STUDIES IN AUSTRALIAN AGARICS AND BOLETES
I: Some species of Psilocybe

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ABSTRACT. The state of knowledge of the agaric genus *Psilocybe* in Australia is reviewed and three species, *P. australiana* Guzmán & Watling, *P. eucalypta* Guzmán & Watling and *P. tasmaniana* Guzmán & Watling, are described.

INTRODUCTION

The present paper gives an assessment of the genus *Psilocybe* in Australia including the description of three new species. The account is based primarily on existing material in national herbaria together with collections made by one of us (R.W.) in Australia in 1974 and is part of a world monograph being prepared by G. Guzmán.

There are 28 species of *Psilocybe* reported from Australia and Tasmania, as shown in the list which follows, and one from the Australian subantarctic. The position of several of these in the genus is, however, in doubt. Probably half of the species recorded as belonging to *Psilocybe* can be attributed more suitably to the genera *Psathyrella*, *Naematoloma* (= *Hypholoma* of British authors) and *Panaeolus*.

Cleland and Cheel (1918) and Cleland (1934) described eight species of *Psilocybe* from the Australian subcontinent but most have never been recollected and there is still confusion as to the true identity of some of their species. This state of disorder plus the fact that *Psilocybe* spp. and related agarics are being used extensively in Australia as recreational drugs (Hall, 1973; Southcott, 1974; Aberdeen & Vock, 1976) make it important that an attempt be made at a critical analysis of the genus. This paper is intended as a starting point for such a study.

NOTES ON SPECIES RECORDED FROM AUSTRALIA

1. Psilocybe aggregata Clel. & Cheel

A species of doubtful affinity; no type study undertaken. It was described from New South Wales and is probably a *Psathyrella* sp.

2. P. asperospora Clel.

No type material examined although a collection agreeing with Cleland's description was found by one of us (R.W.) at Tidbinbilla, Australian Commonwealth Territory. It is undoubtedly a species of *Lacrymaria* (included in *Psathyrella* by Guzmán) and will be dealt with in a later publication.

3. P. atomatoides Peck

A North American species, transferred to *Psathyrella* by Smith (1972) as *Psathyrella atomatoides* (Peck) Smith.

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4. P. atrorufa (Schaeff. ex Fr.) Quél.

Recorded from W Australia by Cooke (1892) under *Agaricus* (*Deconica*) *atrorufus* [Schaeff. ex] Fr. Generally considered in Europe to be the same as *P. montana* (Pers. ex Fr.) Kummer and is sometimes placed in the untenable genus *Deconica* (Dennis, Orton & Hora, 1960). Without specimens it is difficult to assess the records; because of the complexity of the group even in the British Isles, Orton (1960) found it necessary to construct a key to the group with two unnamed entities included.

5. P. bullacea (Fr.) Gillet

A wide-spread subcoprophilous fungus, reported by Cleland and Cheel (1918) but no material was seen by the authors (see note on *P. merdaria*).

6. P. ceres (Cooke & Mass.) Sacc.

A species of doubtful affinity; type (in NY) in bad condition. Probably synonymous with *Naematoloma aurantiaca* (Cooke) Guzmán. *P. ceres* was described from several localities in South Australia. Pegler (1965) has indicated that the spores are 11–12·5 × 6–8 μm, showing all characters of the Strophariaceae and pleurocystidia are probably lageniform or utriform with a large refringent inclusion. Pegler wishes to retain the taxon in *Psilocybe* in the meantime.

7. P. cernua (Vahl ex Fr.) Quél.

Recorded from Victoria by Cooke (1892) under *Agaricus* (*Psilocybe*) *cernuus*. Although it would be difficult to assess the Australian records without reference to specimens this fungus is now classified in *Psathyrella*.

8. P. collybioides Singer & Smith

An Argentinian species (Singer & Smith, 1958), reported from Australia by Hall (1973) and Southcott (1974) without any description; it is recorded by Shepherd & Hall (pers. comm.) from Queensland and by Wade (pers. comm.) from Tasmania. It seems more likely that the Australian records refer to one of the new species described in this paper.

