

## SOME NEW SPECIES OF THE STROPHARIACEAE (AGARICALES) IN TASMANIA

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### Abstract

Eight new species and one new variety in the family Strophariaceae are described from Tasmania. The authors adopt a modern approach to the generic classification, in which only two genera are recognised, viz. *Psilocybe* and *Pholiota*. The new species are *Psilocybe formosa*, *Psilocybe parvula*, *Psilocybe paludicola*, *Psilocybe brunneoalbescens*, *Psilocybe alutacea*, *Pholiota fieldiana*, *Pholiota viscofumosa* and *Pholiota pallidocaulis*, and the new variety is *Psilocybe fascicularis* var. *armeniaca*. These taxa are widespread in Tasmanian native forests.

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### Introduction

The question of which genera make up the family Strophariaceae Sing. & A.H. Smith has been a source of disagreement amongst mycologists over a long period of time, depending upon the degree of significance to assign to such characters as spore colour, the presence or absence of chrysocystidia and of a well-defined veil, and the structure of the pileipellis. In the subfamily Stropharioideae (Sing.) Sing., there have been two schools of thought. One approach, represented by Smith (1979) and Kühner (1980), has been to combine *Psilocybe* (Fr.) Kumm., *Hypholoma* (Fr.) Kumm. [= *Naematoloma* P. Karst.], *Melanotus* Pat. and *Stropharia* (Fr.) Quéf. into one enlarged genus *Psilocybe sensu lato*, relegating the four component genera to subgeneric status. The other view is represented by Guzmán (1983) and Singer (1986), who retained the four component genera, separating *Stropharia* and *Hypholoma*, the two genera that typically possess chrysocystidia, from *Psilocybe* and *Melanotus*, which typically lack them. In turn, *Stropharia* and *Hypholoma* are distinguished from each other by the latter possessing a subcellular hypodermium, which the former lacks. *Psilocybe* is distinguished from

*Melanotus* by the long, centrally attached stipe of the former compared with the short, eccentrically attached stipe of the latter. The treatment of the Stropharioideae by Watling and Gregory (1987) is generally in agreement with that of Singer (1986).

The other subfamily, the Pholiotoideae (Imai) Sing., is similarly controversial, with one school (Smith & Hesler 1968, Jacobsson 1991, Kühner 1980) recognising only a single genus *Pholiota* (Fr.) Kumm., into which various other genera such as *Flammula* (Fr.) Kumm., *Hemipholiota* (Sing.) M. Bon, *Kuehneromyces* Sing. & Smith, *Pachylepyrium* Sing. and *Phaeonematoloma* (Sing.) M. Bon have been synonymised. In contrast, Singer (1986) maintained *Kuehneromyces* and *Pachylepyrium* as separate genera. A further point of disagreement involves the family placement of *Pholiota*, with Watling and Gregory (1987) considering the genus not to belong to the Strophariaceae on the basis of its brown-coloured, rather than a lilac- or purplish-coloured spore mass.

In a recent treatment of the Strophariaceae, Noordeloos (1999) sided with Smith (1979) and Kühner (1980) in adopting broad generic concepts.

All 95 species of Strophariaceae dealt with by Noordeloos (1999) were placed either in *Psilocybe* or *Pholiota*. The species that were traditionally placed in *Hypholoma* were put into two sections of subgenus *Hypholoma* (Fr.) Noordel., viz. section *Fasciculares* (Fr.) Noordel. for wood-inhabiting species with a caespitose habit such as *Psilocybe fascicularis* (Huds. : Fr.) Noordel. [syn. *Hypholoma fasciculare* (Huds. : Fr.) Kumm.] and section *Psilocyboides* (Sing.) Noordel. for solitary, gregarious, predominantly terrestrial taxa. Species that were traditionally placed in *Stropharia* are now assigned to one of three subgenera having a wide range of defining characters, and include the coprophilous *Psilocybe semiglobata* (Batsch : Fr.) Noordel. [= *Stropharia semiglobata* (Batsch : Fr.) Quél.] in subgenus *Stercophila* (Romagn.) Noordel. and the wood-inhabiting *Psilocybe aurantiaca* (Cooke) Noordel. [= *Stropharia aurantiaca* (Cooke) Imai] in subgenus *Stropholoma* (Sing.) Noordel. Many of the large or brightly coloured species are now found in subgenus *Stropharia* (Fr.) Noordel.

Evidence to date from ribosomal DNA studies determines the Strophariaceae to be a paraphyletic group with neither of the two subfamilies appearing to be monophyletic (Moncalvo *et al.* 2000, Moncalvo *et al.* 2002). A recent paper by Gulden *et al.* (2005) clearly shows *Pholiota* and *Psilocybe sensu* Noordeloos to be polyphyletic. It also confirms the placement of *Pholiota* in the Strophariaceae, as well as *Gymnopilus*, a monophyletic genus, and *Galerina*, a polyphyletic genus. This suggests that further studies will be needed to construct a well-supported phylogeny of the Strophariaceae. Sampling a number of sites of the genome or the use of protein-coding genes may be necessary to give a better separation of the taxa and of their relationships.

### Materials and Methods

The delineation of the 31 taxa of the Strophariaceae found by Chang (1992) for Tasmania relied heavily on the use of electrophoresis of extracellular enzymes in conjunction with mating compatibility studies. Comparative macromorphology was found to be effective in delineating species in the majority of cases. The use of DNA/RNA sequencing was in its infancy at the time of completion of that thesis, but some limited use was made of restriction fragment length polymorphisms (RFLP).

Pleurocystidia are sterile end-cells found on the gill face and may take the form of leptocystidia or chrysocystidia. Leptocystidia typically project from the gill face, and are usually fusoid-ventricose with a

long, narrow pedicel and a long, often tapering neck. The contents of these cystidia may, when mounted in water, vary from homogeneous hyaline, homogeneous pale yellow, granular yellow-brown to golden brown. Chrysocystidia, on the other hand, display an amorphous yellowish content when mounted in weak bases such as 10% ammonia or 5% KOH. It is the presence of the highly refractive amorphous content or inclusion, as revived in a weak base, which separates chrysocystidia from leptocystidia. In this study, 5% KOH was used, following the preference of Smith and Hesler (1968).

Electrophoresis of isozymes, which are functionally similar forms of enzymes coded by different genetic loci or different alleles at the same locus, and of allozymes, which are variant isozymes coded by different alleles at the same genetic locus, causes these proteins to be visualised as bands on the supporting medium by using specific staining techniques. The supporting media most frequently used in electrophoretic methods are starch and polyacrylamide gels. The banding patterns or isozyme profiles that result from material drawn from one specimen may be compared with those from other specimens to make systematic or phylogenetic inferences, while electrophoretic data from allozyme studies provide information in assessing gene flow and exploring phylogenetic relationships at intragenetic or intergenetic levels. Electrophoretic methods were employed throughout this study whenever sufficient isolates were available.

Mating compatibility between species of fungi in the investigation of species affinity can confirm the conspecificity of the species concerned, or aid in the reduction to synonymy of taxa that were thought to be different species. It may also identify intersterility groups within a genus. Cultural characteristics were not investigated despite their usefulness in delineating taxa (Jacobsson 1989).

### New Species

The 31 taxa of the Strophariaceae found by Chang (1992) include eight species previously undescribed and one new variety. The nine previously undescribed taxa are described below. Colour descriptions used for macromorphology were according to Kornerup and Wanscher (1978). Each species' description is accompanied by line drawings depicting a fruit body and some important microscopic features. Habit drawings are approximately of natural size in all figures. The scale bar (= 10  $\mu$ m) applies to all microcharacters.

**1. *Psilocybe formosa*** Y.S. Chang & A.K. Mills  
*sp. nov.*

*Pileus* 28–55 mm latus, convexus vel subumbonatus, badius/spadiceus tinctus, violaceus vel brunneo-vinosus; pagina mucosa, strato tenui glutinoso et squamis latis appressis, facile exutis, tandem glabra; margo vestigiis appendiculatis. *Lamellae* adnatae, latae, luteo-griseae tandem griseo-brunneae, margine albo. *Stipes* 56–80 (–99) mm longus, albidus, firmus. *Velum* pallido luteum, submembranaceum, evanescent. *Sporae* in massa violaceo-fuscae, 9.6–11.7 × 5.8–7.5 (–7.9) × 5.8–7.5 µm, ellipsoideae vel subellipsoideae, poro germinali lato. *Basidia* 21.7–30.8 × 6.7–11.7 µm, plerumque tetra-spora, raro bi-spora vel tri-spora, clavate vel constricta ad medium. *Pleurocystidia* ut chrysocystidia, 33.7–54.2 × 10.8–18.3 µm, fusoid ventricosa vel elongato-subclavata, pro parte majore prominentibus protuberantibus. *Cheilocystidia* 23.3–34.2 × 6.7–16.2 µm, hyalina, tenuitunicata, clavate. *Subhymenium* subcellulosum. *Trama* regularis, aetate interta. *Epicutis* stratum ex hypharum gelatinosarum repentibarum, brunneolarum, 2–4 µm latarum, fibuligerium.

Solitaria vel dispersa in terra in sylva mixto.

*Holotypus*: Tasmania, Huon Pine Track, Tahune Forest Reserve, 1 May 1990, Y.S. Chang, CYS341 (HO132639); isotypus in DAR conservatum.

