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Type studies of six Australian and one New Zealand *Lactarius* species (Basidiomycota, Russulaceae)

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Abstract – The type specimens of *Lactarius clarkeae* Clel., *L. clelandii* Grgur., *L. eucalypti* O.K. Mill. & R.N. Hilton, *L. mea* Grgur., *L. subclarkeae* Grgur. and *L. wirrabara* Grgur., all described from Australia, and *L. sepiaceus* McNabb, described from New Zealand, are studied. Microscopical characters are described and illustrated.

Taxonomy / type studies / Australian milkcaps / micromorphology

INTRODUCTION

Compared to their presence on other continents, agaricoid representatives of the genus *Lactarius* are rather poorly represented in Australia. Six species have been described so far. The first species *L. clarkeae* (as *L. clarkei*) was described by J.B. Cleland in 1927. Miller & Hilton (1987) described *L. eucalyptii* from Western Australia and in her book Larger Fungi of South Australia, Grgurinovic (1997) described four more new species. The latter four species are all based on the old collections of Professor Sir John Burton Cleland, making microscopic study of these type specimens quite difficult. No *Lactarius* species described from other continents are known to occur in Australia, except for *L. deliciosus* (L.:Fr.) Gray, growing with introduced *Pinus* (Nuytinck 2005) and *L. necator* (Bull.:Fr.) Pers. growing with *Betula* (Grgurinovic, 1997).

As for many other ectomycorrhizal fungi on this continent, the hypogeous taxa are more common than the epigeous ones (Bougher & Lebel, 2001) and several *Zelleromyces* and *Arcangeliella* species were described from Australia. Future molecular studies may eventually demonstrate that these hypogeous taxa should also be transferred in the genus *Lactarius*.

MATERIAL AND METHODS

The type specimens studied are deposited in the State Herbarium of South Australia, Adelaide (AD), in the herbaria of the University of Adelaide (ADW), the University of West Australia, Perth (UWA) and at Landcare Research, Auckland (PDD).

Microscopic features were studied from the dried material mainly in Congo-red in L4 after pretreatment in a 10% aqueous potassium hydroxide solution. Depending on the quality of the material, the material was pretreated up to

48 hours. Short heating of the material was also necessary after transferring it in Congo-red. Spore ornamentation is described and illustrated as observed in Melzer's reagent. For details on terminology we refer to Verbeken (1998) and Verbeken & Walleyn (2010). Line-drawings were made by A. Verbeken with the aid of a drawing tube at original magnifications of 6000 × for spores and 1000 × for individual elements and sections. Basidia length excludes sterigmata length. Spores were measured in side view in Melzer's reagent, excluding the ornamentation, and measurements are given as [AVa-2*SD] - *AVa* - [AVa + 2*SD] in which AVa = mean value for the measured collection and SD = standard deviation. Q stands for "quotient length/width" and is given as MINQ - *AvQ* - MAXQ in which AvQ stands for the mean quotient for the measured spores.

RESULTS

1. *Lactarius clarkeae* Clel., Trans. Roy. Soc. South Australia 51: 302 (1927) Fig. 1

Original diagnosis: Pileus 3 ins. (7.5 cm) in diameter, infundibuliform, matt, reddish-fawn. Gills adnate, moderately close, pallid becoming spotted and discoloured brown. Stem short, 3/4 in (18 mm) high, stout, 9/16 in (16 mm), expanded towards the pileus, attenuated downwards, solid, colour of the pileus, milk white. Taste mild. Spores slightly angular, 8 µm. S.A.-Mount Lofty, June, 1927.

Lectotypus: Australia: Mount Lofty, Cleland 16-6-1917 (ADW 15299).

Type study: **Spores** 7.0-*8.1*-9.1 × (5.5)5.7-*6.6*-7.6 µm (Q = 1.03-*1.22*-1.37, n = 20), broadly ellipsoid, sometimes subglobose; ornamentation amyloid, composed of mainly isolated, subglobose to irregular warts, up to 0.5 µm high, sometimes aligned or connected by fine lines; plage not amyloid. **Basidia** 70-90 × 8-10 µm, 4-spored, long and narrowly cylindric to slightly subclavate; sterigmata long (up to 12 µm) and broad (up to 3 µm). **Pleuropseudocystidia** moderately abundant, 4-6 µm diam., cylindrical, slightly tortuous, sometimes moniliform. **Pleuromacrocystidia** not observed. **Lamella edge** sterile; marginal cells 35-55 × 3-6 µm, hyaline, thin-walled, very irregularly shaped, tortuous and sometimes branching. **Hymenophoral trama** cellular, composed almost entirely of sphaerocytes and few hyphae. **Pileipellis** a palisade, 150-200 µm thick; subpellis cellular, composed of globose cells which are up to 40 µm diam. and are sometimes slightly thick-walled; elements of suprapellis 40-70 × 4-7 µm, long, narrow, cylindrical, sometimes slightly thick-walled; walls refringent.

Observations: This species is also recorded from New Zealand, where it grows solitary or occasionally gregarious under *Leptospermum* (McNabb, 1971).

In his original description Cleland mentions no other microscopic features than "spores slightly angular, 8 µm"; the angular aspect is undoubtedly caused by the warts when not observed in Melzer's reagent. The spores are in bad condition; most of them are collapsed.

We did not observe true pleurocystidia. The pleurocystidia described by Grgurinovic as "scattered, similar to cheilocystidia" are probably the pleuropseudocystidia which are rather abundant and often have a somewhat moniliform or knotty apex, thus reminiscent of the very irregularly shaped marginal cells.

