

# PERSOONIA

18 / 2  
2003



AN INTERNATIONAL  
MYCOLOGICAL JOURNAL

# PERSOONIA

An International Mycological Journal

Published by the Nationaal Herbarium Nederland, Universiteit Leiden branch, The Netherlands

## Editorial Board:

Dr. H. Cléménçon, Lausanne, Switzerland

Dr. G.L. Hennebert, Louvain-la-Neuve, Belgium

Dr. R.P. Korf, Ithaca, USA

Dr. F. Oberwinkler, Tübingen, Germany

Dr. R.H. Petersen, Knoxville, USA

Dr. D.A. Reid, Middleton-on-Sea, UK

Dr. P. Roberts, Kew, UK

## Editors:

M.M. Nauta (nauta@nhn.leidenuniv.nl)

M.E. Noordeloos (noordeloos@nhn.leidenuniv.nl)

Marianne de Groot (layout)

Persoonia is a journal devoted to mycology, with emphasis on the taxonomy of fungi. Papers on morphology, cytology, ultrastructure, genetics, or chemistry are only accepted when the link to taxonomy is clear.

Publication in Persoonia is not restricted to members of the staff of National Herbarium only, but limited space will also be available for other authors and invited papers. Those interested are requested to contact the Editors.

All manuscripts submitted to Persoonia are externally reviewed before acceptance or refusal.

Correspondence concerning manuscripts for Persoonia should be directed to the Editors.

Persoonia will be published once a year, with about 150 pages per part. Four parts will constitute a volume. Persoonia can be obtained by subscription or by exchange.

Exchange with mycological journals or with periodicals regularly containing mycological papers will be appreciated.

Correspondence concerning orders and subscriptions should be addressed to the Publications Department, Nationaal Herbarium Nederland, Universiteit Leiden branch, P.O. Box 9514, 2300 RA Leiden, The Netherlands.

## NATIONAAL HERBARIUM NEDERLAND, UNIVERSITEIT LEIDEN BRANCH

Director: Prof. Dr. P. Baas

Mycological Department:

Staff Members: Ms. M.M. Nauta, Dr. M.E. Noordeloos

Associates:

Dr. C. Bas

Dr. J. van Brummelen

J. Hengstmengel

L. M. Jalink

**IN MEMORIAM RUDOLF ARNOLD MAAS GEESTERANUS  
DEN HAAG, 20 JANUARY 1911–OEGSTGEEST, 18 MAY 2003**

On 18 May 2003 Rudolf Maas Geesteranus died peacefully at the age of 92. With him the mycological world has lost a remarkable and versatile personality, who worked on the taxonomy of fungi for almost 60 years producing papers and books on a wide range of topics, including both asco- and basidiomycetes. The bibliographical notes and publication list printed in this journal on his retirement from active service at the Rijksherbarium in 1976, and on his eightieth birthday in 1991 (Bas, *Persoonia* 8 (1976) 335–343, and *Persoonia* 14 (1992) 353–356) reflect the extent of his professional interests and output during his long career. After 1991 Maas Geesteranus went on tirelessly, producing another set of papers on the genus *Mycena*, which was his main interest in his last years of mycological activities. Milestones in this period were the two volumes of the *Mycenas* of the Northern Hemisphere (1992), a compilation of his vast knowledge of the genus, and a monograph of the *Mycenas* occurring in the state of Paraná, Brazil, produced in close cooperation with André de Meijer (1997). Although Maas Geesteranus retired from active mycology a few years ago, he was well and active until his death, still very much engaged with his hobbies, such as the study of minerals, butterflies, and painting.

Rudolf Maas Geesteranus will be remembered not only as an outstanding mycologist, but above all as a kind and helpful man, who advised and stimulated several generations of mycologists, both professional and amateur. For this we are very grateful. Our thoughts are with Martha, his wife, and his children and grandchildren, who will miss him dearly.

LIST OF PUBLICATIONS OF R.A. MAAS GEESTERANUS FROM 1991–2003

- Maas Geesteranus, R.A. 1991. Studies in *Mycenas*. Additions and corrections, Part 2. *Proc. K. Ned. Akad. Wet.* 94 (4): 545–571.
- Maas Geesteranus, R.A. 1992. Some *Myceneae* of the Himalayan Foothills. *Persoonia* 15: 33–53.
- Maas Geesteranus, R.A. 1992. *Filoboletus manipularis* and some related species. *Proc. K. Ned. Akad. Wet.* 95 (2): 267–274.
- Maas Geesteranus, R.A. 1992. Two new *Mycenas* of section *Insignis* from the Netherlands. *Proc. K. Ned. Akad. Wet.* 95 (4): 469–472.
- Maas Geesteranus, R.A. & T. Laessle. 1992. *Mycena dasypus*, a new member of Section *Polyadelphia*. *Persoonia* 15 (1): 101–103.
- Maas Geesteranus, R.A. & E. Horak. 1993. *Mycena acrocephala*. A new member of Section *Adonidae* from Sikkim. *Persoonia* 15 (3): 341–343.
- Maas Geesteranus, R.A. 1993. New species of *Mycena* in section *Fragilipedes*. *Proc. K. Ned. Akad. Wet.* 96 (3): 335–345.
- Maas Geesteranus, R.A. & M. Enderle. 1994. *Mycena caliginosa*, eine neue Art der Sektion *Fragilipedes*, aus Bayern. *Z. Myk.* 60 (2): 373–376.
- Maas Geesteranus, R.A. & A. Hausknecht. 1994. *Mycena disra*, a new species of sect. *Calodontes* subsect. *Purae* from Austria. *Österr. Z. Pilzk.* 3: 5–8.
- Maas Geesteranus, R.A. 1995. Three new European species of *Mycena*. *Proc. K. Ned. Akad. Wet.* 98 (1): 55–61.

- Maas Geesteranus R.A. & A. Hausknecht. 1995. *Mycena pallescens*, a new species of sect. *Fragilipedes* from La Réunion (France, Africa). *Österr. Z. Pilzk.* 4: 51–54.
- Maas Geesteranus, R.A. & A. Hausknecht. 1995. Two new *Mycena* species from La Réunion (France, Africa). *Österr. Z. Pilzk.* 5: 237–243.
- Maas Geesteranus, R.A. & E. Horak. 1995. *Mycena* and related genera from Papua New Guinea and New Caledonia. In: *Taxonomic Monographs of Agaricales*. *Bibl. Mycol.* 159: 143–229.
- Maas Geesteranus, R.A. 1997. *Mycena schildiana*, a new species from Italy. *Persoonia* 16: 412–414.
- Maas Geesteranus, R.A. & A.A.R. de Meijer. 1997. *Myceneae paranaenses*. *Verh. K. Ned. Akad. Wet., afd. Natuurkunde, tweede reeks, vol. 97*.
- Maas Geesteranus, R.A. & T. Münzkay. 1997. *Mycena valida*, a new member of Section *Fragilipedes* from Germany. *Persoonia* 16 (3): 415–417.
- Maas Geesteranus, R.A. & C.L. Ovrebo. 1997. A new species and new section of *Mycena* from Costa Rica. *Persoonia* 16 (3): 393–395.
- Maas Geesteranus, R.A. 1998. *Mycena verna*, a new springtime species of Section *Fragilipedes* from Germany. *Persoonia* 17 (1): 145–147.
- Maas Geesteranus, R.A. & A. Hausknecht. 1998. Two striking *Mycenas* from the Southern Hemisphere. *Österr. Z. Pilzk.* 7: 123–128.
- Maas Geesteranus, R.A. & A.A.R. de Meijer. 1998. Further *Mycenas* from the State of Paraná Brazil. *Persoonia* 17 (1): 29–46.
- Maas Geesteranus, R.A. & A. Hausknecht. 1999. A new *Mycena* of sect. *Hiemales* from La Réunion (France, Africa). *Österr. Z. Pilzk.* 8: 1–3.

### IN MEMORIAM KEES (C.B.) ULJÉ (1939–2003)

On 6 April 2003 a tragic accident led to the untimely death of Kees Uljé, mycologist and active member of the Netherlands' Mycological Society. Kees' first contact with mycology dated back some twenty years ago when, not being able to continue his profession as a roadworker, he became more and more interested in the study of agarics and taxonomy. In the first few years he acquired a general knowledge of mushrooms and toadstools, collecting and painting them in his own meticulous style, but gradually he became more and more involved in the study of ink caps (*Coprinus*), eventually becoming one of the world's leading specialists in this taxonomically and ecologically interesting and difficult group of fungi. This resulted not only in a series of popular and scientific papers, but also in a network of personal contacts with mycologists all over the world.

Kees was typically a self-made man: with only a limited higher education, he nonetheless developed all the knowledge and skills necessary for his mycological studies. He had a gift for drawing and made beautiful illustrations for his publications. His affinity with computers and programming was put to good use to produce a unique website on *Coprinus*, and to develop an identification program, which could be down-loaded from his site, and not only served for the identification of ink caps, but also a wide range of other genera.

Above all Kees was a very sociable man, always willing to help other people and pass on his knowledge, without any self-profit. As such he stimulated the interest of many people, not only in the Netherlands' Mycological Society, but all over the world through the Internet.

His contribution to the Flora agaricina neerlandica on the genus *Coprinus* will be published in due course. We will also try to keep his website on line and up to date. As such we will commemorate and honour this remarkable person.

Our thoughts are with Ida, his wife, and his children and grandchildren, who still have great difficulties to accept his untimely passing away.

#### LIST OF PUBLICATIONS

- Uljé, C.B. 1984. Twee bijzondere parasolzwammen: *Leucoagaricus tener* en *Lepiota casimirii*. *Coolia* 27 (1): 10–16.
- Uljé, C.B. 1984. *Coprinus amphithallus*, weinig bekend en toch zo gemakkelijk. *Coolia* 27 (4): 82–84.
- Uljé, C.B. 1986. Over de *Coprinus hemerobius* groep. *Coolia* 29 (2): 25–31.
- Uljé, C.B. 1988. Four new species of *Coprinus* from the Netherlands. *Persoonia* 13: 479–488.
- Uljé, C.B. & C. Bas. 1988. Studies in *Coprinus* I – Subsections *Auricomis* and *Glabri* of *Coprinus* section *Pseudocoprinus*. *Persoonia* 13: 433–448.
- Uljé, C.B. & C. Bas. 1991. Studies in *Coprinus* II – Subsection *Setulosi* & Section *Pseudocoprinus*. *Persoonia* 14: 275–339.
- Uljé, C.B. 1992. A new species of *Coprinus* from the Netherlands. *Persoonia* 14: 565–569.
- Uljé, C.B. & C. Bas. 1993. Some new species of *Coprinus* from the Netherlands. *Persoonia* 15: 357–368.

- Uljé, C.B. & M.E. Noordeloos. 1993. Studies in *Coprinus* III. *Coprinus* section *Veliformes*: subdivision and revision of subsection *Nivei* emend. *Persoonia* 15: 257–301, 357–368.
- Uljé, C.B. 1995. Is mijn paddestoel een inktzwam? *Coolia* 38 (4): 157–166.
- Uljé, C.B. 1996. Over het verzamelen van inktzwammen. *Coolia* 39 (3): 154–156.
- Uljé, C.B. & M.E. Noordeloos. 1996. Type studies in *Coprinus* subsection *Alachuani*. *Proc. K. Ned. Akad. Wet.* 99: 105–124.
- Uljé, C.B. & H. Bender. 1997. Additional studies in *Coprinus* subsection *Glabri*. *Persoonia* 16: 373–381.
- Uljé, C.B. & M.E. Noordeloos. 1997. Studies in *Coprinus* IV – *Coprinus* section *Coprinus*, subdivision and revision of subsect. *Alachuani*. *Persoonia* 16: 265–333.
- Uljé, C.B., A. Aptroot & A. van Iperen. 1998. A new *Coprinus* from Papua New Guinea sporulating in pure culture. *Persoonia* 16: 549–551.
- Uljé, C.B., A. Gennari, F. Doveri, G. Caciolla & V. Caroti. 1998. First report of *Coprinus spadiceosporus* in Europe. *Persoonia* 16: 537–540.
- Uljé, C.B. & M.E. Noordeloos. 1999. Studies in *Coprinus* V. *Coprinus* section *Coprinus*, revision of subsection *Lanatulii* Sing. *Persoonia* 17: 165–199.
- Berg, A.P. van den, A.E. van den Berg-Blok, M.E. Noordeloos & C.B. Uljé. 2000. A new species and a new section of the genus *Mycena* from the Netherlands. *Persoonia* 17: 481–485.
- Uljé, C.B., F. Doveri & M.E. Noordeloos. 2000. Additions to *Coprinus* subsection *Lanatulii*. *Persoonia* 17: 465–471.
- Uljé, C.B. & M.E. Noordeloos. 2000. Type studies in *Coprinus* subsection *Lanatulii*. *Persoonia* 17: 339–375.
- Uljé, C.B. 2001. De 'onverwachte' is gekomen. *Coolia* 44 (1): 29–30.
- Uljé, C.B. 2002. Het Egelzwammetje. *Coolia* 45 (4): 210–212.
- Uljé, C.B. & M. Verbeken. 2002. A new species in *Coprinus* subsection *Setulosi*. *Persoonia* 18: 143–145.
- Uljé, C.B. In prep. *Coprinus*. In: M.E. Noordeloos et al., *Flora agaricina neerlandica* vol. 6.

CONTRIBUTIONS TOWARDS A MONOGRAPH OF PHOMA  
(COELOMYCETES) – X

Section *Pilosa* (taxa with a *Pleospora* teleomorph) and  
nomenclatural notes on some other taxa

G.H. BOEREMA

Karel Doormanstraat 45, 2041 HD Zandvoort, The Netherlands

The two anamorphs classified so far in *Phoma* sect. *Pilosa* ('hairy' pycnidia in vitro) are both metagenetically related to species of the ascomycetous genus *Pleospora*. In addition to their characteristics in vitro and in vivo short comments on the hosts, literature data, ecology and distribution are given.

The notes include additional documentation of the type specimens (dried cultures) of the recently described *Phoma schneiderae* Boerema et al., *Phoma pimpinellae* Boerema et al. and *Phoma leveillei* var. *microspora* de Gruyter & Boerema. Some excluded species are discussed as new proposed taxa: *Asteromella ulmi* nom. nov. (teleom. *Mycosphaerella ulmi* Kleb.), *Microsphaeropsis fuckelii* (Sacc.) Boerema comb. nov. (teleom. *Leptosphaeria coniothyrium* (Fuckel) Sacc.) and *Microsphaeropsis glumarum* (Ellis & Tracy) Boerema comb. nov.

This paper is the final one of a series of 'Contributions' to be included in a monographic treatment of the anamorphic genus *Phoma* based on cultural characteristics. To facilitate the identification the genus has been divided into nine sections; see Boerema, 1997 for their differentiating characteristics and keys.

Those previously treated are the sections *Phoma* (De Gruyter & Noordeloos, 1992; De Gruyter et al., 1993, 1998), *Peyronellaea* (Boerema, 1993), *Plenodomus* (Boerema et al., 1994, 1996; Boerema & de Gruyter, 1999), *Heterospora* (Boerema et al. 1997, 1999), *Sclerophomella* (Boerema & de Gruyter, 1998), *Phyllostictoides* (Van der Aa et al., 2000; De Gruyter et al., 2002), *Paraphoma* (De Gruyter & Boerema, 2002) and *Macrospora* (De Gruyter, 2002).

*Phoma* sect. *Pilosa* Boerema et al. (Boerema, 1997) treated in this paper, is based on *Phoma betae* A. B. Frank, anamorph of *Pleospora betae* (Berl.) Nevod., well known as a seedborne pathogen of *Beta vulgaris* and other Chenopodiaceae (Boerema et al., 1987). The section name refers to the 'hairy' or pilose appearance of the globose pseudoparenchymatous pycnidia of this anamorph in vitro (Fig. 1A). They are initially closed, with late development of a pore (sometimes V-shaped according to Monte & Garcia-Acha, 1988a: 236), instead of a predetermined ostiole. In vivo the pycnidia usually develop beneath the cuticle and look glabrous with a flush circular central opening (Shoemaker & Bissett, 1998). The subglobose-ellipsoidal conidia of *P. betae* are one-celled, but, when germination is initiated, the conidium sometimes becomes 1-septate (Monte & Garcia-Acha, 1988c). Electron microscope observations on the conidiogenesis (Monte & Garcia-Acha, 1988b) show a conidial ontogeny similar to that in other species of *Phoma*. Only the intermediate layer in the papilla preceding the initiation of the first conidium (Boerema, 1997) could not be observed.

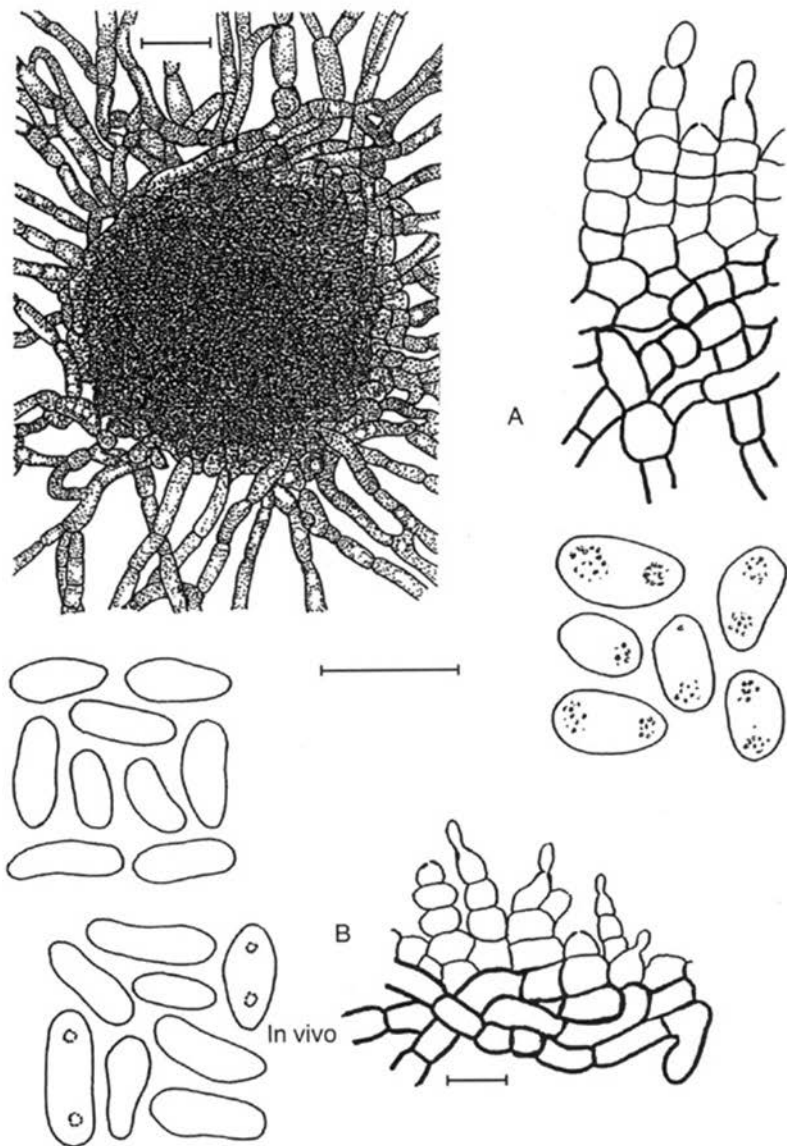


Fig. 1A. *Phoma betae*, type species of section *Pilosa*. 'Hairy' pycnidium in vitro, detail of pycnidial wall and conidia both in vitro. — B. *Phoma typhina*. Conidia in vitro and in vivo and detail of the wall of a small pycnidium in vitro. (Bar: pycnidium 50  $\mu$ m, pycnidial walls and conidia 10  $\mu$ m.)



So far this section includes only two taxa. The other species with 'hairy' pycnidia *in vitro* occurs on *Typha* spp. In its life cycle also a teleomorph of the genus *Pleospora* Rabenh. ex Ces. & De Not occurs.

The methodology is the same as used in the preceding Contributions.

#### KEY TO PHOMA SPECIES OF SECTION PILOSA

- 1a. Conidia relatively broad, globose to subglobose/ellipsoidal, mostly  $4-6.5 \times 2.5-4 \mu\text{m}$  ..... 1. *P. betae*  
teleomorph *Pleospora betae*
- b. Conidia smaller, ellipsoidal to subcylindrical or allantoid, mostly  $4-6 \times 2-2.5 \mu\text{m}$   
2. *P. typhina*  
teleomorph *Pleospora typhicola*

#### HOST-FUNGUS INDEX

##### Chenopodiaceae

e.g. *Beta vulgaris*

*Spinacia oleracea*

*P. betae* (1)

teleomorph *Pleospora betae*

##### Typhaceae

e.g. *Typha angustifolia*

*Typha latifolia*

*P. typhina* (2)

teleomorph *Pleospora typhicola*

### DESCRIPTIVE PART

#### 1. *Phoma betae* A.B. Frank — Fig. 1A

Teleomorph: *Pleospora betae* (Berl.) Nevod.

*Phoma betae* A.B. Frank, Z. Rübenzucker-Ind. 42 (1892) 904, tab. 20, nom. cons. prop. (Shoemaker & Redhead, 1999) [often erroneously listed as '(Oud.) Frank' or 'Rostr.'].  
*Phyllosticta betae* Oudem., Ned. kruidk. Archf II, 2 (3) (1877) 181.

*Phoma sphaerosperma* Rostr., Tidsskr. Landfkon. V, 8 (1889) 746; not *Phoma sphaerosperma* P. Karsten, Hedwigia 24 (1885) 74; not *Phoma sphaerosperma* Fuckel, Fungi rhen. Suppl. Fasc. 5 (1867) No. 1945.

*Phyllosticta tabifica* Prill., Bull. Soc. mycol. Fr. 7 (1891) 19, nom. rej. prop. (Shoemaker & Redhead, 1999), in Sylloge Fung. 10 (1892) 180 listed as '*Phoma tabifica* Prill.' [interpreted as an unintentional error of citation (Boerema & Dorenbosch, 1973), but see Shoemaker & Redhead l.c.]; not *Phoma tabifica* Kesteren, Gewasbescherming 2 (1971) 74 [= *Phoma telephii* (Vestergr.) Kesteren, sect. *Phyllostictoides*, see De Gruyter et al., 2002].

*Phyllosticta spinaciae* H. Zimm., Verh. naturf. Ver. Brünn 47 ['1908'] (1909) 87.

*Phoma spinaciae* Bubák & Willi Krieg. in Bubák, Anns mycol. 10 (1912) 47.

*Gloeosporium betae* Dearn. & E.T. Barthol. in Dearness, Mycologia 9 (1917) 356.

*Selected literature.* Booth (1967), Boerema & Dorenbosch (1973), Boerema et al. (1987), Shoemaker & Bissett (1998).

*Description in vitro*

OA: growth-rate 50–60 mm after 7 days, regular to slightly irregular, with finely floccose, pale olivaceous grey/mouse grey to grey olivaceous aerial mycelium; colony greenish olivaceous/grey olivaceous to dull green; reverse similar.

MA: growth-rate 60–75 mm after 7 days, regular to slightly irregular, with velvety to finely woolly, pale olivaceous grey to pale grey olivaceous aerial mycelium; colony greenish olivaceous to olivaceous grey/olivaceous black; reverse olivaceous black, olivaceous near margin.

CA: growth-rate 30–45 mm after 7 days, irregular, with felty to finely floccose, pale olivaceous grey aerial mycelium; colony grey olivaceous to dull green; reverse similar, with olivaceous black at centre.

Pycnidia densely covered by mycelial hairs, 100–200(–350)  $\mu\text{m}$  in diameter, globose to subglobose, solitary or confluent, with 1(–2) inconspicuous non-papillate pore(s), olivaceous to olivaceous black; with an outer wall formed of 2–3(–4) layers of dark polygonal cells, and an inner wall of 1–3(–4) layers of thin walled, often radially arranged hyaline cells; with milky white, later rosy buff to ivory exuded conidial masses; scattered, both on and in the agar. Conidiogenous cells 4–9  $\times$  5–9  $\mu\text{m}$ , globose to bottle-shaped. Conidia aseptate, (2.5–)4–6.5(–9.5)  $\times$  (1.5–)2.5–4(–5.5)  $\mu\text{m}$ , av. 5.6  $\times$  3.3  $\mu\text{m}$ ,  $Q = 1.1$ –2.4, av.  $Q = 1.7$ , globose to subglobose/ellipsoidal, biguttulate or with two polar concentrations of many small guttules.

Chlamydo-spores absent (but see Note), polymorphic swollen cells commonly occur on all media.

NaOH-spot test: positive, a greenish/bluish discolouring occurs immediately on OA and MA, soon changing to red (E+ reaction).

With Lugol's iodine the entire outer cells of the pycnidial wall become red (different from the blotting paper effect of the cell walls in sect. *Plenodomus*, Boerema et al., 1994).

On MA very fine, needle-like crystals are produced.

*Note.* Monte & Garcia-Acha (1988a) obtained additional vegetative structures on other media: "Sclerotium-like structures" (retarded development of the pycnidial cavity, 'pynoscclerotia' especially characteristic of species in sect. *Sclerophomella*, Boerema & de Gruyter, 1998).

"Holdfasts" (clusters of swollen cells at the tips of hyphae in contact with the bottom of the Petri dish).

"Arthrospores" (schizolytical fragmentation of hyphae).

"Intercalated chains of globose, somewhat elongated chlamydo-spores" (obtained in poor culture media with restricted carbon and nitrogen sources).

*Description in vivo* (especially on *Beta vulgaris*)

Pycnidia (immersed in necrotic tissue of seedlings, leaves, stems and roots; occasionally also in seed clusters) subglobose, up to 250  $\mu\text{m}$  in diameter, glabrous with a flush circular central pore. Conidia as in vitro, subglobose-ellipsoidal, arising from an irregular layer of doliiform conidiogenous cells. These cells sometimes develop alternately or even in a zigzag pattern.

Pseudothecia (occasionally found immersed in necrotic tissue of overwintered seed stalks) subglobose, becoming depressed cupulate, with a short papilla, 200–400  $\mu\text{m}$  in

diameter. Asci cylindrical-clavate, 70–80(–120 when free) × (14–)15–16(–17) µm, 8-spored, overlapping biseriolate; separated by numerous paraphyses. Ascospores ellipsoidal to inequilaterally ovoid, 3-septate, with 1 longitudinal septum in the two central cells, constricted at the septa, (18–)20–22(–27) × (7–)8–9(–11) µm. (For detailed descriptions and illustrations see Booth, 1967 and Shoemaker & Bissett, 1998.)

*Ecology and distribution.* World-wide on beet (*Beta vulgaris*) and spinach (*Spinacia oleracea*). Also recorded from various wild Chenopodiaceae in Europe. Black Leg, Damping-off in seedlings, Root Rot, Storage Rot and Leaf Spot. Mainly seed-borne.

The disease symptoms may be confused with those caused by *Ascochyta caulina* (P. Karst.) Aa & Kesteren, teleomorph *Pleospora calvescens* (Fr.) Tul., see Boerema et al., 1987.

*Representative cultures.* CBS 523.66 (IMI 173140) and CBS 109410 (PD 77/113) ex *Beta vulgaris* (Chenopodiaceae): both from the Netherlands.

## 2. *Phoma typhina* (Sacc. & Malbr.) Aa — Fig. 1B

Teleomorph: *Pleospora typhicola* (Cooke) Sacc.

*Phoma typhina* (Sacc. & Malbr.) Aa, in: Van der Aa & Vanev, Revision Phyllosticta, CBS (2002) 468. — *Phyllosticta typhina* Sacc. & Malbr., in: Saccardo, *Michelia* 2 (1880) 88.

*Phoma typharum* Sacc., *Sylogae Fung.* 3 (1884) 163. — *Phyllosticta typharum* (Sacc.) Allesch., *Rabenh. Krypt.-Flora* [ed. 2], *Pilze* 6 [Lief. 61] (1898) 166 [vol. dated '1901'].

*Phyllosticta renouana* Sacc. & Roum., *Revue mycol.* 6 (1884) 32.

*Phoma typhae* Pass., in: Brunaud, *Acta Soc. Linn. Bordeaux* 40 (1886) 20. — *Phyllosticta typhae* (Pass.) Allesch., *Rabenh. Krypt.-Flora* [ed. 2], *Pilze* 6 [Lief. 61] (1898) 166 [vol. dated '1901'].

*Phoma typhicola* Oudem., *Versl. gewone Vergad. wis- en natuurk. Afd. K. Akad. Wet. Amst.* 9 (1900) 298; *Ned. kruidk. Archf* III, 2 (1) (1900) 246.

*Phyllosticta corallitobola* Bubák & Kabát, *Hedwigia* 44 (1905) 350.

*Selected literature.* Webster & Lucas (1959), Van der Aa & Vanev (2002).

### *Description in vitro*

OA: growth-rate 70–80 mm after 7 days, regular, with floccose to woolly, white to pale olivaceous grey aerial mycelium; colony grey olivaceous/olivaceous to dull green; reverse olivaceous/olivaceous grey to greenish grey.

MA: growth-rate 75–80 mm after 7 days, regular, with woolly, white to (pale) olivaceous grey aerial mycelium; colony olivaceous buff/honey to olivaceous, citrine near margin; reverse similar, partly with olivaceous black.

CA: growth-rate c. 80 mm after 7 days, regular, with woolly, pale olivaceous grey aerial mycelium; colony grey olivaceous/olivaceous grey to dull green; reverse similar.

Pycnidia surrounded by short dark hyphae, 80–200 µm in diameter, globose to subglobose, solitary or confluent, with 1, often indistinct non- or slightly papillate pore (usually only visible as a light spot in crushed pycnidia), honey/sienna, later olivaceous to olivaceous black; wall thin to rather thick in old cultures (as with sect. *Sclerophomella*), composed of 1–8 outer layers of dark brown rounded or isodiametric cells and 1–10 inner layers of smaller, often radially arranged cells, which may become thick-walled; with white to salmon exuded conidial masses; scattered, both on and in the agar. Conidiogenous

cells  $3-7 \times 4-7 \mu\text{m}$ , globose to bottle shaped. Conidia aseptate,  $(3.5-4.5-7(-9) \times 1.5-2.5(-4) \mu\text{m}$ , av.  $5.2 \times 2.3 \mu\text{m}$ ,  $Q = 1.6-3.0$ , av.  $Q = 2.3$ , subglobose to ellipsoidal/allantoid, eguttulate or with some small guttules.

Retarded development of the pycnidial cavity may occur, resulting in 'pyncnosclerotia', similar to those found in cultures of some species in sect. *Sclerophomella*.

Chlamydo-spores absent, but dark swollen cells may occur.

NaOH-spot test: negative.

With Lugol's iodine the contents of the cells in the peridium of the pycnidia usually become red.

Crystals absent.

*Note.* The wall structure of the poroid pycnidia and the pyncnosclerotia of this anamorph are characteristic of species in sect. *Sclerophomella* (Boerema & de Gruyter, 1998). However, due to its connection with a teleomorph in *Pleospora* (members of sect. *Sclerophomella* are related to *Didymella*) and the hairy appearance of the pycnidia in vitro, we have classified it in sect. *Pilosa*.

*Description in vivo (especially on Typha latifolia)*

Pycnidia (subepidermal, then half-free on leaf spots and decayed leaves, leaf sheaths and stems) globose or depressed globose, variable in size, but commonly  $150-200 \mu\text{m}$  in diameter, glabrous with flat ostiole. Conidia as in vitro, but more variable in shape and size (Fig. 1B), arising from a layer of small hyaline cells lining the cavity.

Pseudothecia (also subepidermal and later almost superficial, on dead leaf sheaths and stems; often occurring together with pycnidia) globose or irregularly globose,  $280-480 \mu\text{m}$  diam. Asci cylindrical or broadly clavate,  $200-240 \times 44-48 \mu\text{m}$ , 8-spored, irregularly biseriate; separated by numerous paraphyses. Ascospores oblong, rounded at the ends, 3-septate with 1 longitudinal septum, running down the length of the spore in one plane,  $46-56 \times 18-24 \mu\text{m}$ , strongly constricted at the septa; each cell of the spore is rounded and may separate slightly from adjacent cells. Mature spores are surrounded by a gelatinous sheath (for detailed description and illustration see Webster & Lucas, 1959).

*Ecology and distribution.* In Europe recorded in association with leaf spots and on dead leaves, leaf sheaths and stems of *Typha latifolia* and *Typha angustifolia*. Probably occurring everywhere the hosts are growing.

The occurrence of thin-walled and thick-walled pycnidia initially made us believe there were two different species, see Van der Aa & Vanev (2002). However, a comparative study of the original material of Webster & Lucas (1959) with Dutch collections in vivo and in vitro, proved that only one fungus was involved.

*Representative cultures ex Typha angustifolia* (Typhaceae). CBS 132.69, the Netherlands and SHEFF 2265a (dried), Great Britain.

## NOMENCLATURAL NOTES ON SOME OTHER TAXA

- i. The type specimens of three new taxa recently described in this Contribution series still need to be documented according to Art. 37.3:

***Phoma schneiderae*** Boerema, de Gruyter & van de Graaf, *Persoonia* 17 (2) (1999) 282.

Type specimen L 998.099-105, dried culture on MA, dated 14-07-1998, made by J. de Gruyter, Plant Protection Service (PD) Wageningen, the Netherlands from living culture CBS 101.494 (ADAS AR 98/11 = PD 98/5247) isolated from leaf spot on *Lupinus albus*, Mepal-Ely, Cambridgeshire, Great Britain, April 1998.

Annotation by Boerema, de Gruyter & van de Graaf

***Phoma pimpinellae*** Boerema & de Gruyter, *Persoonia* 17 (2) (1999) 278.

Type specimen L 992.163-138, dried culture on MA, dated 01-04-1999, made by J. de Gruyter, Plant Protection Service (PD) Wageningen, the Netherlands from living culture CBS 10637 isolated from a single ascospore of *Leptosphaeria pimpinellae* Lowen & Sivanesan (1989) on stem of *Pimpinella anisi*, collected at Mt Carmel, Beit Oren Forest, Wadi near Kibbutz Oren, Israel.

Annotation by Boerema & de Gruyter

***Phoma leveillei*** var. ***microspora*** de Gruyter & Boerema, *Persoonia* 17 (4) (2002) 553.

Type specimen L 999.2 42399, dried culture on MA, dated 15-08-2000, made by J. de Gruyter, Plant Protection Service (PD) Wageningen, the Netherlands from living culture CBS 102876, isolated from water, Lake of Skadar, Yugoslavia (Montenegro).

Annotation by De Gruyter & Boerema

- ii. In our study on the identity of the *Phoma*-like anamorphs described by Wollenweber & Hochapfel (Boerema & Dorenbosch, 1973) it was noted that one of the species listed represented a spermatial state and fits into the genus *Asteromella* Pass. & Thüm. However, the new combination proposed at that time, appeared to be an invalid later homonym and must be replaced:

***Asteromella ulmi*** Boerema nom. nov.

■ *Asteromella bellulensis* (Martelli) Boerema & Dorenb., *Stud. Mycol.* 3 (1973) 5 [replaced synonym]; not *Asteromella bellulensis* Syd., *Annls mycol.* 30 (1933) 397.

■ *Phyllosticta bellulensis* Martelli, *Nuovo G. bot. Ital.* 20 (1888) 395.

Teleomorph: *Mycosphaerella ulmi* Kleb.

Conidial anamorph: *Phloeospora ulmi* (Fr.: Fr.) Wallroth.

In Europe a common leaf spot fungus of elms, *Ulmus* spp., see the experimental study by Klebahn (1905).

- iii. *Phoma*-like phialidic pycnidia containing small brown to brown-black conidia at maturity, formerly classified in *Coniothyrium* Corda, are better placed in *Microsphaeropsis* Höhn. on account of conidium ontogeny<sup>1</sup> (Sutton, 1980).

The conidia of *Microsphaeropsis* species are initially subhyaline, which means that collections and cultures with young pycnidia may be easily mistaken for *Phoma*.

1) The conidiogenous cells of the type- and related species of *Coniothyrium* show annellations (annellidic appearance) or an annulated collar (Sutton, 1971; electron microscopic study by Reisinger et al., 1977), comparable with our observations on *Ascochyta* species (Boerema & Bollen, 1975). The conidial ontogeny of the type- and related species of *Microsphaeropsis* agrees with that of *Phoma* (electron microscopic study by Jones, 1976): conidiogenous cells with a collarette, i.e. the basal part of the papilla preceding the initiation of the first conidium. In both genera the pigmentation and differentiation of the conidium wall into an outer and an inner layer by diffuse wall-building occur after conidial secession: maturation asynchronous with conidium ontogeny (Reisinger et al., 1977; Jones, 1976).

Two examples:

- ✧ ***Microsphaeropsis fuckelii*** (Sacc.) Boerema, comb. nov.
  - *Coniothyrium fuckelii* Sacc., *Michelia* 1 (2) (1878) 207 [basionym].
 Teleomorph: *Leptosphaeria coniothyrium* (Fuckel) Sacc.  
 Isolates of this cosmopolitan pathogen of trees and shrubs (Boerema & Verhoeven, 1972) have frequently been sent to the Dutch Plant Protection Service as suspected *Phoma* species.
  
- ✧ ***Microsphaeropsis glumarum*** (Ellis & Tracy) Boerema, comb. nov.
  - *Phoma glumarum* Ellis & Tracy in Ellis & Everh., *J. Mycol.* 4 (1888) 123 [basionym].
  - *Phyllosticta glumarum* (Ellis & Tracy) I. Miyake, *J. Coll. Agric. imp. Univ. Tokyo* 2 (1910) 252.
  - *Sphaeropsis glumarum* (Ellis & Tracy) Kuntze, *Revisio Gen. Pl.* 3 (2) (1898) 525.
 An anamorph recorded on dark glumes of poorly developing or aborted kernels of rice in the USA and China (incl. Taiwan). This fungus has been confused with the plurivorous *Phoma sorghina* (Sacc.) Boerema et al., even by S.M. Tracy, one of its original authors. See the discussion in Boerema, Dorenbosch & Van Kesteren (1973: 136).

#### ACKNOWLEDGEMENTS

Thanks are due to Dr. M.E. Noordeloos and Dr. A. Lyon of the Universities at Leiden and Sheffield for their help in obtaining original material of *Phoma typhina* and *Pleospora typhicola*. Dr. R.T.A. Cook kindly improved the English of this paper.

#### REFERENCES

- Aa, H.A. van der, G.H. Boerema & J. de Gruyter. 2000. Contributions towards a monograph of *Phoma* (Coelomycetes) – VI-1. Section Phyllostictoides: Characteristics and nomenclature of its type species *Phoma exigua*. *Persoonia* 17: 435–456.
- Aa, H.A. van der & S. Vanev. 2002. A revision of the species described in *Phyllosticta*. CBS-Utrecht.
- Boerema, G.H. 1993. Contributions towards a monograph of *Phoma* (Coelomycetes) – II. Section Peyronellaea. *Persoonia* 15: 197–221.
- Boerema, G.H. 1997. Contributions towards a monograph of *Phoma* (Coelomycetes) – V. Subdivision of the genus in sections. *Mycotaxon* 64: 321–333.
- Boerema, G.H. & G.J. Bollen. 1975. Conidiogenesis and conidial septation as differentiating criteria between *Phoma* and *Ascochyta*. *Persoonia* 8: 111–144.
- Boerema, G.H. & M.M.J. Dorenbosch. 1973. The *Phoma* and *Ascochyta* species described by Wollenweber and Hochapfel in their study on fruit-rotting. *Stud. Mycol.* 3: 1–50.
- Boerema, G.H., M.M.J. Dorenbosch & H.A. van Kesteren. 1973. Remarks on species of *Phoma* referred to *Peyronellaea* IV. *Persoonia* 7: 131–139.
- Boerema, G.H. & J. de Gruyter. 1998. Contributions towards a monograph of *Phoma* (Coelomycetes) – VII. Section Sclerophomella: Taxa with thick-walled pseudoparenchymatous pycnidia. *Persoonia* 17: 81–95.
- Boerema, G.H. & J. de Gruyter. 1999. Contributions towards a monograph of *Phoma* (Coelomycetes) – III - Supplement: Additional species of section Plenodomus. *Persoonia* 17: 273–280.
- Boerema, G.H., J. de Gruyter & P. van de Graaf. 1999. Contributions towards a monograph of *Phoma* (Coelomycetes) – IV - Supplement: An addition to section Heterospora: *Phoma schneiderae* spec. nov., synanamorph *Stagonosporopsis lupini* (Boerema & R. Schneider) comb. nov. *Persoonia* 17: 281–285.
- Boerema, G.H., J. de Gruyter & H.A. van Kesteren. 1994. Contributions towards a monograph of *Phoma* (Coelomycetes) – III-1. Section Plenodomus: Taxa often with a *Leptosphaeria* teleomorph. *Persoonia* 15: 431–487.
- Boerema, G.H., J. de Gruyter & M.E. Noordeloos. 1997. Contributions towards a monograph of *Phoma* (Coelomycetes) – IV. Section Heterospora: Taxa with large sized conidial dimorphs, in vivo sometimes as *Stagonosporopsis* synanamorphs. *Persoonia* 16: 335–371.

- Boerema, G.H., W.M. Loerakker & M.E.C. Hamers. 1987. Check-list for scientific names of common parasitic fungi. Supplement Series 2a (additions and corrections): Fungi on field crops: beet and potato; caraway, flax and oilseed poppy. *Neth. J. Pl. Path.* 93, Suppl. 1: 1–20<sup>2</sup>.
- Boerema, G.H., W.M. Loerakker & M.E.C. Hamers. 1996. Contributions towards a monograph of Phoma (Coelomycetes) – III-2. Misapplications of the type species name and the generic synonyms of section Plenodomus (Excluded species). *Persoonia* 16: 141–190.
- Boerema, G.H. & A.A. Verhoeven. 1972. Check-list for scientific names of common parasitic fungi. Supplement Series 1a: Fungi on trees and shrubs. *Neth. J. Pl. Path.* 78, Suppl. 1.
- Booth, C. 1967. *Pleospora björlingii*. *CMI Descr. Pathog. Fungi Bact.* 149.
- Gruyter, J. de. 2002. Contributions towards a monograph of Phoma (Coelomycetes) – IX. Section Macrospora. *Persoonia* 18: 85–102.
- Gruyter, J. de & G.H. Boerema. 2002. Contributions towards a monograph of Phoma (Coelomycetes) – VIII. Section Paraphoma. *Persoonia* 17: 541–561.
- Gruyter, J. de, G.H. Boerema & H.A. van der Aa. 2002. Contributions towards a monograph of Phoma (Coelomycetes) – VI-2. Section Phyllostictoides: Outline of its taxa. *Persoonia* 18: 1–53.
- Gruyter, J. de & M.E. Noordeloos. 1992. Contributions towards a monograph of Phoma (Coelomycetes) – I-1. Section Phoma: Taxa with very small conidia in vitro. *Persoonia* 15: 71–92.
- Gruyter, J. de, M.E. Noordeloos & G.H. Boerema. 1993. Contributions towards a monograph of Phoma (Coelomycetes) – I-2. Section Phoma: Additional taxa with very small conidia and taxa with conidia up to 7 µm long. *Persoonia* 15: 369–400.
- Gruyter, J. de, M.E. Noordeloos & G.H. Boerema. 1998. Contributions towards a monograph of Phoma (Coelomycetes) – I-3. Section Phoma: Additional taxa with very small conidia and taxa with conidia longer than 7 µm. *Persoonia* 16: 471–490.
- Jones, P.C., 1976. Ultrastructure of conidium ontogeny in *Phoma pomorum*, *Microsphaeropsis olivaceum* and *Coniothyrium fuckelii*. *Can. J. Bot.* 54: 831–851.
- Klebahn, H. 1905. Untersuchungen über einige Fungi imperfecti und die zugehörigen Ascomyzetenformen I. u. II. *Jb. Wiss. Bot.* 41 (4): 485–560.
- Lowen, R. & A. Sivanesan. 1989. *Leptosphaeria pimpinellae* and its *Phoma* anamorph. *Mycotaxon* 35: 205–210.
- Monte, E. & I. Garcia-Acha. 1988a. Vegetative and reproductive structures of *Phoma betae* in vitro. *Trans. Br. mycol. Soc.* 90: 233–245.
- Monte, E. & I. Garcia-Acha. 1988b. Conidiogenesis in *Phoma betae*. *Trans. Br. mycol. Soc.* 90: 659–662.
- Monte, E. & I. Garcia-Acha. 1988c. Germination of conidia in *Phoma betae*. *Trans. Br. mycol. Soc.* 91: 133–139.
- Reisinger, O., M. Morelet & E. Kiffer. 1977. Electron microscopic study of conidium ontogeny in *Coniothyrium cupressacearum* (Coelomycetes). *Persoonia* 9: 257–264.
- Shoemaker, R.A. & J. Bissett. 1998. *Pleospora betae*. *Fungi Canadenses* No. 339. *Can. J. Pl. Path.* 20: 206–209.
- Shoemaker, R.A. & S.A. Redhead. 1999. Proposals to conserve the names of four species of Fungi (*Phoma betae*, *Helminthosporium avenae*, *Pyrenophora avenae* and *Pleospora tritici-repentis*) against competing earlier synonyms. *Taxon* 48: 381–384.
- Sutton, B.C., 1971. Coelomycetes IV. The genus *Harknessia* and similar fungi on *Eucalyptus*. *Mycol. Pap.* 123.
- Sutton, B.C. 1980. The Coelomycetes. Fungi imperfecti with pycnidia, acervuli and stromata. CMI, Kew.
- Webster, J. & M.T. Lucas. 1959. Observations on British species of *Pleospora* I. *Trans. Br. mycol. Soc.* 42: 332–342.

2) The complete series 'Check-list for scientific names of common parasitic fungi' compiled by G.H. Boerema and Coworkers was reprinted in 1993 with a cumulative index. *Libri Botanici* 10. IHW Verlag, Eching, D.

## BOOK REVIEWS

H.A. van der Aa & S. Vanev. *A revision of the species described in Phyllosticta*. (Centraalbureau voor Schimmelcultures, P.O.Box 85167, 3508 AD Utrecht, The Netherlands, 2002.) ISBN 90-70351-47-1 (paperback). Pp. 509. Price: EUR 50.

In this extensive publication the taxa described in *Phyllosticta* are enumerated, based on literature and herbarium species, type-specimens and living isolates. It is the result of the studies made by the first author during most of his long career at the CBS in Utrecht (formerly Baarn), but the project was originally initiated by the late Dr. J.A. von Arx. The annotated list of accepted species in *Phyllosticta*, including several new combinations in *Phyllosticta*, and the much longer annotated list of species which have been redispersed and transferred to other genera are impressive. The book offers a short introduction to the genus *Phyllosticta* and its current taxonomic position among the asexual Coelomycetes. A key is given to some of these genera which are important for clarifying this, followed by an overview of the genera concerned with nomenclatural notes and descriptions of their principal characters. After two chapters dealing with methods and material, the main part of the book is devoted to an enumeration of species accepted in *Phyllosticta* (34 pp.) and species excluded from the genus (Pp. 441 pp.!). A full list of references concludes the book.

The authors are to be complimented with this publication which has involved a huge amount of work. It will certainly serve the mycological community with a tremendous source of information for generations to come.

R.A. Agerer (ed.). *Colour Atlas of Ectomycorrhizae, twelfth delivery*. (Einhorn Verlag, Sebalplatz 1, D-73525 Schwäbisch Gmünd, 2002). 28 plates with descriptive text, keys and literature references. Price: EUR 80.

The 12th issue of this renowned series includes new keys to the ectomycorrhizae of *Alnus*, *Betula*, *Eucalyptus*, *Nothofagus*, *Picea*, *Pinus*, *Populus*, *Pseudotsuga*, *Quercus*, *Shorea*, *Tsuga*, *Cistus*, *Fumana*, *Gnetum*, *Helianthemum*, and *Tilia*. The 28 plates comprise 23 identified and 5 non-identified mycorrhizae. Each plate gives several colour and black-and-white photographs of the mycorrhizae and their anatomy, as well as a description of the characters and references to colour photographs of the fruit-bodies, and ecology of both fruit-bodies and mycorrhizae. In some cases additional remarks are given. The present issue forms a valuable addition to this excellent standard work.



## A RECONNAISSANCE OF THE GENUS *PSEUDOBAEOSPORA* IN EUROPE II

C. BAS

Nationaal Herbarium Nederland, Universiteit Leiden branch,  
P.O. Box 9514, 2300 RA Leiden, The Netherlands

In the second and last part of this paper the genus *Pseudobaeospora* is redefined, its taxonomic position is discussed, and the possibilities of a formal infrageneric classification are considered. Because of the recent discovery of another new species, viz. *P. mutabilis* Adamčík & Bas, emendations of the key published in the first part of this paper (Bas, 2002), are proposed. Descriptions and drawings of all European taxa known are presented. Extralimital species are discussed and compared with European species.

With the rapid increase in the number of species of the genus *Pseudobaeospora* in Europe from one or two 'classical' ones before 1995 to 14 to 16 species at present, also the morphological diversity of the genus has increased considerably. Therefore a new circumscription of the genus has become necessary, herewith emending the two most recent ones by Singer (1986) and Bas (1995).

### ***Pseudobaeospora* Singer, Lloydia 5 (1942) 129, emend. Bas**

Selected literature. Horak (1964); Singer (1986); Bas (1995 & 2002).

Basidiocarps very small to small (pileus 1.5–30 mm in diameter; stipe 10–55(–70) × 0.1–3.0 mm), mycenoid to collybioid, often with more or less rooting base of stipe. Pileus pale to dark lilac, violaceous, purple, or grey to brown with such tinges, more rarely without these tinges, sometimes white to pale buff, in two extralimital species yellow, hemispherical, obtusely conical or paraboloid to plano-convex or plano-conical, with or without a small umbo or papilla, at first with outer margin inflexed, usually not or only very slightly hygrophanous with margin not or very slightly striate, but in the tiny basidiocarps of one species hygrophanous and translucently striate almost up to centre when moist, glabrous to minutely granular, minutely fibrillose or felted, more rarely subsquamulose, often somewhat micaceous or silvery because of aeriferous pileipellis. Lamellae emarginate to almost free or free, more rarely adnate, distant to fairly crowded, usually more or less concolorous with pileus, but in some coloured species very pale. Stipe cylindrical to filiform, sometimes tapering downwards, usually ± concolorous with pileus or somewhat darker or paler, usually sparsely to rather densely, minutely white pruinose to flocculose at apex, lower down glabrous to minutely fibrillose, rarely minutely flocculose, at base mostly with white to rarely yellow tomentum and rhizoids, without clear evidence of velar remnants. Context concolorous or paler. Smell (rarely recorded) indistinct, aromatic, weakly raphanoid or slightly farinaceous. Spore print white or whitish (only a few records; two very thin prints seen), but see remarks below.

Spores very small to small (from 2.8 µm to rarely more than 6.5 µm long), globose to ellipsoid (average Q rarely up to 1.6), at first thin-walled and non-amyloid, but matur-

ing after liberation and becoming thick-walled, weakly to rather strongly dextrinoid, congophilous, cyanophilous, and rather frequently more or less metachromatic in cresyl blue (all spores on pileipellis and apex of stipe thick-walled, but in preparations of fragments of lamellae thin-walled spores usually dominant), with very distinct, abrupt hilar appendage, glabrous (in single species tested also with SEM), without germ pore, colourless but on pileus sometimes taking over colour of pileipellis. Basidia 4-spored, rarely 2-spored or 4- and 2-spored in the same basidiocarp, usually with clamp-connection, but in some species without, non-siderophilous. Scattered sclerified basidia usually present. Pleurocystidia always lacking. Cheilocystidia present in some species, broadly to narrowly clavate, lageniform, utriform, subcylindrical, or sometimes irregularly shaped, always thin-walled. Hymenophoral trama regular to somewhat irregular, with cells of hyphae in central part often inflated, sometimes  $\pm$  dextrinoid. Subhymenium narrow, rather dense, from ramose to almost cellular. Pileipellis varying from a simple cutis in some species to an irregular hymeniderm in others, often two-layered and then the thin and inconspicuous to very distinct suprapellis a cutis made up of comparatively narrow hyphae, rarely with distinct pileocystidia, and the usually very prominent subpellis made up of radially to disorderly arranged chains of inflated cells. Pigments predominantly parietal but minute incrustations reported by some collectors (not observed in dried material, possibly disappearing in  $\text{NH}_4\text{OH}$  and  $\text{KOH}$ ). Caulocystidia present at least at apex of stipe, clavate, subcylindrical to filiform, or irregularly shaped, thin-walled, scattered to very crowded. Context of stipe and pileus continuous. Trama of stipe regular, composed of cylindrical, thin- to slightly thick-walled, frequently septate hyphae. Clamp-connections usually present in several or all tissues, sometimes completely lacking, in one species restricted to basidia and subhymenium. In  $\text{KOH}$  5% pileipellis fragments not or hardly changing colour or becoming violet, green, yellow or brownish with such tinges, rarely first red then yellow-green; other parts of basidiocarps may show similar colour changes (insufficiently investigated). In several species tissues more or less dextrinoid (insufficiently investigated).

**Habitat & distribution** — Terrestrial, probably non-mycorrhizal, on needle carpets of conifers, humus, forest litter, wooden debris, once on a fallen branch, among mosses and grasses (and then sometimes deeply hidden in the vegetation), but also sometimes on bare soil, most species seemingly preferring calcareous and/or nutrient-rich soils, but some occurring on peaty soil, from sea level to the subalpine (or even alpine?) zone, in temperate, subtropical and tropical regions; probably cosmopolitan, in literature reported from Europe, North and South America, and central and southern Asia; in Europe fruiting mainly from August–November, very rarely in July and December.

The most important emendation of the generic description concerns the greater variation in pileipellis structures. Two species even appeared to have a hymenidermoid pileipellis of erect inflated cells, which looks round-celled when seen from above. Moreover a few species have perfect cheilocystidia and one evident pileocystidia. A wide range of colour changes of the pileipellis in  $\text{KOH}$  5% offers a new set of useful characters. However, the unity of the genus can hardly be doubted in view of the unique small spores becoming thick-walled and dextrinoid after their liberation from the basidia. Only the genus *Rhodocollybia* Singer (Antonín & Noordeloos, 1997) has similar but usually larger spores, larger basidiocarps with a simple cutis or more often an ixocutis and a pinkish yellow to pinkish brown, never white spore print.

Some special observations should be mentioned here: some authors record coloured spore prints, e.g. Favre (1960) for what probably is true *P. pillodii* ("sporée nettement lilacin-pourpré"), but that is not the case for the few collections with a spore print or with notes on the spore print colour studied by the author.

For the single collection of *P. oligophylla* in its present concept, the collector, N. Dam, noted that some rhizoids were connected with small ochraceous tubers in the soil, as in *Collybia cirrhata* (Pers.) Quél.

#### TAXONOMIC POSITION OF THE GENUS

*Pseudobaeospora oligophylla*, the type species, was originally placed by Singer (1938) in *Baeospora*. Later Singer (1942) excluded this species with dextrinoid spores from *Baeospora* (with amyloid spores) and placed it in the new genus *Pseudobaeospora*, then thought to belong to the Tricholomataceae ('Marasmioidae'). But in the first edition of his 'Agaricales in Modern Taxonomy' Singer (1951) moved *Pseudobaeospora* to Agaricaceae tribus Lepioteae. Even in the latest edition of the same work Singer (1986) maintained the genus in the Agaricaceae (but then in tribus Cystodermateae), very recently still followed by Wasser (2002). Kühner (1980), citing good reasons, had already restored the genus in the Tricholomataceae, and this placement was followed by Bas (1995) and Kirk et al. (2001).

It is not quite clear what made Singer place *Pseudobaeospora* close to *Lepiota*. One would expect that the dextrinoid nature of the thickened mature spore wall would be stressed as an important argument, but that is not the case. *Pseudobaeospora* was considered by Singer (1963) to be closely related to the *Lepiota sericea* group (= *Sericeomyces* Heinemann, 1978); even to such an extent that Locquin's (1952) transfer of this group to *Pseudobaeospora* was accepted by him (Singer, 1975). This taxonomic solution has been strongly opposed by Kühner (1980: 146) and finally rejected by Singer (1986) too, when he excluded again the *L. sericea* group from *Pseudobaeospora*.

Morphological arguments for placing *Pseudobaeospora* in the Tricholomataceae are (1) the shape of the basidiocarp, which is more collybioid than lepiotoid; (2) the attachment of the lamellae, which is only exceptionally free, but mostly emarginate, and sometimes even adnate; (3) the absence of any sign of a veil (but the ontogeny of the basidiocarp has not yet been studied); and (4) the continuous context of stipe and pileus. The fact that the spores of *Pseudobaeospora* become secondarily thick-walled does not hold as an argument against this option, as thickening spore walls becoming dextrinoid occur also elsewhere in the Tricholomataceae, e.g. in *Rhodocollybia*, where, judging by the five European species described by Antonín & Noordeloos (1997: 119–135), viz. *R. maculata* (Alb. & Schwein.: Fr.) Singer, *R. proluxa* (Hornem.: Fr.) Antonín & Noordel., *R. fodiens* (Kalchbr.) Antonín & Noordel., *R. filamentosa* (Velen.) Antonín, and *R. butyracea* (Bolt.: Fr.) Lennox, it might be a generic character too.

