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Studies in *Psilocybe* sect. *Psilocybe*

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Abstract: The species of *Psilocybe* sect. *Psilocybe* emend. are critically evaluated. Keys and descriptions are given of all accepted European species. Type studies are presented of almost all taxa described world-wide. Comments are given on excluded and confusing names.

Zusammenfassung: Die Arten von *Psilocybe* sect. *Psilocybe* werden kritisch bearbeitet. Schlüssel und Beschreibungen aller aus Europa bekannten Arten werden gegeben. Typusstudien von fast allen Arten weltweit werden präsentiert, mit Kommentaren über ausgeschlossene und verwirrende Namen.

Although the genus *Psilocybe* received much attention in the past decades, particularly in the works of GUZMÁN (1983, 1995), HØILAND (1978), ORTON (1960), BON (1977), WATLING & GREGORY (1987), and STAMETS (1996) major problems still existed in identifying species, particularly in the sections *Psilocybe* and *Merdariae,* formerly often treated as a separate genus *Deconica*. Different interpretations of currently used names contributed to the confusion. Characters used to distinguish species appeared to be rather variable and a critical morphological study was therefore necessary to establish more sound criteria for species delimitation.

The question arose whether the group concerned consists of many taxa, which are difficult to delimitate, or only a few, rather variable biological species, made us decide to start a thorough analysis of sect. *Psilocybe*, not only morphologically, but also genetically with crossing experiments in an attempt to establish biological species that hopefully were also morphological distinct. In addition molecular methods have been undertaken to give a further support to the species concepts. The results of this multidisciplinary study are to be published in due course (NOORDELOOS & al., unpubl.). This study formed also the base for the treatment of sect. *Psilocybe* in the Flora agaricina neerlandica (NOORDELOOS 1999).

The present paper provides additional information on morphology and nomenclature of sect. *Psilocybe* in a wider scope than could be realised in the Flora agaricina neerlandica, including keys and descriptions of European taxa, type studies of almost all taxa known world-wide, and comments on excluded and rejected names.

Materials and methods

Most macroscopical descriptions are based on own observations on fresh material, supplemented with descriptions of herbarium specimens. Microscopical data have been obtained from herbarium specimens using standard procedures as described in the Flora agaricina neerlandica (BAS & al. 1988).

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Abbreviations used:
Q = length-width ratio.
Qav = average length/width ratio.
Qf = length-breadth ratio (frontal view).
Qs = length-width ratio (side-view).
F/I: Flattening Index, i.e. the percentage of spores in frontal view in a microscopic preparation of a lamella fragment.
Mu. = MUNSELL Soil Colour Charts. Baltimore.
K&W = KORNERUP & WANSCHER (1975).

History of *Psilocybe*

The name *Psilocybe* has first been used by FRIES (1821) for a grouping (tribus) within the large genus *Agaricus* with the following characters: species with a marginal, thin or floccose, fugaceous veil; with equal, tough, hollow stipe, rarely stuffed in young specimens, with subfibrillose or viscid, first conical, expanding to convex pileus, with subdiscrete stipe; with very broad lamellae; context tough, persistent, not liquescent. FRIES considered it a very natural grouping.

In its original sense, *Psilocybe* included species like the present *Psilocybe* s. str., as well as species now usually included in the genera *Stropharia* and *Hypholoma*. Two groups were distinguished, one with adnexed to almost free lamellae and one with adnate lamellae. Later, FRIES (1838) excluded some species which were transferred to *Naucoria*, *Agaricus*, and *Psalliota*, and two sections were distinguished, *Tenaces* for species with broadly adnate lamellae, and *Rigidi*, for those with narrowly adnate to free lamellae.

The typical section, *Tenaces* FR. was subdivided in three undergroups: (a) "lamellae broadly ventricose, free or adnate, (b) lamellae plane, very broadly adnate to subdecurrent, and (c) lamellae ascending, sublinear". FRIES (1849) gave these groups the rank of stirps: (a) corresponding with stirps *A. ericaei*, (b) with stirps *A. bullacei*, and (c) with stirps *A. callosi*.

KUMMER (1871) raised the Friesian subgenus to the generic level, and altered the concept of *Psilocybe* (FR.) considerably by excluding most of the *Hypholoma*-like species, such as *Agaricus ericaeus* and *A. udus*, but also *A. callosus*. SMITH (1870) described *Agaricus* subg. *Deconica*, for what probably represents *Agaricus* subg. *Psilocybe* sect. *Tenaces* in the circumscription of FRIES (1838, 1874) with the following diagnosis: "Subgenus 32. *Deconica*, subgen. nov. sp. *Psilocybis* FR. – Pileus thin, plane, at first incurved; veil obsolete or adhering to the margin of pileus, not forming a ring; stem cartilagineous, hollow, confluent, but hetergeneous from the hymenophorum; gills decurrent. The typical species figured is *A.* (*Deconica*) *physaloides*, BULL.; it is analogue with *Omphalia*, *Eccilia*, and *Tubaria*".

KARSTEN (1879) raised *Deconica* W. G. SMITH to generic rank. The concept of this genus closely followed SMITH (1870), including species with more or less fleshy pileus with involute margin; very broadly adnate to subdecurrent lamellae that turn blackish, not brown or purple-brown, similar in habit to species of *Omphalia*, *Eccilia*, or *Tubaria*, but with black spores. It included the following species: *Deconica coprophila*, *D. bullacea*, *D. physaloides*, *D. libertatis*, *D. atrorufa*, and *D. nuciseda*.

QUÉLET (1872) created a new classification with the genus *Geophila* to accomodate species of *Stropharia*, some *Hypholoma*, part of *Psathyrella*, and *Psilocybe* and the genus *Drosophila* which included *Hypholoma* and also part of *Psathyrella*. KÜHNER & ROMAGNESI (1953) emended the concept of *Drosophila*, restricting it entirely

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to *Psathyrella* s. l., incl. *Lacrymaria*, and *Geophila* was now entirely confined to *Stropharia*, *Hypholoma*, and *Psilocybe* each of them as a separate subgenus. Later on KÜHNER (1980) replaced the generic name *Geophila* with *Psilocybe* for nomenclatural reasons, and gave arguments for the reason not to split this genus up in several genera. This wide generic concept was followed by SMITH (1979) and NOORDELOOS (1995, 1999).

Characters used for the delimitation of species

1. Macroscopical characters

Veil: Presence or absence of veil always played an important role in the delimitation of species in sect. *Psilocybe*. Our studies proved that it may be of limited value, however. In some cases it is rather constant, and can be used as a distinguishing character, for example in *Psilocybe castanella* PECK and *P. magica* SVRČEK. In other species it is more variable. *Psilocybe crobula* (FR.) SINGER usually has abundant veil in form of appendiculate patches at the margin of the pileus and annuliform zone on the stipe, and *P. inquilinus* (FR.: FR.) BRES. usually does not have a pronounced veil. But exceptions may occur, in which case the difference in spore-size and ecology may give way to a correct identification. *Psilocybe subviscida* (PECK) KAUFFM., which is one of the more commonly encountered species, has forms with well developed veil on pileus and stipe besides variants with veil on stipe only or with hardly any veil. Usually this is correlated with thick-walled spores and habit preference, making a distinction between two varieties possible.

Separable pileipellis: The separability of the cuticle of the pileus is often used to distinguish species, but in practice offers difficulties. In several *Psilocybe* species the pileipellis may vary between a dry cutis, without gelatinized tissue to a moderately thick ixocutis, up to 70, max. 100 µm thick, where the hyphae are embedded in a gelatinous matter. In these cases it is sometimes possible to lift the cuticle with a needle at the margin, sometimes up to half the centre of the pileus, especially in young, fresh specimens. Also when touched with the lips (kissing trick), the pileus appears slightly sticky. However, in other species, the ixocutis is better developed, with a thickness between 100-300 µm or even more. In these taxa the entire cuticle can be lifted off as transparent pellicle. Also here the kissing trick gives more or less the same result. Our experimental studies have proved, that the character of a separable pellicle may only be successfully used as a distinguishing character between species, when the following definition is used:

A pileus is said to have a separable pellicle if it can entirely be lifted off as a thin, translucent membrane, also in mature specimens provided that the material is completely fresh and not dried out. Microscopically the ixocutis is at least 100 µm thick (observed on fresh, intact specimens or well-dried material of such specimens).

Colour of the lamellae: Generally speaking there is a clear relation between the colour of the ripe spores, thickness of the spore wall, and colour of the mature lamellae. In the *P. inquilinus*-group, the spore wall is thin, spore-print brown to red brown, and the fresh (and dried) lamellae have a shade of (dark)brown. In the *P. montana*-group, spores have thickened, dark brown walls, the spore-print is accordingly (dark)purple-brown, and the lamellae of mature specimens have a dark purple-brown colour. This usually makes a good character to distinguish species groups in the field.

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2. Microscopical characters

Spores, wall thickness and colour: Spores with thin versus thick walls are generally a good diagnostic character. One should observe also the colour of the lamellae in this respect, both in fresh and (well) dried material. On account of this character it is possible to differentiate between species groups of *P. inquilinus* and *P. montana*. The first group of taxa has thin- to slightly thick-walled spores, which appear yellow-brown or warm brown when observed in water or ammonia. In the *P. montana*-group the spores are thick-walled, and strong brown, grey-brown or greyish-purplish brown when observed in water or ammonia.

Spore-shape: In sect. *Psilocybe* the spores often are adaxially flattened, and have a breadth that differs from the width. Accordingly the shape in frontal view often is markedly different from the shape in side-view. In side-view the spores appear to be narrowly to broadly ellipsoid, sometimes amygdaliform, in frontal view the spores may appear ovoid, mitriform, rhomboid or angular. In those cases where the spores are extremely flattened, it is hardly possible to find a spore in side-view in a normal preparation. Since this is a good usuable character, the flattening index (F/I) has been introduced to characterize spore-shape (see abbreviations used).

Spore-size: In sect. *Psilocybe* spores rarely exceed 10 µm in length, only in *Psilocybe pratensis* ORTON and in *P. montana* (PERS.: FR.) KUMMER var. *macrospora* NOORDEL. & VERDUIN the spore may reach a length of 11.5 or 12 µm. Although a certain degree of variability is noted, particularly in species like *Psilocybe subviscida* and *P. montana*, small differences in size, particularly in mean values of 15-20 measurements, may prove to be of good diagnostic value.

Spores, germ-pore: Most taxa in sect. *Psilocybe* have spores with a distinct, often rather large germ-pore. In *Psilocybe montana* the germ-pore often is so large, that it gives the spore a truncate appearance. In *Psilocybe micropora* NOORDEL. & VERDUIN the germ-pore is very small and hardly visible, even in oil-immersion.

Cheilocystidia: Generally speaking cheilocystidia are rather uniform in shape, varying from narrowly to broadly lageniform, with short to rather long neck, more rarely utriform, or sublecythiform, fusiform or clavate. GUZMÁN (1983: 20) emphasises the importance of size and shape of the cheilocystidia as a diagnostic character and he frequently used it in his keys. In some cases, however, the variation in size is so big, that the noted differences do not stand, and accordingly some taxa, separated by these characters by GUZMÁN (1983) are considered synonymous. See also the notes with the type-studies below.

Pileipellis: The structure of the pileipellis generally is a rather simple cutis or ixocutis, in varying thickness, rather often separated from the pileitrama by a more or less well-differentiated subpellis of short, inflated hyphal elements. Usually this subpellis is strongly pigmented with yellow brown to brown incrusting pigment.

Taxonomic part

Psilocybe* sect. *Psilocybe emend.
syn.: *Psilocybe* sect. *Pratensae* GUZMÁN, Beih. Nova Hedwigia **74**: 288. 1983.

Basidiocarps generally small, pileus rarely exceeding 20 mm, conico-convex then expanding, with or without umbo, with glabrous, dry to viscid surface; veil usually

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present in primordia, in mature specimens present, sometimes abundant and appendiculate; on stipe absent, or visible in form of fibrils and small flocks, rarely annuliform; lamellae usually broadly adnate, emarginate or with decurrent tooth, sometimes distinctly decurrent, sometimes narrowly adnate-ascending, varying in colour when mature from brown to purple brown or blackish purple, usually with fimbriate, slightly to distinctly paler lamellar edge; stipe usually well-developed, central.

Spores generally (distinctly) shorter than 10 µm, rarely up to 11.5 µm long, thin- to thick-walled, often adaxially flattened, ellipsoid-ovoid, ovoid, mitriform, rhomboid or slightly angular in frontal view, usually with distinct germ-pore; basidia generally 4-spored; lamellar edge usually entirely fertile with abundant cheilocystidia; pleurocystidia absent or very rarely present; subhymenium ramose, thin, often markedly incrusted with yellow brown pigment; pileipellis a cutis or an ixocutis, sometimes separated from a well-differentiated subpellis of short, inflated hypal elements; clamp-connections usually present and abundant.

Ecology: saprotrophic, often gregarious, on vegetal debris, raw humus, wood chips, woody sticks and branches, on grasses and sedges, dead herbaceous plants, etc.

Type-species: *Psilocybe montana* (PERS.: FR.) KUMMER.

GUZMÁN (1983) created sect. *Pratensae* to accomodate species with subellipsoid to slightly rhomboid, thin-walled spores, and without pleurocystidia. In the same work, GUZMÁN (1983) included in sect. *Psilocybe* species with both thin- and thick-walled, rhomboid to subrhomboid spores. Unfortunately, the type species of sect. *Pratensae*, *P. pratensis*, has thick-walled spores, as is demonstrated below. *Psilocybe castanella*, also included in sect. *Pratensae*, has thin-walled spores, which are not rhomboid in frontal view, and fit well in GUZMÁN's concept of the section. Later, GUZMÁN (1995) transferred all thin-walled species from sect. *Psilocybe* in sect. *Pratensae*, viz. *P. inquilinus*, *P. nothofagensis* GUZMÁN & HORAK, *P. physaloides* (BULL.) QUÉL., and *P. smithiana* GUZMÁN, in an attempt to give both sections a better definition. However, considering the variability of spore-wall thickness and spore-shape within taxa (compare *P. subviscida*!) the present author considers the whole species complex a morphologically rather uniform group, and includes all species in a single sect. *Psilocybe*. Unpublished molecular data also strongly indicate that *Psilocybe* ("*Melanotus*") *phillipsii* (BERK. & BR.) VELLINGA & NOORDEL. finds its place in sect. *Psilocybe* as a representative with a reduced, pleurotoid fruitbody.

Key to the European species of *Psilocybe* sect. *Psilocybe*

1 Spores thin- or slightly thick-walled; lamellae of fresh and dried specimens ochre-brown to red-brown, lacking a purple-brown or chocolate-brown tinge (subsect. *Inquilinae*) 2

1* Spores with thickened walls; lamellae often dark purple-brown to chocolate-brown in fresh and dried specimens (subsect. *Montanae*) 6

2 Pileus viscid; pileipellis entirely peeling off as a hyaline, gelatinous pellicle; spores often more or less rhomboid or subangular in frontal view 3

2* Pileus dry; pileipellis not or only slightly peeling off; spores never tending to become rhomboid or subangular in frontal view (if so, compare

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Psilocybe subhyperella SINGER from S America, see type-studies below) 4

3 Spores large, in average 7.8-8.6 x 5.9-6.1 x 5.0-5.3 µm, Qf = 1.4-1.5, Qs = 1.5-1.7; veil usually absent in mature fruitbodies; on dead leaves of grasses

1. *Psilocybe inquilinus*

3* Spores small, in average 6.0-7.5 x 4.6-5.1 x 4.0-5.3 µm, Qf = 1.3-1.6, Qs = 1.3-1.7; veil usually well-developed as appendiculate flocks at pileus margin and an annuliform zone and white fibrils on stipe; usually on woody substrates

2. *Psilocybe crobula*

4 Veil abundant, covering the young pileus entirely and visible as a cortina connecting the margin of the pileus with the stipe, leaving appendiculate patches at pileus margin in mature specimen; spores never strongly flattened, F/I << 50 % 5

4* Veil usually only present as a cortina in young specimens, almost or entirely absent in mature specimens

5. *Psilocybe subviscida* var. *subviscida*

5 Spores ellipsoid to oblong in side-view with small germ-pore; margin of pileus often grooved

3. *Psilocybe castanella*

5* Spores amygdaliform with apical papilla, with large germ-pore, often somewhat truncate; margin of pileus not grooved

4. *Psilocybe velifera*

6 Spores rhomboid, F/I up to 90 % 7

6* Spores not rhomboid, F/I up to 50 % or much lower 9

7 Pileus viscid, glabrous

6. *Psilocybe phyllogena*

7* Pileus dry, fibrillose to flocculose 8

8 Pleurocystidia present, similar to cheilocystidia

7. *Psilocybe flocculosa*

8* Pleurocystidia absent

8. *Psilocybe* cf. *rhomboidospora*

9 Spores without or with a very small germ-pore

9. *Psilocybe micropora*

9* Spores with a distinct germ-pore 10

10 Spores small, 5.5-7.0 x 4.0-5.0(-5.5) x 3.5-4.5 µm

10. *Psilocybe xeroderma*

10* Spores larger 11

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11 Spores 9.0-11.5 µm long 12
11* Spores 7.0-9.5 µm long 13

12 Pileus viscid with a thick, peeling pellicle, indistinctly translucently striate
11. *Psilocybe pratensis*
12* Pileus dry, pellis not peeling, translucently striate up to centre
12. *Psilocybe montana* var. *macrospora*

13 Veil absent, or only a fugaceous cortina present; usually among mosses on open, short vegetation types 14
13* Veil present as appendiculate patches at pileus margin and as fibrils and/or an annuliform zone on stipe; usually in mesic to eutrophic grasslands or in swampy areas among *Juncus* or *Carex* species 15

14 Spores in average 7.5-8.6 x 5.1-5.7 x 4.8-5.7 µm, Qf = 1.4-1.6, slightly flattened, ovoid to mitriform in side-view, often truncate because of a large germ-pore; saprotrophic among mosses such as *Polytrichum piliferum* HEDW., *Racomitrium canescens* (HEDW.) BRID. or *Campylopus introflexus* (HEDW.) BRID.
12. *Psilocybe montana* var. *montana*
14* Spores in average 7.3-8.4 x 4.9-5.5 x 5.7-5.9 µm, Qf = 1.3-1.55, flattened, appearing mitriform or slightly angular in frontal view, with medium-sized germ-pore; often in alpine snow-bed vegetation, parasitic on *Polytrichum sexangulare* FLÖRKE ex BRID. but also found in lowland *Fagus* forest
13. *Psilocybe chionophila*

15 Cheilocystidia 20-35 x 5.5-10 µm, often tibiiform, rarely lageniform, usually with globose 2.0-6.0 µm wide capitulum; on damp, fertile soil in marshy places, wet meadows among *Juncus* or *Carex*, etc.
14. *Psilocybe magica*
15* Cheilocystidia 20-44 x 3.0-7.0 µm, lageniform or subcylindrical with attenuated, 1.5-3.0 µm wide neck; in groups on raw humus in fertilized grasslands, lawns, road-sides, also on rotten manure, straw or old dung
5. *Psilocybe subviscida* var. *velata*

Description of the accepted European species

***Psilocybe* subsect. *Inquilinae*, subsect. nova**
Sporae tenuitunicatae. Holotypus: *Psilocybe inquilinus* (FR.: FR.) BRES.
Spores thin-walled. Type species: *Psilocybe inquilinus* (FR.: FR.) BRES.

1. *Psilocybe inquilinus* (FR.: FR.) BRES., Iconogr. mycol. **18**: pl. 863. 1931. Fig. 1.
Agaricus inquilinus FR.: FR., Syst. mycol. **1**: 264. 1821; *Naucoria inquilinus* (FR.: FR.) KUMMER, Führ. Pilzk.: 71. 1871; *Tubaria inquilinus* (FR.: FR.) GILLET, Hyméno-

mycètes: 538. 1874; *Deconica inquilinus* (FR.: FR.) ROMAGN., Rev. Mycol. **2**: 244. 1937; *Geophila inquilinus* (FR.: FR.) KÜHN. & ROMAGN., Fl. anal. champ. sup.: 339. 1953 (invalid, no complete basionym cited). – *Agaricus inquilinus* "var." *ecbolus* FR., Epicrisis: 199. 1838; *Tubaria ecbola* (FR.) SACC., Syll. Fung. **5**: 876. 1887; *Psilocybe ecbola* (FR.) SINGER, Nova Hedwigia **29**: 254. 1969. – *Atylospora lateritia* MURRILL, Mycologia **10**: 20. 1918. – *Deconica muscorum* P. D. ORTON, Trans. Brit. Mycol. Soc. **43**: 225. 1960; *Psilocybe muscorum* (P. D. ORTON) MOSER, Kl. Kryptogamenflora **II b/2**: 239. 1967.

Misapplied names: *Psilocybe muscorum* sensu ORTON, Trans. Brit. Mycol. Soc. **43**: 225. 1960; MOSER, Kl. Kryptogamenflora **II b/2**: 239. 1967; WATLING & GREGORY, Brit. Fung. Fl. **5**: 49. 1992; GUZMÁN, *Psilocybe*: 293. 1983; M. CONTU, Micol. Veg. Medit. **12**: 3-5. 1997 (= *P. montana* sensu lato).

Iconography: BREITENBACH & KRÄNZLIN (1995: pl. 446), LUDWIG (2000: pl. 72.21a); RYMAN & HOLMÅSEN (1992: 453); STAMETS (1996: 120).

Descriptions: NOORDELOOS (1999: 38-39); STAMETS (1996: 119-120).

Characters:

Pileus: 4-21 mm, conical or hemispherical at first, expanding to plano-convex or applanate, often with small, blunt papilla, with slightly deflexed or straight margin, which often exceeds the lamellae, hygrophanous, translucently striate up to half or three-quarter of the radius, reddish brown at centre, paler towards margin (Mu. 5 YR 4-5/6-8, 7.5 YR 7-6/6-8, margin 7.5 YR 4-7/4-6), strongly pallescent on drying, strongly viscid with pellicle entirely separable as a thin, gelatinous membrane. Veil usually distinct in form of small fibrillose-arachnoid patches, especially in marginal zone, but never appendiculate, often (partly) disappearing with age.

Lamellae: L = 12-26, l = 1-7, moderately crowded, broadly adnate with decurrent tooth, sometimes emarginate with decurrent tooth, segmentiform to subventricose, pale brown then reddish yellow to reddish brown [7.5 YR (5-)6-7/4-6, rarely 5 YR 6/5], lacking a purple or red-brown tint when old, with fimbriate, slightly paler lamellar edge.

Stipe: 8-17 x 1.0-1.5 mm, cylindrical, often flexuous, sometimes slightly tapering towards apex, attenuated or subbulbous at base, reddish brown, darker towards base (7.5 YR 8-7/4-6; lower parts 5 YR 6-5/2-4, base 5 YR 5/6-3/3), entirely flocculose-fibrillose with paler fibrils (veil).

Context: very thin. Smell indistinct. Taste not noted.

Spores: 7.0-10.0 x 5.0-7.0 x 4.0-6.0 µm, average = 7.8-8.6 x 5.9-6.1 x 5.0-5.3 µm; ovoid to subrhomboid or slightly angular, Qf = 1.2-1.4-1.6, ellipsoid-oblong, Qs = 1.4-1.6-1.8 in side-view, with thin or only slightly thickened, pale brown walls, with small to medium-sized apical germ-pore.

Basidia: 15-32 x 4.0-9.0 µm, 4-spored.

Lamellar edge: sterile.

Cheilocystidia: 15-32 x 3.0-10 µm, lageniform with 1.5-4.0 µm wide, blunt neck.

Pileipellis: a 70-130 µm thick ixocutis of narrow, cylindrical, 1.0-3.0 µm wide, colourless or finely incrusted hyphae; subpellis compact, made up of cylindrical to inflated elements, 20-90 x 3.0-15 µm with strong brown incrusted walls.

Clamp-connections: present in all parts of the basidiomata.

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Ecology: saprotrophic, usually in small groups, on dead leaves of grasses and sedges.

Distribution: widespread, but probably often confused with other species, such as *P. subviscida*.

Collections examined: The Netherlands: prov. Friesland, Isl. of Terschelling, 9. 11. 1996, S. VERDUIN (V190); - Oosterend, 10. 11. 1996, E. C. VELLINGA (V0194, L). prov. Drenthe, Beilen, Holten, 4. 11. 1996, E. ARNOLDS (V188, L); - Gieten, Boekweitveentje, 26. 10. 1995, N. & M. DAM (V078, L). prov. Noord Holland, Vogelenzang, Amsterdamse Waterleidingduinen, Eiland van Rolvers, 28. 11. 1996, M. E. NOORDELOOS (V179). prov. Zuid Holland, Rijswijk, Ter Werve, 13. 11. 1996, C. ULJÉ (V196).

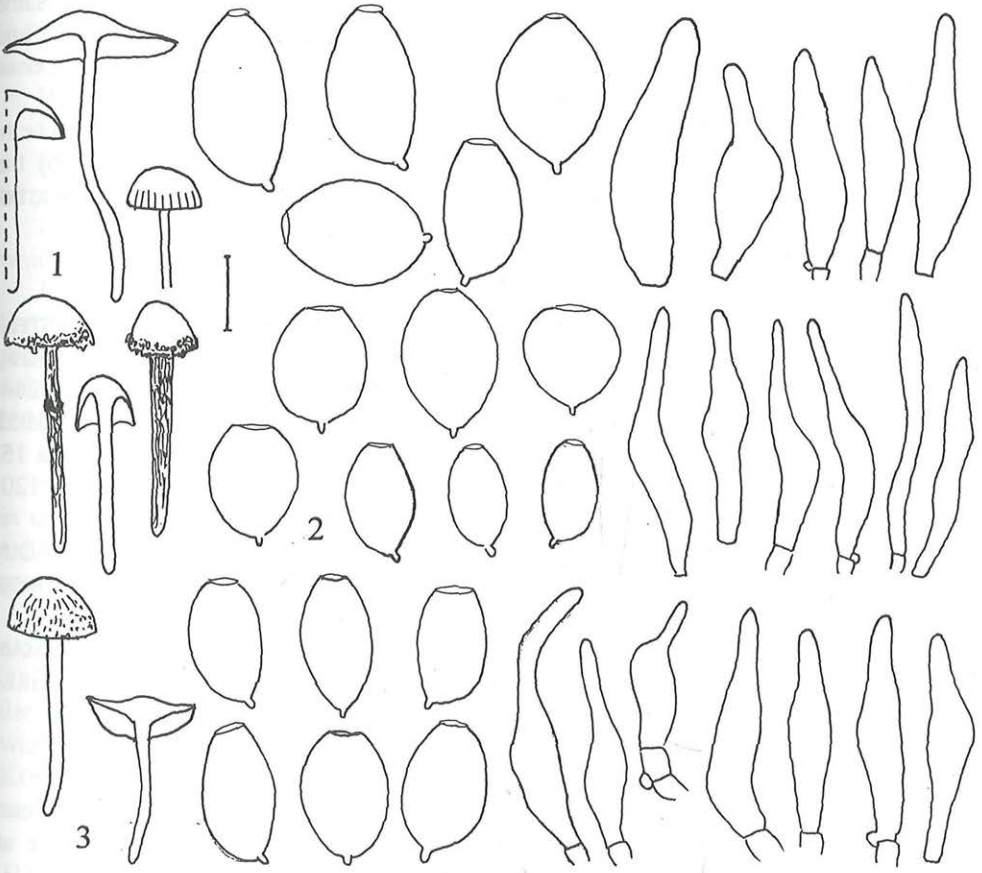

Fig. 1. *Psilocybe inquilinus*. Habit, spores, and cheilocystidia. 2. *P. crobula*. Habit, spores, and cheilocystidia. 3. *P. castanella*. Habit, spores, and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cheilocystidia).

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Notes:
Psilocybe inquilinus, as it is defined here, is a species that can readily be distinguished by the completely separable pellicle, the thin-walled spores, lack of veil and graminicolous habit. It typically grows on the dying leaves of certain grasses, such as *Holcus lanatus* L. at the end of summer. It is very likely that the name *P. inquilinus* often has been misapplied to specimens of *Psilocybe subviscida*. For example, the recently published icons of LUDWIG (2000: pl. 72.21b & c, as *P. inquilinus*) probably represent *P. subviscida*. That species, however, clearly differs not only in microscopy, but also in its habit: it frequently has a stouter stipe, which has a rough-fibrillose covering. It occurs in places rich in humus, such as frequently mown lawns and roadsides, and also on nutrient rich, manured places.

Psilocybe crobula often is considered closely related to *P. inquilinus*. Some authors, e.g., HØILAND (1978) even considered them as varieties of one and the same species. However, as experimental research clearly demonstrated, *P. inquilinus* and *P. crobula are* separate biological species, which can be distinguished on a number of morphological characters, as presented in the key.

Psilocybe muscorum, often interpreted in the sense of ORTON as a species close to *P. montana*, in reality is a synonym of *Psilocybe inquilinus* which was proved by the type-study (HØILAND 1978, and below). See also the discussion under *P. montana*, below.

