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A contribution to the study of the cortinarioid mycoflora of New Zealand, VII

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Fourteen new species are described from New Zealand, *Cortinarius amblyonis, C. chrysoconius, C. cremeorufus, C. cypripedii, C. dulcamarus, C. entheosus, C. lachanus, C. mycenarum, C. mysoides, C. psilomorphus, C. trichocarpus, C. urbiculus, C. vitreofulvus,* and *C. xenosmatoides*. Also two new sections, *Cortinarius* sect. *Cremeolinae* and *C.* sect. *Cycnei,* are proposed, and a new form of *C. lubricanescens* is described. The Patagonian taxon *C. rapaceus* var. *luridus* is raised to species rank under the replacement name *C. austrorapaceus*.

Keywords:, Agaricales, *Cortinarius*, mycorrhiza, Myrtaceae, Nothofagaceae, taxonomy.

Introduction

The agaric mycota of New Zealand contains many taxa that appear to form natural groups based on both morphological and genetic similarity. This is especially true within the genus *Cortinarius* (Pers.) Gray. For instance, the southern species *Cortinarius chalybaeus* Soop (New Zealand) and *C. australis* Gasparini (Australia), are part of the bihemispherical section *Purpurascentes* M.M. Moser (Soop 2002, Gasparini 2007, Saar et al. 2014). Another interesting group, including *C. cremeolina* Soop (New Zealand), consists of fungi with a morphology similar to those of the boreal section *Multiformes* (R. Henry) Moënne-Locc. & Reumaux. One aim of this seventh instalment in a series on *Cortinarius* taxa from New Zealand is to investigate the affinities within the *Cremeolina* group and describe its new taxa. The group may be placed in subg. *Phlegmacium* (Fr.) Trog as morphologically defined by Brandrud et al. (1989). A second aim is to investigate a group of cortinarii that may be placed in subg. *Myxacium* (Fr.) Trog. The group has a circum-antarctic distribution and is centred around *C. magellanicus* Speg.

Other species treated in the present study may be placed in subgenera *Dermocybe* (Fr.) Trog and *Telamonia* (Fr.) Trog, in the above morphological sense. Species in these subgenera were partly considered in the previous instalments (Soop 2001–2014), and by Horak (1987), Horak & Wood (1990), Soop (1998), and Gasparini & Soop (2008), but have not been otherwise treated in publications aimed at the mycota of the country. The infrageneric geotaxonomy of *Cortinarius*, and in particular of the studied groups, was extensively discussed in Soop & Gasparini (2011).

Methods

Phylogenetic reconstruction — A cladogram was produced to illustrate the new sections. Relevant sequences were downloaded from GenBank, while some were generated in this study (for methods, see Soop et al. 2016). When separated, ITS and LSU sequences were manually catenated, while in a few cases only ITS was available. The small dataset (33 samples) were then aligned with Mafft v. 7 (http://mafft.cbrc.jp/alignment/server/), using the E-INS-i option. The alignment was trimmed after the begin-ITS motif and before the end-LSU motif using Mega 5.2.1 (Tamura et al. 2011). The resulting alignment was 1380 positions long. A Newick tree was generated with Raxml (Stamatakis 2014) and converted to a cladogram in pdf format with Mega 5.2.1.

Studied taxa — All collections under *Typification* and *Other collectios examined* were made in the native forests of New Zealand in the years 1997–2015, under the appropriate permits issued by the Department of Conservation.

Species mentioned for comparison under *Comments* are described from New Zealand unless otherwise specified. All holotype material has been deposited in the PDD fungarium, Auckland, New Zealand. The GenBank accession numbers and fungarium numbers are given under *Typification* and *Other collections examined*. The descriptor "CO" indicates the author's collection number. Collection localities are referred to the districts defined by Crosby et al. (1998).

Morphology — In the descriptions, measurements of the basidiome pertain to adult specimens; these are the diameter of the pileus, the length of the stipe, and the diameter of the upper part of the stipe. Lamella colour pertains to immature individuals unless specified otherwise, the designation "L=" means the number of lamellae reaching the stipe, and "l="

the number of lamellulae between two lamellae. The universal and partial veils of the basidiome are referred to as “veil” and “cortina”, respectively. The alkaline reaction was made with a 30% NaOH solution.

Microscopic observations were made principally on material mounted in 5% ammoniacal solution, with or without Congo red, and examined with an oil-immersion objective (1000 ×). The term "marginal elements" refers to sterile cells that are found on the lamellar edge. The spore measurements are expressed as the mean value with one-sigma limits and, in parentheses, the observed maxima and minima. The *Q* value is the length/width quotient; its average and standard deviation are reported. The *n* value is the number of measurements.