9. P. compta (Fr.) Sacc.

Recorded by Cooke (1892) under the name *Agaricus comptulus* Berkeley and Broome, an agaric originally described from Colleyweston, British Isles, in 1861. Dennis, Orton & Hora (1960) consider the species doubtful; possibly a *Psathyrella* sp. On the evidence of Cooke's plate [603 (589)] both Maire and Quélet (in Pearson, 1935) refer the species to the Bolbitiaceae; we cannot confirm this on the information available.

10. P. coprophila (Bull. ex Fr.) Quél.

A very common fimicolous species, known from Europe, America and Asia, and reported from Australia by Cleland (1934). It is now thought to be hallucinogenic. Australian material was not studied by the authors of this paper. It appears to be rare in Australia (see note under *P. merdaria*).

11. P. cubensis (Earle) Sing.

A hallucinogenic pantropical species. From field observations made by one of us (R.W.) it seems that in Australia this annulate species is a complex of at least two forms. Guzmán is studying the variation found in this species the results of which will be included in his monograph of the genus.

12. P. echinata Clel.

No specimen seen although from the description it would not appear to be a *Psilocybe* sp.. It was described from Mount Lofty, South Australia. Willis (1963) records this species as if fairly common in Victoria 'clustered always on or about rotting wood and may be found in our moister forests from Autumn to Spring'.

13. P. ericaea (Pers. ex Fr.) Quél.

Recorded from W Australia and Victoria by Cooke (1892) under *Agaricus* (*Psilocybe*) *ericaeus* and identified recently from material collected in a dried-up marsh at Cannington, Western Australia (E). This species is now considered to be more correctly placed in *Hypholoma* (= *Naematoloma* of G.G.). The taxon has caused confusion even in Europe and three species are now distinguished: *H. ericaeum* with large spores, and non-yellow gills; *H. ericaeoides* P. D. Orton (= *H. ericaeum* sensu Kühner & Romagnesi, 1953), with yellow gills and basidiospores 9–12 × 6–7 μm; and *H. subericaeum* (Fr.) Kühn. (= *P. dichroa* sensu Lange, 1938) with spores 10 μm or less in length and non-yellow gills. Romagnesi (1976) has recently commented on the discrepancies in the published descriptions of this species. Cleland (1934) has described *P. subuda* which is also referable to this complex.

14. P. foenisecii (Pers. ex Fr.) Quél.

A widespread and well known species normally placed in *Panaeolus*. Involvement of this fungus in a case of poisoning is documented by Southcott (1974) based on material examined by one of us (R.W.); the ingestion of psilocybin or related compounds was suspected. Robbers, Tyler & Ola'h (1969) gave evidence for the presence of psilocybin in certain collections of this species.

15 P. merdaria (Fr.) Ricken

A very common and widespread species, reported by Cleland (1934) from South Australia and Cooke (1892), under *Agaricus* (*Stropharia*) *merdarius*, from Victoria, but no material has been seen by the authors of this paper. Both *P. coprophila* and *P. bullacea* have been confused with this species in the past.

16. P. musci Clel. & Cheel

A species of doubtful affinity; type not studied. It was originally described from Australia and has been recorded from New South Wales and South Australia.

17. P. nucisedus (Fr.) Mass.

Recorded from Queensland by Cooke (1892). Considered by Quélet, Maire & Rea (in Pearson, 1935), to represent *Tubaria inquilina* [= *Psilocybe inquilina* (Fr. ex Fr.) Bres.]. Certainly the fungus illustrated in Cooke's plate [609 (601)] would appear to represent a species in the '*Deconica*' complex; however, in our opinion *P. inquilina* differs in several minor characters, especially habitat preferences.

18. P. oedipus Mass.

A species of doubtful affinity described from Tasmania. The type is lost (in K there is only a spore-print and a drawing of the basidiocarp). Pegler (1965) finds the spores smooth, ellipsoid, 6·5–7·5 × 3·5–4 μm and typical of the Strophariaceae.