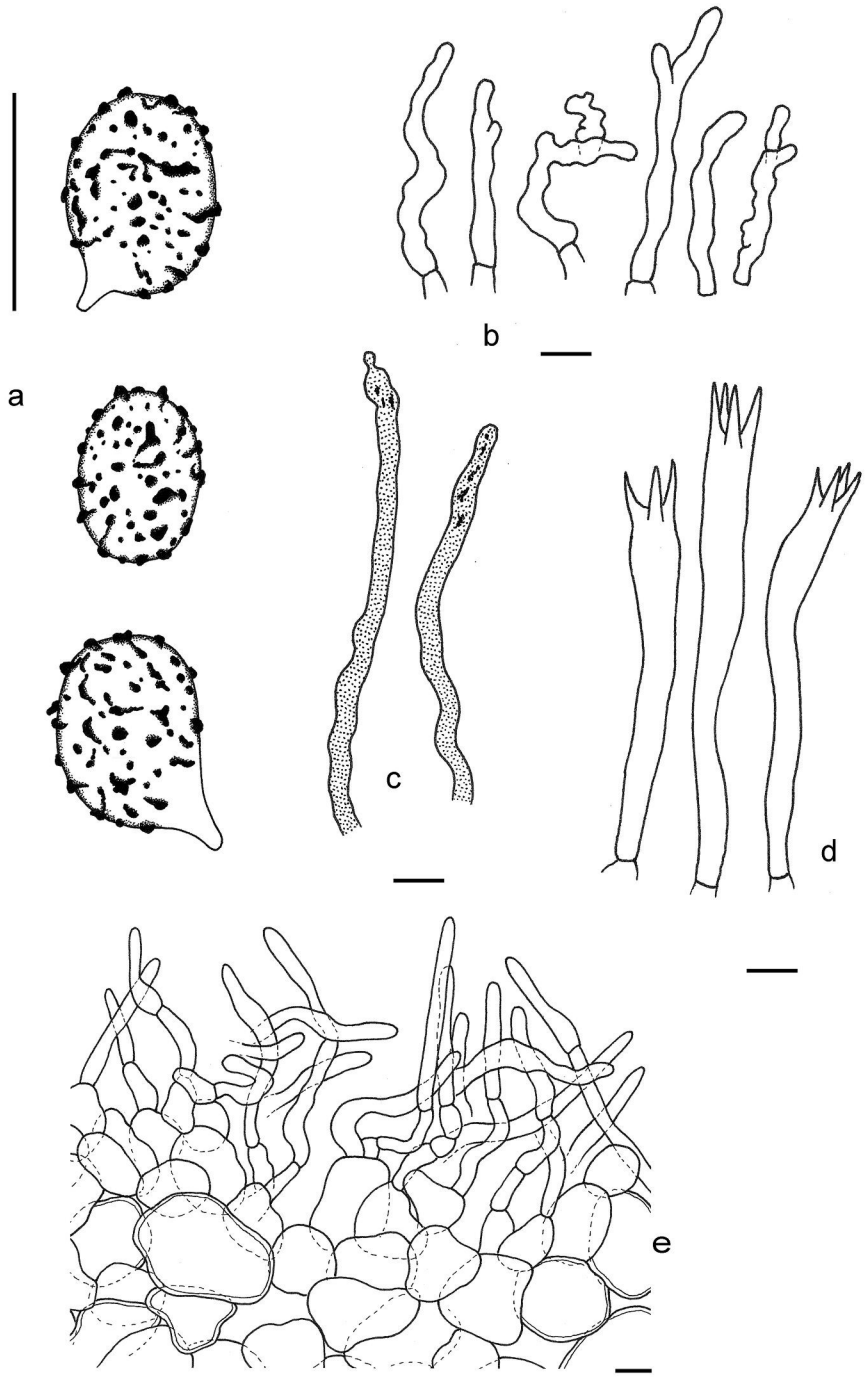

Fig. 1. *Lactarius clarkeae* (Holotypus): a. spores, b. marginal cells, c. pleuropseudocystidia, d. basidia, e. section through the pileipellis (scale bar = 10 µm).

Lalli & Pacioni (1992) use the presence of clavate and thin-walled hymenial cystidia in their key of representatives of *L.* sect. *Lactifluus* to key out *L. clarkeae*, but they do not mention cystidia in their description based on the type material. Also McNabb (1971) mentions pleurocystidia for this species but this probably concerns again the pseudocystidia as suggested by his drawings.

Systematic position: In his study of *Lactarius* in New Zealand, McNabb (1971) explains that the original type material of *L. clarkeae* (South Australia, Mt Lofty, June 1927) could not be traced in Cleland's herbarium and that the paratypes represent different species, one with warty and one with reticulate spores. ADW15299, the one with warty spores, was selected by McNabb as a lectotype for *L. clarkeae*. Grgurinovic (1997) states it might even be possible that this is the holotype because the collection notes agree perfectly with the protologue and there might have been a typographical error.

Heim (1955: 67) mentioned that the species is closely related to *L. volemus* and possibly identical with *L. rugatus*, and that it might be confused with *Russula flocktonae* Clel. & Cheel. (by the tomentose to villose pileus) if it were not for the lack of latex in the latter; this resemblance is also mentioned in the original description (Cleland, 1927: 302). Kühner & Romagnesi (1953) also consider *L. clarkei* and *L. rugatus* as probable synonyms. These findings are based on the material with reticulate spores. The reticulate spored species that was represented in Cleland's paratypes is later described by Grgurinovic as *L. mea* (Grgurinovic 1997; it is confusing that she writes under *L. clarkeae* that "*Heim's interpretation of L. clarkeae was based on the species now named L. clelandii*" – according to her notes under *L. clelandii* and *L. mea*, she means *L. mea* here).

McNabb (1971) raises a new section *L.* sect. *Tomentosi* to accommodate *L. clarkeae*). Singer (1975) doubtfully placed this species in *L.* sect. *Dulces* Heim ex Singer subsect. *Lactifluini* (Burl.) Singer. Lalli & Pacioni (1992) accept the species in *L.* sect. *Lactifluus* (Burl.) Hesler & A.H. Sm.

Macroscopical features, spore ornamentation and a palisade as pileipellis structure make this species fit well in *L.* subgenus *Lactifluus*. Although many species in this subgenus are characterized by remarkable and thick-walled pleurocystidia, species without pleurocystidia are also known (Verbeken & Walleyn, 2010).

2. *Lactarius clelandii* Grgur., Larger Fungi of South Australia: 56 (1997) Fig. 2

Original diagnosis: Pileus usque ad 38 mm diametro, convexus, primo breviter umbonatus tandem infundibularis, porphyreus usque atroporphyreus atrohepaticusve, interdum parum decurrentes, moderate confertae, interdum bifurcatae, ex bubalinio-albis, porphyrescentes. Stipes usque ad 51 mm longus, sursum aliquantum attenuatus, crassiusculus interdum cavescens, pileo concolor, interdum velutinoalbidus ad basim. Sapor mitis, ardesculentis. Sporae 7.0-10.3 (= 8.2) × 5.6-7.9 (= 6.7) µm, late ellipsoideae, reticulo robusto plus minusve effecto ornatae.

Holotypus: New South Wales, Neutral Bay, Sydney, 19.v.1912 & 12.vi.1912, AD 9791 (AD).