*Pileus* 28–55 mm broad, convex or subumbonate, rich date brown with a vinaceous tint (close to 9F7–8) or vinaceous brown (7E4–5), surface slimy viscid with a thin glutinous layer covering broadly appressed, easily abraded scales, then appearing glabrous, veil remnants forming an appendiculate margin. *Lamellae* adnate, broad, yellowish grey (4C2) becoming greyish brown (5D3), margin white. *Stipe* 56–80 (–99) × (3–) 4.5–8 mm, hollow, white flocculose below veil line, white mycelium at base. *Context* whitish (close to 2A2), firm. *Veil* pale yellow (3A2), somewhat membranaceous, evanescent. *Sporae* violaceous black in mass, 9.6–11.7 × 5.8–7.5 (–7.9) × 5.8–7.5 µm, ellipsoidal or subellipsoidal, germ pore broad. *Basidia* 21.7–30.8 × 6.7–11.7 µm, the majority 4-spored, more rarely 2- or 3-spored, clavate or constricted at waist. *Pleurocystidia* as chrysocystidia, 33.7–54.2 × 10.8–18.3 µm, fusoid ventricose or elongate clavate, a majority with prominent protuberance. *Cheilocystidia* 23.3–34.2 × 6.7–16.2 µm, hyaline, thin-walled, clavate. *Subhymenium* subcellular. *Trama* regular, tending to interwoven with age. *Epicutis* a layer of gelatinised, repent, pale brown hyphae, 2–4 µm broad, bearing clamp connections.

Solitary or scattered on ground litter, of either leafy or woody debris.

*Holotype*: Tasmania, Huon Pine Track, Tahune Forest Reserve, 1 May 1990, Y.S. Chang, CYS341 (HO132639), on ground litter beside track in mixed forest; isotype conserved in DAR.

*Other specimens examined*: Tasmania, Hartz Mtn NP, on ground litter, 11 April 1989, Y.S. Chang, CYS107 (HO306048); Mt Field NP, on ground litter in mixed forest, 2 May 1989, Y.S. Chang, CYS137 (HO132636); Mt Field NP, track to Lady Barron Falls, on ground litter on creek bank, 2 May 1989, Y.S. Chang, CYS160 (HO132637); Tasman Peninsula, Fortesque Bay, on sandy ground, 25 Sept. 1989, A.K. Mills, CYS327 (HO132638); Huon Pine Track, Tahune Forest Reserve, on ground litter, 13 May 1989, Y.S. Chang, CYS172 (HO306049) and, 7 May 1990, B. Fuhrer, CYS358 (HO132640).

*Comments*: This is a typical exannulate species of *Psilocybe* subgenus *Stropharia*. The most distinctive features in the field are the vinaceous-brown, viscid to glutinous pileus with appendiculate veil remnants, and the dry, flocculose stipe. These characters place it in section *Stropharia*. It is close to *P. hornemannii* (Fr. : Fr.) Noordel., a saprophytic species of the temperate-boreal and submontane regions of the Northern Hemisphere, occurring in small groups on rotten wood. However, *P. hornemannii* has a flaring, skirtlike, persistent membranous veil, in contrast to the less substantial, more evanescent veil of *P. formosa* *sp. nov.* Another similar species is *Stropharia ambigua* (Peck) Zeller from the Pacific coast of North America, which also has a flocculose stipe and appendiculate pileal margin, but no membranaceous veil, only a fragment of an annulus on the stipe (Arora 1986, Plate 89).

*Illustrations*: Figure 1; colour photograph in Fuhrer and Robinson (1992, p. 59), as *Stropharia* sp.

*Etymology*: *formosa* = handsome, beautiful.

**2. *Psilocybe parvula*** Y.S. Chang & A.K. Mills  
*sp. nov.*

*Pileus* 5–10 mm latus, conico-convexus vel subcampanulatus, viscidus vel mucosus, dilute hygrophanus, glaber, aurantio-brunneus omino, magis brunneus ad discum, pallido bubalinus decolorans. *Lamellae* subdecurrentes, luteo-griseae tandem griseo-brunneae. *Stipes* 18–52 × 1–1.5 mm, aequalis, viscidus, strato tenui glutinoso infra velum, luteo albidus, sub-bulbosus basi. *Contextus* tenuis,

pileo concolorus. *Velum* arachnoideum, evanescent. *Sporae* 12.9–15.4 × 7.5–9.2 × 7.9–9.6 µm, elongato-ellipsoideae, poro terminali lato. *Basidia* (18.3–) 21.7–35 × 9.2–19.2 µm, tetra-spora, clavate vel pyriformia. *Pleurocystidia* ut chrysocystidia, 32.1–47.5 × 11.7–20 µm, fusoido-ventricosa. *Cheilocystidia* 25.8–38.3 (–41.7) × (4.2–) 5–9.2 µm, hyalina, lageniformia vel elongato-clavata. Subhymenium subcellulosum. *Trama* regularis, intertextus prope marginem lamellarum, hyphis 2–16 µm latis, pallido luteo-brunneolis (5% KOH). *Epicutis* stratum tenuis hypharum gelatinosum repentibarum, 2–4 µm latarum, fibuligerium numerosarum. *Hypodermium* stratum hypharum latarum, in crustarum, luteo-brunnearum, 4–16 µm latarum, fibuligerium. *Mycelii* basalis acanthocystae.

Solitaria ad fimum *Macropus*.

*Holotypus*: Tasmania, Mt Field National Park, 27 June 1990, Y.S. Chang, CYS486 (HO300130).

*Pileus* 5–10 mm broad, conico-convex or subcampanulate, viscid or slimy, slightly hygrophanous, glabrous, brownish orange (5C4–5) throughout, browner (6D5) at the disc, fading to pale buff. *Lamellae* subdecurrent, yellowish grey, then greyish brown. *Stipe* 18–52 × 1–1.5 mm, equal, viscid with a thin glutinous layer below the position of the veil, yellowish white (4A2), sub-bulbous at the base. *Context* thin, concolorous with pileus. *Veil* arachnoid, evanescent. *Spores* 12.9–15.4 × 7.5–9.2 × 7.9–9.6 µm, elongate ellipsoidal, germ pore broad. *Basidia* (18.3–) 21.7–35 × 9.2–19.2 µm, 4-spored, clavate or pyriform. *Pleurocystidia* as chrysocystidia, 32.1–47.5 × 11.7–20 µm, fusoid ventricose. *Cheilocystidia* 25.8–38.3 (–41.7) × (4.2–) 5–9.2 µm, hyaline, lageniform or elongate clavate. Subhymenium subcellular. *Trama* regular, tending to interwoven near edge of lamellae, hyphae 2–16 µm broad, pale yellowish brown (5% KOH). *Epicutis* a thin layer of gelatinised repent hyphae, 2–4 µm broad, bearing numerous clamp connections. *Hypodermium* a broad layer of encrusted, yellowish brown hyphae, 4–16 µm broad, clamp connections present. *Basal mycelium* with acanthocytes.

Solitary on wallaby dung.

*Holotype*: Tasmania, Mt Field National Park, near car park, 27 June 1990, Y.S. Chang, CYS486 (HO300130).

*Other specimens examined*: Tasmania, near Nugent, on wallaby dung, 15 May 1990, Y.S. Chang, CYS364 (HO300864); Sandspit River Forest Reserve, past Robertson Bridge, Y.S. Chang, 23 April 1991, CYS526 (HO300131).

*Comments*: Although it might be mistaken for a diminutive form of a member of the *Psilocybe semiglobata* (Batsch : Fr.) Noordel. species group complex, the very slender, delicate habit of *P. parvula* sp. nov., its sometimes faint pinkish hue to the pileus with a diameter seldom exceeding 10 mm, and its exclusivity to the dung of native animals, suggest that it differs from other coprophilous species. The spore size (12.9–15.4 × 7.5–9.6 µm) should separate it from the 'typical' *P. semiglobata* of the Northern Hemisphere, whose spores measure 16–21 × 8.5–11 µm (Noordeloos 1999) or 15–19 × 7.5–10 µm (Arora 1986). *Psilocybe semiglobata* in Tasmania, as found in grazed paddocks and grasslands, usually has spores in the range 13–16.5 × 7.5–9.5 µm, making them inseparable from those of *P. parvula* sp. nov. Noordeloos (1999) synonymised *Stropharia stercoraria* (Schum. : Fr.) Quéf. with *P. semiglobata*, as spore size was the only macroscopic character separating those two species. This suggests that *P. parvula* sp. nov. may just be a reduced form of the *P. semiglobata* species complex. However, evidence of a distinction between *P. parvula* and members of that complex derive from a study of isoenzyme patterns and mating compatibility trials (Chang 1992). In crosses between the isolates of two collections of this taxon with medium- and large-spored forms of *S. stercoraria*, negative pairings were always obtained. In addition, the isozyme patterns of *P. parvula* sp. nov. were always distinct from those of collections of the other coprophilous taxa. Therefore, we conclude that *P. parvula* sp. nov., despite the fact that canonical discriminant analysis of microscopic characters failed to separate this taxon from *P. semiglobata*, can be recognised as a biological species in the sense espoused by Taylor *et al.* (2000). It has so far been found on the dung of native animals only.