Molecular studies on *P. pyrifer*, and a comparison with members of the Agaricaceae showed that it does not belong to this family, but that its position is still unclear, as the LSU sequence is close to those of *Thaxteromyces* and *Nolanea* species (Vellinga, 2003). As only *P. pyrifer* was included in Vellinga's studies, it is premature to draw conclusions for the genus as a whole.

For the moment the best solution seems to accept *Pseudobaeospora* as a member of the Tricholomataceae and to place it there near *Collybia* and its relatives.

## INFRAGENERIC CLASSIFICATION

Although *Pseudobaeospora* shows a wide range of microscopic and macroscopic characters, it is very difficult to define subdivisions that look more or less natural. Rather than adopt an alphabetic order, the species are grouped here by the salient characters they share or by their overall resemblance. Nonetheless these groupings are almost certainly artificial. These groups are:

- I. Albidula group. Basidiocarp white to pale buff. Clamp-connections present. Cheilocystidia absent. Pileipellis not hymenidermoid.  
1. *P. albidula*. 2. *P. paulochroma*. 3. *P. bavariae*.
- II. Celluloderma group. Basidiocarp coloured. Clamp-connections present. Cheilocystidia absent or present. Pileipellis hymenidermoid.  
4. *P. celluloderma*. 5. *P. mutabilis*.
- III. Pyrifer group. Basidiocarp coloured. Clamp-connections present. Cheilocystidia present and conspicuous. Pileipellis not hymenidermoid.  
6. *P. pyrifer*. 7. *P. jamonii*. 8. *P. laguncularis*.
- IV. Frieslandica group. Basidiocarp coloured. Clamp-connections present (in *P. frieslandica* only at basidia and in subhymenium). Cheilocystidia absent (except in *P. dichroa* f. *cystidiata*). Pileipellis not hymenidermoid.  
9. *P. dichroa*. 10. *P. frieslandica*. 11. *P. argentea*. 12. *P. subglobispora*. 13. *P. ellipticospora*. 14. *P. pallidifolia*.
- V. Pillodii group. Basidiocarp coloured. Clamp-connections absent. Cheilocystidia absent. Pileipellis a cutis.  
15. *P. pillodii*. 16. *P. oligophylla*.

## ADDITIONS TO THE KEY TO THE EUROPEAN SPECIES OF PSEUDOBAEOSPORA

When the first part of this paper (Bas, 2002) was already in print, another undescribed species turned up in Slovakia, characterized by the unique combination of a hymenidermoid pileipellis and distinct cheilocystidia. It has meanwhile been published under the name *P. mutabilis* Adamčík & Bas (2002), which refers to the colour change of the pileipellis after bruising. Inclusion of this species in the key requires the following changes:

- (5. Pileipellis in KOH not emitting a deep red pigment.)
  7. Cheilocystidia absent. Spores  $4.4-6.4 \times 3.3-4.4 \mu\text{m}$ , with average  $Q = 1.30-1.40$  ..... *P. pallidifolia* Bas, Gennari & Robich
  7. Cheilocystidia present. Spores  $2.8-3.9 \times 2.6-3.5 \mu\text{m}$ , with average  $Q = 1.05-1.10$ .
    - 7'. Pileipellis made up of erect chains of inflated cells forming an irregular hymeniderm, in KOH turning pale green, sometimes pale violet at first  
*P. mutabilis* Adamčík & Bas
    - 7'. Pileipellis made up of repent to ascending, at centre disorderly arranged, towards margin more radial chains of inflated cells, in KOH turning blue-green to brownish green ..... *P. pyrifer* Bas & L.G. Krieglst.

Because it is possible that the colour change of the pileipellis in KOH is in general somewhat variable and in *P. mutabilis* is not very pronounced, that species is also keyed out with the species that have distinct cheilocystidia.

- (9. Lamellae violaceous to lilacinous ... Cheilocystidia usually clavate, etc.)
- 9'. Pileipellis composed of erect chains of inflated cells, forming an irregular hymeniderm ..... *P. mutabilis* Adamčík & Bas
- 9'. Pileipellis not composed of erect chains of inflated cells ..... 11

A re-examination of the type *P. frieslandica* revealed a wider range of size and length-breadth ratio of the spores than given in the original description and in the key in part I of this paper, which has to be corrected accordingly:

16. Pileipellis consisting of a thin but distinct suprapellis of 2.0–4.5(–6.0)  $\mu\text{m}$  wide hyphae over a thick broad-celled subpellis. Lamellae crowded ( $L = 26\text{--}32$ ), dark violaceous grey. Spores (3.5–)3.9–4.9  $\times$  2.6–3.8  $\mu\text{m}$ ,  $Q = (1.15\text{--})1.20\text{--}1.55(1.60)$ , average  $Q = 1.30\text{--}1.50$  ..... *P. frieslandica*
16. Pileipellis without a suprapellis of narrower hyphae. Lamellae less crowded ( $L = 8\text{--}22$ ), violet or whitish to cream. Spores similar or larger, up to 6.4  $\mu\text{m}$  long ..... 17

#### DESCRIPTIONS OF THE SPECIES

Not all of the following descriptions are congruent. For the macroscopic descriptions this is caused by the many incomplete field notes (although colourslides were sometimes a great help). Therefore characters on which no information is available are not mentioned. The microscopic descriptions are sometimes incomplete because the scanty material did not allow further analysing.

#### I. *Albidula* group

Basidiocarp white to pale buff.

##### 1. *Pseudobaeospora albidula* Bas — Fig. 1

*Pseudobaeospora albidula* Bas, *Persoonia* 18 (2002) 119.

Basidiocarps very small to small and pale, terrestrial, single or in small groups. Pileus 2–8(–10) mm in diameter, at first hemispherical, later conico-convex to obtusely conical, with margin inflexed when young, finally expanded, not translucently striate, white to greyish white or buff, at centre sometimes  $\pm$  brownish, silky to (sub)felted or furfuraceous. Lamellae rather distant ( $L = 11\text{--}17$ ;  $l = 0\text{--}1$ ), adnate to emarginate, at first whitish to pale cream, later pale buff to pale yellow. Stipe 14–30  $\times$  0.1–0.6(–1.0) mm, sometimes tapering downwards, sometimes slightly rooting, at first white to greyish-whitish, later becoming pale ochraceous or somewhat pinkish buff, with age darkening to brownish or dark reddish brown at base, flocculose to silky-fibrillose, at apex pruinose to granulose-flocculose, at base sparsely lanose-substrigose. Smell  $\pm$  fungoid in one case. Spore print colour (recorded only for *ND 01014*) white.

Spores [60/6] 3.4–4.3(–4.5)  $\times$  (2.6–)2.9–3.5(–3.7)  $\mu\text{m}$ ,  $Q = 1.05\text{--}1.35$ , average  $Q = 1.15\text{--}1.20$ , subglobose to ellipsoid, at first thin-walled and non-amyloid, thick-

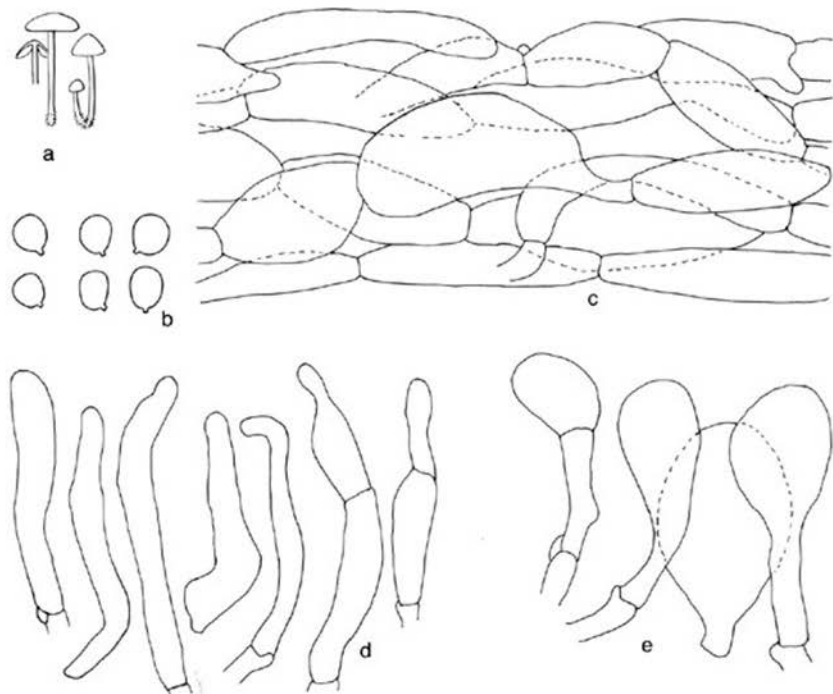


Fig. 1. *Pseudobaespora albidula*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 1000$ ; d. caulocystidia  $\times 1000$ ; e. aberrant caulocystidia of *K(M) 8103*  $\times 1000$ .

walled and dextrinoid, congophilous, and cyanophilous when fully mature, smooth. Basidia (15–)18–22  $\times$  4.0–5.5(–6.0)  $\mu\text{m}$ , 4-spored, with inconspicuous clamp-connection. Sclerified basidia absent or present but then usually rather scarce. Cheilocystidia absent. Hymenophoral trama subregular, consisting of 5–20(–29)  $\mu\text{m}$  wide hyphae, constricted at septa; subhymenium very narrow ( $\pm$  8–9  $\mu\text{m}$ ) and densely ramose to subcellular. Pileipellis almost colourless to very pale brownish in KOH, consisting of radial chains of inflated, thin-walled, colourless cells 10–65(–90)  $\times$  (3.5–)10–32(–37)  $\mu\text{m}$ , sometimes with terminal, cystidioid, attenuate to subutriform or lageniform cells 26–45  $\times$  11–19  $\mu\text{m}$ . Trama of stipe made up of (1.5–)3–20  $\mu\text{m}$  wide, frequently septate, cylindrical, longitudinal hyphae. Caulocystidia at apex of stipe (8–)21–34(–47)  $\times$  2–6.5  $\mu\text{m}$ , filiform often with slightly widening and slightly thick-walled apex to narrowly lageniform, rarely subclavate, but in *K(M) 8103* nearly all clavate and 6–16(–20)  $\mu\text{m}$  wide, often in dense clusters, sometimes septate. Clamp-connections present.

Habitat & distribution — On calcareous loam or on forest litter e.g. of *Fagus*, sometimes under *Mercurialis perennis*, but also collected on calcareous heath (*Pulsatillo-Caricetum humilis* tending towards *Gentiana-Koelerietum*) and there hidden under grasses. Rare but widespread in western Europe (England, Germany, the Netherlands).

*Collections examined.* ENGLAND: Surrey, Mickleham Downs, 30.VII.1988, A. Henrici, *K(M) 1031* (holotype, K); ditto, 28.IX.1988, *K(M) 8103*; ditto, 3.X.1990, *K(M) 8102*; ditto, 14.XII.1993, *K(M) 8104* (all four at K). — GERMANY: Bavaria, Niederbayern, Kelheim, 30.X.1998, L. G. Krieglsteiner 7036/4 (STU). — THE NETHERLANDS: prov. Limburg, Valkenburg, Schaelsberg, 22.VII.2001, N. J. Dam, ND 01014 (L).

In the field basidiocarps of this species could perhaps be mistaken for those of *Collybia cirrhata* or *Cystolepiota seminuda* (Lasch) Bon. However, the first species has a very smooth and glabrous pileipellis consisting of narrow, 5–6  $\mu\text{m}$  wide hyphae embedded in a gelatinous matter, and larger and considerably more slender spores (4.5–6.0  $\times$  3.0–3.5  $\mu\text{m}$ , average  $Q = 1.6$ –1.8), which do not become dextrinoid. *Cystolepiota seminuda* has a powdery-granulose pileipellis, much more crowded lamellae ( $L = 30$ –40) and small but ellipsoid to cylindrical, non-dextrinoid spores (3.5–5.0  $\times$  2.0–3.0  $\mu\text{m}$ , average  $Q = 1.45$ –1.95). The species is perhaps related to *P. flavescens* Singer; see under extra-limital species.

## 2. *Pseudobaeospora paulochroma* Bas — Fig. 2

*Pseudobaeospora paulochroma* Bas, Persoonia 18 (2002) 121.

Basidiocarps small, terrestrial, in small group. Pileus 6–10 mm in diameter, conico-convex, whitish with pale buff centre, under lens minutely felted, with non-striate margin. Lamellae rather crowded ( $L = 19$ –24,  $l = 1$ –3), nearly free, cream-buff, ventricose, somewhat intervenose. Stipe 11–15  $\times$  0.7–1.0 mm, slightly attenuate upwards, pale brownish buff, minutely whitish fibrillose, at base whitish felted or with sparse white rhizoids. Smell slightly unpleasant.

Spores [20/1] 3.8–4.5  $\times$  2.9–3.5 (–3.8)  $\mu\text{m}$ ,  $Q = (1.10)$ –1.20–1.35, average  $Q = 1.25$ , subglobose to ellipsoid, at first thin-walled and non-amyloid, when fully mature becoming thick-walled, dextrinoid, strongly cyanophilous, and weakly metachromatic in cresyl blue, smooth. Basidia 18–24  $\times$  4.2–5.2  $\mu\text{m}$ , 4-spored, with clamp-connection. Sclerified basidia not rare. Cheilocystidia absent. Hymenophoral trama subregular, made up of up to 18  $\mu\text{m}$  wide hyphae constricted at septa; subhymenium narrow, densely ramose. Pileipellis yellow in KOH, with very thin suprapellis of radial to slightly interwoven, 3–7 (–9)  $\mu\text{m}$  wide, cylindrical hyphae over a subpellis of hyphae made up of shorter, up to 15 (–18)  $\mu\text{m}$  wide, inflated cells. Pileitrama composed of loosely interwoven chains of up to 25 (–30)  $\mu\text{m}$  wide cells, without a layer of agglutinate narrow hyphae. Trama of stipe light yellow in KOH, made up of longitudinal, cylindrical, frequently septate, 4–14  $\mu\text{m}$  wide, rather thin-walled hyphae. Caulocystidia (at apex of stipe) forming a dense,  $\pm$  60–90  $\mu\text{m}$  thick turf of entangled, 4–7  $\mu\text{m}$  wide, septate hyphae  $\pm$  perpendicular to surface, with slightly thickened walls and  $\pm$  cylindrical to slightly irregular apical cells 26–55  $\times$  4–7.5  $\mu\text{m}$ . Clamp-connections present.

Habitat & distribution — On needle carpet under *Juniperus communis*. Only known from the type locality in Denmark.

*Collection examined.* DENMARK: Jutland, Djursland, Mols Bjerge near Ebeltoft, surroundings of Mols Laboratoriet, 23.IX.1979, C. Bas 7516 (holotype, L).

*Pseudobaeospora paulochroma* differs from *P. albidula* in more crowded lamellae ( $L = 19$ –24 versus  $L = 11$ –17), somewhat larger basidiocarps, and the presence of a

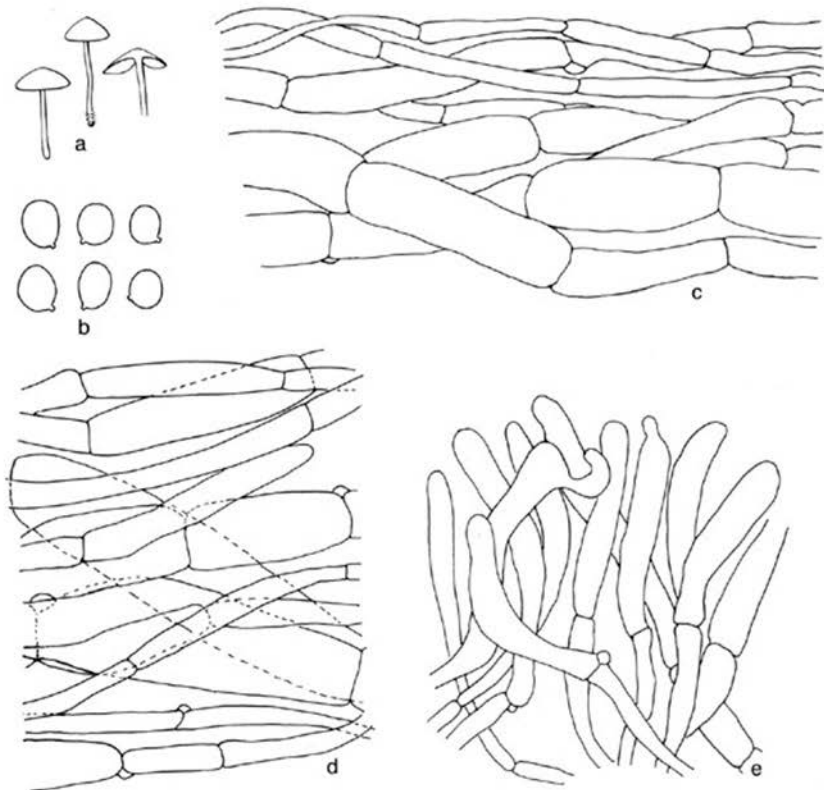


Fig. 2. *Pseudobaespora paulochroma*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 1000$ ; d. pileipellis (scalp)  $\times 1000$ ; e. cluster of caulocystidia  $\times 1000$ .

thin but distinct suprapellis. It differs from *P. bavariae* in the homogeneous trama of the pileus, the non-anastomosing lamellae, and the basal white felt and/or rhizoids. The species is perhaps related to *P. flavescens* Singer; see under extra-limital species.

### 3. *Pseudobaespora bavariae*, *nom. prov.* — Fig. 3

Basidiocarp moderately small, terrestrial, single. Pileus  $\pm 15$ – $20$  mm in diameter, expanded, with depressed centre with slight umbo and arched margin, sordid white, somewhat silky, but under strong lens minutely felted-subtomentose. Lamellae emarginate to almost free, fairly crowded ( $L = \pm 30$ ,  $l = 3$ – $7$ ), whitish, rather irregular, anastomosing and intervenose, fairly broad, with entire, concolorous edge. Stipe  $\pm 27 \times 1.5$ – $2$  mm, slightly rooting, pale reddish greyish with sparse whitish, longitudinal fibrils, pruinose at apex and locally elsewhere, but at base with orange-yellow rhizoids. Context of pileus somewhat tenacious.



Spores [20/1]  $3.5\text{--}4.4 \times 3.0\text{--}3.5 \mu\text{m}$ ,  $Q = (1.05\text{--})1.15\text{--}1.35$ , average  $Q = 1.2$ , broadly ellipsoid to ellipsoid, rarely subglobose, at first thin-walled and non-amyloid, becoming thick-walled when mature and then distinctly dextrinoid, congophilous, strongly cyanophilous, and metachromatic in cresyl blue. Basidia  $19\text{--}24 \times 5.1\text{--}5.5 \mu\text{m}$ , 4-spored, with indistinct clamp-connection. Cheilocystidia absent. Hymenophoral trama regular, made up of  $3.5\text{--}17 \mu\text{m}$  wide hyphae; broader ones constricted at septa; subhymenium  $\pm 12\text{--}16 \mu\text{m}$  thick, densely ramose. Pileipellis a cutis, pale sordid yellowish in KOH, made up of (sub)radial to somewhat interwoven chains of cylindrical to slightly inflated cells,  $18\text{--}45 \times 2.5\text{--}12(-14) \mu\text{m}$ , in lower part hyphae slightly broader, up to  $21 \mu\text{m}$  wide. Context of pileus in upper part rather similar to lower part of pileipellis, but chains more irregular and more loosely arranged; lower part made up of densely packed, agglutinate, slightly thick-walled, narrow,  $2.5\text{--}6(-8) \mu\text{m}$  wide hyphae. Trama of stipe composed of longitudinal, cylindrical, up to  $18 \mu\text{m}$  wide, frequently septate hyphae. Caulocystidia at apex of stipe as dense clusters of short hairs with cystidioid apical cells  $15\text{--}36(-56) \times 5\text{--}10 \mu\text{m}$ . Rhizoids rather bright straw-yellow in KOH, consisting of  $1.7\text{--}3.1 \mu\text{m}$  wide hyphae with very slightly thickened walls. Clamp-connections present.

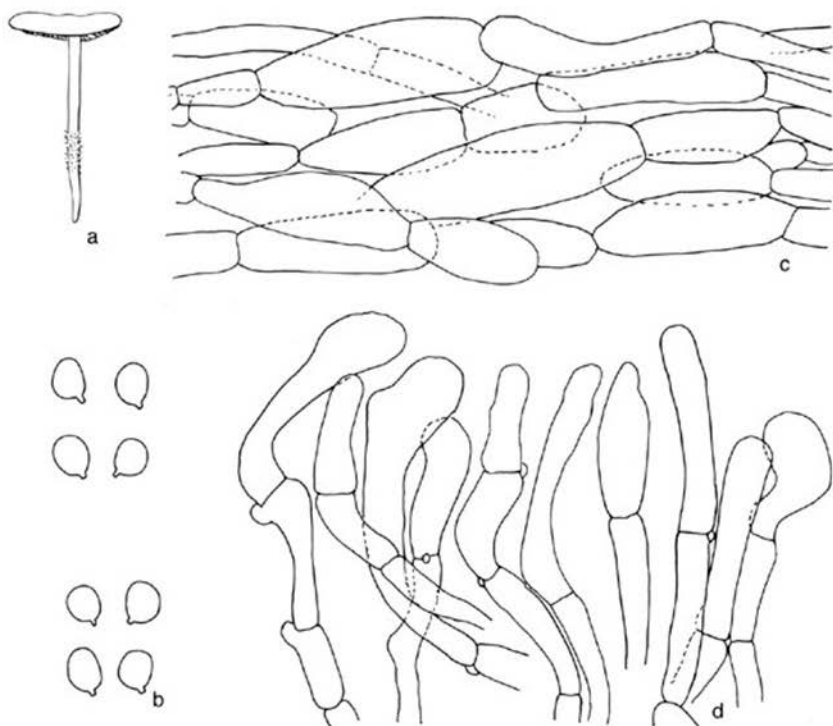


Fig. 3. *Pseudobaeospora bavariae*. a. Basidiocarp  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 1000$ ; d. caulocystidia  $\times 1000$ .

Habitat & distribution — In forest of *Quercus*, *Fagus*, and *Pinus* on limestone ('Muschelkalk') in southern Germany.

Collection examined. GERMANY: Bavaria, Karlstad, Pillenberg near Himmelstadt, 14.IX.1994, L.G. Kriegelsteiner s.n. (STU).

The only specimen available of the present taxon has three characters hitherto not observed in any of the other species of *Pseudobaeospora*, viz. (1) anastomosing and intervenose lamellae; (2) orange-yellow rhizoids at the base of the stipe; and (3) a somewhat tenacious pileus context, because of the presence of a layer of agglutinate, relatively narrow hyphae. Nevertheless, the characters of the spores mark it as a true member of the genus. However, just because of these somewhat aberrant characters, it seems better to wait for more material, before describing it as a new taxon.

## II. *Celluloderma* group

Pileipellis made up of erect chains of inflated cells forming an irregular hymeniderm or intermediate between a hymeniderm and an irregular epithelium. Cheilocystidia absent or present.

### 4. *Pseudobaeospora celluloderma* Bas — Fig. 4

*Pseudobaeospora celluloderma* Bas, Persoonia 18 (2002) 119.

Basidiocarps very small with very slender stipe, terrestrial. Pileus 1–4.5 mm in diameter, at first hemispherical, then convex to conico-convex or broadly conical, finally plano-convex, hygrophanous, when moist purple (e.g. K. & W. 15C7) to reddish violet, sometimes greyish vinaceous (Munsell 5 YR 3/2, but slightly more vinaceous), strongly translucently striate (sometimes up to centre), paling when drying out, e.g. to pale lilacinous ( $\pm$  K. & W. 15A4) smooth, glabrous, minutely micaceous. Lamellae (sub)distal ( $L = 7-9(-11)$ ;  $l = (0-1)(-3)$ ), broadly adnate to emarginate, sometimes with short decurrent tooth, concolorous with pileus, with concolorous entire edge. Stipe 11–35  $\times$  0.1–0.8 mm, filiform to subcylindrical, sometimes undulating, at base occasionally attenuate and slightly rooting, concolorous with pileus, but sometimes slightly paler at apex and slightly darker at base, subfibrillose to glabrous, white pruinose to flocculose at apex, white to pale felted to substrigose at base, with or without whitish to brownish rhizoids.

Spores [64/6] (3.0–)3.5–4.4  $\times$  2.6–3.5  $\mu\text{m}$ ,  $Q = (1.10-1.15-1.40(-1.55))$ , average  $Q = (1.20-1.25-1.35)$ , subglobose to ellipsoid, at first thin-walled and non-amyloid, later becoming thick-walled, weakly dextrinoid, congophilous, cyanophilous, and metachromatic in cresyl blue. Basidia (16–)19–24  $\times$  4.3–5.6  $\mu\text{m}$ , 4-spored, with clamp-connection, but also frequently with pseudoclamps. Sclerified basidia absent to scarce. Cheilocystidia absent. Hymenophoral trama regular, made up of 3–13  $\mu\text{m}$  wide hyphae with cylindrical to slightly inflated cells; subhymenium narrow, densely ramose to subcellular, often with pseudoclamps. Pileipellis in KOH pale brownish to pale pinkish-greyish, constructed as a somewhat irregular hymeniderm tending towards an epithelium, round-celled when seen from above, made up of erect elements with terminal cells (6–)10–38  $\times$  6–29  $\mu\text{m}$ , clavate or broadly clavate to subglobose. Trama of stipe (near apex) consisting of 2.5–12  $\mu\text{m}$  wide, closely packed, multiseptate, lon-

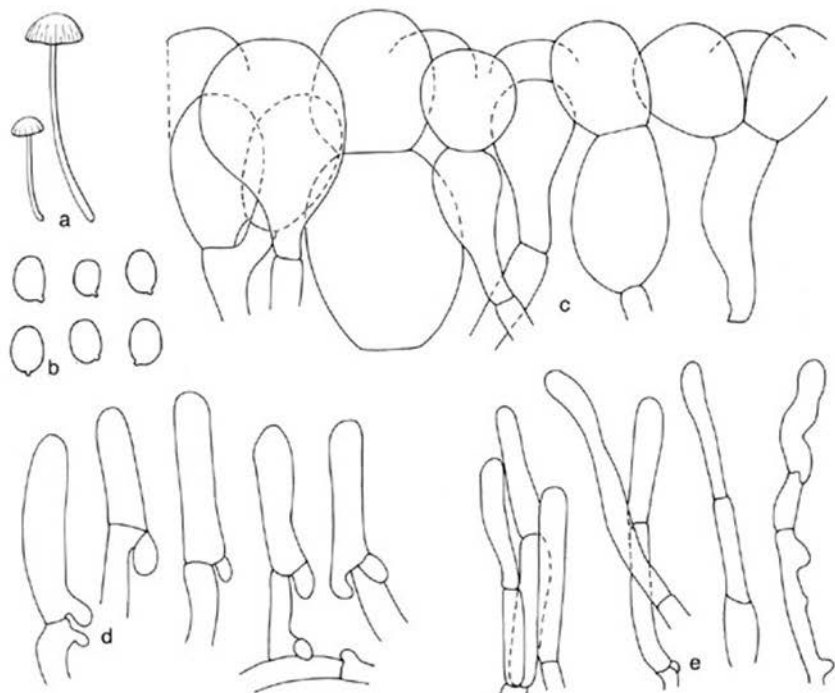


Fig. 4. *Pseudobaeospora celluloderma*. a. Basidiocarps  $\times 2$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 1000$ ; d. basidioles with pseudoclamps  $\times 1000$ ; e. caulocystidia  $\times 1000$ .

gitudinal hyphae. Caulocystidia scattered or in small clusters,  $17\text{--}28(-38) \times 1.5\text{--}6.0 \mu\text{m}$ , filiform to subclavate. Clamp-connections present.

**Habitat & distribution** — On or among woody debris, often in moist environment, in deciduous (*Fagus/Fraxinus*) and mixed (*Picea/Alnus*) forests, at ruderal places (*Epilobium/Rubus idaeus*), but also deep in felted turf of moist meadows, with preference for nutrient-rich or calcareous soils. Rare but widespread in northern, western, and central Europe.

**Collections examined.** ENGLAND: Surrey, Mickleham Downs, 19.VI.1991, A. Henrici, *K(M) 17188* (holotype, K); ditto, 7.IX.1986, A. Henrici, *K(M) 8100* (K). — GERMANY: Hessen: Korbach, nature reserve Meineringhausen, 7.VIII.2000, L. G. Krieglsteiner 269 (STU); ditto, Giessen, nature reserve Brühl (at three localities), 4.IX.2000, L. G. Krieglsteiner s.n. (STU). — FINLAND: Karelia, Kb. Ilomantsi, near Mekrijärvi Biological Station, 26.VIII.1996, T. Læssøe 4237 (C). — SWEDEN: Medelpad, Torp par., Getberget, 14.IX.1991, T. Læssøe 2361, *K(M) 17683* (K).

Because of its minute and slender basidiocarps, its strongly translucently striate pileus when moist, and its pileipellis constructed as an irregular hymeniderm, *P. celluloderma* is very well characterized. The only other species with a hymenidermoid pileipellis is *P. mutabilis* Adamčík & Bas, but that has cheilocystidia, somewhat larger and more sturdy basidiocarps (pileus  $7\text{--}13$  mm wide, stipe  $20\text{--}30 \times 1\text{--}2$  mm) and slightly smaller and more roundish spores ( $3.0\text{--}3.7 \times 2.7\text{--}3.5 \mu\text{m}$ ,  $Q = 1.05\text{--}1.15$ ).

It is remarkable that in three of the collections of *P. celluloderma* examined pseudo-clamps have been found at the basidia and in the subhymenium.

This species is one of the brightest coloured in the genus. Collectors compared its colours with those of *Laccaria amethystina* and young *Mycena sanguinolenta*.

##### 5. *Pseudobaeospora mutabilis* Adamčík & Bas — Fig. 5

*Pseudobaeospora mutabilis* Adamčík & Bas, Mycotaxon 84 (2002) 272.

Basidiocarps small, terrestrial. Pileus 7–13 mm in diameter, hemispherical to almost flat, usually with low umbo at centre, dark grey-brown to dark violaceous grey-brown (K. & W. 10F3 to 11E3), at margin greyish pink to pinkish grey (11B4 to 11C3), changing to bluish grey when bruised; surface finely granulose, smooth; margin not or weakly translucently striate. Lamellae almost free, crowded ( $L = \pm 18$ ,  $l = 1-3$ ), violet, with concolorous, entire edge. Stipe 20–30 × 1–2 mm, with similar colours as pileus, finely pruinose, with white tomentum at base, hollow. Context greyish pink. Smell not distinct. Taste mild.

Spores [20/2] 3.0–3.7(–3.9) × 2.7–3.5(–3.7)  $\mu\text{m}$ ,  $Q = (1.00-1.05-1.15(-1.25))$ , average  $Q = 1.10$ , subglobose, rarely globose or broadly ellipsoid, colourless, at first thin-walled and non-amyloid, later thick-walled and dextrinoid, congophilous, strongly cyanophilous, and not or very weakly metachromatic in cresyl blue, smooth. Basidia 19–27 × 5–6.5  $\mu\text{m}$ , 4-spored, with clamp-connection. Sclerified basidia scattered to

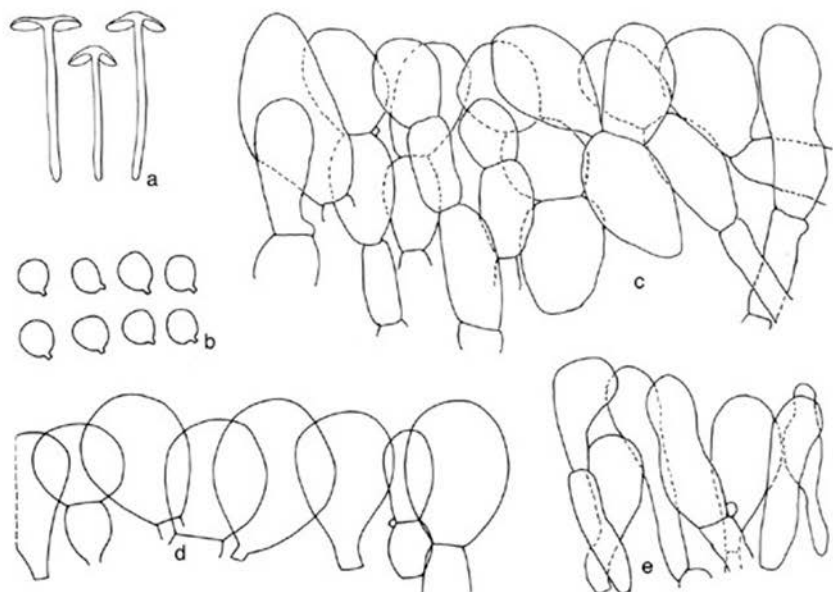


Fig. 5. *Pseudobaeospora mutabilis*. a. Basidiocarps × 1; b. spores × 1500; c. pileipellis (radial section) × 1000; d. cheilocystidia × 1000; e. caulocystidia × 1000.

rather abundant, with dextrinoid wall. Cheilocystidia (8-)10-24(-30) × (5-)7-11(-18)  $\mu\text{m}$ , mostly broadly to very broadly clavate, less frequently narrowly clavate or subglobose, rarely utriform to subcapitate, or somewhat irregularly shaped, thin-walled, and colourless. Hymenophoral trama consisting of rather irregularly disposed to subparallel hyphae made up of inflated 5-15  $\mu\text{m}$  wide cells; subhymenium narrow and very dense. Pileipellis in KOH at first turning pale violet or not, but soon becoming pale green, almost a hymeniderm, consisting of erect chains of inflated cells; terminal cells (9-)15-30(-35) × (5-)7-14(-17)  $\mu\text{m}$ , predominantly broadly clavate to (sub)globose, more rarely narrowly clavate to subcylindrical or subutriform, smooth, thin-walled, and colourless. Trama of stipe made up of densely packed, strictly parallel, 4-11  $\mu\text{m}$  wide hyphae with slightly thickened walls. Caulocystidia at apex of stipe single or more frequently in clusters, 12-29(-37) × 4-11  $\mu\text{m}$ , broadly to narrowly clavate, utriform, or somewhat irregularly shaped, rarely (sub)capitate. Clamp-connections present in all tissues.

**Habitat & distribution** — In high vegetation of *Molinia caerulea* near *Betula* and *Frangula alnus*, on moist sand, together with species of *Clavaria*, *Clavulinopsis*, *Entoloma*, *Hygrocybe*, and *Ramariopsis*. Known only from the type locality in Slovakia.

**Collections examined.** SLOVAKIA: Záhorská nížina lowland, Abrod National Reserve, 12.VIII.1998, Adamčík & Stanová s.n. (SAV); ditto, 10.IX.1998, Adamčík, Stanová & Viceníková s.n. (SAV); ditto, 15.IX.1999, Adamčík, Antonín & Kabát s.n. (SAV).

*Pseudobaespora celluloderma* has a pileipellis that is similar, but it does not have cheilocystidia, has much smaller basidiocarps (pileus 1.0-4.5 mm in diameter, stipe 11-35 × 0.1-0.8 mm), a strongly translucently striate pileus when moist, and somewhat larger and more ellipsoid spores (3.5-4.4 × 2.6-3.5  $\mu\text{m}$ , average Q = (1.20-)1.25-1.35).

*Pseudobaespora mutabilis* has many characters in common with *P. pyrifer* Bas & L.G. Krieglst., but that species has a pileipellis that consists of rather irregularly disposed, short, inflated cells forming a more or less pseudoparenchymatic tissue at the centre of the pileus, and around the centre is made up of repent chains of inflated cells. Moreover, its basidiocarps seem to be somewhat sturdier (pileus 5-23 mm in diameter, stipe 11-35 × 1.5-3 mm) and the lamellae more crowded (L = 20-24, l = (1-)3-7).

### III. *Pyrifera* group

Very distinct cheilocystidia present. Pileipellis not hymenidermoid, not emitting a deep red pigment in KOH.

### 6. *Pseudobaespora pyrifer* Bas & L.G. Krieglst. — Fig. 6

*Pseudobaespora pyrifer* Bas & L.G. Krieglst., Z. Mykol. 64 (1998) 204.  
Selected descriptions & icones: L.G. Krieglst., Regensb. mykol. Schr. 9 (2) (1999) 744, Pl. 37.

Basidiocarps rather small, comparatively sturdy, terrestrial, single or in small groups, rarely subfasciculate. Pileus 5-23 mm in diameter, 5-10 mm high, from obtusely conical or hemispherical to plano-conical or plano-convex, with or without obtuse umbo, with margin at first somewhat inflexed and slightly crenulate, finally more or less flattened

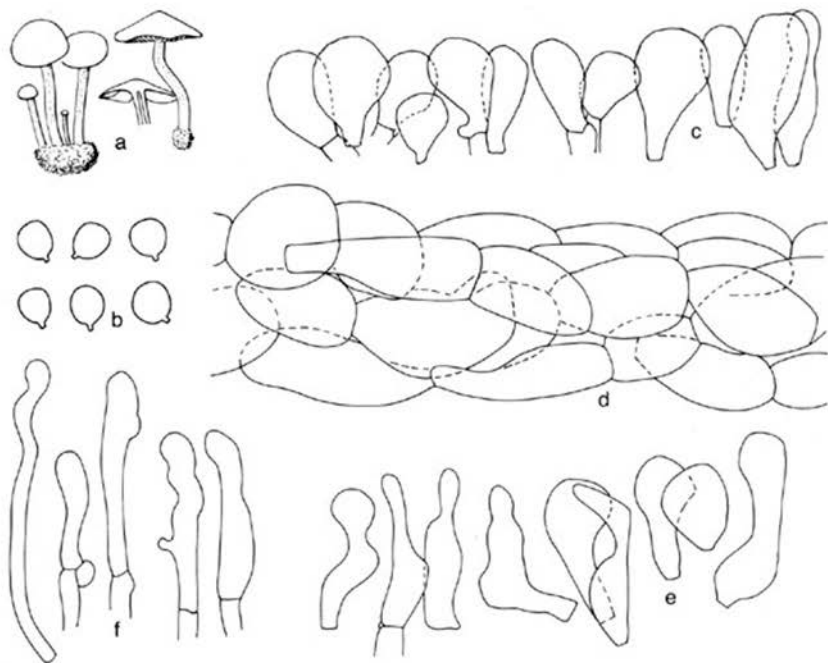


Fig. 6. *Pseudobaeospora pyrifer*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. cheilocystidia  $\times 1000$ ; d. pileipellis (radial section)  $\times 1000$ ; e, f. caulocystidia  $\times 1000$  (e. in type, f. in *De Vries 1869*).

to subumbilicate, not or only slightly hygrophanous, not striate at margin, from very dark purplish brown (Munsell 5 YR 3/3 to 10 YR 4/4) to moderately dark vinaceous brown to pinkish brown at centre, but paler brownish pink at margin, somewhat pinkish pruinose to minutely felted-granular (overall impression a pruinose sordid pink (10 YR 5/4) to pruinose, brownish vinaceous pink ( $\pm 5$  YR 7/4)), in dry condition whitish hoary. Lamellae deeply emarginate with slightly decurrent tooth to almost free, moderately crowded ( $L = 20-24$ ,  $l = (1-3)-7$ ), rather narrow to ventricose, fairly dark reddish violaceous to violaceous pink, becoming lilacinous ochraceous to greyish ochraceous, with concolorous, entire to slightly irregular edge. Stipe  $11-35 \times 1.5-3.0$  mm, cylindrical, solid to slightly hollow, dark vinaceous red-brown, at first minutely whitish pruinose-flocculose, later lower part subfibrillose to almost glabrous, with whitish felt at base. Context violaceous red, darkening when bruised. Smell indistinct. Taste mild.

Spores  $[40/2] 2.8-3.7(-4.2) \times 2.6-3.5(-3.8) \mu\text{m}$ ,  $Q = 1.00-1.15$ , average  $Q = 1.05-1.10$ , globose to subglobose, at first thin-walled and non-amyloid, becoming thick-walled, weakly dextrinoid, congophilous, cyanophilous and some metachromatic in cresyl blue when fully mature, smooth, also in scanning electron microscope. Basidia  $19-23 \times 5.0-5.6 \mu\text{m}$ , 4-spored, with clamp-connection. Sclerified basidia present, scattered. Cheilocystidia abundant,  $10-30 \times 4-13 \mu\text{m}$ , mostly broadly clavate, but also some narrowly clavate, subcylindrical, subutriform or irregularly shaped, thin- to rarely

slightly thick-walled, colourless. Hymenophoral trama regular, composed of 3–15  $\mu\text{m}$  wide hyphae; subhymenium 7–10  $\mu\text{m}$  thick, densely ramose to subcellular. Pileipellis made up of loosely arranged chains of inflated cells, 10–35(–42)  $\times$  6–17  $\mu\text{m}$ , disorderly arranged at centre, more repent and radial towards margin, pale greenish blue to greenish brownish in KOH in dried material, deeper greenish blue in fresh material. Trama of stipe regular, consisting of 3–20  $\mu\text{m}$  wide, frequently septate, thin- to slightly thick-walled hyphae, reddish brown with greenish-yellowish tinge in KOH. Caulocystidia (at apex of stipe) 12–31  $\times$  3–10  $\mu\text{m}$ , in dense clusters, filiform to clavate or lageniform, sometimes irregularly shaped. Clamp-connections abundant but often inconspicuous.

Habitat & distribution — In southern Germany found in *Pruno-Fraxinetum* with *Alnus*, *Prunus padus*, *Fraxinus*, and *Carpinus*, and in *Cirsio tuberosi-Molinietum* grassland; in both habitats with *Entoloma*, *Geoglossum*, *Clavulinopsis*, *Hygrocybe*, and *Ramariopsis* species. In the Netherlands collected in a *Juniperus* stand with *Erica tetralix*, and *Cladonia*, *Entoloma*, and *Hygrocybe* species.

*Collections examined.* GERMANY: Bavaria, Lower Franconia, Kitzingen, 'Klosterforst', 10.IX.1995, L.G. Kriegsteiner s.n. (holotype L; isotype REG). — THE NETHERLANDS, prov. Overijssel, between Rijssen and Markelo, 26.VII.1974, B. de Vries 1869 (WAG).

Kriegsteiner (1999: 744) reported five additional collections of *P. pyrifer* from the type locality and seven collections from three other localities in Lower Franconia. At the type locality he found it sometimes to be the most abundant species.

*Pseudobaeospora pyrifer* can be rather easily recognized by the predominantly broadly clavate cheilocystidia, the comparatively sturdy basidiocarps, and the greenish blue to brownish green KOH reaction of the pileipellis. Moreover, the globose to subglobose spores are, together with those of *P. chilensis* E. Horak (1964) among the smallest in the genus. The latter species differs, however, from the present one by tiny, very slender basidiocarps, inconspicuous, narrow cheilocystidia, and narrower pileipellis elements.

In Europe *P. jamonii* Bas, Lalli & Lonati from Italy seems to be the closest relative of the present species. It differs, however, by the more elongate clavate to (sub)lageniform, cylindrical or irregularly shaped cheilocystidia (15–43  $\times$  4–10  $\mu\text{m}$ ), the presence of a distinct suprapellis of comparatively narrow hyphae, slightly larger and slightly more ellipsoid spores (3.2–4.0  $\times$  2.8–3.5  $\mu\text{m}$ , average  $Q = 1.10$ –1.15), and a different KOH reaction of the context of the stipe (green).

## 7. *Pseudobaeospora jamonii* Bas, Lalli & Lonati — Fig. 7

*Pseudobaeospora jamonii* Bas, Lalli & Lonati, Micol. Vegetat. Mediter. 17 (2002) 32, col. pl.

Selected descriptions & icones: Jamoni & Bon, Bull. trimest. Fédér. mycol. Dauphiné-Savoie 143 (1996) 12–13, pl. on cover (as form of *P. pillodii*).

Basidiocarps small, comparatively sturdy, terrestrial. Pileus 5–25 mm in diameter, plano-convex to plano-conical with small umbo, glabrous, first greyish purple to violaceous brown or reddish brown, with darker centre, later paler, sometimes with watery spots, with non-striate margin. Lamellae fairly crowded ( $L = \pm 16$ –24,  $l = (1)3$ –7), deeply emarginate to nearly free, broad, at first lilacinous-violaceous, later more brownish beige, with paler subdenticulate edge. Stipe 15–30(–50)  $\times$  1.0–2.5 mm,  $\pm$  cylindrical,

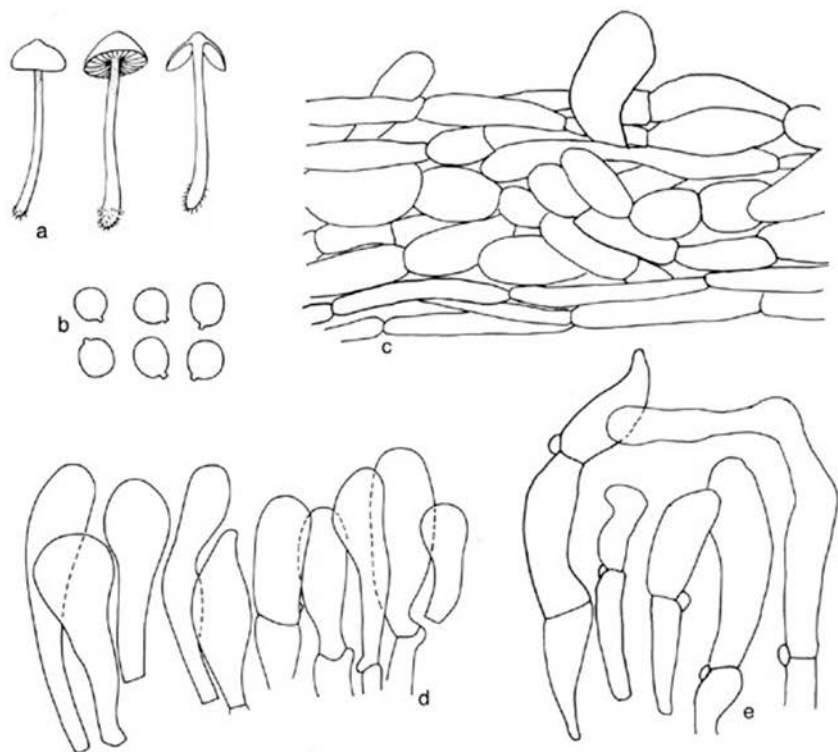


Fig. 7. *Pseudobaecospora jamonii*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 500$ ; d. cheilocystidia  $\times 1000$ ; e. caulocystidia  $\times 1000$ .

somewhat thickening downwards, with often slightly rooting, white strigose-lanose base, lilacinous-violaceous particularly at apex, becoming darker purplish brown, almost completely whitish flocculose-pruinose or only so at apex. Context violaceous in apex of stipe, purplish in cortex of stipe, elsewhere pale brownish. Smell indistinct or weakly raphanoid.

Spores [50/4] (3.0–)3.2–4.0(–4.3)  $\times$  2.8–3.5  $\mu\text{m}$ ,  $Q = 1.05\text{--}1.20(-1.30)$ , average  $Q = 1.10\text{--}1.15$ , subglobose to broadly ellipsoidal, smooth and glabrous, thin-walled at first and then non-amyloid, but later becoming thick-walled and dextrinoid, congophilous, and cyanophilous. Basidia 20–25  $\times$  3.5–5.5  $\mu\text{m}$ , 4-spored, with rather inconspicuous clamp-connection. Sclerified basidia absent to scarce. Cheilocystidia abundant, 15–43  $\times$  4–9.5  $\mu\text{m}$ , mainly narrowly clavate, but also (sub)lageniform, cylindrical or irregularly shaped, thin-walled. Hymenophoral trama regular to subregular, composed of 3.5–18  $\mu\text{m}$  wide hyphae; subhymenium very dense,  $\pm 8\text{--}11 \mu\text{m}$  thick, subcellular (difficult to analyse). Pileipellis turning greenish brownish to pale green in KOH, made up of a suprapellis of 4–10  $\mu\text{m}$  wide, repent hyphae with scattered, broadly clavate, cystioid terminal cells, over a subpellis of chains of more inflated, up to 22  $\mu\text{m}$  wide cells.



Caulocystidia at apex of stipe scattered and in clusters,  $13-60 \times 4-12 \mu\text{m}$ , filiform to slenderly clavate, subcylindrical or slender and somewhat irregular. Context of stipe regular, made up of multiseptate hyphae from  $2.5 \mu\text{m}$  wide near surface to  $10 \mu\text{m}$  wide at centre, green in KOH. Clamp-connections abundant.

Habitat & distribution — In mixed forest (*Alnus incana*, *Fraxinus*, *Fagus*, *Corylus*, *Picea abies*, often near *Buxus*) at 800 to 1300 m altitude in the Piémont in northwestern Italy and in the Abruzzi in central Italy.

*Collections examined.* ITALY: Piémont, Mont Rose, Alagna, lower valley of the Orto, 13.IX.1994, P.G. Jamoni s.n. (holotype, herb. Jamoni; isotype, L); Teramo, Abruzzi, San Pietro, Isola di Grand Sasso, 13.IX.1995, G. Lalli & G. Lonati s.n. (herb. Lalli; L).

Additional collections have been reported by Jamoni & Bon (1996) and Jamoni (1997).

*Pseudobaeospora jamonii* seems closely related to *P. pyrifer*. For a comparison see the discussion under that species.

In one of the specimens from San Pietro a strip of an amyloid, amorphous substance was found along the edge of some lamellae. Spores caught in this substance seemed to be amyloid, but thick-walled spores elsewhere on the same lamellae were dextrinoid. As this phenomenon could not be observed in other specimens, it is considered an inexplicable aberration without taxonomic value.

#### 8a. *Pseudobaeospora laguncularis* Bas var. *laguncularis* — Fig. 8

*Pseudobaeospora laguncularis* Bas var. *laguncularis*, Persoonia 18 (2002) 121.

Basidiocarps small to very small, terrestrial, single or in small groups, sometimes subfasciculate. Pileus 3.5–8.0 mm, at first convex to broadly conical, later plano-convex to plano-conical, sometimes with a more or less pronounced umbo, purple-brown to clay-brown with or without lilacinous tinge, paler towards edge, with non-striate, slightly inflexed, somewhat crenulate margin when young, matt, glabrous, but sometimes with a pallid marginal zone. Lamellae fairly crowded ( $L = 20-25$ ;  $I = 1-3(-7)$ ), deeply emarginate to free, sordid cream to pale clay-brown or pale ochraceous yellow-brown. Stipe  $12-25 \times 0.4-1.6$  mm, cylindrical or slightly tapering downwards, pale brown to grey-brown with lilacinous tinge or pinkish grey, darker towards base, subfibrillose, at apex whitish flocculose to pruinose (sometimes flocculi with brownish tips), with white tomentum and sometimes pale rhizoids at base. Smell absent or indistinct.

Spores [50/4]  $(3.1-3.3-4.0(-4.4) \times 2.9-3.6(-4.6) \mu\text{m})$ ,  $Q = 1.05-1.25(-1.30)$ , average  $Q = 1.10-1.15$ , subglobose to broadly ellipsoid, at first thin-walled and non-amyloid, later thick-walled, dextrinoid, congophilous, cyanophilous, and sometimes metachromatic in cresyl blue, smooth. Basidia  $16-22 \times 3.7-6.1 \mu\text{m}$ , 4-spored, but a few 2-spored seen, with clamp-connection. Sclerified basidia present, but sometimes scarce. Cheilocystidia  $(12-19-49 \times 2.8-8.0 \mu\text{m})$ , usually narrowly lageniform, less often filiform, subcylindrical, or irregularly shaped, often in small clusters, rather frequently with scattered, small, refractive bodies on neck and apex turning brownish-yellowish in  $\text{NH}_4\text{OH}$  and reddish in KOH. Hymenophoral trama regular to subregular, made up of septate hyphae with often somewhat inflated,  $(2-4)-13 \mu\text{m}$  wide cells with slightly thickened walls; subhymenium  $\pm 5-20 \mu\text{m}$  thick, densely ramose to almost cellular. Pileipellis in KOH very pale, brownish with greenish, yellowish or reddish

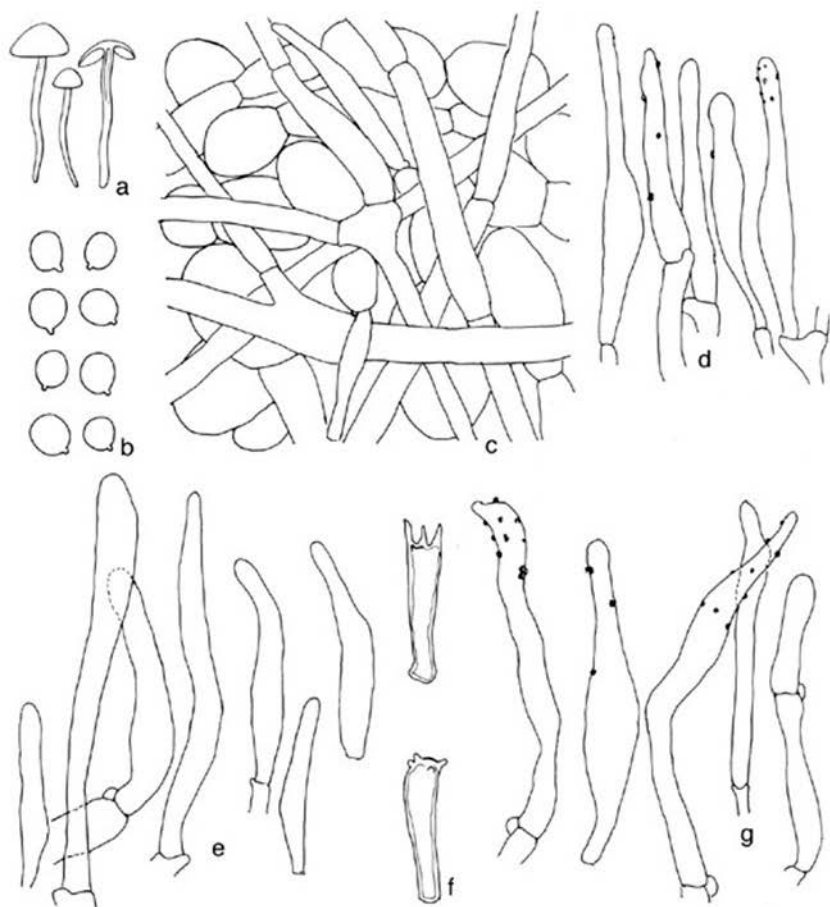


Fig. 8. *Pseudobaeospora laguncularis* var. *laguncularis*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (scalp)  $\times 1000$ ; d. cheilocystidia  $\times 1000$ ; e. pileocystidia  $\times 1000$ ; f. sclerified basidia  $\times 1000$ ; g. caulocystidia  $\times 1000$ .

tinges, sometimes with small red bodies; suprapellis thin, consisting of 1.5–7.0(–13)  $\mu\text{m}$  wide, irregularly disposed, repent hyphae and scarce to rather abundant, narrowly lageniform to subcylindrical pileocystidia; subpellis made up of irregularly disposed chains of inflated cells 12–55  $\times$  8–30  $\mu\text{m}$ . Trama of stipe regular, composed of 5–16  $\mu\text{m}$  wide cylindrical, frequently septate hyphae with slightly thickened wall. Caulocystidia (at apex of stipe) 20–80  $\times$  3.5–8.0  $\mu\text{m}$ , abundant, often in dense clusters, narrowly lageniform to filiform, often somewhat undulating or irregularly shaped, sometimes septate, with thin to slightly thickened wall, in KOH with scattered, small, red or red-brown bodies. Clamp-connections present.

Habitat & distribution — On needle carpet of *Taxus* in England and in mossy, grazed *Juniperus* stands in Germany.

*Collections examined.* ENGLAND: Lancashire, Silverdale, Gait Barrows, 8.X.1997, J.C. Leedal K(M) 8107 (holotype, K); ditto, 29.VIII.1985, J.C. Leedal K(M) 8108 (K). — GERMANY: Pommeren, eastern shore of Müritzsee, 6.XI.1973, B. de Vries s.n. (WAG); ditto, 23.X.1975, B. de Vries 3182 (WAG).

*Pseudobaeospora laguncularis* is very well characterized by the abundant, very slender cheilocystidia, at present unique in the genus. So far it is also the only species with small, scattered, refractive bodies turning red or red-brown in KOH on caulocystidia and cheilocystidia, and sometimes also on the pileipellis, and with distinct, albeit sometimes sparse pileocystidia.