2. *Psilocybe crobula* (FR.) SINGER, Sydowia **15**: 69. 1961. Fig. 2.
Agaricus crobulus FR., Epicrisis: 199. 1838; *Tubaria crobula* (FR.) P. KARSTEN, Ryssl. Finl. Skand. Halföns Hattsv.: 446. 1879; *Naucoria crobula* (FR.) RICKEN, Vadem. Pilzk.: 117. 1920; *Deconica crobula* (FR.) ROMAGN., Rev. Mycol. **2**: 244. 1937; *Geophila crobula* (FR.) KÜHN. & ROMAGN., Fl. anal. champ. sup.: 339. 1953 (invalid, no complete basionym cited); *Psilocybe crobula* (FR.) SINGER, Sydowia **15**: 69. 1961; *Psilocybe inquilinus* var. *crobula* (FR.) HØILAND, Norw. J. Bot. **25**: 120. 1978.

Iconography: BREITENBACH & KRÄNZLIN (1995: pl. 445), COURTECUISSE & DUHEM (1994: pl. 1282), DÄHNCKE (1993: pl. 613), LANGE (1939: pl. 127D), LUDWIG (2000: pl. 72.18), STAMETS (1996: 107).

Descriptions: HØILAND (1978: 119-120), GUZMÁN (1983: 166-169), HUIJSMAN (1957: 43-44), NOORDELOOS (1999: 39), STAMETS (1996: 106-107), WATLING & GREGORY (1987: 48-49).

Characters:
Pileus: 3.5-25(-45) mm, hemispherical to convex then applanate with subinvolute, deflexed finally straight margin, hygrophanous, when moist translucently striate at margin up to half the radius, yellow-brown to red-brown (Mu. 2.5 YR 3/4, 5 YR 3-5/3, 7.5 YR 7-5/6-8, 4/3, 4.5/6, 10 YR 5-6/6, 3/4), slightly paler towards margin (10 YR 4-5/4), pallescent on drying (10 YR 6-7/4), strongly viscid with separable pellicle, with fine, white fibrillose patches of veil, especially at margin of young specimens, connecting the margin of the young pileus with the stipe, in mature specimens forming small flocks near margin, occasionally glabrescent with age.

Lamellae: L = 18-28, l = 1-5, moderately crowded to fairly distant, adnate with decurrent tooth or emarginate with decurrent tooth, segmentiform to ventricose, pale

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yellowish brown at first then dark ochre-grey or clay-colour finally reddish yellow to reddish brown (7.5 YR 6-5/4, later 5 YR 5-3/6-8, 7.5 YR 4/6, 10 YR 3/3) with slightly paler, fimbriate lamellar edge.

Stipe: 15-35 x 1.0-1.5 mm, cylindrical, straight or flexuous, pale brown at apex (7.5 YR 8-7/2-6), dark brown to red-brown below (7.5 YR 6-5/6, 3/4, at base 5 YR 4-3/2), entirely innately to loosely fibrillose with whitish-ochraceous velar remnants, when young sometimes with small fibrillose annuliform zone, base sometimes densely white tomentose, glabrescent with age.

Context: very thin, membranaceous. Smell indistinct; taste mild or slightly farinaceous.

Spore-print: red-brown to dark red-brown (5 YR 4-3/3-4, 10 R 3/2).

Spores: 5.5-8.0 x 4.0-6.0 x 3.5-6.0 µm, distinctly flattened, F/I > 50%, Qf = 1.2-1.8, Qfav = 1.3-1.6, ovoid, submitriform, sometimes slightly hexangular to rhomboid in frontal view, Qs = 1.5-2.0, Qsav = 1.6-1.7, ellipsoid to oblong or slightly amygdaliform in side-view, thin-walled, brown in ammonia, with large apical germ-pore.

Basidia: 17-39 x 4.5-8.0 µm, 4-, rarely also 2-spored.

Lamellar edge: sterile, made up of hyphae bearing numerous cheilocystidia.

Cheilocystidia: 27-50(-66) x 2.0-8.5 µm, Q = 3.7-4.1-5.4, narrowly lageniform to lageniform with long, 1.0-2.5 µm wide, rounded to subacute neck, thin-walled.

Hymenophoral trama: regular, made up of short, inflated elements, some of which are finely incrusted, 10-70 x 3.0-9.0 µm.

Pileipellis: a 100-350 µm thick ixocutis of narrow, 1.0-2.5(-5.0) µm wide cylindrical, smooth or finely incrusted hyphae, embedded in a colourless matrix, subpellis made up of compact radially arranged hyphae, elements slightly to distinctly inflated, 15-35(-70) x 3.5-9.0 µm, gradually passing into trama. Pigment parietal incrusting, most pronounced in subpellis.

Pileitrama: regular, made up of inflated elements.

Stipitipellis: a cutis of cylindrical, 1.5-5.0 µm wide, brown-incrusted hyphae, in upper part loosely arranged tufts of cylindrical hyphae occur, probably veil remnants. Caulocystidia scattered, mainly at apex, 15-70 x 3.0-8.0 µm, cylindrical to lageniform.

Clamp-connections: abundant, visible on many septa in all parts of the basidiomata studied.

Ecology: solitary or in small groups, on small sticks and branches, wood-chips of deciduous and coniferous wood, also on cones of *Picea* or *Pinus*, on saw-dust mixed with dung, also on stems of tall herbs [*Aruncus dioicus* (WALTER) FERN., *A. sylvestris* KOST.], in deciduous, mixed or coniferous forest on various soil-types; also encountered on grass remnants in ruderal place among *Urtica* and *Rubus*.

Distribution: widespread and common all over Europe.

Collections examined: Austria: Steiermark, Leibnitz, Gamlitz, 15. 9. 1996, M. E. NOORDELOOS (V150).

Germany: Bayern, Franken, Roth, Hofberg, 24. 9. 1995, M. E. NOORDELOOS (V020, L); - Nürnberg, Naturschutzgebiet, 17. 6. 1995, M. E. NOORDELOOS (V004, L).

The Netherlands: prov. Friesland, Slochteren, 17. 10. 1996, R. DOUWES (V174, L). prov. Drenthe, Assen, Geelbroek, 6. 2. 1993, R. SULLOCK-ENZLIN (L). prov. Overijssel, Singraven, 22. 7. 1961, E. KITS V. WAVEREN (L). prov. Noord Holland, Kortenhoef, 17. 3. 1971, J. DAAMS (L); - Amsterdamse bos, 17. 9. 1986, M. E. NOORDELOOS 86101 (L). prov. Zuid Holland, Gouderak, Veerstalblok, 31. 8. 1982, M. E. NOORDELOOS 1701 (L).

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United Kingdom: Scotland, Invernessshire, Newtonmore, 27. 8. 1996, M. NAUTA (V130, L); - - Rannoch, Eilean Mor, 26. 8. 1996, S. VERDUIN (V124, L).

Notes:
Psilocybe crobula is very similar to *P. inquilinus*. The best morphological character to separate the two taxa is found in the size of the spores, which are in average definitely smaller in *P. crobula*. Differences in abundance of veil, and substrate, are more variable, although in general *P. crobula* has a more developed veil, and grows on woody substrate and rather tough herbaceous stems, whereas *P. inquilinus* typically has less veil and grows on dead leaves of grasses.

3. *Psilocybe castanella* PECK, Bull. New York State Mus. **1**: 7. 1887. Fig. 3.
Psilocybe apelliculosa P. D. ORTON, Notes Roy. Bot. Gard. Edinburgh **29**: 118. 1969.

Iconography: LUDWIG (2000: pl. 72.17), NOORDELOOS (1998: pl. 3) (both as *P. apelliculosa*).

Descriptions: BON (1977: 70-72), NOORDELOOS (1998: 9-12, 1999: 39-40) (all as *P. apelliculosa*).

Characters:
Pileus: 5-15(-25) mm, conical, hemispherical to convex when young, expanding to convex, plano-convex or applanate, sometimes concave, but usually with small, blunt umbo, with deflexed then straight margin, which sometimes exceeds the lamellae, marginal zone sometimes grooved, weakly to strongly hygrophanous, when moist not or shortly translucently striate at margin only, reddish brown [Mu. 5 YR (3/2)3/3-4/3-4/4] pallescent to yellow-red (5 YR 5-6/8; K&W 9F8, 8F4, margin 7.5 YR 6/2-4; 7F7-8, 7E5), entirely covered with fine velar patches, glabrescent at centre, margin long with fibrillose velar patches, sometimes appendiculate, in fresh specimens surface appearing dusted with a dull greyish covering on red-brown background, absolutely dry, without peeling pellicle.

Lamellae: L = 20-30, l = 1-3(-5), moderately distant to fairly crowded, broadly adnate with decurrent tooth to deeply decurrent on stipe, brown, long remaining so, finally with purple-brown tinges from ripe spores (7.5-5 YR 5/6-4/4 then 5 YR 3/3-4; 7D6-7), with irregular to fimbriate, subconcolorous or paler lamellar edge.

Stipe: 15-50 x 1-2(-2.5) mm, cylindrical with slightly to distinctly swollen base or tapering towards base, straight or flexuous, yellow-brown at apex, darker red-brown towards base (7.5 YR 3/2 to 5 YR 3-4/4-2; 6C5-6-6B4, base 7F7-8), entirely finely fibrillose-pruinose to minutely flocculose, sometimes with narrow annuliform zone, basal part with white to grey tomentum.

Context: concolorous or slightly paler than surface in pileus, colouring darker purplish brown with age. Smell spontaneously weak or slightly farinaceous. Taste indistinct.

Spore-print: very dark red-brown (10 R 2.5-3/2, 5 YR 3/3).

Spores: 6.5-8.0(-8.5) x 4.0-5.5(-6.0) x 4.0-5.5(-6.0) µm, not or slightly flattened, F/I << 25 %, Qf = 1.3-(1.4-1.5)-1.7, broadly ellipsoid to ovoid in frontal view, Qs = (1.3-)1.4-(1.5-1.7)-1.8, ellipsoid to oblong or slightly amygdaliform in side-view, with thin to slightly thickened wall, with small, but distinct apical germ-pore, pale brown to greyish in NH_3.

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Basidia: 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 21-36 x 4.0-8.0 µm, narrowly lageniform to clavate with blunt, rounded to subcapitate, 1.5-3.5 µm wide apex.

Pleurocystidia: absent.

Hymenophoral trama: regular, made up of short, cylindrical to inflated elements, 10-40 x 5.0-8.0 µm, mixed with 2.0-5.0 µm wide, cylindrical connective hyphae, with yellow, often minutely incrusted walls.

Pileipellis: a narrow cutis of cylindrical hyphae, 3.0-7.0 µm wide with hyaline to finely encrusted walls; subpellis compact, made up of short inflated elements, 7.0-35(-55) x 5.0-15(-17) µm with red-brown, strongly incrusted walls, gradually passing into pileitrama.

Pileitrama: regular to irregular, made up inflated elements, 12-90(-100) x 2.0-7.0 µm with hyaline, rarely incrusted walls.

Clamp-connections: present.

Ecology: in meadows, usually attached to the base of grasses or on dead grasses.

Distribution: besides the type-locality in the USA it is known from the United Kingdom and France.

Collections examined: United Kingdom: Scotland, Perthshire, Dunkeld, Trochry, Borelick Farm, 25. 8. 1996, M. E. NOORDELOOS & S. VERDUIN (V110, V113, L); - Gilmerton, 28. 8. 1996, S. VERDUIN (V140, L); - Newtonmore, 27. 8. 1996, S. VERDUIN (V131, L); - Kindrogan, Kindrogan Field Centre, 3. 9. 1997, S. VERDUIN (V240, 240'). England, Yorkshire, Malham, The Lings, 7. 9. 1961, P. D. ORTON 2351 (holotype of *P. apelliculosa*, E).

USA: New York, Sandlake, June, PECK (holotype of *P. castanella*, NYS).

Notes:

Psilocybe castanella is macroscopically very distinctive by the absolutely dry pileus, which usually is dusted to fibrillose with veil, the usually grooved pileal margin, moderately dark red-brown lamellae without purple sheen, and in some cases the grey tomentum at the base of the stipe. Microscopically the thin-walled spores relate this species with *Psilocybe inquilinus*, and *P. crobula*, which have a viscid pileus with peeling pellicle, and distinctly flattened spores. *Psilocybe apelliculosa* appeared to be a later synonym of *P. castanella* (see below). *Psilocybe subviscida*, which usually also has a dry pileus, and occurs in similar habitats, clearly differs by the poorly developed or absent veil, and smaller, usually distinctly flattened spores. *Psilocybe velifera* (FAVRE) SINGER is very similar, but differs in the spores, which are often lemon-shaped or papillate in side-view, also having a slightly larger germ-pore. *Psilocybe libertatis* in the sense of F. H. MOELLER (1945) has also a dry, fibrillose-floccose surface of pileus and stipe, but differs by having much darker, thick-walled spores. Original material of this taxon has not been studied.

4. *Psilocybe velifera* (FAVRE) SINGER, Agar. mod. taxon. 4. edn: 572. 1986. Fig. 4.
Geophila velifera FAVRE, Champ. sup. zone alpine: 204. 1955.

Description: FAVRE (1955: 204).

Characters:

Pileus: up to 16 mm, conico-convex to convex with deflexed margin, fleshy, particularly at centre, hygrophanous, slightly translucently striate at margin in water-soaked

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specimens, deep ochre-brown when moist, slightly viscid, pallescent on drying to beige, shining. Veil present during a long time in form of white flocks at margin of pileus.

Lamellae: L = 18-27, l = 1-3, moderately crowded, adnate to decurrent, up to 3.5 mm, thin, deep brown, not purplish, paler towards white, fimbriate-serrate lamellar edge.

Stipe: up to 30 x 3-3.5 mm, equal, stuffed then fistulose, flocculose in young specimens then densely white fibrillose, pale, almost white at apex, brown below, dark grey-brown at base. Partial veil covering the young lamellae as a membranaceous, whitish structure, which leaves flocks at pileal margin, and rarely also a small ring at stipe when mature.

Context: grey-brown in the moist pileus, then beige on drying, beige in apex of stipe, dark grey-brown in base of stipe. Smell and taste indistinct.

Spore-print: colour not known. Spores purple when on sterigmata, but ochre-brown in water.

Spores: 7.0-9.0 x 4.0-5.5 x 4.0-5.5 µm, average 7.7-8.0 x 4.8 x 4.8 µm, slightly flattened, ovoid to submitriform, sometimes almost limoniform in frontal view, Qf = 1.4-1.6-1.8, ellipsoid-oblong, often somewhat amygdaliform or with almost papillate apex in side-view, Qs = 1.45-1.7-1.8, moderately thick-walled, yellow-brown in ammonia, with distinct, often fairly large germ-pore.

Basidia: 17-22 x 4.0-7.0 µm, 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 21-37 x 4.0-7.0 µm, Q = 3.9-5.9-7.8, with subacute to blunt, 1.5-3.0 µm wide apex, thin-walled.

Pleurocystidia: absent.

Hymenophoral trama: regular, made up of inflated elements, 15-57(-90) x 4.0-13.5 µm with smooth walls.

Pileipellis: a cutis of cylindrical hyphae, 2.0-5.0 µm wide, not clearly separated from subpellis; subpellis made up of chains of short, inflated elements, 17-74(-90) x 4.0-12 µm, gradually passing into pileitrama.

Pileitrama: subregular, made up of inflated elements, 20-120 x 3.0-15 µm. Pigment yellow-brown, membranal and finely incrusting in subpellis and upper pileitrama.

Stipitipellis: a cutis of 1.5-4.5 µm wide cylindrical hyphae.

Clamp-connections: present.

Ecology: in tussocks of living *Carex* in subalpine marsh.

Distribution: poorly known.

Collection examined: Switzerland: National Park, Murtères d'Ivraiana, 17. 8. 1953, J. FAVRE (holotype, G).

Notes:

The holotype consists of many well-preserved basidiocarps. The lamellae are about concolorous with the pileus: yellow-brown, and never as dark as in for example *P. montana*! Although the spores are flattened, there is not much difference between the average width in side- and frontal view. The walls are not very thick-walled, and the colour is pale brown. Therefore FAVRE (1955) was right in considering *Psilocybe velifera* close to *P. inquilinus*. GUZMÁN (1983) did not study the type and ranged it among the doubtful taxa. In his comments he states: "Species described from Switzer-

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land, but unfortunately the author studied no material. It seems close to *P. inquilinus* (PERS. ex FR.) BRES. with spores (6.5-)7-8(-8.5) x 4.5-5 x 4-5 µm. The drawing of FAVRE, however, shows spores that are distinctly thick-walled, with large apical germpore, lentiform in side-view, which is more typical for the *montana*-group". As is demonstrated here that is not the case. For the time being *Psilocybe velifera* is considered a good species, close to *P. subviscida* var. *velata*, differing mainly by the narrow spores that frequently have an apical papilla, and abundant veil.

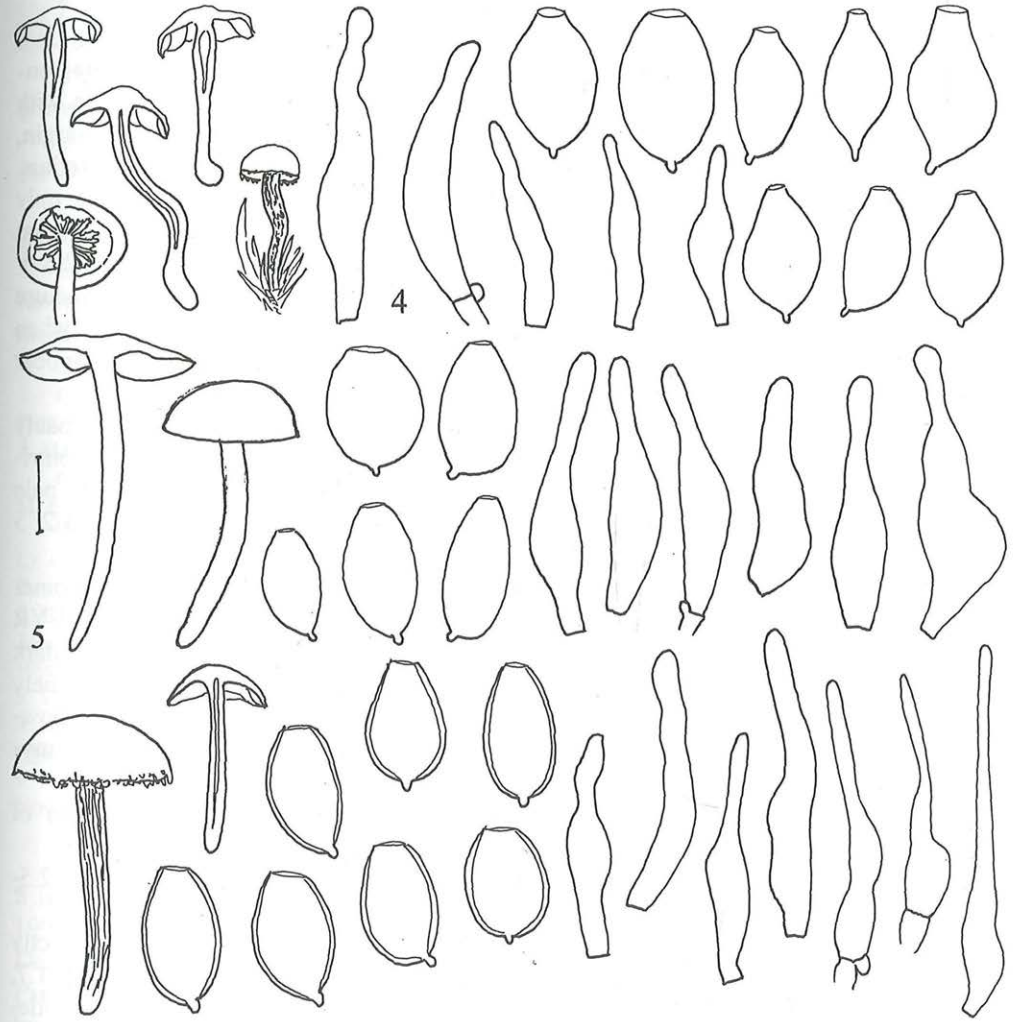

Fig. 4. *Psilocybe velifera*. Habit, spores and cheilocystidia. Fig. 5. *P. subviscida* var. *subviscida* (upper figs.) and var. *velata* (lower figs.). Habit, spores and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cheilocystidia).

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5. *Psilocybe subviscida* (PECK) KAUFFM., Agar. Mich.: 275. 1918.
Deconica subviscida PECK, Ann. Rep. New York State Mus. **41**: 70. 1888. – *Psilocybe caespitosa* MURRILL, Mycologia **15**: 5. 1923.

5 a. var. *subviscida*. Fig. 5.
Misapplied names: *Psilocybe physaloides* sensu J. LANGE, GUZMÁN, STAMETS pro parte; *Psilocybe inquilinus* ss. auct. pro parte? (see below).

Iconography: LUDWIG (2000: pl. 72.23); STAMETS (1996: 158, and ?137, as *P. physaloides*).

Descriptions: NOORDELOOS (1999: 40-41), STAMETS (1996: 157-158).

Characters:
Pileus: 3-25 mm, hemispherical, conico-convex to convex, expanding to plano-convex or applanate, rarely with slightly depressed centre, or concave, sometimes with low, broad umbo, with deflexed then straight, finally sometimes reflexed margin, strongly hygrophanous, when moist translucently striate at margin or up to ½ of radius, dark reddish brown to yellow-brown (Mu. 5-7.5-10 YR 3-5/2-4; 7.5 YR 5-6/6), only slightly paler towards margin (7.5-10 YR 7/6; 10 YR 6/3), strongly pallescent on drying to pale reddish-yellow, pale ochre or sordid white (7.5-10 YR 7-8/4-8; 2.5 Y 8/2-4), dry to slightly viscid when moist, but pellicle never peeling off in mature specimens, but sometimes slightly so in young specimens, dull, mat, glabrous when dry, without veil or with minute velar remnants when young, which quickly disappear with age, rarely with scattered fibrils of veil along margin when mature.

Lamellae: L = 20-40, l = 3-5-7, moderately distant to rather crowded, broadly adnate, sometimes with short decurrent tooth, triangular, segmentiform to subventricose, up to 3 mm broad, sometimes slightly emarginate, at first ochre-yellow to pale brown (7.5 YR 6-7/4), finally brown to red-brown (10 YR 3-4/3; 7.5 YR 5-4/4, 3/2; 5 YR 3/4) with pruinose to fimbriate, slightly to distinctly paler lamellar edge.

Stipe: 10-30(-50) x (0.5-)1-2(-2.5) mm, cylindrical, straight or flexuous, sometimes tapering or slightly broadening at base, yellow to yellow-brown at apex (7.5 YR 6/8; 10 YR 7/8), darker below (2.5 YR 3/2-4-2.5/2; 7.5 YR 4/6), sometimes very dark (red)brown at base (2.5-7.5 YR 3/2-3; 10 YR 3/2-3, 2/2 towards base), apex finely pruinose, downwards finely to coarsely striate to more or less floccose with yellow-brown fibrils, rarely with a faint annuliform zone, with white to greyish basal mycelium.

Context: very thin, concolorous with surface, sometimes paler at centre of pileus. Smell indistinct to slightly farinaceous. Taste mild to farinaceous.

Spore-print: colour dark brown to dark red-brown (5-7.5 YR 3/2; 10 YR 2.5-3/2).

Spores: 6.0-8.5 x 4.0-5.5 x 4.0-5.0 µm, variable in shape, usually distinctly flattened, ellipsoid-oblong, ovoid to submitriform in frontal view, Qf = 1.3-1.5-1.7, narrowly to broadly ellipsoid-oblong, somewhat amygdaliform or fusiform in side-view, Qs = 1.4-1.7-2.2, rarely almost papillate at apex, with large apical germ-pore, thin-walled, yellow-brown to brown when observed in water or ammonia.

Basidia: 15.5-30 x 4.0-7.5 µm, Q = 2.5-(3.1-4.0)-5.1, 4-spored, with clamp-connections.

Lamellar edge: sterile.

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Cheilocystidia: 23-45 x 3.5-10 µm, narrowly to broadly fusiform to irregularly lageniform with blunt, rounded, sometimes moniliform, 1.5-4.0 µm wide neck, thin-walled.

Hymenophoral trama: regular, made up of short, inflated elements, 15-75 x 4.0-20 µm.

Pileipellis: a dry cutis or an up to 50 µm thick ixocutis of narrow, cylindrical, 1.0-3.5 µm wide cylindrical hyphae sometimes embedded in a hyaline, gelatinous matrix, subpellis compact, made up of short, inflated elements, 10-60 x 5.0-15 µm. Pigment brown-yellow, membranal to incrusting in supra- and subpellis and upper part of pileitrama.

Pileitrama: regular, made up of cylindrical to inflated elements, 20-90(-120) x 4.0-20 µm.

Stipitipellis: a loose cutis of cylindrical, 2.0-5.0 µm wide hyphae with yellow-brown, incrusted walls.

Caulocystidia: scarce to abundant at apex of stipe, cylindrical to narrowly clavate or sublageniform, 15-70 x 2.0-6.0 µm, hyaline, thin-walled.

Clamp-connections: abundant, visible on many septa in all parts of the basidiomata studied.

Ecology: single or in small groups, rarely in small bundles, on humus, dead grass remnants, straw, or very old dung in rather exposed, sun-lit, short-grazed or short-cut meadows and road-sides, on sandy, peaty or loamy, neutral to slightly basic soils.

Distribution: widespread and probably rather common in Europe and N America.

Collections examined: Austria: Niederösterreich, Maissau, Grünhof, 26. 5. 1985, A. HAUSKNECHT (WU 4447); - - 7. 6. 1985, A. HAUSKNECHT (WU 12316); - Horn, Breiteneich, 8. 6. 1997, A. HAUSKNECHT (WU 6105).

Germany: Baden-Württemberg, Ulm-Donautal, Sportplatz SV Grimmelfingen, 23. 6. 1991, M. ENDERLE (Herb. ENDERLE, L). Bayern, Riedheim, 26. 5. 1996, M. ENDERLE (Herb. ENDERLE, L).

The Netherlands: prov. Groningen, Nieuwklap, 1. 9. 1996, R. A. F. SULLOCK-ENZLIN (V245, L); - Lauwersmeer, 26. 5. 1997, R. A. F. SULLOCK-ENZLIN (V218, L). prov. Gelderland, Apeldoorn, Bussloo, 14. 9. 1996, G. VAN ZANEN (V143, L). prov. Utrecht, Loenen, Vredehoff, 13. 9. 1997, C. BAS (V246, L). prov. Flevoland, Zeewolde, Horsterwolde, 14. 8. 1996, G. VAN ZANEN (V106, L); - Zeewolde, Hulkesteinsebos, 14. 8. 1996, G. VAN ZANEN (V107, L); - Oostvaardersplassen, 11. 9. 1996, G. VAN ZANEN (V142, L). prov. Noord Holland, Callantsoog, Zwanenwater, 4. 11. 1995, S. VERDUIN (V065, L). prov. Zuid Holland, Oostvoorne, Tenellaplas, 1. 9. 1995, M. E. NOORDELOOS 95102 (V013, L); - Zoetermeer, Noord Aa, 23. 5. 1996, M. E. NOORDELOOS 9605 (V097, L); - Bleiswijk, Bleiswijkse Zoom, 9. 7. 1996, M. E. NOORDELOOS 9621 (V102, L); - Voorschoten, Vlietlanden, 9. 7. 1996, M. E. NOORDELOOS 9620 (V101, L); - Alphen aan den Rijn, Zegersplas, 6. 7. 1996, M. E. NOORDELOOS 9619 (V100, L).

Switzerland: Bern, Bolligen, 3. 6. 1995, B. SENN-IRLET (L).

5 b. *Psilocybe subviscida* var. *velata* NOORDEL. & VERDUIN, Persoonia **17**: 256. 1999. Fig. 5.

Deconica graminicola P. D. ORTON in Notes Roy. Bot. Gard. Edinburgh **26**: 49. 1964; *Psilocybe graminicola* (P. D. ORTON) P. D. ORTON in Notes Roy. Bot. Gard. Edinburgh **29**: 80. 1979.

Misapplied names: *Psilocybe bullacea* sensu auct. (e.g., BREITENBACH & KRÄNZLIN, LUDWIG, MOSER, KEIZER & ARNOLDS) non *Agaricus bullaceus* BULL., Hist. Champ. Fr.: 422. 1793; nec *Agaricus bullaceus* BULL.: FR., Syst. mycol. **1**: 297. 1821. – *Psilocybe inquilinus* sensu ENDERLE, Ulmer Pilzflora **4**: 80-81. 1996.

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Iconography: BREITENBACH & KRÄNZLIN (1995: pl. 442); LUDWIG (2000: pl. 72.15); MOSER & JÜLICH (1985-: *Psilocybe* 3, lower fig.) (all as *P. bullacea*).

Description: NOORDELOOS (1999: 40-41).