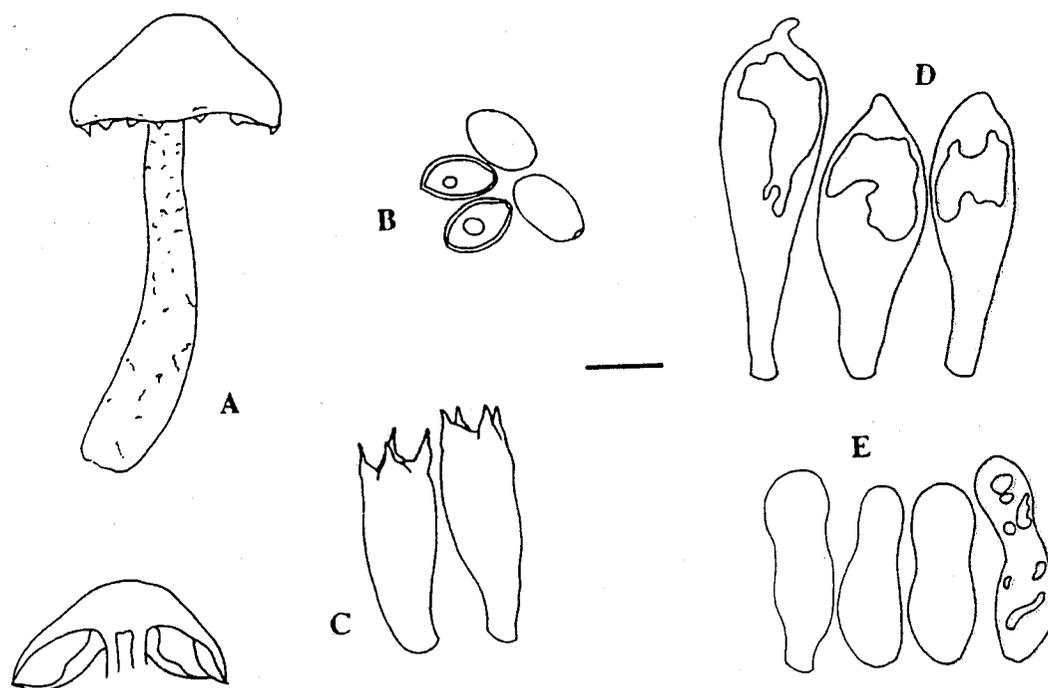
*Illustration*: Figure 2.

*Etymology*: *parvulus* = very small.

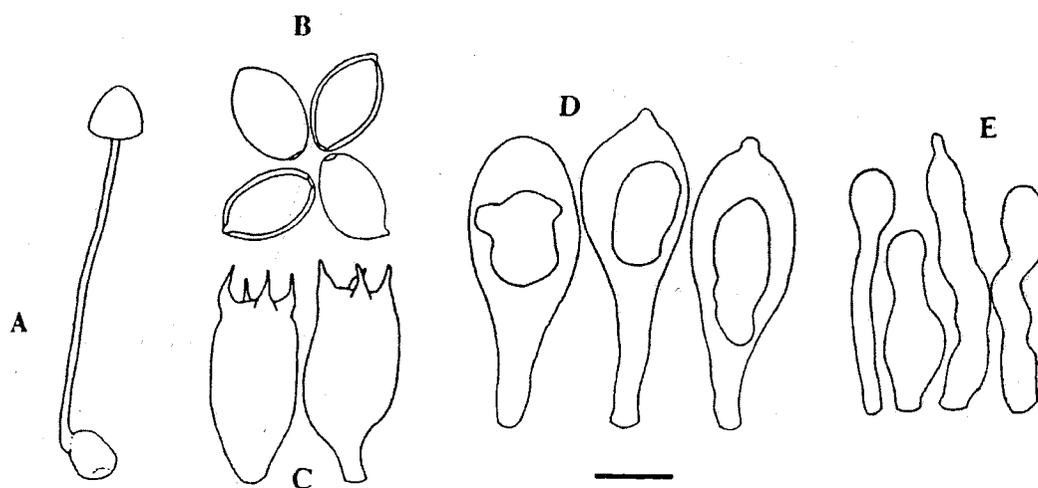
**3. *Psilocybe fascicularis*** (Huds. : Fr.) Noordel. **var. *armeniaca*** Y.S. Chang & A.K. Mills **var. nov.**

*Similis* *Psilocybe fascicularis* praeter colorem armeniacum pilei et lamellarum.

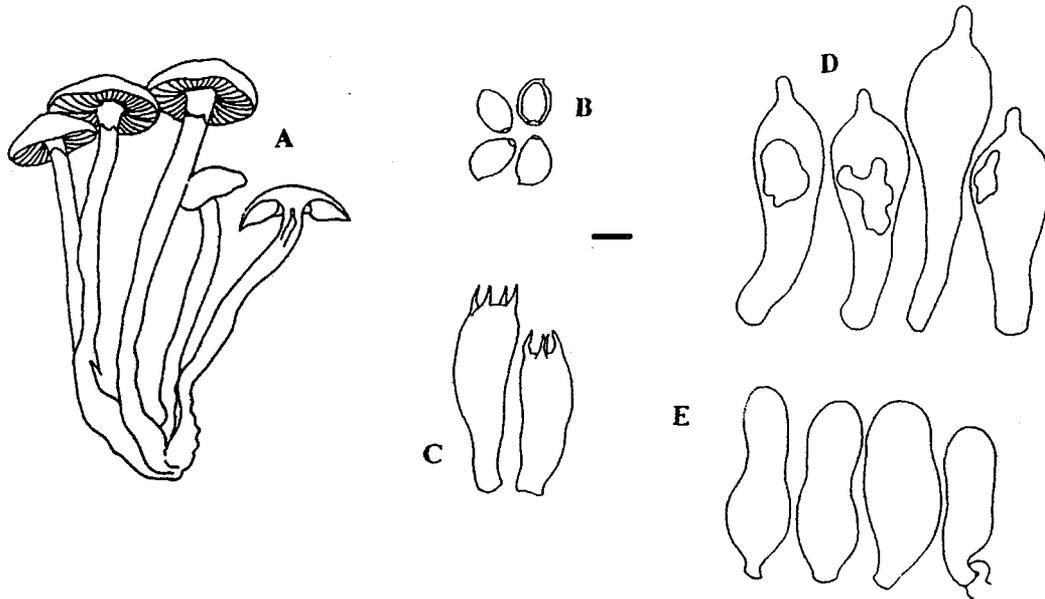
*Holotypus varietatis*: Tasmania, Mt Wellington, Fern Glade, caespitosum ad lignum putridum, 19 April 1990, Y.S. Chang, CYS333 (HO306106).



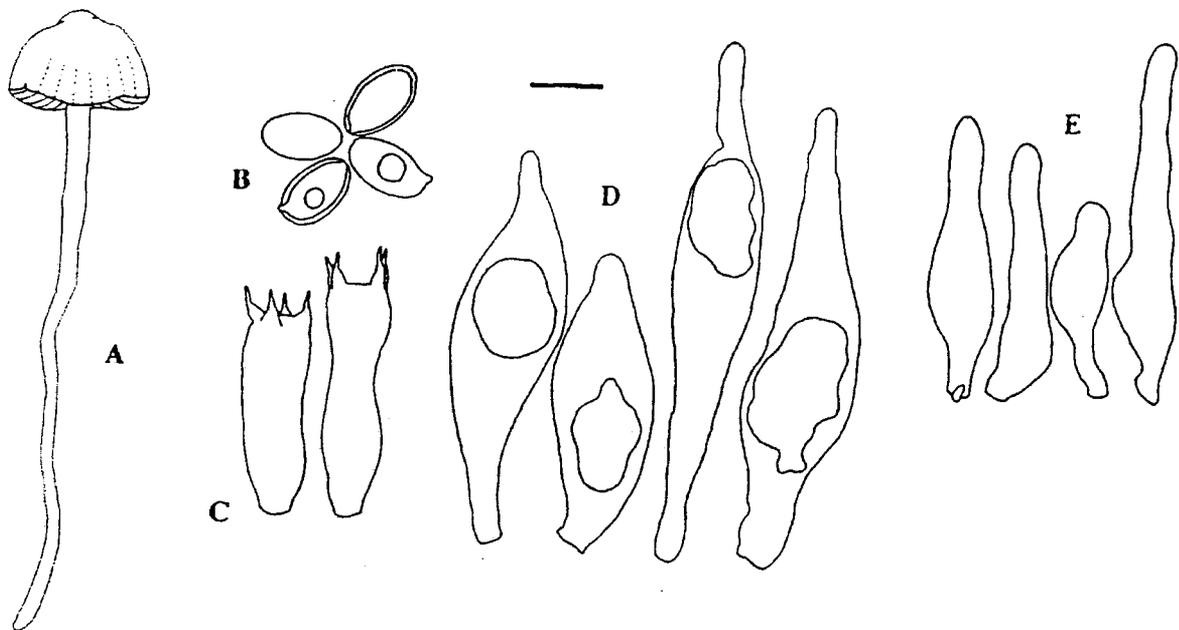
**Figure 1.** *Psilocybe formosa*. A Fruit body; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS341).



**Figure 2.** *Psilocybe parvula*. A Fruit body (from the type collection CYS486); B spores (CYS486); C basidia (from collection CYS364); D pleurocystidia (CYS486); E cheilocystidia (CYS486).



**Figure 3.** *Psilocybe fascicularis* var. *armeniaca*. A Fruit body; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS333).