19. P. sarcocephala (Fr.) Sacc.

A European species, considered by modern authors to belong to the genus *Psathyrella*. Recorded by Cleland (1934) from New South Wales and South Australia, and Willis (1963) from Victoria. Certainly the descriptions of both Cleland and Willis fit the current European concept, although it must be emphasised that the vinaceous to pink gills of this fungus do not agree with Fries' original description of *Agaricus sarcocephalus*.

20. P. semilanceata (Fr. ex Secr.) Kummer

Recorded by McAlpine (1895) from New South Wales, by Shepherd and Hall (1973) for Victoria and collected by Watling in Tasmania (Mt Field National Park, grassy area of car park, 1 v 1974, *Watling* 10306 (E) (mixed collection; see *P. tasmaniana* below). A common, widespread, cosmopolitan agaric growing in base rich grasslands in both northern temperate (Europe, North America, etc.) and southern hemisphere (Central and Southern Chile, etc.) countries. Has been used extensively in Britain as a hallucinogenic drug and at least some collections have been shown to contain psilocybin (Hoffman, Heim & Tscherter, 1963; Benedict, Tyler and Watling, 1967).

The Tasmanian collection had a very slight bluish green flush at the stipe-base agreeing with what has been recognized in Europe as *P. semilanceata* var. *caerulescens* Cke. As shown by Watling (1967) and Watling & Richardson (1971), the separation of this form as a distinct variety is not tenable. However, Cooke's original plate of var. *caerulescens* is slightly different in gross morphology from *P. semilanceata*, and has been called *P. cookei* Singer; the specimens illustrated look very much like *P. callosa* (Fr.) Fr. as recently interpreted by Huijsman (1961).

21. P. spadicea (Schaeff. ex Fr.) Quél.

A European species transferred to *Psathyrella* by Singer (1951). Recorded by Cooke (1892) from both Victoria and Tasmania. The fungus is distinguished by its thick-walled, often encrusted, pleurocystidia; however, it is doubtful whether the presence of this character was verified in the Australian material.

22. P. squamosa (Pers. ex Fr.) P. D. Orton

Recorded by Cooke (1892) from New South Wales and Victoria under *Agaricus* (*Stropharia*) *squamosus*. Usually placed in *Stropharia* but removed because it lacks chrysocystidia.

23. P. stercicola Clel.

A species described from South Australia and recorded also from Tasmania (Cleland, 1934) and Victoria (Willis, 1963). Willis compared it with *Panaeolus foenisecii* (Pers. ex Fr.) Schroeter apud Cohn, and related the species to *Stropharia semiglobata* (Batsch) Fr. as its 'purple-spored cousin'. The latter is probably close to the truth as after a study of the type (AD) one of us (G.G.) considers it to belong to the genus *Naematoloma*.

24. P. subaeruginosa Clel.

A hallucinogenic species of *Psilocybe*, apparently endemic to the Australian mainland and Tasmania. It is close to the group of new species described in this paper. Cleland (1934) records it from South Australia, New South Wales and Victoria; Willis (1963) confirms its presence in Victoria. Some of the records may refer to or include as mixed collections, *P. eucalypta* and/or *P. australiana*. Two collections found in Tasmania by Watling (Mount Field National Park, pathside to Russell Falls in deep shade, i v 1974, *Watling* 10336 & 10387 (E)), agree well with the type (*Cleland* 13251, AD) from Mount Lofty, near Adelaide, South Australia.

This species should not be confused with *P. subaeruginascens* von Höhn. which, although in the same section of *Psilocybe*, possesses a distinct ring.

Picker & Rickards (1970), have studied the psychotomimetic agents in *P. subaeruginosa* but no voucher material was located at CANB to confirm their identification; their work might refer to one of the new species described in this paper.

A line drawing of this agaric is found in Cleland (1934, fig. 25) and a coloured illustration by M. I. Howie in Willis (1963).

25. P. subammophila Clel.

A species of doubtful affinity although possibly belonging to *Psathyrella*; no type seen. It was described from near Kinchina, Henley Beach, South Australia.

26. P. subuda Clel.

A species apparently widespread in South Australia; fresh collections supported by field data are urgently required. Unfortunately no type is available. See under *P. ericaea*.