#### 8b. *Pseudobaeospora laguncularis* var. *denudata* Bas

*Pseudobaeospora laguncularis* var. *denudata* Bas, Persoonia 18 (2002) 121.

This taxon has all the essential characters of the typical variety, such as abundant, very slender cheilo-, pileo-, and caulocystidia, whitish cream young lamellae, and small bodies turning reddish in KOH on cheilo-, caulo-, and pileocystidia, but it lacks the suprapellis of narrow hyphae. There is also a difference in size of the basidiocarps, viz. pileus 10–30 mm in diameter, stipe 40–60 × 2–3 mm, and lamellae 24–38. The spores are also slightly larger and slightly more ellipsoid, 3.6–4.5 × 3.2–3.5 μm, Q = 1.10–1.35, average Q = 1.20.

Habitat & distribution — Known only from the type locality in France, terrestrial under *Buxus sempervirens* and *Quercus pubescens* on calcareous soil.

*Collection examined.* FRANCE: Savoie, Billième, 25.X.1998, P.A. Moreau, PAM 98102501 (holotype, L; isotype, ZT).

Two more collections from the type locality (PAM 99101004 and 99101913), kept in the collector's personal herbarium, have not been studied by the author.

#### IV. *Frieslandica* group

Basidiocarp coloured. Pileipellis not hymenidermoid. Cheilocystidia absent, except in *P. dichroa* f. *cystidiata*. Clamp-connections present, but in *P. frieslandica* only at basidia and in subhymenium.

#### 9a. *Pseudobaeospora dichroa* Bas forma *dichroa* — Fig. 9

*Pseudobaeospora dichroa* Bas forma *dichroa*, Persoonia 18 (2002) 120.

Basidiocarps small but comparatively sturdy, rarely subfasciculate, terrestrial, in small groups. Pileus 10–30 mm in diameter, plano-conical to plano-convex with or without a small umbo, purple-brown to lilacinous grey (e.g. K. & W. 10D4) or violaceous grey-brown (more red-brown when dried), dry, whitish hoary to minutely felted or scurfy, non-striate or sometimes slightly so when very young. Lamellae subdistant to rather crowded (L = 18–30, l = 3), from nearly free to sinuate or adnate with short decurrent tooth, violaceous to dark purplish brown (e.g. K. & W. 10F4), (dark red-

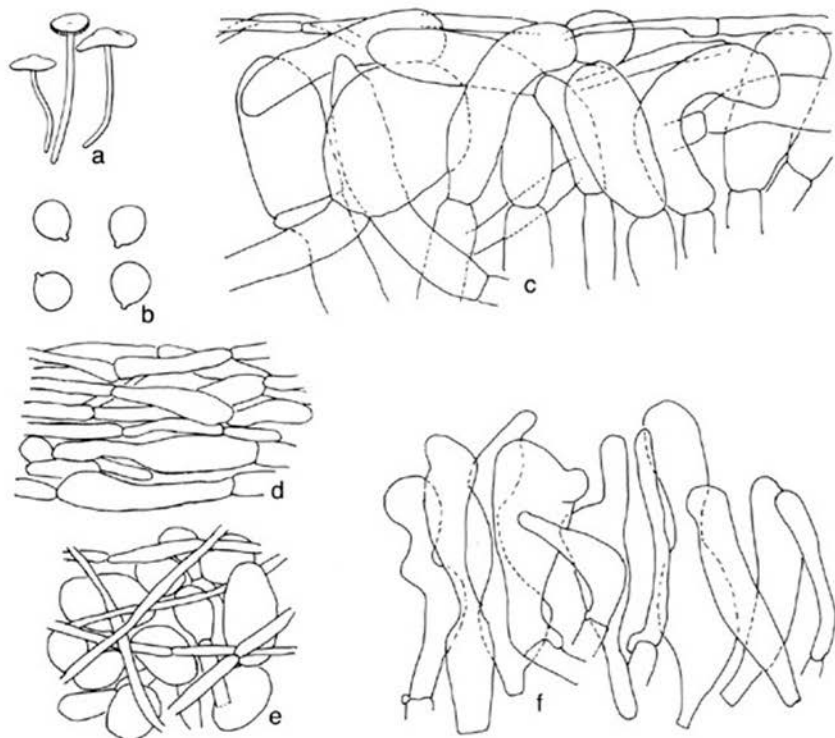


Fig. 9. *Pseudobaeospora dichroa* forma *dichroa*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c–e. pileipellis: c. radial section at centre  $\times 1000$ ; d. scalp near margin  $\times 500$ ; e. scalp near centre  $\times 500$ ; f. caulocystidia  $\times 1000$ .

dish brown when dried) with concolorous to slightly paler, entire edge. Stipe 20–40  $\times$  (0.8–)1.5–2.0 mm, more or less concolorous with pileus, whitish or pale brownish flocculose to almost felted at apex, downwards sparsely white fibrillose, white felted at base. Context of stipe pale lilac-grey.

Spores [45/4] 3.0–3.9(–4.3)  $\times$  2.7–3.5  $\mu\text{m}$ ,  $Q = 1.05$ –1.30(–1.55), average  $Q = 1.10$ –1.20(–1.25), subglobose to broadly ellipsoid, very rarely ellipsoid, thin-walled and non-amyloid at first, becoming slightly thick-walled, weakly to distinctly dextrinoid, congophilous, cyanophilous, and metachromatic in cresyl blue when fully mature, smooth. Basidia 17.5–25  $\times$  4.8–6.5  $\mu\text{m}$ , 4-spored, with clamp-connection. Sclerified basidia scattered to abundant. Cheilocystidia absent (in type) or very scarce (in *K(M) 8101*) and then looking like outsize basidioles, 10–45  $\times$  3.5–9.0(–17)  $\mu\text{m}$ , narrowly clavate, only locally present and larger part of lamella edge fertile. Hymenophoral trama regular to subregular, consisting of 2.5–15(–17)  $\mu\text{m}$  wide hyphae with slightly thickened wall; subhymenium 8–12  $\mu\text{m}$  thick, very densely ramose. Pileipellis at first dark red in KOH, but soon emitting red clouds and becoming yellow-green, near centre heterocellular, consisting of a mixture of subglobose, ellipsoid, clavate, and elongate

cells of 20–34 × 8–19 µm, with or without a very thin suprapellis of 2.8–6.8 µm wide hyphae, near margin merely a broad-celled cutis. Trama of stipe made up of 3–18 µm wide, strictly longitudinal, frequently septate hyphae with thin to slightly thickened walls. Caulocystidia at apex of stipe abundant and in dense clusters, 17–50(–71) × 2.5–13 µm, filiform to broadly cylindrical, clavate, subutriform or sublageniform, but rather often irregularly shaped, sometimes with inflated apex, thin- to slightly thick-walled. Clamp-connections present.

Habitat & distribution — Only known from chalk downs in England; the type specimens were growing deep in mosses and grasses.

*Collections examined.* ENGLAND: Hampshire, Butser Hill, Queen Elisabeth Country Park, 27.IX.1992, *T. Læssøe* 2906, *K(M)* 20450 (holotype, K); Lancashire, Silverdale, Gait Barrows, 13.X.1984, *J.C. Leedal*, *K(M)* 8101 (K).

### 9b. *Pseudobaeospora dichroa* forma *cystidiata* Bas

*Pseudobaeospora dichroa* forma *cystidiata* Bas, *Persoonia* 18 (2002) 120.

This forma differs from the typical one merely by the presence of abundant cheilocystidia of 14–45 × 4–10(–17) µm, which are slenderly to broadly clavate to lageniform, sometimes filiform, but quite often irregularly shaped.

Habitat & distribution — Similar to that of the typical form.

*Collections examined.* ENGLAND: Lancashire, Silverdale, Waterslack Wood, 20.X.1984, *L. Livermore* 19/84K, *K(M)* 8105 (holotype, K); Lancashire, Silverdale, Gait Barrows, 12.VIII.1985, *L. Livermore*, *K(M)* 8106 (K).

*Pseudobaeospora dichroa* is a small, comparatively sturdy, dark species, easily recognized when a scalp or a radial section of the pileipellis is observed in KOH. The colour change from red to yellow-green is very striking, but has been tested only on dried material.

In the type of forma *dichroa* no cheilocystidia have been observed and in the type of forma *cystidiata* they are abundant and evident, so the formal description of a forma seems justified. However, the discovery of a few cheilocystidioid cells in *K(M)* 8101, inserted here in forma *dichroa*, renders its status somewhat shaky.

### 10. *Pseudobaeospora frieslandica* Bas ex Bas — Fig. 10

*Pseudobaeospora frieslandica* Bas, *Fl. agar. neerl.* 3 (1995) 134, fig. 135 (inval.); Bas, *Persoonia* 16 (1996) 225 (inval.); ex Bas, *Persoonia* 17 (1998) 140.

Basidiocarps comparatively sturdy, gregarious to subfasciculate, terrestrial. Pileus 9–16 mm in diameter, paraboloid to convex, with straight margin, very dark violaceous grey to blackish-violaceous, almost completely white hoary-pruinose when young, with age hoariness persisting at margin and central part smooth, glabrous, and matt. Lamellae crowded ( $L = 26-32; l = 1(-3)$ ), free, slightly ventricose, dark greyish-violaceous, almost concolorous with pileus but slightly more violet, with concolorous, even edge. Stipe 31–43 × 1.5–2.0 mm, gradually tapering downwards, sometimes subfasciculate, fistulose with age, very dark violaceous grey to blackish violaceous, with a few whitish,

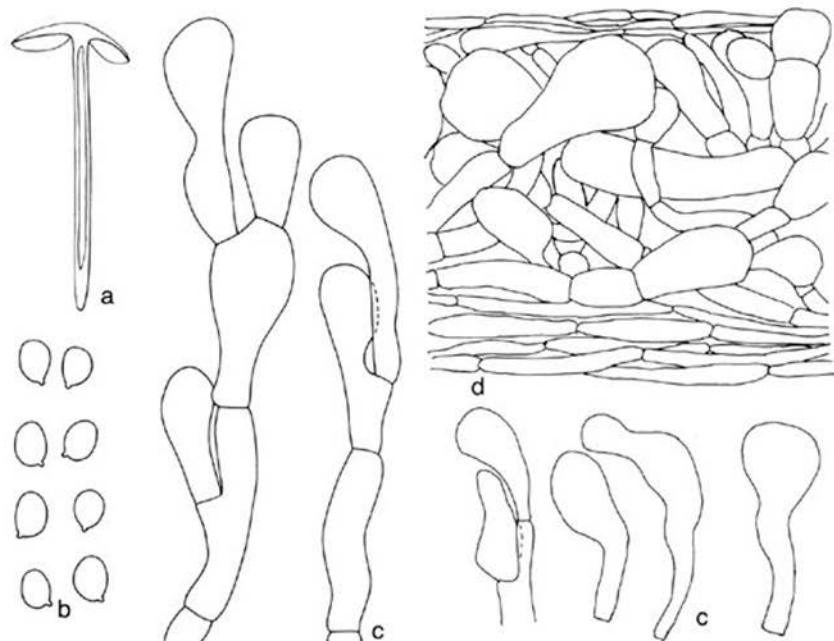


Fig. 10. *Pseudobaeospora frieslandica*. a. Basidiocarp  $\times 1$ ; b. spores  $\times 1500$ ; c. caulocystidia  $\times 1000$ ; d. pileipellis (radial section)  $\times 500$ .

fugacious fibrils, minutely white flocculose at apex. Context more or less concolorous with surface, somewhat pallescent on drying. Smell indistinct. Spore print (very thin) white or whitish.

Spores [30/1]  $(3.5-3.9-4.9 \times 2.6-3.8 \mu\text{m})$ ,  $Q = (1.15-1.20-1.55(-1.60))$ , average  $Q = 1.30-1.50$ , broadly ellipsoid to ellipsoid, colourless, thin-walled and inamyloid when young, thick-walled, weakly dextrinoid, congophilous, cyanophilous, and weakly or not metachromatic in cresyl blue when mature, smooth. Basidia  $21-24 \times 5.0-5.5 \mu\text{m}$ , 4-spored, with clamp-connection. Sclerified basidia present, scattered. Cheilocystidia lacking. Hymenophoral trama subregular, composed of hyphae with somewhat inflated,  $5-18 \mu\text{m}$  wide cells with thin to slightly thickened walls; subhymenium  $10-14 \mu\text{m}$  wide, consisting of slightly inflated, ramose hyphae with clamp-connections. Pileipellis pale yellowish-brownish in KOH, consisting of a  $\pm 5-10 \mu\text{m}$  thick suprapellis (perhaps locally lacking) of  $2.0-4.5(-6.0) \mu\text{m}$  wide, agglutinate, somewhat disintegrating, (sub)radial hyphae, over a  $\pm 30-60 \mu\text{m}$  thick subpellis of irregularly disposed, broad-celled hyphae (cells  $(11-20-38(-60) \times 8-28 \mu\text{m})$ ), thin-walled and constricted at septa, sometimes a few inflated terminal cells of subpellis somewhat projecting beyond suprapellis. Trama of stipe made up of longitudinal,  $3.5-11 \mu\text{m}$  wide, brownish hyphae. Caulocystidia in clusters at apex of stipe,  $17-26 \times 5-15 \mu\text{m}$ , (broadly) clavate to subtriform or sublageniform, partly in chains. Clamp-connections observed only in subhymenium and at basidia.

Habitat & distribution — Known only from the type locality in the north of the Netherlands, found on humus among fallen leaves.

*Collection examined.* THE NETHERLANDS: prov. Friesland, Oudehornstercompagnie, 18.X.1984, J. Wisman s.n. (holotype, L).

Among the coloured species without cheilocystidia and with a weak KOH reaction of the pileipellis, *P. frieslandica* is easily recognized by the very dark violaceous basidiocarps with crowded lamellae, the two-layered pileipellis, fairly large, broadly ellipsoid to ellipsoid spores, and clamp-connections lacking from all tissues except hymenium and subhymenium. It seems related to *P. syringea*; see under extra-limital species.

The suprapellis of this species is rather transparent and might be overlooked in a 'scalp'. In that case one arrives in the key at *P. ellipticospora* and *P. pallidifolia*. But the first has distinctly thinner stipes (0.6–1.0 mm) and fewer lamellae (6–19) and the second has larger spores and white to pinkish cream lamellae. If the clamp-connections of *P. frieslandica* are overlooked, one arrives in the key at *P. pillodii* and *P. oligophylla*, but these two have very slender and long stipes.

A re-examination of the type revealed a wider range of size and length-breadth ratio of the spores than given in the original description and the key is corrected accordingly (see under 'Additions to the key').

## 11. *Pseudobaeospora argentea* Bas ex Bas — Fig. 11

*Pseudobaeospora argentea* Bas, Fl. agar. neerl. 3 (1995) 133, fig. 134 (inval.); ex Bas, Persoonia 16 (1996) 255.

Basidiocarps very small to small, slender, terrestrial, single or in small groups. Pileus 4.5–8.0 mm in diameter and 3.0–3.5 mm high, conical with obtuse apex and straight to slightly reflexed margin, purple-brown to brown under a silvery, aeriferous, fibrillose covering bringing about a pale beige-grey aspect (Munsell 10 YR 6–7/2, slightly tending towards 7/3) particularly when young. Lamellae deeply emarginate to nearly free, rather distant to fairly crowded ( $L = \pm 12-16$ ,  $l = 1-3$ ), thickish, ascending, (sub)ventricose, deeply emarginate to nearly free, very pale greyish-brownish (10 YR 6–7/4) to dingy purplish (10 R 6/2), paler towards entire edge. Stipe 18–30 × 0.6–0.9 mm, equal to attenuate downwards and somewhat rooting, dingy purple (10 R 6/2) to fairly dark grey-brown (10 YR 5/3) at apex, darker dingy purple (10 R 5/3) to blackish brown (10 YR 3/3) at base, sparsely white silky fibrillose to nearly smooth, at extreme apex somewhat white to beige flocculose. Context dingy purplish (10 R 6/2) to grey-brown (10 YR 4/3 to 5/3). Smell indistinct.

Spores [30/2] 3.5–4.8(–5.0) × (2.9–)3.1–4.5  $\mu\text{m}$ ,  $Q = (1.05-1.10-1.20(-1.30))$ , average  $Q = 1.10-1.15$ , subglobose to broadly ellipsoid, at first thin-walled and non-amyloid, becoming thick-walled, dextrinoid, congophilous, cyanophilous, and metachromatic in cresyl blue when fully mature. Basidia 22–28 × 5.9–7.2  $\mu\text{m}$ , 4-spored, with clamp-connection. Sclerified basidia present, scattered. Cheilocystidia absent. Hymenophoral trama somewhat irregular; hyphae 2.5–8.5  $\mu\text{m}$  wide, slightly constricted at septa; subhymenium broadly ramose to subcellular, up to 18  $\mu\text{m}$  wide. Pileipellis not changing colour in KOH, a single layered cutis made up of 5.5–12.5(–15)  $\mu\text{m}$  wide, cylindrical, radial hyphae slightly constricted at septa, with thin to slightly thickened

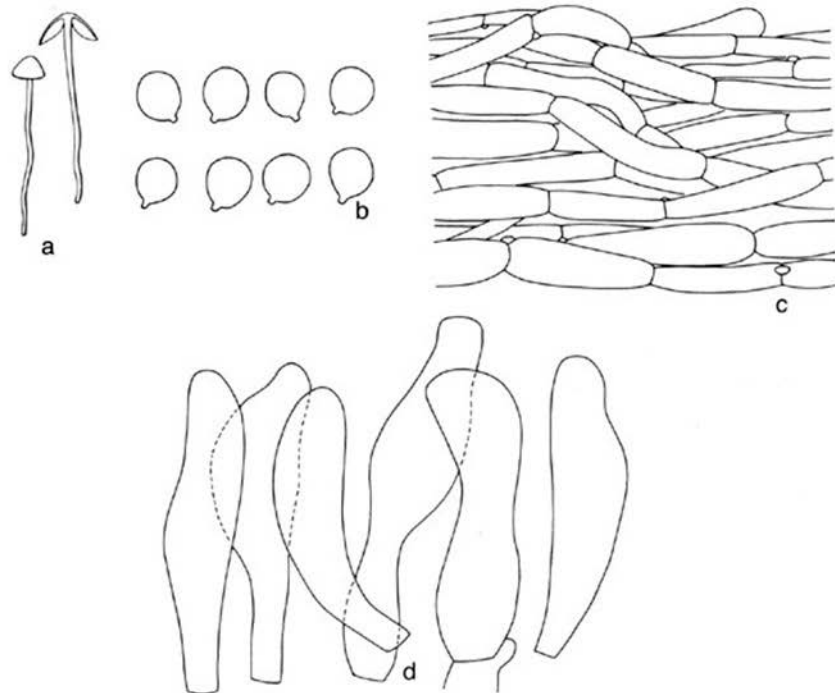


Fig. 11. *Pseudobaeospora argentea*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 500$ ; d. caulocystidia  $\times 1000$ .

wall, with terminal cells sometimes somewhat cystidioid and attenuate to narrowly conical; pigment parietal, but probably also very slightly encrusting. Trama of stipe consisting of longitudinal, 5–14  $\mu\text{m}$  wide, thin-walled hyphae. Caulocystidia 33–57  $\times$  8–13  $\mu\text{m}$ , scattered at apex of stipe, clavate to utriform or somewhat irregularly shaped. Clamp-connections present.

**Habitat & distribution** — Only known from the coastal dunes in the Netherlands, on mossy, probably calcareous sand near or in scrub (*Salix repens*, *Sambucus*).

**Collections examined.** THE NETHERLANDS: prov. Noord-Holland, Santpoort, estate 'Duin en Kruidberg', 9.XI.1936, R.A. Maas Geesteranus 14010 (holotype, L); inner side of outer ridge of coastal dunes south of Zandvoort, 1.XI.1996, E.C. Vellinga (Bas 8999) (L).

This very small to small and slender species is particularly characterized by the silvery fibrillose pileipellis made up of a single layer of radial, cylindrical hyphae.

The second collection (a single basidiocarp) deviates somewhat from the type by smaller spores (3.5–3.8  $\times$  (2.9–)3.1–3.5  $\mu\text{m}$ ) and by lacking purplish tinges. But as in both cases the pileipellis is a single layered cutis of radial, cylindrical hyphae and both collections are from the same area, it is assumed that only one species is involved. It seems related to *P. chilensis* E. Horak; see under extralimital species.



12. *Pseudobaeospora ellipticospora* Bas — Fig. 12

*Pseudobaeospora ellipticospora* Bas, Persoonia 18 (2002) 120.

Basidiocarps small and slender, sometimes fasciculate, terrestrial. Pileus  $\pm$  8–15 mm in diameter, obtusely conical to plano-conical, with age becoming plano-concave with small umbo, with margin at first inflexed, later deflexed, non-striate, violaceous to lilacinous, dry, minutely appressed-felted. Lamellae distant to rather crowded ( $L = (6-8-17(-19))$ ;  $l = 0-3$ ), narrowly adnate and then sometimes with short decurrent tooth, to almost free, narrow, concolorous with pileus, with entire, concolorous edge. Stipe about  $32-42 \times 0.6-1.0$  mm, frequently slightly attenuate downwards, concolorous with pileus, at apex minutely white flocculose, lower down minutely whitish to somewhat lilacinous appressedly fibrillose. Context lilacinous-violaceous, watery in pileus. Smell and taste indistinct. Spore print white.

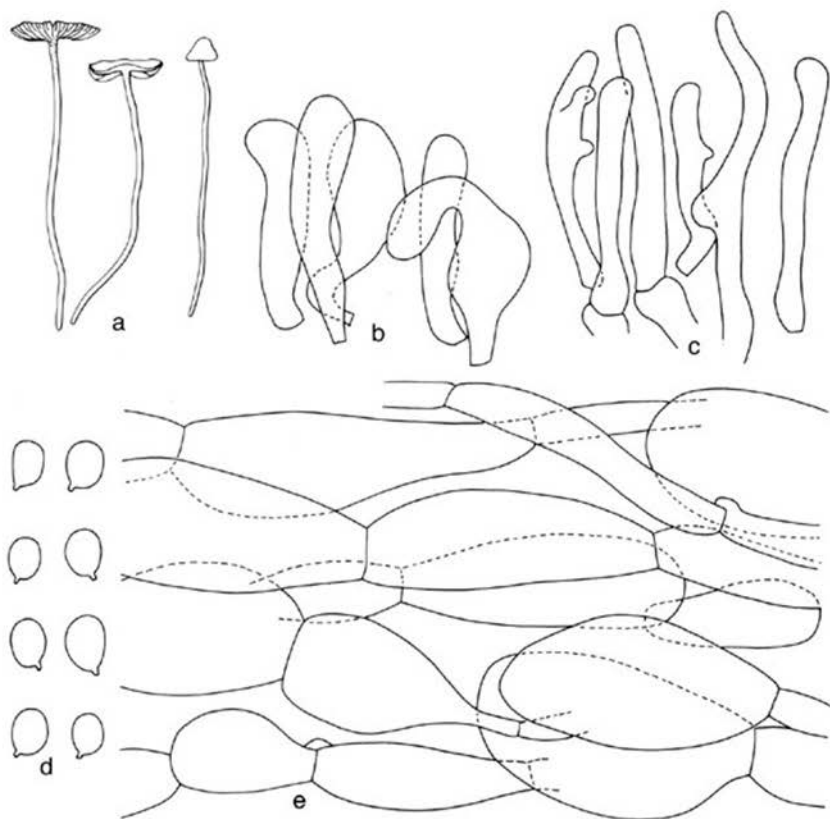


Fig. 12. *Pseudobaeospora ellipticospora*. a. Basidiocarps  $\times 1$ ; b, c. caulocystidia  $\times 1000$ ; b. in Horak 3314, c. in Knudsen 24.VIII.1997; d. spores  $\times 1500$ ; e. pileipellis (scalp)  $\times 1000$ .

Spores [38/2]  $3.6-4.9(-6.2) \times 2.6-3.8(-4.1) \mu\text{m}$ ,  $Q = (1.10-1.15-1.50(-1.70))$ , average  $Q = 1.25-1.30$ , broadly ellipsoid to ellipsoid, at first thin-walled and non-amyloid, later thick-walled and very weakly dextrinoid, congophilous, rather weakly cyanophilous and weakly metachromatic in cresyl blue. Basidia  $21-29 \times 5.3-5.8 \mu\text{m}$ , 4-spored, but some 1- and 2-spored ones present, with clamp-connection. Sclerified basidia present, scattered. Cheilocystidia absent. Hymenophoral trama regular, composed of hyphae with cylindrical to inflated,  $3.5-14(-21) \mu\text{m}$  wide cells; subhymenium narrow, densely ramose, but here and there almost subcellular on account of strongly inflated cells. Pileipellis in KOH pale sordid yellow, made up of loosely arranged, subradial hyphae consisting of long to very long, often broad cells,  $((14-40-87(-200)) \times (4-18-34(-45) \mu\text{m})$ , downwards gradually passing into denser and more strictly radial context of pileus (because of the scanty material pileipellis not studied in radial section); an inconspicuous, very thin suprapellis of scattered narrow hyphae sometimes present. Trama of stipe (near apex) composed of frequently septate, cylindrical hyphae from  $2.6 \mu\text{m}$  wide near surface to  $11 \mu\text{m}$  wide at centre, with slightly thickened wall. Caulocystidia in clusters at apex of stipe,  $24-42 \times 4-13(-17) \mu\text{m}$ , rather variable, from irregularly filiform, fusiform, subutriform or sublageniform to irregularly, broadly clavate, sometimes subcapitate, thin-walled. Clamp-connections present.

Habitat & distribution — Under *Alnus incana* at 1150 m altitude in the Swiss Alps and on boggy, peaty soil under *Alnus* and *Betula* in Denmark.

*Collections examined.* SWITZERLAND: Kanton Graubünden, Engadin, Schuls, Pradella, 30.VIII.1986, E. Horak 3341 (holotype, ZT). — DENMARK: Zealand, Sorø, Sønderkov, Runde Mose, 24.VIII.1977, H. Knudsen s.n. (C, L).

Among the clamp-bearing, coloured species without cheilocystidia, *P. ellipticospora* is characterized by small, slender, entirely lilacinous to violaceous basidiocarps, a pileipellis consisting of chains of very large cells (with or without a thin suprapellis of narrow hyphae), and comparatively large, broadly ellipsoid to ellipsoid spores. It resembles *P. subglobispora* (nom. prov.), which has similar large cells in the pileipellis, but that provisional species has rounder spores and seems to have a different ecology.

### 13. *Pseudobaeospora subglobispora*, nom. prov. — Fig. 13

Basidiocarps very small to small, slender, terrestrial, in small groups. Pileus 2–8 mm in diameter, hemispherical or obtusely conical, becoming plano-convex to flat, sometimes with small umbo, rather pale, lilacinous cream to pinkish grey, felted to silky, aciferous. Lamellae subdistant to somewhat crowded ( $L = 8-12, l = 0-3$ ), emarginate to adnate, cream to pale lilac or greyish pink, with entire margin. Stipe  $10-30 \times 0.4-1.0$  mm, somewhat flexuous, cream to pale brownish or greyish pink, subfibrillose, at apex pruinose-flocculose, at base with some whitish rhizoids.

Spores [26/2]  $3.6-4.5 \times 3.2-4.3 \mu\text{m}$ ,  $Q = (1.00-1.05-1.15(-1.25))$ , average  $Q = 1.10$ , subglobose, rarely globose or broadly ellipsoid, at first thin-walled and non-amyloid, becoming thick-walled, weakly dextrinoid, congophilous, strongly cyanophilous, and not or only very weakly metachromatic in cresyl blue when fully mature. Basidia  $21-25 \times 5.6-8.2 \mu\text{m}$ , 4-spored, with clamp-connection, rarely 2-spored. Sclerified basidia present, scattered. Cheilocystidia absent. Hymenophoral trama made up of

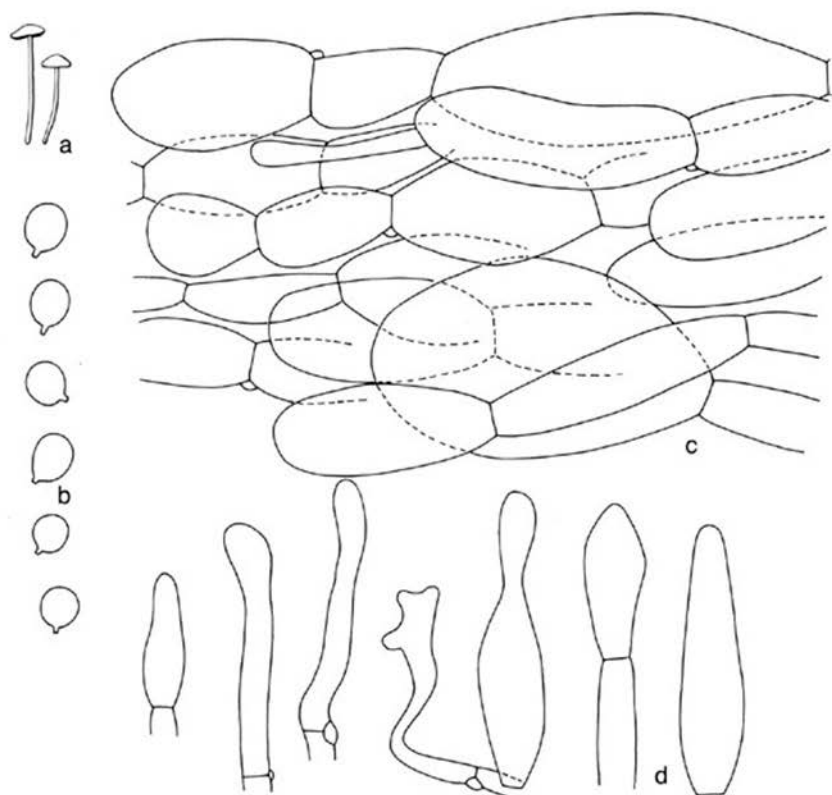


Fig. 13. *Pseudobaeospora subglobispora*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (scalp)  $\times 1000$ ; d. caulocystidia  $\times 1000$ .

somewhat irregularly disposed, subparallel, up to  $37 \mu\text{m}$  wide hyphae constricted at septa; subhymenium narrow, densely ramose (in cresyl blue a great number of bright pink globular droplets, about the size of the spores or somewhat larger, were observed in the crushed tissue of a lamella of coll. 15.X.2000). Pileipellis very pale brownish to pale yellow-brown in KOH, consisting of irregularly disposed to subparallel chains of strongly inflated cells,  $12\text{--}57 \times 9\text{--}30 \mu\text{m}$ , particularly at centre making a subcellular impression; in one young basidiocarp with a fragmented, very thin suprapellis of  $2.5\text{--}6.0 \mu\text{m}$  wide hyphae; in coll. 15.X.2000 a few slenderly clavate pileocystidia (e.g.  $27\text{--}45 \times 5\text{--}7 \mu\text{m}$ ) were seen in a radial section. Caulocystidia at apex of stipe  $18\text{--}44(\text{--}73) \times 2\text{--}9 \mu\text{m}$ , filiform, broadly cylindrical, or narrowly sublageniform, rarely somewhat nodulose. Clamp-connections present.

Habitat & distribution — On calcareous dry heathland (30.X.1998) and in dry unmown grassland on coral limestone tending towards a *Ligustro-Prunetum* (15.X.2000). Only known from middle and southern Germany.

*Collections examined.* GERMANY: Bavaria, Niederbayern, Kelheim, 30.X.1998, L.G. Krieglsteiner s.n. (STU); Hessen, Dillenburg, 'Gonkelrain', 15.X.2000, L.G. Krieglsteiner s.n. (STU).

Among the clamp-bearing, coloured species without cheilocystidia, with a non-hypheniform pileipellis, and without a strong KOH reaction, *P. subglobispora* in its present concept is characterized by the very small to small, pale coloured basidiocarps, the small subglobose spores and the thick pileipellis of very large cells, with or without a very thin suprapellis of narrow hyphae. It seems very closely related to *P. ellipticospora*.

Unfortunately, both collections cited are rather poor and show some differences, particular in the pileipellis, viz. shorter and broader inflated cells, 12–18 × 23–30 µm, in more disorderly arranged chains in coll. 30.X.1998, versus longer and less broad cells, 15–57 × 9–20(–29) µm in more radial chains in coll. 15.X.2000.

The matter becomes even more complicated when a third collection is taken into consideration that keys out under the present provisional name with the key in the first part of this paper (Bas, 2002). Its characters are not included in the description above.

*Pseudobaeospora? subglobispora*, ENGLAND: Somerset, Leigh Woods, 14.IX.1992, T. Læssøe 2842, K(M) 20139 (K).

This collection is very similar to the two described above, but differs by the brownish purple colour of the basidiocarp, slightly smaller and rounder spores (3.1–3.8 × (2.7–)2.9–3.5 µm, Q = 1.00–1.15, average Q = 1.05–1.10), and somewhat narrower inflated cells (15–35 × 6–12 µm) in the pileipellis. It was found terrestrial among tall grasses, associated with Clavariaceae and Hygrophoraceae.

Given the differences between these three collections and the very small number of tiny basidiocarps available, it seems preferable to refrain from formally describing *P. subglobispora* as a new species. In its present provisional concept it seems closely related to *P. ellipticospora* (see discussion there).

#### 14. *Pseudobaeospora pallidifolia* Bas, Gennari & Robich — Fig. 14

*Pseudobaeospora pallidifolia* Bas, Gennari & Robich, Riv. Micol. 40 (1997) 194, col. pl.

Basidiocarps rather small and slender, terrestrial, in small group. Pileus 10–15(–20) mm in diameter, at first convex, then plano-convex, with or without a low obtuse umbo, violaceous brown (in colour-slide ± Munsell 5 YR 4/3), but darker at centre and much paler at margin, with dull, slightly wrinkled surface, not hygrophanous, not striate at margin. Lamellae free to just reaching apex of stipe, moderately crowded (L = ± 20–22, l = 1–3), ventricose, whitish to pinkish cream, with concolorous, entire edge. Stipe 25–35 × 1–2 mm, somewhat flexuous, bent at base, slightly wider at apex, pale slightly pinkish tinged grey-brown, whitish pruinose at apex. Context very thin, reddish brown, lilacinous in centre of pileus. Smell somewhat farinaceous. Taste indistinct. Spore print white.

Spores [30/1] (4.2–)4.4–6.4(–6.9) × (2.7–)3.0–4.4(–4.8) µm, Q = (1.10–)1.15–1.60(–1.65), average Q = 1.30–1.40, broadly ellipsoid to ellipsoid, smooth, at first thin-walled and inamyloid, becoming thick-walled, weakly dextrinoid, congophilous, cyanophilous and metachromatic in cresyl blue when fully mature. Basidia 18–26 × 5.2–6.6 µm, mainly 4-spored, but also a few 2- and 1-spored, with clamp-connection. Sclerobasidia present but sparse. Cheilocystidia absent. Pileipellis a cutis of radial,

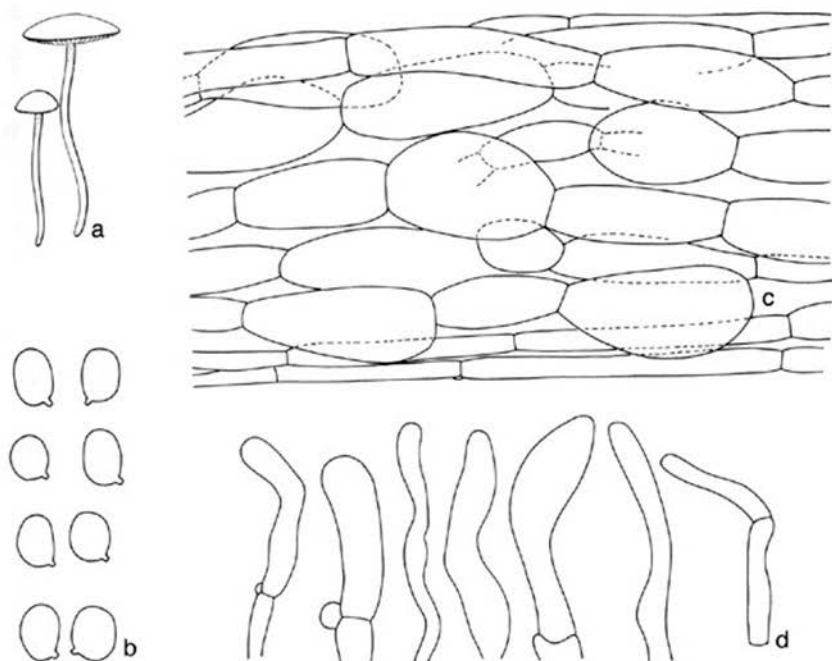


Fig. 14. *Pseudobaesopora pallidifolia*. a. Basidiocarps  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 500$ ; d. caulocystidia  $\times 1000$ .

(5–)8–32  $\mu\text{m}$  wide hyphae made up of cylindrical (particularly in upper part) to inflated cells (particularly in lower part), but not clearly divided into two layers, with minutely encrusted walls, becoming fairly dark greenish blue in KOH and  $\text{NH}_4\text{OH}$ . Stipe made up of regularly septate, cylindrical, longitudinal, 3–12  $\mu\text{m}$  wide hyphae with slightly thickened walls. Caulocystidia at apex of stipe in dense clusters, rather irregularly cylindrical to subclavate, 25–36  $\times$  3.5–9.0  $\mu\text{m}$ , thin-walled. Clamp-connections present.

Habitat & distribution — On mossy ground under conifers. Known only from type locality in Italy.

Collection examined. ITALY: Toscana, Passo dello Scopetone near Arezzo, 19.XI.1992, A. Gennari s.n. (holotype, MCVE 598; isotype, L).

*Pseudobaesopora pallidifolia* is well characterized by its dark pileus with pale margin, strongly contrasting whitish to pinkish cream lamellae, rather pale stipe, and comparatively large and elongate spores.

#### V. *Pillodii* group

Basidiocarps coloured, very small to small, and very slender. Clamp-connections absent from basidia and all tissues. Pileipellis a cutis, with or without pileocystidia.

15. *Pseudobaeospora pillodii* (Quél.) Wasser — Fig. 15

*Collybia pillodii* Quél., C. r. Ass. Franc. Av. Sci. (Champ. Jura Vosges, suppl. 17) 18 (1890) 509.  
— *Pseudobaeospora pillodii* (Quél.) Wasser, Fl. Fung. RSS Ucrainicae, Bas. Agar. (1980) 220.

Selected descriptions: E. Horak, Syn. Gen. Agaric. In Beitr. Kryptog. Fl. Schweiz 13 (1968) 512 (as *P. oligophylla*); Kühn. & Romagn., Complém. Fl. anal. III. In Bull. Soc. Oyonnax 8 (1954) 92 (Bibliotheca mycol. 56: 128, 1977) (as *Collybia pillodii*).

Basidiocarps very small to small and slender to very slender, gregarious, usually terrestrial, but sometimes on woody fragments. Pileus 1.5–13 mm in diameter, conico-campanulate or obtusely conical to plano-convex with umbo, when young with margin somewhat inflexed, dark brownish lilac to pale purplish, violaceous grey, or grey-brown (Munsell 10 YR 6/3–4/3), rarely pale grey, pallescent with age, sometimes with white to pallid, hoary margin, silvery fibrillose to felted, non-striate. Lamellae narrowly adnate to free, subdistant to crowded ( $L = 12-19(-30)$ ,  $l = 0-3$ ), pinkish lilacinous violet, purplish lilac, purplish brown (5 YR4/3), or brownish lilac, pallescent with age. Stipe 18–55(–70) × 0.2–1.0 mm, cylindrical or filiform, frequently tapering downwards, hollow, lilacinous to lilac-brown, pinkish to purplish grey-brown ( $\pm 7.5$  YR 4/2), or

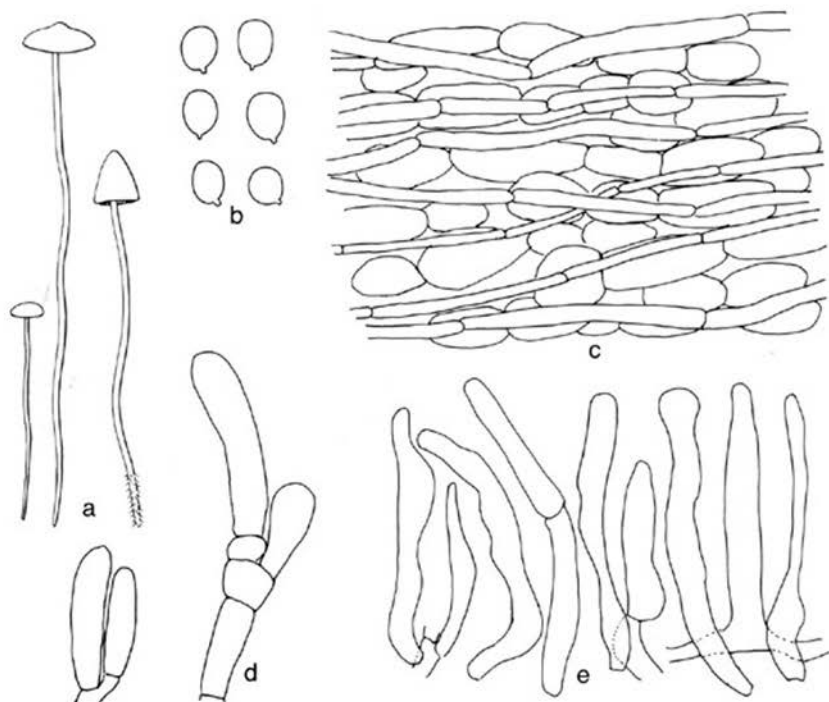


Fig. 15. *Pseudobaeospora pillodii*. a. Basidiocarps × 1; b. spores × 1500; c. pileipellis (scalp) × 500; d. basidioles × 1000; e. caulocystidia × 1000.

dark brownish purple, sparsely whitish fibrillose or not, minutely white flocculose at apex, with white tomentum and white to whitish-yellowish rhizoids at base. Context concolorous. Smell absent or aromatic. Spore print colour white.

Spores [90/7] (3.2–)3.7–4.5(–4.9) × (2.6–)2.9–3.6 μm, broadly ellipsoid to ellipsoid, Q = (1.05–)1.15–1.40(–1.50), average Q = 1.15–1.25 (–1.30), at first thin-walled and non-amyloid, later thick-walled, weakly dextrinoid, congophilous, cyanophilous and metachromatic in cresyl blue. Basidia 17–26 × 4.5–6.5 μm, 4-spored and/or 2-spored, clampless. Sclerified basidia present, scattered, ± dextrinoid. Cheilocystidia absent. Hymenophoral trama regular, consisting of 4–18 μm wide hyphae; subhymenium ± (7–)10–15 μm thick, ramose to cellular. Pileipellis pallid to red-brown in KOH, made up of a distinct to rather indistinct suprapellis of 1.6–7.0(–10) μm wide radial hyphae (sometimes lacking?), gradually passing into a subpellis of rather short- and broad-celled hyphae (cells 15–40(–44) × 8–28(–35) μm); subpellis ± dextrinoid, rarely with a very few repent to slightly ascending, cystidioid terminal cells. Trama of stipe composed of regularly septate, straight hyphae, from 2–5 μm wide at surface to 8–14 μm wide inside. Caulocystidia at apex of stipe, solitary or in small clusters, filiform or (sub)cylindrical to very narrowly clavate, rarely narrowly lageniform, (10–)28–42 × 2.5–7.0 μm, sometimes slightly interwoven. Clamp-connections absent.

Habitat & distribution — On needle carpets under *Picea*, *Pinus cembra*, *Abies*, and *Larix*, once on fallen branch of *Alnus viridis* in shrubbery on acid rock, under *Alnus incana*, but also in felted turf of poor grassland on calcareous soil, often in subalpine habitats at up to 1700 m altitude. Known from Northern and Central Europe.

*Collections examined.* GERMANY: Nordrhein-Westfalen, Lennestadt, Elspe, nature reserve Rübekamp, 24.X.1999, L.G. Krieglsteiner s.n. (STU). — SWITZERLAND: Kanton Bern, Andersteg, *Gasterital*, 7.VIII.1987, B. Senn-Irlet 87/84 (BERN); Axalp, 23.VIII.1996, J. Gilgen 2063 (BERN); Kanton Uri, Schächental, 19.VIII.1997, B. Senn-Irlet 97/69 & E. Wiedmer (BERN); Kanton Ticino, Ghirone, Baselga, 12.IX.1988, E.C. Vellinga 1364 (L); Kanton Graubünden, Stillberg, Dischmatal, 17.IX.1963, E. Horak 63/156 & E. Müller (ZT, as *P. oligophylla*). — RUSSIA: Siberia, Polar Ural, Slantsevaya Mountain, 24.VIII.1996, U. Peintner 96/672 (IB, as *P. oligophylla*).

The present concept of *P. pillodii* is based on that of Kühner in Kühner & Romagnesi (1954) and Horak (1968). Probably the type of Quélet's *Collybia pillodii* does not exist and Quélet's illustration and very concise original description are difficult to interpret, particularly after the recent increase of the number of species in the genus. However, there is nothing in the description and the illustration that excludes the present concept, except the surface of the spores that is described as minutely spinulose ('finement aculéolé'). But as the spores of all species of the genus examined by the author are glabrous under the light microscope (in the only species tested, also in SEM), Quélet was probably mistaken.

*Pseudobaespora pillodii* is characterized by very small to small, very slender, coloured basidiocarps, lacking clamp-connections (even from the basidia), broadly ellipsoid spores (3.7–4.5 × 2.9–3.6 μm, average Q = 1.15–1.25), and a pileipellis composed of fairly broad, radial hyphae, with or without a suprapellis of narrow hyphae, and lacking pileocystidia.

Although specimens have been found with 2-spored basidia only, nothing is gained by formally describing a 2-spored variety or forma, as specimens occur with 2- and 4-spored basidia sometimes even on one lamella.

The very similar *P. oligophylla* in its present sense differs from *P. pillodii* mainly in a pileipellis with many repent to ascending, pileocystidioid terminal cells. It could very well represent a variety of *P. pillodii* (the oldest name of the two). However, although in Singer's diagnosis of *P. oligophylla* such a pileipellis is rather precisely described, its type has not yet been analysed. Therefore, at the moment it seems unwise to introduce a new combination.

*Pseudobaeospora pillodii* may have a much wider range of distribution than indicated above, as the name occurs in quite a few publications. But there is little sense in recording all these reports here, as the available data are often insufficient for a positive identification. *Pseudobaeospora pillodii* sensu Redhead (1982) from Canada might represent perhaps *P. oligophylla*, because of the presence of rather simple pileocystidia (unfortunately the absence or presence of clamp-connections is not mentioned).

*Pseudobaeospora defibulata* Singer is probably related; see under extralimital species.

#### 16. *Pseudobaeospora oligophylla* (Singer) Singer — Fig. 16

*Baeospora oligophylla* Singer, Rev. Mycol. 3 (1938) 194; *Pseudobaeospora oligophylla* (Singer) Singer, Lilloa 22 ('1949') (1951) 438.

Misapplied: ? *Pseudobaeospora pillodii* sensu Redhead, Fungi Canadensis 217 (1982).

Basidiocarps very small, terrestrial, solitary to gregarious. Pileus 4–6 mm in diameter, at first paraboloid, then conical, convex to plano-convex, with very small umbo or papilla, with margin at first slightly inflexed, later straight, somewhat eroded, non-striate, dark violaceous grey-brown (Munsell 10 YR 3/2), paler moderately dark violaceous grey (10 YR 6/2–5/2) towards margin, dry, minutely tomentose under lens, matt. Lamellae narrowly adnate, rather crowded ( $L = \pm 19$ ,  $l = 3$ ), thickish, narrow, only slightly ventricose, slightly undulating, concolorous to margin of pileus, with entire, slightly darker edge. Stipe 10–27  $\times$   $\pm 0.75$  mm, somewhat flexuous, concolorous with centre of pileus but paler at apex, with minute, white, fibrillose scales all-over, but more distinctly so at apex, at base with white tomentum and a few rhizoids and these in some basidiocarps apparently connected with small ochre-yellow grains in the soil. Context concolorous with surface. Smell indistinct.

Spores [20/1] 3.4–3.9(–4.4)  $\times$  2.8–3.5(–3.7)  $\mu\text{m}$ ,  $Q = 1.05$ –1.40, average  $Q = 1.15$ –1.25, subglobose to broadly ellipsoid, rarely ellipsoid, at first thin-walled and non-amyloid, later thick-walled and rather weakly dextrinoid, congophilous, cyanophilous, and sometimes metachromatic in cresyl blue. Basidia 18.2–21.4  $\times$  5.6–6.4  $\mu\text{m}$ , 4-spored, without clamp-connection. Cheilocystidia absent. Hymenophoral trama  $\pm$  regular, composed of about 7–15  $\mu\text{m}$  wide hyphae; subhymenium  $\pm 10$   $\mu\text{m}$  wide. Pileipellis made up of a narrow,  $\pm 10$ –20  $\mu\text{m}$  thick suprapellis of loosely arranged, 3.5–8.5  $\mu\text{m}$  wide, radial hyphae, over a narrow,  $\pm 10$ –35  $\mu\text{m}$  thick subpellis of 9–18  $\mu\text{m}$  wide, short-celled hyphae; suprapellis with abundant repent to ascending, rarely erect pileocystidia, 26–43  $\times$  4.0–7.5  $\mu\text{m}$ , cylindrical to sublageniform and subutriform, rather frequently subcapitate (apex 3.5–8.0  $\mu\text{m}$  wide), at centre almost forming an irregular trichoderm. Trama of stipe composed of 4–11  $\mu\text{m}$  wide, closely packed, thin-walled, straight hyphae. Caulocystidia 15–52  $\times$  4–7  $\mu\text{m}$ , single or in clusters, subcylindrical



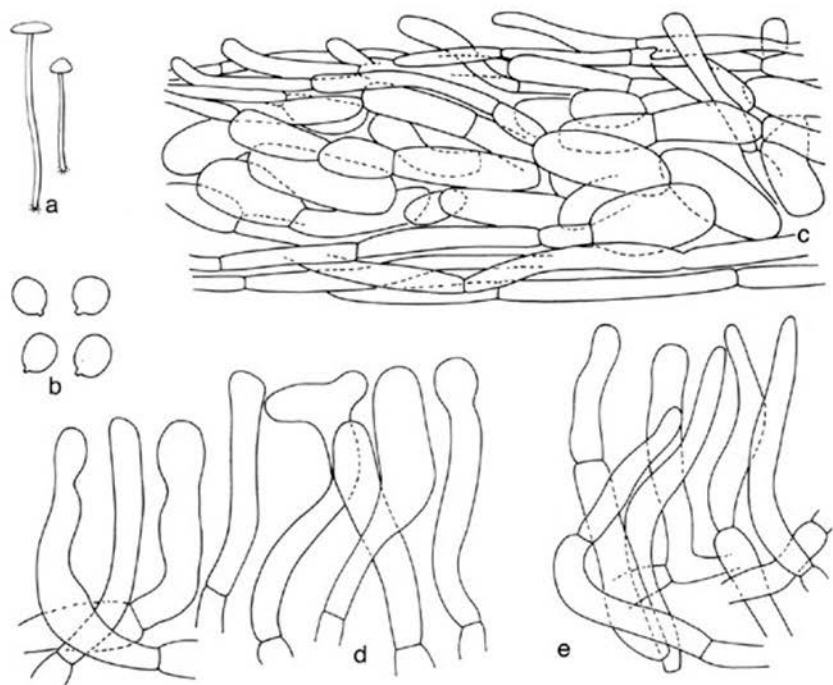


Fig. 16. *Pseudobaeospora oligophylla*. a. Basidiocarp (reconstructed)  $\times 1$ ; b. spores  $\times 1500$ ; c. pileipellis (radial section)  $\times 500$ ; d. pileocystidia (from centre of pileus)  $\times 1000$ ; e. caulocystidia  $\times 1000$ .

to very narrowly lageniform, mostly with tapering neck, but also sometimes broadly rounded, thin- to slightly thick-walled. Clamp-connections absent.

Habitat & distribution — On loose forest litter under *Picea* at 1240 m altitude in the Swiss Alps. (The type collection, not studied here, was found among mosses under *Larix siberica* and *Pinus siberica* at 1900 m altitude in the Altai in Russia.) Possibly also in Canada, see discussion below.

Collection examined. SWITZERLAND: Kanton Bern, Feutersoey, Tschärzisbach, 30.IX.1991, N.J. Dam, ND 91134 (L).

When Singer (1938) described the present species as *Baeospora oligophylla*, apparently he had never seen *Pseudobaeospora pillodii* (Quélet) Wasser, described 48 years earlier by Quélet (1890) as *Collybia pillodii*. He merely noted that that species probably belongs to the genus *Baeospora* too. There has been quite a bit of speculation about the relation between *P. pillodii* and *P. oligophylla* and some authors. e.g. Horak (1968), considered these only two clampless European taxa conspecific. This is quite understandable, when Singer's description is compared with the descriptions of *P. pillodii* in its current concept.

However, there is one element in that description that seems to have escaped attention, viz. Singer's description of the suprapellis, which disagrees with *P. pillodii*. Dr. R. A. Maas Geesteranus (in litt.) kindly translated it from Latin as follows: "... terminal cells somewhat erect, clavate to cylindrical and obtusely rounded, very rarely inflated to globules, but usually repent, filiform or in chains ...", and he added a small sketch showing what he thought the suprapellis would look like and which agrees very well with the suprapellis of the present collection as illustrated here. But the very rare globules mentioned by Singer have not been found. In the basidiocarps of *P. pillodii* cited in this paper pileocystidioid structures are lacking completely. Unfortunately, the present author has not been enabled to examine the type of *P. oligophylla*, that, if it exists, is presumably kept in LE.

The collector of the material described above, observed that some of the rhizoids were connected to very small ochre-yellow grains in the soil "like those of *Collybia cookei*, but a bit smaller", but there were also grains scattered in the soil not connected to rhizoids. It is very uncertain whether these grains belong to the species or not, but that possibility should not be excluded.

Redhead (1982) published a description under the name *P. pillodii*, based on a collection from British Columbia, Canada, which resembles that of *P. oligophylla* very much (see the discussion under *P. pillodii*).

#### EXTRALIMITAL SPECIES

A few species of *Pseudobaespora* have been described from North and South America and one from India. None of these seems to be conspecific with any of the European taxa treated here. Their most important characters are given below.

***Pseudobaespora chilensis*** E. Horak, Rev. Mycol. 29 (1964) 76, from Chile.

Basidiocarps entirely violet-lilac; clamp-connections present; no cheilocystidia; pileipellis a cutis, not colouring in KOH.

Keys out near *P. argentea*, but spores very small, 2.8–3.4 × 2.5–2.8 μm.

***Pseudobaespora citrina*** Rawla & S. Arya, Boletus 15 (1991) 111, from India.

Basidiocarps entirely greenish yellow; clamp-connections absent; spores 4.5–5.6 × 3.5–4.2 μm, strongly dextrinoid; cheilocystidia lacking; pileipellis a cutis of up to 7 μm wide hyphae, with fasciculate hairs (28–140 × 3–5) with slightly thickened walls; similar hairs on stipe; context amyloid.

If this is a *Pseudobaespora*, it is a very unusual one.

***Pseudobaespora defibulata*** Singer, Mycologia 55 (1963) 13, from Argentina.

Pileus pale livid to nearly white, 4–7 mm in diameter; lamellae livid-violet; stipe 10–20 × 0.2–0.6 mm, dusky livid; clamp-connections lacking; cheilocystidia absent, but edge with some sterile basidioles with deformed apex; pileipellis a cutis, made up of a very thin suprapellis of very thin, parallel hyphae over a subpellis of somewhat broader hyphae; KOH reaction unknown, but colourless in NH<sub>4</sub>OH; spores 4.0–4.2 × 3.0–3.2 μm.

Belongs apparently to the *Pillodii* group. Differs from *P. oligophylla* (in the present sense) especially by the absence of pileocystidia, from *P. pillodii* by the much paler pileus and the narrower hyphae of the subpellis (according to Singer somewhat broader than those of the suprapellis, but width not given).

***Pseudobaeospora flavescens*** Singer, Mycol. austr. (Beih. Nova Hedwigia. 29) (1969) 172, from Chile.

Very small (pileus 6 mm in diameter; stipe  $\pm 22 \times 1$  mm); pileus yellow, lamellae and stipe pale yellow; clamp-connections present; cheilocystidia absent; pileus a cutis of filamentous, repent, subparallel hyphae; spores  $4-5 \times 3-4 \mu\text{m}$ .

This species might be placed in the *Albidula* group, but the European species are not yellow. *Pseudobaeospora albidula* has a pileipellis of chains of inflated cells and the pileipellis of *P. paulochroma* is duplex.

***Tricholoma microspora*** sensu Dennis, Trans. Br. mycol. Soc. 34 (1951) 479, pl. 22 fig. 5 = *Collybia syringea* sensu Dennis, Fung. Fl. Venezuela (Kew Bull. Add. Ser. 3) (1970) 27, pl. 5 fig. 10, from Venezuela.