**Figure 4.** *Psilocybe paludicola*. A Fruit body; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS518).

Similar to *Psilocybe fascicularis* var. *fascicularis* except for the apricot-orange (5A7 to 6B7) colour of the pileus and lamellae. Caespitose on rotten wood in wet sclerophyll forest.

*Holotype:* Tasmania, Mt Wellington, Fern Glade, 19 April 1990, Y.S. Chang, CYS333 (HO306106).

*Other specimens examined:* Tasmania, Arve Loop, off Arve Rd, on rotten wood, 21 June 1988, CYS13 (HO306098) and, 23 May 1990, CYS379

(HO306112); Balt Spur, Tasman Peninsula, on rotten wood, 5 July 1988, CYS78 (HO306099), on fallen log, 5 July 1988, CYS81 (HO306118) and, on rotten wood, 25 May 1989, CYS215 (HO306105); Fern Glade, Mt Wellington, on rotten wood, 18 April 1989, CYS108 (HO306101); Myrtle Forest, Collinsvale, on rotten wood, 27 April 1989, CYS124 (HO306097), 17 April 1989, CYS133 (HO306120) and, 3 May 1990, CYS344 (HO306114); Mt Field National Park, on rotten wood, 2 May 1989, CYS141 (HO306096) and CYS151 (HO306093); Scottsdale, NE Tasmania, on woody litter, 9 May 1989, CYS169 (HO306135); Adamsons Rd, on rotten wood, 30 May 1989, CYS221 (HO306116); Milkshake Hills Reserve, NW Tasmania, on rotten wood, 16 June 1989, CYS261 (HO306108); Snug Falls Track, on wood, 26 June 1989, CYS274 (HO306107); Huon Pine Track, Tahune Forest Reserve, on tree stump, 15 May 1990, CYS551 (HO306110).

*Comments:* *Psilocybe fascicularis* var. *armeniaca* var. *nov.* is similar to *Psilocybe fascicularis* var. *fascicularis* in every respect except for the colour of the pileus and lamellae. Both forms occur in similar habitats and even on the same piece of rotten wood, resulting in a gradation of colour from sulphur yellow to apricot orange. There are no discernible differences in the spores or other microscopic characters. In Europe, another widespread varietal form, *Psilocybe fascicularis* var. *pusilla* (J. Lange) Noordel. is recognised by Noordeloos (1999). This is a small variety with a gregarious rather than caespitose growth habit, and is sometimes considered to be a dwarf form of the main variety. Lamoure (1984) found that material of this dwarf form from the Italian Dolomites formed clamp connections in culture with the main variety. However, other dwarf forms collected in the Carpathians of Poland and near Femsjö in Sweden, although compatible with each other, failed to produce clamp connections both with typical *P. fascicularis* var. *fascicularis* and with *Psilocybe fascicularis* var. *pusilla*. Lamoure (1984) concluded that the incompatible dwarf forms were a new, undescribed species.

*Illustration:* Figure 3.

*Etymology:* *armeniacus* = apricot-coloured.

#### 4. *Psilocybe paludicola* Y.S. Chang & A.K. Mills *sp. nov.*

*Pileus* 10–15 mm latus, 8–10 mm altus, convexus, hygrophanus, sordido luteo brunneus, fuscior ad

discum, griseo luteus decolorans. *Lamellae* adnatae ad subdecurrentes, subdistantes, griseo brunneae. *Stipes* 48–60 mm longus, 1–2 mm crassus, cavus, flexuosus, decrescens basin versus, translucens aurantio brunneus fascior basi. *Contextus* tenuis, pileo concolorus. Sporae 9.6–11.7 × 5.8–7.1 × 5.6–7.1 μm, subellipsoideae aspectu frontali, inaequilatae aspectu laterali, poro germinali minuto sed evidenti. *Basidia* 23.7–32.5 (–35.8) × 6.7–10.8 μm, plerumque tetra-sporea, raro bi-sporea. *Pleurocystidia* ut chrysocystidia, 45–77.5 × 10.8–17.5 μm, ventricosa, prominentibus apicali protuberantibus vel elongato subclavata. *Cheilocystidia* 26.7–44.8 × 6.1–9.2 μm, tenuitunicata, hyalina, clavata, sessilia vel pedicellato lageniformia, intermixta chrysocystidiis. *Subhymenium* subcellulosum. *Trama* regularis. *Epicutis* stratum hypharum repentibarum, incrustarum, brunnearum, fibuligerum. *Hypodermium* subcellulosum, hyphis latis, brevibus, fibuligeris constanti.

Solitarium inter *Sphagnum* et *Polytrichum* in areis udo et uliginoso.

*Holotypus:* Tasmania, Arve Road, prope Geeveston, 15 May 1991, Y.S. Chang, CYS543 (HO306006).

*Pileus* 10–15 mm broad, 8–10 mm high, convex, hygrophanous, dingy or sordid yellowish brown (5E5), darker (6E5) at disc, fading to greyish yellow (close to 4B4). *Lamellae* adnate to subdecurrent, subdistant, greyish brown (6E4). *Stipe* 48–60 mm long, 1–2 mm thick, hollow, flexuose, tapering towards the base, translucent orange-brown becoming browner at the base. *Context* thin, concolorous with the pileus. Spores 9.6–11.7 × 5.8–7.1 × 5.6–7.1 μm, subellipsoidal in face view, slightly inequilateral in profile, germ pore minute but distinct. *Basidia* 23.7–32.5 (–35.8) × 6.7–10.8 μm, the majority 4-spored, more rarely 2-spored. *Pleurocystidia* as chrysocystidia, 45–77.5 × 10.8–17.5 μm, ventricose, the apical and/or basal portions elongate clavate and prominent. *Cheilocystidia* 26.7–44.8 × 6.1–9.2 μm, thin-walled, hyaline, clavate, sessile or pedicellate lageniform, intermixed with chrysocystidia. *Subhymenium* subcellular. *Trama* regular. *Epicutis* a layer of repent, encrusted, brown hyphae, clamp connections present. *Hypodermium* subcellular, with broad, short, clamped hyphae.

Solitary amongst *Sphagnum* and *Polytrichum* in wet and boggy areas.

*Holotype:* Tasmania, Arve Road, near Geeveston, 15 May 1991, Y.S. Chang, CYS543 (HO306006).

*Other specimens examined:* Tasmania, Arve Road, near Geeveston, solitary amongst *Sphagnum*, 6 May 1991, A.K. Mills, CYS531 (HO306007); Mt Read, on muddy or boggy embankment, scattered, April 1991, A.K. Mills, AKM1001.

*Comments:* *Psilocybe paludicola* sp. nov. is not typically gregarious and carpophores are either solitary or widely scattered. The habit and habitat suggest that the species belongs in section *Psilocyboides* (Sing.) Noordel., subsection *Elongatae* Noordel. The new species differs from *Psilocybe polytrichi* (Fr. : Fr.) Pears. & Dennis, a widespread species found in the boreal and temperate regions of Europe and North America, in having longer and broader spores. However, the spore size and all characters of the pileus, stipe and lamellae of *P. paludicola* closely match those of *Psilocybe elongata* (Pers. : Fr.) J. Lange, a widespread and common species of the Northern Hemisphere, found in moors and peat bogs, preferring *Sphagnum* but also occurring amongst other mosses and sometimes on bare peat. The possibility that it is part of the *P. elongata* species complex recognised by Noordeloos (1999), which includes *P. laeticolor* (F. Möller) Noordel., *P. xanthocephala* (P.D. Orton) Noordel. and *P. olivaceotincta* C.H. Kauffm., needs to be considered and tested.

*Illustration:* Figure 4.

*Etymology:* *palus* = marsh, bog; *cola* = I inhabit.

##### 5. *Psilocybe brunneoalbescens* Y.S. Chang & A.K. Mills sp. nov.

*Pileus* 7–12 mm latus, acute umbo, glaber, striatus, unctuosus, brunneus, valde hygrophanus, brunneo-albescens desiccatione. *Lamellae* adnatae, pallido-brunneae. *Stipes* (18–) 20–31 × 1–2 mm, aequalis, farctus tandem cavus, basi fibrillosus, fibrillae albae. *Contextus* albidus, tenuis. *Velum* evanescens. *Sporae* 6.7–7.5 × 4.2–4.6 × 4.2–5 µm, subellipsoideae, poro germinali evidenti. *Basidia* 20–25.8 × 5.4–5.8 µm, tetra-sporea, raro bi-sporea, hyalina, obovata vel clavata, sterigmata usque ad 8.3 µm longa. *Pleurocystidia* 31.7–54.2 × 5–9.2 µm, hyalina, lageniformia, apicibus 3–4 lobatis vel late obtusorum. *Cheilocystidia* 23.3–44.2 × 10.8–26.2 µm, obtusis inflata, late obovata vel polymorpha. *Subhymenium* subcellulosum. *Trama* regularis, brunneola, hyphis incrustatis, 2.5–4.2 µm latis. *Epicutis* stratum hypharum filamentosarum incrustarum brunnearum, 3.3–7.5 µm latorum, fibuligerium.

*Gregaria ad lignum putridum in sylva matura mixta.*

*Holotypus:* Tasmania, Collinsvale, Myrtle Forest, 3 April 1991, Y.S. Chang, CYS518 (HO132673).

