

A NEW SPECIES OF *ZELLEROMYCES* (RUSSULALES) FROM AUSTRALIA

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Abstract

Zelleromyces dendriticus sp. nov. is described and illustrations of microscopic features are provided. This species may be distinguished from other species of *Zelleromyces* by the combination of white to yellowish basidiomata and presence of dendritic peridial cystidia.

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Introduction

Australia has proven to be a rich source of sequestrate fungi, in particular the russuloid taxa (Bougher & Lebel 2001, Lebel 1998). During the course of studying russuloid taxa, several collections of *Zelleromyces* were noticed that had distinctive dendritic peridial cystidia, a character not known from any other species of sequestrate Russulales.

Apart from a regional treatment of species of *Zelleromyces* by Beaton *et al.* (1984) for Victoria, in which the descriptions and illustrations to six species were provided, Australian species have been little studied. Bougher & Syme (1998) provide a further description of *Z. daucinus* G.W. Beaton, Pegler & T.W.K. Young from Western Australia, and Grgurinovic (1997) provides short descriptions and a key to three South Australian species. In recent studies of Australian sequestrate fungi, several new species of *Zelleromyces* have come to light and the taxonomy of the genus as a whole is currently under review. However, *Zelleromyces dendriticus* is so distinctive, that it merits description here.

Method

Data on macroscopic features are based on field notes of fresh material and examination of dried collections. Habitat and fruiting patterns are based on field notes. Microscopic features observed with a light microscope are described from free-hand sections of rehydrated specimens mounted in Melzer's reagent or 5% aqueous KOH. Measurements were made at $\times 400$ or $\times 1000$ with a calibrated optical micrometer. Length and width of 30 spores from each collection were measured and QM, the mean length/width ratio of individual spores, determined. Material for scanning electron microscopy was obtained by gently pressing the freshly cut glebal surface of a basidioma onto double-sided sticky discs on a mount, leaving a thin scattering of spores. The specimens were then sputter-coated with gold and photomicrographed with an AMR 1000 scanning Electron Microscope. Scanning electron microscope photographs aided interpretation of spore ornamentation patterns (though illustrations and descriptions are from structures visible by light microscopy).

Taxonomy

Zelleromyces dendriticus T. Lebel sp. nov.

Figs 1–4

Basidiomata 5–25 \times 5–20 mm, subglobosa vel irregularia. *Peridium* albidum cum lutescens; *peridiopellis* caespiticius, hyphis 2–3.5 μ m diametro et cystidiis dendriticis 22–33 \times 4–20 μ m. *Gleba* initio albida maturitate pallide lutea, loculata. *Stipes collumellaque* nulla. *Basidia* sporis 2 vel 4, sterigmatibus robustis. *Cystidia* hymenialia nulla vel ubi praesentia cylindrica vel anguste clavata, dispersa. *Sporae* 9–10.5 \times 8.5–10.5 μ m, globosae; ornamentum amyloideum, reticulo tenui, quasi completo, linearum humilium, ramosarum, verrucas ± 0.5 μ m altas connectentium; verrucae parvae, dispersae, segregatae idem praesentes. *Hic designatus* *Holotypus*: Australia: Victoria, The Gap Scenic Reserve, 1.3 km southeast Survey Rd, J. Trappe 18478, 28 May 1996, MEL 2063482; isotypus OSC 80519.

Etymology: The specific epithet, 'dendriticus' (L), refers to the dendritic peridial cystidia.