27. P. subviscida (Peck) Kauff.

An American species close to *P. crobula* (Fr.) Sing.; it was not found by Watling whilst in Australia, and Cleland records it with some doubt.

28. Stropharia umbonatescens (Peck) Sacc.

An American species, recorded from South Australia and New South Wales by Cleland (1934). In Europe known under the synonym *Psilocybe luteonitens* (Vahl ex Fr.) Parker-Rhodes. No Australian material was seen by the authors of this paper.

It is worth noting that *Psilocybe kumaenorum* Heim was described by Heim (1967) from a moist grassy area in the Western Highlands of New Guinea. There is some similarity between the Highland flora of New Guinea and that of Eastern Australia, and therefore it is possible that this species will be found in the future. Relic pockets of Indo-Malaysian flora are found in Australia dotted along the Eastern Mountain chain, indeed both *P. eucalypta* and *P. australiana* are from such floristic areas. Heim's species is related to the North American *P. caerulipes* (Peck) Sacc. with which one of us (R.W.) is familiar. Heim also relates *P. caerulipes* and *P. kumaenorum* to several Mexican species.

Psilocybe longinqua Singer was described by Singer (1959) from a humus substrate on Macquarie Island in the Australian subantarctic. Unfortunately the type material said to be in LIL could not be located and so the true relationship of this species with those from Australia cannot be determined.

Descriptions of New Species

Psilocybe eucalypta Guzmán & Watling, **sp. nov** Fig. 1A-D.

Pileus 15–38 mm latus, convexus, obtuse umbonatus, sericeus, hygrophanus ad marginem striatus, ochraceo-brunneus vel ochraceus siccitate ochraceo-luteolo-fulvus. *Lamellae* adnatae purpureo-brunneae dein olivaceo-brunneae vel violaceo-griseae. *Stipes* 65–86 × 2–2·5 mm, albidus, ochroleucus vel fulvus, sericeo-fibrillosus, ad basim 4–5 mm latus conspicue albido-bubalinus, lanato-tomentosus, denique aerugineo-tinctus. *Basidia* 4-sporigera, 28–40 × 7·7–9·9 μm. *Basidiosporae* (9·3–)9·9–12(–13) × (6–)6·6–7·1 × 5·5–6·6 μm, ellipsoideae, leviter ovoideae. *Cystidia aciei* lamellarum ventricoso-fusiformia, 15–25 × 4·4–6·6 μm ad apices 3–4 × 1·5–2 μm; *cystidia faciei* lamellarum lageniformia 17–30 × 5·5–7·7 μm, hyalina. *Hyphae cuticulae* pilei filamentosae. *Fibulatae* adsunt.

Pileus 15–38 mm broad, convex expanded but with a central shallow umbo, silky, smooth but striate at the margin, brownish or bright ochraceous, hygrophanous, fading to dull fulvous or straw-colour. *Lamellae* adnate, purplish brown, then olive-brown or dark violaceous grey, with some margins whitish. *Stipe* 65–86 × 2–2·5 mm, 4–5 mm at the base, cylindric except for subbulbous base, whitish to tawny, covered with silky fibrils, woolly tomentose at the base with whitish buff mycelium, blueing or staining greenish principally at the base. *Context* whitish, probably caerulescent.

Basidia 28–40 × 7·7–9·9 μm, 4-spored, hyaline, cylindric-subpyriform, some with a median constriction. *Basidiospores* (9·3–)9·9–12(–13) × (6–)6·6–7·1 × 5·5–6·6 μm, nearly elliptic in side-view or ovate in face-view, smooth, with thick-wall, yellowish-brown in aqueous solutions of potassium hydroxide with a broad, flattened germ-pore. *Pleurocystidia* 17–30 × 5·5–7·7 μm, hyaline, lageniform, with very short necks, some with a subhyaline or