*Pileus* 7–12 mm broad, acutely umbonate, glabrous, striate, greasy, chestnut brown (6F7–8) turning whitish on drying. *Lamellae* adnate, pale brown (6D5–E5). *Stipe* (18–) 20–31 × 1–2 mm, equal, stuffed then hollow, basal part covered with white fibrils. *Context* whitish, thin. *Veil* evanescent. *Spores* 6.7–7.5 × 4.2–4.6 × 4.2–5 µm, subellipsoidal, germ pore distinct. *Basidia* 20–25.8 × 5.4–5.8 µm, 4-spored, rarely 2-spored, hyaline, obovate or clavate, sterigmata up to 8.3 µm long. *Pleurocystidia* 31.7–54.2 × 5–9.2 µm, hyaline, lageniform, apex 3–4 lobed or obtusely rounded. *Cheilocystidia* 23.3–44.2 × 10.8–26.2 µm, inflated or broadly obovate or variable in shape. *Subhymenium* subcellular. *Trama* regular, pale brown, hyphae encrusted, 2.5–4.2 µm broad. *Epicutis* a layer of filamentous, encrusted, brown hyphae, 3.3–7.5 µm broad, clamp connections present.

Gregarious on rotten wood in mature mixed forest.

*Holotype:* Tasmania, Collinsvale, Myrtle Forest, 3 April 1991, Y.S. Chang, CYS518 (HO132673).

*Other specimens examined:* Tahune Forest Reserve, gregarious on woody debris on bank of creek, 5 June 1991, Y.S. Chang, CYS552 (HO300129); Julius River Reserve, gregarious on a very rotten *Nothofagus cunninghamii* log, 9 April 1991, A.K. Mills, AKM968; Myrtle Forest, Collinsvale, 1 July 2003, G. Gates & D. Ratkowsky (HO530099); Mt Field National Park, Lyrebird Walk, 2 June 2001, G. Gates & D. Ratkowsky (HO530100); Little Florentine Valley, off Five Road, 6 August 1998, G. Gates, A.K. Mills & D. Ratkowsky (HO530101).

*Comments:* The colour change from brown to whitish of the pileus upon drying, commencing at the prominent umbo, is a useful field character in identifying *P. brunneoalbescens* sp. nov., as few species of *Psilocybe* possess this character. In this respect, it is closest to *P. aztecorum* Heim emend. Guzmán, known only from the high mountains of central Mexico. However, the new species differs from *P. aztecorum* in not blueing at all, whereas the latter blues slightly near the margin of the pileus, reflecting its psilocybin content, when bruised. The new species also has much shorter spores than those of the two varieties of *P. aztecorum* described by Guzmán (1983). Although showing some affinity with *P. inconspicua* G. Guzmán & E. Horak from Papua New Guinea in the inflated, variable shape of

the cheilocystidia, *P. brunneoalbescens* differs in both macro- and micro-morphology. The pileus of *P. brunneoalbescens* is more acutely umbonate than that of *P. inconspicua*, more strongly hygrophanous and more obviously striate at the margin. In addition, the new species is lignicolous while *P. inconspicua* was found growing in small groups on soil in *Araucaria cunninghamii* forests (Guzmán and Horak 1978). The new species also has little in common with any of the *Psilocybe* species described from New Zealand (Johnston and Buchanan 1995).

*Illustration:* Figure 5.

*Etymology:* *brunneo* = brown; *albescens* = becoming white.

**6. *Psilocybe alutacea* Y.S. Chang & A.K. Mills  
*sp. nov.***

*Pileus* 10–13 mm latus, conicus vel convexus, subviscidus, hygrophanus, glaber, striatus, alutaceo brunneus vel ochraceo brunneus. *Lamellae* adnatae, subdistantes, griseo brunneae, interdum subnebulosae, acie albidus. *Stipes* 25–46 mm longus, 1–2.5 mm crassus, cylindricus, fractus, pallide brunneus. *Sporae* 11.7–15.8 (–16.7) × 7.9–9.2 × 7.5–9.2 µm, ellipsoideae. *Basidia* 25.8–34.2 × 9.2–12.1 µm, tetra-sporea, hyalina, obovate vel clavate. *Cheilocystidia* 22.5–35.9 (–44.2) × 5–10 µm, hyalina, longicollia, 6.7–15 µm, simplicia, bi-furcata vel tri-furcata. *Pleurocystidia rara*, 17.5–30.4 × 4.6–10 µm, lageniformia, longicollia. *Subhymenium* subcellulosum. *Trama* regularis, brunneola (5% KOH), hyphis 3.3–15 µm latis. *Epicutis* stratum hypharum subgelatinosarum, incrustarum, brunneolarum, 2.5–5 µm latarum, fibuligerium.

Solitaria vel subgregaria ad fimum vaccino.

*Holotypus:* Tasmania, Snug Falls Track, 30 May 1990, Y.S. Chang, CYS391 (HO132672).

*Pileus* 10–13 mm broad, conical or convex, subviscid, hygrophanous, glabrous, striate, leathery brown to ochraceous brown (6E5–6 to 5F5–6). *Lamellae* adnate, subdistant, greyish brown (5D3), at times slightly unevenly coloured, the edge white. *Stipe* 25–46 mm × 1–2.5 mm, cylindrical, stuffed, pale brown. *Spores* 11.7–15.8 (–16.7) × 7.9–9.2 µm, ellipsoidal, germ pore distinct, broad. *Basidia* 25.8–34.2 × 9.2–12.1 µm, 4-spored, hyaline, obovate or clavate. *Cheilocystidia* 22.5–35.9 (–44.2) × 5–10 µm, hyaline, long-necked, 6.7–15 µm, simple, bi- or tri-furcate. *Pleurocystidia* rare, 17.5–30.4 × 4.6–10 µm, lageniform, long-necked. *Subhymenium*

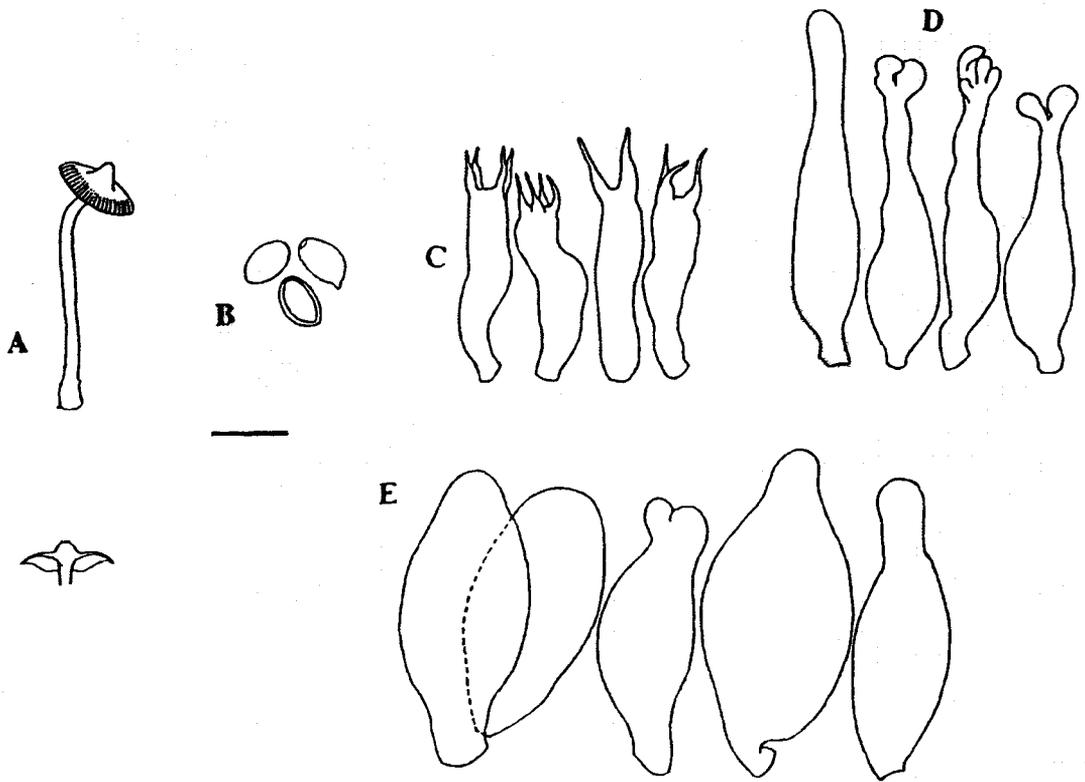
subcellular. *Trama* regular, pale brown (5% KOH), with hyphae 3.3–15 µm broad. *Epicutis* a layer of subgelatinised, encrusted hyphae with brown pigments, 2.5–5 µm broad, clamped.

Solitary to subgregarious on cow dung.