Type study: **Spores** mostly broadly ellipsoid, sometimes subglobose, 6.2-*7.3*-8.3 × 5.4-*6.2*-6.9(7.2) µm (Q = 1.11-*1.19*-1.30, n = 20); ornamentation amyloid, composed of ridges up to 1 µm high, forming a subcomplete reticulum; some short isolated ridges or warts present; plage not amyloid. **Basidia** 40-55 × 7-10 µm, 4-spored, very small and slender; sterigmata 5-8 × 1-2 µm. **Pleuropseudocystidia** very rare, 5-6 µm diam., cylindrical, not emergent. **Pleuromacrocystidia** present

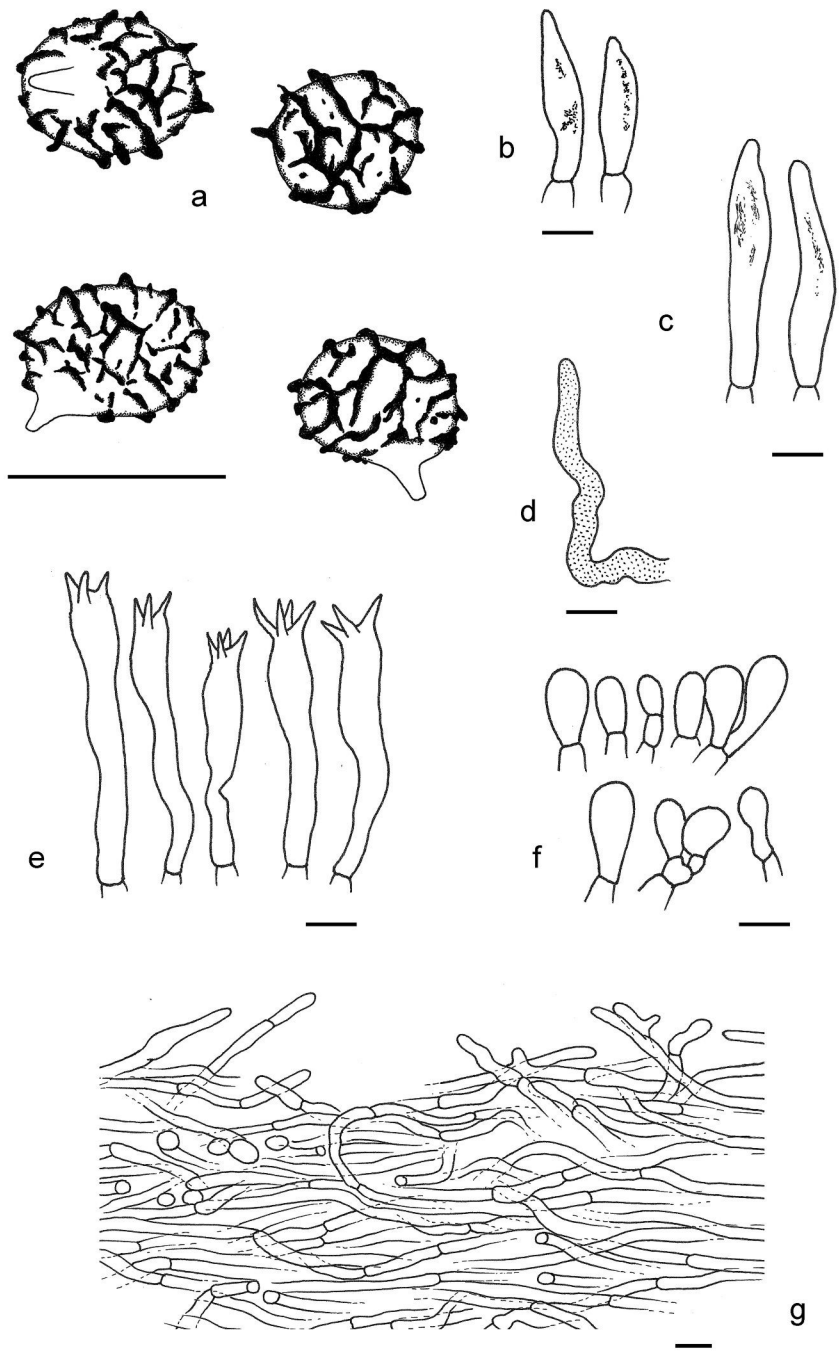

Fig. 2. *Lactarius clelandii* (Holotypus): a. spores, b. cheilomacrocystidia, c. pleuromacrocystidia, d. pleuropseudocystidium, e. basidia, f. marginal cells, g. section through the pileipellis (scale bar = 10 µm).

but scarce, 40-50 × 7-9 µm. **Lamella edge** sterile; marginal cells and cheilomacrocystidia present; marginal cells broadly clavate, 8-20 × 4-10 µm, thin-walled, hyaline; cheilomacrocystidia fusiform, 25-35 × 7-9 µm. **Hymenophoral trama** composed of sphaerocytes and hyaline hyphae. **Pileipellis** a cutis to trichoderm, dry, 60-100 µm thick, composed of mainly repent hyphae but with locally short, oblique or anticline, terminal elements; terminal elements 12-25 × 3-5 µm, cylindrical, sometimes with lateral short branching, with rounded apex, hyaline and thin-walled.

Observations: Grgurinovic (1997) mentions in her original description that she did not observe pseudocystidia nor macrocystidia, but that pleurocystidia are scattered. The pleurocystidia that we observed are of the macrocystidial type with a slightly granular to needle-like content and we also observed pseudocystidia after rather long treatment in aqueous potassium hydroxide.

True pileocystidia are absent. The pileocystidia in the original description are in fact the normal terminal elements of the pileipellis hyphae.

Systematic position: The species belongs in *L.* subgenus *Russularia*. The regular trichoderm as a pileipellis structure and the reddish brown colour of the pileus indeed suggest a connection with *L. rufus* as suggested by Grgurinovic (1997). She mentions that the absence of pseudocystidia also argues for a placement in *L.* sect. *Russularia*, but all *Lactarius* species have pseudocystidia and we also observed them in this species. The type of pleuro- and cheilomacrocystidia is in concordance with those in typical representatives of the subgenus. Also the clavate marginal cells occur in other *Russularia* species.

3. *Lactarius eucalypti* O.K. Mill. & R.N. Hilton, Sydowia 39: 127 (1987) Fig. 3

Original diagnosis: Pileus 18-31 mm latus, cum late convexus tum planus, cum humidus tum paulum viscidus, rufus. Lamellae decurrentes, subdistantes, lamellulis brevibus alternantes, eburneae. Stipes 30-60 mm longus, 4-5 mm latus, aequalis vel ad basim parum expansus, aridus, levis, rufus. Sapor mitis. Odor nullus. Sporae 6.5-9.5 × 6.8-8.5 µm, cum globosae tum subglobosae, reticulo partiale humilique (0.5 µm) instructae, amyloideae. Pleurocystidia cheilocystidiaque, 35-45 × 7.5-9 µm, fusiformia, saepe apice rotundato instructa, tenuiter tunicata, hyalina in solutione Melzeri immersa, numerosa. Caulocystidia absentia. Cutis pilei ixomixocutis est hyphis hyalinis 3.4-6(-8) µm composita.