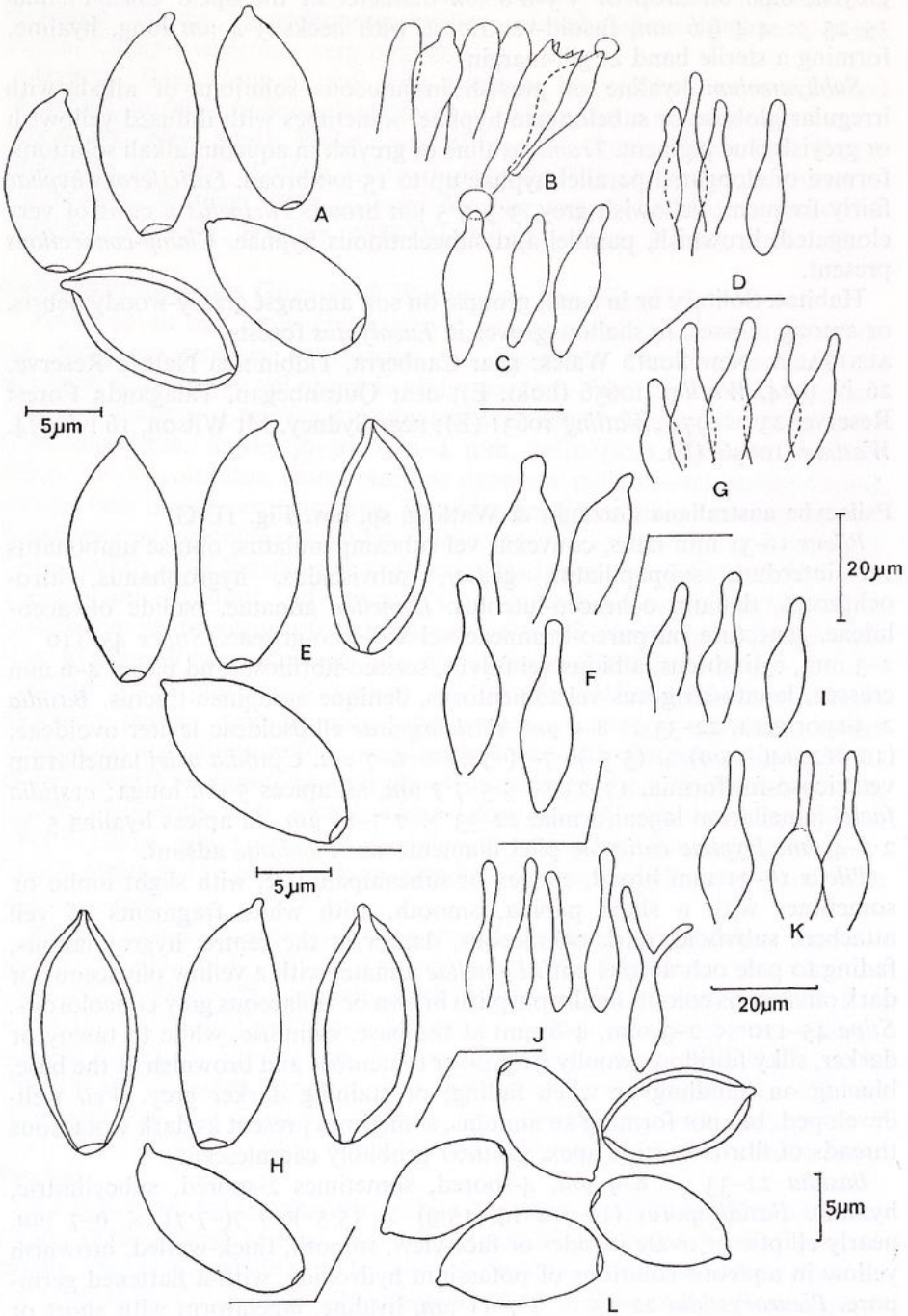

FIG. 1. A-D, *Psilocybe eucalypta*: A, spores; B, hymenium showing a basidium and pleurocystidia; C, pleurocystidia; D, cheilocystidia. E-G, *P. australiana*: E, spores; F, pleurocystidia; G, cheilocystidia. H-L, *P. tasmaniana*: H & L, spores; I, pleurocystidia; J & K, cheilocystidia (H-L from *Watling* 10714, K & L from *Watling* 10332).

greyish blue oil drop of 3·3–8·8 μm diameter at the apex. *Cheilocystidia* 15–25 × 4·4–6·6 μm, fusoid-ventricose with necks 3–4 μm long, hyaline, forming a sterile band at gill-margin.