Taxonomy

Cortinarius* sectio *Cremeolinae Soop sect. nov.

MycoBank 814847.

Basidiomata agaricoid or secotioid. Pileus viscid, ± glabrous with cream to brown, often pale hues. Lamellae/gleba white or pale grey when young. Stipe/columella dry, whitish, with ± distinctive, sometimes wide and marginate bulb. Universal veil white. Odour usually melleous. Spores elliptic to amygdaloid, moderately to weakly verrucose. In native forests, associated with Nothofagaceae or Myrtaceae plants. Australasia and Patagonia.

TYPIFICATION: *Cortinarius cremeolina* Soop 2001, typus sectionis. In Bulletin de la Société Mycologique de France 117(2) p. 103.

Currently known taxa in the section (with area of provenance):

C. austrorapaceus nom. nov.	South America
C. cremeolina Soop	New Zealand
C. cremeolina var. *subpicoides* Soop	New Zealand
C. cremeorufus sp. nov.	New Zealand
C. dulciorum Soop	New Zealand
C. iringa Soop	New Zealand
C. nebulobrunneus Danks, T. Lebel & Vernes	Australia

COMMENTS. This is an austral section of phlegmacioid fungi, morphologically similar to the boreal sect. *Multiformes*. The section is monophyletic, forming a sister clade to *Multiformes* (Fig. 6; cf. Liimatainen et al. 2014, Brandrud et al. 2014). The Australian taxon is the only secotioid member.

The bootstrap support for the section is 93%. Several New Zealand taxa exhibit small incremental genetic distances (Fig. 6), suggesting an ongoing sympatric speciation. For example, the type of *C. iringa* differs from that of *C. cremeolina* by nine nuclear substitutions (ITS+LSU), while the variety *subpicoides* differs by four (ITS).

Key to sect. *Cremeolinae*

1	Habit secotioid	*Cortinarius nebulobrunneus*
1*	Habit agaricoid	2
2	Pileus amber to pale red-brown, with myrtaceous trees	*C. cremeorufus*
2*	Pileus differently coloured, with Nothofagaceae	3
3	Pileus dark grey, often with an olive tinge	*C. cremeolina* var. *subpicoides*
3*	Pileus red-brown to mahogany	*C. dulciorum*
3**	Pileus white, pale yellowish, or pale ochraceous	4
4	Basidiomata slender with a narrow stipe-bulb, pileus pale yellow with a darker disk	*C. iringa*
4*	Basidiomata usually robust with a wide stipe-bulb, pileus white to cream	5
5	Odour acerbic, under *Nothofagus pumilio* or *N. antarctica*, South America	*C. austrorapaceus*
5*	Odour melleous or fruity, with other host, New Zealand	*C. cremeolina*

Cortinarius austrorapaceus Soop nom. et stat. nov.

MycoBank 814848.

BASIONYM: *Cortinarius rapaceus* var. *luridus* M.M. Moser in Horak & Moser 1975. Beiheft zur Nova Hedwigia 52, p. 92.

COMMENTS. The name *C. luridus* is in use (Henry 1969). The Patagonian taxon was described as a variety of the European *C. rapaceus* (syn. *C. foetens* M.M. Moser), which belongs to sect. *Caerulescentes*.

Cortinarius cremeorufus Soop, sp. nov. (Fig. 1C, 4C)

MycoBank 814846.

TYPIFICATION: New Zealand. Otago, Waipori Falls, in *Kunzea* forest, 15 May 2008, *P. Leonard* KS-CO1812, holotype PDD 94056, isotype S F93253. GenBank KU136438(ITS), KU136440 (LSU).

ETYMOLOGY: From *C. cremeolina* and Latin *rufus* " red-brown" , due to the general appearance.

Pileus 30–40 mm diam., rounded, later convex, weakly viscid, not hygrophanous; amber to pale red-brown, later greyish yellow, sometimes with an orange tinge and sparse white tufts at disk, finely innate fibrillose; margin somewhat paler, not striate. *Lamellae* pale grey when young, crowded. *Stipe* 50 × 8 mm, with a marginate bulb; pale tan, sometimes with a rudimentary white volva. *Veil* white, sparse, as a coating on stipe bulb. *Context* pale tan to almost white. *Odour* none or faintly sweet; *taste* none. *Macrochemical reactions*: NaOH weakly red-brown on cutis, else none.