Typum legit R. Hilton & L. O. Hilton, UWA 2341, in silvis Eucalypti marginatae Sm. nec non Eucalypti calophyllae R. Br., Denmark, Church Rd., June 1979, Western Australia (UWA).

Type study: **Spores** subglobose to broadly ellipsoid, 6.7-*7.4*-8.1(8.3) × 5.9-*6.4*-6.9 µm (Q = 1.07-1.15-1.29, n = 20); ornamentation amyloid, up to 1(2) µm high, forming a subcomplete reticulum, with some locally high and acute ridges; isolated warts and short ridges occasionally present; plage not amyloid. **Basidia** 4-spored, occasionally 2-spored, subclavate, 45-55 × 11-13 µm. **Pleuropseudocystidia** abundant, narrowly cylindrical to irregular and often branched, 4-6 µm diam. **Pleuromacrocystidia** abundant, broadly fusiform, with tapering to somewhat moniliform apex, with somewhat needle-like content. **Lamella edge** sterile; marginal cells subclavate to irregularly and shortly cylindrical, 7-20 × 5-8 µm, hyaline; cheilomacrocystidia irregularly fusiform, with slightly needle-like content, 20-25 × 6-8 µm. **Pileipellis** a loose and intricate trichoderm with cylindrical to somewhat inflated hyphae; terminal elements 17-40 × 3-7 µm, thin-walled, hyaline.

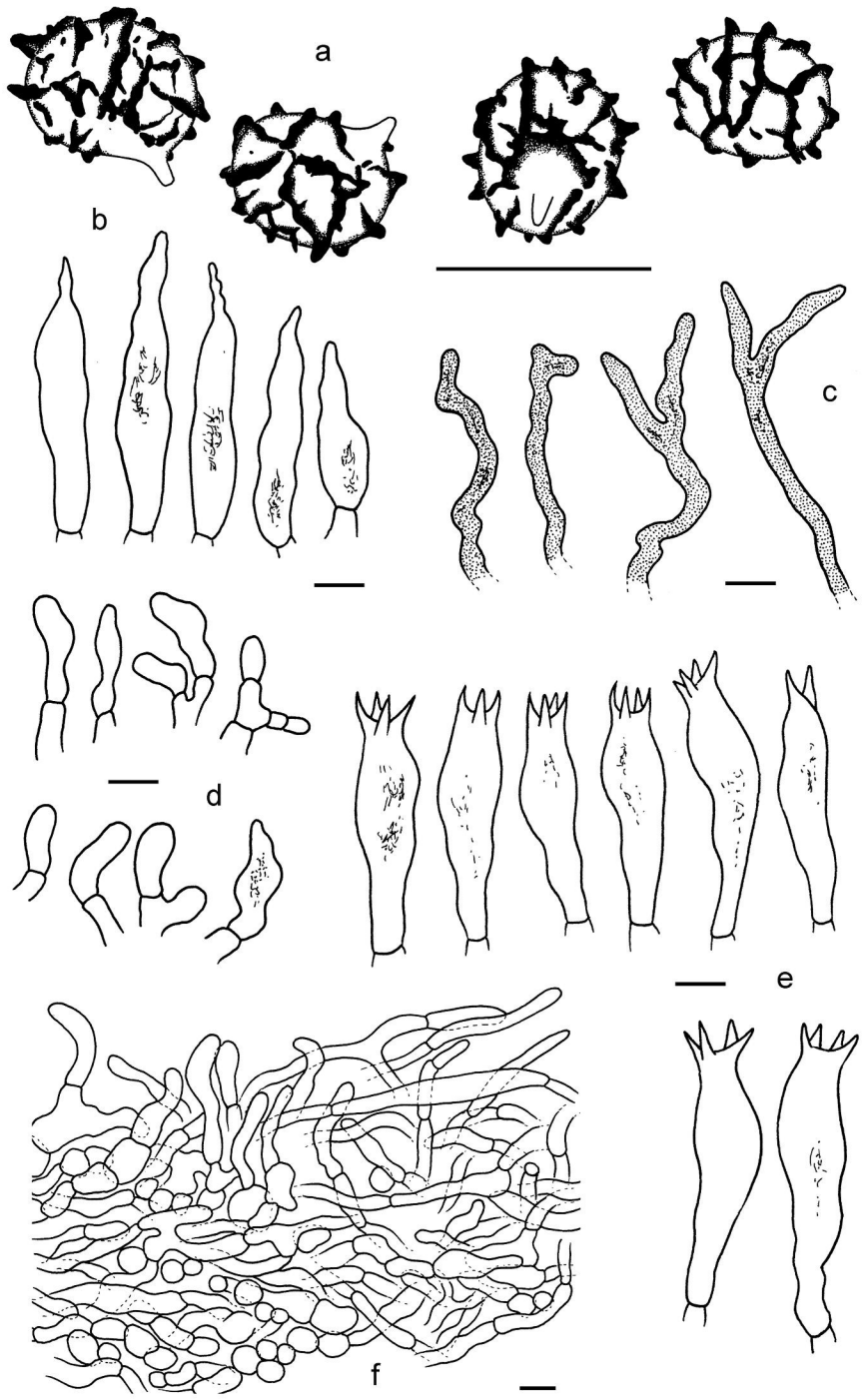

Fig. 3. *Lactarius eucalypti* (Holotypus): a. spores, b. pleuromacrocystidia, c. pleuropseudocystidia, d. marginal cells, e. basidia, f. section through the pileipellis (scale bar = 10 μm).

Observations: Our spore measurements result in lower values that those mentioned in the original description. Some giant spores were observed but not included in the measurements because rare and obviously generated by the occasional 2-spored basidia. Besides the abundant pleuromacrocystidia which are also mentioned in the original description, the species is also characterized by abundant and emergent pleuropseudocystidia. These pseudocystidia are often branched which is not common in the subgenus. Hyphae in the pileipellis are observed to be thin-walled and not thick-walled as mentioned by Miller & Hilton (1987), a slime layer is hardly present.

Systematic position: The trichodermal structure of the pileipellis and the reddish brown to reddish colors suggest a placement in *L.* subgenus *Russularia*.

4. *Lactarius mea* Grgur., Larger Fungi of South Australia: 58 (1997) Fig. 4

Original diagnosis: Pileus usque ad 51 mm diametro, irregulariter convexus, saepe in centro aliquam depressus, subtomentosus, inter porphyreus et brunneus, siccitate paene pallide aurantiacus. Lamellae adnatae usque adnato-decurrentes, moderate confertae paene pallide aurantiacae, coloribus, pilei tinctescentes. Latex albus. Stipes usque ad 38 mm longus, aequalis vel deorsum attenuatus, moderate crassus, subtomentosus, solidus cavusve, pileo concolor. Sporae 7.4-9.5 (= 8.3) × 6.4-8.0 (= 7.2) µm, late ellipsoideae usque subglobosae, reticulo plus minusve effecto ornatae.