Subhymenium hyaline or greyish in aqueous solutions of alkali with irregular globose or subelongate hyphae, sometimes with diffused yellowish or greyish blue pigment. *Trama* hyaline or greyish in aqueous alkali solutions, formed of elongated parallel hyphae up to 15 μm broad. *Laticiferous hyphae* fairly frequent, yellowish grey, 3·3–5·5 μm broad. *Pileipellis* a cutis of very elongated, brownish, parallel and subgelatinous hyphae. *Clamp-connections* present.

Habitat. Solitary or in small groups, on soil amongst grassy-woody debris, or among mosses, in shallow groves in *Eucalyptus* forests.

AUSTRALIA. New South Wales: near Canberra, Tidbinbilla Nature Reserve, 26 iv 1974, *Watling* 10656 (holo. E); near Queanbegan, Talaganda Forest Reserve, 23 iv 1974 ,*Watling* 10631 (E); near Sydney, Mt Wilson, 16 iv 1974, *Watling* 10656 (E).

Psilocybe australiana Guzmán & Watling, **sp. nov.** Fig. 1E-G.

Pileus 16-31 mm latus, convexus vel subcampanulatus, obtuse umbonatus vel interdum subpapillatus, glaber, subviscidus, hygrophanus, atro-ochraceus, demum ochraceo-luteolus. *Lamellae* adnatae, pallide olivaceo-luteae, senectute purpureo-brunneae vel violaceo-griseae. *Stipes* 45–110 × 2–3 mm, cylindricus, albidus vel fulvus, sericeo-fibrillosus, ad basim 4–6 mm crassus, lanato-strigosus vel tomentosus, denique aerugineo-tinctus. *Basidia* 2–4-sporigera, 22–33 × 8–9 μm. *Basidiosporae* ellipsoideae leviter ovoideae, (10–)12–14(–15·9) × (5·5–)6·7–7(–7·7) × 6–7 μm. *Cystidia aciei* lamellarum ventricoso-fusiformia, 17–23 × 5·5–7·7 μm, ad apices 5 μm longa; *cystidia faciei* lamellarum lageniformia, 22–33 × 7·7–11 μm, ad apices hyalina 5 × 2·5–4 μm. *Hyphae cuticulae* pilei filamentosae. *Fibulatae* adsunt.

Pileus 16–31 mm broad, convex or subcampanulate, with slight umbo or sometimes with a short papilla, smooth, with white fragments of veil attached, subviscid, dark ochraceous, darker at the centre, hygrophanous, fading to pale ochraceous buff. *Lamellae* adnate, with a yellow olivaceous or dark olivaceous colour, finally purplish brown or violaceous grey concolorous. *Stipe* 45–110 × 2–3 mm, 4–6 mm at the base, cylindric, white to tawny or darker, silky fibrillose, woolly strigose or tomentose and brownish at the base, blueing on handling or when fading, or staining darker grey. *Veil* well-developed, but not forming an annulus, sometimes present as dark violaceous threads of fibrils at stipe apex. *Context* probably caerulescent.

Basidia 22–33 × 8–9 μm, 4-spored, sometimes 2-spored, subcylindric, hyaline. *Basidiospores* (10–)12–14(–15·9) × (5·5–)6·7–7(–7·7) × 6–7 μm, nearly elliptic or ovate in side- or face-view, smooth, thick-walled, brownish yellow in aqueous solutions of potassium hydroxide, with a flattened germ-pore. *Pleurocystidia* 22–33 × 7·7–11 μm, hyaline, lageniform with short or long necks up to 5 × 2·5–5 μm, rare, or more or less abundant towards gill-edge. *Cheilocystidia* 17–23 × 5·5–7·7 μm, fusoid ventricose with necks of no more than 5 μm long, some with a hyaline oil drop at the apex; forming a sterile band at gill-margin.

Subhymenium of yellowish orange hyphae with irregularly encrusted walls. *Trama* hyaline, more or less parallel. *Laticiferous* hyphae more or less

common, yellowish 5–6 μm broad. *Pileipellis* a cutis of parallel and gelatinized brownish hyphae. *Hypodermium* hyaline, of subglobose hyphae 4–9 μm broad. *Clamp-connections* very common.