Basidiocarps small (pileus up to 10 mm in diameter), dark violet, but lamellae lilac; clamp-connections present, spores  $\pm 3.4 \times 2-3 \mu\text{m}$ , non-amyloid; pileipellis a cutis of smooth hyphae.

Insufficiently known, but almost certainly a species of *Pseudobaeospora*.

***Pseudobaeospora murrillii*** E. Horak, Rev. Mycol. 29 (1964) 79. A new name introduced by Horak for *Mycena syringea* (Murr.) Murr., Mycologia 8 (1916) 221 = *Prunulus syringea* Murr., North Amer. Fl. 9 (1916) 341, from Jamaica.

Insufficiently known. Smith (1947) studied the type and together with Murrill's diagnosis this gives the following picture: pileus 5 mm in diameter, lilac with fulvous disc, subgranular; lamellae distant, adnate, violet; stipe  $20 \times < 1$  mm, melleous, lilac at apex; spores  $3-4 \mu\text{m}$ , globose to subglobose, smooth, non-amyloid; cystidia absent; pileipellis a mat of appressed hyphae with saccate tips; presence or absence of clamp-connections not mentioned.

Although thick-walled, dextrinoid spores are not mentioned, this is indeed probably a species of *Pseudobaeospora*. The colours of the pileus, the small (sub)globose spores, and the quite typical pileipellis seem to define it as a well-recognizable species. Further records of it from several parts of the USA have to be carefully restudied.

***Pseudobaeospora syringea*** Singer, Mycologia 55 (1963) 15, from Peru.

Basidiocarps small (pileus 9–12 mm in diameter, stipe  $30-35 \times 0.8-1.5$  mm); pileus violet, becoming darker and more greyish; lamellae livid-violet, becoming more greyish; stipe pallid to fuscous, but with apex livid-violet when young; spores  $(3.5-4.0-4.5 \times (2.8-4.0-4.5(-7.0) \mu\text{m})$ , thin- to slightly thick-walled, non-amyloid to dextrinoid, often roughened by thin but rather resistant ornamentation; without true cheilocystidia, but empty, often deformed, sometimes *Helvella*-shaped [?] basidioles here and there among normal basidia at edge of lamellae; pileipellis a cutis, consisting of a suprapellis of filamentous hyphae and a subpellis of hyphae made up of much broader cells, pale buff in KOH; clamp-connections present.

*Pseudobaeospora syringeae* keys out near *P. frieslandica*, but has one character not observed before in the genus, viz. finely ornamented spores. It has been found in a rather extreme habitat, viz. at 3700 m altitude in the montane zone of Peru.

Some other species possibly belonging to *Pseudobaeospora* are:

**Agaricus (Collybia) fuscolilacinus** Peck, Ann. Rep. N. Y. St. Mus. Nat. Hist. 39 (1886) 38, from USA (Adirondack Mts).

Basidiocarp small (pileus  $\pm$  9–18 mm, stipe  $\pm$  37–74  $\times$   $\pm$  2.5 mm); pileus brown to lilac-brown, glabrous, rugose when dry; lamellae close, adnexed, brownish; stipe concolorous with pileus, pruinose at apex, whitish felted at base; spores 4–5  $\mu$ m, subglobose to broadly ellipsoid. Type-study required.

**Collybia syringeae** Singer, Mycologia 47 (1955) 768, from Brasil (Paraná).

Basidiocarp small (pileus 12 mm in diameter, stipe 29  $\times$  0.7–1 mm); pileus violaceous, becoming sordidly pallid, glabrous; lamellae violaceous blue, distant, adnexed; stipe concolorous with lamellae, glabrous at apex, tomentose-strigose at base; spores 3.3–4.5  $\times$  3–3.5  $\mu$ m, broadly ellipsoid, thin-walled, inamyloid; basidia 4-spored; cheilocystidia scattered, 25–30  $\times$  2.7–3.5  $\mu$ m, up to 6  $\mu$ m at subventricose base, pileipellis composed of appressed hyphae; superficial hyphae consisting of broad, up to 17  $\mu$ m wide cells, with terminal, sometimes clavate cells; clamps present.

It should be noted that Singer (1986: 281) did not transfer this taxon to *Pseudobaeospora*, but placed it with a question mark in *Pleurocollybia*. Type-study required.

#### ACKNOWLEDGEMENTS

For a taxonomic study of a genus like *Pseudobaeospora*, with its many apparently rare species with their often tiny, inconspicuous basidiocarps, the help of many collectors is a must. Very few European mycologists have seen more than two species of *Pseudobaeospora* fresh. Lothar Krieglsteiner must have a special eye for them, because he provided me with well-annotated collections of six species, for which I am very grateful. Special thanks are also due to Thomas Læssøe, who besides sending in his personal collections of three species, drew the author's attention to the crucial collections of *Pseudobaeospora* from England gathered by Alick Henrici, J. C. Leedal, and L. Livermore, conserved in the mycological herbarium of the Royal Botanic Gardens at Kew. These were kindly made available for the present project by the Director of that Institute.

The author is also very much indebted to the following colleagues for generously lending him collections, field notes, and colour-slides: Slavomir Adamčík, Marcel Bon, Marco Contu, Antonio Gennari, Egon Horak, Pier Giovanni Jamoni, Henning Knudsen, Giorgio Lalli, Pierre-Arthur Moreau, Ursula Peintner, Giovanni Robich, Beatrice Senn-Irlet, Bernhard de Vries, and Jaap Wisman. Advice and valuable information have kindly been supplied by Thomas Kuyper, Machiel Noordeloos, Peter Roberts, and Else Vellinga.

For critically reading the manuscript I am very grateful to Else Vellinga, John Lennie, and Marijke Nauta.

The Director of the Nationaal Herbarium Nederland is thanked for kindly allowing the author to continue his use of the facilities of this institute in an honorary capacity.

## REFERENCES

- Adamčík, S. & C. Bas. 2002. *Pseudobaespora mutabilis*, a new species discovered in Slovakia. *Mycotaxon* 84: 272–275.
- Antonín, V. & M.E. Noordeloos. 1997. A monograph of *Marasmius*, *Collybia* and related genera in Europe. Part 2: *Collybia*, *Gymnopus*, *Rhodocollybia*, *Crinipellis*, *Chaetocalathus*, and additions to *Marasmiellus*. *Libri Botanici* 17.
- Bas, C. 1995. *Pseudobaespora* Sing. In: C. Bas, Th.W. Kuyper, M.E. Noordeloos & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 3: 132–134. Rotterdam, Brookfield.
- Bas, C. 2002. A reconnaissance of the genus *Pseudobaespora* in Europe I. *Persoonia* 18: 115–122.
- Favre, J. 1960. Catalogue descriptif des champignons supérieures de la zone subalpine du Parc National de Suisse. *Ergebnisse der wissenschaftlichen Untersuchungen des schweizerischen Nationalparks*, n.F. VI: 321–610, pl. I–VIII.
- Heinemann, P. 1978. *Sericeomyces*, genre nouveau de *Leucocoprineae* (Agaricaceae). *Bull. Jard. bot. natn. Belg.* 48: 399–407.
- Horak, E. 1964. Notes sur *Pseudobaespora* Sing. (1942), excl. *Lepiota* sect. *Sericellae*. *Rev. Mycol.* 29: 72–81.
- Horak, E. 1968. *Synopsis Generum Agaricalium*. *Beitr. Kryptog. Fl. Schweiz* 13.
- Jamoni, P.G. 1997. Una nuova stazione in Valsesia di *Pseudobaespora pillodii* (Quélet.) Horak. *Funghi Ambiente* 73: 16.
- Jamoni, P.G. & M. Bon. 1996. Quelques récoltes subalpines du massif du Mont Rose et des alentours. *Bull. trimest. Fédér. mycol. Dauphiné-Savoie* 36: 7–15.
- Kirk, P.M., R.F. Cannon, J.C. David & J.A. Stalpers (eds). 2001. *Dictionary of Fungi*, ed. 9. Wallingford, Oxon.
- Kornerup, A. & J.H. Wanscher. 1981. *Methuen Handbook of Colour*. London.
- Krieglsteiner, L.G. 1999. Pilze im Naturraum Mainfränkische Platten und ihre Einbindung in die Vegetation. *Regensb. Mycol. Schr.* 9: 1–905.
- Kühner, R. 1980. Les Hyménomycètes agaricoides. *Bull. Soc. linn. Lyon* 49, Nr. spec.: 1–1027.
- Kühner, R. & H. Romagnesi. 1954. Compléments à la Flore analytique III. Espèces nouvelles, critiques ou rares de Pleurotacées, Marasmiacées et Tricholomacées. *Bull. Soc. Nat. Oyonnax* 8: 73–131 (*Bibliotheca mycol.* 56: 109–167. 1977).
- Locquin, M. 1952. Sur la non-validité de quelques genres d'Agaricales. *Bull. trimest. Soc. mycol. Fr.* 68: 165–169.
- Munsell Soil Color Charts. 1971. Baltimore.
- Quélet, L. 1890. Quelques espèces critiques ou nouvelles de la Flore Mycologique de France. *C.R. Ass. franç. Av. Sci.* 18 (2): 508–514.
- Redhead, S. 1982. *Pseudobaespora pillodii*. *Fungi Canadensis* 217.
- Singer, R. 1938. Notes sur quelques Basidiomycètes IV. *Rev. Mycol.* 3: 187–199.
- Singer, R. 1942. Type studies on agarics. *Lloydia* 5: 97–135.
- Singer, R. 1951 ('1949'). The Agaricales (Mushrooms) in modern taxonomy. *Lilloa* 22: 1–832.
- Singer, R. 1963. The delimitation of the genus *Pseudobaespora*. *Mycologia* 55: 13–17.
- Singer, R. 1975. The Agaricales in modern taxonomy, ed. 3. Vaduz.
- Singer, R. 1986. The Agaricales in modern taxonomy, ed. 4. Koenigstein.
- Smith, A.H. 1947. North American species of *Mycena*. *Ann Arbor/London*.
- Vellinga, E.C. 2003. Phylogeny and taxonomy of lepiotaceous fungi. Thesis, Leiden.
- Wasser, S.P. 2002. Biodiversity of Cyanoprocarvates, Algae and Fungi of Israel. Family Agaricaceae (Fr.) Cohn (Basidiomycetes) of Israel mycobiota. 1. Tribe Agariceae Pat. Ruggell.

## BOOK REVIEWS

Mahesh Kumar Adhikari. *Mushrooms of Nepal*. (P.U. Printers, Kathmandu, Nepal, 2000.) Pp. 236, 41 coloured photographs, many line drawings and black-and-white figs. Price: EUR 43.

The book can be ordered from Etsuzo Sano, Nakashizu 4-16-19, Sakura-City 285-0843, Japan; e-mail: e\_sano@d2.dion.ne.jp.

The mycoflora of Nepal, a remote and not easily accessible country, has been poorly known so far. This book offers a welcome compilation of current knowledge, brought together by the author, and supplemented with his extensive own research. Introductory chapters deal with the phytogeography and climate, followed by an overview of the history of mycology in Nepal so far. The main part of the book is devoted to an annotated list of Ascomycetes and Basidiomycetes found in Nepal, giving details on distribution and sometimes substrate, together with references of the records. The genera *Amanita*, *Russula*, and *Lactarius* are treated in more detail with notes on the characters and keys for identification. Also of the Gasteromycetes a key is given to the genera. Chapters are added on ethnomycology, the value of mushrooms for food and trade, and the book concludes with an extensive chapter on mycobiogeography, comparing the mycoflora of Nepal with other regions of the world, ecological factors affecting the mycoflora, and distribution patterns. A few pages are added on conservation and utilization. The coloured photographs are informative, though not always of very good quality. The book is recommended as an important source of information on this region we know so little about.

P.A. Bidaud, X. Carteret, G. Eyssartier, P. Moëgne-Loccoz & P. Reumaux. *Atlas des Cortinaires. Pars XII. Sous-Genre Dermocybe (Fries) Trog. Section Sericeocybe (P.D. Orton) Melot.* (Éditions Fédération Mycologique Dauphiné-Savoie, F 74270, Marlioz, France. 2002.) Pp. 627–710. Coloured plates 358–413. Price: unknown. In French.

This is already the 12th volume in this impressive series, and continues in the same way as the previous volumes. It provides notes on the morphology of the specimens studied and microscopical characters, accompanied by nice crayon coloured plates of all the species in section *Sericeocybe* treated. Also, keys are given to the subsections and per subsection to the series and to the stirps. Per stirps a key is given to the species and other taxa. 22 New series and stirps are formally described, 34 new species, varieties, or formae are formally described, and 4 new combinations are made. This volume also gives an index to the species treated in all previous volumes.

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM – XXXIX  
**Bolbitius**

EEF ARNOLDS

Holthe 21, 9411 TN Beilen, The Netherlands

A key is provided to the European taxa of *Bolbitius*, mainly based on a revision of material from the Netherlands and adjacent regions. The nomenclature and morphological variation of *B. tibubans* and *B. reticulatus* are discussed. The new combination *B. tibubans* var. *olivaceus* is proposed. Full descriptions are given of the critical species *B. demangei* and *B. lacteus*. *Bolbitius ferrugineus* is described as a new species, based on material from southern Italy.

In this paper some taxonomic and nomenclatural problems in the genus *Bolbitius* are discussed and a key to the recognized species in Europe is given. No recent monograph or critical revision of *Bolbitius* in Europe is available and current species concepts vary strongly from author to author. The descriptions given in this paper and in *Flora agaricina neerlandica* vol. 6 (Arnolds, in prep.) are based on newly collected material and on studies of herbarium specimens, mainly from the Nationaal Herbarium Nederland, Universiteit Leiden branch (L) and the Nationaal Herbarium Nederland, Wageningen university branch (WAG). Most collections studied originate from the Netherlands. In addition a new species, *Bolbitius ferrugineus*, is described, based on a collection from Italy.

KEY TO THE SPECIES OF BOLBITIUS IN EUROPE

1. Spores  $9.5-16.0(-16.5) \times 5.5-11.0 \mu\text{m}$ , on average  $10.4-14.0 \times 6.5-9.7 \mu\text{m}$ , rather thick-walled ( $0.5-1.8 \mu\text{m}$ ), vividly orange-brown to rusty-brown; basidiocarps growing on dung, soil or litter, not on wood.
  2. Pileus bright yellow, olive-yellow or olive-brown ..... *B. tibubans*
  2. Pileus without bright yellow or olivaceous colours but whitish, pink, orange or violaceous grey.
    3. Pileus whitish or cream-coloured and small, up to  $15(-20)$  mm broad; spores  $(10.0-10.5-14.0(-14.5) \times (5.5-6.0-7.5 \mu\text{m}$ , on average  $11.5-12.4 \times 6.6-6.8 \mu\text{m}$  ..... 2. *B. lacteus*
    3. Pileus with pink, orange or violaceous grey colours, at least when young, and larger,  $30-80$  mm broad.
      4. Pileus violaceous grey; spores  $(9.5-10.5-13.0 \times (5.5-6.5-7.0(-7.5) \mu\text{m}$ , on average  $11.1-11.7 \times 6.5-6.8 \mu\text{m}$ , not or slightly flattened  
3. *B. demangei*
      4. Pileus pink, pale orange or flesh-coloured when young, discolouring ochraceous or brownish; spores  $11.5-16.0(-16.5) \times 8.5-11.0 \times 6.5-9.5 \mu\text{m}$ , on average  $13.2-14.0 \times 8.7-9.7 \times 7.4-8.2 \mu\text{m}$ , distinctly flattened.

5. Pileus pale pink or pale orange at first, gradually fading to brownish  
4. *B. coprophilus*
5. Pileus more intensely coloured, flesh-coloured at first  
(*B. incarnatus*, see notes on *B. coprophilus*)
1. Spores (6.5–)7.0–12.0(–12.5) × (3.5–)4.0–5.5(–6.5) μm, on average (7.9–)8.3–9.9 × (4.1–)4.5–5.2 μm, thin-walled (<0.5 μm), pale yellow-brown to brownish orange; basidiocarps growing in forests, often on decayed wood, occasionally on soil.
6. Pileus whitish, pinkish, grey, brown, often with violaceous or olivaceous tone; basidiocarps usually on wood; pileipellis made up of clavate elements intermixed with trichodermal hyphae of short, cylindrical elements; clamp-connections absent or rare ..... 5. *B. reticulatus*
6. Pileus orange-brown; basidiocarps on soil; pileipellis only made up of clavate elements; clamp-connections numerous ..... 6. *B. ferrugineus*

#### NOTES AND DESCRIPTIONS OF THE ACCEPTED TAXA

##### 1. *Bolbitius titubans* (Bull.: Fr.) Fr. — Fig. 1

*Bolbitius titubans* (Bull.: Fr.) Fr., *Epicrisis* (1838) 254.

#### KEY TO THE VARIETIES

1. Pileus entirely bright lemon yellow to egg-yellow at first, becoming beige to brown in broad marginal zone when maturing, retaining bright yellow colour at centre; surface usually smooth, occasionally rugulose to reticulate with yellow veins, concolorous with background ..... 1a. var. *titubans*
1. Pileus ochre yellow, olivaceous yellow to olive-brown at first, becoming brownish in broad marginal zone on maturing, retaining yellowish or greenish colour at centre; surface often rugulose to reticulate with veins darker than background, occasionally smooth ..... 1b. var. *olivaceus*

##### 1a. *Bolbitius titubans* (Bull.: Fr.) Fr. var. *titubans*

*Bolbitius titubans* (Bull.: Fr.) Fr. var. *titubans*, *Epicrisis* (1838) 254.

*Agaricus titubans* Bull., *Herb. France* (1789) pl. 425, fig. 1; *Agaricus titubans* Bull.: Fr., *Syst. mycol.* 1 (1821) 304; *Pluteolus titubans* (Bull.: Fr.) Quéf., *Fl. mycol. France* (1888) 83; *Bolbitius vitellinus* ssp. *titubans* (Bull.: Fr.) Konr. & M., *l.c. sel. Fung.* 2 (1932) pl. 171, fig. 2; *Bolbitius vitellinus* var. *titubans* (Bull.: Fr.) Bon & Courtec., *Doc. mycol.* 18 (69) (1987) 37. — *Agaricus vitellinus* Pers., *Syn. meth. Fung.* (1801) 402; *Agaricus vitellinus* Pers.: Fr., *Syst. mycol.* 1 (1821) 303; *Bolbitius vitellinus* (Pers.: Fr.) Fr., *Epicrisis* (1838) 254; *Pluteolus vitellinus* (Pers.: Fr.) Quéf., *Fl. mycol. France* (1888) 83. — *Agaricus fragilis* L., *Spec. Pl.* (1753) 1175; *Bolbitius fragilis* (L.) Fr. *Epicrisis* (1838) 254; *Pluteolus vitellinus* var. *fragilis* (L.) Quéf., *Fl. mycol. France* (1888) 83; *Bolbitius vitellinus* ssp. *fragilis* (L.) Konrad & Maubl., *l.c. sel. Fung.* 2 (1932) pl. 171, fig. 1; *Bolbitius vitellinus* var. *fragilis* (L.) Bon & Courtec., *Doc. mycol.* 18 (69) (1987) 37.

*Bolbitius titubans* var. *titubans* is a common and well-characterized agaric, in general better known with the name *Bolbitius vitellinus*. Both names *Agaricus titubans* and *A. vitellinus* were sanctioned by Fries but the former name has priority since it is based on the oldest name, viz. *Agaricus titubans* Bull. (*Herb. France*: 425, 1789).



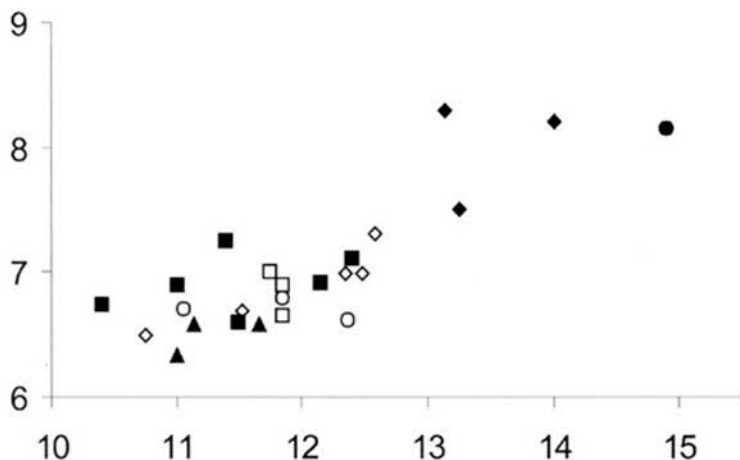


Fig. 1. Average spore size (at least 10 spores measured in side-view) in basidiocarps of *Bolbitius titubans* var. *titubans* with pileus less than 25 mm broad (■); *B. titubans* var. *titubans* with pileus broader than 25 mm (◇); *B. titubans* var. *olivaceus* (□); *B. spec. aff. titubans* var. *olivaceus* (●); *B. lacteus* (○), *B. demangei* (▲) and *B. coprophilus* (◆).

Many authors distinguish two or three taxa (species, subspecies or varieties) within *Bolbitius titubans*. For instance, Moser (1983) distinguished var. *vitellinus* with a deep yellow pileus, white stipe and spores measuring  $12-13 \times 6-7 \mu\text{m}$ , var. *titubans* with a lemon-yellow, deeply striate pileus, yellowish stipe and spores measuring  $13-15 \times 7-9 \mu\text{m}$  and var. *fragilis* with a lemon-yellow pileus striate at margin only, yellowish stipe and spores measuring  $9-12 \times 6-7 \mu\text{m}$ . Watling (1982) and Bon (1992) distinguished *B. titubans* and *B. vitellinus* as different species. *B. titubans* sensu stricto is said to be characterized by small basidiocarps with strongly striate, bright yellow pileus and yellow stipe; *B. vitellinus* by larger basidiocarps with the pileus striate at margin only and a white stipe. Cetto (1989) and Courtecuisse & Duhem (1994) described these two taxa as varieties of a single species. On the other hand, Enderle et al. (1985) argued that all three taxa are only phenotypic variants of a single species without taxonomic relevance. Their opinion was shared by Ryman & Holmåsén (1984), Gerhardt (1997) and others.

On the basis of extensive studies of collections from the Netherlands I support the view that there is only one, variable species. The size of the basidiocarps is quite variable indeed with an expanded pileus ranging from 10–65 mm diameter. This variation can be explained by differences in nutrient status of the substrate (Enderle et al., 1985). Large basidiocarps were usually collected from heaps of dung or wood chips, small basidiocarps from dead grass remains or manured soil. Similar variation is found in other coprophytic species, for instance in *Psilocybe semiglobata* (Batsch: Fr.) Noordel. with a pileus size ranging from 3–30 mm.

It is true that in general the pileus of smaller basidiocarps is paler yellow and stronger striate than the pileus of larger basidiocarps, but this is a normal phenomenon

among agarics. No correlation between yellow colours on the stipe and the size of basidiocarps was found. The spore size showed considerable variation with a minimum size of  $(8.5-9.5-11.5 \times 6.0-7.5 \mu\text{m})$ , on average  $10.4 \times 6.7 \mu\text{m}$  (collection *Arnolds 7114*, WBS) and a maximum of  $10.5-15.0 \times 6.0-9.0 \mu\text{m}$ , on average  $12.5 \times 7.3 \mu\text{m}$  (collection *P.B. Jansen 82-240*, L) (Fig. 1). However, a continuous range of collections with intermediate spore size exist. Spore size is correlated neither with the size of basidiocarps (Fig. 1), nor with any other morphological character. Conclusively, there is no reason to distinguish several (intraspecific) taxa on the basis of morphological characters.

A complete description of *B. titubans* var. *titubans* will be published in *Flora agaricina neerlandica* vol. 6 (Arnolds, in prep.).

#### 1b. *Bolbitius titubans* var. *olivaceus* (Gillet) Arnolds, *comb. nov.*

Basionym: *Bolbitius vitellinus* var. *olivaceus* Gillet in Rea, Brit. Basidiomyc. (1922) 497.

Synonyms: *Bolbitius variicolor* G.F. Atk., Studies Amer. Fungi (1900) 164.; *Mycena variicolor* (G.F. Atk.) Murrill, N. Amer. Fl. 10 (1917) 191; *Bolbitius vitellinus* var. *variicolor* (G.F. Atk.) Krieglst., Beitr. Kenntn. Pilze Mitteleuropas 7 (1991) 62.

*Bolbitius titubans* var. *olivaceus* is often regarded as a separate species under the well-known, correct name *B. variicolor*, for instance by Watling (1982), Furrer-Ziogas (1990), Courtecuisse & Duhem (1992). *Bolbitius variicolor* is said to differ in (1) duller colours of the pileus, ranging from olive-brown to olivaceous yellow or brownish yellow when young; (2) the pileus surface that is often darker brown radially rugulose or reticulate at centre; and (3) regular occurrence in fascicles of several basidiocarps. Basidiocarps combining all these features are quite characteristic and illustrated by e.g. Cetto (1979), Enderle et al. (1985), Furrer-Ziogas (1990), Ludwig (2000, pl. 14, fig. 5.5A). However, the darker veins on the pileus are lacking in many collections with olivaceous colours, as illustrated by Breitenbach & Kränzlin (1995) and Ludwig (2000, pl. 14, fig. 5.5B). On the other hand, large basidiocarps of *B. titubans* var. *titubans* may have a bright yellow pileus with conspicuous concolorous, radial veins, occasionally even with darker brown veins. Such collections have been depicted by Dähncke (1993: 586, as *B. vitellinus*) and by Courtecuisse & Duhem (1994: pl. 1309, as *B. variicolor*).

Both var. *olivaceus* and var. *titubans* may occur fasciculate on large, homogeneous substrates, such as soil mixed with dung and on wood chips. On excrements *B. titubans* var. *olivaceus* grows solitary, like var. *titubans*.

The microscopic characters of var. *olivaceus* are identical with var. *titubans*. The average spore sizes of the collections studied are indicated in Fig. 1. A collection made by Huijsman in 1938 near Domburg with macroscopical characters of var. *olivaceus* differs in very large spores:  $(13.0-14.0-17.5 \times 8.0-10.0 \times 7.5-9.0 \mu\text{m})$ , av.  $14.9 \times 9.1 \times 8.2 \mu\text{m}$ . It may represent in fact a different taxon. Unfortunately the exsiccatum is in bad condition, heavily damaged by moulds.

Krieglsteiner (1991) reduced *B. variicolor* to a variety of *B. vitellinus*. His suggestion was accepted by e.g. Breitenbach & Kränzlin (1995) and Ludwig (2000). In view of the described variation I follow this proposal. In fact the only remaining difference with *B. titubans* var. *titubans* is the duller pileus colour with olivaceous tones in the former taxon. Such a taxon was described before by Gillet (Rea, 1922) with the short

diagnosis: "Differs from the type in its *olivaceous* colour. Horse dung." No authentic herbarium material could be traced but there is little doubt that this variety is identical with *B. varicolor*. The epithet *olivaceus* has priority in the rank of variety, as Watling (1982) suggested before.

For a concise description of *B. titubans* var. *olivaceus* and full references to other descriptions and plates one is referred to *Flora agaricina neerlandica* vol. 6 (Arnolds, 2003).

## 2. *Bolbitius lacteus* J.E. Lange — Fig. 1, 2

*Bolbitius lacteus* J.E. Lange, Fl. agar. dan. 5, Appendix (1940) II.

Excluded — *Bolbitius lacteus* sensu Watling & Knudsen, Svampe 4 (1981) 78. (= *B. reticulatus* var. *pluteoides*); *Bolbitius lacteus* sensu Watling, Nordic J. Bot. 3 (1983) 265. (= *B. reticulatus* var. *pluteoides*); *Bolbitius lacteus* sensu Bon, Mushr. Toadst. (1987) 261. (= *Conocybe apala* (Fr.: Fr.) Arnolds var. *albipes* (Oth) Arnolds (= *C. albipes* (Oth) Hauskn. = *C. lactea* J.E. Lange).

Pileus 8–15(–20) mm, conico-convex at first, then plano-convex to flattened, milk white (K. & W. 1A1/A2) with cream-coloured (2A2) centre at first, then from the margin becoming isabella to pale brown, centre retaining pale colour, smooth, then sulcate-striate up to 3/4 of the radius, viscid, soon deliquescent. Lamellae, L = 24–34, l = 1–3, free, crowded, segmentiform, very thin, whitish at first then brownish orange to orange-brown, with white fimbriate edge, occasionally weeping hyaline droplets, soon deliquescent. Stipe 27–50 × 1–2(–3) mm, cylindrical, fistulose fragile, white to cream-coloured, entirely pruinose-flocculose. Context submembranaceous, fragile, in pileus white, in stipe pale yellow. Smell and taste weak, not distinctive. Spore print not recorded.

Spores (10.0–)10.5–14.0(–14.5) × (5.5–)6.0–7.5 μm, on average 11.5–12.4 × 6.6–6.8 μm, Q = (1.5–)1.6–1.9, av. Q = 1.7–1.8, not to distinctly flattened, in front-view ellipsoid- to ovoid-oblong, in side-view ellipsoid-oblong to subamygdaliform, rarely subphasecoliform, orange-brown in alkali (6C8, 6D8), fairly thick-walled (0.5–1.0 μm) with central to slightly eccentric germ pore, 1.7–2.5 μm wide. Basidia 17.5–25 × 10.5–13 μm, clavate, 4-spored, often surrounded by pseudoparaphyses. Lamella edge heterogeneous. Cheilocystidia 23–37 × 11–18 μm, clavate, utriform or broadly lageniform with neck 6.0–7.5 μm broad. Pleurocystidia absent. Pseudoparaphyses broadly clavate to spherical, 10–22 μm broad, often difficult to find in older basidiocarps. Hymenophoral trama subregular, made up of slender, cylindrical hyphae, 4.0–12 μm broad. Pileipellis an epithelioid hymeniderm, made up of clavate cells, 28–50 × 10–22 μm, with thin hyaline wall, covered by a thin gelatinous layer, not well visible in exsiccata. Pileocystidia absent. Stipitipellis a dry cutis of slender, hyaline hyphae, 2.0–6.0 μm broad, with clusters of caulocystidia. Caulocystidia 13–50 × 6.5–13 μm, subcylindrical, clavate, utriform or broadly lageniform, sometimes in short chains or with irregular projections. Clamp-connections not seen.

Habitat & distribution — Saprotrophic, solitary or in small groups, on dead culms of grasses or on soil, in grasslands on dry, calcareous, loamy soil and along forest edges. Rarely collected in the Netherlands but probably often overlooked. July–Sept. Also recorded from Denmark, Germany and Italy.

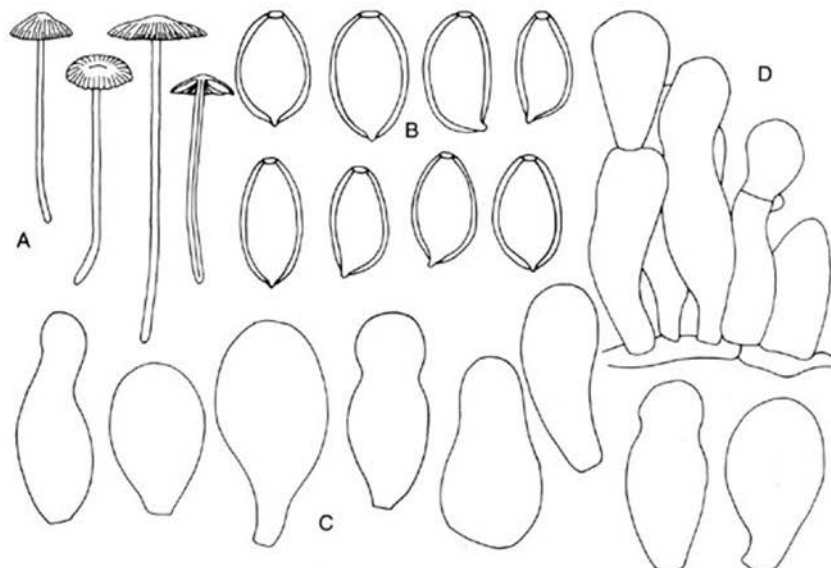


Fig. 2. *Bolbitius lacteus*. A. basidiocarps ( $\times 1$ ); B. spores ( $\times 1500$ ); C. cheilocystidia; D. caulocystidia (all  $\times 1000$ ). (A–D from E. Arnolds 01-5).

*Collections examined.* THE NETHERLANDS: prov. Drenthe, Beilen, Holthe, 'Schepping', 5.IX.2000, Arnolds 00-77 (L); prov. Flevoland, Lelystad, 'Jagersveld', 11.X.1982, P.B. Jansen 82-241 (L); prov. Limburg, Wittem, Nijswiller, 21.VII.2001, Arnolds 01-5 (L). — GERMANY: Eifel, Gerolstein, 'Felsenhof', 15.IX.1990, P.B. Jansen 90-173 (L).

*Bolbitius lacteus* is a little-known species and subject of both taxonomic and nomenclatural confusion. After its introduction by Lange (1940) it was not redescribed until Watling & Knudsen (1981) and Watling (1983), based on a single collection from Denmark. Watling claimed that his material agrees with the original diagnosis in every way, but in fact it differs considerably in spore size (Watling  $8.5\text{--}10.0\text{--}(11.0) \times 5.0\text{--}6.0\text{--}(6.5) \mu\text{m}$ ; Lange  $10.5\text{--}11.5 \times 6.0\text{--}6.3 \mu\text{m}$ ). Moreover the collection was not made in grassland, as Lange did, but in a shady place under *Sambucus nigra*. In my opinion *B. lacteus* sensu Watling is identical with *B. reticulatus* var. *pluteoides*. Several Dutch collections, labelled as *Bolbitius lacteus*, appeared also to belong to *B. reticulatus* var. *pluteoides*. The two taxa can be easily separated by differences in spore size and colour and thickness of the spore wall, and usually also by habitat. *B. reticulatus* var. *pluteoides* occurs in forests, usually on decayed wood but sometimes on soil, whereas *B. lacteus* grows on dead grass remains or soil in meadows and roadside verges.

In nomenclatural respect *Bolbitius lacteus* has been confused with *Conocybe apala* (Fr.: Fr.) Arnolds, until recently better known as *C. lactea* J.E. Lange. *C. apala* is placed by some authors in the genus *Bolbitius*, for instance by Bon in (1992). The plate of *B. lacteus* in Bon (1987) erroneously represents *Conocybe apala*, readily recognized by the elongated, campanulate pileus and microscopically by the lecythiform cheilocystidia.

Future research may reveal that *Bolbitius lacteus* is only a variant of *B. titubans* with very small and pale basidiocarps, as suggested also by Enderle et al. (1985). The investigation of more collections is needed to clarify this relationship.

3. *Bolbitius demangei* (Quél.) Sacc. & D. Sacc. in Sacc. — Fig. 1, 3, 4

*Bolbitius demangei* (Quél.) Sacc. & D. Sacc. in Sacc., Syll. Fung. 17 (1905) 74.

*Pluteolus demangei* Quél. in Assoc. Fr. Avanc. Sci. (1901): 495.

Pileus 30–70 mm broad, ovoid at first, then conico-convex, soon plano-convex to flattened, not hygrophanous, pale to dark violaceous grey, becoming sulcate-striate up to centre, smooth or wrinkled-rugulose around centre, viscid when moist. Lamellae, L = 35–52, l = 1–3, crowded, free, segmentiform, thin, white or pale yellow at first, then greyish brown ('dark café-au-lait'). Stipe 50–100 × 3–5 mm, gradually thickened to base, up to 8 mm thick, fistulose, fragile, white or pale yellow, pruinose-floccose. Context fragile, in pileus submembranous. Smell and taste not recorded. Spore print not recorded.

Spores (9.5–)10.5–13.0 × (5.5–)6.5–7.0(–7.5)  $\mu\text{m}$ , av. 11.1–11.7 × 6.5–6.8  $\mu\text{m}$ , Q = 1.6–2.0, av. Q = 1.7–1.8, not or slightly flattened, in frontal view ellipsoid-oblong to ovoid-oblong, in side-view ellipsoid-oblong to subamygdaliform, brownish orange in ammonia, rather thick-walled (0.5–1.0  $\mu\text{m}$ ), with central to slightly eccentric

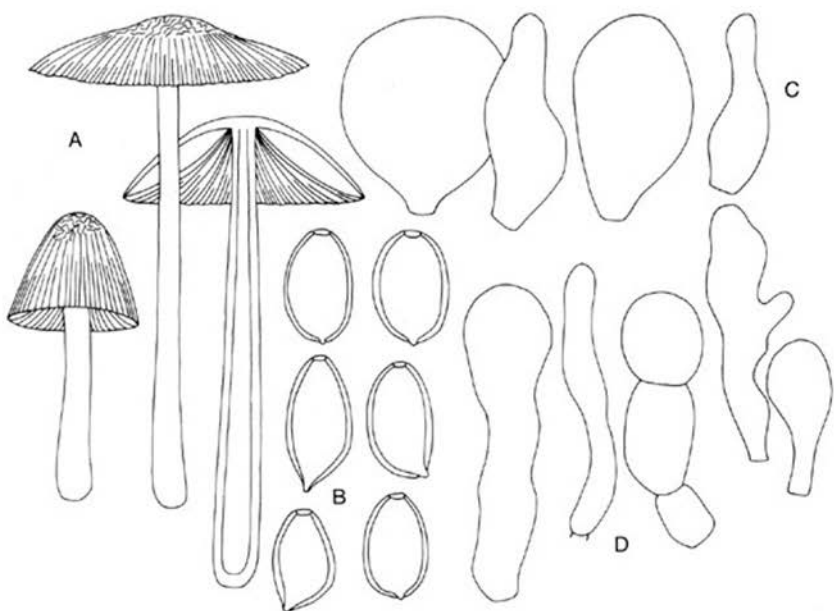


Fig. 3. *Bolbitius demangei*. A. basidiocarps ( $\times 1$ ); B. spores ( $\times 1500$ ); C. cheilocystidia; D. caulocystidia (all  $\times 1000$ ). (A–D from *J. Daams* 71–41).

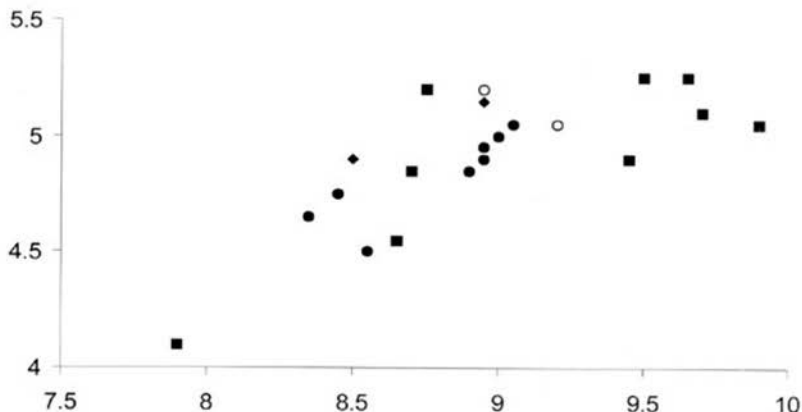


Fig. 4. Average spore size (at least 10 spores measured in side-view) in basidiocarps of *Bolbitius reticulatus* f. *reticulatus* (o); *B. reticulatus* var. *reticulatus* f. *aleuriatus* (■); *B. reticulatus* var. *pluteoides* (●); *B. ferrugineus* (◆).

germ pore, 1.2–2.0  $\mu\text{m}$  wide. Basidia 16–21  $\times$  9.0–11  $\mu\text{m}$ , 4-spored, surrounded by pseudoparaphyses. Lamella edge sterile. Cheilocystidia 30–52  $\times$  9.0–28  $\mu\text{m}$ , broadly clavate, utriform or lageniform with neck 4.0–10  $\mu\text{m}$  broad. Pleurocystidia absent. Pseudoparaphyses 13–17  $\times$  11–13  $\mu\text{m}$ , spheropedunculate. Hymenophoral trama made up of subcylindrical hyphae, 4.0–10  $\mu\text{m}$  broad, with thin, hyaline wall. Pileipellis an epithelioid hymeniderm, made up of clavate elements, sometimes furcate, 26–52  $\times$  6.5–12  $\mu\text{m}$ , hyaline, thin-walled. Pileocystidia absent. Stipitipellis a cutis, made up of slender hyphae, 2.0–5.0  $\mu\text{m}$  broad, with thin, hyaline wall, with clusters of caulocystidia. Caulocystidia 24–54  $\times$  4.0–13  $\mu\text{m}$ , variable, subcylindrical, clavate or lageniform with neck 4.0–5.0  $\mu\text{m}$  broad, often irregular with some projections, thin-walled, hyaline. Clamp-connections absent.

Habitat & distribution — Saprotrophic, subgregarious, in the Netherlands on straw-rich substrate in unheated glasshouses with cucumber cultures, not yet found outside buildings. Very rare in the Netherlands, probably introduced from other regions. June. Also recorded from France (Vosges) and Argentina (Singer & Digilio, 1952; Guzman, 1977).

*Collections examined.* THE NETHERLANDS: 's Graveland, glasshouse Steenvoorde, 22.VI.1971, J. Daams 71-141 (L, as *B. cf. aleuriatus*); ibidem, 12.VII.1971, J. Daams 71-46 (L, as *B. reticulatus*).

The collections mentioned above were initially identified by the collector J. Daams as *Bolbitius reticulatus* or *B. aleuriatus* in view of the violaceous grey colour of the pileus. However, they differ clearly from these taxa in much more robust basidiocarps and considerably larger, in particular broader, spores. The spores in *B. reticulatus* measure (6.5)7.0–12.0(–12.5)  $\times$  (3.5–)4.0–5.5(–6.5)  $\mu\text{m}$ , on average (7.9–)8.4–9.9  $\times$  (4.1–)4.5–5.2  $\mu\text{m}$ . The Dutch collections fit the original diagnosis of *Pluteolus demangei* Quél. well. The latter species is described from dung in a roadside verge in France

(Vosges) and has a lilac brown, 30–40 mm broad pileus and spores of 12.0–14.0  $\mu\text{m}$  in length. The stipe in *P. demangei* is said to be white at first, then becoming pink below. A pink colour was not observed in the studied collections.

Some authors suggest that *Bolbitius demangei* may be identical with *B. coprophilus* (Enderle et al., 1985). However, both colours of the young basidiocarps and the size and shape of spores are quite different in the studied collections. Spores in *B. coprophilus* are clearly flattened and measure 11.5–16.0(–16.5)  $\times$  8.0–11.0  $\times$  6.5–9.5  $\mu\text{m}$ , av. 13.2–14.0  $\times$  8.7–9.7  $\times$  7.4–8.2  $\mu\text{m}$ . A plate by Narducci & Petrucci (1994) under the name of *B. demangei* represents in my opinion *B. incarnatus* Hongo, which is probably a variant of *B. coprophilus* with strongly pigmented pileus (see notes on *B. coprophilus*).

#### 4. *Bolbitius coprophilus* (Peck) Hongo

*Bolbitius coprophilus* (Peck) Hongo, Mem. Fac. Educ. Shiga Univ. Nat. Sci. 9 (1959) 82.

*Pluteolus coprophilus* Peck, Rep. N. Y. St. Mus. nat. Hist. 45 (1893) 59. — *Bolbitius radians* Morgan, J. Cinc. Soc. Nat. Hist. 18 (1895) 36.

*Bolbitius coprophilus* is a species growing on dung, compost and decaying plant material, characterized by its pale pink pileus, at least when young and fresh. The collections from the Netherlands differ from *B. titubans*, *B. lacteus* and *B. demangei* not only in colour of the basidiocarps, but also in larger spores, measuring 11.5–16.0(–16.5)  $\times$  8.5–11.0  $\times$  6.5–9.5  $\mu\text{m}$ , on average 13.2–14.0  $\times$  8.7–9.7  $\times$  7.4–8.2  $\mu\text{m}$ , which are distinctly flattened and have a clearly eccentric germ pore. However, Rald & Strandberg (1991) reported smaller spores, fitting into the range of *B. titubans*, viz. 12.5–13.75  $\times$  7.5–8.75  $\mu\text{m}$ . A full description of *B. coprophilus* will be published in *Flora agaricina neerlandica* (Arnolds, 2003).

*Bolbitius coprophilus* has been described and illustrated in recent years from various European countries, e.g. by Daams (1967) from the Netherlands, Watling (1982) from Great-Britain, Hübsch (1985) and Gerhardt (1997) from Germany, Rald & Strandberg (1991) from Denmark and Hausknecht & Zuccherelli (1993) from Italy. In the Netherlands it has only been observed in glasshouses so far, where it may occur in large quantities in places (Daams, 1967). In Germany, Denmark and Italy it was recorded from gardens and other places in open air. According to Gerhardt (1997: 318) it is common in Berlin. *Bolbitius coprophilus* has been probably introduced in Europe, possibly from North-America from which it was originally described.

*Bolbitius incarnatus* Hongo was originally described from Japan. In Europe it has been recorded from Italy (Moser & Cetto, 1987; Cetto, 1989). It was also described and illustrated under the incorrect name *B. demangei* by Narducci & Petrucci (1994) (see description of *B. demangei* above). *B. incarnatus* is said to be different from *B. coprophilus* in the considerably darker, flesh-coloured pileus, but it may be identical with the latter species. More research is required.

#### 5. *Bolbitius reticulatus* (Pers.: Fr.) Ricken — Fig. 4

*Bolbitius reticulatus* (Pers.: Fr.) Ricken, Blätterpilze 1 (1915) 68.

*Agaricus reticulatus* Pers., Syn. meth. Fung. (1801) 341; *Agaricus reticulatus* Pers.: Fr., Syst. mycol. 1 (1821) 238; *Pluteolus reticulatus* (Pers.: Fr.) Gillet, Champ. France (1878) pl. 373; *Pluteolus aleuriatus* (Fr.: Fr.) P. Karst. var. *reticulatus* (Pers.: Fr.) J.E. Lange, Dansk bot. Ark. 9 (6) (1938) 49.

— *Agaricus aleuriatus* Fr., *Observ. mycol.* 1 (1801) 49; *Agaricus aleuriatus* Fr.: Fr., *Syst. mycol.* 1 (1821) 238; *Pluteolus aleuriatus* (Fr.: Fr.) P. Karst, *Ryssl. Finl. Skand. Halföns Hattsvamp.* (1879) 428; *Bolbitius aleuriatus* (Fr.: Fr.) Singer, *Lilloa* 22 (1951 '1949') 490; *Bolbitius reticulatus* var. *aleuriatus* (Fr.: Fr.) Bon, *Doc. mycol.* 20 (78) (1990) 39; *Bolbitius reticulatus* f. *aleuriatus* (Fr.: Fr.) Enderle, *Ulmer Pilzfl.* 4 (1996) 50. — *Bolbitius pluteoides* M.M. Moser, *Fung. rar. Ic. col.* 7 (1978) 27.

#### KEY TO THE VARIETIES AND FORMAE OF BOLBITIUS RETICULATUS

1. Basidiocarps usually small: pileus 5–17 mm, stipe 15–45 × 0.5–1(–1.5) mm; pileus paler: whitish, pale beige, pinkish or pale violaceous grey . . . var. *pluteoides*
1. Basidiocarps with pileus 12–45 mm, stipe 20–55 × 1–4 mm; pileus violaceous grey, greyish brown or brown with darker centre . . . . . var. *reticulatus*
  2. Pileus 25–45 mm, near centre wrinkled to reticulate . . . . . f. *reticulatus*
  2. Pileus 12–30 mm, smooth . . . . . f. *aleuriatus*

#### 5b. *Bolbitius reticulatus* var. *pluteoides* (M.M. Moser) Arnolds, *comb. nov.*

Basionym: *Bolbitius pluteoides* M.M. Moser, *Fung. rar. Ic. col.* 7 (1978) 27.

*Bolbitius reticulatus* is easily recognized in the field by the delicate basidiocarps with a viscid, greyish, violaceous or brownish pileus, free, orange-brown lamellae and habitat on woody substrates, ranging from small twigs and wood chips to decaying trunks. Moreover, the spores are considerably smaller and paler than in the other European species of *Bolbitius* (Fig. 1). However, size, colour and structure of pileus surface are exceedingly variable and have led in the past to the distinction of several species or intraspecific taxa. Already Fries (1821) described *B. reticulatus* and *B. aleuriatus* as different species. Moser (1983) and Courtecuisse & Duhem (1994) distinguished 3 species, *B. reticulatus*, *B. aleuriatus* and *B. pluteoides*. Watling (1982) and Bon (1992) recognized two species, *B. pluteoides* and *B. reticulatus*, the latter including *B. aleuriatus*. Bon (1992) distinguished *B. aleuriatus* in the rank of variety. On the other hand, Enderle et al. (1985) argued that the characters of these taxa are intergrading and they recognise only one species, *B. reticulatus*. Also Ryman & Holmåsén (1984) and Ludwig (2000) considered all variants as belonging to one taxon.

Of this complex 20 collections were studied, mainly from the Netherlands. On the basis of macromorphology three groups could be distinguished. Part of the collections had very small and pale basidiocarps in agreement with the description of *B. pluteoides* by Moser (1978). According to this author, Watling (1982) and Bon (1992) *B. pluteoides* differs from *B. reticulatus* not only in small and pale basidiocarps, but also in smaller spore size. However, this character could not be confirmed (Fig. 4). Since size and colour of the basidiocarps appears to be the only difference, *B. pluteoides* is reduced to a variety of *B. reticulatus*. Occasionally basidiocarps are found that are more or less intermediate between var. *reticulatus* and var. *pluteoides*, for instance combining a pileus over 20 mm wide with pale pinkish colours (see e.g. Ludwig, 2000, plate 13, fig. 5.3B). However, the large majority of the collections studied could be easily assigned to one of the varieties.

Several collections in Dutch herbaria, identified as *B. lacteus*, appeared to belong to *B. reticulatus* var. *pluteoides*. See also notes on *B. lacteus*.



The remaining collections of the *B. reticulatus* complex had larger basidiocarps with a more intense violaceous, greyish or brownish pileus. They could be separated in two groups, viz. a group with a smooth pileus, 12–30 mm broad, and a group with a wrinkled to reticulate pileus, 25–45 mm broad. However, these groups are intergrading to some extent and may be only phenotypic variants of a single taxon. For the time being they are distinguished in the rank of forma, as suggested also recently by Enderle (1996).

A full description of *B. reticulatus* and its intraspecific taxa will be published in *Flora agaricina neerlandica* (Arnolds, in prep.).

### 6. *Bolbitius ferrugineus* Arnolds, *spec. nov.* — Fig. 4, 5

Pileus 25–35 mm latus, convexus, dein plano-convexus vel applanatus, hygrophanus, aurantio-brunneus, striatus, glutinosus. Lamellae liberae, confertae, aurantio-brunneae. Stipes 50–65 × 3–4 mm, subcylindraceus, fistulosus, pallide brunneo-aurantius, albo-striatus, apice pruinatus. Caro fragilis, concolorata.

Sporae 7.5–9.5(–10.5) × 4.5–5.5(–6.0)  $\mu\text{m}$ , av. 8.5–9.0 × 4.9–5.2  $\mu\text{m}$ , Q = 1.6–2.0, av. Q = 1.7–1.75, ellipsoideae-oblongae vel subamygdaliformae, haud lentiformes, tenuitunicatae, poro germinativo 1.0–1.5  $\mu\text{m}$ . Basidia 18–26 × 7.0–9.0  $\mu\text{m}$ , clavatae, tetrasporigerae. Cheilocystidia 18–35 × 5.0–10  $\mu\text{m}$ , utriformia, clavata vel subcylindracea. Pleurocystidia nulla. Pileipellis hymenidermium, cellulae pyriformes vel clavatae, 14–35(–47) × 8.0–15  $\mu\text{m}$ . Caulocystidia 20–53 × 5.0–14(–19)  $\mu\text{m}$ , utriformia, clavatae, lageniformia vel subcylindracea. Fibulae praesentes. Ad terram humosam in nemoribus frondosis.

Holotypus: Italia, La Basilicata, Laghi di Monticchio, 15.XI.2000, *E. Arnolds 00-178* (L).

Pileus 25–35 mm, at first convex, then plano-convex to flattened, with or without low umbo, hygrophanous, when moist orange-brown to rusty brown (K. & W. 6D8, 6D8/7D8), translucently striate up to halfway the radius, strongly glutinous, on drying becoming pale dull orange (5A3/B3) with slightly darker centre, smooth or slightly wrinkled at centre. Lamellae, L = 47–50, l = 3–7, crowded, free, thin, up to 5 mm broad, orange-brown, slightly paler than the pileus, with slightly paler edge. Stipe 50–65 × 3–4 mm, cylindrical or slightly thickened towards base, fistulose, pale brownish orange (5B3/C4), white striate lengthwise, at apex pruinose. Context fragile, concolorous with surface, in pileus up to 2.5 mm thick. Smell weak, not distinctive. Taste not recorded.

Spores 7.5–9.5(–10.5) × 4.5–5.5(–6.0)  $\mu\text{m}$ , av. 8.5–9.0 × 4.9–5.2  $\mu\text{m}$ , Q = 1.6–2.0, av. Q = 1.7–1.75, ellipsoid-oblong to subamygdaliform in side-view, a few phaseoliform, not flattened in front-view, thin-walled, with sometimes indistinct apical pore, 1.0–1.5  $\mu\text{m}$  wide. Basidia 18–26 × 7.0–9.0  $\mu\text{m}$ , clavate, 4-spored. Lamella edge sterile. Cheilocystidia 18–35 × 5.0–10  $\mu\text{m}$ , densely packed, variable, utriform, clavate or subcylindrical. Pleurocystidia absent. Pseudoparaphyses not observed. Hymenophoral trama regular, made up of cylindrical to strongly inflated elements, up to 80  $\mu\text{m}$  long and 4.0–25  $\mu\text{m}$  broad, with thin, hyaline wall. Pileipellis an epithelioid hymeniderm, made up of pyriform and clavate elements, 14–35(–47) × 8.0–15  $\mu\text{m}$ , with pale brown intracellular pigment, apparently covered with gelatinous layer when fresh (but invisible in the studied exsiccata). Stipitipellis made up of thin, parallel hyphae, 2.0–6.0  $\mu\text{m}$  wide, near apex with clusters of cystidia. Caulocystidia 20–53 × 5.0–14(–19)  $\mu\text{m}$ , very variable, utriform, clavate, lageniform or subcylindrical, sometimes branched or furcate at apex. Clamp-connections present in hymenium, hymenophoral trama and numerous in stipitipellis.

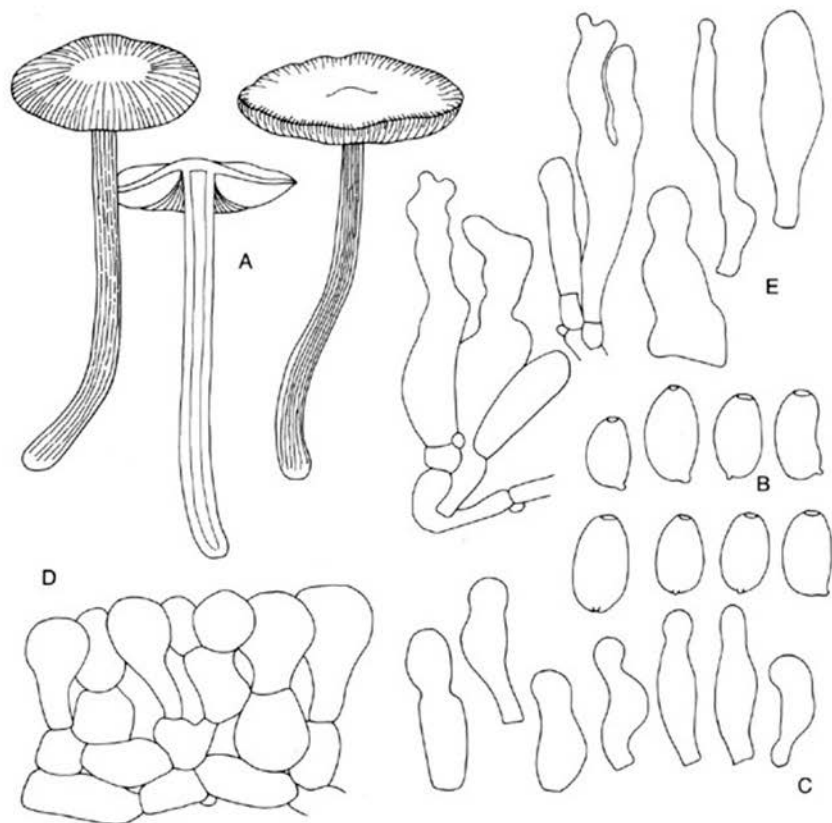


Fig. 5. *Bolbitius ferrugineus*. A. basidiocarps ( $\times 1$ ); B. spores ( $\times 1500$ ); C. cheilocystidia; D. pileipellis; E. caulocystidia (all  $\times 1000$ ). (A–D from E. Arnolds 00-178, holotype).