Holotypus: South Australia, Mt Lofty, 25.iv.1925, AD 9800 (AD).

Type study: **Spores** subglobose, sometimes globose, to broadly ellipsoid, 7.4-*8.2*-8.9(9.1) × 6.4-*7.1*-7.9(8.1) µm (Q = 1.01-*1.15*-1.25, n = 20); ornamentation amyloid, composed of ridges up to 1 µm high, forming a subcomplete reticulum; short isolated ridges and warts present but scarce; plage distally amyloid. **Basidia** 45-50 × 11-15 µm, rather short, but broad, 4-spored; sterigmata rather short (up to 7 µm). **Pleuropseudocystidia** scarce, 3-5 µm diam., cylindric, with obtuse apex. **Pleuromacrocystidia** abundant, 60-70 × 7-11 µm, fusiform, with tapering, often moniliform apex, with needle-like content, thin-walled. **Lamella edge** sterile; marginal cells 7-20 × 3-6 µm, cylindrical, hyaline, thin-walled. **Pileipellis** a cutis, without slime layer, 40-70 µm thick, composed of repent, interwoven hyphae which are 3-5 µm diam. and thin-walled.

Observations: The type material is in rather bad condition but after a long treatment in aqueous potassium hydroxide, the hymenial cells and lamellar edge could be observed clearly. In the original description, Grgurinovic (1997) mentions that there are scattered cheilocystidia and scattered pleurocystidia, but that pseudocystidia and macrocystidia are not observed. This makes no sense to us since there are abundant pleurocystidia and these are clearly of the macrocystidial type. As always in *Lactarius,* there are also pleuropseudocystidia though they are scarce. As for the lamella edge, we did not observe any cheilomacrocystidia.

Systematic position: The species is based on one of the paratypes of Cleland's *L. clarkeae* (see under this species), but is not at all related to *L. clarkeae*. *L mea* belongs to *L.* subgenus *Russularia*. The dry cutis as a pileipellis structure, the reddish brown colours and the abundant presence of macrocystidia fit very well for this subgenus.

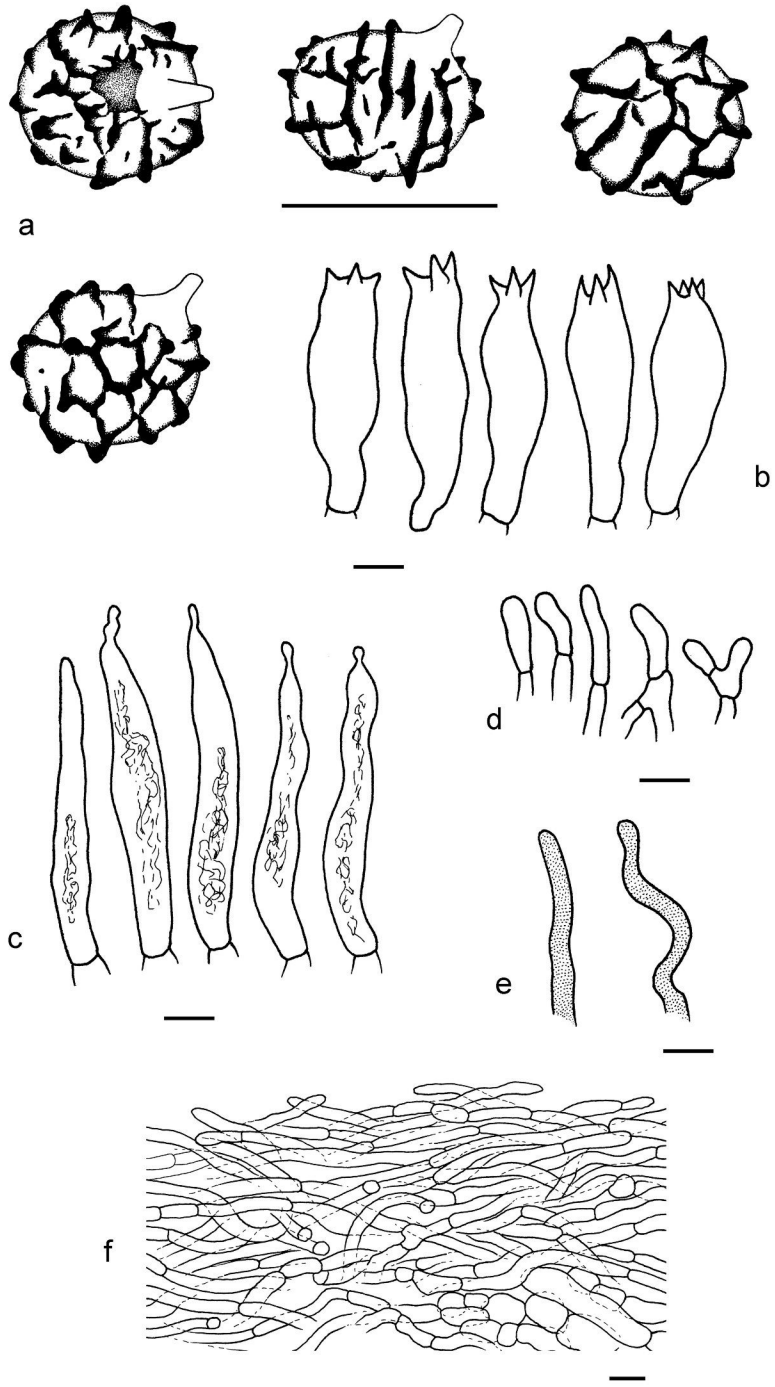

Fig. 4. *Lactarius mea* (Holotypus): a. spores, b. basidia, c. pleuromacrocystidia, d. marginal cells, e. pleuropseudocystidia, f. section through the pileipellis (scale bar = 10 μm).

5. *Lactarius subclarkeae* Grgur., Larger Fungi of South Australia: 63 (1997) Fig. 5

Original diagnosis: Pileus usque ad 89 mm diametro, irregulariter convexus, in centro depressus, laevis, usque pruinoideus, fissuratulus, ex pallide armeniacohinnuleus vel brunneus, margine saepe porphyreo, incurvato. Lamellae adnatae, interdum parum decurrentes, confertae usque moderate distantes, lamellulatae, saepe bifurcatae vel anastomosantes, albidae usque eburneae, lente maculatescens vetustate vel si contusae. Latex lacteus, insipidus. Stipes usque ad 57 mm longus, crassus, deorsum aliquantum attenuatus, albus usque porphyreus, pruinoideus, Sporae 6.2-9.0 (= 7.4) × 5.2-7.8 (= 6.1) µm, late ellipsoideae, reticulo tenui plus minusve effecto ornatae.