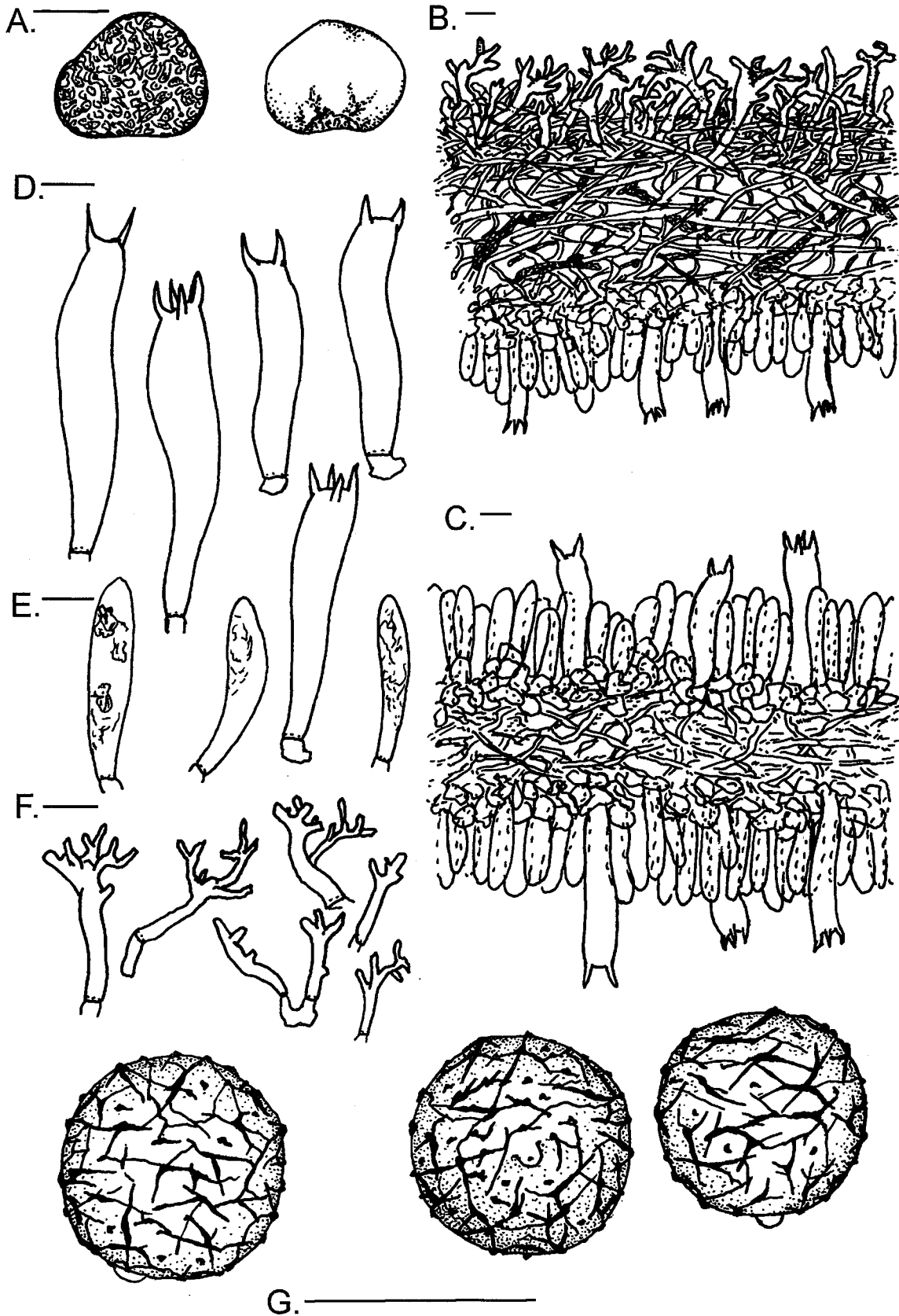


Figure 2. *Zelleromyces dendriticus* A. basidiome; B. structure of the peridium; C. hymenium and hymenial trama; D. basidia; E. hymenial cystidia; F. dendritic peridial cystidia; G. spores. Bars = 10 mm, basidiomata; = 10 μ m, peridiopellis and context, hymenium, basidia, cystidia, and spores.