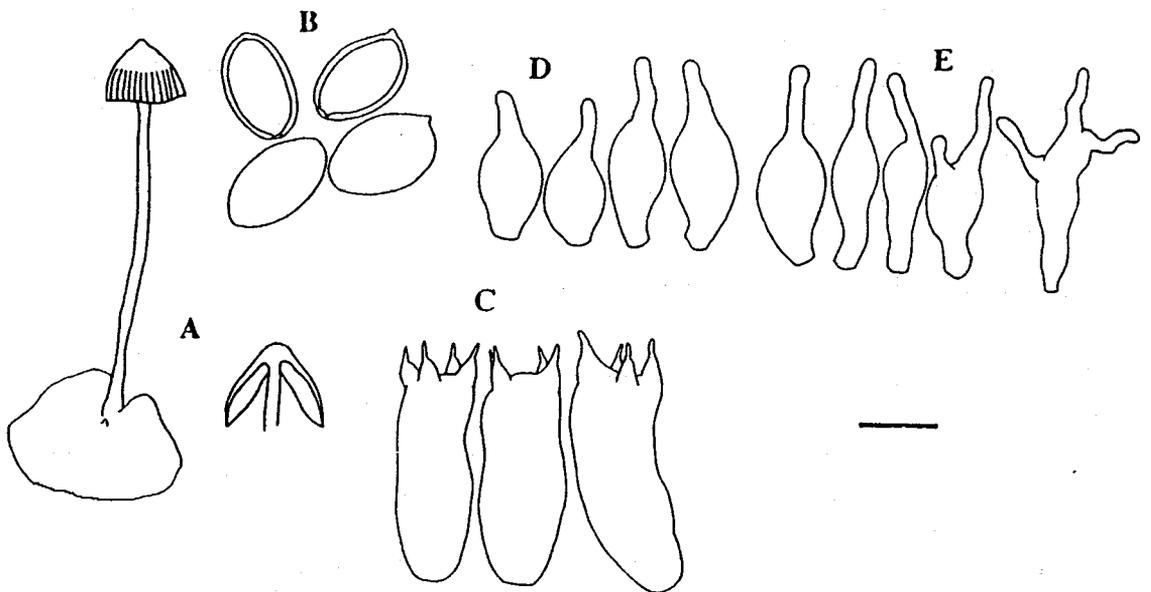
*Holotype:* Tasmania, Snug Falls Track, 30 May 1990, Y.S. Chang, CYS391 (HO132672).

*Other specimens examined:* Tasmania, Snug Falls Track, on horse dung, 30 May 1990, Y.S. Chang, CYS389 (HO300135) and, on cow dung, Y.S. Chang, CYS405 (HO300136); Snug Falls Track, on horse dung, 13 June 1990, Y.S. Chang, CYS448 (HO300137) and, on cow dung, Y.S. Chang, CYS450 (HO307794); Mt Field National Park, Pandanus Walk, 1050 m, on wallaby dung, 16 April 1991, Y.S. Chang, CYS522 (HO300138); Kermandie Falls, Upper Track, on wallaby dung, 30 May 2000, G. Gates and D. Ratkowsky (HO530077).

*Comments:* This species shares many macro- and micro-characteristics with *Psilocybe semilanceata* (Fr.) Kumm., e.g. pileus shape, spore shape and size, and the fact that both species occasionally show a weak blueing reaction when bruised, but the acutely conical pileus of the latter is usually papillate, and its habitat is predominantly on nutrient-poor grasslands and pastures (Noordeloos 1999, p. 45), rarely on dung, in contrast to the new species. Mating crosses between isolates of *P. semilanceata* and *P. alutacea* always produced negative pairings, in contrast to the positive pairings that were always produced amongst isolates of three collections of the new species. Other coprophilous species with which the new species may be confused include *Psilocybe fimetaria* (P.D. Orton) Walling, but the stipe of that species discolours yellow to yellow-brown when handled or when old (Noordeloos 1999, p. 46), *Psilocybe liniformans* Guzmán & Bas, but the pileus of that species is convex, then applanate (Noordeloos 1999, p. 47), *Psilocybe stercicola* Cleland, but blueing is absent in the basidiomata of that species and the cheilocystidia are not furcate (Grgurinovic 1997, pp. 547–548), and *Psilocybe kolya* Grgurinovic, but that species has a non-blueing context and a hypodermium that is not subcellular (Grgurinovic 1997, pp. 549). The blueing reaction of the new species is slow and discernible only at the lamella edge. Nevertheless, *P. alutacea* appears to be close to the blueing temperate coprophilous species, and its conical pileus, adnate lamellae and non-flattened, ellipsoidal-ovoid spores put it into section *Semilanceatae* Guzmán rather than section *Merdariae* (Fr.) Singer.



**Figure 5.** *Psilocybe brunneoalbescens*. A Fruit bodies; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS518).



**Figure 6.** *Psilocybe alutacea*. A Fruit bodies; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS391).

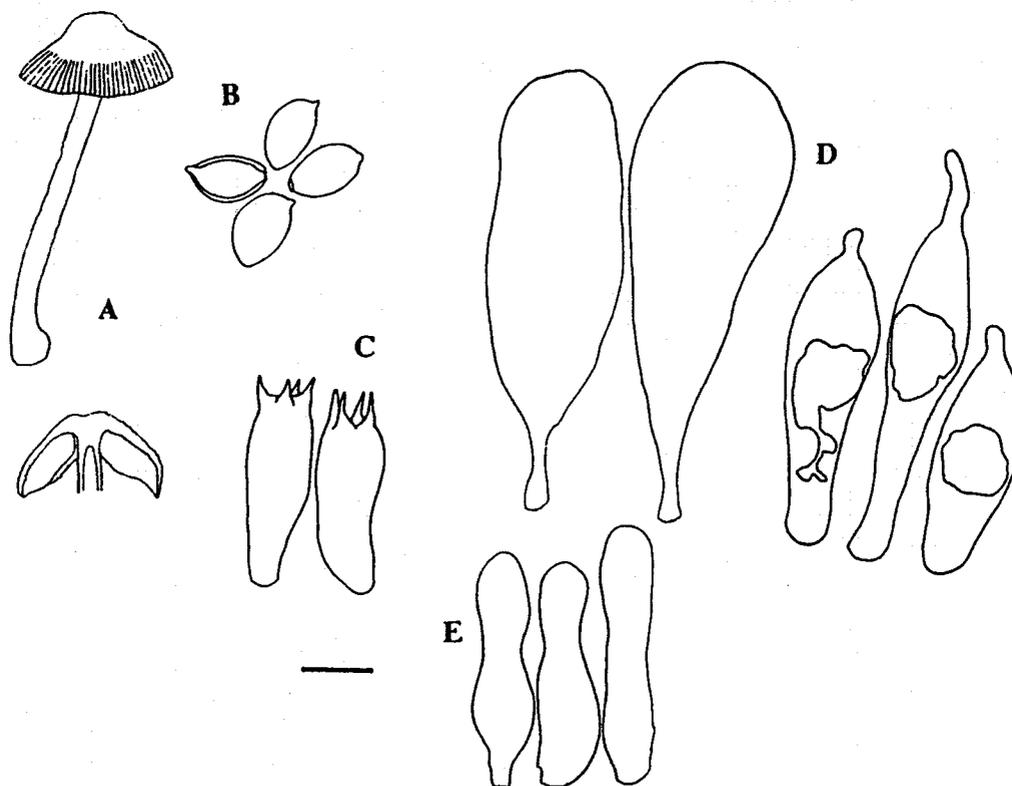


Figure 7. *Pholiota fieldiana*. A Fruit bodies; B spores; C basidia; D pleurocystidia (two kinds); E cheilocystidia (all from type collection CYS509).

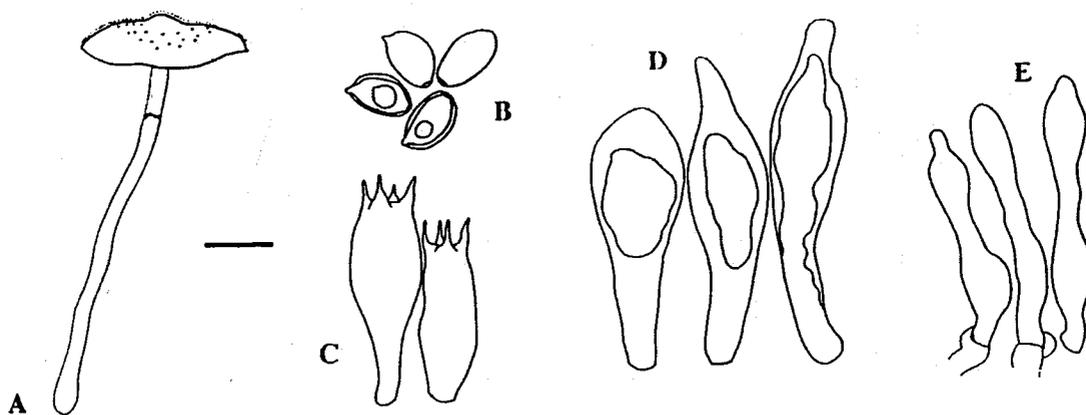


Figure 8. *Pholiota viscofumosa*. A Fruit body; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS520).

*Illustration:* Figure 6.

*Etymology:* *alutacea* = leathery.