Holotypus: New South Wales, Bradleys Head, Sydney, 13.iv.1917, AD 9807 (AD).

Type study: **Spores** broadly ellipsoid, sometimes subglobose, 6.3-*7.2*-8.0 × 5.3-*6.2*-6.9 µm (Q = 1.08-*1.17*-1.32, n = 20); ornamentation amyloid, composed of rounded to irregular warts, up to 0.5 µm high, often connected by fine and low lines, sometimes forming an incomplete reticulum; plage not amyloid. **Basidia** 60-70 × 8-10 µm, 4-spored, long and narrowly cylindrical to subclavate, with long sterigmata (up to 10 µm). **Pleuropseudocystidia** rather abundant, cylindrical to tortuous, 6-8 µm broad. **Pleuromacrocystidia** not observed. **Lamella edge** not observed. **Pileipellis** a lamprotrichoderm; terminal elements 15-70(90) × 3-6 µm, cylindrical, somewhat irregular, mostly with rounded apex, sometimes slightly tapering, distinctly thick-walled.

Observations: The type material is in very bad condition and even after a long treatment in aqueous potassium hydroxide the hymenial cells do not rehydrate very well. The scattered pleurocystidia that Grgurinovic (1997) mentions in her description are probably the pseudocystida which are rather abundant, although this is not in agreement with her drawing (1997: Fig. 23). We did not observe any true pleurocystidia.

Systematic position: Our data are insufficient to be sure about the taxonomic position of this species. It is not closely related to *L. clarkeae* as suggested by Grgurinovic (1997) because the latter species has a palisade and *L. subclarkeae* has a lamprotrichoderm which is in fact very typical for *L.* subgenus *Lactariopsis*. The spore ornamentation and the lack of true cystidia are in agreement with this eventual placement.

6. *Lactarius wirrabara* Grgur., Larger Fungi of South Australia: 58 (1997) Fig. 6

Original diagnosis: Pileus usque ad 114 mm diametro, convexus usque irregulariter infundibularis, umbrinus, ut videtur villosus. Lamellae decurrentes, remotae, profundae, multi-lamellulatae, pallide eburneae. Stipes usque ad 51 mm longus, plerumque excentriciusculus, opacus, brunneus vel brunneolus, cavescens. Latex copiosus, sapor mitis. Sporae 7.2-10.4 [-11.9-13.2] (= 9.1) × 6.4-9.4[-11.2] (= 7.7) µm, late ellipsoideae usque subglobosae, reticulo grosso plus minusve effecto ornatae. Holotypus: South Australia, New South Wales, Neutral Bay, Sydney, iv.1918, AD 9974 (AD).

Type study: **Spores** broadly ellipsoid to ellipsoid, (7.7)7.9-*8.6*-9.5 × 6.8-*7.5*-8.3 µm (Q = 1.06-*1.14*-1.27, n = 20); ornamentation composed of ridges, up to 1 µm high, forming a subcomplete to complete, rather dense reticulum; plage distally and centrally amyloid. **Basidia** 65-70 × 10-12 µm, 4-spored, cylindrical to narrowly clavate; sterigmata rather blunt. **Pleuropseudocystidia** scarce, 6-7 µm diam., cylin-

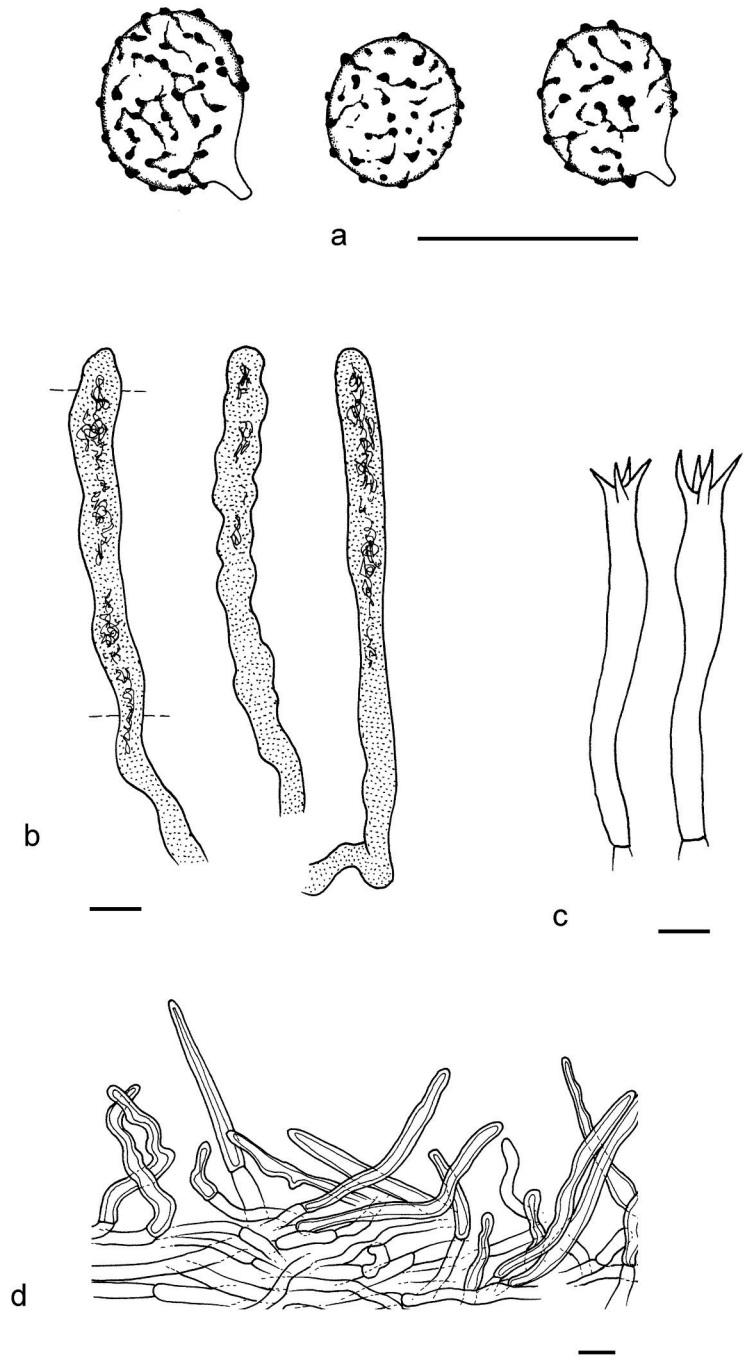

Fig. 5. *Lactarius subclarkeae* (Holotypus): a. spores, b. pleurospseudocystidia, c. basidia, d. section through the pileipellis (scale bar = 10 µm).