**Habitat & distribution** — In a small group on humus in semiruderal roadside-verge along deciduous forest on loamy soil. November.

**Collections examined.** ITALIA: La Basilicata, Laghi di Monticchio ( $15^{\circ}36'24''$ – $40^{\circ}55'30''$ ), 15.XI.2000, E. Arnolds 00-178 (L).

*Bolbitius ferrugineus* is unique among the European representatives of *Bolbitius* in the orange-brown colour of the pileus. The spore size is much smaller than in *B. titubans* and related species (see Fig. 1) and falls into the range of *B. reticulatus* (Fig. 4). Also the pale colour and thin wall of the spores may indicate affinity to the latter species. However, *B. reticulatus* differs macroscopically markedly in the pinkish to violaceous brown or grey pileus and white stipe that is not striate lengthwise. Besides, that species is usually found on woody substrates, not on soil.

The structure of the pileipellis in *B. ferrugineus* resembles that of *B. titubans* and allies since it is made up of only clavate and pyriform elements. However, in *B. titubans* these elements are much larger, measuring 26–84 × 8.0–26 µm (Arnolds, 2003). Their size is in better agreement with *B. reticulatus* (14–40 × 10–30 µm; Arnolds, 2003), but in that species the clavate elements are intermixed with branched, trichodermal hyphae with short, subcylindrical elements. Such hyphae are lacking in *B. ferrugineus*. The numerous clamp-connections may also be distinctive for *B. ferrugineus*.

#### ACKNOWLEDGEMENTS

Dr. A. Hausknecht (Maissau, Austria) is thanked for his comments on the manuscript of this paper.

This study has been carried out for the project 'Flora agaricina neerlandica' with financial support of the Rijksherbariumfonds Dr. Kits van Waveren.

#### REFERENCES

- Arnolds, E. In prep. Conocybe & Pholiotina. In: M. E. Noordeloos, Th. W. Kuyper & E. C. Vellinga (eds.), *Flora agaricina neerlandica* 6.
- Bon, M. 1987. The mushrooms and toadstools of Britain and North-western Europe. London.
- Bon, M. 1992. Clé monographique des espèces galero-naucorioïdes. *Doc. Mycol.* 21 (84): 1–89.
- Breitenbach, J. & F. Kränzlin. 1995. *Pilze der Schweiz* 4. Luzern.
- Cetto, B. 1979. *I Funghi dal vero*. Vol. 3. Trento.
- Cetto, B. 1989. *I Funghi dal vero*. Vol. 6. Trento.
- Courtecuisse, R. & B. Duhem. 1994. *Guide des Champignons de France et d'Europe*. Paris.
- Daams, J. 1967. *Kasfungi*. *Coolia* 13: 97–100.
- Dähncke, R. M. 1993. *1200 Pilze*. Aarau.
- Enderle, M. 1996. Bemerkenswerte Agaricales-Funde XII. *Ulmer Pilzflora* 4: 41–91.
- Enderle, M., E. Kajan & G. J. Kriegelsteiner. 1985. Studien in der Gattung *Bolbitius* Fries. *Mittbl. Arbeitsgem. Pilzk. Niederrhein* 3: 5–34.
- Fries, E. 1821. *Systema Mycologicum*. Lund.
- Furrer-Ziogas, C. 1990. Bemerkungen zur Variabilität und zum Vorkommen von *Bolbitius variicolor*. *Atk. Mycol. helv.* 3: 467–475.
- Gerhardt, E. 1997. *Der grosse BLV Pilzfürher*. München.
- Guzmán, G. 1977. Algunos macromicetos argentinos y discusiones sobre su distribución en Mexico. *Bol. Soc. Argentina bot.* 18: 183–204.
- Hausknecht, A. & A. Zuccherelli. 1993. Ritrovamenti interessanti dal Ravennate. I parte: Alcune Agaricales a spore brune o più scure. *Boll. Gruppo micol. G. Bres.* 36: 35–57.
- Hübsch, P. 1985. *Bolbitius coprophilus* – Erstfund für die DDR. *Mykol. Mittbl.* 28: 47–50.
- Kriegelsteiner, G. J. 1991. Über neue, seltene, kritische Makromyzeten in Westdeutschland (ehemalige BRD, Mitteleuropa). XII. Röhrlinge und Blätterpilze. *Beitr. Kenntn. Pilze Mitteleuropas* 7: 61–79.
- Lange, J. E. 1940. *Flora agaricina danica*. Vol. 5. Copenhagen.
- Ludwig, E. 2000. *Pilzkompendium 1. Abbildungen*. Eching.
- Moser, M. 1978. *Fungorum rariorum Icones coloratae VII*. Vaduz.
- Moser, M. 1983. *Kleine Kryptogamenflora, Die Röhrlinge und Blätterpilze*, 5. Aufl. Stuttgart, New York.
- Moser, M. & B. Cetto. 1987. *Bolbitius incarnatus* Hongo trovato in Italia. *Boll. Gruppo micol. G. Bres.* 30: 26–28.
- Narducci, R. & P. Petrucci. 1994. Alcuni funghi interessanti del territorio Lucchese. *Riv. Micol.* 37: 253–264.
- Rald, E. & M. Strandberg. 1991. *Rosa Gulhat (Bolbitius coprophilus)* i Danmark. *Svampe* 24: 7–10.

- Rea, C. 1922. *British Basidiomycetae*. Cambridge.
- Ryman, S. & I. Holmåsen. 1984. *Svampar – En fälthandbok*. Stockholm.
- Singer, R. & A.P.L. Digilio. 1952 ('1951'). *Prodomo de la flora agaricina argentina*. Lilloa 25: 5–461.
- Watling, R. 1982. *Bolbitiaceae: Agrocybe, Bolbitius & Conocybe*. *British Fungus Flora* 3: 1–139. Edinburgh.
- Watling, R. 1983. *Observations on the Bolbitiaceae – 23. Interesting Danish members of the family*. *Nord. J. Bot.* 3: 261–268.
- Watling, R. & N.M. Gregory. 1981. *Census Catalogue of World Members of the Bolbitiaceae*. *Bibliotheca Mycologica* 82. Vaduz.
- Watling, R. & H. Knudsen. 1981. *Fire interessante arter i Gulhatfamilien (Bolbitiaceae) fra Danmark*. *Svampe* 4: 74–79.

NOTES ON SOME TYPE MATERIALS OF DISCISEDADA  
(LYCOPERDACEAE)

G. MORENO<sup>1</sup>, A. ALTÉS<sup>1</sup> & C. OCHOA<sup>2</sup>

Type collections of four species of *Disciseda* have been carefully re-examined. This has led us to propose the synonyms *Disciseda pedicellata* = *D. hyalothrix* and *D. arida* = *D. verrucosa*. Our findings are supported by photographs of the macroscopic characters and spore ornamentation with scanning electron microscope of the collections studied.

*Disciseda* Czern. 1845 is a widely distributed genus of the family Lycoperdaceae (Gasteromycetes) and comprises 15 species (Kirk et al., 2001) originating from different continents. The genus was created with the type species *Disciseda collabescens* Czern. 1845, in addition to *D. compacta* Czern. 1845, and subsequently included species of the genus *Catastoma* Morgan (Morgan, 1892), a later synonym.

The principal character which distinguishes *Disciseda* from similar genera (i.e. *Abstoma* G. Cunn. 1926, *Bovista* Pers. 1794 : Pers.) is the particular mode of development of the basidiomes (Morgan, 1892; Lloyd, 1903; Smith, 1951; Mitchel et al., 1975). According to these authors the stoma in this genus typically develops in the basal zone of the peridium. When the basidiomes reach maturity, their exoperidia fissure in a way more or less irregularly circumscissile, leaving the lower half in the substrate with the remainder forming a kind of cap enclosing the upper part of the endoperidium. The weight of the substrate, which usually remains agglutinated in the said upper cap, facilitates the overturning of the liberated basidiomes, thus exposing the stoma in the 'apical zone' to achieve an effective spore dispersal. The difficulty of verifying these details *in situ*, has, however, caused some authors to doubt this character or, indeed, to attribute it only to certain species of *Disciseda* (Coker & Couch, 1928; Cunningham, 1942).

Although species of *Disciseda* have been included in numerous works, hardly any have been revised or comparisons have been made between the described taxa. This therefore implies that a number of taxonomic problems still have to be resolved in this genus. In this contribution the type collections of four species of *Disciseda* originating from Australia, New Zealand (Australasia), Europe and North America are revised. The object has been to study and to redefine their differential macro- and microscopical characters in order to ascertain whether they can be maintained as independent species. In this sense, although it is not a problem exclusive to *Disciseda*, we must emphasize the sparsity of characters which can be used in the taxonomy of this genus. These are

- 
- 1) Dpto. Biología Vegetal, Universidad de Alcalá, E-28871 Alcalá de Henares, Madrid, Spain.  
E-mail: gabriel.moreno@uah.es
  - 2) Herbario BCMEX, Facultad de Ciencias, Universidad Autónoma de Baja California, Apdo. Postal 1880, Ensenada, Baja California, 22800 Mexico.  
E-mail: cochoa@uabc.mx

K(M): 56042 HERB. HORT. BOT. REG. KEW 1 2 3  
 Australia : Victoria  
*Disciseda hyalothrix* (Cooke & Masee) Hollos  
 N.W. Of Lake Allacutya

Alt.(m):

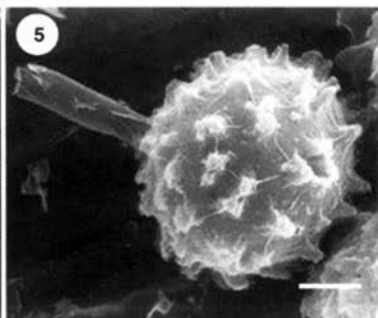
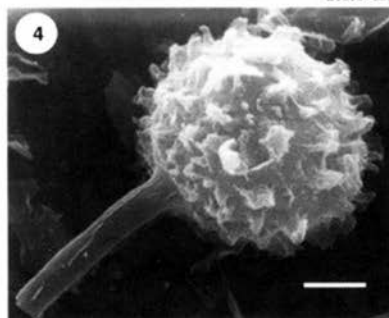
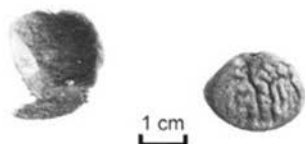
Coll. C. French

Date:

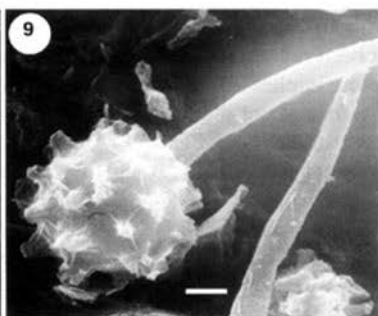
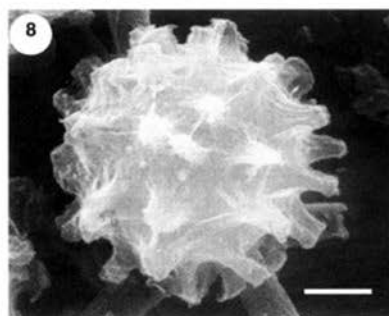
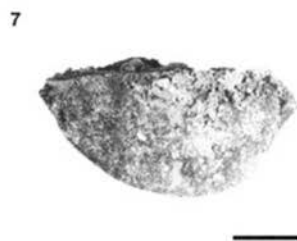
Add.  Type:

Det.

2.1.17.2.7



6 *Fungus*  
*A. P. Morgan*  
*Catantoma pedicellatum*  
 Lichen S. C.  
 opposite H. W. Ransaul.



Figs. 1–5. *Disciseda hyalothrix* (holotype of *Bovista hyalothrix*, K 56042). 1. Label of the collection; 2, 3. basidiomes (2 with exposed remains of gleba); 4, 5. spores under SEM. — Figs. 6–9. *D. pedicellata* (holotype of *Catantoma pedicellatum*, NY). 6. Label of the collection; 7. sectioned basidiome; 8, 9. spores under SEM. — Scale bars: 4, 5, 8, 9 = 2  $\mu$ m; 7 = 5 mm.

primarily the morphology and spore ornamentation, and secondarily the structure of the stoma. In the case of the species studied here, the absence of significant differences between some of them has led us to propose their synonymy.

#### MATERIAL AND METHODS

The type collections studied originate from the herbaria K, NY, PDD and PRM. Other material included in this revision, collected in Spain and Mexico, is deposited in AH, BCMEX and CESUES.

The items examined under the optical microscope (OM) were mounted in water or lactophenol cotton blue. All spore measurements include the ornamentation. Scanning electron micrographs (SEM) were obtained using the technique described in Moreno et al. (1995).

#### DESCRIPTIONS

##### 1. *Disciseda hyalothrix* (Cooke & Masee) Hollós — Figs. 1–5

*Disciseda hyalothrix* (Cooke & Masee) Hollós, Növény. Köz. 1 (1902) 107.

*Bovista hyalothrix* Cooke & Masee, Grevillea 16 (1888) 73.

*Catastoma hyalothrix* (Cooke & Masee) Lloyd, The Lycopodiaceae of Australia, New Zealand and Neighbouring Islands (1905) 27.

The type material comprises one complete globose to subglobose basidiome and half of another, practically without any gleba (Figs. 2, 3), 20–22 mm in diameter and 17–19 mm high. Exoperidium sparse and consisting only of a thick basal patch of typical hyphae mixed with remains of the substrate. Endoperidium very finely membranaceous, brown to purple when dry, remaining entire at maturity, opening by a small plane and irregular stoma. Gleba pulverulent, greyish brown, somewhat purplish.

Spores 8–9  $\mu\text{m}$  in diameter, globose, brown to dark ochraceous; hilar appendage very evident and persistent, 4–6  $\mu\text{m}$  long (Figs. 4, 5); ornamentation subhyaline but obvious, formed by spinose elements with a truncated apex (Figs. 4, 5) which measures approximately 1  $\mu\text{m}$  in height, and which are apparently formed by several fused fine spines. Capillitium 3–4  $\mu\text{m}$  in diameter, abundant, formed by easily fragmented filaments, frequently sinuated, branched, without pores or septa.

*Specimen examined.* AUSTRALIA: N.W. of Lake Allacutya, Victoria, *C. French* (K 56042, holotype).

##### 2. *Disciseda pedicellata* (Morgan) Hollós — Figs. 6–9, 24–28

*Disciseda pedicellata* (Morgan) Hollós, Természetr. Füz. 25 (1902) 103.

*Catastoma pedicellatum* Morgan, J. Cincinn. Soc. Nat. Hist. 14 (1892) 143–144.

The type collection consists of a flattened half basidiome (Fig. 7) with part of the gleba still preserved, 20 mm in diameter. Exoperidium reduced to some sparse hyphal remains mixed with substrate in the basal part of the spore sac. Endoperidium consisting of a rather thin and fragile layer, purple in its more basal half and glossy greyish in the remainder, with the dense trama of the capillitium of the gleba exposed where it has disappeared. However, as the specimen had been sectioned, it was not possible to ascertain the type of stoma. Gleba pulverulent and brown.

HERBARIUM OF THE PLANT DISEASES DIVISION,  
NEW ZEALAND

10  
ESSS Ex Herbarium of Dr. G. H. Cunningham  
37/4713/3

No. *Disciseda verrucosa* G.H.Cunn.  
on ground

District: Otago Date: January 1920

Locality: Milford Track

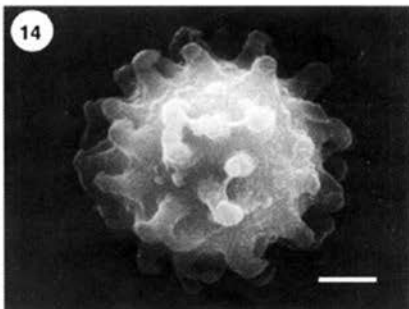
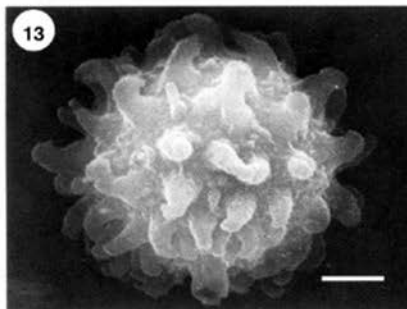
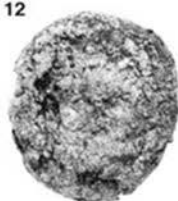
Collector: S.H. Atkinson Det. by Type Collection

Not to be used for exchange.

11



12



15 *Topus*  
Herb. Kryptogamologicum Musei Nat. Pragae.

Collector (Prager) J. Velouchko  
Acc. No. 24/1947

Flore Bohemica No. 154108

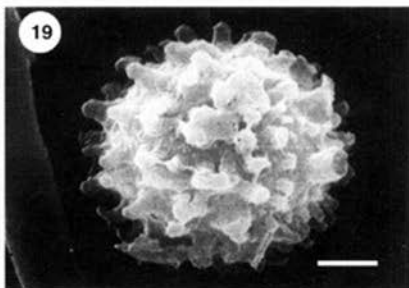
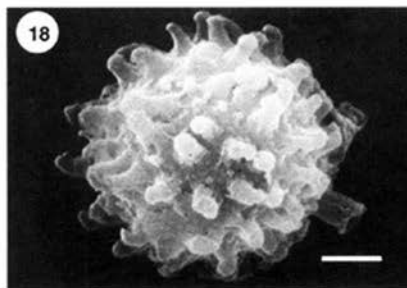
*Disciseda arida* det.

Herbar: *Prague*  
*In herb. Bohemica arida det.*

Det. *A. 1910* Leg. et det. J. Velouchko

16 *Disciseda arida*  
det./corr. *Prague*  
Herb. Univ. Halensis

17



Figs. 10–14. Holotype of *Disciseda verrucosa* (PDD). 10. Label of the collection; 11, 12. basidiome (stoma up and down, respectively); 13, 14. spores under SEM. — Figs. 15–19. Holotype of *D. arida* (PRM 154108). 15, 16. Labels of the collection; 17. basidiome; 18, 19. spores under SEM. — Scale bars: 11, 12 = 10 mm; 17 = 5 mm; 13, 14, 18, 19 = 2  $\mu$ m.



Spores 7–9.5  $\mu\text{m}$  in diameter, globose and clearly ornamented, brown, with long pedicels whose length usually amply surpasses the spore in diameter (normally about 10  $\mu\text{m}$  long, some to 15  $\mu\text{m}$ ); ornamentation formed by apically truncate spinose hyaline elements, which appear to comprise groups of strongly fused thin spines (Figs. 8, 9). Capillitium 3–5  $\mu\text{m}$  in diameter, sinuous to spiralled, subhyaline, with thin walls which allow a wide lumen, with very fragile filaments which disintegrate into a crowd of small fragments, branched, with sparse septa but pores not observed.

The remainder of the studied collections, some very well preserved, agree very well with all their characters (Figs. 24–28, a Mexican collection). The dimensions of these basidiomes vary between 20 and 31 mm in diameter. These collections allow us to observe that the stoma of this species is plane and irregular (Figs. 24, 25).

*Specimens examined.* MEXICO: Baja California, El Rosario, Km 71 of San Quintín-Cataviña highway, con *Euphorbia californica* y *Pachycereus pringlei*, 2.III.1986, I. Manjarrez (BCMEX 3462); *ibidem*, 26.II.1991, C. Ochoa (BCMEX, ex AH 14355); *ibidem*, Cataviña, terreno arenoso con Cactaceae y *Prosopis* sp., 30.I.1999 (AH 25196); *ibidem*, Sierra Juárez, La Cholla, con vegetación xerófila, 960 m, 13.III.1998, C. Ochoa 1061 (BCMEX 5757); Sonora, Municipio San Javier, Km 137.5 of Hermosillo-Yécora road, 9.VI.1996, A. Armenta, A. Nuñez & R. Santos (CESUES 2768). — USA: South Carolina, H.W. Ravenel, NY; *ibidem*, Aiken, H.W. Ravenel (NY, holotype); Alabama, Auburn, VII.1896, L.M. Underwood (NY); *ibidem*, IX.1896, L.M. Underwood (NY); *ibidem*, XII.1972, Weber (NY); Texas, W.H. Long 2002 (NY).

### 3. *Disciseda verrucosa* G. Cunn. — Figs. 10–14

*Disciseda verrucosa* G. Cunn., Trans. Proc. N.Z. Inst. 57 (1926) 205.

The type collection consists of a single flattened and very mature basidiome (Figs. 11, 12), of 27 mm in diameter. Exoperidium well preserved with the agglutinated substrate forming a cup at the base of the spore sac (Fig. 12). Endoperidium greyish, similar to *Disciseda bovista* (Klotzsch) Henn. 1903, but basally with yellowish brown to reddish brown tones. Stoma plane and irregular (Fig. 11), becoming lacinate. Gleba pulverulent, dark brown.

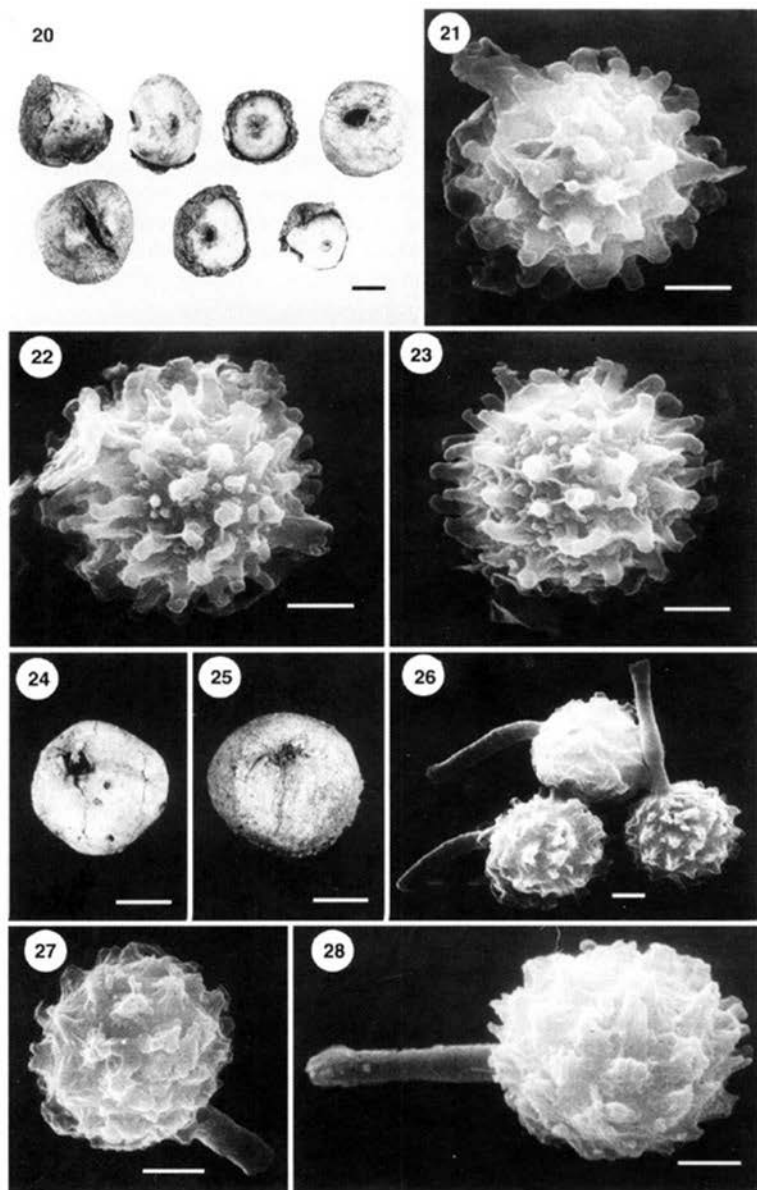
Spores 8.5–10  $\mu\text{m}$  in diameter, globose, ochraceous, with a short, hyaline pedicel, up to 1  $\mu\text{m}$  long, with a conspicuous ornamentation formed by large obtuse elements (digitiform), frequently curved at the extremity, up to 2  $\mu\text{m}$  long (Figs. 13, 14). Capillitium 3–5  $\mu\text{m}$  in diameter, formed by yellowish filaments, branched, sinuous, with some septa but pores not observed.

*Specimens examined.* NEW ZEALAND: Milford Track, Otago, 7.I.1920, E.H. Atkinson (Herb. Cunningham 8593, PDD, holotype). — MEXICO: Sonora, Municipio Alamos, Las Uvalamas, 12.IX.1994, E. Pérez-Silva, M. Esqueda & I. Buendía (CESUES 1778).

### 4. *Disciseda arida* Velen. — Figs. 15–23

*Disciseda arida* Velen., Novit. Mycol. (1939) 169.

The material consists of a flattened basidiome of 13 mm in diameter (Fig. 17). Exoperidium persistent at the base of the spore sac, where it forms a thick and wide cup by the agglutination of the substrate. Endoperidium greyish brown. Stoma plane and irregular. Gleba pulverulent, dark brown.



Figs. 20–23. *Disciseda arida* from Spain (AH 21919). 20. Basidiomes; 21–23. spores under SEM. — Figs. 24–28. *D. pedicellata* from Mexico. 24, 25. Basidiomes (AH 14355 and BCMEX 3462, respectively); 26, 27. spores under SEM (BCMEX 3462); 28. spore under SEM (AH 14355). — Scale bars: 20 = 10 mm; 21–23, 26–28 = 2  $\mu$ m; 24, 25 = 5 mm.

Spores 8–10  $\mu\text{m}$  in diameter (somewhat smaller than the description by the author of the species), globose, ochraceous, with a short pedicel, ornamented with conspicuous digitiform elements of 1.0–1.5  $\mu\text{m}$  long, normally curved at their extremities (Figs. 18, 19). Capillitium 2–4  $\mu\text{m}$  in diameter, with thick walls, subhyaline, sinuous, very broken, with some small pores and sparse septa.

The numerous basidiomes collected in the province of Guadalajara, Spain, agree very well in all their characters with the type of *Disciseda arida*. These collections extend the known distribution of this species, which was previously only known from former Czechoslovakia.

*Specimens examined.* CZECH REPUBLIC: Čechy, Stránčice, in terra arenosa arida, X.1934, J. Velenovský (PRM 154108, holotype). — SPAIN: Guadalajara, Tamajón, pradera abierta, 5.XI.1997, G. Moreno, C. Illana & A. Altés (AH 21919); *ibidem*, Valdeaveruelo, Urbanización Sotolargo, arroyo Morcuera, pasto nitrificado sobre arenas ácidas, 27.V.2000, F.J. Rejos & G. Rodríguez (AH 25240).

#### DISCUSSION

The revision of the type collections of these four species of *Disciseda* allow us to reach some conclusions which correct and simplify their taxonomic situation. The first two, *D. hyalothrix* and *D. pedicellata*, are well differentiated from the remainder by their spores having characteristic long pedicels, normally 10  $\mu\text{m}$  or more in length. Cunningham (1942) mentioned this character in his study of the Gasteromycetes of Australia and New Zealand, establishing the difference between both species in some minor details. The most important difference is, without doubt, the spore sizes: 8–10  $\mu\text{m}$  in diameter in *D. pedicellata* and 10–13  $\mu\text{m}$  in *D. hyalothrix*. Taking into account the scarcity of available morphological characters to distinguish the different taxa of *Disciseda* more clearly, we might justify the separation of the two species by their different spore sizes. However, the spores we observed in the type of *D. hyalothrix* are smaller (8–9  $\mu\text{m}$  in diameter, including the ornamentation) than given by Cunningham (1942). It is true that there is a certain difference in the length of the spore pedicels between the two species, being normally somewhat longer in *D. pedicellata*. But this difference of length is not so clear as Cunningham indicated, in no case exceeding 15  $\mu\text{m}$  in length. The length of the pedicels is a variable character in these species of *Disciseda*, probably dependent on the degree of ripening of the gleba and the conditions under which it was observed. In relation to this, Coker & Couch (1928) gave a measurement for the spore pedicels in the type collection of *D. pedicellata* of up to 6  $\mu\text{m}$  long, markedly lower than described here, while Bottomley (1948) mentioned pedicels up to 37.4  $\mu\text{m}$  long in South African material. In this way, the principal differential features between the two species disappear. The variation which, according to Cunningham (1942), exists in the other characters, does not appear important to us but is probably the result of ripening and preservation of the material. For example, Cunningham considers the type of stoma found in each species to be different: a plane and poorly defined aperture in *D. pedicellata*, and a tendency towards a lacinated-denticulated stoma in *D. hyalothrix*. In our experience in the study of *Disciseda*, the stomata, in the process of ripening of the basidiomes, have a tendency to tear into small lacinia or teeth (sometimes a simple mechanical tear). This does not therefore appear to be a good taxonomic character for distinguishing the two species. Examination of the morphology of the spore ornamentation (Figs. 4, 5, 8,

9), which is the most important character to take into account in the taxonomy of this genus, shows no considerable differences, though the ornamentation is slightly more developed in *D. pedicellata*. For these reasons, we consider no justification in maintaining of these two independent taxa, and thus propose the synonymy of *D. pedicellata* and *D. hyalothrix*.

*Disciseda pedicellata* has been reported in North America, Africa, Australia (Bottomley, 1948; Moravec, 1958) and Europe (Rydberg, 1949) though the European report is somewhat doubtful according to the illustration of its spores and the short description of the specimen given by Rydberg, as already mentioned by Eckblad (1955). Known only from Australian records (Cunningham, 1942), *D. hyalothrix* appears to have a rather restricted distribution.

With respect to the other two species, *D. verrucosa* and *D. arida* are characterized by having large spores, up to 10  $\mu\text{m}$  in diameter, sparsely pedicellate and ornamented with digitiform elements up to 2  $\mu\text{m}$  long. This last feature distinguishes them from other species of *Disciseda*. Until now, the records of *D. arida* are scarce and exclusively from former Czechoslovakia (Moravec, 1958). Despite the foregoing, Moravec believed the previously mentioned Swedish record of *D. pedicellata* to be *D. arida*. Only SEM examination of its spores can confirm this. The Spanish collections studied, which perfectly fit the description of *D. arida*, significantly extend its area of distribution in Europe.

Though also little known, *Disciseda verrucosa* actually has a larger distribution, having been reported in New Zealand, Australia (Cunningham, 1942), South Africa (Bottomley, 1948) and Mexico (Aparicio-Navarro et al., 1994; Pérez-Silva et al., 2000). Comparative study of the type collections of these two taxa, and also of material originating from Mexico and Spain, has allowed us to conclude that in neither case exist sufficiently important morphological differences to justify their maintenance as independent species. Certainly, the digitiform elements ornamenting the spores of the type of *D. verrucosa* are somewhat more developed. However, more important is that the morphology of this ornamentation is very similar in both species, and we consider this to reflect variation within a single taxon. In the remaining material studied, it is also possible to observe these small differences in the degree of development of the spore ornamentation, which reinforces our opinion. Consequently, it appears to us appropriate to synonymize *D. verrucosa* and *D. arida*.

In conclusion, the proposed taxonomic results of this revision are as follows:

***Disciseda hyalothrix* (Cooke & Masee) Hollós, Növényt. Közlem. 1 (1902) 107.**

*Bovista hyalothrix* Cooke & Masee, Grevillea 16 (1888) 73.

*Catastoma hyalothrix* (Cooke & Masee) Lloyd, The Lycoperdaceae of Australia, New Zealand and Neighbouring Islands (1905) 27.

*Catastoma pedicellatum* Morgan, J. Cincinnati Soc. Nat. Hist. 14 (1892) 143–144.

*Disciseda pedicellata* (Morgan) Hollós, Természetrzaji Füz. 25 (1902) 103.

***Disciseda verrucosa* G. Cunn., Trans. & Proc. New Zealand Inst. 57 (1926) 205.**

*Disciseda arida* Velen., Novitates Mycologicae (1939) 169.

## ACKNOWLEDGEMENTS

We wish to express our gratitude to Dr. M. Sarasini for revising the manuscript, and to Mr. J.T. Palmer for the linguistic assistance. Thanks are due to the curators of the herbaria CESUES, K, NY, PDD, PRM, and AH for the loan of the type collections and other materials. The assistance of J.A. Pérez and A. Priego with the SEM has been invaluable.

This study has been funded by project DGICYT H REN2002-01965 and by the Programa de Cooperación con Iberoamérica, Ministerio de Educación y Ciencia, Spain.

## REFERENCES

- Aparicio-Navarro, A., A. Quijada-Mascareñas, T. Quintero-Ruiz & A. Búrquez-Montijo. 1994. Nuevos gasteromicetos para la micobiota de Sonora, México. *Ecológica* 3: 11–14.
- Bottomley, A.M. 1948. Gasteromycetes of South Africa. *Bothalia* 4: 473–810.
- Coker, W.C. & J.N. Couch. 1928. The Gasteromycetes of the Eastern United States and Canada. J. Cramer, *Bibl. Mycol.* 19 (reprint 1969), New York.
- Cunningham, G.H. 1942. The Gasteromycetes of Australia and New Zealand. J. Cramer, *Bibl. Mycol.* 67 (reprint 1979), Vaduz.
- Eckblad, F.E. 1955. The Gasteromycetes of Norway. The epigaeal genera. *Nytt Mag. Bot.* 4: 19–86.
- Kirk, P.M., P.F. Cannon, J.C. David & J.A. Stalpers. 2001. *Ainsworth and Bisby's Dictionary of the Fungi*, ed. 9. CAB International, Wallingford, Oxon.
- Lloyd, C.G. 1903. *Catastoma*. *Mycol. Notes Lloyd Libr. Mus.* 13: 121.
- Mitchel, D.H., S.W. Chapman & G. Grimes. 1975. Studies of *Disciseda* (Gasteromycetes) in Colorado. *Mycologia* 67: 586–596.
- Moravec, Z. 1958. *Disciseda*. In: A. Pilát (ed.), *Flora CSR, Gasteromycetes, Series B-1*: 377–386. Čslká Akademie Ved, Praha.
- Moreno, G., A. Altés, C. Ochoa & J.E. Wright. 1995. Contribution to the study of the Tulostomataceae in Baja California, Mexico. I. *Mycologia* 87: 96–120.
- Morgan, A.P. 1892. North American Fungi. V. The Gastromycetes. *J. Cincinnati Soc. Nat. Hist.* 14: 141–148.
- Pérez-Silva, E., M. Esqueda, T. Herrera, G. Moreno & A. Altés. 2000. *Disciseda verrucosa* (Gasteromycetes) in Mexico. *Mycotaxon* 76: 337–341.
- Rydberg, R. 1949. Notes on the Gasteromycetes in Sweden. I. *Svensk bot. Tidskr.* 43: 540–546.
- Smith, A.H. 1951. *Puffballs and their allies in Michigan*. University of Michigan Press, Ann Arbor, Michigan.

**BOOK REVIEW**

J. Dighton. *Fungi in Ecosystem Processes*. (Marcel Dekker Ag./IBS Bookservice AG, Hutgasse 4/Postfach 812, CH-4001 Basel, 2003.) ISBN 0824742443. Pp. 430, numerous illustrations in the text. Price: \$ 175.

This book is entirely dedicated to the functional role of fungi in all kind of ecosystems, and it attempts to show how the world would function if fungi were not there. It is conceived as an introduction to the subject for students in mycology and ecology. The introductory chapters deal with fundamental themes, and define fungi, ecosystems and their interaction. The two following chapters deal with fungi and primary production, elucidating the way fungi make available nutrients, and the roles symbiotic and parasitic relations play with regards to plant growth and carbon fixation. Chapter 4 gives an overview of secondary productivity: fungi as food for secondary producers, and fungal-faunal interactions such as ant and termite fungus gardens, bark beetle fungus interactions, and the role of fungi as faunal pathogens. Chapter 5 has population and community regulation by fungi as central theme, dealing with the role of mycorrhiza with regard to plant successions and plant fitness, saprotroph-pathogen interactions, the role of endophytes and nematophagous fungi. Chapter 6 has the interaction of fungi with humans as subject, focussing on fungi and the environment: their interaction with acidifying pollutants, heavy metals, radionucleotids, and their reaction on climatic changes. The final chapters are a synopsis and outlook to the future, in which suggestions are made for further research in the subject, using new methodology and tools. In conclusion, the book offers a lot of information on the subject, and will serve as a great source of information on fungi in ecosystems. The large number of references may facilitate further reading.

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM – XL  
New combinations in *Conocybe* and *Pholiotina*

EEF ARNOLDS

Holthe 21, NL-9411 TN Beilen, The Netherlands

Some new combinations in *Conocybe* are made and justified. The name *Conocybe apala* is proposed to replace the names *C. albipes* and *C. lactea*. *Conocybe albipes* var. *pseudocrispa* and *C. moseri* var. *bisporigera* are distinguished on the rank of species. On the other hand, *Conocybe subalpina* is reduced to a variety of *C. pallida* and *C. rickenii* to a forma of *C. siliginea*. In addition, three new combinations are made in *Pholiotina* on the rank of subsections.

In this paper some new combinations are proposed that are necessary in the framework of the forthcoming revision of the *Bolbitiaceae* in volume 6 of *Flora agaricina neerlandica* (Arnolds, in prep.). Full descriptions of these taxa will be published in that volume.

***Conocybe apala*** (Fr.: Fr.) Arnolds, *comb. nov.*

Basionym: *Agaricus apalus* Fr., *Observ. Mycol.* 2 (1818) 142; Fr.: Fr., *Syst. mycol.* 1 (1821) 265.

Synonymy: *Pluteolus apalus* (Fr.: Fr.) Quéll., *Enchir. Fung.* (1886) 105. — *Bolbitius albipes* G.H. Otth, *Mitt. naturf. Ges. Bern* 711–744 (1871) 92; *Conocybe albipes* (G.H. Otth) Hauskn., *Österr. Z. Pilzk.* 7 (1998) 102; *Conocybe albipes* var. *rugata* Hauskn., *Österr. Z. Pilzk.* 7 (1998) 110. — *Bolbitius tener* Berk. & Broome, *Outl. Br. Fungol.* (1860) 183 (non *Conocybe tenera* (Schaeff.: Fr.) Fayod, 1889) — *Galera lactea* J.E. Lange, *Fl. agar. dan.* 5 (1940) IV; *Conocybe lactea* (J.E. Lange) Métrod, *Bull. trimest. Soc. Mycol. Fr.* 56 (1940) 46. — *Conocybe huijsmanii* Watling, *Nord. J. Bot.* 3 (1983) 262; *Conocybe huijsmanii* var. *conica* Watling, *Gard. Bull. Singapore* 45 (1994) 377.

*Misapplied names.* *Galera lateritia* sensu Ricken, *Blätterpilze* (1915) 224; *Conocybe lateritia* sensu Kühner, *Genre Galera* (1935) 121, sensu auct. eur. plur.

*Conocybe apala* is one of the most widespread and easily recognised species of *Conocybe* in Europe, readily characterised by the whitish, non-striate pileus, pubescent white stipe, very thin and crowded, easily collapsing lamellae and very soft, quickly decaying context. This fungus is at present generally known under the name *Conocybe lactea* (J.E. Lange) Métrod, based on *Galera lactea* J.E. Lange (1940). It would be surprising in fact if no earlier name was available for such a striking agaric. Indeed, Hausknecht (1998: 102) found out that *Bolbitius albipes* G.H. Otth is an earlier synonym, published in 1871. He made the combination *Conocybe albipes* (G.H. Otth) Hauskn.

One may wonder whether Elias Fries knew this fungus as well, since it occurs in the temperate and hemiboreal zone of Sweden (Watling, 1992: 274). Indeed, when reading the original description of *Agaricus apalus* by Fries (1818: 142), it very much resembles the descriptions of *C. lactea* and *C. albipes*. The epithet *apalus* itself, meaning 'soft', is already indicative in view of the remarkably soft consistence of basidiocarps of this

fungus. The pileus was described as campanulate, not expanding, obtuse and whitish, sometimes yellowish at centre; the lamellae as narrowly adnate to almost free, whitish at first then orange-ochre; the stipe as 75–150 × 4 mm, slender, slightly thickened at base, fragile, white and entirely pubescent when young; the context as thin and white; the spore-print as ochraceous. Also the habitat and periodicity, mentioned by Fries, are in good agreement with *C. lactea*: in ruderal, grassy place in Femsjö, July–September. Fries (1818) added that *Agaricus apalus* is probably related to *Agaricus vitellinus* (= *Bolbitius vitellinus*). Also, at present *Conocybe lactea* is sometimes considered to belong to the genus *Bolbitius*, e.g. by Bon (1992).

The sanctioning description of *Agaricus apalus* by Fries in *Systema* (1821) is largely identical but more concise. The pileus is then described as submembranaceous, 25 mm high and wide, the lamellae as rusty brown when mature. Obviously, Fries described the same fungus as in his *Observationes*.

One may wonder why the epithet *apalus* has not been accepted earlier for *Conocybe lactea*. Kühner (1935: 121) used in his fundamental study on *Conocybe* the name *C. lateritia* (Fr.: Fr.) Kühner for this fungus with the addition "sensu Ricken". Apparently Kühner was not sure whether his interpretation was identical with the original description of *Agaricus lateritius* by Fries (1821: 265). Indeed, Fries' diagnosis differs from *C. lactea* in at least three significant characters: the pileus is described as rusty brown, becoming paler ("ferrugineo-expallente"), the stipe as glabrous and the habitat as dung in forest. It is impossible to identify this fungus with any certainty as one of the other modern species of *Conocybe*. The interpretation of *Agaricus lateritius* by Ricken (1912) and Kühner (1935) as identical with *Conocybe lactea* can be better understood in connection with the plate of *Agaricus lateritius* in Fries' *Icones* (pl. 127, fig. 2, 1884). The third depicted basidiocarp represents a fungus with the characteristic elongated-campanulate, white pileus of *C. lactea*. It is quite remarkable, however, that the next basidiocarp is a fungus with similar shape of the pileus but with a dark orange-brown colour that never occurs in *C. lactea*. The pileus of *Agaricus lateritius* is, in agreement with the name, described as "plus minus obscure lateritius" (lateritius = brick-red), not as white. Consequently, Fries' plate represents either a heterogeneous collection, or it represents a strongly hygrophanous species that cannot be identified as one of the species, distinguished at present in *Conocybe*. In addition, it should be noticed that *A. lateritius* Fr.: Fr. is an illegal homonym of *Agaricus lateritius* Schaeff.: Fr. (= *Hypohoma* or *Psilocybe* (*sub*)*lateritia*).

Kühner (1935: 123) discussed the name *Agaricus apalus* in his observations on *Conocybe lateritia* and implicitly regarded it as a synonym ("... ces distinctions nous paraissent de bien faible valeur ..."), consequently also as identical with *C. lactea*. Watling & Gregory (1981: 164) in their nomenclatural survey of Bolbitiaceae listed *Agaricus apalus* under the rejected names: "Although obviously distinct with its pubescent stipe this species is unknown; the recently described *Conocybe inocybeoides* Watling closely resembles figures in *Icones Select. Hymenomycetum* II: 127 (1884)". The plate, quoted by Watling & Gregory, is in fact difficult to interpret. The sporocarp to the left, showing a robust basidiocarp with a convex, non-striate, white pileus and a white, pubescent stipe, might represent *Conocybe lactea* sensu lato indeed. However, the basidiocarp depicted at the centre with a rather dark, grey-brown pileus and white, pubescent stipe, is strongly deviating. The description of the pileus, reading "udus livido-pallescentis,



siccus omnino albus”, indicates a strongly hygrophanous species, quite different from both *C. lactea* and the original description of *Agaricus apalus*. One cannot escape the conclusion that Fries changed his concept of this species over the years and/or that the quoted plate is based again on a heterogeneous collection.

It is evident that the plates of both *Agaricus apalus* and *A. lateritius* are misleading, but they are not relevant from a nomenclatural point of view. Only the original descriptions are decisive for interpretation of these names. Since the diagnosis of *Agaricus apalus* by Fries (1818) fits in well with *Conocybe albipes* and *C. lactea* s.l. I propose to replace these names by the older and sanctioned name *Conocybe apala* (Fr.: Fr.) Arnolds.

*Conocybe apala* is a variable species concerning the shape of the pileus. In the Netherlands two types can be distinguished. The pileus in the most widespread form has a characteristic, elongated conical or campanulate shape that is always higher than broad and hardly expanding in age. This form corresponds with *C. albipes* and *C. lactea*. However, other populations are characterised by a hemispherical to convex, expanding pileus, being broader than high. This form was described by Watling (1983: 262) as a separate species, *Conocybe huijsmanii*. On the other hand, Hausknecht (1998: 102) synonymised *C. huijsmanii* with *C. albipes*, although he indicated that he never came across collections with both types of pileus intermixed. Also in the Netherlands the populations with elongated and convex pileus are always clearly separated. Since no other differences could be found, I prefer to distinguish these taxa in the rank of varieties.

The question remains to which variety the original *Agaricus apalus* Fr. belongs. Fries (1818) described the pileus as equally high as broad. This is in better agreement with the variety with the convex pileus (= *C. huijsmanii*). Interestingly, the latter variety seems to be more common in southern Scandinavia than the variety with elongated pileus (= *C. lactea*) (Hausknecht in letter). Also Watling (1992: 274) wrote in *Nordic Macromycetes*: “Many of these records [of *Conocybe lactea*] undoubtedly refer to *C. huijsmanii* Watling ...”. Consequently, *C. huijsmanii* is considered to be identical with *C. apala* var. *apala* and *C. lactea* with *C. apala* var. *albipes*.

***Conocybe apala* (Fr.: Fr.) Arnolds var. *albipes* (G.H. Otth) Arnolds, *comb. nov.***

Basionym: *Bolbitius albipes* G.H. Otth, Mitt. naturf. Gesellsch. Bern 711–744 (1871) 92.

*illegit. ? > nom. nov.*

*but p. 2  
180*

***Conocybe pseudocrispa* (Hauskn.) Arnolds, *comb. nov.***

Basionym: *Conocybe albipes* var. *pseudocrispa* Hauskn., Österr. Z. Pilzk. 7 (1998) 106.

*Conocybe pseudocrispa* differs from *C. apala* (= *C. albipes*) not only in 2-spored basidia, but also in spores that are not flattened in frontal view. Therefore it is distinguished in the rank of species.

***Conocybe bisporigera* (Hauskn. & Krisai) Arnolds, *comb. nov.***

Basionym: *Conocybe moseri* Watling var. *bisporigera* Hauskn. & Krisai, *Persoonia* 14 (1992) 659.

Synonymy: *Conocybe siltiginea* forma *typica*, ‘récoltes bisporiques’ Kühner, *Genre Galera* (1935) 109 (invalid).

*Conocybe bisporigera* differs from *C. moseri* not only in 2-spored basidia and consequently larger spores, but also in the clearly flattened shape of the spores. Therefore it is considered a separate species.

***Conocybe subpallida* Enderle var. *subalpina* (Sing.) Arnolds, *comb. nov.***

Basionym: *Conocybe mesospora* var. *subalpina* Sing., *Feldiana* 21 (1989) 104.

Synonymy: *Conocybe subalpina* (Sing.) Sing. & Hauskn., *Pl. Syst. Evol.* 190 (1992) 89; *Conocybe macrocephala* var. *macrospora* Hauskn., *Österr. Z. Pilzk.* 9 (2000) 92.

Both *Conocybe subalpina* and *C. subpallida* belong to section *Conocybe* with predominantly lecythiform caulocystidia. Within this section these taxa are characterised by the remarkably pale yellow-brown, thin-walled, fairly large spores (on average 9.6–11.4 × 5.4–6.0 μm), cheilocystidia with small capitulum (less than 5.0 μm) and the formation of needle-like crystals in ammonia. *Conocybe tenera* (Schaeff.: Fr.) Fayod is closely related but has much darker, thick-walled spores. *Conocybe subalpina* has also been described as *C. macrocephala* var. *macrospora* Hauskn. (Hausknecht, 2000: 92) but *C. macrocephala* differs rather strongly in smaller spores and in cheilocystidia and caulocystidia with larger capitulum.

Later on Hausknecht (2002: 69) described *Conocybe subalpina* and *C. subpallida* as separate species, differing in the considerably darker pileus colour in *C. subalpina* and in the covering of the stipe, made up of (almost) exclusively lecythiform cystidia in *C. subalpina*, whereas in *C. subpallida* the lecythiform cystidia are intermixed with cylindrical hairs. However, in material from the Netherlands the two characters are intergrading to some extent. Some collections combine a dark brown pileus with the occurrence of hairs at the stipe and the proportion of hair-like caulocystidia is quite variable from one collection to the other. Therefore, *C. subalpina* is reduced to a variety of *C. subpallida*.

***Conocybe siliginea* (Fr.: Fr.) Kühner forma *rickenii* Arnolds, *comb. nov.***

Basionym: *Galera rickenii* Schaeff., *Z. Pilzk.* 6 (1930) 171.

*Conocybe siliginea* s.l. is well-characterised by the combination of the pale, pubescent, non-striate pileus, pubescent stipe without or with few lecythiform cystidia, 2-spored basidia and large spores, measuring (10.5–)12.0–19.0(–22.5) × 7.0–10.5 μm. It is a variable species concerning size and general appearance of basidiocarps. The pileus size ranges from 5–30(–40) mm, the stipe from 15–80(–100) × 1–4 mm. In view of this variation, many authors distinguish two species, viz. *C. siliginea* with small basidiocarps and *C. rickenii* with larger basidiocarps (e.g. Watling, 1982; Moser, 1983; Hausknecht & Passauer, 1997). Large basidiocarps are usually found immediately on dung or compost whereas small basidiocarps mainly grow on fertile soil in fields, gardens and ruderal sites. A similar morphological variation is often found in dung-inhabiting species. Enderle & Hübner (1999: 9) suggested therefore that *C. rickenii* is probably only a luxuriant form of *C. siliginea* due to a richer substrate and recognised only one taxon.

However, there seem to be some other subtle differences between the two taxa. In larger basidiocarps the pileus surface often has a shiny, somewhat greasy appearance

and the colour of the pileus tends to be slightly darker, often with an olivaceous tone. In Dutch collections the characters of the two taxa are more or less intergrading. The microscopic characters are identical. Therefore the taxa are distinguished at the rank of forma.

The nomenclature of *C. siliginea* has been much disputed. Enderle & Hübner (1999: 9) stated correctly that the identity of *Agaricus siligineus* Fr. cannot be established with any certainty on the basis of the authentic descriptions by Fries (1818, 1821) and therefore they preferred the use of the name *Conocybe rickenii* (Schaeff.) Kühner. On the other hand, there are no obvious discrepancies between Fries' diagnosis and the current use of the name *Agaricus siligineus*. Recent interpretations of this name are consistent and always concern the taxon described above. In addition, a neotype has been designated by Hausknecht & Passauer (1997: 36) in agreement with current interpretations. Therefore the name *Conocybe siliginea* is maintained for this fungus.

Some new combinations in *Pholiotina* will be used in *Flora agaricina neerlandica* (Arnolds, in prep.):

**Pholiotina** subsect. **Intermediae** (Watling) Arnolds, *comb. & stat. nov.*

Basionym: *Conocybe* sect. *Intermediae* Watling, *Persoonia* 6 (1971) 328.

**Pholiotina** subsect. **Verrucisporae** (Sing.) Arnolds, *comb. nov.*

Basionym: *Pholiotina* sect. *Verrucisporae* Sing., *Beih. Nova Hedwigia* 7 (1973) 79.

**Pholiotina** subsect. **Cyanopodinae** (Sing.) Arnolds, *comb. nov.*

Basionym: *Pholiotina* sect. *Cyanopodae* Sing., *Beih. Nova Hedwigia* 7 (1973) 79.

#### ACKNOWLEDGEMENTS

For his critical reading of the manuscript I am indebted to Dr. Th. W. Kuyper (Wageningen).

This study has been carried out for the project 'Flora agaricina neerlandica' with financial support of the Rijksherbariumfonds Dr. Kits van Waveren.

#### REFERENCES

- Arnolds, E. In prep. *Conocybe* & *Pholiotina*. In: M.E. Noordeloos, Th.W. Kuyper & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 6.
- Bon, M. 1992. Clé monographique des espèces galero-naucorioïdes. *Doc. Mycol.* 21 (84): 1–89.
- Enderle, M. & H.J. Hübner. 1999. *Conocybe-Pholiotina-Studien VIII*. *Z. Mykol.* 65: 3–22.
- Fries, E. 1818. *Observationes Mycologicae praecipue ad illustrandam floram Suevicam*, Pars II. Copenhagen.
- Fries, E. 1821. *Systema Mycologicum*. Lund.
- Fries, E. 1867–1884. *Icones selectae Hymenomycetum*. Stockholm.
- Hausknecht, A. 1998. Beiträge zur Kenntnis der Bolbitiaceae 4. Die Sektion *Candidae* und andere hellhütige Arten der Gattung *Conocybe*. *Österr. Z. Pilzk.* 7: 91–121.
- Hausknecht, A. 2000. Beiträge zur Kenntnis der Bolbitiaceae 6. Die *Conocybe tenera*-Gruppe in Europa, Teil I. *Österr. Z. Pilzk.* 9: 73–109.

- Hausknecht, A. 2002. Beiträge zur Kenntnis der Bolbitiaceae 11. Die *Conocybe tenera*-Gruppe, Teil 2, und eine Revision der Arten um *Conocybe mesospora* in Europa. *Österr. Z. Pilzk.* 11: 35–77.
- Hausknecht, A. & U. Passauer. 1997. Was ist *Agaricus siligineus* im Sinne von Fries? *Österr. Z. Pilzk.* 6: 35–44.
- Kühner, R. 1935. Le genre *Galera*. *Encyclopédie mycologique* 7. Paris.
- Lange, J.E. 1940. *Flora agaricina danica*. Vol. 5. Copenhagen.
- Moser, M. 1983. *Kleine Kryptogamenflora, Die Röhrlinge und Blätterpilze*, 5. Aufl. Gustav Fischer Verlag. Stuttgart, New York.
- Oth, G. 1871. Siebenter Nachtrag zu dem in den Mitteilungen vom Jahr 1844 enthaltenen Verzeichnisse schweizerischer Pilze, und Fortsetzung der Nachträge vom Jahr 1846, 1850, 1857, 1863, 1865 und 1868. *Mitt. Naturf. Gesellsch. Bern* 711–744: 88–445.
- Ricken, A. 1910–1915. *Die Blätterpilze (Agaricaceae)*. Leipzig.
- Watling, R. 1982. Bolbitiaceae: *Agrocybe*, *Bolbitius* & *Conocybe*. In: *British Fungus Flora* 3: 1–139. Edinburgh.
- Watling, R. 1983. Observations on the Bolbitiaceae – 23. Interesting Danish members of the family. *Nord. J. Bot.* 3: 261–268.
- Watling, R. 1992. *Conocybe*. In: L. Hansen & H. Knudsen (eds.), *Nordic Macromycetes*. Vol. 2: 272–277.
- Watling, R. & N.M. Gregory. 1981. *Census Catalogue of World Members of the Bolbitiaceae*. *Bibliotheca Mycol.* 82. Vaduz.

**CREPIDOTUS CRISTATUS, A NEW YELLOW SPECIES  
FROM THE NETHERLANDS**

BEATRICE SENN-IRLET<sup>1</sup> & GERT IMMERZEEL<sup>2</sup>

*Crepidotus cristatus* is described as a new species close to *C. citrinus*. Distinctive features are the yellow colour of the fruit-bodies, (sub-)globose spores, small cheilocystidia with finger-like outgrowths, thick-walled epicuticular hyphae near the point of attachment and small crystals on the cystidia and on the pileipellis.

A collection of *Crepidotus* from an estate in the Netherlands proved to represent an undescribed species with noteworthy characters such as crystals on the cheilocystidia, typical of species known from the paleotropics and Australia/New Zealand.

***Crepidotus cristatus* Senn-Irlet & Immerzeel, spec. nov. — Fig. 1–3**

Pileo 2–10 mm lato, reniformi vel conchiforme, citrino-luteo perstrigoso. Lamellis excentric concurrentibus, pallide luteis dein brunneis. Stipite iuventute praesenti, cylindrico, sublaterali. Sporis 5.0–6.5 × 4.5–6.5 μm, globosis vel subglobosis, verrucosis, brunneis. Basidia clavata, 20–30 × 6–8 μm, 4-sporigera. Cheilocystidiis 20–30 × 6–15 μm, utrifomis, cristalliferis, hyalinis, appendicibus valde diverticulatis praeditis. Cuticula valde tomentosa ex hyphis laxe intricatis fibuligeris, parte tunicis 0.2–0.5 μm crassis vel cristalliferis. Ab *C. citrinus* differt sporis minoribus. Ad corticem arborum, Hollandia.

Holotypus: The Netherlands, prov. Utrecht, Nijenrode, Breukelen, 20.X.2001, G. Immerzeel (I2001-302 (L; Paratypus ZT)).