Characters:

Pileus: 8-30 mm, conico-convex or convex with deflexed margin when young, quickly expanding with age to applanate, with or without very slight central depression, with straight to slightly or distinctly reflexed margin, hygrophanous, when moist translucently striate at margin, up to ½ (rarely more) of radius, deep red-brown (Mu. 5 YR 4-3/3-4; 7.5 YR 3/5, 4/4, 6/2) with paler margin (7.5 YR 5-6/6), pallescent on drying to sordid yellow-red (7.5-10 YR 8/4-6) or sordid white, subviscid to viscid, but pellicle not entirely peeling off, with abundant veil, usually in form of one or more concentric zones of minutely fibrillose patches, sometimes only appendiculate with small denticulate patches.

Lamellae: L = 20-40, l = 3-7, moderately crowded, adnate with decurrent tooth, segmentiform to ventricose, red-brown finally with very dark red-brown with or without purple tinge (7.5 YR 6-5/4, finally 4-3/2-4), with white, fimbriate lamellar edge.

Stipe: 20-50 x 1-3 mm, cylindrical or with broadened apex, straight or flexuous, red-brown at apex, dark brown to blackish brown in lower part (apex 7.5 YR 7-5/6, lower part 7.5-5 YR 3/2-2.5/2), finely white fibrillose to finely floccose all over or in upper part only from velar remnants, some specimens also with conspicuous annuliform zone, which disappears with age; glabrescent with age, white tomentose at base.

Context: reddish yellow, more or less concolorous with surface. Smell indistinct. Taste slightly farinaceous or indistinct.

Spores: 6.5-8.0(-9.0) x 4.0-5.5(-6.0) x 4.0-5.0(-5.5) µm, average 7.2-7.6 x 4.5-4.7 x 4.8-6.2 µm, ellipsoid to oblong in side-view, Qf = 1.4-1.6-2.0; ovoid to somewhat mitriform in frontal view, Qs = 1.3-1.5-1.7, slightly thick-walled, dark brown in water and ammonia, greyish brown in Congo-red, with large, apical germ-pore.

Basidia: 29-32 x 7.0-9.0 µm, 4-spored.

Lamellar edge: sterile.

Cheilocystidia: 29-44 x 5.5-7.0 µm, Q = 4.8-6.3-8.1, lageniform with long, narrow, 1.0-2.0 (-3.5) µm wide neck.

Pleurocystidia: absent.

Pileipellis: a 20-30 µm thick cutis of narrow, cylindrical, 1.5-4.0 µm wide hyphae, subpellis hardly differentiated from pileitrama.

Pileitrama: regular, made up of cylindrical to inflated elements, 30-120 x 3.0-15 µm with brown, incrusting pigment.

Clamp-connections: present in all parts of the basidiomata, but not at all septa.

Ecology: gregarious often in large groups, sometimes fasciculate, on vegetal debris, wood-chips mixed with humus, straw, old dung mixed with straw, etc.

Distribution: widespread in Europe and N America.

Collections examined: Austria: Niederösterreich, Langenlois, Strass, 23. 5. 1996, A. HAUSKNECHT (V098, L); - Maissau, Grünhof, 26. 5. 1985, A. HAUSKNECHT (WU 4447); - Schrems, Gebharts-Haslau, 12. 7. 1987, leg. L. SANDMANN (Herb. SANDMANN).

Germany: Baden-Württemberg, Ulm-Donautal, Sportplatz SV Grimmelfingen, 23. 6. 1991, M. ENDERLE (Herb. ENDERLE, L). Bayern, Limbach, 12. 8. 1996, M. ENDERLE (Herb. ENDERLE, L); -

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Unterfahlheim, 7. 6. 1986, M. ENDERLE (Herb. ENDERLE, L); - Franken, Erlangen, Gebbertstrasse, 4. 5. 1998, G. WÖLFEL (L).

The Netherlands: prov. Noord Holland, Hargen aan Zee, 13. 6. 2000, F. A. V. D. BERGH (L). prov. Zuid Holland, Alphen aan den Rijn, 18. 5. 1997, C. ULJÉ (V216, L); - Zwammerdam, 8. 10. 1996, C. ULJÉ (V155; L).

Switzerland: Bern, Bolligen, Lindenmatt, 3. 6. 1995, B. SENN-IRLET (L).

United Kingdom: Scotland, Perthshire, Dunkeld, Trochry, Borelick Farm, 28. 8. 1996, S. VERDUIN & M. E. NOORDELOOS (V136; L).

Notes:

Psilocybe subviscida is a very variable species. Typically it is a species with rather dry to somewhat sticky pileus, without a peeling pellicle, and a rather strongly fibrillose stipe with traces of veil. The spores of the typical variety are thin to very slightly thick-walled, brownish in water, distinctly flattened, but never subrhomboid as in *Psilocybe inquilinus*. Several collections have been made with darker spores, which have a slightly but distinctly thickened wall, and often the pileipellis is slightly to distinctly gelatinised and can be (partly) peeled off. Some of these collections were identified as *Psilocybe bullacea* or *P. graminicola*. Some also reminded of *Psilocybe montana*, which however, has larger spores with thicker wall and larger apical germ-pore. Also the ecology is different: in raw humus in fertilised grassland and lawns, piles of rotten manure mixed with straw or on very old dung. In addition these collections usually had a distinct veil present at the margin of the pileus, which sometimes is appendiculate, and frequently also on the surface of the stipe, in form of fibrils or a weak annuliform zone. The surface of the pileus in these collections is also slightly more viscid, sometimes with partly peeling pellicle. For those collections the description of *Psilocybe graminicola* fits very well. The conspecifity has been confirmed by a study of the holotype (see below). However, since all collections of this group interbreed with typical *P. subviscida*, we consider these collections varieties of that species. It is also likely that *Psilocybe subviscida* var. *velata* has been described as *P. bullacea* in literature. See also comments on insufficiently known and excluded taxa below.

Another matter is *Psilocybe muscorum*. As suggested by HØILAND (1978) and confirmed by the type study (see NOORDELOOS 1999) the microscopic characters are very similar to those of *P. subviscida*. The macromorphology, as described by ORTON (1960) however, gives indeed a picture of a species with similar veil patterns on pileus and stipe, but with a viscid, separable pileipellis. Also the ecology is different, as *P. muscorum* is said to grow among grass and lichens in sand dunes, a habitat similar to that of *P. montana*.

***Psilocybe* subsect. *Montanae*, subsect. nova**

Sporae crassitunicatae. Holotypus: *Psilocybe montana* (PERS.: FR.) KUMMER.

Spores thick-walled. Type-species: *Psilocybe montana* (PERS.: FR.) KUMMER.

6. *Psilocybe phyllogena* (PECK → SACC.) PECK, New York State Mus. Bull. **157**: 99. 1912. Fig. 6.

Agaricus phyllogenus PECK, Ann. Rep. New York State Mus. Nat. Hist. **26**: 60. 1874, non *Agaricus phyllogenus* PERS. 1801; *Hypholoma phyllogenum* PECK → SACC., Syll. Fung. **5**: 1042. 1887. – *Agaricus modestus* PECK, Ann. Rep. New York. State Mus. Nat. Hist. **32**: 29. 1879, non *Agaricus modestus* BERK. 1843; *Psilocybe modesta*

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(PECK →) A. H. SMITH, Mycologia **40**: 700. 1948. – *Agaricus rhombisporus* BRITZ., Bot. Centralbl. **15-17**: 18. 1893; *Psilocybe rhombispora* (BRITZ.) SACC., Syll. Fung. **11**: 72. 1895; *Deconica rhombispora* (BRITZ.) SINGER, Lilloa **22**: 509. ("1949") 1951; *Geophila rhombispora* (BRITZ.) KÜHN. & ROMAGN., Fl. anal. champ. sup.: 338. 1953 (invalid).

Misapplied name: *Naucoria tenax* sensu RICKEN, Blätterpilze: 212. 1912.

Iconography: LUDWIG (2000: pl. 72.20).

Description: NOORDELOOS (1999: 37).

Characters:

Pileus: 5-25(-35) mm, convex with involute or deflexed margin, expanding to applanate, sometimes with small umbo, usually with slightly depressed centre, with deflexed to straight margin, hygrophanous, translucently striate at margin, when moist moderately dark red-brown to pinkish brown, pallescent on drying to pinkish yellow-brown or ochraceous, slightly to distinctly viscid when moist, with or without peeling pellicle, becoming dull on drying, sometimes breaking up on small patches, margin appendiculate with white to yellow velar remnants.

Lamellae: L = 10-20, l = 3-5, moderately crowded, adnate, emarginate with slightly decurrent tooth, segmentiform to ventricose, up to 5 mm broad, sordid yellow-brown to violaceous grey, with fimbriate, almost concolorous or white lamellar edge.

Stipe: 20-40 x 1-3 mm, cylindrical, fistulose, pale yellow-brown at apex, reddish brown to almost black towards base, entirely silvery fibrillose, becoming more woolly-fibrillose towards base.

Context: yellow-ochre in pileus and upper part of stipe, dark brown in stipe base. Smell weak. Taste slightly rancid.

Spore-print: brownish-violaceous.

Spores: (5.5-)6.0-7.5(-8.0) x (4.5-)5.0-6.5(-7.0) x 4.0-4.5 µm, strongly flattened, F/I > 50%, Qf = 1.0-1.5, Qfav 1.15-1.25, rhomboid to mitriform in frontal view, Qs = 1.6-1.9, Qsav 1.6-1.7, ellipsoid to oblong in side-view, with thick, brown walls, with large apical germ-pore.

Basidia: 14-23 x 3.0-7.5 µm, 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 28-46 x 3.0-10 µm, irregularly fusiform to lageniform with tapering, 1.5-3.0 µm wide neck.

Hymenophoral trama: regular, made up of inflated elements, 22-95 x 3.0-11 µm with pale yellow walls.

Pileipellis: a cutis or thin ixocutis, made up of cylindrical, 2.0-7.0 µm wide hyphae with finely incrusted walls; subpellis compact, made up of inflated elements, 15-95 x 3.0-8.0(-12) µm with yellow-brown, incrusted walls.

Stipitipellis: a cutis of cylindrical hyphae, 2.5-4.0(-7.0) µm wide with yellow-brown walls.

Caulocystidia: 24-50 x 3.0-7.0 µm, subcylindrical to fusiform with rather blunt apex, abundant at apex of stipe.

Clamp-connections: abundant.

Ecology: saprotrophic, gregarious, sometimes caespitose on woody remnants, sawdust etc. of deciduous and coniferous trees (e.g., *Fagus*, *Picea*) in parks and woods on various soil-types.

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Distribution: rare, but widespread in Europe and N America, also recorded from S America (Chile).

Collections examined: Austria: Niederösterreich, Purkersdorf, Weidlingauer Eichberg, 7. 6. 1997, W. JAKLITSCH (WU 17243, L; V220).

Germany: Bayern, Bubesheimer Wald near Bibertal-Kissendorf, 14. 8. 1996, M. ENDERLE (Herb. ENDERLE, L).

The Netherlands: prov. Noord Holland, s'-Gravenland, Boekenstein, 9. 5. 1972, J. DAAMS 72.130 (L); - - Boekenstein, 29. 5. 1972, J. DAAMS 72.159 (L).

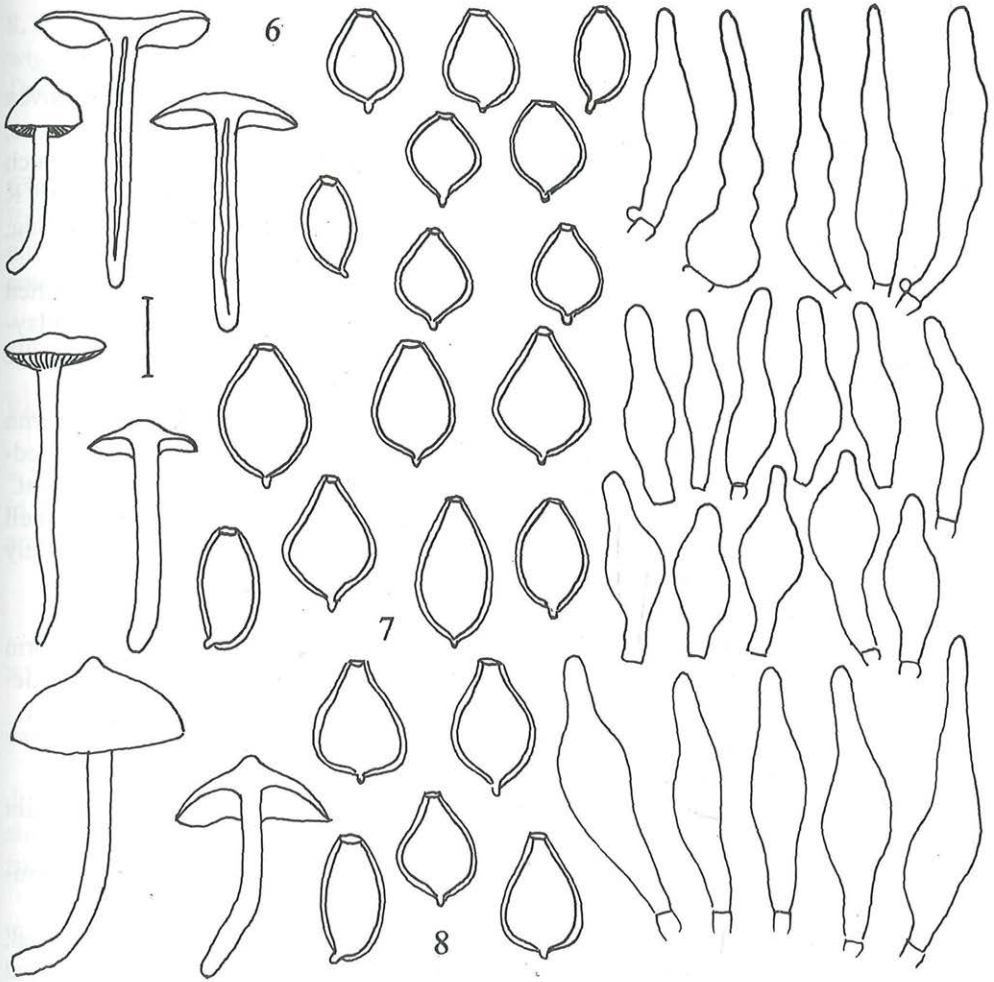

Fig. 6. *Psilocybe phyllogena*. Habit, spores and cheilocystidia. 7. *P. flocculosa*. Habit, spores, cheilo- and pleurocystidia. 8. *P.* cf. *rhomboidospora*. Habit, spores and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cystidia).

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Notes:
Psilocybe phyllogena resembles *P. crobula* in its lignicolous ecology and velar remnants on the pileus. It clearly differs, however, by the thick-walled, predominantly rhomboid spores. In *P. crobula* the spores may be somewhat rhomboid in appearance, but they are paler and thin or very slightly thick-walled. *Psilocybe flocculosa* BAS & NOORDEL. also resembles *P. phyllogena*, particularly by the rhomboid spores, but clearly differs by the strongly flocculose, dry pileus and stipe, and presence of pleurocystidia.

7. ***Psilocybe flocculosa*** **BAS & NOORDEL.,** Persoonia **16**: 243. 1996. Fig. 7.
Description: NOORDELOOS (1999: 38).

Characters:
Pileus: 5-9 mm, obtusely conical with involute margin, expanding to plano-convex or applanate, usually with slight depression around low, rounded umbo, hygrophanous, when moist dark red-brown at centre (Mu. 5 YR 3/2-4), with rather narrow, much paler ochraceous red to dark isabella marginal zone (5 YR 4/6, 7.5 YR 5/4, 10 YR 5/3), translucently striate at margin, dry, entirely subgranulose, pallescent on drying, becoming minutely fibrillose-flocculose.

Lamellae: L = 15-30, l = 1-3, crowded, broadly adnate to subdecurrent, often secedent in expanded pilei, rather broad, triangular, up to 1.5 mm wide, pale clay-coloured when young (10 YR 6/3) then darker grey-brown with slight violaceous tinge (10 YR 5/3-7.5 YR 5/4), with white, granular lamellar edge.

Stipe: 9-17 x 0.3-1.5 mm, tapering towards base, reddish ochraceous brown with dark red-brown base, finally almost black in basal part, at first entirely with pale reddish-ochraceous flocculose-squamulose covering, later on more fibrillose, glabrescent.

Context: rather dark brown in pileus, concolorous with surface in stipe. Smell spontaneously weak, strongly subaromatical when crushed. Taste unpleasant, slightly bitter.

Spore-print: dark purple-grey brown (5 YR 3/3).

Spores: (5.5-)6.0-7.0 x 4.5-6.0 x 3.5-4.0(-4.5) µm, Qf = 1.0-1.2-1.3, mitriform to distinctly rhomboid in frontal view, Qs = 1.4-1.6-1.8, ellipsoid to oblong in side-view; thin-walled to slightly thick-walled, with prominent germ-pore, brown in water.

Basidia: 16-24 x 4-7 µm, 2- and 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 20-30 x 6.0-8.0 µm, narrowly lageniform with 2.0-3.0 µm wide neck.

Pleurocystidia: abundant, 20-30 x 8.0-11 µm, ventricose-rostrate to lageniform with 3.0-4.0 µm wide neck.

Pileipellis: a dry cutis with transitions to a trichoderm, made up of cylindrical, often branched, 3.0-7.0 µm wide hyphae. Pigment minutely incrusting and membranal in upper layer of pileus.

Stipitipellis: a cutis with trichodermal tufts of cylindrical, often strongly branched, up to 5.0 µm wide hyphae with incrusted walls.

Clamp-connections: abundant.

Ecology: saprotrophic, in large group in sandy soil mixed with compost and wood debris in orchard.

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Distribution: so far only known from the type locality in The Netherlands.

Collection examined: The Netherlands: prov. Noord Holland, s'-Gravenland, Boekenstein, 9. 9. 1968, J. DAAMS (holotype, L).

Notes:

Psilocybe flocculosa comes close to *P. phyllogena*, which has rather similar spores, but differs clearly by the presence of pleurocystidia, fibrillose-flocculose pileus, and flocculose-subsquamulose stipe. So far it has only been found on the type locality in The Netherlands. *Psilocybe rhomboidospora* (ATK.) SMITH ex GUZMÁN probably is very close, but has no pleurocystidia.

8. *Psilocybe* cf. *rhomboidospora* (ATK.) A. H. SMITH ex GUZMÁN, Beih. Nova Hedwigia 74: 189. 1983. Fig. 8.

Deconica rhomboidospora ATK., Ann. Mycol. 7: 368. 1909.

Description: GUZMÁN (1983: 189-190, figs. 326-328).

Characters:

Pileus: 10-18 mm broad, conico-convex with pointed centre, with deflexed margin, not distinctly hygrophanous, not translucently striate, warm reddish brown, entirely covered with paler fibrillose-floccose veil.

Lamellae: L = 20-28, l = 3-5, moderately distant, broadly adnate with short decurrent tooth, reddish yellow with white, fimbriate lamellar edge.

Stipe: 20-40 x 1-2.5 mm, cylindrical, concolorous with pileus, entirely fibrillose-floccose with paler remnants of veil.

Spores: 6.5-7.5(-8.0) x 4.5-6.5 x 4.0-4.5 µm, average 7.0-7.2 x 5.5 x 4.0 µm, Qf = 1.1-1.3-1.5, Qs = 1.65-1.75-1.8, strongly flattened, F/I > 75 %, mitriform to rhomboid in frontal view, ellipsoid in side-view, with thickened, brown walls, with large apical germ-pore.

Basidia: 15-19 x 5.0-6.0 µm, 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 19-27 x 4.5-7.5 µm, lageniform with 2.0-4.0 µm wide, blunt apex.

Hymenophoral trama: irregular, made up of inflated elements with incrusted walls.

Pileipellis: a cutis with transitions to an irregular trichoderm, made up of cylindrical elements, 5.0-7.5 µm wide; subpellis subregular, made up of cylindrical to slightly inflated elements, 20-45 x 3.0-9.0 µm. Pigment brown, incrusting over a wide zone of pileipellis and subpellis.

Stipitipellis: a loose trichoderm of cylindrical hyphae, 2.0-6.0 µm wide with incrusted walls.

Clamp-connections: present in all parts of the basidiomata.

Ecology: saprotrophic on herbaceous and woody debris in a tropical hothouse.

Collection examined: The Netherlands: prov. Flevoland, Luttelgeest, Orchideeen-hoeve, 17. 11. 2000, J. WISMAN (L).

Notes:

The present collection has been made in a tropical greenhouse of a commercial plant grower on material probably originating from tropical regions in SE Asia.

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Microscopically this species is clearly close *to P. phyllogena*, from which it differs mainly by the dry surface of the pileus and abundant veil on both pileus and stipe. It comes therefore very close to *Psilocybe rhomboidospora*, described from N America.

9. *Psilocybe micropora* NOORDEL. & VERDUIN, Persoonia **17**: 257. 1999. Fig. 9.
Description: NOORDELOOS (1999: 35-36).

Characters:
Pileus: 5-17 mm, conico-convex soon convex to plano-convex with or without low umbo, with deflexed then straight margin, hygrophanous, when moist slightly translucently striate at margin only, very dark red-brown (Mu. 5 YR 3/2-4/3-4; 2.5 YR 3/4), only slightly paler at margin, pallescent on drying; dry, not viscid, pellicle not peeling. Veil present in young stage only in form of fine fibrillose-arachnoid covering of marginal zone of pileus and loose fibrils on lower part of stipe.

Lamellae: L = 20-26, l = 5-7, moderately distant, broadly adnate to subdecurrent, triangular then segmentiform, very dark red-brown (7.5 YR-5 YR 3-4/4), with subentire, concolorous or very slightly paler lamellar edge.

Stipe: 10-30 x 1-2 mm, cylindrical to flexuous, with or without broadened base, yellow-brown or yellow-red at apex, red-brown below (7.5 YR 7/6-4/4, 5 YR 4/4), with finely pruinose apex, downwards loosely fibrillose, glabrescent.

Context: very thin, concolorous with surface. Smell indistinct, taste mild.

Spore-print: deep red-brown.

Spores: 5.5-7.5(-8.0) x 4.5-6.0 x 4.0-5.5 µm, ovoid to almost mitriform in frontal view, Q = 1.3-1.45-1.6, ellipsoid-oblong to amygdaliform in side-view, Qs = 1.15-1.4-1.5, with slightly thickened, deep brown wall, with very small apical germ-pore, often difficult to see.

Basidia: 15-24 x 6.0-9.0 µm, 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 17.5-23 x 4.5-6.0 µm, lageniform with slender, 1.5-2.5 µm wide neck, thin-walled.

Pleurocystidia: absent.

Hymenophoral trama: regular, made up of strongly inflated elements, 10-30 x 6.0-25 µm, with minutely incrusted pigment.

Pileipellis: a 10-35 µm thick cutis of cylindrical, 2.0-4.0 µm wide hyphae, well differentiated from subpellis composed of very large, inflated elements, 40-95 x 7.0-18 µm, with yellow-brown, membranal and coarsely incrusting pigment, gradually passing into pileitrama.

Pileitrama: regular, composed of inflated elements, 12-70 x 4.0-15 µm, with pale yellow not distinctly incrusted walls.

Stipitipellis: a cutis of cylindrical hyphae, elements 10-50(-90) x 2.0-6.0 µm.

Caulocystidia: 11-30 x 2.0-6.0 µm, cylindrical to irregularly clavate, at apex of stipe only.

Ecology: saprotrophic, terrestrial, and among moss [*Rhytidiadelphus squarrosus* (HEDW.) WARNST. and *Brachythecium rutabulum* (HEDW.) SCHIMP.] in mossy lawn on sandy-peaty soil.

Distribution: so far only known from the type locality and one additional record from Sweden.

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Collections examined: The Netherlands: Wassenaar, Estate Zuidwijck, 30. 6. 1997, M. E. NOORDELOOS 9710 (V 226; L, holotype)

Sweden: Jämtland, Jämtland Lockna, W of Ange, 4. 9. 1997, J. VESTERHOLT (M. E. NOORDELOOS 9759, L).

Notes:

Psilocybe microspora can be distinguished from the very similar *P. montana* by the spores which are somewhat less pronouncedly flattened and have almost no germ-pore.

10. *Psilocybe xeroderma* HUIJSM., Persoonia **2**: 94. 1961. Fig. 10.

Psilocybe smithiana GUZMÁN, Beih. Nova Hedwigia **74**: 196. 1983. – *Psilocybe alpestris* SINGER, Fieldiana, Bot., n. s. **21**: 108. 1989. – ?*Psilocybe nothofagensis* GUZMÁN & HORAK, Sydowia **31**: 47. 1978.

Misapplied names: *Psilocybe physaloides* sensu BRES., Iconogr. mycol. **18**: pl. 866. 1931; ?*Psilocybe physaloides* sensu WATLING & GREGORY, Brit. Fung. Fl. **5**: 45. 1987; *Psilocybe physaloides* sensu GUZMÁN, *Psilocybe*: 186-188, pro parte. 1983. – *Geophila hyperella* sensu KÜHN. & ROMAGN., Fl. anal. champ. sup.: 329. 1953. – *Deconica libertatis* sensu MŒLLER, Fungi Færøes **1**: 187-188. 1945.

Descriptions: GUZMÁN (1983: 197-198, figs. 340-342), NOORDELOOS (1999: 35).

Characters:

Pileus: 5-20 mm, obtusely conical, convex to plano-convex, sometimes with small umbo, hygrophanous, not translucently striate or at margin only, reddish brown (Mu. 5 YR 4-5/6, 7.5 YR 5-6/6, 4-5/4; Expo H32, F32; K&W 8F6, 7D-E8), pallescent from centre to yellow-brown or ochraceous (7-8F6), dry to slightly viscid, without separable pellicle, especially when young with white, silky fibrillose veil, sometimes appendiculate at margin, usually disappearing with age leaving only few appendiculate patches at margin.

Lamellae: L = 15-30, l = 1-3(-7), moderately crowded to crowded, adnate-arcuate to subdecurrent, ventricose to broadly ventricose, brown then purple-brown, with distinctly paler, irregularly fimbriate-denticulate lamellar edge.

Stipe: 15-40 x 0.5-2 mm, cylindrical, straight to flexuous, stuffed or fistulose, pale pinkish brown at apex, much darker red-brown in lower part (5 YR 5-4/6; Expo H34, 32, J32; 6C-D6, 6E7), slightly flocculose-pruinose at apex, fibrillose or girdled with veil below, sometimes with an annuliform zone, glabrescent with age, often leaving only a few fibrils behind, somewhat tomentose at base.

Context: rather thick and pale in the pileus, subconcolorous in stipe. Smell and taste inconspicuous.

Spore-print: purple-black.

Spores: 5.5-7.0 x 4.0-5.0(-5.5) x 3.5-4.5 µm, distinctly flattened, ovoid to slightly mitriform in frontal view, Qf = 1.24-1.3-1.4-1.5, ellipsoid to oblong, sometimes slightly amygdaliform in side-view, Qs = 1.25-1.4-1.7, with sordid brown, slightly but distinctly thickened walls, with small to fairly large, apical germ-pore.

Basidia: 16-27 x 5.0-7.5 µm, 4-spored.

Lamellar edge: sterile.

Cheilocystidia: 19-30(-33) x 4.5-11.5 µm, broadly to narrowly lageniform with 2.0-8.0 µm wide, blunt neck, thin-walled, colourless.

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Hymenophoral trama: regular, made up of inflated elements, 15-35(-50) x 3.5-16 µm with hyaline, not pigmented walls.

Pileipellis: a narrow cutis of hyaline, colourless, cylindrical, 1.0-3.5 µm wide hyphae, subpellis compact, made up of cylindrical to inflated elements, 10-55(-70) x 2.5-14 µm, gradually passing into pileitrama, which is made up of inflated elements, 23-90(-120) x 2.5-9.0(-15) µm. Pigment yellow-brown, membranal and incrusting in subpellis and upper pileitrama.

Stipitipellis: a cutis of narrow, cylindrical, 1.5-4 µm wide, yellow-brown, minutely incrusted hyphae.

Caulocystidia: few, at apex of stipe only, single or in clusters, cylindrical to clavate or sublageniform, 10-23 x 2.0-7.0 µm.

Clamp-connections: present in all parts of the basidiocarps studied.

Ecology: saprotrophic on forest litter, grasses, etc., in montaneous to subalpine habitats, under or near conifers (*Pinus sylvestris* L., *P. mugo* TURRA).

Distribution: so far recorded from Austria, France, Italy and Switzerland. Also occurring in N America.

Collections examined: Austria: Niederösterreich, Hochschneeberg, 16. 8. 1979, R. SINGER (WU 784, holotype of *P. alpestris*); - Raxalpe, 15. 6. 1997, A. HAUSKNECHT (V220, WU 7248, L).

France: Dept. Doubs, Lougres, 19. 6. 1956, H. S. C. HUIJSMAN (L, holotype of *P. xeroderma*); - - 20. 7. 1956, H. S. C. HUIJSMAN (L); - Planeyse, 10. 6. 1965, H. S. C. HUIJSMAN (L); - Bôle, 8. 7. 1969, H. S. C. HUIJSMAN (L); - Rochefort, 5. 7. 1965, H. S. C. HUIJSMAN (L).