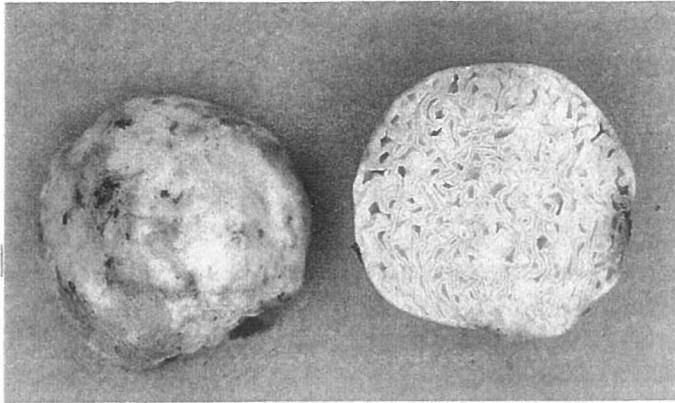


Figure 1. *Zelleromyces dendriticus* basidiome (MEL 2063479) 2x.

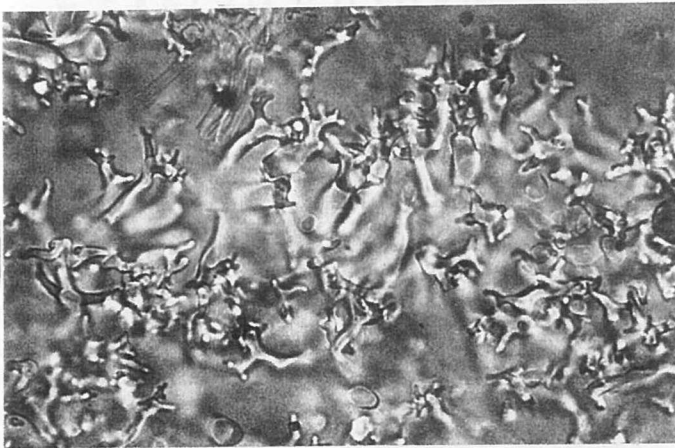


Figure 3. Dendritic peridial cystidia, in Melzer's solution x400.

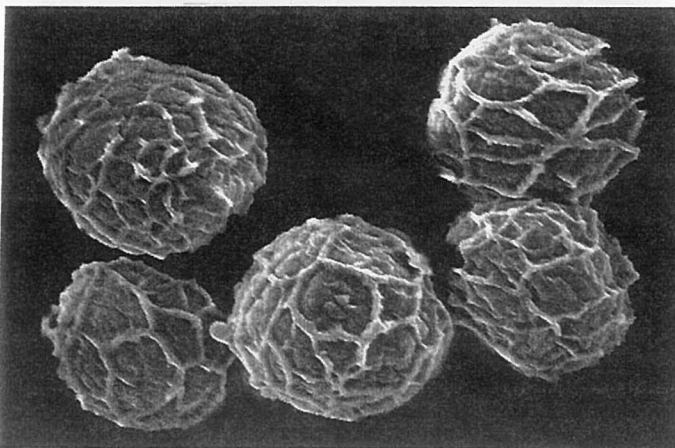


Figure 4. Scanning electron micrograph of spores.

Basidiomata 5–25 × 5–20 mm, subglobose to irregular or furrowed, especially near the base; locules exposed at base. *Peridium* dry, smooth to minutely fibrillose or verrucose, white with a yellowish tinge and often some darker yellow-brown patches; thin, off-white in cross-section. *Gleba* white when young, becoming pale yellow to pale brown-yellow with maturity, loculate, locules large, 0.5–2 mm wide, labyrinthine. *Stipe* and *columella* absent. *Odour* mildly sweet, pleasant. Taste mild. *Latex* scant to abundant, milky. *Spore colour* in mass white to off-white.

