 1982. Mean percentage of smutty spikes of this stand was 26.96 % (Tab. 2).

Beside knowledges about the distribution of the fungus T. controversa may be of importance the morphological and ecophysiological characteristics of chlamydospores of its population spread in the eastern Slovakia. Knowledges we have obtained in this fields are documented in Tab. 3 and Fig. 1.

Discussion

Large distribution of the fungus *T. controversa* in winter wheat stands could be observed in the eastern Slovakia. Number of obtained localities, intensity of stands infection seemed to be something lower when compared with our data obtained in the central Slovakia (Paulech et al., 1993). From our investigation results, we could

find area of wheat cultivation free of dwarf bunt, or sporadic occurrence only in the eastern part of our territory. Especially flatland regions of Východoslovenská nížina are to be mentioned. Morphological and ecophysiological characteristic of the fungus *T. controversa* population spread out in the eastern Slovakia may be of essential similarity to the populations characteristic from other localities of our territory (Paulech, 1992, Paulech et al., 1993). Some difference could be supposed mainly in the intraspecies structure of the pathogen population in the field of distribution and representation of fungus physiological races. It seems to be no informations about population spread out in the eastern Slovakia. We have obtained only a few data from the other parts of our territory (Paulech et Paulech, 1991, Paulech, 1992).

According to our observations fungus *T. controversa* parasites besides on winter wheat also on species of the genus *Elytrigia* in the eastern Slovakia (Paulech et Maglocký, 1988). Experiments with transferring of dwarf bunt from these host plants on wheat were unsuccessfull. In all probability two specialized forms of the fungus *T. controversa* might exist (Paulech et Paulech, 1991). The problematic of physiological races of he fungus *T. controversa* have been worked out as best in USA, till now (Hoffmann, 1982).

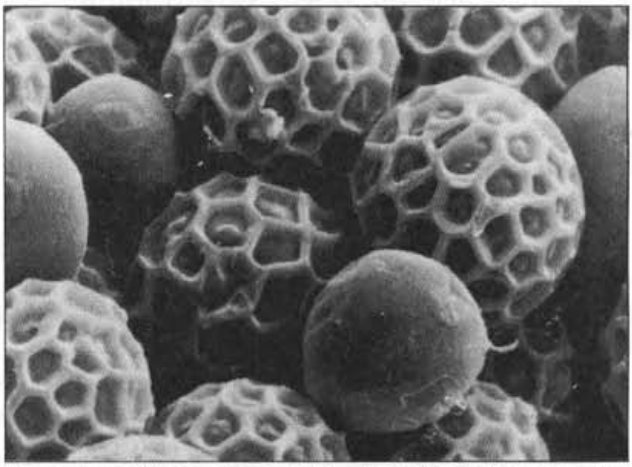

Fig. 1. Reticulated and smooth (hyaline) chlamydospores of the fungus *T. controversa*. Magnific. 3000×, SEM

District	Degree of occurrence/number of localities				Total
	sporadic	week	medium	strong	
Bardejov	14	35	7	14	70
Humenné	8	26	11	13	58
Košice	0	5	2	4	11
Michalovce	4	4	1	0	9
Poprad	4	0	0	0	4
Prešov	26	26	21	7	80
Rožňava	2	1	2	0	5
Spišská Nová Ves	2	0	2	0	4
Stará Lubovňa	6	4	0	0	10
Svidník	8	11	3	1	23
Trebišov	0	1	4	0	5
Vranov nad Topľou	4	17	5	2	28
Total	78	128	58	41	307

Table 1. Number of localities and degree of occurrence of the fungus *Tilletia controversa* in districts of eastern Slovakia.

Repetition	Number of spikes			Percentage	
	healthy	smutty	total	healthy	smutty
1	309	164	473	65.320	34.680
2	372	105	477	77.990	22.010
3	480	149	629	76.310	23.690
4	413	91	504	81.940	18.060
5	397	208	605	65.610	34.390
Total	1171	717	2688	—	—
Mean	234.20	143.40	537.60	73.44	26.56

Table 2. Number and percentage of healthy and infected (by the fungus *T. controversa*) spikes of wheat/m^2
Locality: Vyšný Mirošov, distr. Svidník, year 1982

Characteristics	Values
Spore diameter	17.7–21.2 μm
Thickness of the hyaline sheath	1.4–2.1 μm
Number of meshes per spore diameter	3–8
Percentage of hyaline spores	2–4
Temperature required for germination	min. 1° C, opt. 5–8° C, max. 12° C
Dormancy period	28–30 days
Special condition for germination	light
Spore wall	reticulated
Odour	after trimethylamin
Color of spore mass	brown to blackishbrown
Percentage of aspherical spores	0–8

Table 3. Some characteristics of the fungus *T. controversa* distributed in eastern Slovakia

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In memoriam of Dr. Věra Holubová-Jechová (1936–1993)

OLGA FASSATIOVÁ[1] and FRANTIŠEK KOTLABA[2]

[1]Department of Botany Charles University, Benátská 2, Praha 2;
[2]Na Petřinách 10, Praha 6, Czech Republic

Czech mycology lost on March 5, 1993, a prominent micromycetologist, Dr. V. Holubová-Jechová, principal research officer of the Botanical Institute, Academy of Sciences of the Czech Republic at Průhonice near Prague, who was born in Prague on March 17, 1936.