Pileus 2–10 mm, irregularly rounded flabelliform, reniform, rarely semicircular, mostly unguulate when young, later plano-convex or with a low umbo at point of attachment, irregularly waved when old, with distinctly incurved margin, mat, felted-tomentose, pale sulphur to lemon yellow, butter yellow (Methuen 3A4–3A5, 4A4–A5), in dried specimen buff to ochraceous, not hygrophanous, sessile, at point of attachment tomentose-villose. Lamellae L = 6–14, l = 1–3, rather narrow, moderately crowded, subventricose, narrowly adnexed, young pale yellowish, later cinnamon-buff to cinnamon; edge white, distinctly fimbriate. Stipe visible only in very young, undeveloped fruit-bodies, curved, tomentose. Flesh thin, white. Taste slightly farinaceous, smell fungus-like.

Spores 5.0–6.5 × 4.5–6.5 μm, Q = 1–1.25, mean volume 92 μm<sup>3</sup>, globose, sometimes subglobose, punctate-warty, verruculose (type 1 sensu Senn-Irlet, 1995); walls moderately coloured. Basidia 20–30 × 6–8 μm, four-spored, clamped. Cheilocystidia 20–30 × 6–15 μm (including outgrowths), clavate, narrowly utriform, with short finger-like, up to 3 μm wide protuberances, which may be branched, angled or flexuous, antler-like, in upper part covered with scattered small crystals. Trama of lamellae subregular.

1) WSL, Swiss Federal Research Station, CH-8903 Birmensdorf, Switzerland.

2) Straatweg 23, NL-3621 BB Breukelen, The Netherlands.

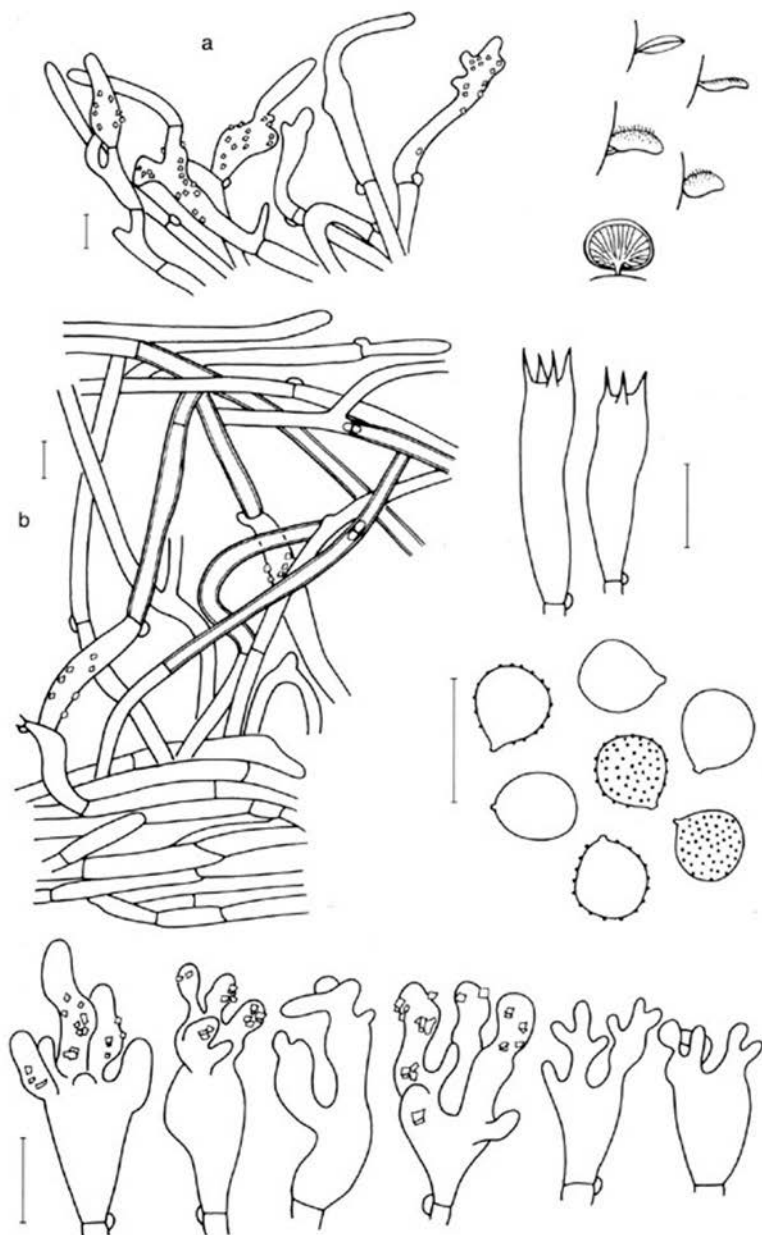


Fig. 1. *Crepidotus cristatus*. Line-drawings from pileipellis (a, near cap margin) and in the centre (b), basidia, spores, and cheilocystidia. Scale bars = 10  $\mu$ m.



Fig. 2. *Crepidotus cristatus*. Fresh carpophores from collection G11999-101 (above) and from collection G12001-302 (below).

Pileipellis a transition between a trichoderm and a cutis with mostly straight, more rarely flexuous, filiform, 2–3  $\mu\text{m}$  wide hyphae; in lower part scattered fragments covered with small crystals and slightly thick-walled hyphae not rare; terminal cells undifferentiated, especially at pileus margin often in the shape of cheilocystidia with outgrowths and covered with small cuboid crystals; strigose hairs at point of attachment composed of straight, slightly thick-walled hyphae. Pileitrama regular, hyaline. Pigment yellowish, rather indistinct, intracellular and faintly membranaceous in pileipellis, dissolving in ammonia. Clamp-connections abundant in all tissues.

Pileipellis a transition between a trichoderm and a cutis with mostly straight, more rarely flexuous, filiform, 2–3  $\mu\text{m}$  wide hyphae; in lower part scattered fragments covered with small crystals and slightly thick-walled hyphae not rare; terminal cells undifferentiated, especially at pileus margin often in the shape of cheilocystidia with outgrowths and covered with small cuboid crystals; strigose hairs at point of attachment composed of straight, slightly thick-walled hyphae. Pileitrama regular, hyaline. Pigment yellowish, rather indistinct, intracellular and faintly membranaceous in pileipellis, dissolving in ammonia. Clamp-connections abundant in all tissues.

Habitat — On various fallen corticated branches of up to 15 cm diameter of *Acer pseudoplatanus*, *Buxus*. Together with *Nectria* spec.

Collections examined. THE NETHERLANDS: prov. Utrecht, Nijenrode, Breukelen, 8.XI.1999, G. Immerzeel GI1999-101 (L); idem 20.X.2001, G. Immerzeel GI2001-302 (L, holotype).

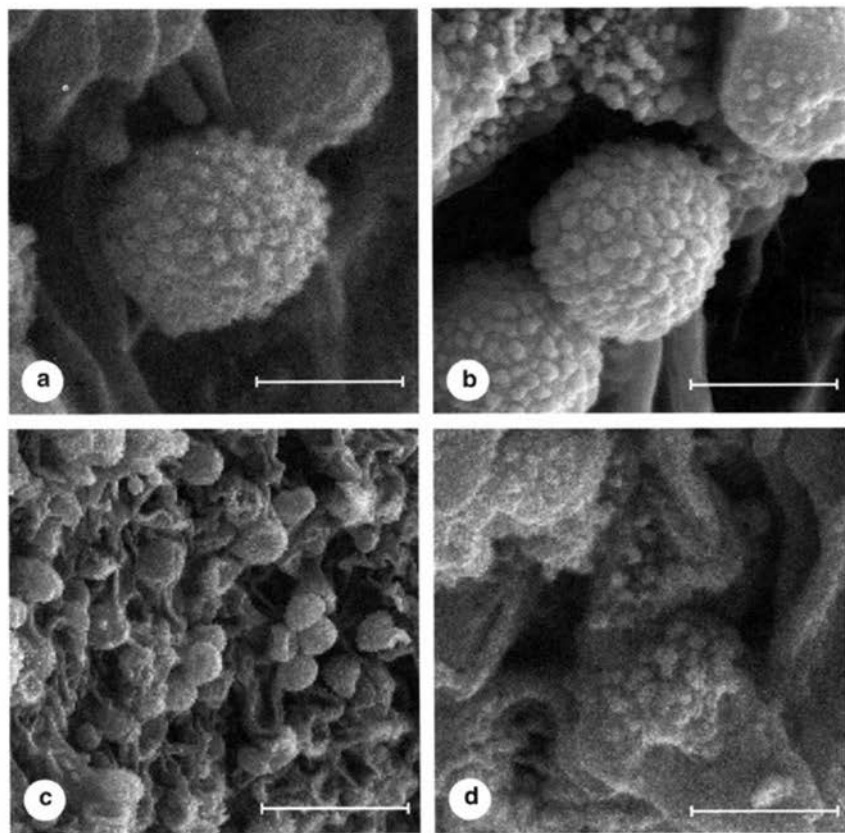


Fig. 3. *Crepidotus cristatus*. a–c. Spores, crystals on collapsed cheilocystidia; d. arrowhead. Scale bars = 10  $\mu\text{m}$ .



## DISCUSSION

This species is characterised by the combination of a yellow fruit-body, small cheilocystidia with finger-like outgrowths and cuboid crystals.

Among the hitherto known European species with cystidia of such shape and size are *C. carpaticus* and *C. roseornatus*. While the latter is a reddish-coloured species, *C. carpaticus* with cream-buff fruit-bodies may also display yellowish tints. However, its cheilocystidia lack crystals. In addition the SEM pictures show a slightly different type of spore ornamentation: isolated hemispherical warts in the new species (Fig. 3 a–c), irregular, confluent warts at times decorated with small outgrowths in *C. carpaticus* (Senn-Irlet, 1995).

In the North American mycoflora (Hesler & Smith, 1965) *Crepidotus contortus* Hesler & A.H. Sm. seems to come close with pale olive buff colours, globose spores and small, exceptionally strongly contorted cheilocystidia. The cystidia in our species cannot be described as contorted, they form a dense band not easy to detach for a microscopic analysis as the outgrowths sometimes intermingle. In addition the presence of crystals is not reported for *C. contortus*.

Crystal bearing cheilocystidia are known from several species in the *Crepidotus episphaeria*-complex from the Southern hemisphere (Reid, 1975; Horak, 1977). However, none of these species have the same shape of cystidia.

Table I. Distinctive sizes (in  $\mu\text{m}$ ) and features of six collections of the complex around *Crepidotus citrinus*.

species	collection	mean spore length in $\mu\text{m}$ (N = 20)	mean spore width in $\mu\text{m}$ (N = 20)	cheilo-cystidia size in $\mu\text{m}$	shape of cheilo-cystidia	presence crystals	number of spores per basidium
<i>sulphurinus</i>	CBM-FB 11123	7.7	7.5	30–46 × 6–10	utriform	scattered on cheilocystidia	2
<i>sulphurinus</i>	CBM-2281	8.0	7.5	14–42 × 8–11	utriform	scattered on cheilocystidia	2
<i>citrinus</i>	PR-3434	7.7	7.3	19–43 × 7–10	utriform & antlerlike	scattered on cheilocystidia and pileipellis	2
<i>citrinus</i>	RE-68	7.8	7.4	25–45 × 6–10	antlerlike	abundant on cheilocystidia	2–4
<i>cristatus</i>	GI 1999-101	5.7	5.4	22–35 × 6–10	antlerlike	scattered on cheilocystidia	4
<i>cristatus</i>	GI 2001-302	6.0	5.5	18–28 × 7–14	antlerlike	abundant on cheilocystidia and scattered on pileipellis	4

*Localities.* CBM-FB-11123: Japan, Chiba pref., Higashi-yamashina-cho, Midori-kuz, 14.VI.1994, leg. Ostuta & Isoda; CBM-2281: Japan, Chiba pref., Kiyosumi-yama, Amatsu-kominato-cho, Awa-gun, 300–350 m, broad-leaved forest mixed with *Quercus acuta*, and *Castanopsis cuspidata*, 8.VII.1989, leg. T. Fukiharu; PR-3434: Puerto Rico, Luquillo Mountains, Mun. de Rio Grande, Caimitillo Trail, 700 m, 2.X.1996, leg. S.A. Cantrell; RE-68: La Réunion, Forêt de Bélouve, 13.III.1996, leg. A. Hausknecht & G. Wölfel.

*Crepidotus citrinus* Petch, a species with a mainly (sub-)tropical distribution, has larger, intensely coloured golden-brown spores and two-spored basidia (Singer, 1973). There is a difficulty in the unequivocal interpretation of this species, as hitherto published type studies do not mention the shape of the cheilocystidia (Pilát, 1951) nor the crystals and the thick-walled hyphae of at least parts of the pileipellis (Pegler, 1986). These structures seem to be destroyed in the type collection. Singer (1973) illustrates quite bizarre cheilocystidia shapes from a collection from Argentina which have the same antler-like pattern as our species. Own observations on several collections from all over the world with distinct yellow fruit-bodies have convinced us that *C. citrinus* should be interpreted as a species with antler-like cheilocystidia, scattered crystals at least in the cheilocystidia and often in addition in the pileipellis, and thick-walled epicuticular hyphae especially near the point of attachment.

In contrast to the original description of *C. citrinus*, Japanese authors offer a more exhaustive description of another similar species, *C. sulphurinus* Imazeki & Toki. Already the original description mentions rare incrustations of the cheilocystidia. The study of Japanese collections of *C. sulphurinus* showed utriform cheilocystidia with scattered small crystals and the presence of thick-walled hyphae in the epicutis. Yet, the basidia are all two-spored, the spores larger (see Table I) and in one collection coarse yellow agglutinated crystals were present in the trama. In contrast to Singer (1973) who interpreted *C. sulphurinus* as a synonym of *C. citrinus* we treat these two as distinct species, with the main difference found in the shape of the cystidia.

#### ACKNOWLEDGEMENTS

We thank Marco Herwegh from the Institute of Geological Sciences (Bern) for the SEM pictures and T. Fukiharu from the Natural History Museum and Institute Chiba (Japan), A. Hausknecht (Vienna, Austria) and Jean Lodge from the Center of Forest Mycology Research (Puerto Rico) for the loan of various *Crepidotus* collections.

#### REFERENCES

- Hesler, L.R. & A.H. Smith. 1965. North American species of *Crepidotus*. Hafner, New York.
- Horak, E. 1977. *Crepidotus episphaeria* and related species from the Southern Hemisphere. Ber. Schweiz. Bot. Gesellschaft 87: 227–235.
- Kornerup, A. & J.H. Wanscher. 1978. Methuen handbook of colours. 3rd ed. London.
- Pegler, D. 1986. Agaric Flora of Sri Lanka. Kew Bull. Add. Series XII.
- Pilát, A. 1951. Revision of the types of some extra-european species of the genus *Crepidotus*. Trans. Brit. Mycol. Soc. 33: 215–249.
- Reid, D. 1975. Type studies of larger basidiomycetes described from Southern Africa. Contr. Bolus Herb. 7: 1–255.
- Senn-Irlet, B. 1995. The genus *Crepidotus* (Fr.) Staude in Europe. Persoonia 16: 1–80.

## BOOK REVIEWS

Kevin D. Hyde (ed.). *Fungi in marine environments. Fungal Diversity Research Series, vol. 7.* (Fungal Diversity Press, Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China.) ISBN 962-85677-8-0. Pp. 397, with numerous text-figs. Price: US\$ 80.

This book is dedicated to the world-known specialist in marine mycology, E. B. Gareth Jones on the occasion of his 65th birthday, for his substantial contribution to marine mycology. It contains 22 contributions by a multitude of authors, grouped around the central theme of Fungi in marine environments. The book is divided into three parts. Part 1 (organisms), contains contributions on fungal species: taxonomy, based on morphology as well as molecular characters, treating groups like the Oomycete genus *Halophytophthora*, and ascomycete groups like de Halosphaeriales, Loculoascomycetes, *Lophiostoma* and *Massarina*, as well as marine yeasts, and a contribution on anamorph-teleomorph connections in marine ascomycetes. Part 2 is devoted to ecology, mainly to mangrove habitats and sea-grass communities, which harbour lots of marine fungi. Also the subject of endangered mangrove habitat is treated. Finally, Part 3 of the book deals with applied aspects of marine fungi, with contributions on secondary metabolites from marine fungi, bioremediation of coloured pollutants by terrestrial versus facultative marine fungi, fatty acids in Thraustochytrids, as well as molecular cloning of the isopenicillin synthase gene in the marine fungus *Kallichroma tethys*.

D. Moore. *Slayers, Saviors, Servants and Sex. An exposé of Kingdom Fungi.* (Springer Verlag, Heidelberg, 2001.) ISBN 0-387-95098-2 (paperback). Pp. 175. Price: EUR 29.95.

David Moore, a mycologist of international reputation, has written this book for a broad public to introduce them into the fascinating world of fungi. He succeeds in presenting various interesting mycological topics in an entertaining style. The first chapter, called "Toxins, Kill the primates, Rule the world", deals with poisonous substances produced by fungi, such as fly agarics, ergotism and aflatoxins. In "Blight, Rusts, Bunks, and Mycoses" the author deals with diseases caused by fungi. Further chapters treat subjects like decay and degradation, fungi in medicine, fungal symbiosis, the use of fungi as biocontrols, fungi used to produce food and drinks, and the use of fungi in the battle against pollution.

The book is not only suited for using as text-book for students, but serves the whole mycological community, including interested hobby mycologists, since it is written in a very clear, understandable language and style, avoiding difficult terminology. It is therefore highly recommended for reading, for fun and education.

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM – XLI  
Conocybe and Pholiotina

EEF ARNOLDS<sup>1</sup> & ANTON HAUSKNECHT<sup>2</sup>

Four interesting species of *Conocybe* and one species of *Pholiotina*, recently recorded from western Europe, are described and illustrated. *Conocybe merdaria*, related to *C. pubescens*, is described as a new coprophytic species with the type locality in Westfalen, Germany. Another coprophytic species, *C. magnispora*, was found in the Netherlands and had not been reported from Europe before. The collections of *C. farinacea* in the Netherlands represent the first records of this species in continental Europe. It is demonstrated that the European records under the name *C. fragilis*, originally described from North America, in fact belong to a different species, viz. *Galera incarnata*. The new combination *Conocybe incarnata* is made. The species, known in Europe under the name of *Conocybe plicatella* or *Galerella plicatella*, appears to be different from the original description of *Agaricus plicatellus* from North America and to belong to the genus *Pholiotina*. The new name *Pholiotina sulcata* is introduced.

In volume 6 of *Flora agaricina neerlandica* the *Bolbitiaceae* will be treated, including the genera *Conocybe* and *Pholiotina* (Arnolds, in prep.). During the revision of fresh and dried collections of the Netherlands by the first author a number of taxonomic and nomenclatural problems were encountered that were studied and discussed in close cooperation with the second author, who is preparing a monographic treatment of *Conocybe* and *Pholiotina* in Europe.

In this paper we present descriptions of five new or critical species, including one new species, *Conocybe merdaria*, and two species that had not been recorded before from continental Europe. A new name is proposed for *Galerella plicatella* sensu auct. Eur., viz. *Pholiotina sulcata*.

1. *Conocybe merdaria* Arnolds & Hauskn., spec. nov. — Fig. 1

Pileus 15–18 mm latus, 12–16 mm altus, conico-campanulatus, hygrophanus, aurantio-brunneus, margine translucido-striatus, in sicco pallide aurantiacus, pubescens. Lamellae subconfertae, adnexae, pallide luteae demum ochraceo-brunneae vel aurantio-brunneae. Stipes 50–75 × 1–1.5 mm, cylindraceus, haud radicans, pallide ochraceus demum incarnato-brunneus, pruinosis-striatus, pubescens. Odore saporeque indistincto. Sporae (11.0–)12.0–15.0(–17.0) × (6.5–)7.5–9.5 µm, ellipsoideae-oblongae vel ovoideae-oblongae, aurantio-brunneae, crassitunicatae, poro germinativo prae-ditus. Basidia 16–22 × 10–11 µm, bisporigera. Cheilocystidia 14–19 × 6.0–10.5 µm, lecythiformia, capitulo 3.5–4.5 µm. Pleurocystidia nulla. Pileipellis hymeniformis, cellulis clavatis, 18–47 × 12–30 µm. Pileocystidia rara, lecythiformia, 26–33 × 7.5–9.5 µm, capitulo 3.5–4.5 µm, vel filiformia, 40 × 2.0–3.0 µm. Caulocystidia pro parte lecythiformia, 15–20 × 6.0–9.0 µm, capitulo 2.5–4.5 µm, pro parte subglobosa vel lageniformia, 10–17 × 8–14 µm, pro parte filiformia, 30–130 × 2.0–4.0 µm. Fibulae nullae. Ad fimam.

1) Holthe 21, NL-9411 TN Beilen, The Netherlands.  
2) Sonndorferstrasse 22, A-3712 Maissau, Austria.

Holotypus: Germany, Nordrhein-Westfalen, Teutoburgerwald, Brochterbeck S. of Ibbenbüren, 5.X.2001, E. Arnolds (*Arnolds 01-147*) (L).

Pileus 15–18 mm broad, 12–16 mm high, conico-campanulate, hygrophanous, when moist and fresh orange-brown, on drying becoming pale orange (K. & W. 5B5) at centre, ochraceous orange (5B4) towards the margin, pubescent under a hand-lens. Lamellae, L = 20–22, l = 3, crowded, adnexed, ventricose, up to 4 mm broad, rusty brown when mature, with white flocculose edge. Stipe 50–75 × 1–1.5 mm, cylindrical, slightly thickened towards base, not rooting, pale ochre yellow at first, then becoming flesh-coloured brown in lower half from base upwards, entirely pruinose-striate and pubescent. Context fragile, concolorous with surface. Smell and taste weak, not distinctive. Spore-print not recorded.

Spores (11.0–)12.0–15.0(–17.0) × (6.5–)7.5–9.5 μm, av. 13.7–14.1(–15.3) × 8.1–8.4 μm, Q = 1.5–2.0, Q av. = 1.6–1.85, not or slightly flattened, ellipsoid-oblong to ovoid-oblong, orange-brown in ammonia, moderately thick-walled (0.5–1.0 μm) with apical germ pore, 2.0–2.5 μm wide. Basidia 16–22 × 10–11 μm, 2-spored, in two collections very few 4-spored basidia present (less than 4%). Lamella edge sterile. Cheilocystidia 14–19 × 6.0–10.5 μm, lecythiform with ellipsoid to clavate basal part, short neck (1.0–3.0 × 1.0–2.0 μm) and small capitulum, 3.0–5.0 μm broad, hyaline; pleurocystidia

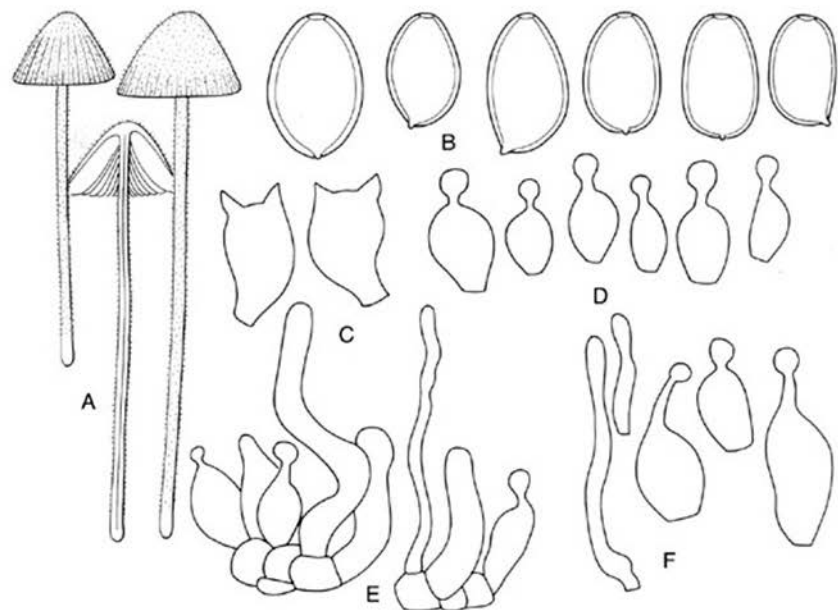


Fig. 1. *Conocybe merdaria*. A. Basidiocarps (× 1); B. spores (× 1500); C. basidia; D. cheilocystidia; E. caulocystidia; F. pleurocystidia (all × 1000). (A–F from E. Arnolds 01–147, holotype.)

absent. Hymenophoral trama made up of cylindrical and inflated elements, 4.0–18  $\mu\text{m}$  broad. Pileipellis an epithelioid hymeniderm, made up of spheropedunculate and clavate elements, 18–47  $\times$  12–30  $\mu\text{m}$ , often with yellowish pedicel. Pileocystidia scarce, lecythiform like cheilocystidia but larger, 26–33  $\times$  7.5–9.5  $\mu\text{m}$  with neck 4.5–7.5  $\times$  1.0–2.0  $\mu\text{m}$  and capitulum 3.5–4.5  $\mu\text{m}$  broad, in addition some cylindrical hairs up to 40  $\times$  2.0–3.0  $\mu\text{m}$ . Stipitipellis a cutis, made up of repent hyphae, 2.0–6.0  $\mu\text{m}$  broad. Caulocystidia a mixture of (1) numerous lecythiform cystidia, 15–20  $\times$  6.0–9.0  $\mu\text{m}$  with neck 1.5–4.0  $\times$  1.0–2.0  $\mu\text{m}$  and capitulum 2.5–4.5  $\mu\text{m}$  broad, (2) numerous globose and ellipsoid to lageniform elements, 10–17  $\times$  8–14  $\mu\text{m}$ , (3) cylindrical hairs, 30–130  $\times$  2.0–4.0  $\mu\text{m}$ , often with brown content. Clamp-connections not seen. Chemical reactions: no needle-like crystals on fragments of lamellae in ammonia.

Habitat & distribution — Saprotrophic, solitary or in small groups on old dung of horse, cattle or deer or on a mixture of dung and litter in semi-natural grasslands and forests. May–Oct. Not yet recorded from the Netherlands. Type collection made in Germany, Teutoburgerwald, close to the eastern border of the Netherlands. Also known from various other localities in Austria, Germany and Spain.

*Collections examined.* AUSTRIA: Niederösterreich, Hainfeld, Michelbach (MTB 7960/2), 26 May 1984, W. Klofac (WU 3363); Niederösterreich, Hohenberg, Lahnsattel (MTB 8259/1), 1 July 2001, T. Bardorf (Herbarium Hausknecht 53347); same loc., 22 July 2001, T. Bardorf (WU 21278). — GERMANY: Nordrhein-Westfalen, Teutoburgerwald, Brochterbeck S. of Ibbenbüren, 5 Oct. 2001, E. Arnolds (Arnolds 01-147) (L. holotype); Bavaria, Tutzing, Hartschimmel-Gelände (MTB 8033/3), 5 Sept. 2001, P. Karasch (WU 21902). — SPAIN: Madrid, Canencia, Puerto de Canencia, 5 Oct. 1990, M. Blanco et al. (AH 28399).

The Latin diagnosis of *C. merdaria* is exclusively based on the type collection. The English description includes also data of other collections of this species, made by the second author.

*Conocybe merdaria* is close to *C. pubescens* (Gillet) Kühner in its coprophytic habitat, macroscopical appearance and stipe covering of lecythiform cystidia and hairs, characteristic of section *Mixtae* (Watling, 1982; Arnolds, in prep.). It differs from that species mainly in the predominantly 2-spored basidia. In addition the spores are smaller than in the 4-spored *C. pubescens* (in collections from the Netherlands (13.0–)14.0–18.5(–20.0)  $\times$  (7.0–)7.5–10.0  $\mu\text{m}$ , on average (14.6–)15.8–17.0  $\times$  8.2–9.2  $\mu\text{m}$ ). Therefore we think that *C. merdaria* is not merely a 2-spored form of *C. pubescens*. In that case one would expect that the spores in 2-spored basidiocarps are larger than in 4-spored basidiocarps. Moreover, it seems that in the genus *Conocybe* 2-spored and 4-spored populations usually belong to different species, as is the case in *Coprinus*.

Within sect. *Mixtae*, *Conocybe ambigua* Watling is another 2-spored species with spores in the same size range. However, that species differs from *C. merdaria* in the terrestrial habitat and narrower spores (in collections from the Netherlands (10.0–)10.5–15.5(–16.5)  $\times$  5.5–7.5(–8.5)  $\mu\text{m}$ , on average 12.5–14.0  $\times$  6.3–7.0  $\mu\text{m}$ ) which are moreover subamygdaliform in side-view. The related *C. rubiginosa* Watling has considerably longer spores and also grows on soil.

## 2. *Conocybe magnispora* (Murrill) Singer — Fig. 2

*Galerula magnispora* Murrill, Mycologia 35 (1943) 530; *Conocybe magnispora* (Murrill) Singer, Sydowia 4 (1950) 135.

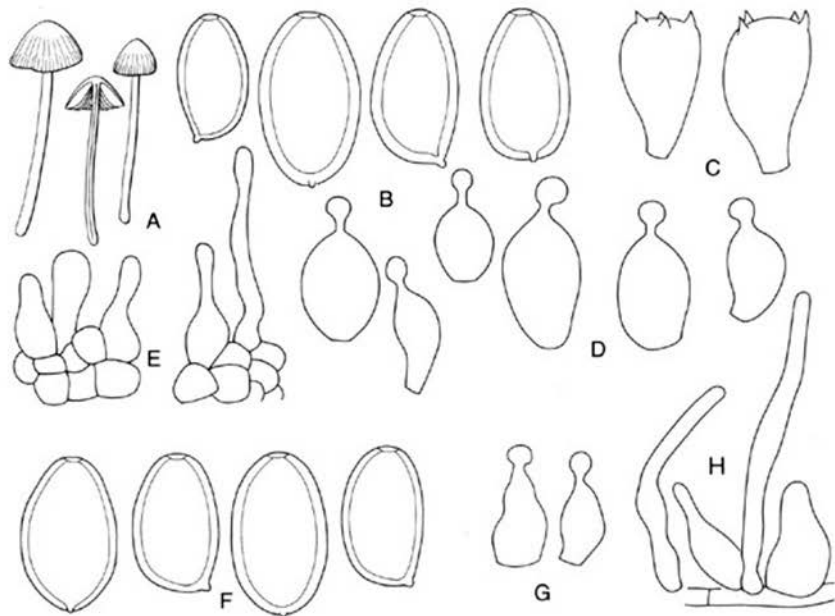


Fig. 2. *Conocybe magnispora*. A. Basidiocarps ( $\times 1$ ); B, F. spores ( $\times 1500$ ); C. basidia; D, G. cheilocystidia; E, H. caulocystidia (all  $\times 1000$ ). (A–E from E. Arnolds 01-58; F–H from W.A. Murrill, 8 March 1942, holotype.)

Pileus 5–12 mm broad, 4–8 mm high, conico-campanulate to hemispherical, only slightly expanding, hygrophanous, when moist and fresh at centre greyish ochre-brown to orangey brown (K. & W. 5D5, 5E6, 6E7), only slightly paler towards margin, translucently striate up to  $3/4$  of the radius, on drying pale ochraceous, pubescent at first, then glabrous. Lamellae,  $L = 14-17$ ,  $l = 3$ , fairly crowded, adnexed, slightly ventricose, ochraceous at first, then rusty brown, with concolorous fimbriate edge. Stipe 18–30  $\times$  0.8–1.5 mm, cylindrical, at base not bulbous, not rooting, whitish at first, then pale straw-yellow to ochraceous, pubescent at least at apex. Context concolorous with surface. Smell and taste weak, not distinctive. Spore print not recorded.

Spores 13.5–20.5  $\times$  7.5–10.5 (–11.0)  $\mu\text{m}$ , av. 14.5–17.0  $\times$  8.3–9.6  $\mu\text{m}$ ,  $Q = (1.5-)$ 1.6–2.0,  $Q$  av. = 1.65–1.85, not flattened, ellipsoid-oblong to ovoid-oblong in frontal view, ellipsoid-oblong to subamygdaliform in side-view, ochre-brown, brownish orange to orange-brown in ammonia, thick-walled (0.5–2.0  $\mu\text{m}$ ) with large, apical pore, 1.8–2.5  $\mu\text{m}$  wide. Basidia 20–28  $\times$  12–14  $\mu\text{m}$ , 4-spored. Lamella edge sterile. Cheilocystidia 17–28  $\times$  6.0–13  $\mu\text{m}$ , lecythiform with subglobose, ellipsoid or clavate basal part, short to moderately long neck (1.0–4.0  $\times$  1.0–1.5  $\mu\text{m}$ ) and small capitulum, 3.0–4.0 (–5.0)  $\mu\text{m}$ . Hymenophoral trama made up of cylindrical hyphae and inflated, globose elements, 6.0–20  $\mu\text{m}$  broad. Pileipellis an epithelioid hymeniderm, made up of clavate and spheropedunculate cells, 29–51  $\times$  11–30  $\mu\text{m}$ . Pileocystidia not seen in exsiccata. Stipitipellis a cutis, made up of parallel hyphae, 2.0–5.0  $\mu\text{m}$  broad, with clusters of caulocystidia.

Caulocystidia predominantly clavate to lageniform,  $16-22 \times 4.0-7.0 \mu\text{m}$ , intermixed with numerous subglobose elements,  $5.0-10.0 \times 4.5-9.0 \mu\text{m}$  and scattered cylindrical hairs up to  $70 \times 2 \mu\text{m}$ ; lecythiform cystidia absent. Clamp-connections present. Chemical reactions: Ammonia reaction negative.

Habitat & distribution — Saprotrophic, solitary or in small groups on dung of horse and cow. In the Netherlands so far only in poor habitats, such as heathland and forest on acidic, sandy soil. Originally described from North America; also recorded from France and Sweden. Febr.–Oct.

*Collections examined.* FRANCE: Dep. Rhône, Lyon, sur un crottin, 22 Feb. 1945, *M. Jossierand* (det. *R. Kühner*) (G, as *Conocybe siliginea* var. *neoantipus*). — THE NETHERLANDS: prov. Drenthe, Emmen, Bargerbos, on horse dung, 2 Oct. 1999, *R. Chrispijn* (L); Westerbork, Orvelte, 'Orvelterzand', on dung of Scottish highland cattle, 12 Sept. 2001, *E. Arnolds* (*Arnolds 01-58*) (L). — SWEDEN: Västmannland, Sala, Skuggan, on horse dung, 3 Aug. 1947, *R. Morander* (UPS, as *Conocybe pubescens*) — USA: Florida, Levy County, Gulf Hammock, on cow dung, 8 March 1942, *W. A. Murrill* (holotype, FLAS); Florida, Alachua County, Gainesville, on cow dung, 8 July 1943, *R. Singer* (F); Tennessee, Knox County, Knoxville, University of Tennessee campus, on horse dung, 24 Feb. 1941, *S. L. Meyer* (det. *L. R. Hesler*) (MICH, as *Conocybe pubescens*).

This is the first report of *Conocybe magnispora* in Europe. This species has originally been described from North America and was later also recorded from South America (Singer, 1950). It is characterized by the very large spores in combination with 4-spored basidia and stipe covering exclusively with cylindrical hairs and clavate to lageniform elements, without lecythiform cystidia.

The second author investigated the holotype and two other collections from the southeastern USA and found no essential differences with the European collections. The spores in the holotype, collected by Murrill, were orange-brown, thick-walled and measured  $15.0-16.5 \times 8.5-10.5 \mu\text{m}$ , on the average  $15.6 \times 9.6 \mu\text{m}$  (Fig. 2F). The stipe was only covered with clavate, lageniform and filiform cystidia (Fig. 2H). In Meyer's collection the spores were intensely ochre-brown, averaging  $15.1 \times 8.7 \mu\text{m}$ , in Singer's collection they were pale reddish brown and measured on the average  $16.0 \times 8.8 \mu\text{m}$ .

*Conocybe magnispora* belongs to section *Pilosellae*. In that section two other species combine very large spores with 4-spored basidia. *Conocybe singeriana* Hauskn. grows also on dung, but differs in much larger basidiocarps with the pileus 10–40 mm and the stipe (45–)60–90(–110) mm with a distinctly bulbous base (Hausknecht & Krisai-Greilhuber, 1997; Arnolds, in prep.). *Conocybe watlingii* Hauskn. is another coprophytic species in this group with very large spores ( $14.5-18.0 \times 7.5-9.5 \mu\text{m}$ , on average  $16.0-16.7 \times 8.5-9.0 \mu\text{m}$ ), but it has a rooting stipe base and the stipe covering is intermixed with some scattered lecythiform cystidia (Hausknecht, 1996).

*Conocybe magnispora* may also be easily confused with *C. pubescens*, a much more common coprophytic species with similar habit and comparable spore size, viz. (13.0–) 14.0–18.5(–20.0)  $\times$  (7.0–)7.5–10.0  $\mu\text{m}$ , on average (14.6–)15.8–17.0  $\times$  8.2–9.2  $\mu\text{m}$ . However, the latter species always has a considerable proportion of lecythiform cystidia among the caulocystidia and therefore belongs to section *Mixtae*.

### 3. *Conocybe farinacea* Watling — Fig. 3

*Conocybe farinacea* Watling, Notes R. bot. Gdn Edinb. 25 (1964) 309.



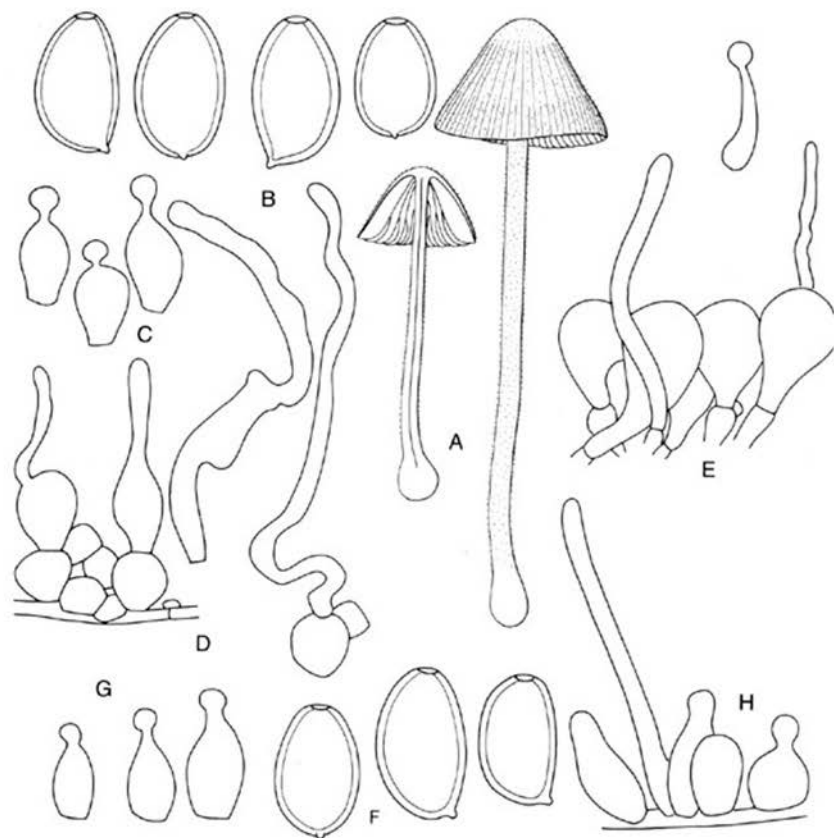


Fig. 3. *Conocybe farinacea*. A. Basidiocarp ( $\times 1$ ); B, F. spores ( $\times 1500$ ); C, G. cheilocystidia; D, H. caulocystidia; E. pileipellis (all  $\times 1000$ ). (A–E from *E. Arnolds 02-18*, F–H from *P.D. Orton*, 6 Oct. 1960, holotype.)

Pileus 18–27 mm broad, 10–20 mm high, conico-campanulate to hemispherical, hygrophanous, when moist at centre rusty brown (K. & W. 7D8), towards the margin paler orange-brown (6D8), translucently striate up to  $3/4$  of the radius, on drying fading to pale orange-brown or slightly greyish orange (5B4, 6C7), pubescent at first, then glabrous, at centre smooth or slightly wrinkled. Lamellae,  $L = 28-33$ ,  $l = 3$ , fairly crowded, adnexed, segmentiform, yellow-brown at first, then orange-brown, with slightly paler fimbriate edge. Stipe 35–78  $\times$  2–4 mm, cylindrical, at base slightly thickened to subbulbous, up to 7 mm thick, not rooting, pale orange (5A5, 5B5), at first pubescent, slightly striate lengthwise, then becoming glabrous. Context concolorous with surface. Smell of entire basidiocarp weak and not distinctive, but readily farinaceous when crushed or cut; taste strongly farinaceous. Spore print not recorded.

Spores 12.0–15.0(–17.0) × 7.0–9.5(–10.5)  $\mu\text{m}$ , av. 13.0–14.1(–15.6) × 7.7–8.4  $\mu\text{m}$ , Q = 1.6–1.9, Q av. = 1.65–1.7, not or weakly flattened, ellipsoid-oblong to ovoid-oblong in frontal view, ellipsoid-oblong to slightly phaseoliform in side-view, brownish orange to rusty brown (5C7, 6D8, 7D8) in ammonia, thick-walled (0.5–2.0  $\mu\text{m}$ ), with large, apical pore, 1.8–2.5  $\mu\text{m}$  wide. Basidia 20–29 × 12–14  $\mu\text{m}$ , 4-spored. Lamella edge sterile. Cheilocystidia 18–25 × 6.0–10.0  $\mu\text{m}$ , lecythiform with ellipsoid or clavate basal part, moderately long neck (2.5–4.5 × 1.5–2.0  $\mu\text{m}$ ) and small capitulum, 3.0–4.5  $\mu\text{m}$  broad. Hymenophoral trama made up of cylindrical hyphae and inflated, globose elements, 4.0–18  $\mu\text{m}$  broad, often with yellow-brown wall. Pileipellis an epithelioid hymeniderm, made up of clavate and spheropedunculate cells, 20–47 × 10–20  $\mu\text{m}$ , often with pale brown pedicel, intermixed with scattered cystidia. Pileocystidia rare to scattered, mainly filiform, up to 60  $\mu\text{m}$  long and 2.5–4.0  $\mu\text{m}$  wide, often tortuous, hyaline or with yellow content; occasionally with few capitate cystidia, c. 23 × 4.5  $\mu\text{m}$  with neck 2.0  $\mu\text{m}$  and capitulum 4.5  $\mu\text{m}$  broad. Stipitipellis a cutis, made up of parallel hyphae, 2.0–6.0  $\mu\text{m}$  broad, with clusters of caulocystidia. Caulocystidia predominantly subglobose and ellipsoid, often in chains, 7.0–14 × 5.0–11  $\mu\text{m}$ , intermixed with clavate and lageniform elements, 16–33 × 4.5–11  $\mu\text{m}$  and scattered cylindrical hairs, 18–160 × 2.0–5.5  $\mu\text{m}$ ; lecythiform cystidia absent or very rare. Clamp-connections present. Chemical reactions: Ammonia reaction negative or weak.

Habitat & distribution — Saprotrophic, solitary or in small groups, in the Netherlands on dung of horse and donkey in woodlands. Also recorded from Great Britain and Iceland. Aug.–Sept.

*Collections examined.* THE NETHERLANDS: prov. Drenthe, Vledder, 'Vledderhof', on horse dung, 2 Aug. 1998, R. Christijn s.n. (L); Vledder, 'Boschoord', on decayed heap of manure of donkey in forest, 24 Aug. 2002, R. Christijn (Arnolds 02-18) (L) — UNITED KINGDOM: Scotland, Perthshire, Rannoch, Dall Wood, 6 Oct. 1960, P.D. Orton (E, holotype); laboratory cultures grown from holotype, Nov. 1960 (L, MICH, NY, UPS); in pure culture on paper pulp, 10 Aug. 1961 (E).

*Conocybe farinacea* was originally described from three localities in Scotland (Watling, 1964) and later collected in the New Forest in England (Watling, 1982). Outside Great Britain it was recorded from Iceland (Watling, 1985), but not from continental Europe. The species is characterized in the first place by the farinaceous smell and taste, a unique feature in the genus *Conocybe*. It should be noticed that in the collection from the Netherlands this smell was absent or weak in undamaged basidiocarps. It became much more apparent when basidiocarps were crushed or cut.

The microscopic characters of the quoted collection were compared with those of the holotype and dried basidiocarps from cultures of the type collection, harvested in 1960 and 1961. All essential characters were similar. The spores in the holotype measured 13.5–17.0 × 7.0–9.5  $\mu\text{m}$ , on the average 15.6 × 8.2  $\mu\text{m}$  (Fig. 3F); the spores in the cultured collection from the holotype in L measured (12.0–)13.0–15.0 × 7.5–9.0  $\mu\text{m}$ , on average 14.1 × 8.3  $\mu\text{m}$ .

In the original description of *C. farinacea*, Watling (1964) stated: "The stipe has long narrow hairs, 1.5–2.5  $\mu\text{m}$  in diameter, as well as similar cells to those on the gill edge and/or elliptical, subglobose, non-capitate and slightly capitate cells". Therefore the species was placed by Watling (1982) in section *Mixtae*. In the collection from the Netherlands lecythiform cystidia were absent on the stipe. In the type collection, the second author found only two slightly capitate caulocystidia (Fig. 3H) and such cells

could not be found at all in the cultured type collections. Therefore we place *C. farinea* in section *Pilosellae*.

*Conocybe farinea* may be confused at first sight with the common coprophytic species *C. pubescens*. The latter species differs not only in the absence of the farinaceous smell, but also in the larger spores, measuring  $(13.0-14.0-18.5-20.0) \times (7.0-7.5-10.0) \mu\text{m}$ , on average  $15.8-17.0 \times 8.3-9.2 \mu\text{m}$ , and the frequent occurrence of lecythiform caulocystidia. Watling (1964) demonstrated that cultures of *C. farinea* are incompatible with cultures of *C. pubescens*, as well with two non-coprophytic species of section *Mixtae*, viz. *C. pseudopilosella* Kühner & Watling (= *C. pulchella* (Velen.) Hauskn. & Svrček) and *C. subpubescens* P.D. Orton (= *C. digitalina* (Velen.) Singer).

Within section *Pilosellae*, *Conocybe singeriana* Hauskn. shows much resemblance to *C. farinea*. *Conocybe singeriana* is also a coprophytic species with rather robust basidiocarps. It differs in the absence of a mealy smell, a strongly bulbous stipe base, 5–12 mm broad, and broader spores, measuring  $(12.0-13.0-17.0-18.5) \times (7.0-8.0-11.0) \mu\text{m}$ , on average  $14.0-16.5 \times 8.2-9.7 \mu\text{m}$  (Hausknecht & Krisai-Greilhuber, 1997; Arnolds, in press).

#### 4. *Conocybe incarnata* (Schaeff.) Hauskn. & Arnolds, *comb. nov.* — Fig. 4, 5

Basionym: *Galera incarnata* Schaeff., Z. Pilzk. 9 (1930) 165.

Misapplied names. *Conocybe siliginea* var. *fragilis* sensu Kühner, Genre Galera (1935) 112; *Conocybe fragilis* sensu Watling, Br. Fung. Fl. 3 (1982) 76, sensu Mos., Röhrlinge Blätterpilze 5. Aufl. (1983) 282, sensu auct. Eur.

Pileus 7–20 mm broad, 5–12 mm high, obtusely conical to campanulate, then conico-convex, hygrophanous, when fresh and moist pinkish red to wine red or brick red at first, then discolouring to brown-red or flesh-coloured brown, finally losing all red colour, translucently striate up to half of the radius or more, rapidly drying and becoming non-striate, pallescent to flesh-coloured or ochraceous-vinaceous, dull, glabrous. Lamellae, L = 18–28, l = 3, fairly crowded to crowded, slightly ventricose, ochraceous at first, then orange-brown to rusty brown, with slightly paler, fimbriate edge. Stipe 25–50 × 0.7–1.5 mm, cylindrical with base tapering into a pseudorhiza up to 30 mm long, fistulose, pink to vinaceous, then becoming brown-red from the base upwards, minutely pruinose-striate and pubescent, in particular near apex. Context concolorous with surface, fragile. Smell and taste weak, not distinctive. Spore print orange-brown.

Spores  $(7.0-7.5-10.0) \times 4.0-5.5(-6.0) \mu\text{m}$ , av.  $7.9-9.0 \times 4.5-5.8 \mu\text{m}$ , Q = 1.6–1.9, Q av. = 1.65–1.8, not or weakly flattened, ellipsoid- to ovoid-oblong, in side-view occasionally slightly amygdaliform, yellow-brown to pale orange-brown (5C7, 6B6/C6, 6C7) in ammonia, slightly thick-walled ( $\pm 0.5 \mu\text{m}$ ), with central germ pore, 1.0–1.5  $\mu\text{m}$  wide. Basidia 14–20(–25) × 6.0–9.0  $\mu\text{m}$ , clavate, 4-spored. Lamella edge sterile or heterogeneous. Cheilocystidia 13–20(–25) × 5.0–9.0  $\mu\text{m}$ , lecythiform with subglobose to clavate basal part, rather short neck (1.0–3.5 × 1.0–1.5  $\mu\text{m}$ ) and small capitulum, 3.0–4.5  $\mu\text{m}$  broad. Pleurocystidia absent. Hymenophoral trama made up of cylindrical and inflated elements, 4.0–20  $\mu\text{m}$  broad, with hyaline or pale yellow wall. Pileipellis an epithelioid hymeniderm, made up of clavate and spheropedunculate elements, 23–50 × 10–32  $\mu\text{m}$ , some with brownish, slightly thick-walled pedicel, in fresh basidiocarps with reddish intracellular pigment. Pileocystidia absent. Stipitipellis a cutis of cylindri-

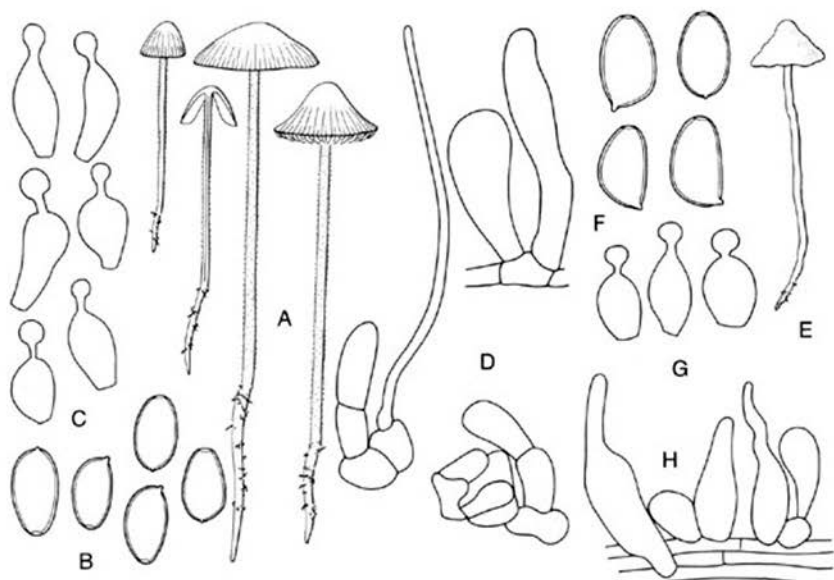


Fig. 4. *Conocybe incarnata*. A. Basidiocarps ( $\times 1$ ); B, F. spores ( $\times 1500$ ); C, G. cheilocystidia; D, H. caulocystidia (all  $\times 1000$ ); E. dried basidiocarp ( $\times 1$ ). (A–D from J. Daams 520; E–H from J. Schäffer, 1929, holotype.)

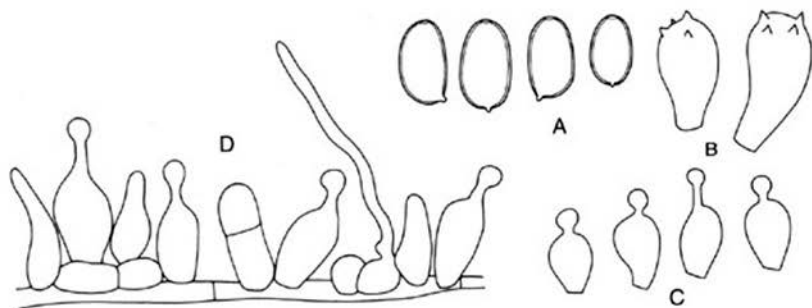


Fig. 5. *Conocybe fragilis*. A. spores ( $\times 1500$ ); B. basidia; C. cheilocystidia; D. caulocystidia; (all  $\times 1000$ ). (A–D from E. Bartholomew 2313, holotype.)

cal hyphae,  $2.0\text{--}7.0\ \mu\text{m}$  broad, with hyaline or pale yellow wall, with clusters of caulocystidia. Caulocystidia predominantly globose to broadly clavate,  $6.0\text{--}18 \times 5.0\text{--}10\ \mu\text{m}$ , also with longer, narrowly clavate and subcylindrical elements,  $20\text{--}38 \times 6.0\text{--}10\ \mu\text{m}$ , and with thin, cylindrical hairs up to  $120\ \mu\text{m}$  long,  $1.0\text{--}2.0\ \mu\text{m}$  broad; lecythiform cystidia lacking. Clamp-connections present but scarce and difficult to find. Chemical reactions: Ammonia reaction negative.

**Habitat & distribution** — Saprotrophic, solitary or gregarious to subfasciculate, on compost or humus-rich soil, also when mixed with wood chips, in disturbed places very rich in nutrients, such as gardens, orchards, fields, lawns and flower-beds. Also in unheated glasshouses with e.g. cucumber. In the Netherlands very rare. Also recorded from Austria, Germany and Finland. Outside buildings Aug.–Oct., in glasshouses the entire year.

*Collections examined.* AUSTRIA: Niederösterreich, Krems-Land, Dross (MTB 7559/1), 5 Aug. 1989, A. Hausknecht (WU 22743). — FINLAND: Etelä-Häme, Jämsä, Lokalaiti, 9 Sept. 2001, L. Kosonen et al. (WU 21897). — GERMANY: Brandenburg, Potsdam, Ruinenbergerstrasse 25, 1929, J. Schäffer (UPS, holotype). — THE NETHERLANDS: prov. Noord-Holland, 's Graveland, 'Boekensteijn', 9 Oct. 1967, J. Daams s.n. (L); Idem, 20 Sept. 1969, J. Daams 520 (L); Idem, 13 Aug. 1971, J. Daams 71-204 (L); Kortenhoef, glasshouse 'Steenvoorde', 26.III.1971, J. Daams 71-62 (L).

*Conocybe incarnata* is a striking and beautiful species with its pink to vinaceous pileus. Another important diagnostic character is the clearly rooting base of the stipe. Schäffer (1930) supposed that his *Galera incarnata* could be identical with *Galera fragilis* Peck, described from North America. This hypothesis was accepted by Kühner (1935), who therefore named the European collections *Conocybe fragilis* (Peck) Singer. That name was also adopted by Watling & Gregory (1981), Watling (1982), Moser (1983) and other European authors, although nobody compared the European collections with the type of *C. fragilis* from North America. The American mycologist Hesler indicated already in unpublished notes that the stipe in the holotype of *Galera fragilis* is covered with numerous lecythiform cystidia, intermixed with few non-lecythiform cystidia and cylindrical hairs. Recent examination of the type collection [USA, Kansas, Rooks County, on ground in short grass, *E. Bartholomew 2313* (NYS)] by the second author confirmed this observation (Fig. 5D). In addition, three specimens in this collection had a slightly bulbous stipe base without pseudorhiza.

In the well-preserved holotype of *Conocybe incarnata*, lecythiform caulocystidia are completely lacking. The stipe covering is a mixture of non-lecythiform elements and hairs (Fig. 4H). In addition, at least two out of six type specimens show a distinct, although broken, pseudorhiza (Fig. 4E). This character of great taxonomic significance was neither mentioned in the original description, nor noticed by other authors. Also the studied collections from the Netherlands, Austria and Finland show a stipe without lecythiform cystidia and a pseudorhiza up to 30 mm long. The spores in the type collection of *C. incarnata* measured  $7.0\text{--}9.5 \times 4.5\text{--}6.0 \mu\text{m}$ , on the average  $8.7 \times 5.2 \mu\text{m}$  (Fig. 4F). The size of the spores in the type of *Galera fragilis* was almost identical, measuring  $8.5\text{--}10.0 \times 5.0\text{--}6.0 \mu\text{m}$ , on the average  $9.1 \times 5.4 \mu\text{m}$  (Fig. 5A). However, the spores of *C. incarnata* have a considerably larger germ pore ( $1.0\text{--}1.5 \mu\text{m}$ ) than the spores of *C. fragilis* ( $0.5\text{--}0.8 \mu\text{m}$ ).

It is evident that *C. fragilis* and *C. incarnata* are distinct species that are probably not even closely related: In view of the stipe covering the former species belongs to section *Mixtae* whereas *C. incarnata* is a member of section *Pilosellae*.