Spores (8.4–)8.6–9.2–9.8(–10.6) × (4.9–)5.3–5.7–6.1(–6.5) µm, Q=1.61±0.11 (n=25), obtusely elliptic, moderately verrucose. Marginal elements scattered, clavate to vesiculose, of varying sizes 12–17 × 7–8 and 22–28 × 7–8 µm. Basidia 25–30 × 7–9 µm, 4-spored. Pileipellis with an upper layer of tangled, gelatinous hyphae, 3–5 µm wide, lower layer of repent hyphae 3–5 µm wide. Hypocutis of oblong elliptic elements, 25–60 × 8–15 µm. Clamp connections present.

HABITAT: Gregarious, in myrtaceous forest, uncommon.

OTHER COLLECTIONS EXAMINED: New Zealand. Taupo, 29 Apr 2001, *E. & A. Horak,* PDD 72649, GenBank KT833622 (ITS+LSU).

COMMENTS. *Cortinarius cremeorufus* resembles *C. cremeolina*, but presents an amber pileus and is the only agaricoid taxon in the section that grows with myrtaceous trees, characters that makes it easy to determine.

Cortinarius lachanus Soop & M. Wallace sp. nov. (Fig. 2A, 4G)

MycoBank 814849.

TYPIFICATION: New Zealand. Buller, Reefton, Murray Creek Track, in *Fuscospora fusca* forest, 11 May 2006, *K. Soop* CO1699, holotype PDD 103887, GenBank KF727361 (ITS), KF727305 (LSU).

ETYMOLOGY: From Greek λαχανος " vegetable" , due to the general greenish coloration.

Pileus 9–12 mm diam., obtusely conical, dry, weakly hygrophanous, green to yellow-green or olive green, yellowing towards the margin when older, innate-fibrillose; margin ± plicate, later striate. *Lamellae* greenish yellow when young, distant, free, edge concolorous. *Stipe* 30–50 × 2–3 mm, cylindrical, slender, citrinous, pale turquoise at apex, brown-yellow towards base. *Veil* greenish, very thin; *cortina* not noted. *Context* pale green to olive green. *Odour* and *taste* insignificant. *Macrochemical reactions*: NaOH blood red on cutis, elsewhere brownish red; fluorescence in UV light none.

Spores (8.2–)8.5–9.0–9.5(–10.4) × (4.6–)4.9–5.2–5.5(–5.7) µm, Q=1.75±0.13 (n=27), amygdaloid, weakly verrucose. *Marginal elements* crowded, cylindrical, some subcapitate, 18–25 × 6–8 µm. *Basidia* 25–35 × 6–8 µm, 4-spored. *Pileipellis* of repent hyphae 3–6 µm wide. *Hypocutis* of oblong, ± rectangular elements, 25–45 × 8–12 µm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Taupo, Kaimanawa Rd, 19 May 2015, *M. Wallace* DSC 5337, PDD 107498.

COMMENTS. This is a small dermocyboid fungus with a remarkably green coloration and a strong alkaline reaction, consistent with the presence of anthraquinonic pigments. Superficially it evokes species of *Hygrocybe* or *Entoloma*. According to available sequences *Cortinarius lachanus* belongs to a small clade

that includes the Australian species *C. walkeri* Cooke & Mass. (syn. *C. austrovenetus* Cleland) and the Patagonian species *C. elaphinus* M.M. Moser (data not shown).

Cortinarius mycenarum Soop sp. nov. (Fig. 2B, 4H)

MycoBank 814850.

TYPIFICATION: New Zealand. Nelson, Abel Tasman NP, Harwoods Hole, in *Lophozonia menziesii* forest, 10 May 2015, *K. Soop* CO2185, holotype PDD 107715, isotype S F267771, GenBank KT875188 (ITS+LSU).

ETYMOLOGY: From its resemblance to certain species of *Mycena* (Latin plur. genitive).

Pileus 10 × 9 mm diam., acutely conical, later bonnet-shaped, dry, weakly hygrophanous; dark red without a brown tinge, even when older, radially red innate-fibrillose. disk darker; margin not striate. *Lamellae* brownish red when young, free, distant, (L=32, l=1–2). *Stipe* 30–40 × 1–3 mm, cylindrical, pale red-brown but ± covered by reddish tufts and fibrils. *Veil* red, fairly copious; *cortina* very sparse. *Context* brownish red. *Odour* and *taste* insignificant. *Macrochemical reactions*: NaOH cherry red on cutis, red-brown on stipital veil, elsewhere red.

Spores (5.4–)5.6–6.1–6.6(–7.3) × (4.6–)4.7–5.0–5.3(–5.7) µm, Q=1.22±0.08 (n=28), subglobose, moderately to fairly coarsely verrucose. *Marginal elements* crowded, cylindrical, some subcapitate or sinuous, 16–27 × 5–8 µm. *Basidia* 23–30 × 6–8 µm, 4-spored. *Pileipellis* of repent, hyaline to pale orange hyphae 3–5 µm wide. *Hypocutis* of oblong, ± rectangular, pale yellow-brown elements, 35–65 × 8–15 µm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago Lakes, Haast Pass, Bridle Track, 28 Apr 2004, *K. Soop* CO1442, PDD 78785.