Habitat. Gregarious on soil with wood or leafy debris, on tracks and roadsides, in *Pinus radiata* plantations, or in temperate rain forests.

AUSTRALIA. New South Wales: near Canberra, Cotter Dam, Blue Range Block, 23 iv 1974, *Watling* 10617 (holo. E); Tidbinbilla Nature Reserve, 26 iv 1974, *Watling* 10577 (E) and *Watling* 10549 (E); near Sydney, Mt Wilson, 16 iv 1974; *Watling* 10888 (E) and 10 iv 1974; *Watling* 10962 (E).

Psilocybe tasmaniana Guzmán & Watling, **sp. nov.** Fig 1H-L.

Pileus 10–20 mm latus, convexus vel subcampanulatus, glaber, interdum ad marginem striatus, subviscidus, ad marginem primo velo fibrilloso, adpresse squamuloso vel appendiculato, aurantio-fulvus, siccitate ochraceo-luteolo-bubalinus. *Lamellae* late adnatae, brunneo-violaceae, ad acies albidae denticulataeque. *Stipes* 40–50 × 1–2 mm, cylindricus, sericeo-fibrillosus, albus vel concoloratus, dein praecipue deorsum pallido—vel melleo-fuscus, rariore basi leviter aeruginascens. *Basidia* 4-sporigera, 22–33 × 5·5–9·9 μm. *Basidiosporae* ellipsoideae vel subovoideae, (10–)12–13(–15·4) × 7·1–7·7(–8·8) μm. *Cystidia aciei* lamellarum ventricoso-fusiformia vel bifurcata 22–33 × 4·4–9·9 μm, hyalinus, ad apicem 5–11 × 1·6–3·3 μm; *cystidia faciei* lamellarum ventricoso-fusiformia 19–24 × 6·6–8·8 μm, ad apices 1·6–2·7 μm lata, hyalina. *Hyphae cuticulae* pilei filamentosae. *Fibulatae* adsunt.

Pileus 10–20 mm broad, convex or subcampanulate, glabrous, without umbo or papilla, smooth, sometimes striate at margin, subviscid, tawny orange, drying dull or ochraceous straw-colour, with marginal whitish flecks of veil, or veil remaining as appendiculate particles. *Lamellae* broad, adnate, brown violaceous with whitish edges. *Stipe* 40–50 × 1–2 mm, cylindric, silky fibrillose, white to almost concolorous with pileus not, or only slightly, bluish green at the base, lacking annulus. *Context* pallid; odour and taste not recorded.

Basidia 22–33 × 5·5–9·9 μm, 4-spored, hyaline, subcylindric. *Basidiospores* (10–)12–13(–15·4) × 7·1–7·7(–8·8) μm, elliptic in side-view or subovate in face-view, smooth, thick walled, brownish yellow, darker in aqueous solutions of potassium hydroxide, with apical germ-pore. *Pleurocystidia* 19–24 × 6·6–8·8 μm, hyaline, fusoid-ventricose with short necks 1·6–2·7 μm diameter, more or less distributed towards gill-edge. *Cheilocystidia* 22–33 × 4·4–9·9 μm, hyaline, fusoid-ventricose with long necks of 5–11 × 1·6–3·3 μm, some bifurcate and others with a hyaline oil drop at the top.

Subhymenium with brownish yellow pigment irregularly distributed in hyphal wall. *Trama* hyaline, formed of parallel elongated hyphae 4–6 μm broad. *Pileipellis* gelatinised, formed of parallel, brownish yellow hyphae no more than 3 μm broad. *Hypodermium* with hyaline, subglobose hyphae 5–10 μm diameter.

Habitat. Solitary or in small groups on dung, or at least on debris (wood and leaves) intermixed with dung (some collections were made on dung which was probably of kangaroo), in *Eucalyptus* forests.