Dr. V. Holubová-Jechová. Čes. Budějovice, 14. 9. 1982. Photo by F. Kotlaba

She studied mycology and phytopathology at the Biological Faculty of the Charles University, Prague, where she defended in 1960 her thesis "Rots and moulds of imported southern fruits and control of banana moulds", which was carried out under the guidance of Prof. Dr. Karel Cejp. Her delight and talent in taxonomy and ecology of micromycetes already appeared during her university studies, which she achieved excellently figured by photographs or line-drawings.

Dr. V. Holubová-Jechová inicially worked in the Cryptogamological Department, Biological Faculty of the Charles University (1960–61) and then in the Institute of Natural Drugs, Prague (1962–63). On November 1, 1963, she commenced her work in the Botanical Institute of the former Czechoslovak Academy of Sciences, Průhonice near Prague, where was active until her untimely death.

For the whole 30 years, she devoted herself to the study of saprotrophic *Hyphomycetes*, especially those occurring in natural forests, preferably in natural reserves. In collaboration with Z. Pouzar, a specialist on *Basidiomycetes* from the same institute, she studied the connection of the anamorphs and teleomorphs in the *Corticiaceae*. This led to the discovery of new taxa of *Hyphomycetes* and, in some cases, to the knowledge of their teleomorphs. In 1969, she defended her postgraduate thesis "Study in wood-inhabiting Hyphomycetes", and remained faithful to this subject for her immensely productive life.

She intensively collected fungi in field and, from her microscopic study and cultures, proposed a number of new genera and species, as well as dicoveries of new or rare species for Czechoslovakia, some other countries, territories etc., but also the connections of some anamorphs with their teleomorphs.

Dr. V. Holubová-Jechová had a taxonomic sense and understood also the ecology of these fungi; she was also able to solve nomenclatural problems. Her main interest was the family *Dematiaceae*, where she became a respectable specialist. She intensively collected, not only in territory of former Czechoslovakia but travelled often to a number of foreign countries, collecting fungi in Canada, Estonia, Germany, Great Britain, Hungary, the Netherlands, Poland and Romania. Her numerous collections of *Hyphomycetes* are deposited mostly in the herbarium of the National Museum in Prague (PRM), including types; her culture collection was divided among the Culture Collection of Fungi of the Faculty of Sciences in the Charles University, Prague, the Centraalbureau voor Schimmelcultures, Baarn, and the International Mycological Institute, Egham. She was twice in Cuba (4 months in 1981 and 3 months in 1985), where she collected fungi and took part on the postgraduate education of several Cuban mycologists in imperfect fungi.

She studied *Hyphomycetes* in various large institutes such as the Centraalbureau voor Schimmelcultures in Baarn (1969), the Biosystematics Research Institute in Ottawa (1979) and the Commonwealth Mycological Institute in Kew (1982, 1992). She also took part in several mycological congresses, e.g. in Budapest (1978), Tallin (1989), Regensburg (1990) and London (1992).

The papers of Dr. V. Holubová-Jechová were published not only in Czech journals (Česká mykologie, Folia geobot. et phytotax.) but also in foreign ones (Canad. J. Bot., Mycotaxon and Studies in Mycology), as well as Cuban, Estonian etc. periodicals. One of her activities were her regular contributions to discussions on the journal AnaNet, published in Canada and designated for specialists dealing with fungal anamorphs.

In the taxonomy of *Hyphomycetes*, she fully accepted modern ideas and knowledge about the conidiogenesis, which she applied in her work. She studied some problems jointly with several leading specialists in the field of *Hyphomycetes* such as J. A. von Arx, A. Borowska, W. Gams, G. Hennebert, D. W. Minter, B. Sutton, S. J. Hughes, L. Weresub and others. She described 10 new genera, 2 subgenera, over

120 new species, and her name is commemorated in the following genera: *Holubovea* Mercado Sierra (1983), *Holubovaniella* Castañeda Ruiz (1985) and *Veramyces* Subramanian (1993). As a renowned specialist in the *Hyphomycetes*, she was elected a honorary member of the Mycological Society of America in 1992.