United Kingdom: Scotland, Perthshire, Kindrogan, Kindrogan Field Centre, 3. 9. 1997, S. VERDUIN (V241; L).

Italy: Trento, Calceranica, 19. 9. 1999, M. E. NOORDELOOS 9942 (L).

USA: Michigan, Harbor Spring Hills, 25. 7. 1961, SMITH 63667 (holotype of *P. smithiana*, MICH).

Notes:

Psilocybe xeroderma clearly belongs to the complex of *Psilocybe montana*, from which it can be differentiated by small spores and rather short cheilocystidia, usually with broad basal part and blunt, rounded neck, and the presence of veil, which usually is clearly visible on the surface of pileus and stipe. It probably has frequently been called *Psilocybe physaloides* in literature (see also notes on insufficiently known and excluded names, below). *Psilocybe acadiensis* A. H. SMITH is very similar, differing mainly by the rather copious veil. Type-studies have shown that *Psilocybe smithiana* GUZMÁN, and *P. alpestris* SINGER are synonymous, and *Psilocybe nothofagensis* GUZMÁN & HORAK can hardly be distinguished as well (see below).

11. *Psilocybe pratensis* P. D. Orton, Notes Roy. Bot. Gard. Edinburgh **29**: 120. 1969. Fig. 11.

Misapplied name: *Psilocybe physaloides* sensu COOKE, Ill. Brit. fungi, pl. 601(609). 1874.

Iconography: COURTECUISSE & DUHEM (1994: 1283).

Descriptions: NOORDELOOS (1999: 36-37), ORTON (1969: 92).

Characters:

Pileus: 8-18 mm, convex then plano-convex or almost applanate, sometimes subumbonate, with deflexed margin, hygrophanous, indistinctly translucently striate, uniformly red- or yellow-brown [Mu. 2.5 YR (2.5/2-)2.5/4; 10 YR 4/4], pallescent on

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drying (centre 5 YR 5/8, middle part 5 YR 6/6, margin 2.5 YR 3/4-6 finally 10 YR 7/6), strongly viscid with thick, separable pellicle; veil absent.

Lamellae: L = 22-24, l = 3, normally distant, sinuate-emarginate with decurrent tooth, never really decurrent, ventricose to broadly ventricose, red-brown (5 YR 3/3. 4/4.2.5 YR 3/4, 2.5 YR 3/4-2.5/4), with even to eroded, concolorous or slightly paler lamellar edge.

Stipe: 10-20 x 1-2 mm, cylindrical, straight to flexuous, or slightly tapering upwards, or slightly subbulbous at base, pale brown (10 YR 8/4) white pruinose at apex, paler fibrillose-flocculose below.

Context: thin, concolorous with surface. Smell and taste indistinct or fungoid.

Spore-print: dark red-brown.

Spores: 8.5-12 x 6.0-7.5 x 5.5-6.5 µm, slightly flattened, Qf = 1.3-1.5-1.75, ovoid to slightly hexagonal in frontal view, Qs = 1.45-1.7-1.8, ellipsoid to oblong, often somewhat amygdaloid in side-view, with thick, brown wall (-2.0 µm), with large, apical germ-pore.

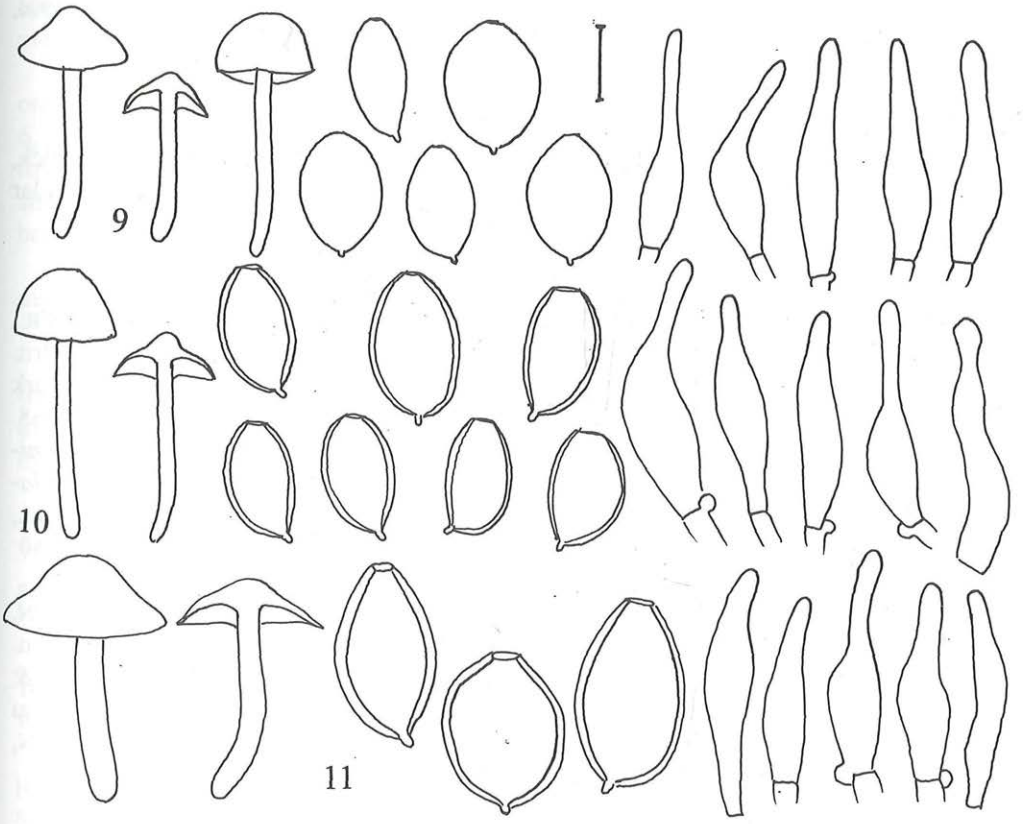

Fig. 9. *Psilocybe micropora*. Habit, spores and cheilocystidia. 10. *P. xeroderma*. Habit, spores and cheilocystidia. 11. *P. pratense*. Habit, spores and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cheilocystidia).

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Basidia: 25-27.5 x 5.5-6.5 µm, 4-spored, with clamp-connections.

Lamellar edge: sterile.

Cheilocystidia: 20-31 x 5.0-6.5 µm, lageniform, with blunt, 1.5-3.0 µm wide apex.

Hymenophoral trama: regular, made up of inflated elements, 22-90 x 3.0-17 µm with yellow, sometimes finely incrusted walls.

Pileipellis: an up to 250 µm thick ixocutis, made up of narrow, cylindrical, 1.5-3.5 µm wide hyphae; subpellis compact, made up of inflated elements, 20-75 x 5.0-15 µm with brown, incrusting pigment.

Pileitrama: regular, made up of inflated elements, 30-110 x 4.0-12(-17) µm.

Stipitipellis: a hardly differentiated cutis of narrow, cylindrical, 2.0-7.0 µm wide hyphae with brown-yellow walls.

Clamp-connections: abundant.

Ecology: saprotrophic, amongst *Ammophila arenaria* (L.) LINK in primary dune valleys along the coast. November/December.

Distribution: rare, but widespread, recorded from United Kingdom, France, and The Netherlands.

Collections examined: The Netherlands: prov. Friesland, Isl. Terschelling, 9. 11. 1996, M. NAUTA (V 189, L). prov. Zuid Holland, Isl. Goeree, 12. 11. 1984, E. C. VELLINGA (L).

United Kingdom: East Lothian, Dirleton, 7. 12. 1960, R. WATLING 2826 (holotype, E).

Notes:

Psilocybe pratensis is characterized by the large, dark, thick-walled spores and thick, viscid, separable pellicle of the pileus. *Psilocybe montana* var. *macrospora* has similar spores, but a dry pileus without separable pellicle.

12. *Psilocybe montana* (PERS.: FR.) KUMMER, Führ. Pilzk.: 71. 1871.

Agaricus montanus PERS., Observ. mycol. **1**: 9. 1796; *Agaricus montanus* PERS.: FR., Syst. mycol. **1**: 293. 1821; *Deconica montana* (PERS.: FR.) P. D. ORTON in Trans. Brit. Mycol. Soc. **43**: 175. 1960. – *Agaricus polytrichophilus* PECK, Ann. Rep. New York State Mus. **30**: 42. 1878; *Psathyra polytrichophilus* (PECK) SACC., Syll. Fung. **5**: 1068. 1887; *Deconica polytrichophila* (PECK) MURRILL, Mycologia **10**: 20. 1918. – *Deconica bryophila* PECK, Ann. Rep. New York State Mus. **46**: 106. 1893. – *Atylospora lateritia* MURRILL, Mycologia **10**: 20. 1918; *Psathyra lateritia* (MURRILL) MURRILL, Mycologia **15**: 10. 1923; *Psilocybe lateritia* (MURRILL) A. H. SMITH, Mycologia **40**: 698. 1948.

Misapplied names: *Psilocybe atrorufa* sensu FRIES, Epicr. 230. 1838; RICKEN, Blätterpilze 248. 1912; BRES., Iconogr. mycol. **18**: pl. 865. 1931; LANGE, Fl. agar. dan. **4**: pl. 149C. 1939; IMLER, Bull. Soc. Mycol. France **52**, Atl. pl. 73. 1936; KÜHN. & ROMAGN., Fl. anal. champ. sup.: 338. 1953 pro parte. – *Psilocybe muscorum* sensu M. CONTU, Micol. Veg. Medit. **12**: 3-5. 1997. – *Psilocybe physaloides* sensu RICKEN, Blätterpilze: 252. 1913; ORTON, Trans. Brit. Mycol. Soc. **60**: 386. 1960.

12 a. var. *montana*. Fig. 12.

Iconography: CONTU (1997: 3-5, as *P. muscorum*), LUDWIG (2000: pl. 72.16), STAMETS (1996: 133).

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Descriptions: ARNOLDS (1983: 445-449), GUZMÁN (1983: 173-179), NOORDELOOS (1999: 38-39), ORTON (1960: 386, as *P. physaloides*), STAMETS (1996: 132-133).

Characters:

Pileus: 4-16 mm, campanulate, hemisphaerical to conico-convex when young, soon convex or plano-convex, with or without small papilla, with deflexed then straight margin, finally crenulate marginal zone, strongly hygrophanous, when moist hardly or shortly translucently striate, or distinctly so, up to half the radius, uniformly very dark grey-brown or red-brown when moist (Mu. 2.5-5 YR 2.5-3/2-4, 7.5 YR 3/2-3; K&W 7F5-4, 6F5), not or only slightly paler towards margin, strongly pallescent on drying to yellow-brown or sordid yellow (7.5 YR 5/4, 6-7/8, 10 YR 7/3-4), dry to viscid when moist, pellicle not entirely separable, shining, smooth, without veil or with very minute velar remnants in young stages only.

Lamellae: L = 15-24, l = 1-5(-7), moderately distant, broadly adnate with decurrent tooth to subdecurrent, triangular, segmentiform or subventricose, moderately dark brown then dark red-brown, with or without grey tinge finally purplish black to blackish brown (2.5-5 YR 2.5/2, 3/2, 4/3-4; 6F5), with slightly paler or white, fimbriate lamellar edge.

Stipe: 15-40 x 1-2 mm, cylindrical or slightly tapering towards base, pale orange-brown at apex, downwards red-brown, paler than pileus (10 YR-7.5 YR 5-3/4-6, 7-6/8), darker towards base (7.5-2.5 YR 2.5/2), glabrous, polished or finely fibrillose lengthwise with innate, paler fibrils, rarely with sparse remnants of veil in form of slight annuliform zone and some loose fibrils below, without or with poorly developed basal mycelium.

Context: very thin, dark brown in pileus, pallid in inner part of stipe. Smell indistinct. Taste not tried.

Spore-print: very dark purplish brown.

Spores: 7.0-9.0 x 4.5-6.0 x 4.0-6.0 µm, flattened, ovoid-truncate to ovoid in frontal view, Qf = (1.2-)1.3-1.8, Qfav = 1.5-1.6; ellipsoid to oblong or amygdaliform in side-view, Qs = 1.2-1.7, Qsav = 1.4-1.5, greyish brown in ammonia, with distinctly thickened walls, with large apical germ-pore, often appearing truncate.

Basidia: 12-23 x 4.0-9.0 µm, 4-spored.

Lamellar edge: sterile.

Cheilocystidia: 17-46 x 4.0-8.5 µm, Q = 2.2-(4.8-5.6)-8.6, lageniform with subacute rarely subcapitate, 1.5-3.5 µm wide neck, thin-walled.

Pleurocystidia: absent.

Hymenophoral trama: regular, made up of short, inflated elements, 15-70-100(-110) x 3.0-12(-17) µm, with hyaline to pale yellow, rarely minutely incrusted walls.

Pileipellis: a cutis or up to 30 µm thick ixocutis of narrow, cylindrical, 2.0-6.0 µm wide, hyaline or minutely incrusted hyphae; subpellis compact, made up of (very) short, inflated elements, 20-50(-90) x 4.0-12 µm, with yellow-brown, often coarsely incrusted walls, gradually passing into pileitrama.

Pileitrama: regular, made up of inflated elements, 20-95(-120) x 3.0-17 µm with yellow-brown, minutely to coarsely incrusted walls.

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Stipitipellis: a cutis of cylindrical, 2.0-7.0 µm wide hyphae with yellow-brown, incrusted walls.

Caulocystidia: at apex of stipe only, scattered or in clusters, 12-55 x 2.5-7.0 µm, cylindrical to narrowly clavate.

Clamp-connections: present and abundant in all parts of the basidiomata studied.

Ecology: saprotrophic or parasitic, often associated with the mosses *Brachythecium albicans* (HEDW.) SCHIMP., *B. rutabulum*, *Campylopus introflexus* (HEDW.) BRID., *Ceratodon purpureum* (HEDW.) BRID., *Dicranum scoparium* HEDW., *Eurhynchium hians* (HEDW.) LAC., *E. praelongum* (HEDW.) SCHIMP., *E. speciosum* (BRID.) JUR., *Racomitrium canescens* (HEDW.) BRID., *Pohlia* spec. or *Polytrichum piliferum* HEDW., but also frequently growing amongst *Climacium dendroides* (HEDW.) WEB. & MOR., *Dicranella heteromalla* (HEDW.) SCHIMP., *Hypnum cupressiforme* HEDW., *Plagiomnium indulatum* (HEDW.) T. KOP., *Pohlia nutans* (HEDW.) LINDB. and *Rhytidiadelphus squarrosus*, and/or lichens (e.g., *Cladonia* spp.) in rather exposed situations such as dune-meadows, heaths and tree-less tundra, open *Pinus* forest, usually on nutrient-poor, well-drained soil; also recorded from burnt soil.

Distribution: wide-spread and common in cold and temperate regions, probably with circumpolar distribution.

Collections examined: **Austria:** Salzburg, Mittersill, Hollersbachtal, 13. 7. 1996, A. HAUSKNECHT & F. REINWALD (V103, WU 16400, L).

Finland: Sodankylä, Tankavaara, 14. 8. 1995, P. HÖYER (V094, L); - Porvoo, 11. 9. 1995, P. HÖYER (V014, L); - - 23. 10. 1995, P. HÖYER (V096, L); - - Teissala, 13. 9. 1995 and 31. 5. 1996, P. HÖYER (V015, V215, L).

Germany: Bayern, Leipheim, 3. 6. 1984, M. ENDERLE (Herb. ENDERLE, L).

The Netherlands: prov. Groningen, Middelbert, Churchyard, 30. 10. 1996, R. DOUWES (V193, L). prov. Friesland, Terschelling, Oosterend, 10. 11. 1996, N. J. DAM & S. VERDUIN (V195, L). prov. Drenthe, Wijster, Vossenberg, 23. 10. 1995, S. VERDUIN (V043, V044, L). prov. Gelderland, Apeldoorn, Loenermark, 15. 10. 1995, N. & M. DAM (V039, L); - Hulshorst, Hulshorster Zand, 5. 10. 1996, N. J. DAM (V151, L). prov. Flevoland, Dronten, Abbertsbos, 13. 10. 1996, G. VAN ZANEN (V176, L); - Zeewolde, 9. 10. 1996, G. VAN ZANEN (V154, L). prov. Noord Holland, Callantsoog, Zwanenwater, 4. 11. 1995, S. VERDUIN (V069, L); - - 12. 4. 1997, A. STROO (V215, L); - - 23. 11. 1996, S. VERDUIN (V202, L); - Bergen aan Zee, Verbrande Pan, 4. 11. 1996, M. E. NOORDELOOS (V186, L); - Vogelenzang, Amsterdamse Waterleidingduinen, 17. 11. 1995, S. VERDUIN (V042, L); - - 16. 11. 1996, S. VERDUIN (V198, L); - - Eiland van Rolvers, 28. 10. 1996, M. NAUTA, M. E. NOORDELOOS & S. VERDUIN (V181 & V182, L). prov. Noord Brabant, Breda, 6. 12. 1970, P. B. JANSEN (L).

Norway: Finnmarken, Vadsö, Ekkeröya, Bird Sanctionary, 19. 8. 1995, M. E. NOORDELOOS 95098/9 (V010, V011, L).

United Kingdom: Scotland, Perthshire, Aviemore, Cairn Gorm, Sugar Bole, 27. 8. 1996, S. VERDUIN V128 and V129 (L); - Cairnwel, Glen Shee, 4. 9. 1997, S. VERDUIN (V242, L).

Notes:

Psilocybe montana is a very common species particularly in exposed, scanty vegetation of grass with mosses and lichens, preferably on rather poor, sandy or gravely soil. It can be found throughout the year. *Psilocybe montana* is characterized by the dry to viscid pileus, without separable pellicle, lack of veil, and dark lamellae. Microscopically the thick-walled, truncate spores are distinctive. The seize of the spores covers a rather wide range. It appeared therefore to be impossible to differentiate between *P. montana* and *P. muscorum* on account of these characters, which was supported also by our crossing experiments (NOORDELOOS & al., unpubl.). So *Psilocybe mus-*

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corum in the sense of most authors is considered to fit into the variability of *P. montana*. The type-material of *P. muscorum*, however, represents an insufficiently known species close to *P. subviscida* (see below).

A few collections have been encountered with exceptionally large spores, which come into the range of *P. pratensis*. Since they appeared to be interfertile with typical *P. montana* with smaller spores, we described them as *P. montana* var. *macrospora*.

12 b. *Psilocybe montana* var. *macrospora* NOORDEL. & VERDUIN, Persoonia **17**: 256. 1999. Fig. 12.

Description: NOORDELOOS (1999: 34-35).

Characters:

Pileus: 12-21 mm, convex then plano-convex, with or without obtuse umbo, with deflexed margin, hygrophanous, when moist translucently striate up to centre, dark grey-brown (K&W 7E5), or red-brown (Mu. 5-2.5 YR 3/2-4), strongly pallescent on drying to pale red-brown or yellow-brown (5 YR 5/4, 7.5 YR 5-6/6, 10 YR 7/6), dry, not viscid. Veil absent in mature basidiocarps, but visible as a very thin whitish cortina in very young specimens.

Lamellae: L = 18-24, l = 3(-7), distant to moderately distant, broadly adnate to slightly emarginate or with short decurrent tooth, horizontal, not or slightly ventricose, grey-brown then red-brown, finally very dark red-brown (7E5; 7.5 YR 4/2, 5 YR 4/3 to 3/3), with white, entire or fimbriate lamellar edge.

Stipe: 20-32 x 1.5-2.5 mm, cylindrical, straight or flexuous, equal or with slightly swollen base, pale ochre-yellow or yellow-brown at apex, dark reddish brown below (apex 10 YR 7/6-8, lower part 7.5 YR 7-6/6, 5/6, 5 YR 4/3), glabrous in upper part, white striate with some scattered fibrils in lower part.

Context: thin, concolorous with surface. Smell and taste indistinctive to strongly farinaceous.

Spores: 8.5-11(-11.5) x 6.0-8.5 x 5.0-7.0 µm, average 9.7-10 x 6.0-7.4 x 5.6-6.3, flattened, ovoid to mitriform in frontal view, Qf = 1.2-1.35-1.8, ellipsoid in side-view, Qs = 1.4-1.6-1.8(-2.0), with thick (1.5-2 µm) brown wall and large, apical germ-pore.

Basidia: 21.5-28.5 x 7.0-8.5 µm, Q = 2.8-3.2-4.1, 4-spored.

Lamellar edge: sterile.

Cheilocystidia: 20-40 x 4.5-8 µm, lageniform with long neck, sometimes forked, apex always in form of small 1.5-3.0 µm capitulum with seemingly thickened, refringent wall.

Hymenophoral trama: subregular, made up of cylindrical elements with or without fine incrustations.

Pileipellis: an up to 70 µm thick ixocutis of cylindrical to slightly swollen hyphae, 1.5-5 µm wide, with hyaline, non pigmented walls; subpellis compact, made up of inflated to subcylindrical elements, 35-75 x 3.0-12 µm with bright yellow-brown, incrusted walls.

Pileitrama: regular, made up of cylindrical to inflated elements, 15-70(-90) x 3-7(-11) µm.

Clamp-connections: present.

Ecology: saprotrophic amongst mosses (e.g., *Ceratodon purpureum*) on dry, acid, sandy soil, near sheep dung (but not connected).

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Distribution: so far only known from three localities in The Netherlands.

Collections examined: The Netherlands: prov. Drenthe, Beilen, Holthe, De Schepping, 5. 10. 1995, E. ARNOLDS 6677 (L, holotype). prov. Flevoland, Oost Flevoland, Spijkstrand Noord, 4. 10. 1992, F. TJALLINGII (L). prov. Noord Holland, Castricum, Koningsbos, 4. 11. 1992, M. E. NOORDELOOS 92211 (L).

Notes:

Initially these collections were all filed under *Psilocybe pratensis*, on account of the large spores. However, monosporic isolates of ARNOLDS 6677 crossed with several typical *P. montana* isolates, but failed to mate with an isolate of *P. pratensis* from the Island of Terschelling (NAUTA, 9. 11. 1996). That latter collection differs macroscopically by having a very thick, separable pellicle, typical for *P. pratensis*. Considering the great difference in spore size with other collections of *P. montana*, it was decided to describe a separate variety *macrospora*.

13. *Psilocybe chionophila* LAMOURE, Bull. Soc. Linn. Lyon **46**: 215. 1977. Fig. 13.

Iconography: GULDEN (1985: 30).

Descriptions: NOORDELOOS (1999: 35), SENN-IRLET (1986: 217-219, figs. 100, 103, 104)

Characters:

Pileus: 3-13 mm, plano-convex with low umbo, hygrophanous, obscurely translucently striate at margin, dark chocolate-brown when moist (K&W 7F8), pallescent from centre to margin to pale cream-brown, dry, glabrous, smooth.

Lamellae: L = 20, l = 3, rather distant, broadly adnate, up to 5 mm broad, rather dark brown (6E5) with pale, whitish lamellar edge, especially near attachment to stipe.

Stipe: up to 12 x 1 mm, cylindrical to compressed, pale brownish, striate, with pale grey basal tomentum.

Context: concolorous with surface, darker in basal part of stipe. Smell faint, when cut slightly fungoid.

Spores: 7.5-9.0 x 5.5-6.0 x 5.0-6.0 µm, distinctly flattened, Qf = 1.25-1.3-1.55, ovoid to mitriform, rarely somewhat angular in frontal view, Qs = 1.45-1.55-1.7, ellipsoid to oblong, sometimes subamygdaliform in side-view, with grey-brown, thickened walls and moderately large apical germ-pore.

Basidia: (17-)21-30 x 4.0-7.0 µm.

Lamellar edge: sterile.

Cheilocystidia: 21-27 x 4.5-7.5 µm, Q = 3.0-3.8-4.5, lageniform, often with broad basal part and rather long, tapering neck with 1.0-2.0 µm wide apex.

Pleurocystidia: absent.

Hymenophoral trama: regular, made up of cylindrical to strongly inflated elements, 17-70 x 4.0-20 µm, with pale yellow-brown parietal pigment, rarely also finely incrusted.

Pileipellis: a narrow cutis of cylindrical, 2.0-5.5 µm wide hyphae with colourless walls; subpellis compact, made up of short inflated elements, 15-70 x 6.0-22 µm with strong, red-brown parietal and incrusting pigment, gradually passing into pileitrama.

Pileitrama: regular, made up of cylindrical to inflated, often very irregularly shaped elements, 5.0-20 µm wide, with practically colourless walls.

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Stipitipellis: a compact cutis of cylindrical, 2.0-5.0 µm wide hyphae.

Caulocystidia: present at apex, singly or in clusters, subcylindrical to sublageniform, 11-27 x 3.0-5.5 µm.

Clamp-connections: abundant in all parts of the basidiomata.

Ecology: parasitic on mosses (*Polytrichum sexangulare*) in snow-bed vegetations in the alpine zone.

Distribution: in the alpine zone, possibly widespread all over northern and central Europe.

Collection examined: Norway: Hordaland, Ulvik, Finse, Lille Finsenutt, 12. 8. 1986, E. C. VELLINGA 756 (L).

Notes:

LAMOURE (1977) has described *Psilocybe chionophila* as a result from a critical study of alpine *Psilocybe* species. It is a fungus similar to *Psilocybe montana*, characteristic for snow-beds where it grows parasitically on the moss *Polytrichum sexangulare*. LAMOURE proved that isolates from *Psilocybe chionophila* were intersterile with *P. montana*, and must be considered a separate biological species. Morphologically *P. chionophila* could be differentiated from *P. montana* by the slightly broader spores. Since then *Psilocybe chionophila* has been found in other alpine regions (SENN-IRLET 1986; GULDEN 1985), where it seems to be rather common, always parasiting *Polytrichum sexangulare*. Unfortunately we failed to locate the holotype of *P. chionophila*. Despite the generous help offered by Dr LAMOURE, it has not been located in Lyon, nor in Geneva, so it is to be feared that the holotype is lost! From the original description and material studied by us, it appears very close to *Psilocybe montana*, from which it is said to differ by the broader spores, beside the intersterility, as demonstrated by LAMOURE and ourselves. For a discussion see NOORDELOOS & al. (unpubl.).

During our experimental studies we were able to confirm the intersterility of the type strain of *P. chionophila* with most of our *P. montana* collections (NOORDELOOS & al., unpubl.). But, surprisingly, one collection of *P.* "*montana*" collected from a grassy path in a *Fagus* plantation proved to be interfertile with the type-strain of *P. chionophila* and intersterile with all *P. montana*-isolates. Macro- and microscopically this collection fits well with the description given by LAMOURE (1977) of *Psilocybe chionophila*:

Characters:

Pileus: 10-15 mm, semiglobose to convex with deflexed margin, hygrophanous, when moist dark red-brown, probably slightly translucently striate, moderately dark reddish brown (Mu. 7.5 YR 6/4-5/4), dry, not viscid, glabrous, except for a few fibrils at margin, which may be remnants of veil.

Lamellae: L = about 20, l = 3-5, distant, broadly adnate, segmentiform, red-brown (5 YR 3/3) later on purple brown with whitish, fimbriate lamellar edge.

Stipe: 30 x 1 mm, cylindrical, slightly tapering towards base, yellow-brown at apex, downwards dark red-brown (10 YR 7/6-4, 7.5 YR 7/8, 5 YR 3/4), finely innately striate, without remnants of veil.

Context: thin, concolorous. Smell none. Taste mild or slightly farinaceous.

Spore-print: very dark red-brown (10 YR 3/2, 2.5/2).

Spores: 7.0-8.0 x 5.5-6.5 x 4.5-5.5 µm, average 7.3-7.4 x 5.7 x 4.9 µm, distinctly flattened, ovoid-mitriform, Q = 1.2-1.3-1.35 in frontal view, ellipsoid to slightly amyg-

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daliform in side-view, Q = 1.4-1.5-1.7, with thick, grey-brown walls and large, apical germ-pore.

Basidia: 18-34 x 5.0-7.5 µm, 4-spored.

Lamellar edge: sterile.

Cheilocystidia: 30-39 x 5.5-7.5 µm, lageniform with slender, subacute, 1.5-2.5 µm wide neck, thin-walled.

Pleurocystidia: absent.

Hymenophoral trama: regular, made up of cylindrical to broadly inflated elements, 32-90 x 8.0-21 µm, with yellow-brown, sometimes finely incrusted walls.

Pileipellis: a cutis, 23-30 µm thick, made up of cylindrical, 1.5-3.0 µm wide hyphae; subpellis compact, made up of strongly inflated elements, 15-55(-70) x 3.0-9.0 µm, with yellow-brown, incrusted walls.

Stipitipellis: a cutis of narrow, cylindrical, 2.0-7.0 µm wide hyphae, with yellow-brown parietal pigment.

Caulocystidia: absent or only scattered, subcylindrical to subclavate, 15-22 x 4.0-6.0 µm with thin, hyaline walls.

Clamp-connections: abundant in all parts of the basidiomata.

Ecology: terrestrial among grass in *Fagus* forest.

Collection examined: The Netherlands: Flevoland, 14. 8. 1996, G. VAN ZANEN 132 (V 105).