AUSTRALIA. Tasmania: NE of Hobart, Nugent, Buckland, 2 v 1974, *Watling* 10393 (holo. E), *Watling* 10332 (E); Mt Field National Park (in grassy area

under trees with *Psilocybe semilanceata*), i v 1974, *Watling* 11993 (E). New South Wales; near Canberra, Tidbinbilla Nature Reserve, 27 iv 1974, *Watling* 10714 (E).

Discussion

NEW SPECIES. *Psilocybe australiana*, *P. eucalypta* and *P. tasmaniana* are close to the hallucinogenic *P. subaeruginosa* Clel.; a comparison of the microscopic characters of all species is made in Table I. The presence of brownish grey pleurocystidia is the principal feature separating Cleland's species from the three new species. *P. australiana* and *P. eucalypta* are very similar to each other whilst *P. tasmaniana* resembles *P. coprophila* (Bull. ex Fr.) Kummer.

TABLE I

MICROSCOPIC CHARACTERS OF FOUR AUSTRALIAN EXANNULATE SPECIES OF PSILOCYBE

	P. subaeruginosa	*P. eucalypta*	*P. australiana*	*P. tasmaniana*
HABITAT	decaying leaves	soil with wood debris	wood debris or leafy debris	dung
SPORE				
length μm	(11-)13·2-14·3(-16·5)	(9·3-)9·9-12(-13)	(10-)12-14(-15·9)	(10-)12-13(-15·4)
breadth μm	6·6-7·7	(6-)6·6-7·1	(5·5-)6·6-7(-7·7)	7·1-7·7(-8·8)
width μm	6·7	5·5-6·6	6-7	7·1-7·7(-8·8)
PLEURO-CYSTIDIA	hyaline and brownish grey	hyaline	hyaline	hyaline
length μm	24-47·3	17-30	22-33	19-24
breadth μm	8·8-16·5.	5·5-7·7	7·7-11	6·6-8·8
CHEILO-CYSTIDIA	neck short, 4 μm, or less, simple	neck short, 5 μm or less, simple	neck short, 4 μm or less, simple	neck long, more than 5 μm, often bifurcate
length μm	26-29	15-25	17-23	22-33
breadth μm	8-11	4·4–6·6	5·5-7·7	4·4-9·9

P. tasmaniana is apparently close to *P. fuegiana* (Horak) Sing. and *P. angustispora* Smith, the former from Tierra del Fuego, Argentina, and the latter from north west United States. These three species are coprophilous and belong to the *P. coprophila* group which at one time was separated together with the *P. montana* (Pers. ex Fr.) P. D. Orton group into the genus *Deconica* (W. G. Smith) Karst.; see Dennis, Orton and Hora (1960). This separation is, however, no longer tenable.

P. australiana and *P. eucalypta* both have hyaline pleurocystidia and resemble the African *P. mairei* Singer in general facies; the morphology of the cystidia, however, separates them from *P. subaeruginosa*. The fungus reported by Hall (1973) and Southcott (1974) as *P. collybioides* Singer and Smith from mainland Australia and Tasmania is probably *P. australiana* or *P. eucalypta*, or even *P. subaeruginosa*; unfortunately no description was given and herbarium material was not cited.

SIGNIFICANCE OF PLEUROCYSTIDIA. The occurrence of brown pleurocystidia in *Psilocybe subaeruginosa* mentioned above draws *Psilocybe* closer than ever before to *Naematoloma* (= *Hypholoma* of R.W.) which is characterised by the presence of chrysocystidia. *Psilocybe* spp. are generally considered to lack chrysocystidia but Singer (1972) has recently described the section *Chrysocystidiatae* where pleurocystidia similar in shape to chrysocystidia are present although they lack amorphous contents which yellow in aqueous potassium hydroxide solutions. The presence of dark pleurocystidia is perhaps a primitive feature and apparently is not found in any of the boreal or temperate members of the genus.

HALLUCINOGENIC SPECIES. *Psilocybe cubensis*, *P. semilanceata* and *P. subaeruginosa* and dubious records of *P. collybioides* are the only reportedly hallucinogenic species of *Psilocybe* from this area of the world, but the three new species described here, because of their closeness particularly to *P. subaeruginosa*, might be suspected to possess psychoactive compounds.

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