Dr. V. Holubová-Jechová was a very diligent, careful and strong-minded woman, who wrote her papers in a clear, precise and comprehensible style. She continued the tradition of the famous micromycetologist A. C. J. Corda, who founded in Bohemia in the last century the study of microscopic fungi to such an extent that it became of worldwide importance. The publications of Dr. V. Holubová-Jechová represent in a dignified manner this branch of mycology in her country as well as in the world mycological community.

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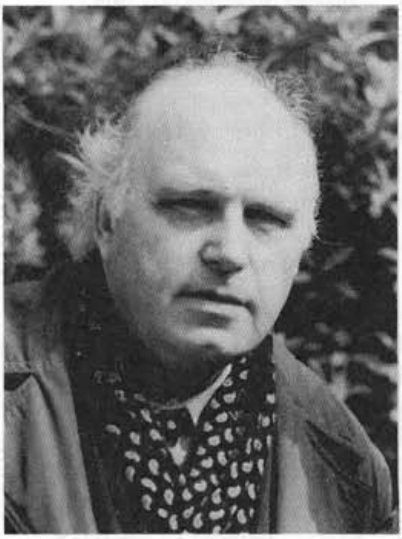
Dr. Zdeněk Pouzar sexagenarian

JOSEF HERINK[1] and FRANTIŠEK KOTLABA[2]

[1]Mnichovo Hradiště, Turnovská 3;
[2]Na Petřínách 10, Praha 6 – Veleslavín. Czech Republic

Dr. Zdeněk Pouzar was sixty in 1992. His life has been closely connected with mycology, a self-chosen field of science. His activities in botany (another domain of his interest) was treated by Kotlaba in 1992. This paper deals with Pouzar's work in mycology.



Z. Pouzar was born on April 13, 1932 in Říčany, a town near Prague (where both parents were teachers employed in a social institution for youth). In 1936, the family moved to Prague, where Pouzar has lived all his life except for the last three years of World War II (his father died in 1945 as a victim of persecution for his participation in the national resistance). In 1952, Pouzar finished his studies in the grammar school (Gymnasium) and began to study mycology and phytopathology at the Biological Faculty of the Charles University, Prague. Because of his great interest in mycology, he specialized in this branch of botany and, in 1957, he submitted his thesis on the taxonomy of the Czechoslovak species of the family *Coniophoraceae* and graduated in biology. It was the start of his career as a professional mycologist.

The begining of his study of mycology can be traced back to 1947, when, as young man aged 15, with a broad interest in living nature, he decided to familiarize himself with mycology. Besides studying the literature, he gained great experience whilst

working in the former Czechoslovak Mycological Club, especially in contact with its mycological advice centre led by the secretary I. Charvát. He first contacted the centre in 1948 and, a year later, he attended Sunday mycological excursions and Monday lectures as well as other activities of the Club. He was very well received by all professional and amateur mycologists of many generations, who at that time worked in the taxonomy and the floristics of the higher fungi, with whom he came into close contact, acquainting himself with their activities and co-operating with many. His mycological knowledge increased and, in 1950, he began to publish his papers in the journal Česká mykologie.

After a short employment in the State Selection and Breeding Enterprise (1957–1961), Pouzar tood up work in the Geobotanical Laboratory in Průhonice on May 1, 1961. In the same year, F. Kotlaba also entered this institution which, on January 1, 1962, became the Botanical Institute of the Czechoslovak Academy of Sciences. At that time, both friends had closely worked in the taxonomy of the wood-inhabiting fungi, especially the polypores.

After the decease of A. Pilát, the first head of the Mycological Department of the National Museum – Museum of Natural History since its establishement in 1965, Pouzar succeeded to his position in October 1, 1974 and has held this office even since.

Besides the usual care of the herbarium collections, their arrangement and scientific exploitation, he started a special collection of types and unique specimens of fungi. Later on, he also established a section of the herbarium for newly acquired materials. As a worker in the Museum, he was also an active member of the editorial boards of two journals published by Museum, namely the Journal of National Museum – natural history series and Acta Musei nationalis Pragae.

In 1961–1981, Pouzar acted as an external expert for the identification of mushrooms in the cases of mushroom poisoning at the Institute of Toxicology and Forensic Chemistry of the Charles University in Prague.