## 6. *Pholiotina sulcata* Arnolds & Hauskn., *spec. nov.* — Fig. 6, 7

Pileus 6–18 mm latus, plane convexus, distincte umbonatus, centro cinnamomeus, castaneus, margine pallidior flavo-brunneus, ochraceo-brunneus, hygrophanus, margine ad medium pilei striatus et undulate sulcatus, partim incisus, margo leviter inflexus. Lamellae anguste adnatae,

aliquantum distantes, ventricosae, flavo-brunnescentes, demum pallide brunneae, acies lamellarum indistincte, leviter inaequalis. Stipes 25–35 mm longus, 1–1.2 mm latus, filiformis, cylindraceus, basi leviter inflata, stramineus, pallide ochraceo-brunnescentis, parte superiore pruinatus, cetera glaber. Caro concolor, odore infirmo Pelargonio simile. Sporae  $6.8-8.7 \times 4.2-5.2 \mu\text{m}$ , in medio  $7.8 \times 4.8 \mu\text{m}$ ,  $Q = 1.4-1.9$ ,  $Q \text{ av.} = 1.6$ , ellipsoideae, interdum leviter phaseoliformes, pallide brunneo-aurantiacae in potassio hydroxydico, pariete leviter incrassata et distincte poro germinativo ca.  $1.0 \mu\text{m}$  lato. Basidia  $17.5-24 \times 7.0-9.0 \mu\text{m}$ , tetrasporigera, clavata. Acies lamellarium sterilis vel heterogenea. Cheilocystidia  $26-45 \times 6.5-11.5 \mu\text{m}$ , lageniformia rostro longo cylindraceo  $3-5 \mu\text{m}$  lato, nonnullis elementis sphaeropedunculatis  $-15 \times 10 \mu\text{m}$  immixtis. Pleurocystidia nulla. Caulocystidia  $17-50 \times 5.0-12 \mu\text{m}$ , amplitudine formaque admodum variabilia. Pileipellis hymeniformis elementis pyriformibus ad sphaero-pedunculatis  $12-22 \mu\text{m}$  lato consistens, basi pigmento incrustato. Pileocystidia nulla. Fibulae adsunt sed rarissimae. Saprophyticus, gregarius, in pratis macilentis calcareis.

Holotypus: Germany, Bayern, Weissenburg-Gunzenhausen, 'Kmenathen', 14.IX.1993, A. Hausknecht et al. (WU 22742).

Misapplied names. *Conocybe plicatella* sensu Kühner, Genre Galera (1935) 137, Watling in Br. Fung. Fl. 3 (1982) 84, sensu auct. eur.; *Galerella plicatella* sensu Mos., Röhrlinge Blätterpilze 5. Aufl. (1983) 282, sensu auct. eur. — *Bolbitius luteolus* sensu Rick., Blätterpilze (1915) 69.

Pileus 6–18 mm broad, convex to plano-convex with obtuse umbo; margin strongly and irregularly plicate-sulcate up to 3/4 of the radius, splitting in places; hygrophamous, when moist orangey brown or pale reddish brown (K. & W. 7D6, 8D5) with red-brown centre (8E8, 9E6), on drying ochraceous to flesh-coloured brown. Lamellae, L = 16–25, l = 1–3, moderately crowded, adnexed, slightly ventricose, yellow-brown, then pale brown to rusty brown with slightly paler, flocculose edge. Stipe 25–37  $\times$  1–2.5 mm, cylindrical with slightly swollen base, fistulose, pale ochre-yellow to pale flesh-coloured, minutely white striate lengthwise, minutely pruinose at apex. Context concolorous. Smell weak, not distinctive or reminding *Pelargonium* leaves. Taste not recorded. Spore print not recorded.

Spores  $(6.5-7.5-10.0(-10.5) \times 4.0-5.5 \mu\text{m}$ , av.  $7.3-8.9 \times 4.7-5.1 \mu\text{m}$ ,  $Q = 1.4-2.0$ ,  $Q \text{ av.} = 1.45-1.85$ , not flattened, ellipsoid, ellipsoid-oblong to subamygdaliform or sometimes slightly phaseoliform in side-view; ellipsoid to ovoid or oblong in frontal view, brownish orange to orange-brown (5C7, 6D8) in ammonia, slightly thick-walled with small, central to slightly eccentric germ pore,  $1.0-1.3 \mu\text{m}$  wide. Basidia  $16-24 \times 7.0-10.5 \mu\text{m}$ , clavate, 4-spored, 2-(1)-spored or 4- and 2-(1)-spored intermixed. Lamella edge almost sterile. Cheilocystidia  $24-56 \times 6.5-14 \mu\text{m}$ , lageniform, strongly variable in shape and size, mostly with long, cylindrical neck,  $2.5-4.0 \mu\text{m}$  broad, often subcapitate, apex up to  $7.0 \mu\text{m}$  broad, also with short thick neck, intermixed with some pyriform and spheropedunculate cells,  $14-25 \times 8.0-12 \mu\text{m}$  and scattered basidia. Pleurocystidia absent. Hymenophoral trama made up of cylindrical and inflated elements,  $3.0-30 \mu\text{m}$  broad, with hyaline to yellow-brown encrusted wall. Pileipellis an epithelioid hymeniderm made up of pyriform and spheropedunculate cells,  $17-42 \times 10-26 \mu\text{m}$  with pale brown walls; stalk often with brown encrusted pigment. Pileocystidia absent. Stipitipellis a cutis of hyaline or pale yellow, repent hyphae,  $2.0-6.0 \mu\text{m}$  broad with scattered to clustered caulocystidia. Caulocystidia  $17-53 \times 5.0-14 \mu\text{m}$ , quite variable in size and shape, mainly lageniform with short to long neck,  $3.0-6.5 \mu\text{m}$  broad, not capitate, also subcylindrical and clavate; in addition many small, subglobose cells up to  $10 \mu\text{m}$  broad. Clamp-connections absent.

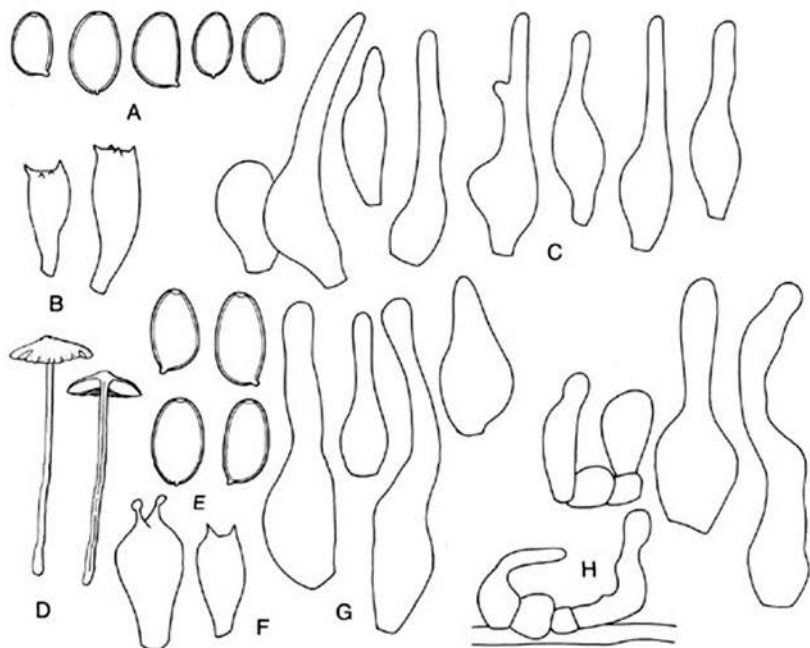


Fig. 6. *Pholiotina sulcata*. A, E. spores ( $\times 1500$ ); B, F. basidia; C, G. cheilocystidia ( $\times 1000$ ); D. basidiocarp ( $\times 1$ ). (H. caulocystidia ( $\times 1000$ ); A–C from *Hausknecht et al.*, 14 Sept. 1993, holotype; D–H from *E. Arnolds 6708*.)

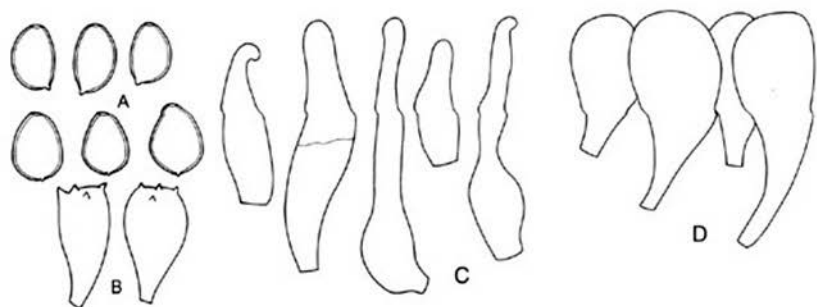


Fig. 7. *Agaricus plicatellus* ('coprinoides'). A. Spores ( $\times 1500$ ); B. basidia; C. cheilocystidia; D. pileipellis (all  $\times 1000$ ). (A–D from *C.H. Peck s.n.*, holotype.)

Habitat & distribution — Saprotrophic, solitary or in small groups in unfertilized pastures on dry, weakly acid to basic, often calcareous loam. In the Netherlands very rare in southern Limburg, Sept.–Oct. Widespread in Central Europe but rare.

*Collections examined.* AUSTRIA: Niederösterreich, Horn, Sonndorf (MTB7460/2), 6 Oct. 1984, A. Hausknecht (WU 8415). — GERMANY: Bavaria, Weissenburg-Gunzenhausen, Kemnathen, 14 Sept. 1993, A. Hausknecht et al. (WU 22742, holotype); same loc., 27 Sept. 1995, A. Hausknecht & F. Reinwald (WU 14468). — HUNGARY: Mátra Mountains, near Parádk, 25 Sept. 1968, M. Babos et al. (HUN 44194, HUN 44195); Hajdu-Bihar, Hortobágy, Ujszentmargita, 6 Oct. 1976, M. Babos et al. (HUN 56042). — THE NETHERLANDS: prov. Limburg, Wittem, Nijswiller, 22 Oct. 1995, Arnolds 6708 (L); Epen, Cottessen, 27 Oct. 2001, Arnolds 01-170 (L).

The Latin diagnosis is based on the type collection (also Fig. 6A–C). The English description is a compilation of data of all collections studied by us.

*Pholiotina sulcata* is a characteristic species with its soon expanding pileus that is irregularly sulcate-plicate, often also split at the margin in places. In view of the absence of any veil it belongs to *Pholiotina* section *Piliferae* (Kühner) Singer. The collections from the Netherlands differ from most earlier descriptions in the presence of exclusively 2-spored or mixed 4- and 2-spored basidia. This variation explains the large range in spore size in this species (Fig. 6A, E). Also Kühner (1935: 139) described a collection (as *Conocybe plicatella*) with partially 2-spored basidia. The exclusively 4-spored and 2-spored collections do not deserve a taxonomic status since many basidiocarps combine variable proportions of the two types of basidia. It is a notable exception within the Bolbitiaceae where usually 4- and 2-spored taxa are clearly separated and distinguished in the rank of species.

*Pholiotina sulcata* has been synonymised by European authors with the North American species *Agaricus plicatellus* Peck in the past. That name was introduced by Peck in 1878 in order to replace the name *Agaricus coprinoides* Peck (1873), a later homonym of *Agaricus coprinoides* Corda 1831, representing a quite different fungus. *Agaricus coprinoides* was originally described by Peck (1873) as a small agaric with “membranaceous, soon expanded pileus, often split on the margin, plicate-sulcate to the small even disk, yellowish inclining to ochre ... the appearance of the pileus is suggestive of some of the smaller Coprini”. The aberrant appearance of the basidiocarps was reason for Earle (1909) to erect the genus *Galerella*, typified by *Agaricus coprinoides* Peck. Singer (1951) accepted this genus in his world wide survey of Agaricales.

The second author studied the holotype (New York State, Cayuga County, Sterling, C.H. Peck, NYS) and concluded that the pileus surface in *Galerella plicatella*, as well as in other tropical species assigned to *Galerella*, is in fact completely different from that of *Pholiotina sulcata*. In *Galerella* the pileus margin is minutely and regularly crenulate and the pileus is deeply and densely sulcate-striate up to the centre, as in *Coprinus plicatilis* and allies (see also Thomas et al., 2001; Horak & Hausknecht, 2002). In *Pholiotina sulcata* the pileus margin is irregularly wavy-lobed and sulcate only in places up to a variable proportion of the radius. It does not remind to *Coprinus* spp. at all. Watling & Gregory (1981) already noticed that the European collections, named *Conocybe* or *Galerella plicatella*, are ‘doubtfully the same’ as the North American species. Watling studied also the type collection of *Agaricus coprinoides* Peck and added a note to the exsiccatum, reading: “After examining European material attributed to this species I doubt



whether this fungus has even been seen in Europe". More extensive research is needed to evaluate whether *Galerella* deserves the status of an independent genus.

*Pholiotina sulcata* and *Galerella plicatella* differ also in some microscopic characters. The spores in the latter species are clearly flattened and in part slightly rhomboid to slightly hexagonal in frontal view, measuring  $7.0\text{--}8.5 \times 5.0\text{--}6.0 \times 4.5\text{--}5.0 \mu\text{m}$ , on the average  $7.4 \times 5.5 \times 4.6 \mu\text{m}$  in the type collection (Fig. 7A). The cheilocystidia are rather similar. In the type of *G. plicatella* they are lageniform and measure  $20\text{--}50 \times 7.0\text{--}10 \mu\text{m}$  with a neck  $3.0\text{--}5.0 \mu\text{m}$  broad (Fig. 7C).

#### ACKNOWLEDGEMENT

This study has been carried out for the project Flora agaricina neerlandica with financial support by the Rijksherbariumfonds Dr. Kits van Waveren.

#### REFERENCES

- Arnolds, E. In prep. Conocybe & Pholiotina. In: M.E. Noordeloos, Th.W. Kuyper & E.C. Vellinga (eds), Flora agaricina neerlandica 6.
- Earle, F.S. 1909. The genera of the North American Gill Fungi. Bull. N.Y. bot. Gdn 5: 373–451.
- Hausknecht, A. 1996. Beiträge zur Kenntnis der Bolbitiaceae 3. Europäische Conocybe-Arten mit wurzelnden oder tief im Substrat eingesenktem Stiel. Österr. Z. Pilzk. 5: 161–202.
- Hausknecht, A. & I. Krisai-Greilhuber. 1997. Some rare Agaricales with brown or darker spores. Fungi non delineati 2:1–32. Alasio.
- Horak, E. & A. Hausknecht. 2002. Notes on extra-European taxa of Bolbitiaceae (Agaricales, Basidiomycota). Österr. Z. Pilzk. 11: 213–264.
- Kühner, R. 1935. Le genre Galera. Encyclopédie mycologique 7. Paris.
- Moser, M. 1983. Kleine Kryptogamenflora, Die Röhrlinge und Blätterpilze, 5. Aufl. Gustav Fischer Verlag, Stuttgart, New York.
- Peck, C.H. 1873. Descriptions of new species of fungi. Bull. Buffalo Soc. Nat. Sciences, 1873–1874: 41–72.
- Peck, C.H. 1878. Twenty-ninth annual report on the New York State Museum of Natural History: 29–82. New York.
- Schäffer, J. 1930. Die Sammelhäubchen (Galera). Z. Pilzk. 9: 163–174.
- Singer, R. 1950. New and interesting species of Basidiomycetes III. Sydowia 4: 130–157.
- Singer, R. 1951 ('1949'). The 'Agaricales' (Mushrooms) in Modern Taxonomy. Lilloa 22: 1–832.
- Thomas, K.A., A. Hausknecht & P. Manimohan. 2001. Bolbitiaceae of Kerala State, India: New species and new and noteworthy records. Österr. Z. Pilzk. 10: 87–114.
- Watling, R. 1964. Observations on the Bolbitiaceae I. A new species of Conocybe. Notes R. bot. Gdn Edinb. 25: 309–312.
- Watling, R. 1982. Bolbitiaceae: Agrocybe, Bolbitius & Conocybe. In: British Fungus Flora 3: 1–139.
- Watling, R. 1985. The Agaricales of Iceland (Íslenzkir Hattveppir) VI. Icelandic species of Bolbitiaceae. Observations on the Bolbitiaceae 25. Acta bot. Isl. 8: 3–19.
- Watling, R. & N.M. Gregory. 1981. Census Catalogue of World Members of the Bolbitiaceae. Bibliotheca Mycologica 82. Vaduz.

## PHAEOTRICHOSPHAERIA MINOR SPEC. NOV. FROM ARGENTINA

A.I. ROMERO & C.C. CARMARÁN

Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Pabellón 2, 4to piso, C 1428 EHA Buenos Aires, Argentina.  
E-mail: romero@bg.fcen.uba.ar

A new species of ascomycetes, *Phaeotrichosphaeria minor*, is described, illustrated and compared with the closely related species within the genus and a modified key is given.

A new species of ascomycetes was found amongst collections obtained during the ongoing study of the ascomycetes of Argentina (Romero, 1987, 1998; Romero & Samuels, 1991; Romero & Carmarán, 1997; Romero et al., 1999). This species is identified as a member of the genus *Phaeotrichosphaeria* Sivan. It is still uncertain in which order and family this genus should be placed. Barr (1990) placed it in Sordariales, Lasiosphaeriaceae, although Réblová (1999) arranged it in Trichosphaeriales, Trichosphaeriaceae, mainly based on characters of the peridial wall, asci, ascospores and conidiogenesis of the anamorph.

*Phaeotrichosphaeria* was erected to accommodate some unitunicate pyrenomycetes with *Endophragmiella* anamorphs (Sivanesan & Sharma, 1983). It contained three species, *Phaeotrichosphaeria indica* Sivan. & N.D. Sharma from India, being the type species, *P. hymenochaeticola* Sivan. & N.D. Sharma from New Zealand and *P. britannica* Sivan. & N.D. Sharma from England.

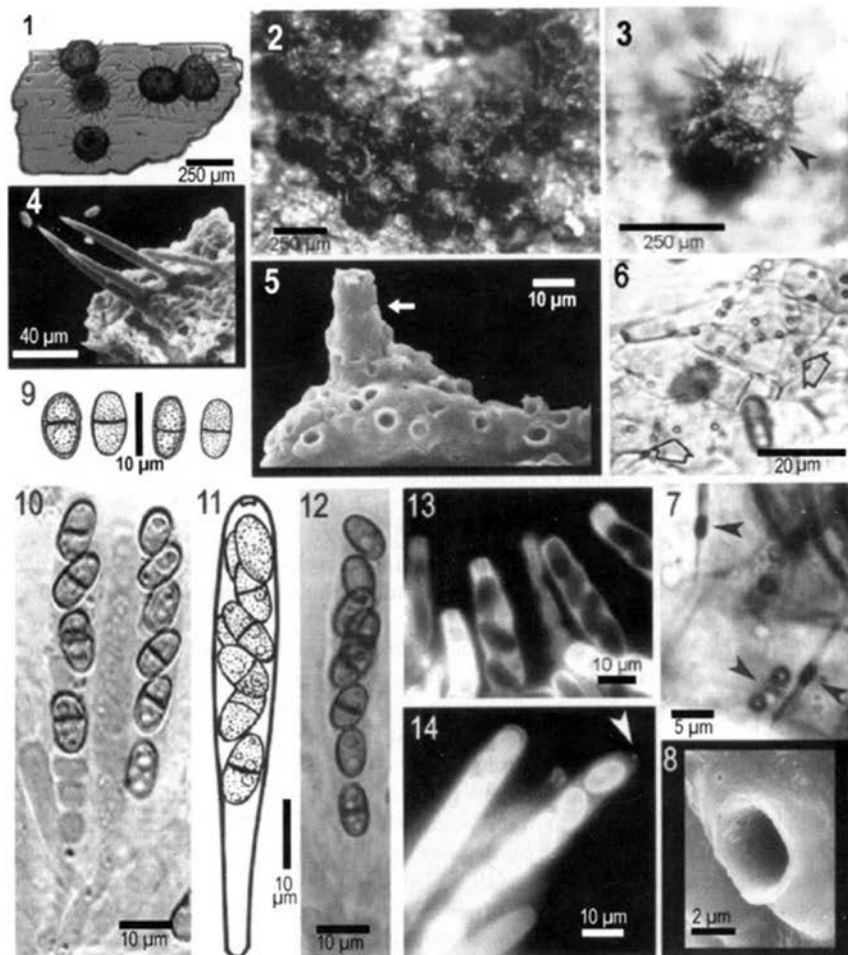
One remarkable feature of this new taxon is the presence of peridial pores. These pores are apparently similar to Munk pores, which are hitherto known only in Vialaeaceae and certain groups of the Sordariales, notably Nitschkiaceae and a few species of the Lasiosphaeriaceae. Cannon (1995) listed fungi with this kind of pore and also studied their systematic significance.

This Argentine fungus is unique on account of a combination of ascus and ascospores morphology and peridial pores. After the examination of holotypes of the species belonging to the genus *Phaeotrichosphaeria*, we conclude that it is a new species which is described here.

### MATERIAL AND METHODS

The material considered here is deposited at the BAFC and IMI herbaria. Specimens from IMI (herbarium abbreviations follow Holmgren et al., 1990) were also studied.

The specimens mounted in KOH and floxine were studied under bright field microscopy (M). The asci were observed with fluorescence microscope (EFM) using 5% calcofluor (Romero & Minter, 1988). The peridium was examined by scanning electronic microscopy (SEM). The drawings were made using a camera lucida and the photographs were taken with Tri X Pan 400 ASA film for fluorescence.



Figs. 1–14. *Phaeotrichosphaeria minor*. 1. Habit sketch of ascomata; 2. ascomata; 3. detail of perithecium (arrow = ostiole); 4. portion of peridium with setae (SEM); 5, 6. detail of peridium showing the pores (5: arrow shows a base of a seta, SEM; 6: M); 7. peridial pores in lateral view and two pores in top view (arrows); 8. detail of a pore (SEM); 9. ascospores; 10–14. asci (13, 14: note the apical ring, arrow, EFM).

***Phaeotrichosphaeria minor*** A.I. Romero & Carmarán, *spec. nov.* — Figs. 1–14

*Phaeotrichosphaeria indica* similis sed ascosporis differti in 7–12 × 5–6 µm. Asci cylindrici 70–90 × 8–10 µm. Status conidialis: ignoto.

Holotypus: Argentina, Salta province, Departamento La Caldera, at 6 km of the boundary of Jujuy province, on National Route 9, on fallen branch, 11.VII.1994, *Carmarán* (BAFC 50390, holotypus; IMI 385826, isotypus).

Etymology: referring to the small size of the ascospores.

Perithecia superficial, separate and scattered or in groups of 2–4 or densely crowded, globose, 160–300  $\mu\text{m}$ , bearing numerous setae, ostiolate with an apical shortly papillate pore lined on the inside by hyaline periphyses. Setae straight or flexuous, brown, cylindrical, septate, simple, 70–105  $\mu\text{m}$  long, 7–10  $\mu\text{m}$  wide at the base. Peridium 10–30  $\mu\text{m}$  thick, composed of polygonal, brown, thick-walled cells which become progressively less thick-walled, subhyaline to hyaline and compressed towards the interior. Munk pores 1–3  $\mu\text{m}$  wide, prominent, with thick, reddish rim, appearing as dark rings. Paraphyses filiform, hyaline, persistent. Asci arising from a basal hymenium, cylindrical, short-stalked, 8-spored, unitunicate, 70–90  $\times$  7–10  $\mu\text{m}$  with a non-amyloid thin plate-like apical structure. Ascospores uniseriate in the ascus, 0–1 septate, not constricted at the septum, smooth, pale brown when mature, somewhat thick-walled, 7–12  $\times$  5–6  $\mu\text{m}$ .

Anamorph unknown.

#### ADDITIONAL SPECIES EXAMINED

*Phaeotrichosphaeria indica*. INDIA: Narsungpur, Bohami, 17.XI.1978, N.D. Sharma 6c (IMI 232780, holotype).

*Phaeotrichosphaeria britannica*. UNITED KINGDOM: Surrey, Ranmore, on *Quercus* wood, 14.XII.1947, S.J. Hughes (IMI 20032g, holotype).

*Phaeotrichosphaeria hymenochaeticola*. NEW ZEALAND: Centennial, track, Upper Piha Valley, Waitakere Range, on *Hymenochaete mougeotii*, 2.V.1963, J.M. Dingley DAOM 159752 (IMI 259002, slide of the holotype).

*Nitschkia phaeospora*. TAIWAN: Ilan, IV.1995 (IMI 371137, holotype).

#### DISCUSSION

The taxonomic position of this fungus has been difficult to ascertain. In the type of ascus, especially the structure of the apical ring, it resembles members of the Sordariales. The presence of an ostiole and of peridial pores further suggest the family Lasiosphaeriaceae (Barr, 1990). Réblová (1999) placed *Phaeotrichosphaeria* in the Trichosphaeriaceae but she did neither study the type nor notice the presence of peridial pores. Nevertheless, our examination of the holotype of *Phaeotrichosphaeria indica* Sivan. & N.D. Sharma revealed the presence of these peridial pores and until more research is done we follow Barr (1990) and place *Phaeotrichosphaeria* in Lasiosphaeriaceae.

The asci and ascospores of *Phaeotrichosphaeria indica* and *P. minor* are both very similar but *P. indica* has larger perithecia, asci and ascospores than *P. minor*. Furthermore, the ascomata of *P. indica* are completely covered by hyphal hairs and they also differ in the type of peridial pores. In *P. indica* these are simple holes, one or two per cell, which are very easy to overlook. They were not described by Sivanesan & Sharma (1983). In *P. minor* the pores are very abundant along the peridial cells (Figs. 5, 6), conspicuous, one or more per cell and very evident with a dark red rim around the hole (Fig. 7). According to Sivanesan & Sharma (1983) the anamorph of *P. indica* is *Endophragmiella* spec. We could not affirm that *P. minor* also has an *Endophragmiella* anamorph but some free conidia of the *Endophragmiella* type are present around the perithecia.

Peridial pores are also present in the other two species of *Phaeotrichosphaeria*, *P. britannica* and *P. hymenochaeticola*. But in longitudinal section of the ascoma they can be hardly seen and are very scarce, only one or two in very few cells. These pores are very simple, similar to those of *P. indica* and even more inconspicuous. It is necessary to examine additional specimens of all species to confirm the presence of pores in the genus.

Sivanesan & Sharma (1983) suggested a close relationship between *Phaeotrichosphaeria* and *Lasiosphaeria*. The occurrence of peridial pores in this genus and in *Lasiosphaeria* (Cannon, 1995) reinforces this suggestion.

The peridial pores and the dark, 1-septate ascospores also invite comparison with *Nitschkiia phaeospora* described from Taiwan (Hsieh et al., 1998). However, the asci are different: in Nitschkiaceae they are simple without any apical structure, in the new species *Phaeotrichosphaeria minor* there is an apical ring. The presence of an ostiole in *P. minor* further suggests that it cannot be referred to the Nitschkiaceae.

KEY TO THE SPECIES OF PHAEOTRICHOSPHERIA  
(modified from Sivanesan & Sharma, 1983)

- 1a. Ascospores 0–1 septate, smooth ..... 2  
 b. Ascospores aseptate, echinulate ..... 3  
 2a. Ascospores 15–18(–20) × 8–10 μm. Peridial pores simple ..... *P. indica*  
 b. Ascospores 7–12 × 5–6 μm. Peridial pores with rim ..... *P. minor*  
 3a. Ascospores 8–9 × 3.5–5.5 μm ..... *P. hymenochaeticola*  
 b. Ascospores 12.5–18.5 × 5–7 μm ..... *P. britannica*

ACKNOWLEDGEMENTS

We are especially appreciative of the efforts of Dr. M. Barr in examining some of these fungi and giving us the benefit of her great knowledge of ascomycetes. Also the authors would like to express their gratitude to Dr. Paul Cannon and to Lic. Silvana Sede for their collaboration. We are grateful to the Curator of IMI Herbarium for the loan of type material. Thanks to Gillette SA Argentina for providing us with blades and to Becette DeCamillis Sistemas SA as well.

This is publication No. 155 of the PRHIDEB, financed by the Argentine National Research Council.

REFERENCES

- Barr, M.E. 1990. Melanommatales (Loculoascomycetes). North American Flora. Series II. Part 13.  
 Cannon, P.F. 1995. Studies on fungi with isthmoid ascospores: the genus *Vialaea*, with the description of the new family *Vialaeaceae*. Mycol. Res. 99: 367–373.  
 Holmgren, P.K., N.H. Holmgren & L.C. Barnett. 1990. Index Herbariorum. Part I: The Herbaria of the World. New York Botanical Garden.  
 Hsieh, W.H., C.Y. Chen & A. Sivanesan. 1998. Six new ascomycetes from Taiwan. Mycol. Res. 102: 228–234.  
 Réblová, M. 1999. Studies in Chaetosphaeria sensu lato III. Umbrinosphaeria gen. nov. and Myoshiella with Sporidesmium anamorphs. Mycotaxon 71: 13–43.  
 Romero, A.I. 1987. Contribución al estudio de los hongos xilófilos de la Argentina. II. Ascomycotina en Eucalyptus viminalis. Darwiniana 28: 251–270.

- Romero, A.I. 1998. Clave de las especies de micromicetes xilófilos, registrados sobre *Eucalyptus viminalis* Labili en el NE de la provincia de Buenos Aires (Argentina). Bol. Soc. Micol. Madrid 23: 47-89.
- Romero, A.I. & C.C. Carmarán. 1997. Algunos micromicetes xilófilos de la región subtropical Argentina. I. Misiones. Bol. Soc. Argent. Bot. 33: 59-67.
- Romero, A.I., C. C. Carmarán & L. E. Lorenzo. 1999. A new species of Coniochaeta with a key to the species known in Argentina. Mycol. Res. 103: 689-695.
- Romero, A.I. & D.W. Minter. 1988. Fluorescence Microscopy: An aid to the elucidation of ascomycete structures. Trans. Br. Mycol. Soc. 90: 457-470.
- Romero, A.I. & G. Samuels. 1991. Studies on xilophilous fungi from Argentina. V. Ascomycotina on *Eucalyptus viminalis*. Sydowia 43: 228-248.
- Sivanesan, A. & N.D. Sharma. 1983. Studies on Ascomycetes. Trans. Br. Mycol. Soc. 81: 313-332.

## BOOK REVIEW

G.J. Krieglsteiner (ed.). *Die Grosspilze Baden-Württembergs. Band IV: Ständerpilze: Blätterpilze II.* (Verlag Eugen Ulmer GmbH & Co., Wollgrasweg 41, D-70599 Stuttgart (Hohenheim), 2003.) ISBN 3-8001-3281-8. Pp. 467, 259 coloured photographs, line-drawings and distribution maps. Price: EUR 49.90.

The 4th volume in this series, which was initiated by German J. Krieglsteiner, is completed and prepared for print after Krieglsteiner's death by Andreas Gminder. The present volume treats several families of Agarics, viz. Amanitaceae, Lepiotaceae, Entolomataceae, Pluteaceae, Bolbitiaceae, Strophariaceae and Crepidotaceae. Within the families, genera are treated in alphabetical order. Keys are presented to all species occurring in Baden-Württemberg, followed by short descriptions or notes to the species, including details on ecology, threat and distribution in the state Baden-Württemberg. Many species are also presented in the form of colour photographs, which are generally of good to excellent quality, and distribution maps are often given. The taxonomy used in this book generally follows the traditional concepts in modern literature, with a few exceptions. Krieglsteiner had a rather rigid opinion about species concept, which leads also in this volume to the lumping of closely related or morphologically similar, but not necessarily related species, treating them as varieties of each other. Examples in this volume are *Macrolepiota procera* var. *konradii*, and *Entoloma hirtum* var. *dysthaloides*. Whether these changes are justified will have to be proved in future. Apart from this tiny bit of criticism, the book can be highly recommended, and will serve as a valuable source of information, not only for those who want to name a fungus from Baden-Württemberg.

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM – XLII  
ADDITIONS TO COPRINUS SUBSECTION SETULOSI

C. B. ULJÉ† & M. E. NOORDELOOS

Nationaal Herbarium Nederland, Universiteit Leiden branch,  
P.O. Box 9514, 2300 RA Leiden, The Netherlands

Throughout the years, a number of unknown species in subsect. *Setulosi* have been collected and preserved. As a result of our work on the Flora agaricina neerlandica, some new species and a new variety are described from the Netherlands.

METHODS

The magnification of the drawings is  $\times 2000$  for spores,  $\times 800$  for other microscopical features and  $\times 1$  for basidiocarps.

In the descriptions, reference is made to the colour codes of Munsell (1975) and Kornerup & Wanscher (1978), respectively indicated as Mu. and K. & W.

The terminology in this paper follows the glossary in Flora agaricina neerlandica (Vellinga, 1988).

A notation like [80, 4, 2] means: 80 spores from 4 specimens from 2 collections were measured. Spore measurements are generally based on samples of 20 spores.

The sizes of the spores as given in the key and the descriptions relate to L  $\times$  B or L  $\times$  B  $\times$  W. The quotients of the spores (QB and QW) relate to L : B and L : W.

For other abbreviations see Uljé & Bas (1991).

1. *Coprinus callinus* var. *limicolus* Uljé, var. nov.

*Coprinus* species Uljé, Persoonia 14 (1991) 314.

Pileus primo usque ad 10  $\times$  9 mm, in centro obscure rubro-brunneus vel ochraceo-brunneus, ad marginem pallidior, ut expansus ad 22 mm latus. Lamellae liberae, ad 2 mm latae, ex albo nigricantes. Stipes 20–50  $\times$  1.5–2.5 mm, albidus, pubescens. Sporae 9.4–12.8  $\times$  6.0–7.6  $\mu$ m, med. L = 11.1, med. B = 6.7  $\mu$ m, Q = 1.55–1.80, med. Q = 1.65, ellipsoideae vel ovoideae, poro germinativo excentrico, ca. 1.8  $\mu$ m lato, instructae. Basidia 18–40  $\times$  8.5–10.5  $\mu$ m, 4-sporigera. Pseudoparaphyses 3–6 pro basidio. Cheilocystidia globosa, ad 40  $\mu$ m lata, interdum late ellipsoidea, usque ad 40  $\times$  25  $\mu$ m. Pleurocystidia absentes. Pileocystidia 50–90  $\times$  13–20  $\mu$ m, lageniformia, ad apicem attenuata, 5–7  $\mu$ m lata. Sclerocystidia absentes. Caulocystidia 40–80  $\times$  16–25  $\mu$ m, lageniformia, ad apicem attenuata vel cylindrata, interdum incrassata, 5–8.5  $\mu$ m lata. Fibulae praesentes. In solo palustri.

Holotypus: The Netherlands, prov. Zuid-Holland, Ter Aar, De Put, 20.VIII.1986, C. B. Uljé (Uljé 1009, holotype, L).

Closed pileus up to 10  $\times$  9 mm, dark red-brown to ochre-brown at centre (Mu. 7.5 YR 3–4/4, 4/6, 10 YR 4/4, 5/3–4, 6/5, K. & W. 6E/F8, 6E7, 5C4), paler towards margin (7.5 YR 4/4, 10 YR 4–5/3, 6/4–6, 7/2–4, 2.5 Y 7.5/4 to 5 Y 6/1, K. & W. 5C/D4, 4A3); up to c. 22 mm wide when expanded. Lamellae free, up to 2 mm broad, white to blackish; L = 16–21, l = 1–3. Stipe 20–50  $\times$  1.5–2.5 mm, whitish, pubescent.



Spores [60, 3, 1]  $9.4-12.8 \times 6.0-7.6 \mu\text{m}$ , av.  $L = 11.1$ , av.  $B = 6.7 \mu\text{m}$ ,  $Q = 1.55-1.80$ , av.  $Q = 1.65$ , ellipsoid to ovoid; germ pore eccentric, c.  $1.8 \mu\text{m}$  wide. Basidia  $18-40 \times 8.5-10.5 \mu\text{m}$ , 4-spored. Pseudoparaphyses 3–6 per basidium. Cheilocystidia mostly globose, up to  $40 \mu\text{m}$  in diam., but also broadly ellipsoid, up to  $40 \times 25 \mu\text{m}$ . Pleurocystidia absent. Pileocystidia  $50-90 \times 13-20 \mu\text{m}$ , lageniform with tapering neck,  $5-7 \mu\text{m}$  wide at apex. Sclerocystidia absent. Caulocystidia somewhat shorter and broader,  $40-80 \times 16-25 \mu\text{m}$ , lageniform with tapering to cylindrical neck and equal, sometimes slightly enlarged,  $5-8.5 \mu\text{m}$  wide apex. Clamp-connections present.

Habitat & distribution — Solitary or gregarious in dry ditch, on humus and fallen branches.

Only known from type locality.

Collection examined. THE NETHERLANDS: prov. Zuid-Holland, Ter Aar, De Put, 2.VIII.1986, C.B. Uljé (Uljé 1009, holotype, L).

Macroscopically this taxon resembles *C. callinus*, but the fruit-bodies are smaller than in that species. Microscopically this variety deviates in the absence of sclerocystidia, which are almost always present in *C. callinus*. The length of the pileocystidia is less than  $100 \mu\text{m}$ , whereas the pileocystidia in *C. callinus* are up to  $150(-180) \mu\text{m}$  long. The habitat on mud in dry ditch is also a feature that distinguishes *C. callinus* var. *callinus* from *C. callinus* var. *limicolus*.

## 2. *Coprinus minutisporus* Uljé, *spec. nov.*

*Coprinus species* Uljé, Persoonia 14 (1991) 314.

Pileus primo usque ad  $4 \times 3 \text{ mm}$ , in centro cinnamomeus, ad marginem pallidior, ut expansus ad  $7 \text{ mm}$  latus cum albo atque minute flocculoso velo. Lamellae anguste adnatae, ex albo nigricantes. Stipes  $8-20 \times 0.1-0.5 \text{ mm}$ , albidus, vitreus, minute setulosus. Sporae  $7.0-8.5 \times 5.1-6.2 \mu\text{m}$ , med.  $L = 7.4-8.1$ , med.  $B = 5.5-5.7 \mu\text{m}$ ,  $Q = 1.25-1.60$ , med.  $Q = 1.35-1.40$ , late ellipsoideae, ellipsoideae vel etiam ovoideae, poro germinativo medio,  $1.6 \mu\text{m}$  lato, instructae. Basidia  $16-40 \times 8-11 \mu\text{m}$ , 4-sporigera. Pseudoparaphyses non detectae. Cheilocystidia  $20-50 \times 20-30 \mu\text{m}$ , vesiculosa. Pleurocystidia absentes. Pileocystidia  $50-100 \times 14-22 \mu\text{m}$ , (late) lageniformia, stricto vel subcapitato apice,  $7-12 \mu\text{m}$  lato, praedita. Sclerocystidia absentes. Velum leviter diverculatis hyphis,  $2-8(-10) \mu\text{m}$  latis, compositum. Fibulae praesentes. Super vel prope parva ligna in solo arenoso.

Holotypus: The Netherlands, prov. Zuid-Holland, Alphen aan den Rijn, 17.VII.1988, C.B. Uljé (Uljé 926, holotype, L).

Closed pileus up to  $4 \times 3 \text{ mm}$ , at centre cinnamon, towards margin paler, soon grey, up to c.  $7 \text{ mm}$  wide when expanded. Veil present on pileus, visible as small, whitish, radial fibrillose flocks. Lamellae narrowly adnate;  $L = 8-13$ ,  $l = 0-1$ . Stipe  $8-20 \times 0.1-0.5 \text{ mm}$ , whitish, vitreous, with widely dispersed setulae.

Spores [40, 2, 1]  $7.0-8.5 \times 5.1-6.2 \mu\text{m}$ , av.  $L = 7.4-8.1$ , av.  $B = 5.5-5.7 \mu\text{m}$ ,  $Q = 1.25-1.60$ , av.  $Q = 1.35-1.40$ , broadly ellipsoid, ellipsoid to ovoid; germ pore central,  $1.6 \mu\text{m}$  wide. Basidia  $16-40 \times 8-11 \mu\text{m}$ , 4-spored. Pseudoparaphyses not noted. Cheilocystidia  $20-50 \times 20-30 \mu\text{m}$ , vesiculose. Pleurocystidia absent. Pileocystidia  $50-100 \times 14-22 \mu\text{m}$ , (broadly) lageniform with  $7-12 \mu\text{m}$  wide, equal to slightly subcapitate apex. Sclerocystidia absent. Veil on pileus of somewhat diverculate  $2-8(-10) \mu\text{m}$  broad hyphae. Clamp-connections present.

Habitat & distribution — On sandy-clayey soil, among or on wood-chips. Solitary or a few together.

Collection examined. THE NETHERLANDS: prov. Zuid-Holland, Alphen aan den Rijn, 17.VII.1988, C.B. Uljé (*Uljé 926*, holotype, L).

In this species particularly the shape and the size of the spores are characteristic. None of the other species with cylindrical veil elements has spores as small as *Uljé 926*. The central germ pore is the most important difference with other species (except *C. hiascens*) which possess cylindrical veil elements. *Coprinus hiascens*, however, has spores with a conical apex, lageniform cheilocystidia and tapering pileocystidia, whereas *Uljé 926* has spores with a rounded apex, vesiculose cheilocystidia and pileocystidia, that are broadened at the apex. Because of the very small size of the fruit-bodies and the greyish colour of the pileus this species is very inconspicuous and difficult to find. Another species that agrees somewhat is *C. heterothrix*, but that species have larger spores with  $Q = 1.65-1.70$  (*Uljé 926*: 1.35-1.40) and lageniform cheilocystidia.

### 3. *Coprinus allovelus* Uljé, *spec. nov.*

*Coprinus species Uljé 952* in *Persoonia* 14 (1991) 297.

Pileus primo usque ad 6 × 4 mm, in centro ochraceus, ad marginem leviter pallidior, ut expansus ad 12 mm latus cum albo, minute flocculoso velo. Lamellae anguste adnatae, ex albo nigricantes. Stipes 15-30 × 0.5-1 mm, albidus, vitreus, pubescens. Sporae 8.8-11.6 × 5.0-5.7 μm, med. L = 10.4, med. B = 5.3 μm, Q = 1.70-2.15, med. Q = 1.95, subcylindratae vel anguste ovoideae, poro germinativo excentrico, ca. 1.6 μm lato, instructae. Basidia 17-36 × 7-9 μm, 4-sporigera. Pseudoparaphyses (3-) 4-5(-6) pro basidio. Cheilocystidia 30-50 × 8-10 μm, lageniformia, in propria cervice 3-5 μm lata, at saepe ad apicem incrassata, usque ad 6.5 μm lata. Pleurocystidia absentes. Pileocystidia 70-120 × 13-18 μm, late lageniformia, in cervice 7-11 μm lata, in apice aequalia vel subclavata, 9-13(-15) μm lata. Sclerocystidia absentes. Velum hyphis inflatis, 6-16 μm latis, compositum. Fibulae praesentes. In solo argillaceo.

Holotypus: The Netherlands, prov. Utrecht, Linschoten, 13.VIII.1988, C.B. Uljé (*Uljé 952*, holotype, L).

Closed pileus up to 6 × 4 mm, ochre-brown at centre, somewhat paler towards margin, up to c. 12 mm in diam. when expanded. Veil present, visible as small, whitish, radially fibrillose flocks on pileus. Lamellae narrowly adnate; L ≤ 18, l = 0-1(-3). Stipe 15-30 × 0.5-1 mm, whitish, vitreous, pubescent.

Spores [20, 1, 1] 8.8-11.6 × 5.0-5.7 μm, av. L = 10.4, av. B = 5.3 μm, Q = 1.70-2.15, av. Q = 1.95, subcylindric to narrowly ovoid; germ pore distinctly eccentric, c. 1.6 μm wide. Basidia 17-36 × 7-9 μm, 4-spored. Pseudoparaphyses (3-) 4-5(-6) per basidium. Cheilocystidia 30-50 × 8-10 μm, lageniform with 3-5 μm wide neck often slightly enlarged towards (up to 6.5 μm wide) apex. Pleurocystidia absent. Pileocystidia 70-120 × 13-18 μm, broadly lageniform with 7-11 μm wide neck and equal to subclavate, 9-13(-15) μm wide apex. Sclerocystidia absent. Veil consisting of inflated, fusiform, 6-16 μm thick hyphae present on pileus. Clamp-connections present.

Habitat & distribution — Solitary or subfasciculate on bare, rich river-clay; a few together.

Collection examined. THE NETHERLANDS: prov. Utrecht, Linschoten, 13.VIII.1988, C.B. Uljé (*Uljé 952*, holotype, L).

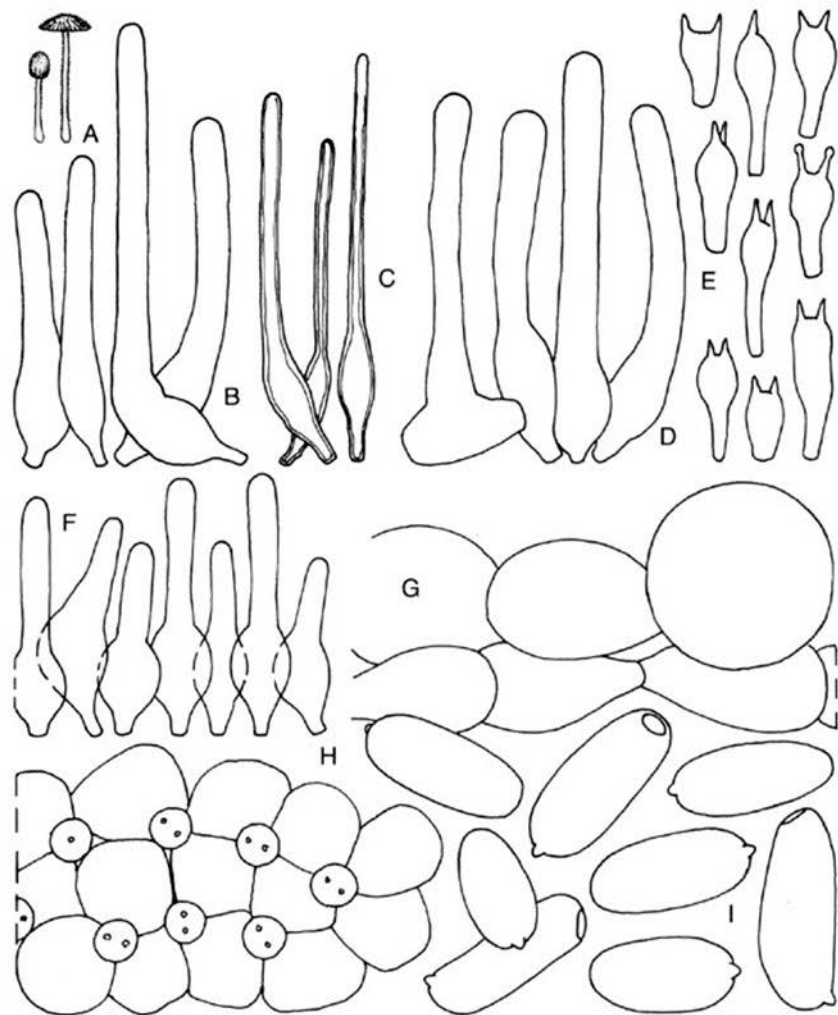


Fig. 1. *Coprinus pseudoamphithallus*. A. Habitus,  $\times 1$ ; B. pileocystidia; C. sclerocystidia; D. caulocystidia; E. basidia; F. cheilocystidia; G. pileipellis; H. fragment of lamella (A–H  $\times 800$ ; I  $\times 2000$ ).

The veil on the pileus consists of hyphae made up of elongate cells and fusiform to clavate terminal cells. The elements of this veil are larger and broader than in other species of the *Setulosi* with velar hyphae on the pileus. Moreover, this taxon can be distinguished from those species by its slender, subcylindrical spores.

#### 4. *Coprinus pseudoamphithallus* Uljé, *spec. nov.* — Fig. 1

Pileus primo 2–3 × 1–2 mm, ut expansus ad 7 mm latus, primo globosus vel ellipsoideus, demum expansus vel applanatus, primo pallide ochraceus, demum flos lactis vel pallide griseus, iuvenis pruinosis. Lamellae (fere) liberae, ex albo nigricantes. Stipes usque ad 15 × 0.75 mm, albidus, pruinosis. Sporae 9–12.7(–14.8) × 4.7–5.7 × 4.4–5.6 μm, QB = 1.75–2.4, med. QB = 2.1, QW = 2.1–2.9, med. QW = 2.25–2.55, med. L = 10.9–11.4(–12.8) μm, med. B = 5.2 μm, med. W = 5.1 μm, oblongae vel subcylindratae, interdum a latere leviter phaseoliformes, obscure rufobrunneae, poro germinativo excentrico, c. 1.6 μm lato, instructae. Basidia 14–28 × 7–9 μm, bi- vel unisporigera, 3–6 pseudoparaphysibus cincta. Pleurocystidia absentes. Cheilocystidia 23–50 × 7.5–14 × 3–5.5 μm, lageniformia, cum cylindrata cervice atque rotundato apice. Pileocystidia 50–90 × 6–12 × 4–7 μm, lageniformia, cum cylindrata cervice atque aequali vel leviter incrassato apice. Sclerocystidia 70–100 × 5–7 × 1.5–4 μm, copiosa, leviter crassitunicata, flavobrunnea. Caulocystidia 40–100 × 7–14 × 5–8 μm, pileocystidiis similia. Pileipellis sphaeropedunculatis vel (sub)globosis partibus, ad 36 μm latis, composita. Fibulae absentes. In solo.

Holotypus: The Netherlands, prov. Zuid-Holland, Ter Aar, De Put, Oostkanaalweg, at the end of the small path of approach at the West-side, from the Aarkanaal, 2.VI.2000, C.B. Uljé (C.B. Uljé 1288, holotype, L).

Pileus 2–3 × 1–2 mm when still closed, up to 7 mm when expanded, first globose or ellipsoid, then hemispherical to convex, finally almost flat, at first pale ochre-brown, soon becoming cream to pale grey, pruinose when young. Lamellae, L = c. 14, l = 0–1, free or almost free, first white, then pale grey. Stipe up to 15 × 0.75 mm, white, pruinose.

Spores [20, 1, 1] 9–12.7(–14.8) × 4.7–5.7 × 4.4–5.6 μm, QB = 1.75–2.4, av. QB = 2.1, QW = 2.1–2.9, av. QW = 2.25–2.55, av. L = 10.9–11.4(–12.8) μm, av. B = 5.2 μm, av. W = 5.1 μm, oblong to subcylindrical, in side view often somewhat phaseoliform, dark red-brown, with large, c. 2 μm wide, eccentric germ pore. Basidia 14–28 × 7–9 μm, 2-spored, some 1-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia absent. Cheilocystidia 23–50 × 7.5–14 × 3–5.5 μm, lageniform with cylindrical neck and rounded apex. Pileocystidia 50–90 × 6–12 × 4–7 μm, lageniform with cylindrical neck and equal to slightly widened apex. Sclerocystidia 70–100 × 5–7 × 1.5–4 μm, numerous, slightly thick-walled and yellow-brown. Caulocystidia 40–100 × 7–14 × 5–8 μm, similar to pileocystidia. Pileipellis made up of spheropedunculate to (sub)globose elements, the latter up to 36 μm in diameter. Clamp-connections absent.

Habitat & distribution — Solitary on grassy road-sides, often on naked soil. Very rare, only known from type-locality.

*Collection examined.* THE NETHERLANDS: prov. Zuid-Holland, Ter Aar, De Put, Oostkanaalweg, at the end of the small path of approach at the West-side, from the Aarkanaal, Am. Coörd: 108.3-462.3, Km. hok: 31-32-34, 22.V.2000, two young basidiocarps, 2.VI.2000, C.B. Uljé (C.B. Uljé 1288, holotype, L).

This species differs from the 2-spored and slightly similar *C. amphithallus* in smaller basidiocarps, smaller and narrower spores with relative large germ pore, cystidia with cylindrical neck, presence of sclerocystidia and absence of clamp-connections.

#### ACKNOWLEDGEMENT

Sincere thanks are due to Francesco Doveri for correcting the Latin diagnoses of the new taxa.

## REFERENCES

- Kornerup, A. & J.H. Wanscher. 1978. Methuen handbook of colour. London.
- Munsell. 1975. Munsell soil color charts. Baltimore.
- Uljé, C.B. & C. Bas. 1991. Studies in Coprinus II. Persoonia 14: 257–301.
- Vellinga, E.C. 1988. Glossary. In: C. Bas, Th.W. Kuijper, M.E. Noordeloos & E.C. Vellinga, Flora agaricina neerlandica, vol. 1: 54–64.

**A NEW SPECIES OF LOPHIOTREMA FROM WILD FRUIT  
IN HONG KONG**

A.M.C. TANG, K.D. HYDE, K.M. TSUI & R.T. CORLETT

Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity,  
The University of Hong Kong, Pokfulam Road, Hong Kong, China

*Lophiotrema psychotrii* spec. nov. is described and illustrated based on specimens occurring on *Psychotria asiatica* and *Rhodomyrtus tomentosa* fruits in Hong Kong. This species is characterized by small, hyaline, guttulate, uniseptate, fusiform ascospores bearing a narrow mucilaginous sheath, which is narrow in the middle and drawn out at both ends to form pad-like appendages. A synoptic table and key to *Lophiotrema* species is provided.

*Psychotria asiatica* L. (Rubiaceae) is one of the most common native understorey shrubs in Hong Kong and South China (Davis et al., 2001). It occurs widely in shrubland and its fruits are small and fleshy, presumably dispersed by birds (Corlett, 1996). Its abundance and successful colonization in degraded landscapes makes it one of the suitable candidates for studies of fructicolous fungi, due to the potentially conflicting relationship with frugivorous birds and microbes (Herrera, 1982; Cipollini & Stiles, 1993; Cipollini, 2000). The fruits need to attract dispersers after ripening, but repel microbes. In the current study, the mycota of different wild fruits species are being investigated. An ascomycete was found on a decaying fruit of *Psychotria asiatica*, belonging to the genus *Lophiotrema* Ces. & De Not. It is described and illustrated here.

MATERIAL AND METHODS

Decaying fruits of *Psychotria asiatica* were collected from Lung Fu Shan, in Hong Kong. The fruits were returned to the laboratory and incubated at room temperature (~23°C) in 'zip lock' plastic bags with added sterile moist paper at room temperature. Fruits were examined under the stereo-microscope periodically. Squash mounts and sections of fungal fruit-bodies were mounted in water for measurement and photographed with a digital camera. Fungi were isolated and are maintained in the University of Hong Kong Culture Collection (HKUCC) and fruits with fungi were dried and deposited in the University of Hong Kong Herbarium (HKU(M)).

RESULTS

*Lophiotrema psychotrii* A.M.C. Tang, K.D. Hyde, K.M. Tsui & R.T. Corlett,  
spec. nov. — Figs. 1–9

Ascomata 70–110 µm alta, 85–140 µm diam., erumpentes, ostiolo fissuriformi. Asci 64–80 × 6–7.5 µm, 8-spore, bitunicati, cylindrici. Ascospores 14–17 × 4–4.5 µm, fusiformes, bicellulae, uniseptatae, hyalinae, 2–3 guttulis.

Holotypus: Hong Kong, Hong Kong Island, Lung Fu Shan, on fruit of *Psychotria asiatica*, 15.XII.2001, A.M.C. Tang (HKU(M) 16702). Living culture of HKU(M) 16702 in HKUCC 9015.

Etymology: named after the host.

Ascomata 70–110  $\mu\text{m}$  high, 85–140  $\mu\text{m}$  in diameter, erumpent, broadly oblong with flattened neck, developing on a thin black stromatic crust, opening with an elongated slit-like ostiole, carbonaceous, black. Peridium 14–30  $\mu\text{m}$  thick at the sides, 10–14  $\mu\text{m}$  at the base, comprising black-walled *textura angularis*, encrusted with melanin particles, darker in the upper half and lighter at the base. Pseudoparaphyses abundant, cellular, up to 2  $\mu\text{m}$  in diameter. Asci 64–80  $\times$  6–7.5  $\mu\text{m}$ , cylindrical, thick-walled, bitunicate, fissitunicate, with an ocular chamber and faint ring, arising from the base of the ascoma, 8-spored (Figs. 5, 6). Ascospores 14–17  $\times$  4–4.5  $\mu\text{m}$  (on average 15.25  $\times$  4.15  $\mu\text{m}$ ,  $n = 20$ ), uniseriate to biseriate, fusiform, hyaline, uniseptate, constricted at the septum, with 2 or 3 lipid guttules in each cell, surrounded by a narrow mucilaginous sheath, 1–2  $\mu\text{m}$  thick; sheath is narrow in the middle and drawn out at the ends to form pad-like appendages (Figs. 7–9).

Habitat — Saprobic on fruits.