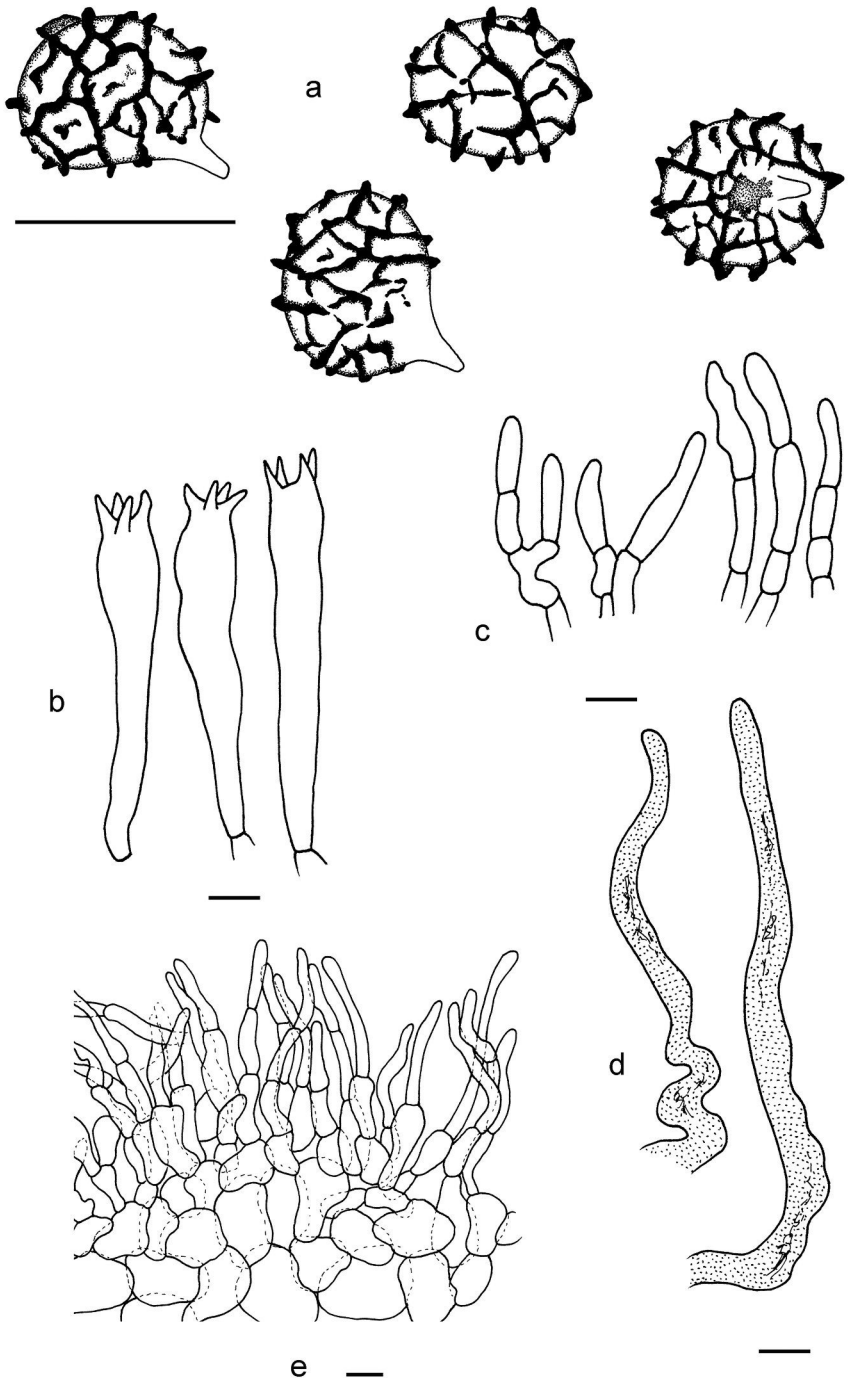

Fig. 6. *Lactarius wirrabara* (Holotypus): a. spores, b. basidia, c. marginal cells, d. pleuropseudocystidia, e. section through the pileipellis (scale bar = 10 μm).

drical, tapering towards apex. **Pleuromacrocystidia** absent. **Lamella edge** sterile; marginal cells cylindrical, frequently septate, 25-45 × 3-6 µm, thin-walled, hyaline and similar to terminal elements of the pileipellis. **Hymenophoral trama** mixed; lactifers abundant and broad. **Pileipellis** a palisade; suprapellis 60-70(90) µm thick, composed of narrowly cylindrical elements, 15-70 µm long, 2-4 septate; basal elements swollen; terminal elements narrow; subpellis cellular, 50-60 µm thick.

Observations: In the original description, it is mentioned that no type of cystidia is observed. Pleuropseudocystidia however are present though scarce. Macrocystidia seem indeed absent. There is a striking resemblance between *L. wirrabara* and *L. sepiaceus*, but the spores of the two type specimens differ in density and extent of the reticulum. Fuhrer's (2005:107) concept of *L. wirrabara* with lamellae staining pink and latex slowly turning milky brown is incorrect. Based on molecular analyses, Stubbe *et al.* (2010) demonstrated that pink discoloring specimens identified as *L. wirrabara* (or *L. sepiaceus*) actually belong to a separate species. The spores of these pinkening specimens are also quite different from those of the type of *L. wirrabara*, being ornamented with interconnected, blunt spines, much like *L. ochrogalactus* Hashiya (Wang *et al.* 2006).

The results of Stubbe *et al.* (2010) also showed that specimens without a pink discoloration (identified as *L. wirrabara* or *L. sepiaceus*) fall in at least two separate clades. All these specimens (including a New Zealand specimen) had variable spores but similar to those of the type of *L. wirrabara*. It is therefore uncertain that the study of Stubbe *et al.* (2010) contained veritable *L. sepiaceus* specimens. There was no apparent difference in host between the two clades. For now, we must acknowledge the existence of these cryptic species until a more detailed, macromorphological description of *L. wirrabara* based on fresh material allows to narrow down the concept.

Systematic position: Based on the brown and velvety pileus and on the palisadic pileipellis structure, Grgurinovic understandably assigned *L. wirrabara* to *L.* subgenus *Plinthogalus*, section *Plinthogalus*. However, phylogenetic analyses of the *L. gerardii* clade indicate that *L. wirrabara* belongs to the newly established *L.* subgenus *Gerardii* (Stubbe *et al.* 2010). A brown pileus and stipe, rather distant and white lamellae, spores with a reticulate ornamentation less than 1.5 µm high and the lack of macrocystidia are all consistent with a placement in *L.* subgenus *Gerardii.* The subgenus is further characterized by a white spore deposit, which still needs to be confirmed for *L. wirrabara*.