Pouzar was very capable for the mentioned scientific work, having such good qualities as deliberation, criticism, good memory, diligence and a deep interest in the subject of his study. In personal relation, his readiness for co-operation and helpful assistance, as well as allowance for different ideas, have always been appreciated by his colleagues. He soon gained a wide experience in mycology, as well as a broad view and expansive knowledge of various taxonomic groups of macrofungi (e.g., poroid and non-poroid *Aphyllophorales* and larger *Pyrenomycetes*). His sense of taxonomy predeterminated him well for this work. Pouzar mastered the rules of botanical nomenclature and became an expert in this field, not only for mycology but also for other groups of plants, and often consulted by many specialists in taxonomic botany. He initiated and later proposed, together with a group of mycological taxonomists that the starting point of mycological nomenclature should be changed to the earlier year of 1753. This

proposal was accepted by the 13th International Botanical Congress in Sydney, 1981.

In his metodical work, he has used macro- and micromorphological characters of fungi as well as their ecological and chorological features. He is a supporter of a concept of narrowly limited species as well as genera, in accordance with the idea that the understanding of the variability of species requires a detailed knowledge of the species in question.

It is not easy to survey the results of Pouzar's lifelong work in mycology. He has published independently, or with co-authors, nearly 300 papers, most of them introducing original results, others giving overviews and book-reviews, in which he expressed several ideas not publishing elsewhere. His papers deal with various groups of higher *Basidiomycetes* and also, since 1969, with some selected groups of stromatic pyrenomycetes. The results of these studies are presented in the bibliography (see below). Some topics are so important that they are worth referring to in detail.

Whilst Pouzar's initial interest was connected with the larger agarics (e.g., *Lactarius, Agaricus*), it was soon directed to the wood-inhabiting non poroid fungi (family *Corticiaceae* s.l.) and, since 1956 until now, especially to the polypores. In the years 1955–1957, he produced a contribution on the genus *Tulostoma* for the monograph of *Gasteromycetes*, which appeared as the first volume of the Flora ČSR in 1958. Soon afterwards, he published a short survey of the Czechoslovak stipitate hydnums. In 1957, he produced, together with F. Kotlaba, a new system of the European polypores based on the hyphal systems of their carpophores. Some papers from the period 1953–1964 were concentrated on the genus *Stereum* s.l. In 1964, a paper by F. Kotlaba and Z. Pouzar appeared on cyanophily (i.e. the staining of the spore walls and other microscopic structures with cotton blue) and on the application of this feature in fungal taxonomy, especially of the polypores. In 1966, Pouzar started working on species of the terrestrial polypore-genus *Albatrellus*, which culminated in a world-monograph of this genus, which was submitted in 1976 as his thesis for the scientific degree of Candidatus scientiarum (i.e. Ph.D.) in 1978. In the years 1989–1991, Kotlaba and Pouzar published in four parts a revision of most polypore species and infraspecific taxa described by A. Pilát as new. A great number of Pouzar's occasionally published contributions referred not only to certain groups of gill fungi and boleti, but also to some gasteromycetes and discomycetes, in most cases giving some new taxonomic or nomenclatural aspects. Pouzar, either alone or together with F. Kotlaba, described about 50 new genera and nearly 30 new species with a large number of new transfers and nomenclatural combinations.

The complete revision by Kotlaba and Pouzar of R. Veselý's manual of indigenous macrofungi under the title Přehled československých hub (Survey of Czechoslovak fungi) (1972) has been much appreciated by Czechoslovak beginners in mycology.

The work of Pouzar in mycology is highly regarded by the mycologists of his

country as well as in the world mycological community. New genera and species of fungi named in his honour are *Geastrum pouzarii* Staněk 1954, *Leucogyrophana pouzarii* Parmasto 1967, *Phellinus pouzarii* Kotlaba 1968, *Pluteus pouzarianus* Singer 1984, *Pouzaromyces* Pilát 1951, *Pouzarella* Mazzer 1972, *Pouzaroporia* Vampola 1992 and *Wrightoporia pouzarii* David et Rajchenberg 1987.

During the year 1990, Pouzar was appointed to several functions in the former Czechoslovak Academy of Sciences.

From the beginning of his mycological activity (in 1948) Pouzar has been active in various positions in the Czechoslovak Scientific Society for Mycology (the former Czechoslovak Mycological Club), in which he has been a member of the executive committee since 1956, secretary since 1961 till 1992, when he was elected president of the present Czech Scientific Society for Mycology. In 1982, he was nominated a meritorious member and, in 1992 he became an honorary member. In the course of the years 1957–1977, Pouzar worked as a member of the editorial board of the journal Česká mykologie, and in 1993, he was elected editor-in-chief of a new series of this journal (Czech Mycology / Česká mykologie).

Zdeněk Pouzar richly deserves enormous gratitude for his fruitful mycological work and effort to ensure the development of Czech mycology. He is a well-known representative of Czech mycology at the world mycological forum. All Czech mycologists, mostly his numerous close friends, join in wishing him well-being and further success in his scientific work.

Ad multos annos sequentes!

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