**7. *Pholiota fieldiana*** Y.S. Chang & A.K. Mills  
*sp. nov.*

*Pileus* 25–32 mm latus, conicus vel subumbonatus, viscidus, glaber, hygrophanus, striatus, olivaceo-luteus omino, brunneus umbone, aurantio-brunneus desciccatione. *Lamellae* depresso-adnatae vel adnexae, luteo-griseae tandem luteo-brunneae. *Stipes* 38–43 mm longus, 3–4.5 mm crassus, glutinosus infra velum linea extensus basin versus, apice pallide luteus, brunnescens prope basin. *Contextus* pallido aurantio-brunneus vel pallido cinnamomeo-brunneus, tenuis. *Sporae* 9.2–11.7 × 5.4–6.7 × 5–6.7 µm, ellipsoideae or inaequilaterales, poro germinali conspicuo. *Basidia* 20–29.2 × 7.5–10 µm, tetra-sporea, hyalina, anguste obovata vel subpyriformia. *Cheilocystidia* 20–36.7 × 6.7–10 µm, hyalina, pedicellata, clavata vel lecythiformia. *Pleurocystidia* biformia, ut chrysocystidia et abundans, pedicello longo in subhymenio, 34.2–53.7 × 8.7–14.6 µm, et leptocystidia, hyalina, rara, 48.3–65 × 17.5–22.5 µm, saccata vel lecythiformia. *Subhymenium* subcellulosum. *Trama* regularis, hyphis tunicis tenuibus, hyalinis ad pallido luteo-brunneolis (5% KOH), 6–20 µm latis. *Epicutis* stratum hypharum gelatinosarum, repentibarum, infirme incrustatarum, 2–4 µm latarum, fibuligerium. *Hypodermium* subcellulosum.

Solitaria vel dispersa in terra inter muscos in sylva temperata.

*Holotypus:* Tasmania, Mt Field National Park, Lyrebird Walk, 660 m, 2 August 1990, Y.S. Chang, CYS509 (HO132675).

*Pileus* 25–32 mm broad, conical to subumbonate, slimy viscid, glabrous, hygrophanus, striate, olivaceous yellow (4C6) throughout, brown (6E7) at disc, fading or drying to brownish orange. *Lamellae* depressed adnate to adnexed, yellowish grey (4C5) then yellowish brown. *Stipe* 38–43 × 3–4.5 mm, slimy viscid below veil line extending to the base, pale yellow above, browner near base. *Context* pale orange-brown to pale cinnamon brown, thin. *Spores* 9.2–11.7 × 5.4–6.7 × 5–6.7 µm, ellipsoidal in face view, inequilateral in profile, germ pore conspicuous. *Basidia* 20–29.2 × 7.5–10 µm, 4-spored, hyaline, narrowly obovate or subpyriform. *Cheilocystidia* 20–36.7 × 6.7–10 µm, hyaline, pedicellate, clavate or lecythiform. *Pleurocystidia* of two types, as chrysocystidia and abundant, with long pedicel embedded in the subhymenium, 34.2–53.7 ×

8.7–14.6 µm, and as leptocystidia, hyaline, rare, 48.3–65 × 17.5–22.5 µm, saccate or lecythiform. *Subhymenium* subcellular. *Trama* regular, hyphae with thin walls, hyaline to pale yellow-brown (5% KOH), 6–20 µm broad. *Epicutis* a thin layer of gelatinised, repent hyphae, slightly encrusted, 2–4 µm broad, clamped. *Hypodermium* subcellular.

Solitary or scattered on the ground among mosses (*Rhizogonium*) in temperate rainforest.

*Holotype:* Tasmania, Mt Field National Park, Lyrebird Walk, 660 m, 2 August 1990, Y.S. Chang, CYS509 (HO132675).

*Other specimens examined:* Tasmania, Mt Field National Park, Lyrebird Walk, 660 m, 3 July 1989, Y.S. Chang, CYS284 (HO132676); Growling Swallet, 7 August 2001, G. Gates and D. Ratkowsky (HO530074); Black Sugarloaf, 23 August 2001, G. Gates, D. Ratkowsky, S. Lloyd & R. Nagorcka (HO530075); Julius River Forest Loop, 15 June 2002, G. Gates & D. Ratkowsky (HO530076).

*Comments:* The glutinous pileus and stipe place the new species in subgenus *Phaeonematoloma* Sing. It differs from the type species of the subgenus, *Phaeonematoloma myosotis* (Fr. : Fr.) Sing. in its much smaller spores, its conspicuous germ pore, and in possessing both chrysocystidia and leptocystidia on the lamella walls. *Pholiota fieldiana* shares some macroscopic and microscopic features with other species of subgenus *Phaeonematoloma*, such as *P. aberrans* Sm. & Hesler, *P. majalis* Sing. and *P. myxacioides* Sing. It has shorter spores with a smaller length to width ratio than *P. aberrans*, and differs from *P. majalis* and *P. myxacioides* in having leptocystidia instead of the metuloids of the latter two species.

*Illustration:* Figure 7.

*Etymology:* *fieldiana* = of Mt Field National Park.

**8. *Pholiota viscofumosa*** Y.S. Chang & A.K. Mills  
*sp. nov.*

*Pileus* 15–40 mm latus, plano-convexus vel subumbonatus, glutinosus, striatus, annulis concentricis squamellarum albidarum ad discum, squamellulae facile exutae et glabrescens; argillaceus tandem fumosus. *Lamellae* late adnatae, griseo luteae tandem brunnescens sporarum. *Stipes* 23–87 mm longus, 2–6 mm crassus, aequalis, flexuosus, siccus, cavus, albidus, flocculosus, glabrescens et sordido brunnescens. *Contextus* pallide luteus. *Velum* arachnoideum, evanescens.

*Sporae* 9.2–11.7 × 5.8–7.1 (–7.5) × (5.4–) 5.8–6.7 (–7.1) µm, elongato ellipsoideae, poro germinali lato. *Basidia* (20.8–) 23.3–30 (–30.8) × 7.1–9.6 (–10.4) µm, tetra-spora, clavata. *Cheilocystidia* 20–36.7 × 6.7–10 µm, hyalina, pedicellata, clavata vel lecythiformia. *Pleurocystidia* ut chrysocystidia, 32.5–57.5 × (8.7–) 10–17.5 (–19.2) µm, mucronata, contento amorpho. *Subhymenium* subcellulosum. *Trama* regularis, hyphis 6–20 µm latis. *Epicutis* stratum hypharum gelatinosarum repentibarum fibuligerium. *Hypodermium* subcellulosum.

Subcaespitosa vel subgregaria ad terram vel ligno carioso vel inter muscos, in areis perfugio sylvae temperatae.

*Holotypus*: Tasmania, Mt Field National Park, Lyrebird Walk, 660 m, 16 April 1991, Y.S. Chang, CYS520 (HO132685).

*Pileus* 15–40 mm broad, plano-convex or subumbonate, surface slimy viscid, striate, with concentric rings of whitish squamules at disc, easily abraded and becoming glabrous; dark blond to clay (4C4 to 5D5) then smoky grey (close to 4B4). *Lamellae* broadly adnate, dull to greyish yellow (3B3–3C4) then browner with spores. *Stipe* 23–87 × 2–6 mm, equal, flexuose, dry, hollow, whitish, flocculose, becoming glabrous and sordid brown. *Context* pale yellow. *Veil* arachnoid, evanescent. *Spores* 9.2–11.7 × 5.8–7.1 (–7.5) × (5.4–) 5.8–6.7 (–7.1) µm, elongate ellipsoidal, germ pore broad. *Basidia* (20.8–) 23.3–30 (–30.8) × 7.1–9.6 (–10.4) µm, 4-spored, clavate. *Cheilocystidia* 20–36.7 × 6.7–10 µm, hyaline, pedicellate, clavate or lecythiform. *Pleurocystidia* as chrysocystidia, 32.5–57.5 × (8.7–) 10–17.5 (–19.2) µm, mucronate, contents amorphous. *Subhymenium* subcellular. *Trama* regular, with hyphae 6–20 µm broad. *Epicutis* a gelatinised layer of repent hyphae, clamped. *Hypodermium* subcellular.

Subcaespitose to subgregarious on ground litter or rotten wood or amongst mosses in sheltered areas of temperate rainforest.

*Holotype*: Tasmania, Mt Field National Park, Lyrebird Walk, 660 m, 16 April 1991, Y.S. Chang, CYS520 (HO132685).

*Other specimens examined*: Tasmania, Little Florentine Valley, off Five Road, on ground litter, 17 June 1989, Y.S. Chang, CYS184 (HO306002); NW Coast, Pine Track, off Tayatea Road, on ground amongst moss, 16 June 1989, Y.S. Chang, CYS256 (HO132690); Mt Field National Park, off Lyrebird

Walk, gregarious on ground litter, 3 July 1989, Y.S. Chang, CYS285 (HO132689), 2 May 1990, Y.S. Chang, CYS342 (HO132688), and, 27 June 1990, Y.S. Chang, CYS487 (HO132686); Tasman Peninsula, Balt Spur, on moss-covered ground, 6 June 1990, Y.S. Chang, CYS410 (HO132687); Mt Field National Park, Pandanus Walk, 1050 m, 16 April 1991, Y.S. Chang, CYS521 (HO132684).