Notes:

It is obvious that the morphological differences with typical *P. montana* are very small indeed: the differences with *P. montana* are so small that it is practically impossible to identify both species in this case.

GUZMÁN (1983) studied the types of *Deconica semistriata* PECK and *Psilocybe chionophila* and considered them to be synonymous. This is not confirmed by our studies (see below).

14. *Psilocybe magica* SVRČEK, Česká Mykologie **43**: 82. 1989. Fig. 14.
?*Psilocybe schoenetii* BRESINSKY in Hoppea **35**: 104. 1976; see notes and type-study, below.

Iconography: LUDWIG (2000: pl. 72.16F, as *Psilocybe* cf. *montana*).

Description: NOORDELOOS (1999: 36).

Characters:

Pileus: 5-20 mm, conico-convex or convex with or without conical umbo, expanding with age to plano-convex, with or without umbo, with deflexed to straight, sometimes crenate margin, hygrophanous, deeply translucently striate, red-brown (Mu. 5 YR 4-6/6, centre 2.5 YR 3.3; K&W 9F8, 7F8, 6F8, 14F5), paler towards margin and between striae (5 YR 5-6/8, 2.5 YR 5/8), pallescent on drying, slightly viscid, but without separable pellicle. Veil present in form of white appendiculate flocks near and along margin, sometimes disappearing with age.

Lamellae: L = 16-28, l = 1-3(-5), distant to moderately crowded, broadly adnate-subdecurrent, brown to red-brown (7.5 YR 6-5/4, 5 YR 4/3; 6E7-8, finally 7/8F8) finally sometimes with greyish-purple tinge, with fimbriate, more or less concolorous or paler, pinkish white lamellar edge.

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Stipe: 20-35 x 1-2 mm, cylindrical, often flexuous, equal or with broadened, almost bulbous base, orange-yellow to yellow-brown at apex (7.5 YR 6/8, 6-5/6), downwards red-brown, much darker towards base (5 YR 4-3/6-3, 2.5 YR 3/3), almost glabrous or with a few scattered paler fibrils.

Context: thin, concolorous with surface. Smell and taste indistinct.

Spore-print: deep red-brown (2.5 YR 2.5/2).

Spores: (6.0-)7.0-8.5 x 4.0-6.5(-7.0) x 4.0-5.5 µm, average 6.9-8.4 x 4.7-6.4 x 4.2-4.9 µm, Qf = 1.3-1.7, Qfav = 1.4-1.55; Qs = 1.4-2.2, Qsav = 1.5-1.9, hardly to distinctly flattened, ellipsoid to oblong, rarely somewhat amygdaliform in side-view, ellipsoid or somewhat ovoid or mitriform in frontal view, with moderately thick, grey-brown walls, with fairly large, apical germ-pore.

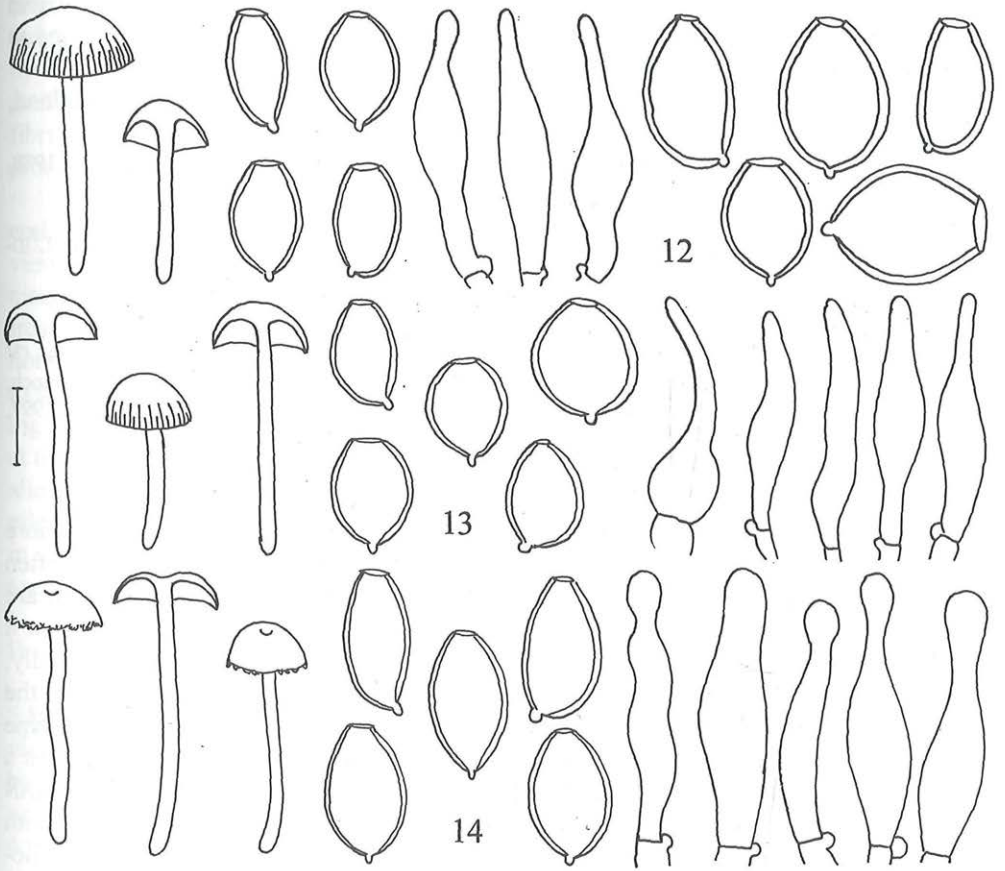

Fig. 12. *Psilocybe montana* var. *montana* and var. *macrospora*. Habit, spores and cheilocystidia. 13. *P. chionophila*. Habit, spores and cheilocystidia. 14. *P. magica*. Habit, spores and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cheilocystidia).

Basidia: 17-25(-30) x 4.0-8.0 µm, 4-spored, with clamp-connections.

Lamellar edge: sterile, rarely heterogeneous.

Cheilocystidia: 20-50 x 5.5-10 µm, lageniform to tibiiform with rounded, 2.0-5.0 µm wide neck, thin-walled.

Pleurocystidia: absent.

Hymenophoral trama: regular to subregular, made up of short, inflated elements, 18-85 x 5.0-18 µm, with incrusted walls.

Pileipellis: a cutis to ixocutis, up to 80 µm thick, made up of 1.5-5.0 µm wide, cylindrical hyphae; subpellis well-developed, made up of short, moderately to strongly inflated elements, 23-95 x 9.0-21 µm, with yellow-brown, incrusted walls, gradually passing into pileitrama.

Stipitipellis: a cutis of narrow, cylindrical hyphae, 2.0-4.0 µm wide.

Clamp-connections: present.

Ecology: saprotrophic, on dead parts of mosses [e.g., *Campylium stellatum* (HEDW.) J. LANGE & C. JENS., *Campylopus introflexus* (HEDW.) BRID.], grasses, and sedges in meadows with *Juncus effusus* L. on rather moist fertile soil and also found in tussocks of *Carex elata* ALL.

Distribution: wide-spread in Europe: recorded from Sweden, Denmark, Scotland, The Netherlands, and the Czech Republic.

Collections examined: Czech Republic: Central Bohemia, Voznice near Dorbis, 8. 8. 1988, M. SVRČEK (holotype, PRM 855442).

Denmark: Isl. Mön, Ulvshale Skoven, 28. 9. 1997, T. LÆSSØE (V255, L).

Germany: Bayern, Berchtesgadener Land, Königssee near St. Bartholomä, 29. 9. 1986, E. LUDWIG (Herb. LUDWIG 2093).

The Netherlands: prov. Drenthe, Havelte, Reelangen, 3. 10. 1996, E. ARNOLDS (V 152, L).

Sweden: S Norrbotten, Lappenporta, 7. 8. 1989, B. SENN-IRLET (BERN).

United Kingdom: Scotland, Perthshire, Dunkeld, Trochry, 25. 8. 1996, M. E. NOORDELOOS (V 116); - Perthshire, Kindrogan, 1. 9. 1997, S. J. W. VERDUIN (V 239); - Invernessshire, Loch Rannoch, Eilean Moor, 26. 8. 1996, M. E. NOORDELOOS 9679 (V 123); - Rannoch, S of Black Wood, 1. 9. 1997, S. J. W. VERDUIN (V 237).

Notes:

Psilocybe magica differs from the closely related *P. montana* particularly by the more pronounced, often appendiculate veil, possibly also the dark stipe base, the short, often tibiiform cheilocystidia with rather wide neck, and the shape of the spores which are less distinctly flattened, and ellipsoid to somewhat ovoid in frontal view. In addition it has been found in very damp places among rushes and sedges. Morphologically, *P. magica* and *P. schoenetii* are very similar, but the latter may differ slightly by the darker, thicker walled, larger and somewhat more distinctly flattened spores. The type culture of *P. schoenetii* did not cross with any of the isolates of *P. magica,* and has a different culture morphology (NOORDELOOS & al., unpubl.). With the key of GUZMÁN (1995) to the species of sect. *Psilocybe*, *P. magica* collections fit very well with *P. schoenetii* on account of the appendiculate veil and short, rather broad cheilocystidia.

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Type studies

acadiensis – *Psilocybe acadiensis* A. H. SMITH, J. Elisha Mitchell Sci. Soc. **62**: 192. 1946. Fig.15.

Holotype: WEHMEYER 618, Canada: Nova Scotia, Colchester County, Upper Brookside (MICH).

Original diagnosis: Pileus 1-2.5 mm broad, obtusely conic becoming obtusely campanulate to plane or expanded-umbonate, the margin incurved at first, surface with scattered white flecks of fibrils left from the universal veil or with a zone of flecks near the margin, glabrescent, viscid, hygrophanous, dark rusty brown when fresh ("Mars brown" to "Werona brown"), fading to ochraceous or clay colour ("clay color"), fading on umbo first, margin striate when moist; flesh thin and fragile, odor and taste not distinctive; lamellae rather narrow, close to crowded, broadly adnate, whitish when young, becoming purplish brown, dull dark cinnamon brown when dried, edges white-fimbriate; stipe 2-4 mm long, 2-2.5 mm thick, equal above an enlarged base, tubular, flesh within dark brown like the cap, surface more or less covered by the copious remnants of the white veil causing it to appear white or whitish, with a median to superior evanescent fibrillose annulus but surface silky fibrillose with white fibrils above it, the somewhat enlarged base surrounded by an extensive mat of appressed white mycelium.

Spores 5-6.2 x 4-4.5 µm, smooth, in side view subellipsoid to slightly inequilateral, pore apical and small but distinct and apex appearing slightly truncate, in face view broadly ovate to subglobate with the sides slightly angled (some appearing almost triangular), dull yellowish brown when revived in KOH, purplish brown when fresh; basidia four-spored, hyaline in KOH, (12-)14-18 x 4-6.5 µm; pleurocystidia none; cheilocystidia very abundant and conspicuous, when young narrowly ventricose to subcylindric, 28-40 x 5-6 µm, the apex often capped with mucilage, in age becoming filamentous and 50-70 x 3-6 µm, flexuous or straight and with a clamp-connection at the cross wall at the base, content hyaline and homogeneous in KOH; gill trama parallel to subparallel, pale cinnamon brown in KOH but darker along the subhymenium; pileus trama with a well differentiated gelatinous pellicle of hyaline hyphae 1.5-3 µm in diameter and bearing clamp-connections; the flesh proper compactly interwoven and pale cinnamon brown in KOH, the pigment incrusted on the hyphae.

Habit, habitat and distribution: Scattered on decaying stems of *Epilobium*, Upper Brookside, Colchester County, Nova Scotia, July 13, 1931 (WEHMEYER no. 618, type).

Observations on the holotype: spores 5.5-7.0 x 4.0-5.0 x 3.0-4.0 µm, average 5.8-6.3 x 4.5 x 3.7 µm, strongly flattened, F/I > 75 %, ovoid to mitriform in frontal view, Qf = 1.3-1.4-1.5, ellipsoid to oblong in side-view, Qs = 1.5-1.6-1.75, with dark brown, clearly thickened wall, with large apical germ-pore. Basidia 14-19 x 4.0-7.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 31-57 x 4.0-7.5 µm, fusiform to lageniform with gradually tapered, 2.0-3.5 µm wide neck, sometimes septate and irregularly subcylindrical-fusiform. Pleurocystidia absent. Subhymenium thin, incrusted. Hymenophoral trama regular, made up of cylindrical to slightly inflated hyphae, 3.0-7.0 µm wide with incrusted walls. Pileipellis a thin ixocutis of narrowly cylindrical, 2.0-5.0 µm wide, finely incrusted hyphae. Clamp-connections abundant.

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Notes: only a part of the holotype has been received. It consisted of two well-preserved specimens. SMITH (in SMITH & HESLER 1946) considered *P. acadiensis* a distinct species, mainly on account of the dimorph cheilocystidia. The two specimens available for study, revealed a sterile lamellar edge with (in one specimen) well-developed fusiform to lageniform cheilocystidia arranged in a hymeniform layer, measuring 30-50 x 5.5-7.5 µm, the second specimen, however, showed a thicker sterile layer of septate fusiform to subcylindrical, proliferated and sometimes septated cystidia, 31-60 x 4.0-7.5 µm. The aberrant lamellar edge of the second specimen may be caused by the age of the specimen (also suggested by GUZMÁN 1983), and can therefore be considered of minor diagnostic value. Apart from this phenomenon, *Psilocybe acadiensis* is very similar to *P. xeroderma,* differing mainly by the very copious veil present on both pileus and stipe.

alpestris – *Psilocybe alpestris* SINGER, Fieldiana Bot. n. s. **21**: 108. 1989. Fig. 16.
Holotype: Austria: Niederösterreich, Hochschneeberg, 16. 8. 1979, SINGER C 9168 (WU 784).

Translation of the original diagnosis: Pileus 10-11 mm, bluntly conical to hemispherical, hygrophanous, brownish-ochre, pallescent on drying to yellow-ochre, glabrous, dry. Veil present in young specimens as fine fibrillose flocks near margin and evanescent annulus on stipe. Lamellae crowded to subcrowded, broadly adnate to slightly decurrent, seceding and then appearing rounded-subfree, very broad, brown. Stipe 13-14 x 2.0-2.4 mm, attenuated towards base, apex finely pruinose, more or less glabrous below, with white mycelium at base. Context pallid. Smell none.

Observations on the holotype: spores 6.0-7.5 x 4.0-5.0 x 3.5-4.5 µm, average 6.8 x 4.6 x 4.2 µm, ovoid to slightly mitriform in frontal view, Qf = 1.1-1.3-1.5, ellipsoid, Qs = in side-view, thick-walled with moderately thick walls and large, apical germpore, sordid brown in ammonia. Basidia 20-24 x 5.0-9.9 µm, 4-spored. Lamellar edge sterile. Cheilocystidia 20-29 x 4.0-9.0 µm, narrowly to broadly lageniform with short to moderately long, broad, rounded, 3.0-6.0 µm wide neck. Subhymenium and hymenophoral trama made up of narrow hyphae with pale brown, finely incrusted walls. Pileipellis a cutis of narrow, cylindrical hyphae, 2.0-5.0 µm wide; subpellis compact, made up of short, inflated elements, 22-55 x 3.0-8.0 µm. Pigment yellow-brown, membranal and incrusting in subpellis and upper pileitrama. Clamp-connections present.

Notes: *Psilocybe alpestris* is, according to SINGER (1989), a distinct species on account of the broadly clavate-ventricose cheilocystidia and small spores. The macro- and microscopical data of the type collection fit well with those of the type of *Psilocybe xeroderma*, and therefore *P. alpestris* it is considered a later synonym of that species (see below). *Psilocybe physaloides* in the sense of BRESADOLA, GUZMÁN, WATLING & GREGORY probably also stands for *P. xeroderma* (see also insufficiently known and excluded taxa below).

apelliculosa – *Psilocybe apelliculosa* P. D. ORTON, Notes Roy. Bot.Gard. Edinburgh **29**: 118. 1969. Fig. 17.
Holotype: UK, Yorkshire, Malham, ORTON 2351 (E).

Original diagnosis: Cap 6-20 mm convex then ± plane, often obtusely umbonate especially when young, rather deep tawny-honey or burnt sienna at first then ochra-

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ceous honey often with yellower margin, drying creamy or pale ochraceous-buff from centre out but sometimes remaining darker at centre with dark marginal zone when half-dry, slightly viscid and striate 1/4-2/3 in wet weather but without separable pellicle, mat or slightly shiny and silky-atomate when dry, margin with adpressed fibrillose or appendiculate remnants of veil at first. Gills adnate with tooth or adnate-decurrent, ventricose or triangular, whitish then soon pale- or honey-buff, tobacco colour or tinged violaceous when old, fairly crowded, L 14-20, l 3-(7), edge whitish denticulate at first then concolorous or slightly paler. Stem 15-30 x 0.5-1.5 mm, equal or slightly thickened at apex, usually bulbillose, often flexuous, ochraceous-honey or tawny honey like cap, soon becoming Vandyke or bay from the base tip but apex remaining paler or sometimes slightly redder, at first with conspicuous copious adpressed pale buff or yellowish fibrillose ring-zone or remnants of veil which usually disappear with age leaving the stem ± silky-striate, apex whitish floccose-pruinose when fresh and often striate from gills, hollow, base finely whitish, greyish or pale buff tomentose. Flesh concolorous, drying whitish or pale yellowish in centre of cap and stem. Smell none, or faint pleasant. Spores ellipsoid slightly amygdaliform, lentiform, 6-8(-9) x 3.5-4.5 x 4.5-5 µm, violaceous-brown in mass. Basidia 4-spored, 26-30 x 7-8 µm. Marginal cystidia ± lageniform, 22-40 x 8-12 µm, apex 2-4 µm in diam. Hyphae of cap cuticle filamentous, cells 6-14 µm in diam.

On soil in grass. Malham, Yorks., 7 IX 1961 (type in herb. Edinb.) and Kew Dall, Perthshire, 15 IX 1967.

The often greyish tomentose bulbillose stem-base, together with dryish cap without separable pellicle and gills violaceous only when quite old distinguish this species from its allies – see key to *Psilocybe* in part 1 of this paper.

Observations on the holotype: The holotype is in poor condition and consists of a few broken basidiocarps, entirely moulded. It appeared to be impossible to study the hymenium and covering layers. The following data have been observed: Spores 7.0-8.0(-8.5) x 4.5-5.5(-6.0) x 4.5-5.5(-6.0) µm, broadly ellipsoid to ovoid in frontal view, Qf = 1.3-1.4-1.6, ellipsoid to slightly amygdaliform in side-view, Qs = 1.3-1.5-1.6, thin or slightly thick-walled, brown to grey in ammonia, with rather distinct apical germ-pore. Clamp-connections seen in hymenium. Pigment in covering layer of pileus incrusting.

Notes: ORTON (1900) distinguished *P. apelliculosa* from closely related taxa on account of the dry pileus, lamellae that turn violaceous in old stages only, and greyish tomentose bulbillose stipe base. It has been refound in various places in Scotland and studied in fresh condition by the present author. *Psilocybe apelliculosa* appears to be a good biological species, well delimited from related *P. inquilinus*, *P. crobula*, and *P. subviscida* (NOORDELOOS 1999; NOORDELOOS & al., unpubl.). *Psilocybe castanella* is very similar and considered an earlier synonym of *P. apelliculosa* (see below).

bryophila – *Deconica bryophila* PECK, Ann. Rep. New York State Mus. **46**: 106. 1893. Fig. 18.

Holotype: NY: Kelmar n. Delmar, May, PECK (NYS).

Original diagnosis: Pileus thin, membranous on the margin, subconical, becoming convex or nearly plane, glabrous, hygrophanous, chestnut colour or dark brown and striatulate on the margin when moist, creamy-white, greyish white or pale brown when dry and often distinctly striate on the margin; lamellae distant, adnate or slightly decur-

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rent, plane or ventricose, at first then purplish brown, stem slender, slightly silky-fibrillose when young, stuffed or hollow, pallid or brown; spores brown, elliptical, .0003 in. long, .0002 broad. Pileus 3 to 6 lines broad; stem 8 to 12 lines long.

Sandy soil among mosses, Delmar and Karner. May. From *D. bullacea* this species differs in its not viscid pileus and in its distant lamellae. The chestnut-colored specimens sometimes have the centre of the pileus darker than the margin.

Observations on the holotype: The holotype consists of several fragmented specimens in a rather good state. The lamellae are dark chocolate-brown with slightly paler fringed edges. Spores 6.5-8.0 x 4.0-6.0 x 4.0-5.0 µm, average 7.0-7.4 x 5.4 x 4.6 µm, ovoid to very slightly mitriform in frontal view, Qf = 1.2-1.4-1.55, ellipsoid to oblong in side-view, Qs = 1.4-1.55-1.65, with brown, thickened walls and large apical germ-pore. Basidia 20-30 x 6.0-9.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 22-40 x 4.0-8.0 µm, lageniform, with rounded, 2.0-2.5 µm wide neck. Pileipellis a cutis of narrow cylindrical hyphae, 2.0-5.5 µm wide with incrusting pigment. Clamp-connections present.

Notes: The type study confirms the synonymy of *Deconica bryophila* with *Psilocybe montana* as already noted by GUZMÁN (1983).

caespitosa – *Psilocybe caespitosa* MURRILL, Mycologia **15**: 5. 1923. Fig. 19.
Holotype: MURRILL, 6 June 1910, New York Botanic Garden (NY).

Original diagnosis: Pileus convex to expanded, often with a broad nipple-like umbo, densely caespitose, 1-2.5 cm broad; surface smooth, glabrous, hygrophanous to dry, striate over the lamellae when wet, brownish-isabelline to isabelline, the margin incurved and joined to the stipe in young stages by a slight, fibrillose, evanescent veil; context without characteristic odour or taste; lamellae adnate to sinuate, crowded, arcuate, colored like the pileus but with a smoky or purplish tint, beautifully notched on the edges; spores ovoid, smooth, pale-isabelline with a slight purplish tint under the microscope, smoky purplish brown in mass, about 7 x 5 µm; stipe subequal, concolorous or paler, darker at the base, shaggy-fibrillose to subglabrous and shining, cartilaginous, fistulous, 1-3 cm long, 1-2 mm thick.

Observations on the holotype: The holotype consists of fragmented fruitbodies in a relatively good state. The lamellae are of a dark chocolate-brown. There is also a nice watercolour painting of the basidiocarps. Spores 7.0-9.0 x 4.5-6.0 x 4.0-4.5 µm, average 7.7-7.8 x 5.0 x 4.1 µm, Qf = 1.4-1.55-1.7, ovate in frontal view, Qs = 1.7-1.9-2.0, ellipsoid to oblong in side-view, with thin of slightly thickened, yellow-brown walls, with relatively small, but distinct germ-pore. Basidia 20-25 x 5.0-7.5 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 23-32 x 4.5-6.0 µm, lageniform with blunt, 1.5-2.0 µm wide neck. Pileipellis a cutis of narrow, cylindrical, 2.0-6.0 µm wide hyphae, subpellis poorly differentiated, gradually passing into pileitrama. Pigment brown, incrusting in upper layer of pileus. Stipitipellis a cutis of narrow, cylindrical hyphae, 2.5-7.0 µm wide, with incrusted walls. Caulocystidia 20-50 x 3.0-7.5 µm, lageniform to subcylindrical, with blunt apex, scattered to abundant and clustered. Clamp-connections abundant.

Notes: The type study reveals that *Psilocybe caespitosa* is very similar to *P. subviscida*, which had been noted already by SMITH (1948). The relatively pale, rather thin-walled spores, which are slightly flattened are distinctive, as well as the macro-

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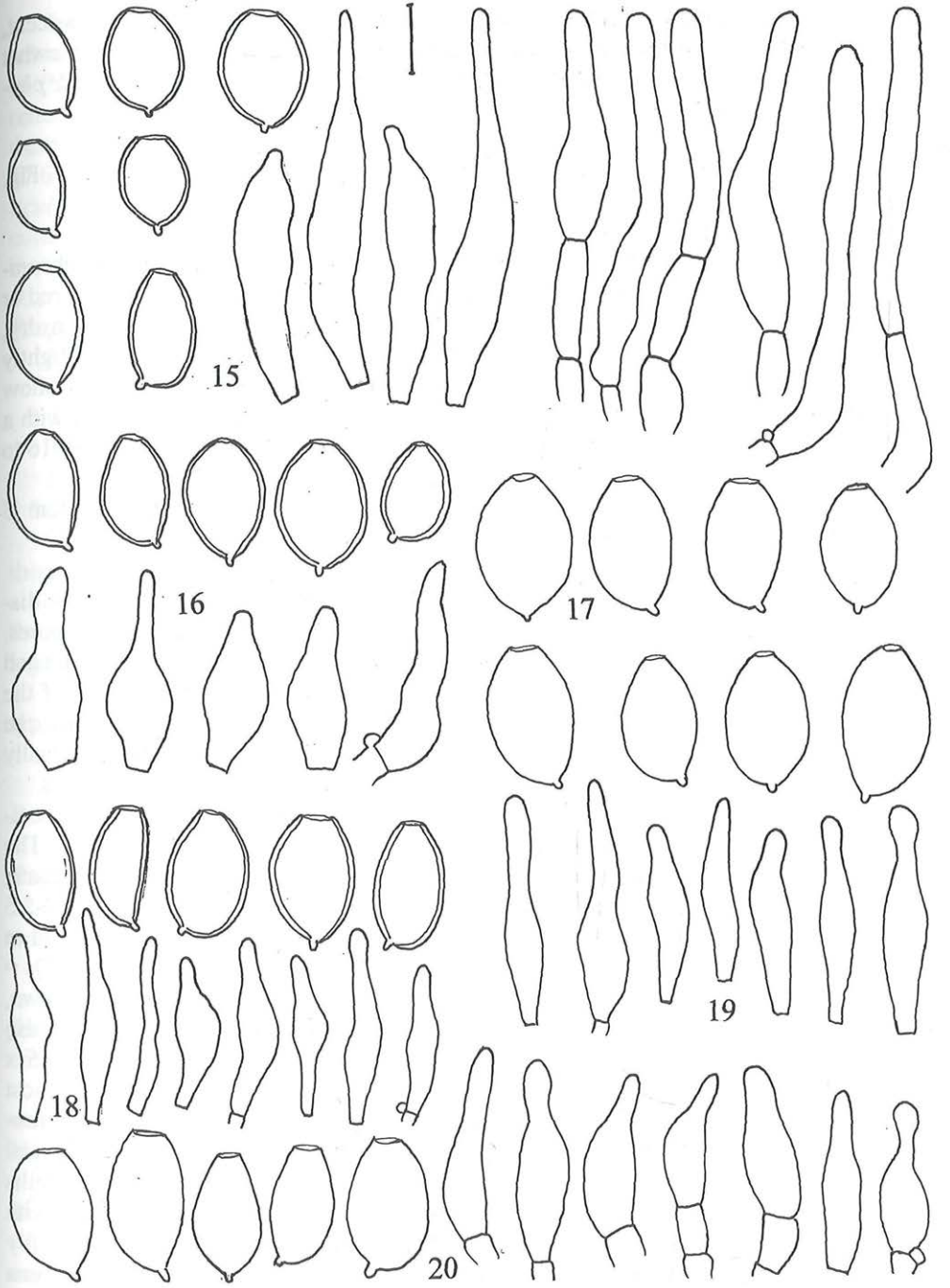

Fig. 15. *Psilocybe acadiensis*. Spores and cheilocystidia (right cystidia from second specimen). 16. *P. alpestris*. Spores and cheilocystidia. 17. *P. apelliculosa*. Spores. 18. *P. bryophila*. Spores and cheilocystidia. 19. *P. caespitosa*. Spores and cheilocystidia. 20. *P. castanella*. Spores and cheilocystidia. – Bar: 5 µm (spores), 10 µm (cheilocystidia).

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scopical features such as slightly viscid to dry pileus, and presence of an evanescent, fibrillose veil. The substrate, on or near compost heaps and manure piles is somewhat indicative for var. *velata*. GUZMÁN (1983) ranged it among the synonyms of *P. physaloides*.

castanella – *Psilocybe castanella* PECK, Bull. New York State Mus. **1**: 7. 1887. Fig. 20.

Holotype: PECK, Sandlake, June (NYS).

Original diagnosis: *Psilocybe castanella*. Pileus thin, at first convex or subconical, then expanded or slightly depressed, glabrous, hygrophanous, chestnut-coloured or umber-brown and striatulate on the margin when moist, pale alutaceous when dry, flesh a little paler than the surface of the pileus; lamellae close, adnate or slightly rounded behind, at first pale brown, then purplish-brown; stem equal, flexuous, hollow or stuffed with a whitish pith, slightly silky fibrillose, brownish or subrufescent with a white mycelium at the base; spores purplish brown, .0003 to .00032 in. long, .00016 to .0002 in. broad.

Plant gregarious or subcaespitose, 1 to 2 in. high, pileus 4 to 8 lines broad, stem .5 to 1 line thick.

Rich grassy ground by roadsides. Sandlake, June.