Peridiopellis 18–35 μm wide, a patchy, dense turf of hyaline hyphae 2–3.5 μm diam. and dendritic, hyaline cystidia 22–33 × 4–20 μm, 3–5 μm diam. at base, with variously and often elaborately branched apices. *Peridial context* 32–55 μm wide, of tightly interwoven, hyaline hyphae 2–3 μm diam., with slightly thickened walls, slightly more crowded towards the surface than within, and scattered to common, sinuous laticiferous hyphae 3–7 μm diam., refractive in KOH; sphaerocysts absent. *Hymenophoral trama* 14–22 μm wide, a narrow central strand of crowded, hyaline hyphae 2–3 μm diam., with thickened walls, intermixed with scattered sinuous laticiferous hyphae 3–7 μm diam., sphaerocysts absent; subhymenium 16–33 μm wide, with 2 or 3 tiers

of \pm isodiametric cells 8–14 μm diam. *Basidia* 35–65 \times 7–12 μm , elongated clavate to cylindrical or rarely narrowly ventricose, hyaline, thin-walled, with 2 or 4 robust, slightly curved sterigmata 4–10 \times 3 μm . *Cystidia* absent or when present, 25–30 \times 6–10 μm , cylindrical to narrowly clavate, scattered, with oily refractive contents; arising in trama from laticiferous hyphae and extending up through the subhymenium. *Spores* 9–10.5 \times 8.5–10.5 μm (mean = 9.6 \pm 0.5 \times 9.5 \pm 0.6, $n = 35$), range of QM = 1–1.05, globose, orthotropic, wall weakly amyloid; ornamentation amyloid, a fine, almost complete reticulum of low, branched lines connecting low warts \pm 0.5 μm high with scattered, isolated small warts also present. Hilar appendix small, central, hyaline; plage absent. *Clamp connections* absent in all tissues.

Habit and Distribution: Fruiting in April–July in small to large groups, at mid to higher elevations in the mountains of Victoria and Tasmania. Hypogaeal in mixed forests of *Eucalyptus fastigata*, *E. cytellocarpa*, *E. radiata*, *E. dalrympleana*, *E. globoidea*, *E. obliqua*, *E. pauciflora*, *E. stellulata*, *E. regnans*, *Acacia dealbata*, *A. melanoxylon*, *A. aculeatissima*, *A. cognata*, or *A. mearnsii*.

Other collections examined: **Australia:** **Tasmania:** Elephant Pass, *J. Trappe H1373*, 2 May 1990, CSIRO-Wembley, OSC 80521; Elephant Pass, *N. Malajczuk H1368*, 2 May 1990, MEL 2063481. **Victoria:** Errinundra National Park, Gunmark Rd, 1.3 km SE of Survey Rd, *A.W. Claridge 2664A*, 27 May 1999, MEL 2105061; Errinundra National Park, Tea Tree flat picnic area, *A.W. Claridge & W. Colgan III s.n. [Trappe 18469]*, 28 May 1996, MEL 2063480; Errinundra National Park, Gunmark Rd, 1.6 km SE of junction with Survey Rd, *J. Trappe 19045*, 11 June 1996, MEL 2063475; East Gippsland, Bentleigh Plains Forest Reserve, Bentleigh Plains Rd, 0.4 km northeast of crossing of Bentleigh Plains Creek, *A. Jumpponen s.n. [AWC 3629]*, 18 May 2001, OSC; The Gap Scenic Reserve, Gap Rd, 0.3 km E of junction of Bonang Highway, *J. Trappe 18428*, *A.W. Claridge*, *A. Jumpponen*, 28 May 1996, MEL 2063476; The Gap Scenic Reserve, Gap Rd, 3.9 km E of Bonang Highway, *J. Trappe 18434*, 28 May 1996, MEL 2063477; The Gap Scenic Reserve, Gap Rd, 2.1 km W of track to Result Creek Falls, *A. Jumpponen s.n. [Trappe 19021]*, 11 June 1996, MEL 2063473; The Gap Scenic Reserve, Gap Rd, 2.1 km W of track to Result Creek Falls, *J. Trappe 19022*, 11 June 1996, MEL 2063472; The Gap Scenic Reserve, Gap Rd, 2.1 km W of track to Result Creek Falls, *J. Trappe 19023*, 11 June 1996, MEL 2063474; Lady Talbot Drive, northeast of Marysville, on Wishing Well track, *T. Lebel 5*, 19 April 1999, MEL 2063377; King Lake National Park, Mountain Creek Track, *M. Castellano s.n. [Trappe 14042]*, 8 July 1993, MEL 2063479, OSC 80520; 15 km W of Mansfield near Mt Buller, *T. Lebel & M. Castellano s.n. [Trappe 14063]*, 9 July 1993, MEL 2063478; 2.4 km N of Baw Baw National Park, *J. Trappe H6792*, 16 June 1994, CSIRO-Wembley.