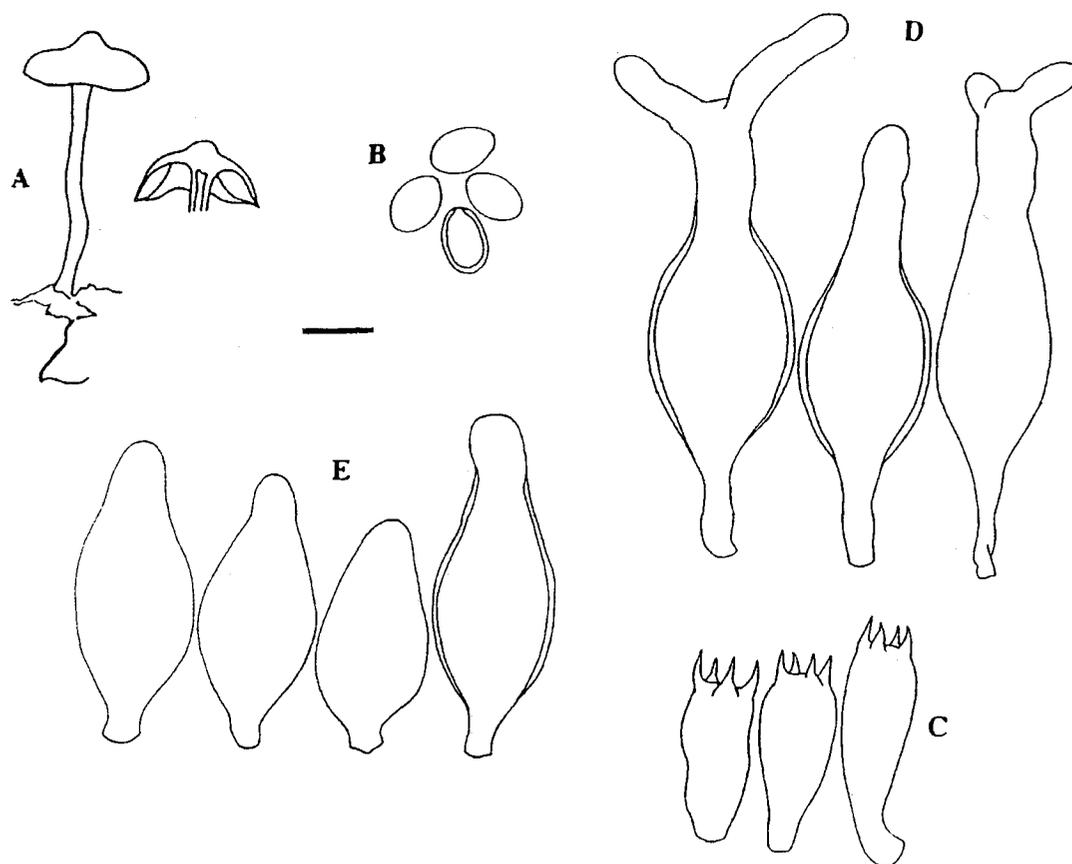
*Comments*: The combination of macro- and micro-characters separate this previously undescribed species from any other described species. The absence of a conspicuously scaly pileus or stipe distinguish it from the two most common species of *Pholiota* in Tasmanian forests, viz. *P. squarrosipes* Cleland and *P. multicingulata* E. Horak. The pileus of *P. viscofumosa* is slimy viscid, dark blonde, clay coloured or smoky grey, with any hint of squamulosity appearing in youth as concentric rings of whitish scales at the disc, then becoming more or less glabrous. The whitish, flocculose stipe similarly becomes glabrous and darkens with age. These features suggest an affinity with *Psilocybe* subgenus *Stropharia* (Fr.) Noordel., but the dark brown (6F6–7) spore print is more suggestive of *Pholiota* than *Psilocybe*. We provisionally place it in subgenus *Flammula* (Fr.) Sing. (subgenus *Flammuloides* Sm. & Hesler), with which the new species agrees in its main defining features as presented by Singer (1986).

*Illustration*: Figure 8.

*Etymology*: *viscofumosa* (*viscosus* = viscous; *fumosus* = smoky).

### 9. *Pholiota pallidocaulis* Y.S. Chang & A.K. Mills *sp. nov.*

*Pileus* 14–45 mm latus, late convexus vel subumbonatus, mucosus viscidus, annulis concentricis squamellularum albidarum ad discum vel facie glabro, luteolus tandem brunneo-aurantius tandem brunnescens omnino. *Lamellae* late adnatae vel adnexae, usque ad 5 mm latae, luteolae tandem brunnescens sporis. *Stipes* 25–54 mm longus, 2–4 mm crassus, plus minusve aequalis, pallidus, aetate color sordidescens, basis subbulbosa vel abrupta, mycelia albido et rhizomorpha luteo basi. *Contextus* albidus, firmus. *Velum* arachnoideum, cremicolor, evanescent. *Sporae* 7.5–9.2 (10) × 5–5.8 × 5–6.2 µm, subellipsoideae vel leviter inaequilaterales, poro germinali minuto et inconspicuo. *Basidia* 18.7–32.5 × 7.5–10.8 µm, tetra-spora, obovata vel clavata, luteo brunneum prope lamellae acie. *Cheilocystidia*



**Figure 9.** *Pholiota pallidocaulis*. A Fruit bodies; B spores; C basidia; D pleurocystidia; E cheilocystidia (all from type collection CYS482).

26.7–43.3 × 11.7–22.5 μm, facientia plus minusve taenia steriles, hyalina vel contentis luteo brunneolis, tunicis crassi vel tenui. *Pleurocystidia* 53.3–69.2 × 16.7–21.7 μm, projicienta, tunicies 0.8–1.7 μm crassa, hyalina, fusoido ventricosa, apicibus obtusis vel furcatis. *Subhymenium* filamentosum gelatinosarum. *Trama* regularis. *Epicutis* filamentarum, hypharum incrustarum, brunnearum, fibuligerium.

Dispersa vel gregaria ad lignum putridum.

*Holotypus*: Tasmania, Hobart, campus universitatis, 26 June 1990, Y.S. Chang, CYS482 (HO132706).

*Pileus* 14–45 mm broad, broadly convex or subumbonate, slimy viscid, with concentric rings of whitish squamules at disc or with a glabrous appearance, light yellow (4A4) then brownish orange (5C5–6) becoming light brown (6D7) throughout. *Lamellae* broadly adnate or adnexed, up to 5 mm broad, pale yellow (4B3) then becoming brown with spores. *Stipe* 25–54 mm long, 2–4 mm

thick, more or less equal, pallid, becoming sordidly coloured with age, base sub-bulbous or abrupt, white mycelium and yellow rhizomorph at base. *Context* white, firm. *Veil* arachnoid, cream coloured, evanescent. *Spores* 7.5–9.2 (10) × 5–5.8 × 5–6.2 μm, subellipsoidal or slightly inequilateral, germ pore minute and inconspicuous. *Basidia* 18.7–32.5 × 7.5–10.8 μm, 4-spored, obovate or clavate, yellowish brown near gill edge. *Cheilocystidia* 26.7–43.3 × 11.7–22.5 μm, forming a more or less sterile band, hyaline or with yellowish brown content, with thick or thin walls. *Pleurocystidia* 53.3–69.2 × 16.7–21.7 μm, projecting, with wall 0.8–1.7 μm thick, hyaline, fusoid ventricose, with apex obtuse or branched. *Subhymenium* filamentous, gelatinised. *Trama* regular. *Epicutis* filamentous, hyphae encrusted with brown pigments, clamped. Refringent hyphae present in stipe trama, lamella trama and epicutis.

Scattered or gregarious on woody debris.

*Holotype*: Tasmania, Hobart, University of Tasmania campus, 26 June 1990, Y.S. Chang, CYS482 (HO132706).

*Other specimens examined*: Tasmania, Arve Loop, off Arve Rd, on ground, 21 June 1988, Y.S. Chang, CYS4 (HO300144), CYS30 (HO132704) and CYS43 (HO300143); Myrtle Forest, Collinsvale, on fallen rotten log, 28 June 1988, Y.S. Chang, CYS54 (HO300142); Balt Spur, Tasman Peninsula, on ground amongst moss, 5 July 1988, Y.S. Chang, CYS86 (HO300141) and, on ground amongst moss, 6 June 1990, Y.S. Chang, CYS411 (HO132708); Snug Falls Track, on ground, 20 June 1989, Y.S. Chang, CYS275 (HO305976) and, on ground near buried wood, 13 June 1990, Y.S. Chang, CYS433 (HO132707); Lady Barron Falls Track, Mt Field NP, on fallen manfern trunk, 3 July 1989, Y.S. Chang, CYS289 (HO300140); Lyrebird Walk, Mt Field NP, on ground, 20 October 1989, Y.S. Chang, CYS329 (HO305981) and, on ground amongst moss, 27 June 1990, Y.S. Chang, CYS488 (HO305985) and, on log, 2 August 1990, Y.S. Chang, CYS510 (HO306147); Arve Rd, on wood, 14 July 1990, Y.S. Chang, CYS494 (HO305984) and, on ground litter, 17 July 1990, Y.S. Chang, CYS502 (HO306145); gully near Hytten Hall, University of Tasmania, Hobart, on wood chips, 12 August 1990, Y.S. Chang, CYS514 (HO306150); Hartz Rd, Hartz Mtn NP, on fallen log in rainforest area, 6 May 1991, A.K. Mills, CYS533 (HO306151).

*Comments*: This is the third most common species of *Pholiota* (after *P. squarrosipes* Cleland and *P. multicingulata* E. Horak) encountered in Tasmania's wet forests, and is recognisable by the whitish or pale-coloured stipe and conspicuous yellow rhizomorphs. Microscopically, its projecting chrysocystidia distinguish it from *P. squarrosipes*, which has embedded chrysocystidia, and from *P. multicingulata*, whose leptocystidia may sometimes have yellow contents, but which lack true chrysocystidia. The characteristics of *P. pallidocaulis* suggest that it belongs in subgenus *Flammuloides* section *Flammuloides* Sm. & Hesler, perhaps near those species that show variations in the wall thickness of their cystidia.

*Illustration*: Figure 9.

*Etymology*: *pallidocaulis* (*pallidus* = pale; *caulis* = stem).

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