The species appears to be closely allied to *Agaricus squalens*, which may be distinguished by its lurid colour, decurrent lamellae and ferrugineous-brown spores. Moreover its habitat is unlike that of our plant. In very wet weather both the pileus and lamellae sometimes have a watery brown appearance, and then the striations of the former sometimes extend to the disk, which is rarely slightly umbonate. In drying, the moisture first disappears from the centre of the pileus. The young pileus is usually chestnut colored, and its margin and the stem are adorned with a few whitish fibrils.

Observations on the holotype: The holotype consists of five partly intact specimens glued on cardboard, and in addition loose fragments of several specimens. The specimens are warm ochre-brown, incl. lamellae, which seem to be narrowly adnate, slightly ascending, ochre with fimbriate lamellar edges. Spores (5.5-)6.0-7.5 x 4.0-5.5 x 3.5-5.0 µm, average 6.7-6.8 x 4.8 x 4.3 µm, slightly flattened, F/I < 25 %, ovoid to submitriform in frontal view, Qf = 1.25-1.4-1.5, ellispoid to oblong in side-view, Qs = 1.45-1.55-1.8, usually thin-walled, rarely very slightly thick-walled, yellow-brown, with medium-sized apical germ-pore. Basidia 12-18(-20) x 2.5-7.5 µm, 4-, rarely also 2-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 15.5-25.5 x 4.5-7.0 µm, average 20.5 x 6.0 µm, Q = 2.9-3.5-5.0, fusiform, lageniform to almost tibiiform, with 1.5-3.0 µm wide, rounded to subcapitate neck, which sometimes is covered with a hyaline mucous cap. Hymenophoral trama regular, made up of cylindrical to slightly inflated elements, 17-38(-52) x 3.5-10 µm, with yellowish walls. Pileipellis a thin, up to 25 µm thick ixocutis of narrow, cylindrical hyphae, 2.0-5.0 µm wide, with yellow, sometimes minutely incrusted walls; subpellis compact, made up of strongly inflated elements, 15-35(-55) x 3.5-27 µm with yellow incrusted walls. Pileitrama regular, made up of cylindrical to inflated elements, 20-110 x 2.0-7.0(-15) µm with pale yellow walls. Stipitipellis a cutis of narrow, cylindrical, 2.0-6.0 µm wide hyphae with yellow-brown, sometimes incrusted walls. Caulocystidia scattered at apex of stipe, cylindrical to inflated, 12-50 x 2.0-5.0 µm. Clamp-connections abundant.

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Notes: *Psilocybe castanella* belongs to the group of *P. inquilinus* on account of ochre-brown lamellae and the thin-walled spores. Macroscopically it strongly reminds of *Psilocybe apelliculosa* in colour, the relatively dry pileus, and the fibrillose veil remnants at the margin of the pileus and on the stipe. GUZMÁN (1983) also considered them being very close, and distinguished the taxa on the size of the cheilocystidia 17.6-28.6 x 3-6.6 µm in *P. castanella*, versus 22-23(-40) x 7.7-8.8(-12) µm in *P. apelliculosa*. Observations on the holotype of *P. apelliculosa*, *P. castanella*, and recently collected material from Scotland, however, reveal the following sizes for the cheilocystidia:

P. castanella: 15.5-25.5 x 4.5-7.0 µm, average 20.5 x 6.0 µm, Q = 2.9-3.5-5.0, and

P. apelliculosa:

V110: 21-31 x 4.5-8.0 µm, average 26 x 5.5 µm, Q = 2.8-4.6-5.3

V113: 23-36 x 4.0-6.0 µm, average 34 x 5.7 µm, Q = 3.7-5.5-7.8

V240':28-40 x 4.5-7.5 µm, average 33 x 6.4 µm, Q = 3.0-5.3-7.0

V240: 28-34 x 4.5-7.0 µm, average 30 x 4.5 µm, Q = 4.9-7.4-11.7

total: 21-36(40) x 4.0-8.0 µm, average 26-34 x 4.5-6.4 µm, Q = 2.8-11.7, Qav = 4.6-7.4.

There is a big overlap in size, and when we compare *P. castanella* with V110, there is hardly any difference. Unfortunately the holotype of *P. apelliculosa* is in such a poor state, that this character could not be verified. ORTON (1969), however, gives the following dimensions in the original description: cheilocystidia 22-40 x 8-12 µm, lageniform, which fits rather well in the range above, albeit the slightly larger width.

Also the shape of the cheilocystidia is very similar in the collections studied, with typically a relatively short, broad and blunt neck.

Spore size is also very similar:

P. castanella:

(5.5-)6.0-7.5 x 4.0-5.5 x 3.5-5.0 µm, average 6.7-6.8 x 4.8 x 4.3 µm.

P. apelliculosa:

6.5-8.0(-8.5) x 4.0-5.5(-6.0) x 4.0-5.5(-6.0) µm, average 7.0-7.7 x 4.8-5.3 x 4.4-4.9 µm.

In conclusion, it is very likely that *Psilocybe castanella* represents an earlier synonym of *P. apelliculosa*. SMITH (1948) studied the types of *P. castanella* and *P. californica* EARLE and considered them to be synonymous. The type of the EARLE's species has not been studied.

conica – *Psilocybe conica* PECK, Ann. Rep. New York State Mus. **54**: 153. 1901. Fig. 21.
Holotype: USA, Franklin, Floodwood, PECK (NYS).

Original diagnosis: Pileus thin, conical, rarely convex, glabrous, hygrophanous, dark brown when moist, pale ochraceous when dry; lamellae very broad, close, adnate, whitish or pallid when young, dark brown when mature, often with a white flocculent edge; stem slender, hollow, silky fibrillose, brown; spores elliptic .0002-.00024 of an inch long, .00016 broad. Pileus 4-6 lines broad; stem 1-1.5 inches long, .5 line thick. Decaying prostrate trunks of spruce. Floodwood. September.

Observations on the holotype: The holotype consists of a few specimens in good state. Fruitbodies very dark brown with dark chocolate-brown lamellae with pallid, fringed lamellar edge. Spores 5.5-7.0 x 4.5-5.0 x 4.0-4.5 µm, average 5.9-6.3 x 4.8 x

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4.1 µm, rather strongly flattened, F/I = 50-75 %; ovoid, mitriform to rhomboid in frontal view, Qf = 1.1-1.25-1.35, ellipsoid in side-view, Qs = 1.4-1.55-1.7, thick-walled with dark brown walls, with large apical germ-pore. Basidia 22-30 x 4.0-9.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 31-40 x 5.5-7.5 µm, Q = 4.0-5.5-7.4, lageniform with blunt to subcapitate, 2.0-2.5 µm wide neck. Subhymenium and hymenophoral trama brown incrusted. Pileipellis a thin cutis of narrow, cylindrical hyphae, 2.0-5.0 µm wide with incrusting pigment. Clamp-connections present.

Notes: *Psilocybe conica* enters the group of *P. phyllogena* with its rather small, thick-walled spores that are distinctly flattened, though not as distinctly rhomboid as in the latter species. The small size of the spores also reminds of those of *P. xeroderma*. GUZMÁN (1983) considers it a synonym of *P. phyllogena*.

graminicola – *Deconica graminicola* P. D. ORTON, Notes Roy. Bot Gard. Edinburgh **29**: 120. 1969. Fig. 22.

Holotype: UK, Scotland, Invernessshire, Loch-an-Eilean, 23. 8. 1961, P. D. ORTON 2354 (K).

Original diagnosis: Pileus 5-20 mm, convex then expanded more or less plane, sometimes slightly obtusely umbonate, burnt sienna or tawny-date to umber or purplish date, drying pale ochraceous or ochraceous-honey from centre out and sometimes with tawny tinge, especially around centre when half-dry, extreme margin often remaining dark for sometime, not striate or striate at margin only (about ¼ in.) when moist, with veil traces at margin when fresh, viscid with separable pellicle. Lamellae L = 12-24, l = 1-3, not or fairly crowded, adnate-decurrent, slightly ventricose with tooth to ± triangular, pale or clay-umber then deeper umber or violaceous-umber (sometimes with slightly tawny tinge), with lamellar edge white flocculose at first then concolorous and even. Stipe 18-36 x 1-2 mm, equal or slightly thickened at base or apex, ochraceous honey or pale date then often darker date or umber at base, slightly hygrophanous, veil leaving white or whitish ring-zone and scattered floccose patches below at first, then ± smooth or slightly silky striate, apex white pruinose, narrowly hollow. Context concolorous, drying reddish ochraceous to pale buff or whitish. Taste and smell none or slightly fungussy.

Observations on the holotype: The holotype consists of two small envelopes, each containing part of the holotype; the smaller one contains only a fragment of one pileus, the larger one fragments of four specimens. The lamellae are rather dark chocolate-brown. Spores 6.5-8.0 x 5.5-6.0 x 4.5-5.0 µm, average 7.5 x 5.6 x 4.7 µm, distinctly flattened, Qf = 1.25-1.35-1.45, ovoid-submitriform in frontal view, ellipsoid-oblong, Qs = 1.5-1.55-1.7 in side-view, with grey-brown, thickened walls, with large apical germ-pore. Basidia 21-25 x 5.0-9.0 µm, 4-spored, with clamp-connec-tions. Lamellar edge fertile. Cheilocystidia 23-40 x 4.5-7.5 µm, lageniform with 2.0-3.0 µm wide, rounded to subcapitate neck. Pileipellis a thin, 45-75(-100) µm thick ixocutis of 1.5-2.5 µm wide, cylindrical hyphae with almost colourless, but finely incrusted walls, embedded in a colourless gelatinous matrix, subpellis compact, made up of inflated elements, 7.0-30 x 5.0-12 µm with strongly pigmented yellow-brown, incrusted walls, gradually passing into pileitrama. Pileitrama rather irregular, made up of irregularly shaped, inflated elements, with colourless to minutely incrusted walls. Clamp-connections abundant in all parts of the basidiomata.

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Notes: *Psilocybe graminicola* is very similar to *P. subviscida*, but the spores are slightly broader in frontal view and distinctly darker and more thick-walled than in that species. GUZMÁN (1983: 297) proposed, however, to synonymize both names. However, GUZMÁN (1983) obviously did not study the holotype of *Deconica graminicola*, but an additional collection mentioned by ORTON, viz. Scotland, Shetland, Mid Yell, ORTON 1518, which, according to the thin-walled spores, may represent typical *P. subviscida*. See also the discussion by *P. subviscida*.

During our studies in *Psilocybe*, collections were found fitting rather well with the concept of *Psilocybe graminicola* (NOORDELOOS & al., unpubl.). The surface of the pileus in these collections is somewhat viscid, and the pellicle at least partly peeling. However, in mating experiments, all these collections interbred with typical *P. subviscida* (NOORDELOOS & al., unpubl.). Therefore *Psilocybe graminicola* is considered conspecific with *P. subviscida*. However, on account of the distinct macroscopical differences with typical *P. subviscida*, the collections fitting with *P. graminicola* were described as *Psilocybe subviscida* var. *velata*. Most likely, some interpretations of the name *Psilocybe bullacea* in literature also refer to this taxon. See also comments on insufficiently known and excluded taxa below.

lateritia – *Atylospora lateritia* MURRILL, Mycologia **10**: 20. 1918; *Psathyra lateritia* (MURRILL) MURRILL, Mycologia **15**: 10. 1923; *Psilocybe lateritia* (MURRILL) A. H. SMITH, Mycologia **40**: 698. 1948. Fig. 23.
Holotype: MURRILL & MURRILL, Dec. 25-Jan. 8, 1908-1909, Cinchona, Jamaica (NY).

Original diagnosis: Pileus hemispheric to broadly convex, not expanding, solitary, 8 mm broad, 3 mm thick; surface smooth, glabrous, striate, dull lateritious, pale-testaceous on the disk; margin straight, entire, whitish; lamellae adnexed, rather broad, distant, pale-chestnut, entire and somewhat paler on the edges; spores ovoid or ellipsoid, smooth, usually 2-guttulate, purplish-brown, about 9 x 5 µm; stipe equal or slightly tapering upward, concolorous below, paler above, smooth, glabrous, 2 cm long, 1-1.5 mm thick. Type collected among moss on a clay bank at Cinchona, Jamaica, December 25/January 8, 1908-9, W. A. & EDNA L. MURRILL 471 (herb. N. Y. Bot. Gard.)

Observations on the holotype: The holotype consists of a fragment of a stipe of one fruitbody in a poor state. A few spores could be located on the stipe: 7.5-8.5 x 4.0-5.5 x 4.0-4.5 µm, average 7.9-8.3 x 4.5-4.7 µm, Q = 1.55-1.75-1.83, Qs = 1.6-1.8-2.0, thick-walled with dark brown walls and large apical germ-pore.

Notes: According to the original diagnosis and the spores found on the stipe, *Atylospora lateritia* could well represent a species close to or identical with *Psilocybe montana*, conform with SMITH (1948) and GUZMÁN (1983).

latispora – *Psilocybe latispora* MURRILL, Mycologia **15**: 10. 1923. Fig. 24.
Holotype: EARLE 1462, USA, New York Botanical Garden (NY).

Original diagnosis: Pileus convex to expanded, obtuse or umbonate, gregarious, 1-1.5 cm broad; surface glabrous, hygrophanous, dark fuscous and substriate on the margin when moist, becoming ochraceous on drying; context concolorous, with mild but mawkish taste; lamellae adnate, subcrowded, broad, pallid to dark fuscous; spores very broadly ovoid to subglobose, smooth, pale smokey-purplish-brown under the

microscope, about 7 x 5.5 µm; stipe equal, fuscous, pruinose at apex, fibrillose below, fistulose, 2-3 cm long, 1-2 mm thick. Ecology: along roadsides.

Observations on the holotype: The holotype consists of several specimens in good state. The exsiccates are vivid ochre-brown, lamellae moderate brown, with fimbriate lamellar edges. No trace of veil seen. Spores 6.0-8.5 x 4.5-7.0 x 4.5-5.0 µm, average 6.9-7.2 x 5.7 x 4.7 µm, strongly flattened, F/I = >> 75%, rhomboid or mitriform in frontal view, Q = 1.1-1.25-1.4, ellipsoid to subamygdaliform in side-view, Q = 1.4-1.45-1.55, with yellow-brown, thickened wall and large apical germ-pore. Basidia 15-21 x 4.5-7.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile, made up of a band of hyphae, bearing clustered cheilocystidia. Cheilocystidia 27-39 x 4.5-7.0 µm, lageniform with 2.0-4.0 µm wide, blunt neck, often with mucous cap around apex. Hymenophoral trama made up of narrow, cylindrical hyphae with pale yellow, not or hardly incrusted walls. Pileipellis a cutis of narrow, cylindrical hyphae, 2.0-4.0 µm wide with minutely incrusted walls. Clamp-connections present.

Notes: *Psilocybe latispora* is very similar to *P. phyllogena* and can be considered a synonym. The differences indicated by GUZMÁN (1983, 1995), viz. the slightly smaller spores and smaller cheilocystidia, are not confirmed by the present type-study.

magica – *Psilocybe magica* SVRČEK, Česká Mykologie **43**: 82. 1989. Fig. 25.
Holotype: Czech Republic: Central Bohemia, Voznice near Dorbis (PRM 855442).

Original diagnosis: Pileus (5-)7-13 mm, convex, slightly umbonate or rarely minutely papillate, hygrophanous, when moist translucently striate up to centre, dark date brown, pallescent on drying to very pale yellow-brown, slightly viscid, pellicle separable, veil present in form of very small white scales, particularly at margin, which disappear with age. Lamellae L = 12-18, l = 3(-7) subdistant, adnate, segmentiform, pale brown finally umber, with flocculose-fimbriate, white edge. Stipe 15-30 x 1.5-2.5 mm, [cylindrical, straight], pale brown at apex, dark brown below, white fibrillose. Spore print umber.

Observations on the holotype: The holotype is in rather poor condition and consist of about four, partly fragmented basidiocarps. The lamellae are very dark chocolate-brown. Spores 7.0-8.5(-9.0) x 5.0-6.0 x 4.0-5.0(-5.5) µm, distinctly flattened, ovoid in frontal view, Qf = 1.4-1.6-1.8, ellipsoid to oblong in side-view, Qs = 1.4-1.6-1.8, with dark brown, distinctly thickened walls and large apical germ-pore. Basidia 20-26 x 5.0-7.5 µm, 4-spored, with clamp-connections. Lamellar edge sterile or heterogeneous. Cheilocystidia 18-35 x 4.5-8.0 µm, lageniform to somewhat utriform, with broad, rounded to subcapitate, 2.0-5.0 µm wide neck, thin-walled, with clamp-connections. Hymenophoral trama more or less regular, made up of short, inflated elements, 10-35(-50) x 5.0-15 µm with minutely incrusted walls. Pileipellis an up to 50 µm wide ixocutis of narrow, cylindrical hyphae, 2.0-7.0 µm wide, with occasionally inflated terminal elements up to 12 µm wide, with colourless, sometimes finely incrusted walls; subpellis compact, made up of short, inflated elements, 12-50 x 4.0-15 µm, with dark yellow-brown, incrusted walls. Clamp-connections abundant.

Notes: The type study revealed that *Psilocybe magica* is very similar to *P. schoenetii* BRESINSKY, in macroscopy, microscopy and habitat. We inclined to synonymise both names, but mating studies showed, that the type strain of *P. schoenetii* did not cross with morphologically rather similar collections fitting well with *P. magica*. So

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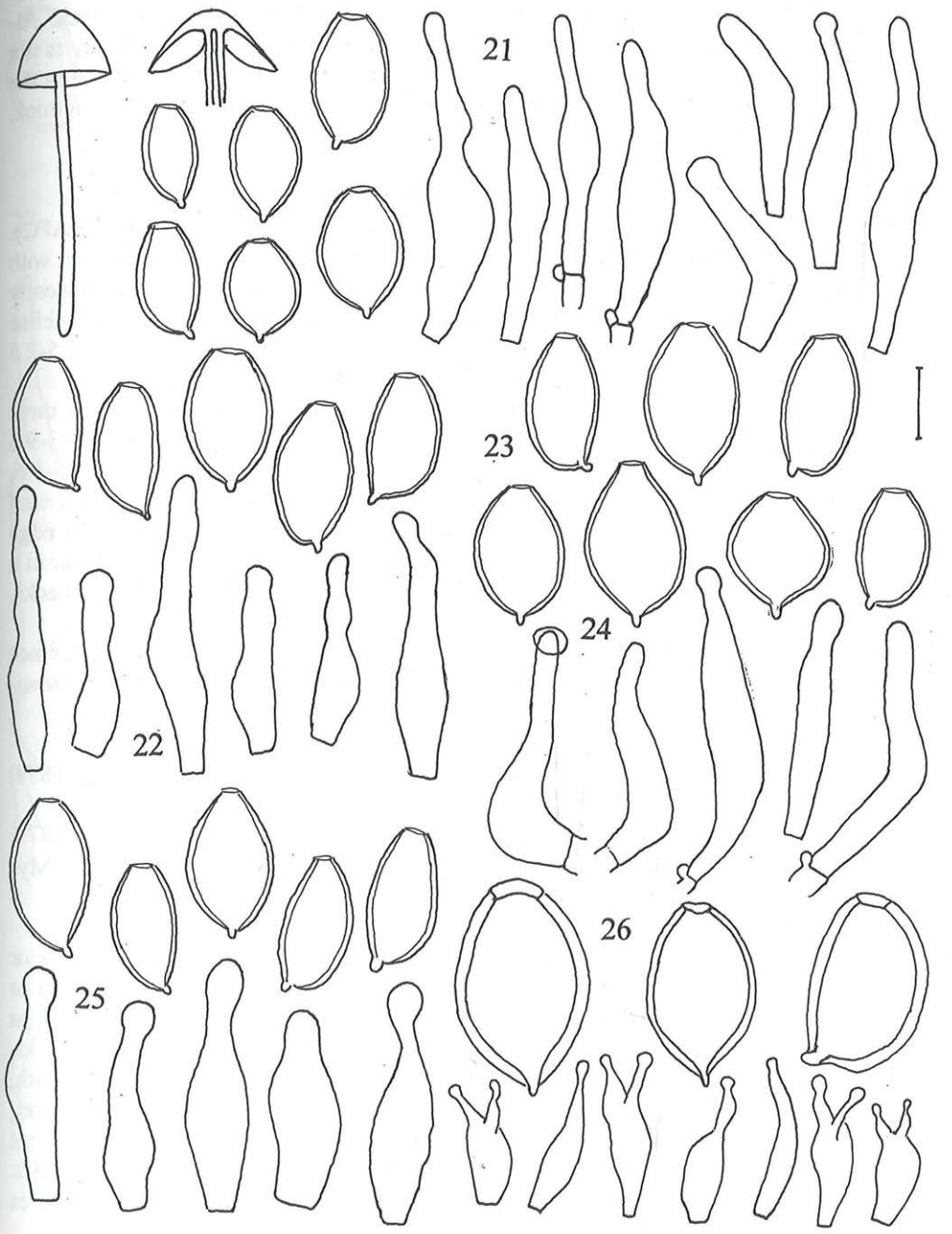

Fig. 21. *Psilocybe conica*. Habit, spores and cheilocystidia. 22. *P. graminicola*. Spores and cheilocystidia. 23. *P. lateritia*. Spores. 24. *P. latispora*. Spores and cheilocystidia. 25. *P. magica*. Spores and cheilocystidia. 26. *P. marthae*. Spores and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cheilocystidia).

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for the time being both species are retained. Distinctive for this species are the thick-walled spores and short cheilocystidia with broad, sometimes subcapitate neck. Although SVRČEK states in the diagnosis that the pellicle is separable, it probably is not separable in our sense (compare NOORDELOOS & al., unpubl.). This is reflected in the microscopical structure of the pileipellis, which is a narrow ixocutis up to 50 µm thick, an observation also made by SVRČEK (1989).

marthae – *Psilocybe marthae* SINGER, Nova Hedwigia **29**: 255. 1969. Fig. 26.
Holotype: SINGER M 5572, Chile, Valdivia, Cordillera Pelada, Western Zone (BAFC).

Original diagnosis: Pileus 19-20 mm broad, conico-convex then applanate, with incurved then straight margin, with umbo, strongly hygrophanous, deeply translucently striate, olivaceous brown, strongly pallescent on drying, viscid, glabrous. Lamellae subcrowded, adnate, broad, grey, blackening with white edge. Stipe 42-52 x 1.5-2.5 mm, pallid, dry, shining. Veil practically absent. On moist ground.

Observations on the holotype: The holotype consists of fragments of two or three specimens in a rather bad state. Spores 8.5-10 x 6.0-7.0 x 5.5-6.5 µm, average 9.3-9.6 x 6.0-6.4 µm, slightly flattened, F/I < 20 %, ovoid in frontal view, Qf = 1.4-1.5-1.6, ellipsoid to oblong in side-view, Qs = 1.4-1.55-1.85, with dark brown, very thick wall and large apical germ-pore. Basidia 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 15-20 x 3.0-4.5 µm, lageniform with long neck which ends in a small capitulum, often with hyaline mucous cap, frequently forked with two necks. Clamp-connections present.

Notes: Although placed in sect. *Psilocybe* by GUZMÁN (1983, 1995), it becomes apparent from the type study that *P. marthae* probably is better placed in sect. *Semilanceatae* on account of the typical forked cheilocystidia.

modesta – *Psilocybe modesta* PECK, Ann. Rep. New York State Mus. **32**: 29. 1879. Fig. 27.
Agaricus modestus PECK, Ann. Rep. New York State Mus. Nat. Hist. **32**: 29. 1879, non *Agaricus modestus* BERK. 1843; *Psilocybe modesta* (PECK →) A. H. SMITH, Mycologia **40**: 700. 1948. Fig. 28.

Holotype: USA, New York, Adirondack Mountains (NYS).

Original diagnosis: *Agaricus* (*Hypholoma*) *modestus* PECK. Pileus thin, convex or subconical, then expanded, rarely slightly umbonate, hygrophanous, reddish brown or pale chestnut-colored when moist, dingy or ochraceous brown when dry, smooth, at margin whitened when young by the flocculent evanescent veil, sometimes striate; lamellae plane, broad, adnate or slightly emarginate, usually with a decurrent tooth, greyish or clouded, becoming purplish brown, the edge white; stem equal, rather firm, hollow, fibrillose, brownish; spores purple brown, broadly ovate, compressed. Plant gregarious, about 1 inch high, pileus 4-10 lines broad, stem about 1 line thick. Back and branches lying on the ground in woods. Adirondack Mountains. Aug. The species belongs to section *Appendiculati*. In drying the disk changes its colour first.

Observations on the holotype: The holotype collection consists of about 20 specimens of a small agaric with warm brown pileus, concolorous lamellae and stipe, lamellae with rather conspicuous ochre-fringed lamellar edge; stipe with fibrillose surface. A study of this type revealed that probably two species are involved: one with spores 6.0-7.0(-7.5) x 5.0-5.5 x 4.0-4.5 µm, distinctly flattened, F/I = 75 %, Q = 1.15-

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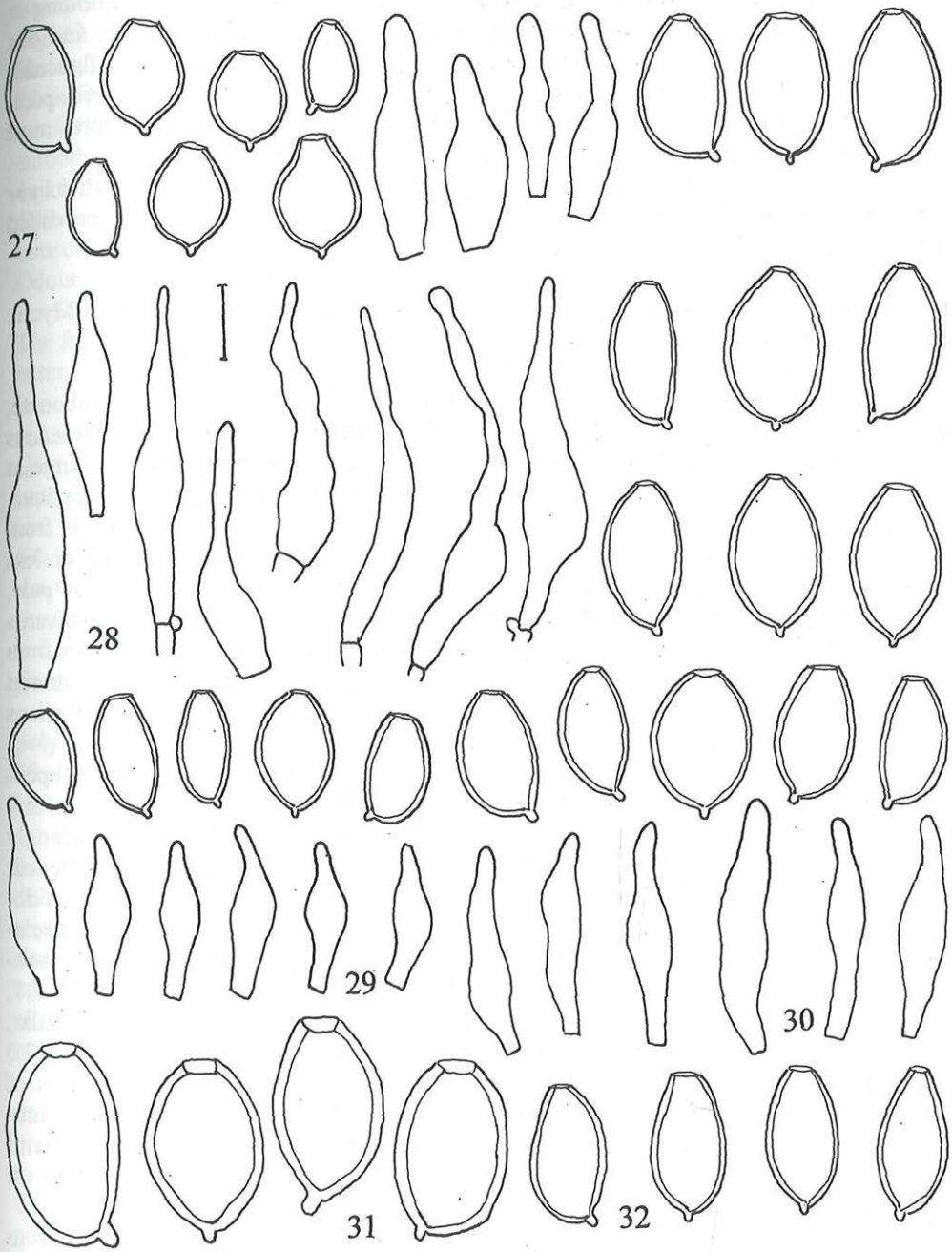

Fig. 27. *Psilocybe modesta*. Spores (left typical spores, right aberrant spores) and cheilocystidia. 28. *P. muscorum*. Spores and cheilocystidia. 29. *P. nothofagensis*. Spores and cheilocystidia. 30. *P. polytrichophilus*. Spores and cheilocystidia. 31. *P. pratensis*. Spores. 32. *P. pteridophytorum*. Spores. – Bar: 5 µm (spores), 10 µm (cheilocystidia).