Remarks

Zelleromyces dendriticus is currently known only from Victoria, where it is widespread in areas of relatively higher rainfall, and Tasmania. Its basidiomata do not always produce a latex when cut or bruised, but the presence of abundant laticiferous hyphae terminating in pseudocystidia indicates its relationship to the lactarioid rather than the russuloid Russulales (Buyck 1989, Miller *et al.* 2000). Two sequestrate genera related to *Lactarius* have been described, *Zelleromyces* and *Arcangeliella*. This species is placed in *Zelleromyces* rather than *Arcangeliella* because it lacks a stipe-columella, and has globose, orthotropic spores rather than ellipsoidal heterotrophic spores. Recent studies of the type species have raised questions about generic boundaries in these taxa, which are currently under review (Lebel & Trappe 2000). Of the six described Australian species of *Zelleromyces* (Table 1), three, *Z. australiensis* (Berk. & Broome) Pegler & T.W.K. Young, *Z. majus* (J.W. Cribb) A.H. Sm. and *Z. glabrellus* (Zeller & C.W. Dodge) Singer & A.H. Sm., have white to pale cream-coloured basidiomata similar to *Z. dendriticus*. Microscopically, however, *Zelleromyces dendriticus* is unique. None of the other species have globose spores with a low, partial to almost complete reticulum and long slender basidia and a turf of branched peridial cystidia. Branched peridial cystidia have not been observed in any other species of sequestrate Russulales.

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Table 1. Selected comparative features of currently recognised Australian *Zelleromyces* taxa.

Some of the key diagnostic features for each taxon are highlighted in bold type. Data for species other than *Z. dendriticus* extracted from Beaton *et al.* (1984).

Character	<i>Z. dendriticus</i>	<i>Z. australiensis</i>	<i>Z. glabrellus</i>	<i>Z. majus</i>	<i>Z. striatus</i>	<i>Z. daucinus</i>	<i>Z. malaiensis</i>
Basidioma colour	white with yellowish tinge and some darker patches	white to subochraceous	white to brownish	pale cream to pale salmon	brownish orange	moderate orange	rosy buff to reddish brown
Gleba colour	white to ivory-yellow	pale ochraceous	white to ivory yellow	pale ochraceous	pale orange	pale orange	pale cream to pale orange
Stipe-columella	absent	absent or partially developed	present	absent	sterile base present or absent; columella absent	absent	absent
Peridiopellis structure	hyphal and cystidia	epicutis (hyphal)	epicutis (hyphal)	epicutis (hyphal)	epicutis (hyphal)	epithelium (inflated cells)	trichodermium
Branched peridial cystidia	present	absent	absent	absent	absent	absent	absent
Basidia dimensions	35–65 × 7–12 µm	24–35 × 8–11 µm	22–33 × 7–8 µm	28–35 × 10–13 µm	35–45 × 7–10 µm	35–55 × 7–10 µm	43–67 × 7–13 µm
Spore shape	globose	subglobose	broadly ellipsoidal	subglobose	globose to broadly ovoid	globose to subglobose	subglobose
ornamentation	almost complete reticulum, ±0.5 µm high	almost complete reticulum, ±0.5–1.5 µm high	broad warts with low connectives <0.5 µm high	short irregular ridges and isolated warts <0.5 µm high	concentric striae of continuous or interrupted ridges, 0.5–1.5 µm high	complete reticulum of deep ridges, 1–2.5 µm high	'winged' appearance, warts and ridges 0.5–4 µm high