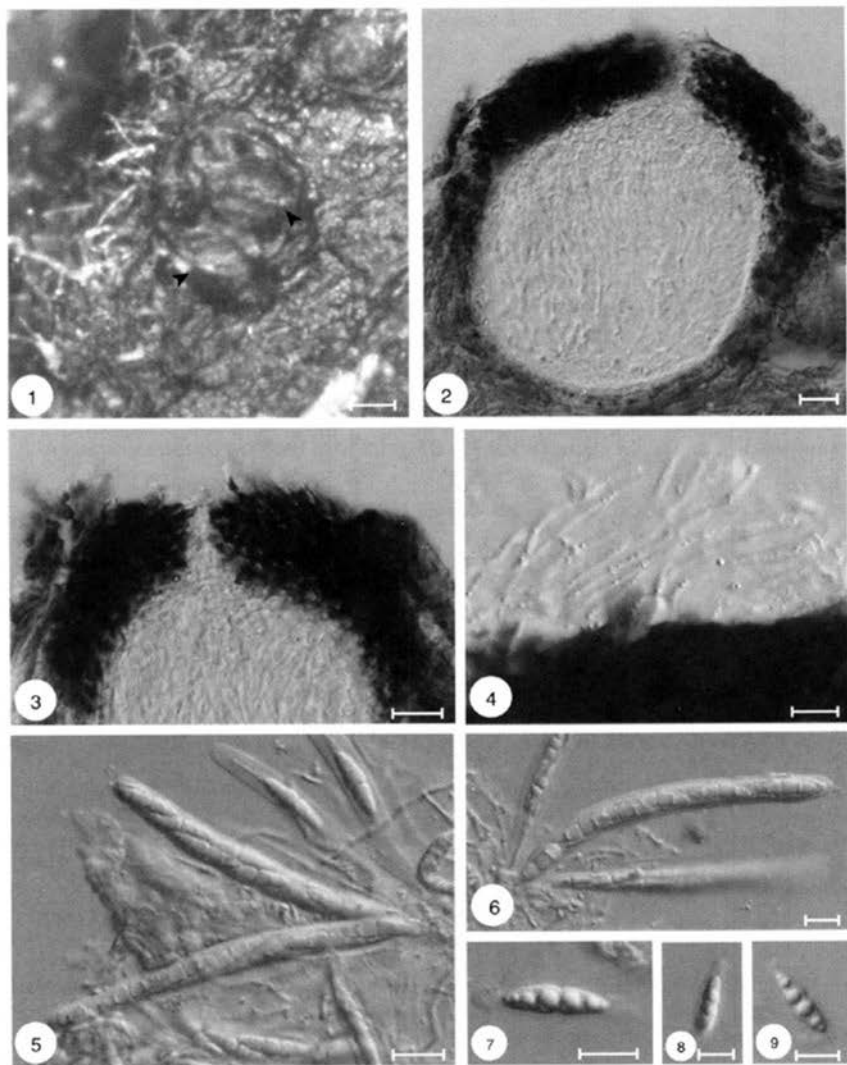
Known distribution — Hong Kong.

*Other material examined.* HONG KONG: New Territories, Pat Sin Leng, on decaying fruit of *Rhodomyrtus tomentosa* (Myrtaceae), 22.XII.2001, A.M.C. Tang, (HKU(M) 16731, living culture in HKUCC 9045).

#### DISCUSSION

The genus *Lophiotrema* has been treated as a synonym of *Lophiostoma* by several authors (Chesters & Bell, 1970; Hawksworth et al., 1983; Eriksson & Hawksworth, 1987). Holm & Holm (1988) separated *Lophiotrema* from *Lophiostoma* by the differences of peridium and ascospore morphology and five species were described. Barr (1992) accepted this classification, with three additional species. The new fungus found in the current survey shares characters which are typical of *Lophiotrema* species. *Lophiotrema psychotrii* is characterized by having typically small ascomata (85–140  $\mu\text{m}$ ), a peridium composed of *textura angularis*, up to 15  $\mu\text{m}$  wide, cylindrical asci, and hyaline ascospores with a mucilaginous sheath. These characteristics differ from typical *Lophiostoma* species, where the ascomata are generally larger (200–700  $\mu\text{m}$ ), the peridium comprises several layers of parallel, long, prismatic cells, asci are mostly clavate and ascospores often have terminal appendages rather than a mucilaginous sheath (Holm & Holm, 1988; Liew et al., 2002; Hyde et al., 2002).

Presently, there are 8 species of *Lophiotrema* (Holm & Holm, 1988; Barr, 1992). Holm & Holm (1988) provided a key to five species, but two of these were not formally described (named only as *Lophiotrema* sp. 1 and 2). Therefore a key to the six named species is provided here. *Lophiotrema psychotrii* is similar to *L. alpinum* in spore morphology. However, the former differs in having smaller ascospores (14–17  $\times$  4–4.5  $\mu\text{m}$  vs. (15–)18–20  $\times$  4–4.5  $\mu\text{m}$ ), asci (64–80  $\times$  6–7.5  $\mu\text{m}$  vs. 80–100  $\times$  7–11  $\mu\text{m}$ ), and a different type of mucilaginous sheath (Barr, 1992). The sheath in *L. psychotrii* is narrow in the middle and drawn out to form pad-like appendages at both ends, while ascospores of *L. alpinum* are surrounded by a condensed sheath. *Lophiotrema neohysterioides* should also be compared with *L. psychotrii*; they have fusiform spores with a similar size range,



Figs. 1–9. 1. Ascomata of *Lophiotrema psychotrii* on host surface, with slit-like ostiole; 2. vertical section through ascoma; 3. vertical section through ostiole; 4. pseudoparaphyses; 5, 6. asci; 7–9. ascospores, surrounded by mucilaginous sheath, narrow in the middle and drawn out to form pad-like structures at both ends. Scale bars: 1 = 100  $\mu\text{m}$ ; 2–9 = 10  $\mu\text{m}$ .

but in the former ascospores are three-septate at maturity and each ascospore has two lipid guttules per cell. The mucilaginous sheath, if present, is narrow and condensed, and does not form pads as in *L. psychotrii* (Chesters & Bell, 1970; Barr, 1992).



Table 1. Synopsis of characters of *Lophiotrema* species

	<i>L. alpinum</i>	<i>L. boreale</i>	<i>L. neohysterioides</i>	<i>L. nucula</i>	<i>L. psychotrii</i>	<i>L. vagabundum</i>	<i>L. velatum</i>
Ascomata	500 $\mu\text{m}$ diam.	Not available	Not available	200–300 $\mu\text{m}$ diam.	85–140 $\mu\text{m}$ diam.	200–300 $\mu\text{m}$ diam.	200–300 $\mu\text{m}$ diam.
Asci	80–100 $\times$ 7–11 $\mu\text{m}$	80–90 $\times$ 7–8 $\mu\text{m}$	60–80 $\times$ 5–7 $\mu\text{m}$	120–130 $\times$ 8–11 $\mu\text{m}$	64–80 $\times$ 6–7.5 $\mu\text{m}$	100–110 $\times$ 7–8 $\mu\text{m}$	80–90 $\times$ 8–10 $\mu\text{m}$
Ascospores	(15–)18–20 $\times$ 4–4.5 $\mu\text{m}$	14–16 $\times$ 3 $\mu\text{m}$	14–17 $\times$ 3–4 $\mu\text{m}$	18–21(–24) $\times$ 5–6(–7) $\mu\text{m}$	14–17 $\times$ 4–4.5 $\mu\text{m}$	24–30 $\times$ 6–7 $\mu\text{m}$	18–24 $\times$ 4–5 $\mu\text{m}$
Shape	Fusiform	Oblong	Fusiform	Ellipsoid	Fusiform	Fusiform	Oblong
Guttules/ cell	2	0	0 or 2	2	2 or 3	3	2 or 3
Septation	1	1	3	1	1	1	1
Mucilag- inous sheath	Narrow and con- densed	Absent	Narrow and con- densed or absent	Absent	Narrow in in the middle and drawn out at both ends as pad- like appendages	Wide and distinct	Absent
Host	Conifer wood and cone scales	<i>Salix</i> wood	<i>Kalmia</i> , <i>Quercus</i> , <i>Hicoria</i> , <i>Abies</i> and <i>Rubus idaeus</i>	Frondose wood	Wild fruit	Herbaceous stems and <i>Rubus idaeus</i>	<i>Quercus</i> wood

## KEY TO LOPHIOTREMA SPECIES

- 1a. Ascospores fusiform ..... 2  
 b. Ascospores oblong or ellipsoid ..... 5  
 2a. Ascospores 1-septate ..... 3  
 b. Ascospores 3-septate at maturity ..... *L. neohysterioides*  
 3a. Ascospores with wide mucilaginous sheath, 24–30 × 6–7 µm ... *L. vagabundum*  
 b. Ascospores with narrow mucilaginous sheath ..... 4  
 4a. Ascospores with 2 or 3 guttules/cell, constricted at septum, 14–17 × 4–4.5 µm  
     ..... *L. psychotrii*  
 b. Ascospores with 2 guttules/cell, slightly constricted at septum, (15–)18–20 × 4–4.5  
     µm ..... *L. alpinum*  
 5a. Ascospores oblong ..... 6  
 b. Ascospores ellipsoid ..... *L. nucula*  
 6a. Ascospores constricted at septum, 14–16 × 3 µm ..... *L. boreale*  
 b. Ascospores not constricted at septum, 18–24 × 4–5 µm ..... *L. velatum*

## ACKNOWLEDGEMENTS

A.M.C. Tang is grateful to The University of Hong Kong for the award of a Postgraduate Studentship. M.T.W. Choy and H.Y.M. Leung are thanked for photographic and technical assistance.

## REFERENCES

- Barr, M.E. 1992. Notes on the Lophiostomataceae: Pleosporales. *Mycotaxon* 45: 191–221.  
 Chesters, C.G.C. & A. Bell. 1970. Studies in Lophiostomataceae. *Mycol. Pap.* 120: 1–55.  
 Cipollini, M.L. 2000. Secondary metabolites of vertebrate-dispersed fruits: evidence for adaptive functions. *Rev. Chil. Hist. Nat.* 73: 421–440.  
 Cipollini, M.L. & E.W. Stiles. 1993. Fruit rot, antifungal defense, and palatability of fleshy fruits for frugivorous birds. *Ecology* 74: 751–762.  
 Corlett, R.T. 1996. Characteristics of vertebrate-dispersed fruits in Hong Kong. *J. Trop. Ecol.* 12: 819–833.  
 Davis, A.P., D. Bridson, C. Jarvis & R. Govaerts. 2001. The typification and characterization of the genus *Psychotria* L. Rubiaceae. *Biol. J. Linn. Soc.* 135: 35–42.  
 Eriksson, O. & D.L. Hawksworth. 1987. An alphabetical list of the generic names of ascomycetes—1987. *Systema Ascomycetum* 6: 1–109.  
 Hawksworth, D.L., B.C. Sutton & G.C. Ainsworth. 1983. *Ainsworth and Bisby's Dictionary of the Fungi* (7th ed.). CMI, Kew, Surrey, England.  
 Herrera, C.M. 1982. Defense of ripe fruit from pests: its significance in relation to plant-disperser interactions. *Am. Nat.* 120: 751–762.  
 Holm, L. & K. Holm. 1988. Studies in the Lophiostomataceae with emphasis on the Swedish species. *Ups. Symb. Bot.* 18 (2): 1–50.  
 Hyde, K.D., W.S.W. Wong & A. Aptroot. 2002. Marine and estuarine species of *Lophiostoma* and *Massarina*. In: K.D. Hyde (ed.), *Fungi in Marine Environments*. Fungal Diversity Research Series 7: 93–109.  
 Liew, E.C.Y., A. Aptroot & K.D. Hyde. 2002. An evaluation of the monophyly of *Massarina* based on ribosomal DNA sequences. *Mycologia* 94: 803–813.

**BOOK REVIEW**

P.M. McCarthy (ed.). *Flora of Australia. Volume 58A, Lichens 3*. (CSIRO Publishing, P.O.Box 1139, Collingwood, VIC 3066, Australia. 2001.) ISBN 0643067132 (hardback); 0643067124 (paperback). Pp. 242. 56 coloured plates, 58 text-figs. Price: AUD 85 hardback; AUD 70 paperback.

Volume 58A of the in 1981 started series Flora of Australia is the third volume dealing with lichens. Previous volumes concerning lichens were volume 54 (1992) which contained an introduction and Lecanorales 1, and volume 55 (1994) which dealt with Lecanorales 2, family Parmeliaceae. Apparently volume 56 and 57 are still on its way. In total 9 different authors from Austria, Germany, Australia, New Zealand and Sweden have contributed to the present volume. In total 10 illustrators and photographers made the book the attractive looking volume it now is.

The following groups are treated: order Lecanorales family Sphaerophoraceae, Leotiales families Baecomycetaceae, and Icmadophilaceae, Lichinales family Peltulaceae, Patellariales family Arthrorhaphidaceae, Peltigerales family Lobariaceae, Trichotheliales family Myeloconaceae, Trichotheliaceae, and of the order Verrucariales family Verrucariaceae. Of each familie an extensive circumscription is given, followed by a key to the genera, an extensive genus description, per genus a key to the species and a description for each species including synonymy, references to illustrations and material studied. Literature references are given for each family and genus. Of a selected number of species drawings are given of the fruit-bodies and spores or asci. A distributionmap of each species makes the work complete. The high quality photographs of a limited number of species are bound together on two places in the book. In anticipation of the revision of more families of crustose pyrenocarpous lichens for future volumes of the Flora of Australia, a key is given to the genera of crustose pyrenocarpous lichens in Australia. Part of the crustose lichens is included in this volume, belonging to the orders Trichotheliales and Verrucariales.

It is a bit surprising that lichens are included in this series Flora of Australia which deals with plants, and not in the in 1996 started series Fungi of Australia. But this is probably a historic choice, made long before the Fungi of Australia started, and does not derogate from the quality of this volume and the other volumes in this series.

If you had always wanted to know everything about the lichens of Australia, about the luxuriant species of cool-temperate southeastern Australia as well as the soil inhabiting groups of the (semi)arid regions, this is your chance. But do not forget to buy the other (forthcoming and published) volumes. The price is not the problem, only the beautiful colour pictures make us wish every species was depicted!

## A NEW AGROCYBE ON WOODCHIPS IN NORTH WESTERN EUROPE

M.M. NAUTA

Nationaal Herbarium Nederland, Universiteit Leiden branch,  
P.O. Box 9514, 2300 RA Leiden, The Netherlands

In the scope of a revision of the genus *Agrocybe* for Flora agaricina neerlandica volume 6, a new species was discovered from heaps of woodchips in Rotterdam, the Netherlands. The species, *Agrocybe rivulosa*, spec. nov. is here described and is characterized by the strongly radially rugose cap, a large but thin ring and large spores of  $11.5\text{--}12.0 \times 7.0\text{--}8.0 \mu\text{m}$  on average. It belongs to subgen. *Agrocybe* sect. *Agrocybe* on account of the spores with a conspicuous and wide germ pore and the clavate to sphaeropedunculate cystidia. The species has been found on several localities in the (north)west of the Netherlands. Recently, the species has also been found in the eastern part of the Netherlands and in Luxembourg.

Furthermore, a key is provided to the species on woodchips in the Netherlands and adjacent countries.

The genus *Agrocybe* has been revised recently for the project 'Flora agaricina neerlandica' (Nauta, 1987; in prep. a), resulting in 13 species recorded for the Netherlands. Remarkably enough, two new species were found among the material from the Netherlands already present in L. One of them is described here, the other new species, which belongs to sect. *Pediadeae*, is described elsewhere in this volume (Nauta, in prep. b).

In 1999 an unknown *Agrocybe* was collected from a heating heap of woodchips in the city of Rotterdam, the Netherlands by Gerrit Keizer. Since then, the *Agrocybe* has been found on several places in the western part of the Netherlands, always on (heaps of) woodchips. It is now also known from the eastern part (Dam, 2003), and recently from Luxembourg (M. T. Tholl, pers. comm.).

The original collection had a noteworthy radially venose yellow-brown cap, a large but evanescent ring, and a remarkable striate stipe with a thick ball of mycelium at the base. Microscopically the new *Agrocybe* is characterized by large spores, on average  $11.5\text{--}12 \times 7\text{--}8 \mu\text{m}$ , and the clavate to pedicellate globose cystidia. No pileocystidia could be found. The robust fruit-bodies reminded a bit of *Agrocybe putaminum*, another species on woodchips which is now very common in the western part of the country. Because of an increased use of woodchips on footpaths in woods and parks, several species growing on woodchips have become more common now. The velvety cap and lack of ring distinguishes *Agrocybe putaminum* morphologically from the new species, besides microscopical differences. On the other hand the morphological resemblance with a remarkably wrinkled *Agrocybe cylindracea* is also striking, but again, the microscopy is rather different. *Agrocybe cylindracea* var. *rugosovenosa* Singer (1953) is distinguished by the wrinkled cap, but also this taxon has a different microscopy. *Agrocybe putaminum* and *A. cylindracea* have smaller and narrower spores with a less conspicuous germ pore, differently shaped cheilocystidia and pileocystidia are present. Comparison with other species occurring outside the region covered by the Flora agaricina neerlandica,

led to the originally North-American *Agrocybe acericola*, of which a possible find in Scandinavia is described by Watling (1988). But also this species differs in sporesize and shape of cystidia, viz. spores  $7.5\text{--}9.5 \times 5\text{--}6 \mu\text{m}$  and cheilocystidia vesiculose.

It is remarkable that this is the second new agaric which is discovered on heating heaps within a short period of time. In 1997 *Agaricus rufotegulis* was discovered in the Netherlands and south England on heating heaps of rotting leaves (Nauta, 1999). Meanwhile, that species has also been found in Portugal (Hausknecht, 2002), but unfortunately it has not been found since in the Netherlands.

*Agrocybe rivulosa* belongs to subgen. *Agrocybe* sect. *Agrocybe* on account of the conspicuous wide germ pore, the large spores, form of the cystidia and lack of pileocystidia.

***Agrocybe rivulosa* Nauta, spec. nov. — Fig. 1**

Pileus 40–100 mm diametro, convexus ad applanatus, hygrophanus, spadiceus vel flavobrunneus, in sicco pallescens; rivulosus. Lamellae emarginatae, brunneae. Stipes 50–115 mm longus, 5–15 mm crassus, semibulbosus, annulatus, curvatus, infra anulum valde fibrillosus, rhizomorphis albidis. Annulus 5–15 mm latus descendens, tenuis. Caro sapore farinoso.

Spores 10.0–14.0  $\mu\text{m}$  longae, in medio 11.5–12.0  $\mu\text{m}$ , (6.0–)6.5–8.0(–8.5)  $\mu\text{m}$  latae, in medio 7.0–8.0  $\mu\text{m}$ ,  $Q = 1.45\text{--}1.80$ , in medio (1.55–)1.60–1.70, ellipsoideae vel oblongae, cum poro germanitivo evidenti. Basidia 4-sporigera. Lamellae margine cheilocystidiis et basidiis. Cheilocystidia clavata ad pedicellata globosa, 35–60  $\times$  20–30  $\mu\text{m}$ . Pleurocystidia rara, cheilocystidiis staturae et formae similis. Pileipellis cellulis pyriformibus ad clavatis, 20–40(–55)  $\times$  (14–)20–30(–35)  $\mu\text{m}$ , stratis gelatinosis 50  $\mu\text{m}$  tectus. Pileocystidia rara vel nulla, utriformia.

Holotypus: The Netherlands, Rotterdam, X.1999, *G. Keijzer* (MN 8109; L).

Vernacular name — Geaderde leemhoed.

Carpophores in groups or fasciculate. Cap (30–)40–100 mm in diameter, young truncately conical, soon convex to plano-convex or applanate with a conspicuous umbo, hygrophanous, in wet condition young warm brown, later yellow-brown (Mu. 10 YR 7/4–8) at centre, paler towards margin, pallescent on drying to pale yellow or pale yellowish brown; surface young glutinous and smooth, later dry and strongly radially venose; young with dirty white to greyish veillflocks, later margin often with short fringe of whitish veil remnants. Lamellae moderately crowded, emarginate, 4–8 mm broad, at first pale yellow to grey-brown, later darker to (greyish) brown (10 YR 6/3–4; 7.5 YR 4/4), with slightly paler, minutely denticulate edge. Stipe 50–115  $\times$  (3–)5–15 mm, annulate, cylindrical, often with bulbous base up to 16 mm, curved, white in upper part, pale yellowish brown downwards, becoming brownish on handling in lower part, above ring smooth to pruinose, below ring strongly striate-fibrillose; at base white tomentose, with several small white rhizomorphs, often with large mycelial tangle. Ring at 0.60–0.75 of height of stipe, 5–15(–20) mm wide, often partly attached to margin of cap, descending, slightly spreading, fragile, thin, easily torn, whitish, with smooth to slightly striate upperside; underside smooth or sometimes fibrillose or with some small teeth at margin. Context 3 mm thick in cap. Smell indistinct or pleasant, sometimes sweetish. Taste strongly farinaceous. Spore print dark red-brown (7.5 YR 3/4).

Spores 10.0–14.0  $\times$  (6.0–)6.5–8.0(–8.5)  $\mu\text{m}$ , on average 11.5–12.0  $\times$  7.0–8.0  $\mu\text{m}$ ,  $Q = 1.45\text{--}1.80$ , on average (1.55–)1.60–1.70, ellipsoid to oblong, in side-view often flattened at one side, thick-walled, with a usually conspicuous, 0.8–1.5  $\mu\text{m}$  wide, apical germ pore;

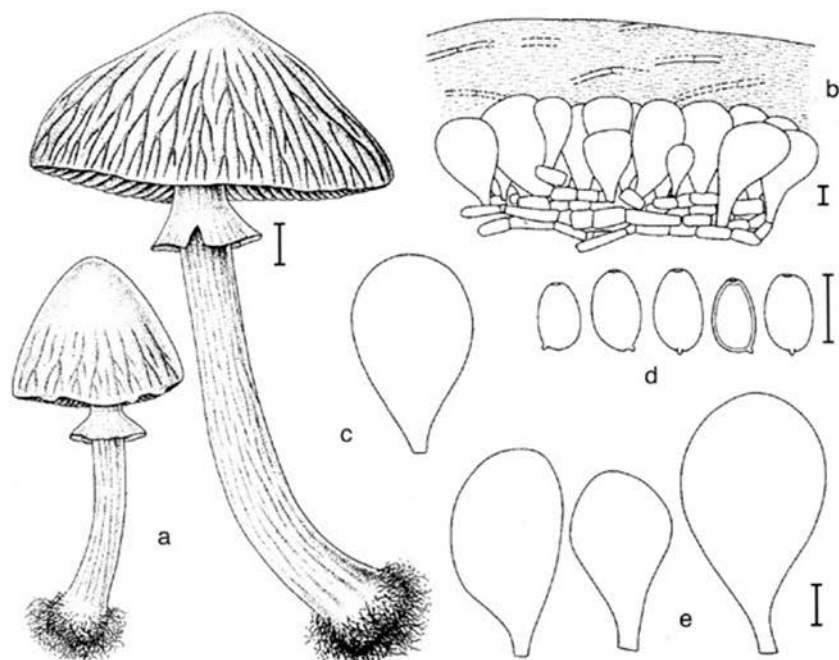


Fig. 1. *Agrocybe rivulosa*. a. Fruit-body; b. pileipellis; c. pleurocystidia; d. spores; e. cheilocystidia. Scale bars: resp. 1 cm, 10  $\mu$ m.

yellow-brown with light microscope. Basidia usually mostly 4-spored, although a few 2-spored basidia may be present. Lamella edge heterogeneous, composed of cystidia and basidia. Cheilocystidia (20–)35–60  $\times$  (11–)20–30(–35)  $\mu$ m, clavate to sphaeropedunculate, easily collapsed. Pleurocystidia scarce, of same size and shape as cheilocystidia, sometimes larger and up to 130  $\times$  60  $\mu$ m, easily collapsed. Pileipellis a 50–100  $\mu$ m thick hymeniderm, consisting of erect, clavate to pedicellate globose elements of 20–40(–55)  $\times$  (14–)20–30(–35)  $\mu$ m, sometimes with irregular fingerlike outgrowths, covered with an up to 50  $\mu$ m thick gelatinous layer. Veil on cap composed of irregularly interwoven, 3.0–5.0  $\mu$ m wide hyphae intermixed with inflated elements of c. 30  $\times$  24–28  $\mu$ m, with numerous clamp-connections and intracellular and encrusting yellow pigment. Pileocystidia very scarce to absent, utriform, up to 50  $\times$  15  $\mu$ m. Clamp-connections abundantly present in stipeipellis and pileipellis, also present at base of basidia.

Habitat & distribution — Gregarious to rarely fasciculate, saprotrophic; on heating heaps of woodchips and on woodchips along paths in city parks. Sept.–March. Rare in the Netherlands, mainly in the western part, also recorded from Luxembourg.

*Material studied.* THE NETHERLANDS: Zuid-Holland, Leiden, 12.IX.2001, C. Bas 9613; Den Haag, 2002, K. Fokkens; Den Haag, Haagse Bos, 6.XI.2001, L. Bakker & L. Hilbers (MN 8608); Rotterdam, X.1999, G. Keijzer (MN 8109; type); idem, X.1999, G. Keijzer (MN 8108); Noord-Holland, Enkhuizen, X.2002, A. Gutter 744.

## KEY TO SPECIES OF AGROCYBE ON WOODCHIPS IN NORTH WESTERN EUROPE

- 1a. Stipe with ring ..... 2  
 b. Ring absent ..... 5
- 2a. Spores on average  $7.5-11.0 \times 5.0-6.0 \mu\text{m}$ . Cap smooth or areolate-rimose ... 3  
 b. Spores on average  $11.5-12.0 \times 7.0-8.0 \mu\text{m}$ . Cap remarkably radially rivulose to wrinkled ..... *Agrocybe rivulosa*
- 3a. Cheilocystidia mainly clavate, with some utriform elements,  $20-40 \times 7.0-16.0$  ( $-19.0$ )  $\mu\text{m}$ ; spores  $8.5-12.5 \times 5.0-7.0 \times 4.5-6.5 \mu\text{m}$ , on average  $9.5-11.0 \times 5.0-6.0 \mu\text{m}$ . Cap yellowish white to pale yellow-brown, often areolate-rimose. Taste not farinaceous ..... *Agrocybe cylindracea*  
 b. Cheilocystidia only utriform,  $35-65 \times 15.0-33.0 \mu\text{m}$ ; spores  $7.5-10.0 \mu\text{m}$  on average. Cap ochre to brown, smooth. Taste farinaceous ..... 4
- 4a. Cap brown, convex with umbo. Spores  $7.5-9.5 \times 5.0-6.0 \mu\text{m}$   
*Agrocybe acericola* sensu Watling (1988)  
 b. Cap ochre to yellowish brown, convex to plano-convex. Spores  $8.0-11.0 \times 5.0-7.5 \times 4.5-6.5 \mu\text{m}$ , on average  $8.5-10.0 \times 5.5-6.5 \times 5.0-6.0 \mu\text{m}$  ... *Agrocybe praecox*
- 5a. Cap velvety, dark yellow-brown to dark brown, sometimes olivaceous ..... 6  
 b. Cap smooth, yellow-brown. Cystidia with characteristic fingerlike projections  
*Agrocybe arvalis*
- 6a. Cap without olivaceous tinge, 20–70 mm in diameter; stipe 4–8 mm wide. Spores with conspicuous germ pore, on average  $10.5-11.5 \times 6-7 \mu\text{m}$   
*Agrocybe putatinum*  
 b. Cap usually with olivaceous tinge, 10–30 mm in diameter; stipe up to 3 mm wide. Spores without or with inconspicuous, narrow germ pore, on average  $6.5-7.5 \times 4-5 \mu\text{m}$  ..... *Agrocybe firma*

## ACKNOWLEDGEMENTS

For sending their collected material I wish to thank G. Keizer (Lelystad), L. Bakker (Wassenaar), C. Bas (Leiden) and A. Gutter (Enkhuizen). J.F. Veldkamp corrected the Latin diagnosis. This study has partly been carried out for the project 'Flora agaricina neerlandica', with a fellowship granted by the 'Rijksherbariumfonds Dr. E. Kits van Waveren'.

## REFERENCES

- Dam, N. 2003. De trek naar het oosten. *Coolia* 46 (1): 35–36.  
 Hausknecht, A. 2002. *Agaricus rufotegulis* Nauta in Portugal. *Rev. Cat. Micologia* 24: 225–227.  
 Nauta, M.M. 1987. Revisie van de in Nederland voorkomende soorten van het geslacht *Agrocybe* (Leemhoeden). Rijksherbarium, Leiden.  
 Nauta, M.M. 1999. Notes on *Agaricus* section *Spissicaulis*. *Notulae ad floram agaricinam neerlandicam XXIII*. *Persoonia* 17: 221–233.  
 Nauta, M.M. In prep. a. *Agrocybe*. In: M.E. Noordeloos, Th.W. Kuyper & E.C. Vellinga. *Flora agaricina neerlandica* vol. 6.  
 Nauta, M.M. In prep. b. Studies in the *Agrocybe* *pediades*-complex. *Persoonia* 18.  
 Singer, R. 1953. Quelques *Agaricus* nouveaux de l'Argentine. *Rev. Mycol.* 18: 3–23.  
 Watling, R. 1988. Observations on the *Bolbitiaceae* – 28. *Nordic records. Agarica* 9: 39–59.

MELIOLACEAE OF KERALA, INDIA – XII  
The genus *Meliola* on Lecythidaceae members in India

V.B. HOSAGOUDAR

Microbiology Division, Tropical Botanic Garden and Research Institute,  
Palode 695 562, Thiruvananthapuram, Kerala, India

An account of three species of the genus *Meliola* occurring on Lecythidaceae in India is presented here, viz. *Meliola indica* Syd. & P. Syd., recollected on *Barringtonia acutangula* in the southern Western Ghats, *Meliola careyae* (Stev.) Hosag. comb. nov. and *Meliola careyae* (Stev.) var. *indica* var. nov.

*Meliola indica* Syd. & P. Syd. and *Meliola indica* Syd. & P. Syd. var. *careyae* Stev. are known to occur on members of the family Lecythidaceae in India (Hansford, 1961; Hosagoudar, 1996). *Meliola indica* Syd. & P. Syd., originally collected in 1910 by A. Som in Assam, has recently been recollected in the southern Western Ghats. Hence, an account of the *Meliola* species occurring on the members of Lecythidaceae is given here.

KEY TO THE MELIOLA SPECIES ON LECYTHIDACEAE IN INDIA

- 1a. On *Barringtonia*, cause yellow haloes around the black colonies . . . . . *M. indica*  
b. On *Careya*, no such effect on the host . . . . . 2  
2a. Phialides borne on separate mycelial branches . . . . . *M. careyae*  
b. Phialides mixed with appressoria . . . . . *M. careyae* var. *indica*

*Meliola indica* Syd. & P. Syd. — Fig. 1

*Meliola indica* Syd. & P. Syd. in Sydow et al., Ann. Mycol. 9 (1911) 382.

Colonies amphigenous, dense, causing yellow haloes around the black colonies and yellowing of the corresponding opposite sides of the leaves, up to 3 mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite at acute angles, closely reticulate, cells 19–35 × 4–8 µm. Appressoria opposite, about 5% alternate to unilateral, antrorse to subantrorse, 12–16 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells ovate to globose, entire, 9–11 × 8–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–18 × 7–9 µm. Mycelial setae many, densely scattered, simple, straight, about 1–2% uncinuate at the upper part, acute to obtuse at the tip, up to 350 µm long. Perithecia loosely grouped to scattered, globose, verrucose, up to 192 µm in diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, middle cell often appearing slightly larger, 40–45 × 14–16 µm.

*Material examined.* INDIA: Kerala, Palode, Thiruvananthapuram, in the campus of Tropical Botanic Garden and Research Institute, on leaves of *Barringtonia acutangula* Gaertn., 28.V.2001, T. Sabu (HCIO 43961, TBGT 480).



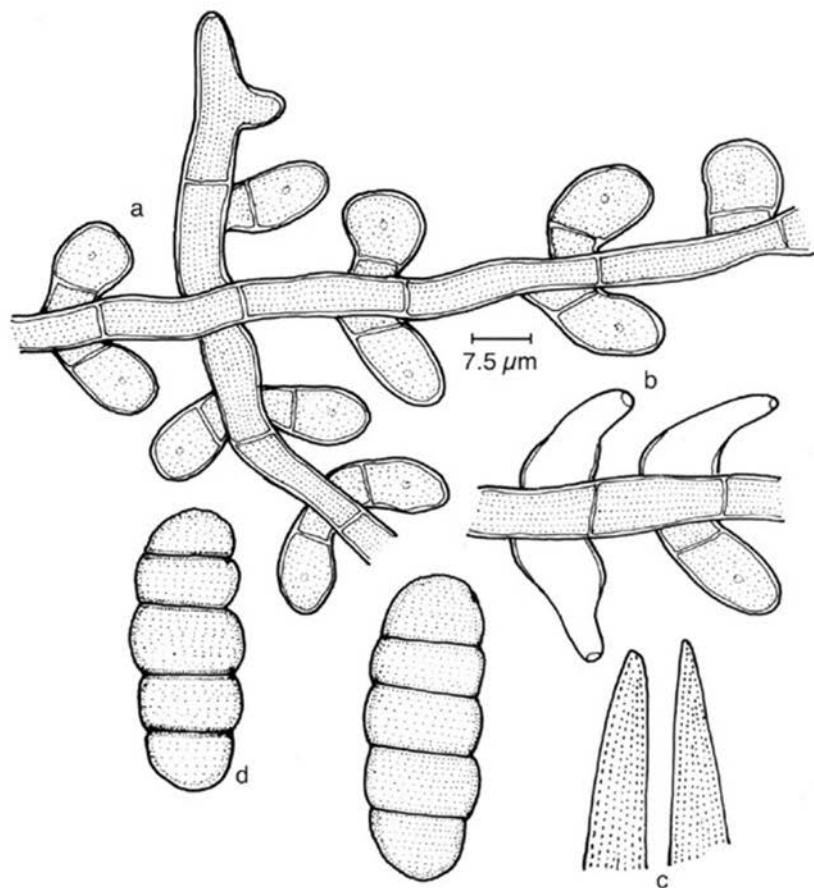


Fig. 1. *Meliola indica*. a. Appressorium; b. phialide; c. apices of mycelial setae; d. ascospores.

Hansford (1961) recorded this species on other species of the genus *Barringtonia* from the Philippines and Java. Although Thite & Kulkarni (1973) recorded it from the Western Ghats, no material exists other than the holotype in HCIO (Hosagoudar et al., 1995).

***Meliola careyae* (Stev.) Hosag., *comb. nov.* — Fig. 2**

Basionym: *Meliola indica* Syd. var. *careyae* Stev., Ann. Mycol. 26 (1928) 223.

Colonies epiphyllous, dense, velvety, up to 4 mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite at wide angles, closely reticulate, cells 25–30 × 6–8 μm. Appressoria alternate and opposite in varying proportions, antrorse to spreading, mostly straight, 15–20 μm long; stalk cells cylindrical to cuneate, 3–6 μm

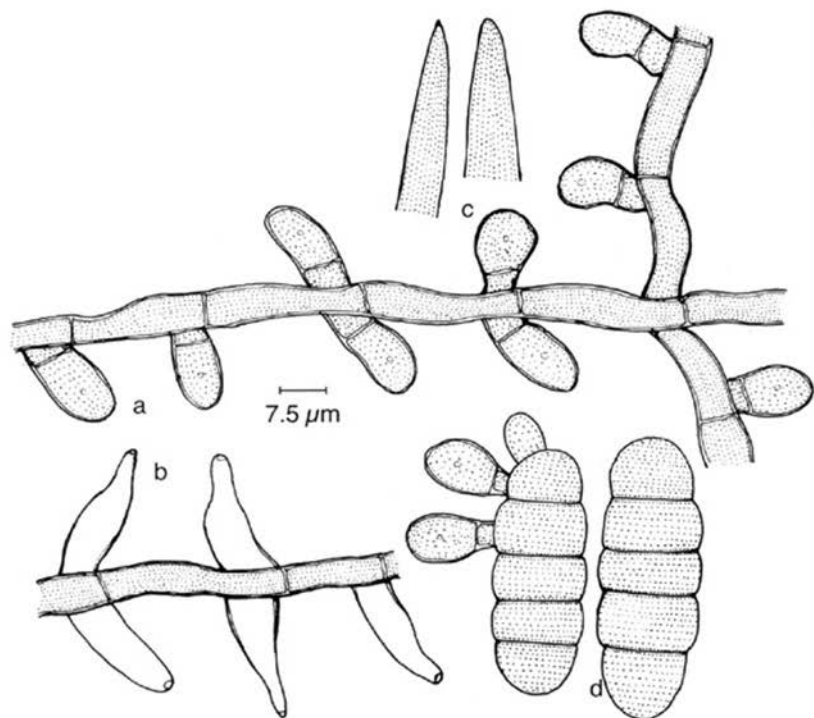


Fig. 2. *Meliola careyae*. a. Appressorium; b. phialide; c. apices of mycelial setae; d. ascospores.

long; head cells globose to broadly clavate, entire,  $10-14 \times 8-12 \mu\text{m}$ . Phialides borne on separate mycelial branches, alternate to opposite, ampulliform,  $16-20 \times 7-9 \mu\text{m}$ . Mycelial setae numerous, scattered, simple, straight, acute, up to  $700 \mu\text{m}$  long. Perithecia scattered, verrucose, up to  $180 \mu\text{m}$  in diameter; ascospores oblong, 4-septate, constricted at the septa,  $30-50 \times 14-18 \mu\text{m}$ .

*Material examined.* INDIA: Gersoppa Falls, Karnataka, on leaves of *Careya arborea* Roxb., X.1919, L.J. Sedgwick (HCIO 1985, holotype).

***Meliola careyae* (Stev.) Hosag. var. *indica* Hosag., var. nov. — Fig. 3**

A varietate typica phialidis appressoriis intermixtus differt.

Holotypus: On leaves of *Careya arborea* Roxb., India, Kerala, North of Eanikara, Karakulam, Thiruvananthapuram, 28.I.2001, P.V. Mahanteshagouda (HCIO 43968, holotype; TBGT 477, isotype).

Colonies epiphyllous, dense, up to 5 mm in diameter, rarely confluent. Hyphae straight to substraight, branching alternate to opposite at acute to wide angles, closely reticulate and form solid mycelial mat, cells  $12-26 \times 4-8 \mu\text{m}$ . Appressoria opposite,

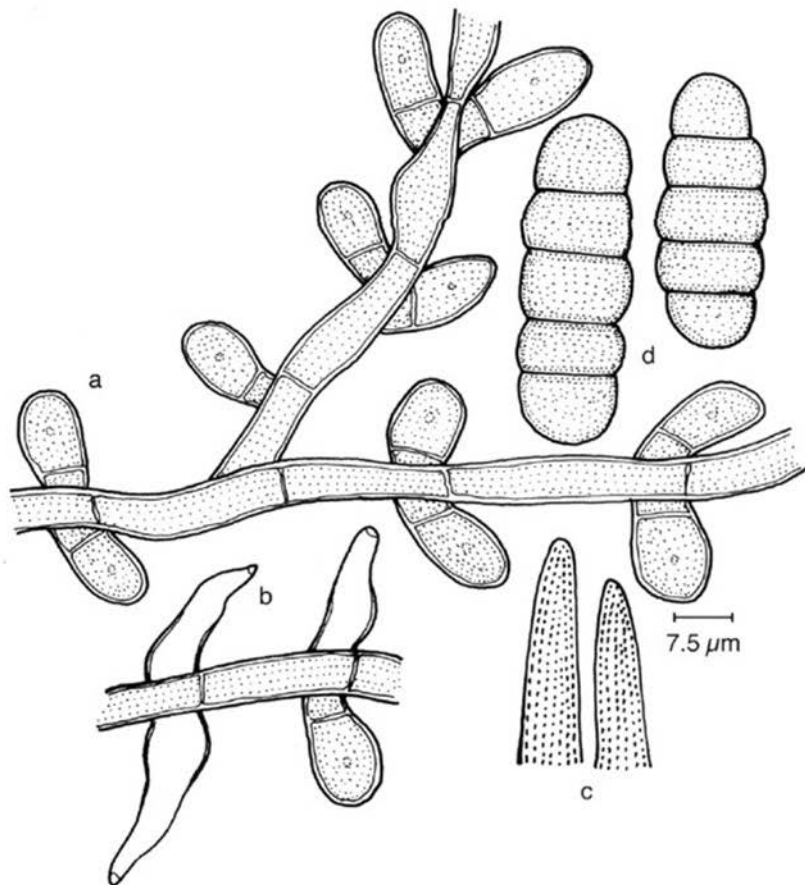


Fig. 3. *Meliola careyae* var. *indica*. a. Appressorium; b. phialide; c. apices of mycelial setae; d. ascospores.

about 3% alternate, antrorse to subantrorse, 14–18  $\mu\text{m}$  long; stalk cells cylindrical to cuneate, 3–5  $\mu\text{m}$  long; head cells ovate, rarely globose, entire, 9–13  $\times$  9–12  $\mu\text{m}$ . Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–23  $\times$  8–10  $\mu\text{m}$ . Mycelial setae scattered to grouped around perithecia, simple, straight, acute, up to 25  $\mu\text{m}$  long. Perithecia scattered, up to 25  $\mu\text{m}$  in diameter; asci scattered, sterile or cylindrical, 4-septate, constricted, 36–44  $\times$  14–16  $\mu\text{m}$ .

#### ACKNOWLEDGEMENTS

Thanks are due to Dr. L. M. Nair, Director and Dr. T. K. Abraham, Deputy Director, TBGRI, Palode for encouragement.

## REFERENCES

- Hansford, C.G. 1961. The Meliolineae. A Monograph. Sydowia Beih. 2: 1–806.
- Hosagoudar, V.B. 1996. Meliolales of India. Botanical Survey of India, Calcutta.
- Hosagoudar, V.B., A.K. Sarbhoy, D.K. Agarwal & M.K. Khan. 1995. Meliolaceae exsiccatae in Herbarium Cryptogamae Indiae Orientalis. Mycotaxon 56: 347–386.
- Thite, A.N. & U.K. Kulkarni. 1973. Additions to sooty moulds of Maharashtra. J. Shivaji Univ. 6: 161–166.

## BOOK REVIEW

G. Robich. *Mycena d'Europa*. (Associazione Micologica Bresadola, Via A. Volta, 46, I-38100 Trento, 2003.) Italian and English, Pp. 728, many coloured photographs and line-drawings. Price: EUR 85 excl. EUR 10 postal charges.

The *Mycena* specialist Robich, known from many publications, created his *magnum opus* with the present book, which, according to the title, covers all species known from Europe. Although many of his observations are based on southern European collections, his studies extended to other parts of Europe as well, and an attempt has been made to study the available type collections. His intensive contacts with the late Dr. R. A. Maas Geesteranus are reflected in the overall infrageneric taxonomy and species concepts. A comparison with Maas Geesteranus' *Conspectus of Northern Hemispheric Mycena* is therefore unavoidable. Robich book has a practical approach, with keys to the sections, and within sections to the species, both in Italian and English, which greatly improves the use of the book outside Italy. The descriptions are all in the same format, and include a nomenclator with the valid name, basionym and synonyms, with literature references, and the original diagnosis with a translation in Italian. A rather complete iconography facilitates comparison with literature. The descriptions are elaborate, listing macroscopical characters and habitat, followed by the microscopic characters. Observations, when necessary, complete the species description, followed by a list of examined specimens. As such, Robich book forms a perfect supplement to that of Maas Geesteranus cited above. For detailed information on nomenclature, types and history the latter publication has of course more to offer. The great value of the present book, apart from its accurate and elaborate text, is the iconography. All species are illustrated with line-drawings of excellent quality, supplemented with at least one coloured photo *in situ*, and often also with one or more photographs of microscopical structures. Also for those who do not master the Italian language, this book is of great use. Students in *Mycena* are therefore greatly advised to purchase this very valuable publication.

**COPRINUS PARVULUS, A NEW COPRINUS  
FROM THE NETHERLANDS**

C. B. ULJÉ† & P.-J. KEIZER

Kruisweg 23, 3513 CS Utrecht, The Netherlands

A new *Coprinus* species in subsection *Setulosi*, *Coprinus parvulus* is described and illustrated.

During an inventory of fungi in a coniferous forest in the Netherlands, in the autumn of 2001, a very small species of *Coprinus* was found on dung. Incubated dung produced more carpophores, which made it possible to complete the description. On account of the presence of lageniform to fusiform pileocystidia it belongs in the subsection *Setulosi* J. E. Lange of section *Pseudocoprinus* P. D. Orton & Watling. In addition spherical cells of veil are present on the pileus. This *Coprinus* could not be assigned to any species in literature and is therefore described as new.

***Coprinus parvulus* P.-J. Keizer & Uljé, spec. nov. — Fig. 1**

Pileus primo ovoideus 0.3–1 mm, non striatus, deinde expansus 0.5–2(–3) mm, primo albus mox cinereo-albidus, maturus griseus leviter deliquescens, in statu iuveni velo albo granuloso contextus, quod in statu maturo in medio pileo tantum remanet. Lamellae L = 3–8, l = 0–1, distantes, late adnatae, segmentiformes, primo albidae, mox purpurascens, acie alba. Stipes 3–7 × 0.2–0.5 mm, cylindraceus, subbulbosus, hyalinus, leviter pilosus, ad basim cum squamis veli. Odor nullus, sapor non perquisitus. Sporae depositae purpureo-fuscae.

Sporae [40, 2, 1] 5.7–7.2 × 2.7–3.7 μm, Q = 1.75–2.30, cylindraceo-ellipsoideae, ellipsoideae vel ovoideae, laeves, fusco-badiae, cum poro germinativo medio, c. 0.6 μm lato. Basidia 10–20 × 5.5–6.5 μm, tetraspora, a 4–5 pseudoparaphysibus cincta. Pleurocystidia absentes. Cheilocystidia 15–25 × 5–8.5 × 1.2–3 μm, fusiformia vel lageniformia. Pileipellis (sub)globosis hyphis instructa, pileocystidiis et velo contexta. Velum hyphis clavatis vel (sub)globosis 15–35 μm latis compositum, connexis cellulis hyphoideis, saepe distortis, 2.5–6 μm latis. Pileocystidia 25–45 × 6–11 × 1.5–3 μm, lageniformia vel fusiformia. Caulocystidia 22–40 × 6–12.5 × 1.5–3.5 μm, lageniformia vel fusiformia. Fibulae nullae.

In excremento in pineto invenitur.

Holotypus: 'The Netherlands, Prov. Gelderland, Forest 'Planken Wambuis', on dung in *Pinus sylvestris* forest on fixed drift sand, 21.IX.2001, P.-J. Keizer (L)'.

Etymology: parvulus, diminutive of Latin parvus = small, referring to the small size of the carpophores.

Pileus 0.3–1 mm when young, expanding to 0.5–2(–3) mm, young ovoid, then conico-convex, finally applanate, not translucently striate, when young white, then very pale greyish cream, with age greyish and only slightly deliquescent; when young covered with white fine-granular veil, with age granular velar remnants only present at centre. Lamellae, L = 3–8, l = 0–1, distant, broadly adnate, emarginate, sometimes with decurrent tooth, segmentiform, up to 0.5 mm broad, whitish when young, then purplish with

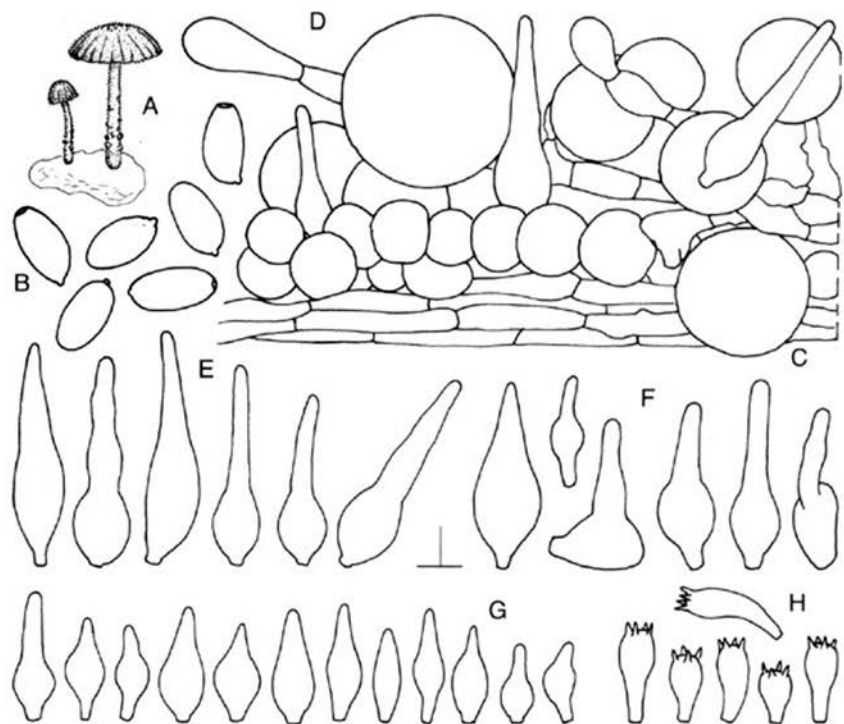


Fig. 1. A. *Coprinus parvulus*. B. spores; C. pileipellis; D. veil; E. pileocystidia; F. caulocystidia; G. cheilocystidia; H. basidia; (A =  $\times 7$ ; B =  $\times 2000$ ; C–H =  $\times 800$ .)

white edge. Stipe 3–7  $\times$  0.2–0.5 mm, cylindrical, subbulbose at base, greyish hyaline, minutely hairy, in lower part with sparse remnants of veil in form of small white squamules. Smell indistinct, taste not tested. Spore print dark purplish brown.

Spores [40, 2, 1] 5.7–7.2  $\times$  2.7–3.7  $\mu\text{m}$ , Q = 1.75–2.30, av. Q = 1.90–2.05, av. L = 6.1–6.8, av. B = 3.1–3.4  $\mu\text{m}$ , cylindrical to ellipsoid or ovoid, medium red-brown, with central, c. 0.6  $\mu\text{m}$  wide germ pore. Basidia 10–20  $\times$  5.5–6.5  $\mu\text{m}$ , 4-spored, surrounded by 4 or 5 pseudoparaphyses. Pleurocystidia absent. Cheilocystidia 15–25  $\times$  5–8.5  $\times$  1.2–3  $\mu\text{m}$ , fusiform or lageniform. Pileipellis a layer of (sub)globose elements, covered with pileocystidia and veil. Veil made up of (sub)globose to clavate cells; the globose ones 15–35  $\mu\text{m}$  wide, connected by hyphoid, often irregular, 2.5–6  $\mu\text{m}$  wide elements. Pileocystidia 25–45  $\times$  6–11  $\times$  1.5–3  $\mu\text{m}$ , lageniform or fusiform. Caulocystidia 22–40  $\times$  6–12.5  $\times$  1.5–3.5  $\mu\text{m}$ , lageniform or fusiform. Clamp-connections absent.

Habitat — On old dung, presumably from Wildboar (*Susscrofa*), covered with algae, in pine forest.

Collection examined. THE NETHERLANDS: Prov. Zuid-Holland, Ede, Planken Wambuis, 21.IX.2001, on dung, P.-J. Keizer (holotype, L).

The presence of lageniform pileocystidia places *C. parvulus* in subsection *Setulosi*. In that subsection only *C. pellucidus* P. Karst., another small dung inhabiting *Coprinus* species, is rather close to *C. parvulus*. That species, however, lacks veil consisting of sphaerocysts on the pileus, has larger spores and globose cheilocystidia. Cacialli et al. (1999: 234) mention another taxon close to *C. pellucidus*, having some lageniform cheilocystidia between the globose ones, but with much larger spores similar to these in *C. pellucidus*. Other species of the subsection have considerably larger spores, often with eccentric germ pores, larger fruit-bodies or a non-coprophilous habitat (Uljé & Bas, 1991).

#### ACKNOWLEDGEMENT

We are indebted to Mr. R. H. F. Hofman for correcting the Latin diagnosis.

#### REFERENCES

- Cacialli, G., V. Caroti & F. Doveri. 1999. *Contributio ad Cognitionem Coprinorum*. Monografie de Pagine di Mycologia. Livorno. AMB. Vicenza.
- Uljé, C. B. & C. Bas. 1991. *Studies in Coprinus II*. Subsection *Setulosi* of section *Pseudocoprinus*.



## Instructions to authors

(A more extensive 'Checklist for preparation of manuscripts' is available)

**Copy**, preferably in English, to be sent to the editors, printed on one side of the paper, double-spaced, and with a left margin of about 4 cm. For fractions of numbers the decimal system should be used.

Please send one copy of the manuscript, together with a file on diskette, one set of original line drawings, and one set of original photographs to the editors of *Persoonia*, Nationaal Herbarium Nederland, Universiteit Leiden branch, P.O. Box 9514, NL-2300 RA Leiden.

**Drawings** within A4 size should be in India ink, preferably **not** on transparent or tracing-paper, and **photographs** (also within A4 size) should be mounted ready for publication on glossy paper. Magnification should preferably be indicated by a scale-line. In other cases the author should give the magnification as in the original.

**Summary**. Each paper should be provided with a concise summary.

**Citation of literature**. Citations in the 'References' should conform to the following format:

*For books, e.g.:*

Fries, E. M. 1821. *Systema mycologicum*. Vol. 1. Lundae.

Singer, R. 1975. *The Agaricales in modern taxonomy*, ed. 3. Vaduz.

*For chapters in a book, e.g.:*

Pitt, J.I. & R.H. Cruickshank. 1990. Speciation and synonymy in *Penicillium* subgenus *Penicillium* towards a definitive taxonomy. In: R.A. Samson & J.I. Pitt (eds.), *Modern concepts in Penicillium and Aspergillus classification*: 103--119. New York and London.

*For journals, e.g.:*

Singer, R. & H. Cléménçon. 1971. Neue Arten von Agaricales. *Schweiz. Z. Pilzk.* 49: 118--128.

Titles of journals and other publications are abbreviated mainly in accordance with the 'International Code of Abbreviations for Titles of Periodicals', and with 'A World List of Scientific Periodicals'.

Italics are **not** used in the references.

Write out the name(s) of author(s), i.e., do not replace author names with a long dash, when the author(s) is/are the same as in the immediate preceding citation(s).

**Note**: Use only a period, without a space, between the initial(s) of an author's name. Leave one space between the volume number with colon and page numbers in a journal article. Use double hyphens between page numbers, e.g., *Bull. trimest. Soc. mycol. Fr.* 80: 88--101.

**Keys**. For keys the bracketed type is strongly recommended.

**Reprint orders** can be submitted together with corrected proofs. Authors will, as a rule, not receive free reprints.

## CONTENTS

In memoriam R.A. Maas Geesteranus .....	149
In memoriam C.B. Uljé .....	151
G.H. Boerema: Contributions towards a monograph of <i>Phoma</i> (Coelomycetes) – X. Section <i>Pilosa</i> (taxa with a <i>Pleospora</i> teleomorph) and nomenclatural notes on some other taxa .....	153
C. Bas: A reconnaissance of the genus <i>Pseudobaeospora</i> in Europe II .....	163
E. Arnolds: Notulae ad floram agaricinam neerlandicam – XXXIX. <i>Bolbitius</i> ...	201
G. Moreno, A. Altés & C. Ochoa: Notes on some type materials of <i>Disciseda</i> (Lycoperdaceae) .....	215
E. Arnolds: Notulae ad floram agaricinam neerlandicam – XL. New combinations in <i>Conocybe</i> and <i>Pholiotina</i> .....	225
B. Senn-Irlet & G. Immerzeel: <i>Crepidotus cristatus</i> , a new yellow species from the Netherlands .....	231
E. Arnolds & A. Hausknecht: Notulae ad floram agaricinam neerlandicam – XLI. <i>Conocybe</i> and <i>Pholiotina</i> .....	239
A.I. Romero & C.C. Carmarán: <i>Phaeotrichosphaeria minor</i> spec. nov. from Argen- tina .....	253
C.B. Uljé & M.E. Noordeloos: Notulae ad floram agaricinam neerlandicam – XLII. Additions to <i>Coprinus</i> subsection <i>Setulosi</i> .....	259
A.M.C. Tang, K.D. Hyde, K.M. Tsui & R.T. Corlett: A new species of <i>Lophiotrema</i> from wild fruit in Hong Kong .....	265
M.M. Nauta: A new <i>Agrocybe</i> on woodchips in northwestern Europe .....	271
V.B. Hosagoudar: Meliolaceae of Kerala, India – XII. The genus <i>Meliola</i> on Lecythidaceae members in India .....	275
C.B. Uljé & P.-J. Keizer: <i>Coprinus parvulus</i> , a new <i>Coprinus</i> from the Nether- lands .....	281
Book reviews .....	162, 200, 224, 238, 258, 270, 280

Published by



Nationaal Herbarium Nederland

Universiteit Leiden branch  
P. O. Box 9514  
2300 RA Leiden  
The Netherlands