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1.3-1.5, mitriform to rhomboid in frontal view, Q = 1.5-1.6-1.8, ellipsoid-oblong in side-view, with strong brown, thickened walls and large apical germ-pore, and one with spores 7.0-8.5 x 5.5-6.0 µm, average 8.1 x 5.7 µm, not distinctly flattened, Q = 1.3-1.45-1.6, with rather thin yellowish walls and medium-sized apical germ-pore. From the original diagnosis it will be clear however, that the first type of spores must be considered typical. This was also the opinion of A. H. SMITH (1948).

Notes: *Agaricus modestus* clearly represents an earlier synonym of *Psilocybe rhombispora* and *P. phyllogena*, but for nomenclatoral reasons, it should be called *P. phyllogena*.

muscorum – *Psilocybe muscorum* P. D. ORTON (as *Deconica*), Trans. Brit. Mycol. Soc. **43**: 225. 1960. Fig. 28.
Holotype: UK, Dorset, ORTON 1517 (K).

Original diagnosis: Pileus 5-16(-25) mm, convex then expanded often umbonate, sometimes becoming slightly depressed, chestnut, date brown, honey or ochraceous honey, drying from centre pale ochraceous yellowish sometimes with tawny tinge at centre, when moist rather viscid and shiny and striate at margin, when dry opaque, with separable pellicle, margin at first white with a few, fugacious white fibrils from veil. Lamellae L = 14-20, l = 1-3, subdistant, adnate or subdecurrent, more or less plane, clay-whitish then clay-umber, finally violaceous-umber, with white or pale, flocculose-denticulate edge. Stipe 12-30 x 1-2 mm, equal or attenuated downwards sometimes slightly bulbillose, whitish soon ochraceous-honey or reddish brown from base, apex paler and white pruinose, white silky veil cortinate and forming scattered patches of lower stipe, hollow. Context concolorous drying paler in centre of pileus and stipe. Smell and taste none.

Observations on the holotype: The holotype consists of fragments of a few specimens. The pilei are rather pale ochre-white, the lamellae medium brown, without any chocolate- or purple-brown tinges, with a fimbriate edge; stipe pallid, rather strongly fibrillose-pruinose. Spores 7.5-8.5 x 5.0-6.0(-6.5) x 4.0-5.0 µm, distinctly flattened, ovoid to broadly ovoid in frontal view, Qf = 1.25-1.45-1.55, ellipsoid-oblong in side-view, Qs = 1.55-1.65-1.8, with pale brown, thin or slightly thickened walls and relatively small, apical germ-pore. Basidia 15-22 x 5.0-9.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 27-54 x 5.5-9.0 µm, Q = 3.8-5.7-7.7, lageniform, thin-walled, with clamp-connections. Hymenophoral trama subregular, made up of short to medium sized, cylindrical to inflated elements, 30-110 x 2.0-7.0 µm with hyaline, non-pigmented walls. Pileipellis an up to 75 µm thick ixocutis of narrow, cylindrical hyphae, 2.0-4.0 µm wide, with hyaline, non-incrusted walls, subpellis more or less regular, made up of inflated elements, 15-40 x 2.0-7.0 µm, with pale brown, sometimes minutely incrusted walls. Clamp-connections present in all parts of the basidiomata.

Notes: The type-study revealed that the spores of *Deconica muscorum* are thin- to slightly thick-walled and much paler in colour than in *Psilocybe montana*. Also in the dried basidiocarps the lamellae are rather pale. This is in accordance with the observations of HØILAND (1978) who correctly suggested that ORTON's species is related to the *P. inquilinus*-group and not, as was suggested by ORTON (1960) to the *P. montana*-group. Size and shape of the spores, separable pellicle, and presence of veil suggest a close affinity to *P. inquilinus* s. str.

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nothofagensis – *Psilocybe nothofagensis* GUZMÁN & HORAK, Sydowia **31**: 47. 1978. Fig. 29.
Holotype: Papua New Guinea, Morobe district, Wau, Mt Kaindi, HORAK s.n. (ZT 72/605).

Original diagnosis: Pileus 3-6 mm diam., conical (also in aged carpophores), smooth, striate towards the margin, membranaceous, dark brown to fuscous, without veil remnants. Lamellae broadly adnate to subdecurrent, deep brown, ventricose, albo-fimbriate at lamellar edge. Stipe 15-20 x 0.5-1 mm, cylindrical, equal, cartilaginous, concolorous with pileus, apex pruinose, otherwise glabrous, veil remnants absent. Odour and taste not distinctive. Spore print brown.

Observations on the holotype: The holotype consists of three stipes and two pilei. The fruitbodies are very dark brown. Remarkable is the prominent pointed umbo at the centre of the pileus. Considering the scantiness of the holotype, only a fragment of the lamellae has been studied. Spores 5.0-7.0 x 4.0-4.5 x 3.0-4.0 µm, average 5.9-6.0 x 4.1 x 3.4 µm, distinctly flattened, F/I = about 50 %, ovoid to mitriform in frontal view, Qf = 1.35-1.45-1.5, ellipsoid to slightly amygdaliform in side-view, Qs = 1.6-1.75-2.0, with dark brown, thickened wall and large, apical germ-pore. Basidia 13-22 x 4.0-7.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystida 15-24 x 4.0-7.5 µm, lageniform. Hymenophoral trama made up of inflated elements, 4.0-7.5 µm wide with finely incrusted walls. Clamp-connections present.

Notes: *Psilocybe nothofagensis* is very similar to *P. xeroderma* because of the size and shape of the spores. It differs mainly by the conical pileus, and incrusted hymenophoral trama, but these characters may be of minor importance.

polytrichophilus – *Agaricus polytrichophilus* PECK, Ann. Rep. New York State Mus. **30**: 42. 1878. Fig. 30.
Holotype: NY, West Albany, May, PECK (NYS).

Original diagnosis: Pileus thin, convex or subcampanulate, glabrous rather fragile, sometimes with a slight umbo, hygrophanous, striatulate and brown when moist, dull ochraceous or buff when dry, somewhat shining; lamellae plane and adnate or slightly arcuate and decurrent, broad, subdistant, colored almost like the pileus; stem slender, equal, subflexuous, slightly whitish fibrillose, especially toward the base, mealy at the top, concolorous, containing a whitish pith; spores purple-brown, subelliptical, .0003' long, .0002' broad. Plant gregarious, odorous, 1-2' high, pileus 2-5' broad. Ground among *Polytrichum*. Oneida. Warne, West Albany. May.

Observations on the holotype: The holotype consists of several specimens glued on cardboard and a few loose fragments. The lamellae have a distinct dark chocolate-brown colour. Spores 6.5-8.5 x 4.0-5.5 x 4.0-5.5 µm, average 7.2-7.5 x 5.1 x 4.8 µm, ovoid to very slightly mitriform in frontal view, Qf = 1.3-1.5-1.7, ellipsoid to oblong, Qs = 1.3-1.5-1.7, in side-view, with brown, thickened walls and large apical germ-pore. Basidia 19-27 x 5.0-8.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 21-42 x 4.5-7.0 µm, lageniform, with rounded, 2.0-2.5 µm wide neck. Pileipellis a cutis of narrow cylindrical hyphae, 2.0-5.5 µm wide with incrusting pigment. Clamp-connections present.

Notes: *Agaricus polytrichophilus* clearly is a synonym of *Psilocybe montana*, as already noted by GUZMÁN (1983).

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pratensis – *Psilocybe pratensis* P. D. ORTON, Notes Roy. Bot. Gard. Edinburgh **29**: 120. 1969. Fig. 31.

Holotype: United Kingdom: Scotland, Dirleton, East Lothian, 7 XII 1960, R. WATLING (E).

Original diagnosis: Cap 5-20 mm, convex then expanded often obtusely umbonate, dark date-brown or rusty-chocolate with slight purplish tinge, drying tawny-ochraceous, ochraceous-yellowish or -buff, ± viscid when moist and striate at edge or up to halfway in, with separable pellicle. Gills adnate with tooth, sometimes adnate-decurrent or emarginate, pale bay or clay-buff, sometimes slightly olivaceous, then bay or umber tinged purplish to distinctly purplis umber, subcrowded, L 14-20, l 3-(7), edge pale flocculose when fresh. Stem 8-20/1-2.5 mm, equal or slightly swollen at apex, clay-buff or whitish, often becoming pinkish or reddish-brown especially above, white pruinose veil especially in upper part when fresh, then fibrillose-striate, hollow, base white tomentose. No smell or taste noted. Spores ellipsoid lentiform with germ-pore, (8.5)9.5-12 x (5)5.5-7 x 6-7.75 µm. Basidia 4-spored. Marginal cystidia lageniform with shorter or longer often flexuous neck, c. 25-30 x 6-10 µm apex 2-4 µm in diam.

In grass (on basic soil), Epsom College, Epsom. Surrey, 21 XI 1951 and 4 XI 1952. In turf on stable dunes. Aberlady, East Lothian, 16 XI 1960 (legit R. WATLING); Dirleton, East Lothian, 7 XII 1960 (legit R. WATLING; type in Herb. Edinb.).

Readily distinguished from other non-coprophilous species of section *Deconica* by relatively large spores. In view of the above habitats it would seem likely that this is a calcicole species. This description is still somewhat imperfect on account of the scanty material available.

Observations on the holotype: The holotype is in very poor condition. The herbarium sheet contains two envelopes, one marked with holotype, but the other, according to the label, is just another part of the same holotype. Both packages contain fragments of a pileus, with damaged lamellae. It appeared to be impossible to detect any cheilocystidia in this material. The spores, however, could be measured and drawn. Spores (8.5)9.0-11 x 6.0-8.0 x 6.0-8.0 µm, flattened, ovoid in frontal view, average 9.8 x 7.0 µm, Q = 1.2-1.4-1.55, ellipsoid to oblong in side-view, average 9.7 x 6.7 µm, Q = 1.3-1.45-1.7, with thick walls (between 0.5-1 µm), with large, apical germ-pore. Basidia 20-31 x 4.0-7.5 µm, 4-spored, with clamp-connections. Subhymenium with a few incrustations. Cystidia not seen. Pileipellis not studied because of scanty material.

Notes: This species is fairly characteristic not only because the spores are quite large for a *Deconica*, but they also show a rather thick wall. *Psilocybe montana* var. *macrospora* has similarly sized, thick-walled spores, differing by a completely dry pileus.

GUZMÁN (1983) reports the spores as thin-walled (no more than 5 µm wide). He also used this character to create sect. *Pratensae*. This obviously is a mistake.

pteridophytorum – *Psilocybe pteridophytorum* SINGER, Mycologia **51**: 582. 1959. Fig. 32.

Holotype: SINGER T-2132, Argentina, Tucumán, Rio de los Sosas (BAFC).

Original diagnosis: Pileus deep dark brown, glabrous, subviscid, short and indistinctly striate, not umbonate, convex, about 5 mm broad; veil white, on the extreme margin, not striking. Lamellae brownish, subdistant, broad, adnate. Stipe date brown,

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paler than the pileus, about equal, about 20 x 1 mm. Veil on stipe none, at least when mature. Context partly dull brownish, without any striking odour.

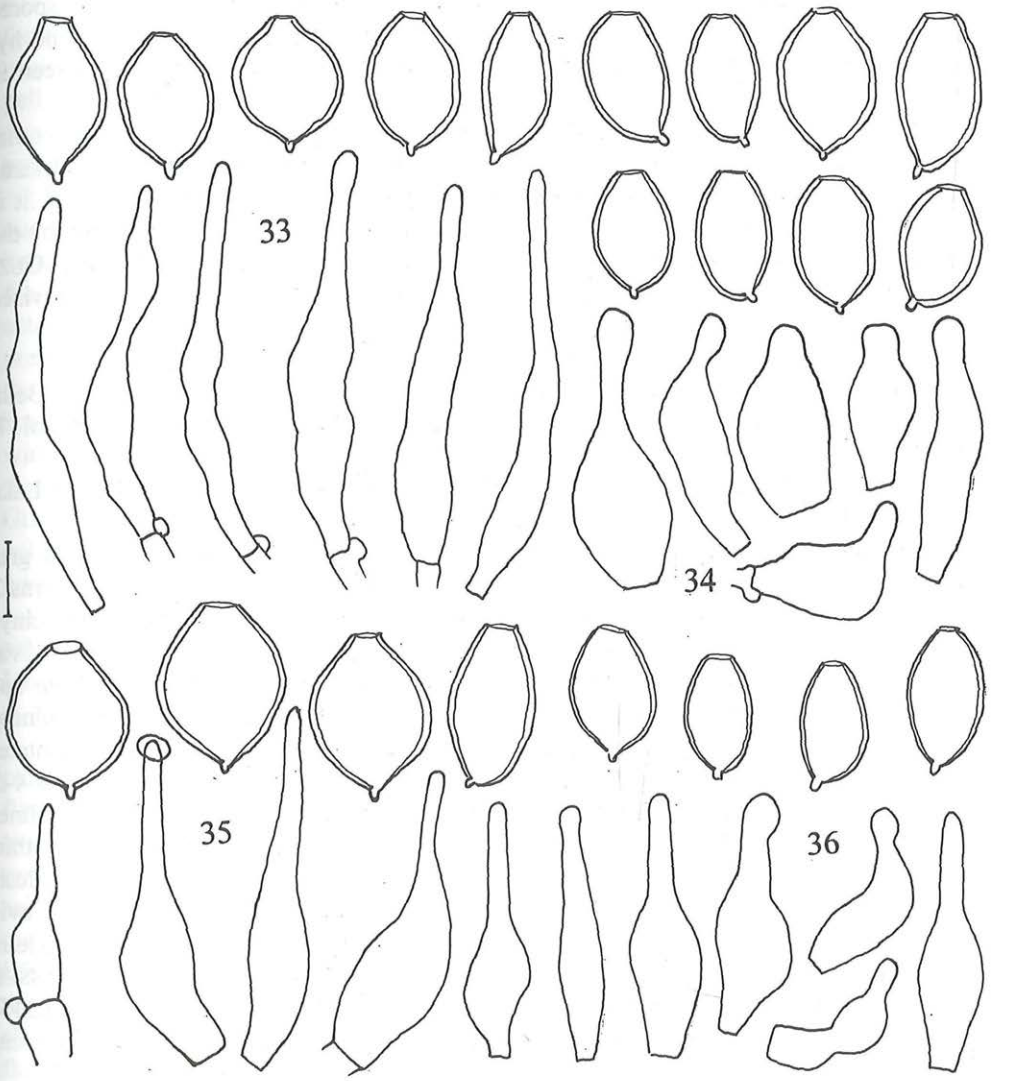

Fig. 33. *Psilocybe rhomboidospora*. Spores and cheilocystidia. 34. *P. schoenetii*. Spores and cheilocystidia. 35. *P. semistriata*. Spores and cheilocystidia. 36. *P. smithiana*. Spores and cheilocystidia. – Bar: 5 µm (spores), 10 µm (cheilocystidia).

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Observations on the holotype: The holotype consists of one basidiocarp in rather bad state. Only the spores and hymenial structure could be studied. Spores 7.0-8.5 x 4.0-4.5 x 3.8-4.2 µm, average 7.5-7.7 x 4.4 x 3.9 µm, slightly flattened, F/I < 20 %, oblong to narrowly ovoid in frontal view, Q = 1.6-1.75-2.0, oblong to subamygdaliform in side-view, Q = 1.65-1.9-2.0, with dark brown, thickened walls and prominent, but relatively small apical germ-pore. Intact basidia not observed, but a few 4-spored seen. Lamellar edge difficult to observe, but probably sterile. Subhymenium and hymenophoral trama with minutely brown-incrusted walls. Clamp-connections seen in hymenium.

Notes: SINGER (1959) described *Psilocybe pteridophytorum* without any other remark than that it is "apparently well separated from related species in the same group, i.e. *Deconica*". On account of the description and study of the holotype, it is concluded that *P. pteridophytorum* is very similar to *P. montana* differing only by the slightly narrower spores, and substrate. It is only known from the type locality. GUZMÁN (1983) maintained it as a separate species, but it does not reappear in his revised keys to sect. *Psilocybe* (GUZMÁN 1995).

rhomboidospora – *Psilocybe rhomboidospora* (ATKINSON) SMITH ex GUZMÁN, Beih. Nova Hedwigia 74: 189. 1983; *Deconica rhomboidospora* ATKINSON, Ann. Mycol. 7: 368. 1909. Fig. 33.

Holotype: JACKSON s.n., USA, N.Y., Ithaca, Cayuga Lake Basin, S of Beebe Lake (CUP 18245).

Original diagnosis: *Deconica rhomboidospora* ATKINSON, n. sp. – Plants gregarious, sometimes two or three clustered, 2-3 cm high; pileus 0.5-1 cm broad; stems 2 mm thick; pileus ochraceous to clay colour; gills chestnut, edge white; stems clay-colour (R) and covered with whitish fibrils and flocci, more dense at base. Pileus oval to convex, dry, not striate, towards margin with scattered whitish flocci, margin appendiculate with minute triangular fragments of veil, flesh ochraceous. Gills adnate and decurrent, about 2 mm broad, edge white from numerous sterile cells, dentate. Basidia 4-spored. Spores purplish brown, oval to subrhomboidal, smooth, 5-7 x 4-5 µm. Cystidia non on side of gills; sterile cells on edge of gills, numerous, hyaline, slender, flexuous, 60-70 x 7-9 µm. Trama of pileus floccose, homogeneous, very thin layer of whitish threads over the coloured portion. Stems even, flexuous, hollow, flesh chestnut colour, white mycelium at the base spreading over the substratum. Veil evident when young, appendiculate in small triangular fragments on margin of pileus when older. Odor none, taste slightly mealy. Near *D. nuciseda* FR., of which MASSEE gives the spores as 8 x 4 µm. SACCARDO as 10-12 x 6 µm. – C.U. herb., no 18245, ground, on leaves and rotten wood, south of Beebe Lake, near toboggan slide, Ithaca, N.Y., June 5, 1904, JACKSON.

Gregaria, 2-3 cm alta; pileo 0,5-1 cm lato, stipite 2 mm crasso. Pileo ovato-convexo, sicco, ad marginem leviter floccoso appendiculato, ochraceo-pallido, luteo. Lamellis castaneis, adnatis et decurrentibus, 2-3 mm latis, margine dentatis. Basidiis tetrasporis. Sporis purpureo-brunneis, ovato-subrhomboideis, levibus, 5-7 x 4-5 µm. Stipite flexuosos, cavo, ad basim mycelio albo ornato. Ad folia et ligna putrida in silvis, Ithacae, N.Y.

Observations on the holotype: The holotype consists of fragments of about three specimens in a relatively good state. Pileus and stipe with distinct fibrillose veil rem-

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nants; lamellae brown with conspicuous fimbriate, paler edge. A description and photograph accompany the type. Spores 6.0-7.0(-8.0) x 4.5-6.0 x 4.0-4.5 µm, average 6.5-7.1 x 5.6 x 4.1 µm, distinctly flattened, F/I 50-75 %, ovoid to rhomboid in frontal view, Qf = 1.2-1.25-1.3, ellipsoid to slightly amygdaliform in side-view, Qs = 1.45-1.55-1.6, with thick, brown walls, with distinct apical germ-pore. Basidia 18-30 x 5.0-8.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile with narrowly fusiform to lageniform cheilocystidia, 40-54 x 4.5-7.0 µm, with subacute, 1.5-3.0 µm wide neck. Hymenophoral trama of slender, cylindrical hyphae, no incrustations seen. Pileipellis a thin (ixo)cutis of narrow, cylindrical hyphae, 2.0-5.0 µm wide with fine incrusted pigment; subpellis poorly developed of inflated hyphae. Clamp-connections present.

Notes: *Psilocybe rhomboidospora* is characterised by the dry pileus with conspicuous veil, (mentioned in the diagnosis, and clearly visible in the dried specimens of the holotype), brown lamellae with white fimbriate lamellar edge, and fibrillose stipe surface. Microscopically the small spores tending to be rhomboid in frontal view are characteristic. In many ways it comes close to *P. flocculosa*, which differs mainly by the presence of pleurocystidia. GUZMÁN (1983) gives a description, which deviates from the original in several ways, although according to the data given, only the type had been studied. Accordingly GUZMÁN (1983) interprets *P. rhomboidospora* as a species with poorly developed veil, close to *P. phyllogena*, differing from the latter mainly by the dry, non viscid pileus. The differences in size of the cheilocystidia, as suggested by GUZMÁN (1983), do not seem to be significant. Recently a *Psilocybe* spec. has been collected in a heated greenhouse in The Netherlands which is very similar to *P. rhomboidospora* (see above).

schoenetii – *Psilocybe schoenetii* BRESINSKY, Hoppea **35**: 104. 1976. Fig. 34.
Holotype: Germany: Bayern, Hardtkapelle near Weilheim, 8. 6. 1974, A. BRESINSKY & A. EINHELLINGER (M).

Original diagnosis (translated into English): Pileus 10-25(-30) mm, bluntly campanulate, expanding to convex with more or less distinct umbo, with involute to deflexed margin, finally fully expanded, applanate with hardly visible umbo and straight to reflexed margin, hygrophanous, when young hardly translucently striate, when older up to half of radius, rarely up to centre translucently striate, reddish brown, when old sordid brown with olivaceous components, pallescent from centre to pale brown or greyish ochre (K&W 6E7 when young, then 7E6+C10, 7D8+C05, near margin 6D8+B05, 7E6, centre 7E8, middle 6D7+R05 or 6D7, 6E7, 6F6, when old 6D4+Y05, 5C6, dry: 2A5+M05, 4A5, 5A5+Y05), slightly viscid, but pellicle not (entirely) peeling off, shining; veil present in form of a cortina in young specimens, later on as small white flocks on and adhering to the margin. Lamellae rather crowded, broadly adnate and somewhat decurrent, broad (up to 3.5 mm), reddish brown then umberbrown to chocolate brown (6E6, 6D-E6), with contrasting brownish-white flocculose lamellar edge. Stipe 30-55 x 2-3 mm, straight or curved, cylindrical or with clavate base, concolorous with pileus at first, later on blackish brown from base upwards, apex pruinose, downwards fibrillose-twisted, white tomentose at base. Context thin, membranaceous in pileus. Smell indistinct. Taste somewhat astringent. Spore-print purple-brown (6F6) to dark brown (5F5). Ecology: in peat-bogs (Primulo-Schoenetum), often connected with mosses (e.g., *Campylium stellatum*).

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Observations on the holotype: Spores 6.0-8.5 x 4.5-6.0 x 4.5-5.5 µm, ovoid to submitriform or slightly angular in frontal view, Qf = 1.2-1.4-1.5, ellipsoid to oblong in side-view, Qs = 1.3-1.5-1.8, rather dark brown in ammonia with fairly thick walls and large apical germ-pore. Basidia 18-24 x 4.0-7.0 µm, 4-spored. Lamellar edge entirely sterile, consisting of a strand of hyphae bearing clusters of cheilocystidia. Cheilocystidia 20-33 x 6-13 µm, short, broadly lageniform with short to long, blunt, 3.0-6.0 µm wide neck. Hymenophoral trama subregular, made up of short, inflated elements, 15-45 x 6.0-13 µm with minutely encrusted walls. Pileipellis an up to 50 µm thick ixocutis of 2.0-5.0 µm wide, cylindrical to slightly inflated hyphae with minutely incrusted walls; subpellis compact, made up of short, inflated elements, 13-50 x 6.0-14 µm with minutely incrusted walls. Clamp-connections abundant.

Notes: So far *Psilocybe schoenetii* is only known from the type locality, where it has been observed by A. EINHELLINGER several times between 1973 and 1977 (EINHELLINGER, pers. comm.). On account of the rather dark, thick-walled spores *Psilocybe schoenetii* should be placed in stirps *Montana*. Distinctive are the rather short and broad cheilocystidia. *Psilocybe magica* is very similar, see also discussion in that species. A monosporic isolate, kindly provided by A. BRESINSKY, Regensburg, appeared to be intersterile with all isolates of *P. magica*, however, and therefore the formal synonymy of the species could not be carried through.

semistriata – *Psilocybe semistriata* (PECK) GUZMÁN, Beih. Nova Hedwigia **74**: 193. 1983; *Deconica semistriata* PECK, Ann. Rep. New York State Mus. **51**: 291. 1898. Fig. 35.

Holotype: *Deconica semistriata* PECK. Gansevoort, July (NYS).

Original diagnosis: *Deconica semistriata* n. sp. Pileus thin except on the prominent broadly umbonate disk, glabrous, somewhat wavy on the margin and striate to the umbo, greyish brown, paler when dry and less distinctly striate, the broad umbo yellowish; lamellae broad, distant or subdistant, adnate or slightly decurrent, purplish brown, whitish on the edge; stem equal, firm, short, slightly floccose-fibrillose, stuffed with a whitish pith, colored like the pileus; spores compressed, suborbicular, .00025 to .003 in. long, .00025 broad. Pileus 4 to 5 lines broad; stem 8-10 lines long, .5 line thick. Damp ground in woods. Gansevoort, July. Easily distinguished by the broad convex umbo-like disk and the widely striate margin.

Observations on the holotype: The holotype consists of one entire specimen and a pileus without stipe in fairly good condition. The pileus is ochre brown with warm red-brown disk, lamellae blackish with white fimbriate lamellar edge. Stipe concolorous with the pileus. Spores 7.0-9.0 x 6.0-7.0 x 4.5-5.5 µm, average 7.5-7.7 x 6.4 x 5.1, Qf = 1.15-1.2-1.25, mitriform, cordiform to rhomboid in frontal view, Qs = 1.35-1.5-1.7, broadly ellipsoid to ellipsoid in side-view, with dark brown, very thick walls and large apical germ-pore. Basidia 12-22 x 4.0-7.0 µm, 4-spored. Lamellar edge sterile. Cheilocystidia 22.5-41.5 x 4.0-9.0 µm, lageniform with rather broad basal part and long, tapering, 1.5-2.5 µm wide neck, which is sometimes surrounded by a hyaline mucous drop. Hymenophoral trama made up of inflated elements, 15-70 x 4.0-20 µm, with yellow-brown parietal and incrusting pigment. Pileipellis a cutis of narrow cylindrical hyphae, 2.0-5.0 µm wide with yellowish walls; subpellis compact, made up of inflated elements, 20-90 x 3.0-22 µm with dark brown parietal and incrusting pigment. Clamp-connections abundant.

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Notes: The thick-walled, rhomboid spores are distinctive for this species. It comes close to *P. phyllogena*. GUZMÁN (1983) synonymised *P. chionophila* with this species. However, the spores of the type of *P. semistriata* are very distinctly flattened, rhomboid, whereas those of the two collections of *P. chionophila* studied so far, have much less flattened spores that are never distinctly rhomboid. So there is reasonable doubt as to their synonymy. The spores of *P. rhombispora* are similar, but generally smaller.

smithiana – *Psilocybe smithiana* GUZMÁN, Beih. Nova Hedwigia **74**: 196. 1983. Fig. 36.

Holotype: SMITH 63667, 25 July 1961, Harbor Spring Hills, Michigan, USA (MICH).

Original diagnosis: A *Psilocybe nothofagensis* GUZMÁN & HORAK affini differt subhymenium sine crusto septa. Pileus 5-15 mm in diam., convex to subumbonate, more or less plane in the adults specimens, subvisvid, glabrous, even, but somewhat striate at the margin when moist, hygrophanous, brown-reddish, fading to straw colour or alutaceous. Lamella broadly adnate, russet cocoa or reddish brown, with whitish and subfloccose edges. Stipe 30-40 x 1-2 mm, equal or subbulbous, hollow, whitish to greyish, fibrillose, covered by whitish floccose fibrils from the veil. Veil rudimentary as a fugaceous, white cortina, Context thin, somewhat pliant and pale brownish at the pileus. No odour and taste checked.

Observations on the holotype: The holotype is very scanty, only a small fragment of a pileus could be sent on loan. Spores 5.5-7.0 x 4.0-4.5 x 3.0-4.5 µm, average 6.2-6.7 x 4.3-3.8 µm, distinctly flattened, F/I = about 50 %, ovoid to mitriform in frontal view, Qf = 1.3-1.5-1.8, ellipsoid-oblong in side-view, Qs = 1.3-1.65-2.0; dark grey-brown in water with slightly but distinctly thickened wall, with large, apical germpore. Basidia 16-25 x 4.0-8.0 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 18-31 x 5.5-8.5 µm, average 25 x 7.0 µm, Q = 2.6-3.6-5.4, lageniform to tibiiform, with 2.0-3.5 µm wide, blunt, rarely subcapitate neck. Subhymenium thin, hyaline, not incrusted. Hymenophoral trama of short, inflated elements, 20-75 x 3.0-9.5 µm. Pileipellis a thin ixocutis of hyaline, 2.0-3.5 µm wide hyphae; subpellis of narrow, pale yellow hyphae. Clamp-connections abundant.