7. *Lactarius sepiaceus* McNabb, New Zealand J. Bot. 9: 50 (1971) Fig. 7

Original diagnosis: Pileus subtiliter infundibuliformis, 5-12 cm diam., siccus, rugosus, azonatus, phaeo-brunneus vel sepiaceus. Lamellae decurrentes, ad 6 mm altae, pallide cremeo-albae, margines plerumque atrobrunneae; lamellulae adsunt; latex viscidus, albus. Stipes 2-6 cm longus, plus minusve aequalis, 1-2.5 cm diam., cavatus, siccus, concolor cum pileo. Sporae amyloides, late ellipticae, 7.5-11 × 6.5-9.5 µm, ornatae [...] Habitat: Solitary or gregarious under *Nothofagus*.

Collections examined: Under (1) *N. fusca* and *N. menziesii*, Nelson; Maruia, 23. III.1966, J. A. McRobb (Holotype, PDD 26384 - PDD).

Type study: **Spores** broadly ellipsoid, 7.8-*9.2*-10.6 × 6.6-*7.5*-8.3 µm (Q = 1.09-1.23-1.40, n = 20); ornamentation about 1 µm high, forming a dense and regular, complete reticulum, with abundant small meshes especially near the

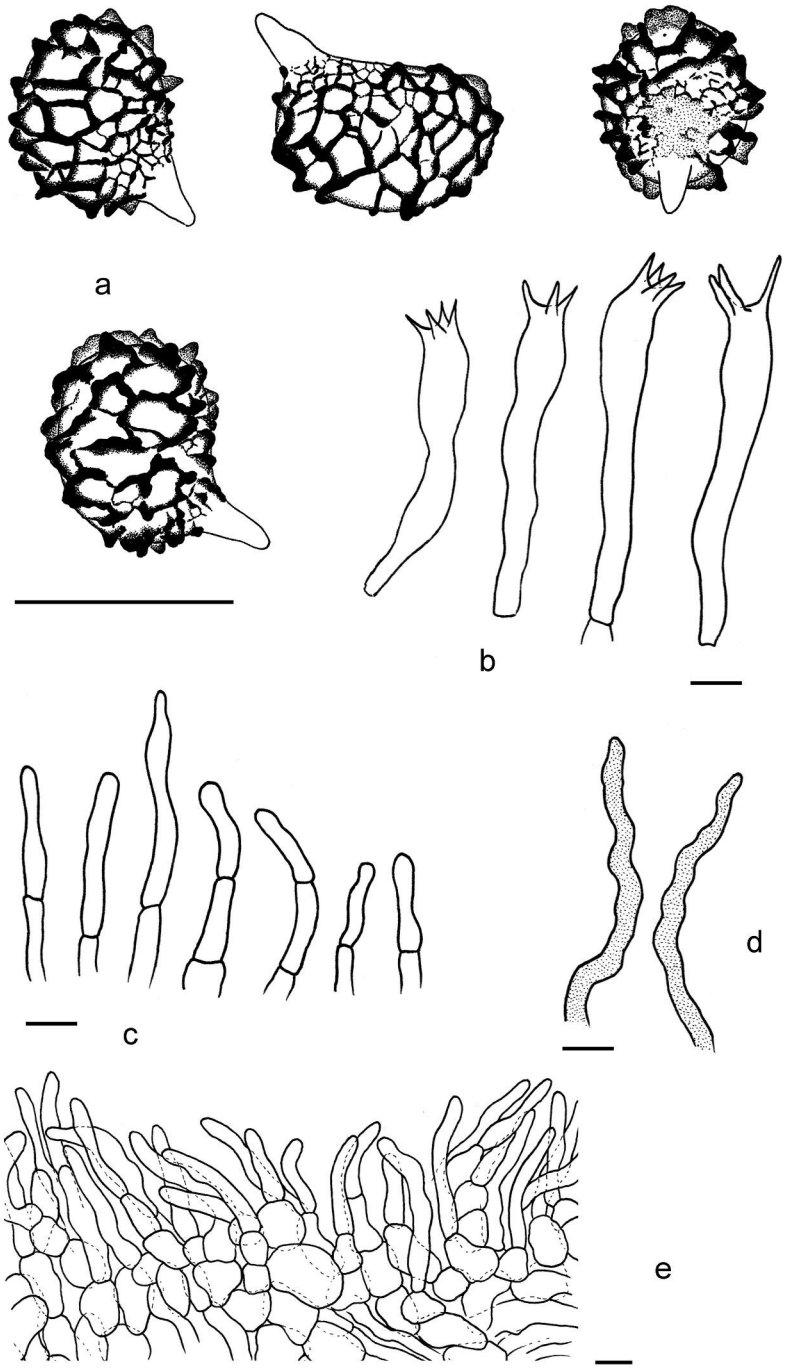

Fig. 7. *Lactarius sepiaceus* (Holotypus): a. spores, b. basidia, c. marginal cells, d. pleuropseudocystidia, e. section through the pileipellis (scale bar = 10 μm).

plage; plage not amyloid. **Basidia** narrowly cylindrical to narrowly subclavate, 4-spored with rather long (sometimes 5 µm) sterigmata. **Pleuropseudocystidia** scarce, irregularly cylindrical, with rounded apex, 2-4 µm diam. **Pleuromacrocystidia** absent. **Lamella edge** sterile; cheilomacrocystidia absent; marginal cells narrowly cylindrical, thin-walled, 15-45 × 2-5 µm, with rounded or sometimes slightly tapering apex. **Pileipellis** a palisade, 60-90 µm thick, with abundant, dark brown, intracellular pigmentation; suprapellis composed of rather long and narrow, cylindrical elements, 20-45 × 4-6 µm; subpellis a thin layer of rounded cells, sometimes only one cell layer thick, locally even absent, making the pileipellis sometimes look like a trichopalissade.

Observations: This species is also recorded from Tasmania, where it occurs under *Nothofagus* and *Eucalyptus* (Hongo & Mills, 1988).

The *L. sepiaceus* paratype (PDD 31236) was also examined in this study. It appears to have deviant spores and most likely belongs to *L. wirrabara*, illustrating the close resemblance between these two species. Based solely on morphology, one could argue to lump *L. sepiaceus* and *L. wirrabara* and attribute the different spore ornamentation to variability, though this would be rather rash, given the paucity of New Zealand specimens in molecular analyses and the recently discovered cryptic species in *L. wirrabara* (Stubbe *et al.*, 2010).

Systematic position: *L. sepiaceus* fits best in *L.* subgenus *Gerardii* for exactly the same reasons as *L. wirrabara*.

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