Notes: *Psilocybe smithiana* clearly belongs to the group of *P. xeroderma*, from which it hardly can be distinguished. Accordingly it is ranged among its synonyms.

subhyperella – *Psilocybe subhyperella* SINGER, Beih. Sydowia **7**: 83. 1973; *Psilocybe castanella* var. *subhyperella* (SINGER) GUZMÁN, Beih. Nova Hedwigia **74**: 292. 1983. Fig. 37.

Holotype: Colombia, Cundinamarca, Salto de Tequendama, SINGER B-3502 (BAFC).

Original diagnosis: *Psilocybe subhyperella* SING. spec. nov. – Pileo aurantio-brunneo vel brunneo (inter "Tarragona" et "Alamo" M&P), hygrophano dessiccatione pallidiore, in humidis per tertia partem radii pellucide striato, e campanulato convexo, obtuse sed constanter umbonato, 6-14 mm lato. – Lamellis argillaceo-brunneolis (inter "toast" et "bure" M&P), moderatim latis, confertis, adnatis, saepe ab apice stipitis separatis. – Stipite brunneolo ("tawny" M&P), sed in adultis atrocastaneo-brunneo basin versus, sericeo, aequali, 15-24 x 11,5 mm; velo sericeo, in juvenilibus zonam vix annuliformem diffractam vel linearern medianam formante, pallido, fugaci; annulo nullo. Carne inodora. – Sporis eis *P. omniumsanctorum* simillimis, (6)-6,5 x 4-4,3 x 3,5-4,2 µm leniter lentiformibus, frontaliter rotundato-subrhomboideis, lateraliter ellipsoideis

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vel oblongis, poro germinativo truncato lato munitis, episporio atro et endosporio hyalino instructis, levibus. – Basidiis 15,5-18 x 6-7 µm, clavatis, hyalinis, tetrasporis. Cystidiis nullis. Cheilocystidiis 17-22 x 4,5-6 µm apice 2,5-8 x 1,2 µm obtuso vel rarius subacuto praeditis, subulatis vel ampullaceis, hyalinis. – Hyphis fibuligeris. – Epicute tenui, haud gelatinosa, hyalina, cutiformi, hyphis tenuissimis. Hypodermio atrobunneo pigmento fortiter incrustante, elementis nonnullis sat brevibus, omnibus intertextis. – Ad culmos *Chusqueae* et ad hospites alios transiens. Typus a R. SINGER (B 3502) in Columbia: Cundinamarea: Salto de Tequendama, 24. VII. 1960 lectus et in F conservatus.

Observations on the holotype: The holotype consists of a few specimens in relatively good state. Spores 7.5-8.5 x 4.5-5.5 x 3.5-4.0 µm, average 7.9-8.0 x 5.3 x 3.9 µm, strongly flattened, narrowly ellipsoid in side-view, Qf = 1.65-1.9-2.2, broadly ovoid to mitriform in frontal view, Qs = 1.4-1.5-1.75, thin- or very slightly thick-walled, pale yellow-brown, with large apical germ-pore. Basidia 19-28 x 4.0-6.0 µm, 4-spored, with clamp-connections. Cheilocystidia 22-32 x 4.0-7.0 µm, lageniform. Pileipellis a thin cutis of 2.0-6.0 µm wide cylindrical hyphae; subpellis of short, cylindrical hyphae with incrusting pigment. Clamp-connections present.

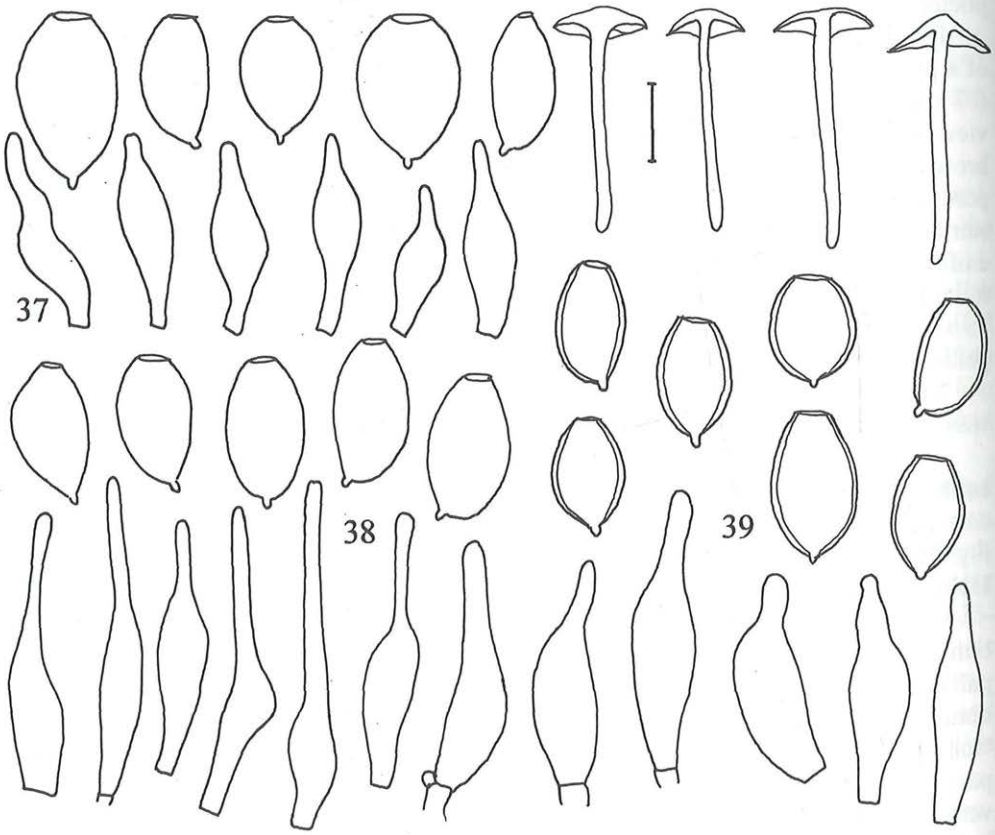

Fig. 37. *Psilocybe subhyperella*. Spores and cheilocystidia. 38. *P. subviscida*. Spores and cheilocystidia. 39. *P. xeroderma*. Habit, spores and cheilocystidia. – Bar: 1 cm (habit), 5 µm (spores), 10 µm (cheilocystidia).

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Notes: *Psilocye subhyperella* clearly belongs to the group of *P. inquilinus* on account of the relatively pale, thin-walled spores. The type study revealed that the spores are rather strongly flattened. Considering also the presence of veil and lignicolous habit, it therefore comes close to *Psilocybe crobula*, from which it clearly differs, however, by the dry pileus. *Psilocybe apelliculosa* differs by the less distinctly flattened spores. GUZMÁN (1983) synonymised it with *P. castanella*, but made it a separate variety on account of the better developed veil, small fruitbodies, and lignicolous habit. The present author, however, concludes that *P. subhyperella* better can be treated as a species in its own right.

subviscida – *Deconica subviscida* PECK, Ann. Rep. New York State Mus. **41**: 70. 1888; *Psilocybe subviscida* (PECK) Kauffm., Agar. Mich.: 275. 1918. Fig. 38.
Holotype: USA: New York, Albany, Menands, Aug. C. H. PECK (NYS).

Original diagnosis: Pileus thin, at first subconical, then convex or nearly plane, often slightly umbonate, glabrous, hygrophanous, pale chestnut or reddish tan color, subviscid and striatulate on the margin when moist, pallid or dull buff when dry; lamellae broad, subdistant, adnate or slightly decurrent, at first whitish or dingy, then brownish ferruginous; stem equal or tapering downwards, fibrillose, hollow, brownish toward the base, paler above, the fibrils whitish or greyish; spores ovate, brown, .0003 in. long, .0002 broad. Pileus 3-6 lines broad; stem about 1 in. long, 1 line thick. Horse dung and manured ground. Menands, August.

This species has many characters in common with *D. bullacea*, from which I have separated it because of its scarcely viscid pileus without a separable cuticle, and its different spores. It is gregarious, and in wet weather appears in great abundance and in successive crops. The slight whitish veil is perceptible in the young plant.

Observations on the holotype: The type consists of about six specimens glued on cardboard and a large number of fragmented specimens in a separate sachet. A specimen has been selected with brown lamellae, conform to the diagnosis of PECK, on which the following characters have been observed: spores (6.0-)6.5-7.5(-8.0) x 4.5-5.0(-5.5) x 4.0-4.5(-5.0) µm, average 7.2-7.5 x 4.9 x 4.5 µm, ovoid in frontal view, Qf = 1.4-1.5-1.7, ellipsoid-oblong in side-view, Qs = 1.45-1.6-1.8, with distinct, apical germ-pore, thin-walled (< 0.5 µm), wall visible as one line or sometimes a double line in ammonia and Congo red, yellow-brown in ammonia. Basidia 17-27 x 5.5-7.5 µm, 4-spored, with clamp-connections. Lamellar edge sterile. Cheilocystidia 27-44 x 6.0-8.0 µm, Q = 3.7-5.4-7.1, lageniform with tapering, 0.5-2.5 µm wide neck, thin-walled, colourless. Pleurocystidia similar to cheilocystidia, few and scattered, usually rather close to the edge. Pileipellis a cutis of cylindrical hyphae, about 1.5-6 µm wide, gradually passing into pileitrama, pileitrama more or less regular, made up of relatively short, cylindrical to inflated elements, 20-60 x 5.0-9.0 µm. Pigment yellow-brown, incrusting, particularly in subpellis and upper pileitrama. Clamp-connections seen at many septa.

Notes: The type-specimens fit well with the current use of the name *P. subviscida* (e.g., in NOORDELOOS 1999). It is an extremely variable species, which includes forms with a viscid pileus with a (partly) peeling pellicle, including typical *Psilocybe graminicola*.

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xeroderma – *Psilocybe xeroderma* HUIJSM., Persoonia **2**: 94. 1961. Fig. 39.
Holotype: France, Doubs, Lougres, 16 June 1956, H. S. C. HUIJSMAN (L 956.110-431).

Original diagnosis (translation into English): Pileus 5-20 mm, convex, plano-convex or very obtusely conical, hygrophanous, translucently striate at margin, nice reddish brown or chocolate-brown (Expo H32, F32), pallescent from centre to yellow-brown or ochraceous, with white, silky fibrillose, fugaceous remnants of veil. Lamellae L = 22-30, l = 3, subcrowded, arcuate-subdecurrent, fauve then chocolate, with much paler, crenulate-denticulate lamellar edge. Stipe 15-40 x 1-2 mm, subflexuous, stuffed or fistulous, subequal, sometimes somewhat feutre-tomentose at base, slightly flocculose-pruinose at apex, with fagaceous remnants of veil, honey-coloured pinkish brown (fauvatre) at apex, much darker towards base, which becomes very dark (Expo H34, 32, J32). Context rather thick and pale in the pileus, subconcolorous in the stipe. Spore-print purple-black.

Observations on the holotype: The holotype consists of about six, partly intact specimens with remarkably dark chocolate-brown lamellae. Spores 5.5-6.5(-7.0) x 4.0-5.0(-5.5) x 3.5-4.5 µm, slightly mitriform in frontal view, Qf = 1.3-1.4-1.6, ellipsoid to oblong, sometimes slightly amygdaliform in side-view, Qs = 1.25-1.45-1.6, with dark brown, distinctly thickened walls, with large, apical germ-pore. Basidia difficult to inflate in type, 16-23 x 5-7 µm, 4-spored. Lamellar edge sterile. Cheilocystidia 27-33 x 4.5-10.5 µm, Q = 2.7-4.2-6.7, lageniform with 2.0-3.5 µm wide, blunt neck, thin-walled, colourless. Hymenophoral trama regular, made up of inflated elements, 15-35(-50) x 3.5-16 µm with hyaline, not pigmented walls. Pileipellis a narrow cutis (-20 µm) of hyaline, colourless, cylindrical, 1.0-2.5 µm wide hyphae, subpellis compact, made up of cylindrical to inflated elements, 10-55(-70) x 2.5-7.0 µm, gradually passing into pileitrama, which is made up of inflated elements, 23-90(-120) x 2.5-9.0(-15) µm. Pigment yellow-brown, membranal and incrusting in subpellis and upper pileitrama. Stipitipellis a cutis of narrow, cylindrical, 1.5-4 µm wide, yellow-brown, minutely incrusted hyphae. Caulocystidia few, at apex of stipe only, single or in clusters, cylindrical to clavate or sublageniform, 10-23 x 2.0-7.0 µm, Clamp-connections abundant in all parts of the basidiomata studied.

Ecology: subcaespitose or subisolated on vegetal debris, in clearings and along paths in coniferous forest mixed with deciduous trees. According to HUIJSMAN (1961) rather common in the Jura.

Notes: *Psilocybe xeroderma* fits well in the group of *P. montana* on account of the thick-walled, somewhat mitriform spores. The small size of the spores and relatively dry pileus, and prominent remnants of veil on pileus and stipe are distinctive. *Psilocybe alpestris*, *P. smithiana*, *P. physaloides* sensu GUZMÁN, and *Deconica libertatis* sensu MŒLLER are considered synonymous. GUZMÁN (1983, 1995) used subtile differences in size and shape of cheilocystidia to distinguish these taxa. As is shown from our studies, these differences are hard to maintain.

Notes on some insufficiently known or doubtful species

atrorufa – *Agaricus atrorufus* SCHAEFF., Fung. bav. **4**, Index 3: 58, pl. 234. 1774; *Agaricus montanus* "var." *atrorufus* SCHAEFF.: FR., Syst. mycol. **1**: 293. 1821; *Agaricus atrorufus* (SCHAEFF.: FR.) FR., Epicr.: 230. 1838; *Deconica atrorufa* (SCHAEFF.:

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FR.) SACC., Syll. fung. **5**: 1059. 1886; *Psilocybe atrorufus* (SCHAEFF.: FR.) QUÉL., Champ. Jura Vosges **1**: 148. 1872; *Geophila atrorufa* (SCHAEFF.: FR.) QUÉL., Enchir.: 114. 1886.

Original diagnosis: *Agaricus* canescens, solitarius, parum carnosus; pileo subconico, striato, fusco, lamellis concoloribus; petiolo tereti, gracili, concolore, fistuloso, basi bulboso; velo et annulo destitutus. Agaricus paruus, atro-rufescens, pileolo conico, obtuso, a vertice ad marginem leviter striate; lamellis rarioribus; petiolo praealto, tenui & fistuloso. Gled. fung. p. 127, n. XXV. Fungus paruum, totus atro-rufescens, pileolo desuper, undique & leviter striato, subtus rare lamellate, pediculo praetervi & fistuloso. Mich. nov. gen. plant. p. 167. Fungus paruus, pileolo fornicato, desuper obscuro & mais ad ores, quam ad reliquas partes pulchre striato, inferne lamellis fusco-griseis, pediculo lineam crasso, medii coloris et argentissime perforato. Mich. nov. gen. plant. p 169?

In sylvis inter muscos ad radices arborem verno tempore obuius est.

Der Hut und der untere Theil des Stieles ist dunkel rotbraun, der Hut in der Mitte etwas zugespitzt, am Rande gestrichelt; die Blätter und der obere Theil des Stieles sind etwas lichterer Farbe.

Man trifft ihn im Frühjahr an der Wurzeln der Bäume an.

Notes: The plate of SCHAEFFER (1774) shows a small, red-brown agaric with a mycenoid habit, conical to conico-convex pileus, ascending lamellae and slender, cylindrical stipe. The spore-print on the plate is warm red-brown. FRIES (1821) considers SCHAEFFER's species as a variety of *Agaricus montanus* FR. with a long, white fibrillose stipe. Later, FRIES (1838) considers both taxa conspecific, and ranges *Agaricus montanus* PERS. under the synonymy. It is clear from the description, however, that FRIES (1838) emended the concept of the species, by stating "lamellis subdecurrentibus latis planis umbrinis". FRIES (1838) describes a real *Deconica* with broadly adnate to subdecurrent, dark umber brown lamellae, whereas in SCHAEFFER's original concept the lamellae are red-brown and ascending. It is clear that FRIES has another species in mind when describing *Agaricus atrorufus*. FRIES' concept was followed by some later authors. For example *Psilocybe atrorufus* sensu QUÉL. (1886); RICKEN (1913: pl. 66 fig. 9); LANGE (1939: pl. 149C) clearly represents this fungus. *Psilocybe atrorufa* sensu BRESADOLA (1931: pl. 865) may also belong here. It is considered to represent *Psilocybe physaloides* by ORTON (1960, 1969) and WATLING & GREGORY (1987). The description of KÜHNER & ROMAGNESI (1953, as *G. atrorufa*) probably contains elements of both *P. montana* and *P. xeroderma*.

Psilocybe atrorufa sensu BRESADOLA, pl. 865, has been accepted by WATLING & GREGORY as *Psilocybe physaloides*. But in BRESADOLA's decription it is clearly stated that the spores are yellow (flavidae). This comes very close to our concept of *Psilocybe subviscida*. WATLING & GREGORY (1987) described as *P. physaloides* a species with darker lamellae and relatively thick-walled spores, which may be represented by our collection V241. This comes close to *Psilocybe xeroderma* (see below).

The present author considers *Agaricus atrorufus* SCHAEFF. in its original sense a nomen dubium, as it may stand for any red-brown spored agaric, and *Agaricus atrorufus* sensu FR. as a misapplied name for *Psilocybe montana*.

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angulata – *Psilocybe angulata* (BATSCH) SINGER sensu SINGER, Persoonia **2**: 7. 1961 non BATSCH (= *Marasmius* spec.).
Notes: SINGER (1961) studied material of PERSOON in L, which he considered a lectotype. This, however, is incorrect. The original *Agaricus angulatus* BATSCH probably refers to a *Marasmius* species. The PERSOON material probably refers to a species close *to Psilocybe montana* because of the thick-walled, flattened spores with large germ-pore. SINGER (1961), however, suggested that it is close to *Geophila inquilina* sensu KÜHNER & ROMAGNESI (1953), a suggestion which was taken literally by GUZMÁN (1983) who placed *Geophila inquilina* sensu KÜHNER & ROMAGNESI under the misapplied names of *Psilocybe angulata.*

bullacea – *Psilocybe bullacea* (BULL.: FR.) KUMMER, Führ. Pilzk.: 71. 1871. *Agaricus bullaceus* BULL., Hist. Champ. Fr.: 422. 1793; *Agaricus bullaceus* BULL.: FR., Syst. mycol. **1**: 297. 1821; *Geophila bullacea* (BULL.: FR.) QUÉL., Enchir. Fung.: 114. 1886.
Original diagnosis: *Agaricus* stipite fistuloso, nudo, brevi, piloso; pileo semiglobato, fuligineo-fuscescente; lamellis latissimus, ferrugineo-fuligineis, basi adnexis.

In silvis pratisque super jumentorum stercus, aestate et autumno; ut plurimum gregarius. Stipes subaequalis, fistulosus, nudus; nunc ferrugineo-lateritius; nunc fuligineus, nunc fuscus aut fusco-nigricans; nonnunquam subalbidus, primum pilosus, demum glaber, 6-10 x 1 lin. Pileus glaber, initio laevis, suborbicularis, cinereo-fuscescens, fuligineus, fuligineo-rutilus, ferrugineus aut fuscus, dein semiglobatus, plus minusve ve striatus, demum subcomplanatus, per explicationem absolutam 5-10 lin. latus. Caro tenuis, pileo concolor et dilutior. Lamellae latissimae, rarae, subrectangulair, primums stramineo-fuligineae, demum fuligineo-lateritiae, lateritio-fuscescentes, nec maculatae.

Notes: FRIES (1821) sanctioned the name bullacea as follows: *Agaricus bullaceus* pileo submembranaceo rufo, margine striato, lamellis planis latissimis cinnamomeis, stipite brevi tomentoso. Stipes 1 ½ unc. longus, basi subincurvatus. Pileus hemisphericus, minor. Lam. ½ unc. latus. Sporidia? Cum priori (*A. coprophilus*), gregarius (v.ic.).

Obviously FRIES did not know this species by own experience!

Thus far, *Agaricus bullaceus* was defined as a coprophilous species with reddish, translucently striate, glabrous pileus, cinnamon brown lamellae, and tomentose stipe. It resembles *Agaricus coprophilus*, which, however, has grey (livid) lamellae.

There exist several interpretations of this old name.

- *Psilocybe bullacea* sensu RICKEN (1913: pl. 66, fig. 3), GUZMÁN (1983) is a dung-inhabiting species with spores that are more or less hexagonal in frontal view. This seems to be more closely related to *P. coprophila*, and agrees more or less with the original concept of *Agaricus bullaceus*. So far the author has not seen such a fungus.

- *Psilocybe bullacea* sensu BRESADOLA (1931: pl. 864-1) is considered to represent *Psilocybe muscorum* by ORTON (1960). Indeed the plate represents a species very close to our concept of *P. montana* with deep red-brown, striate pileus without any traces of veil.

- *Psilocybe bullacea* sensu BREITENBACH & KRÄNZLIN (1995), MOSER (1984), LUDWIG (2000), and KEIZER & ARNOLDS (1995) very likely represent *P. subviscida* var. *velata* (see there).

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hyperellus – *Agaricus hyperellus* FR.: FR., Syst. mycol. **3**, Index: 24. 1821. *Agaricus hyperellus* FR., Elenchus fungorum **I**: 35. 1828.
Notes: In its original concept, *Agaricus hyperellus* was described by FRIES (1828) as a *Naucoria*-like agaric close to *A. hypnorum* with a red-brown, glabrous pileus, broad, dark red-brown lamellae and short, fibrillose stipe. KÜHNER & ROMAGNESI (1953) interpreted it as a *Psilocybe* species, close to *P. inquilinus*, from which it differs by the dry pileus and very small spores. This interpretation probably stands for *Psilocybe xeroderma.*

libertatis – *Agaricus libertatis* BATSCH, Elenchus fungorum, cont. prima: fig. 62. 1787; *Deconica libertatis* (BATSCH) SACC., Syll. Fung. **V**: 1059. 1887; *Psilocybe libertatis* (BATSCH) M. BON & J. L. CHEYPE, Bull. Féd. Mycol. Dauphiné-Savoie **138**: 34. 1995.
Notes: In its original concept, *Agaricus libertatis* stands for a small, naucorioid species of agaric. MŒLLER (1945) decribed *Psilocybe libertatis* as a species with definetely thick-walled, dark, lentiform spores, close to *P. montana*, differing from that species by the greyish felt of the dry pileus and fibrillose-flocculose stipe. We have not seen original material from MŒLLER, but considering the small spores and dry pileus, we think that MŒLLER may have described as *Deconica libertatis* a collection fitting well with the current concept of *Psilocybe xeroderma.* BON & CHEYPE (1995) describe *Psilocybe libertatis* as a different taxon, with pale lamellae and obviously also paler spores, growing among mosses in an alpine habitats. This species may indeed be close to *Psilocybe apelliculosa.*

physaloides – *Agaricus physaloides* BULL., Hist. Champ. Fr. **2**: 420. 1793; *Psilocybe physaloides* (BULL.) QUÉL., Mém. Soc. Émul. Montbéliard, sér. II, **5**: 238. 1872 (Champ. Jura Vosges 1); *Deconica physaloides* (BULL.) P. KARSTEN, Ryssl., Finl. Skand. Halföns Hattsvamp.: 516. 1879; *Geophila physaloides* (BULL.) QUÉL., Enchir. Fung.: 114. 1886.
Original diagnosis: *Agaricus* stipite fistulose, glabro, pileo laevi, semigloboso, lateritio-vinoso; lamellae latissimis, subfuligineo-vinosis, basi declivibus.

In pascuis frequentissimis, verno; terrestris, solitarius. Stipes subaequalis, fistulosus, nudus, pileo concolor, glaber: dimidia parte lin, ad 1 lin latus, 7-12 lin altus. Pileus glaber, laevis, primium suborbiculari-conicus, stramineus aut lateritio-vinosus, dein subglobosis, vinoso-lateritius aut fuligineus, demium complanatus, cavus, fuligineo-fusceus; per explicationem perfectem 9-12 lin latus. Caro tenuis, subalboda. Lamellae latissimae, rarae; primium stramineae subreactangulares et basi aduncae, demium vinoae, vinoso-lateritiae, lateritio fuligineae et declivis.

Notes: BULLIARD (1793) adds to this diagnosis the following comment: "The specific characters of this *Agaricus physaloides* is the glabrous, naked, fistulose stipe; the semiglobose glabrous, smooth pileus which normally is reddish-vinaceous tending to brick-colour; the distant, very broad, reddish brown lamellae which end in a small denticule. This species is common in spring in pastures, where it grows solitary on the ground. It is close to *Agaricus bullaceus* and *A. coprophilus*, which however have veil remnants on the stipe and grow on dung."

FRIES (1821) did not list this species, but in the index (FRIES 1829) he notes "*physaloides* BULL., spec. dubium". Later, FRIES (1838) gives a description of *Agaricus*

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physaloides, which deviates slightly from BULLIARD by having a viscid pileus, adpressed fibrillose stipe, and crowded, decurrent lamellae. He notes also that *A. physaloides* is very easily confused with *A. inquilinus*. Since then, the epithet *physaloides* has variously been interpreted.

- COOKE [1886: pl. 601(609)] depicts *Agaricus physaloides* with a dark red, not striate, glabrous pileus, very broad, warm brown lamellae without any tinge of purplish-black, and a white fibrillose stipe. According to large spores this may be *P. pratensis*, as was suggested by ORTON (1960, 1969).

- RICKEN (1913, pl. 66) describes a species with a very dark, slightly viscid, hardly striate, glabrous pileus, crowded, triangular, broadly adnate, almost decurrent, rusty-red lamellae, and red-brown, innately fibrillose stipe, with spores 8-9 x 5-6 µm, which are more or less mitriform in frontal view. Common, according to RICKEN (1913), among mosses in heathlands, often appearing already early in spring. This concept comes very close to that of *P. atrorufa* sensu RICKEN, which differs, according to RICKEN (1913), by having a dry pileus, and growing in different places. We have no difficulties in recognising *Psilocybe physaloides* sensu RICKEN as *P. montana*. ORTON (1960), however, describes *Deconica muscorum* P. D. ORTON to replace *Psilocybe physaloides* sensu RICKEN. It differs, according to ORTON (1960), from *P. montana* by the viscid pileus. See also notes with the type-study of *D. muscorum*.

- *Psilocybe physaloides* sensu BRESADOLA stands for *P. xeroderma* HUIJSM.

- LANGE (1939: 83, pl. 146D) described *Psilocybe physaloides* as a species with dull bay-brown, dry pileus, which becomes ochre-tan when dry, rather broad, dark brown lamellae, brown, fibrillose-glabrescent stipe, rather pale obliquely ovate spores, 6 x 4 µm. It has a superficial likeness with *P. inquilinus*.

- MŒLLER (1945) gives an extensive description of *Deconica physaloides* which is, in his opinion, very close to *P. atrorufa* sensu J. LANGE (= *P. montana*). It is characterized by a viscid, translucently striate pileus; ochraceous-rusty to umber lamellae, and minutely whitish fibrillose-floccose, dark olive-grey to blackish stipe. The spores are olive-sooty brown with a purple tinge, 7-8 x 4-5 µm, ovate in frontal view. According to this description, *D. physaloides* sensu MŒLLER may represent *D. muscorum* sensu ORTON (= *P. montana*).

- KÜHNER & ROMAGNESI (1953) do not know *"Geophila" physaloides*, which they think sensu originale comes close to *P. inquilinus*.

- ORTON (1960) considered *P. physaloides* sensu J. LANGE as being close to the original concept of BULLIARD. He placed it close to *P. montana*, from which it mainly differs by the smaller spores and hardly striate pileus. It could, however, on account of the relatively pale spores, and medium brown lamellae, also fit our concept of *P. subviscida*.

- GUZMÁN (1983) gives a description and illustration of a species that in many ways reminds us of our interpretation of *Psilocybe subviscida*. According to his illustrations of the spores, it is accepted to have both thin-walled (figs. 254-255), and thick-walled spores (figs. 322-325). The photo (fig. 691) taken from a collection from California, may well stand for some of our collections of *P. subviscida*.

- STAMETS (1996) depicts a collection of *Psilocybe physaloides* that very typically represents the current concept of *P. subviscida* on account of the rather pallid lamellae, and fibrillose stipe.

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Summary of the interpretations of the epithet *physaloides*:

Psilocybe physaloides s. FRIES, 1838 = *P. montana.*

Psilocybe physaloides s. RICKEN (= *Deconica muscorum* ORTON) = *Psilocybe montana.*

Psilocybe physaloides s. BRES. = *Psilocybe xeroderma.*

Psilocybe physaloides s. COOKE = *Psilocybe pratensis.*

Psilocybe physaloides s. J. LANGE = *Psilocybe subviscida* or *Psilocybe montana.*

Psilocybe physaloides s. ORTON, WATLING & GREGORY = *P. montana.*

Psilocybe physaloides s. GUZMÁN = mixture of several species, including *P. subviscida* and *P. xeroderma.*

Psilocybe physaloides s. STAMETS = ?*P. subviscida.*

Since the original diagnosis does not give way for a modern interpretation of the name *physaloides*, it is considered a nomen dubium.

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