COMMENTS. This small, dermocyboid fungus is easily taken for a *Mycena* in the field, due to its bonnet-shaped pileus and thin stipe. *Cortinarius mycenarum* is dark red all over (cf. *M. haematopus*) like a few other small cortinars in New Zealand, which all produce narrower spores. Of these, *C. vinicolor* (E. Horak) G. Garnier in the same habitat may be closest in habit, while *C. cruentoides* Soop grows in association with myrtaceous trees. A BLAST search reveals no close genetic relative, but available sequences indicate a position basal to several dermocyboid clades.

Cortinarius xenosmatoides Soop sp. nov. (Fig. 3B, 5F)

MycoBank 814851.

TYPIFICATION: New Zealand. Buller, St Arnaud Range, in *Fuscospora solandri* forest, 4 May 2013, *K. Soop* CO2096, holotype PDD 103668, GenBank KF727362 (ITS), KF727318 (LSU).

ETYMOLOGY: From its resemblance to *C. xenosma*.

Pileus 20–40 mm diam., convex, later expanded, dry, weakly or not hygrophanous, dark mahogany brown to umber, finely innate-fibrillose with pale ochraceous patches and fibrils; margin concolorous, not striate. *Lamellae* red-brown when young, adnate, moderately crowded to fairly distant (L=30–40, l=2). *Stipe* 30–65 × 4–9 mm, cylindrical, white to pale yellow-brown with rather dense brown fibrils, coated pale ochraceous at base. *Veil* greyish ochre, darkening to red-brown, fairly copious; *cortina* not noted. *Context* greyish yellow, marbled yellow-brown with a pale horn-rim near stipital cortex. *Odour* faint, raphanoid or like wax candles; *taste* none. *Macrochemical reactions*: NaOH none.

Spores (6.8–)7.2–7.6–8.0(–8.2) × (4.6–)4.9–5.2–5.5(–5.7) µm, Q=1.47±0.10 (n=23), elliptical to obtusely elliptical, weakly verrucose. *Marginal elements* crowded, clavate, some subcapitate hyaline, 20–25 × 7–9 µm. *Basidia* 25–32 × 7–9 µm, 4-spored. *Pileipellis* of repent, pale yellow-brown hyphae 4–6 µm wide. *Hypocutis* of oblong, pale yellow-brown elements, 40–50 × 8–16 µm, maculated by brownish encrustations. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, uncommon.

OTHER COLLECTIONS EXAMINED: New Zealand. Buller, St Arnaud Range, 4 May 2013, *K. Soop* CO2097, PDD 103669, S F244779; Nelson, Abel Tasman NP, Harwoods Hole, 10 May 2015, *K. Soop* CO2187, PDD 107717, S F267763, GenBank KT875183 (ITS+LSU).

COMMENTS. This telamonioid fungus looks like *Cortinarius xenosma* Soop, but without the typical reddish tinge on the stipe. It also deviates by being more slender in average habit, and by the brick-coloured lamellae. Available molecular data show that the two species are genetically remote, placing *C. xenosmatoides* near several dermocyboid species, such as *C. cardinalis* (E. Horak) G. Garnier and *C. canarius* (E. Horak) Gasparini. This is remarkable, since it is a definitely telamonioid species, apparently lacking in anthraquinonic pigments as witnessed by the absent alkaline reaction.

Cortinarius trichocarpus Soop sp. nov. (Fig. 2E, 5C)

MycoBank 814852.

TYPIFICATION: New Zealand. North Canterbury, Arthurs Pass, Coral Track, in *Fuscospora solandri* forest, 20 Apr 1999, *K. Soop* CO1029, holotype PDD 103637, GenBank KF727354 (ITS), KF727335 (LSU).

ETYMOLOGY: From Greek τριχος " hair" and καρπος " fruit", due to its hirsute appearance.

Pileus 45–80 mm diam., rounded, later convex-plane, dry, not hygrophanous; dark purple-brown, young ± covered by grey-brown to grey-yellow veil breaking into thick squames and patches; margin with similar tufts, not striate. *Lamellae* pale purple to greyish blue when young, thick, broadly adnate, fairly crowded (L=62, l=2). *Stipe* 45–65 × 10–19 mm, clavate, robust, pale grey to yellowish grey, ± covered by brownish girdles. *Veil* yellow-grey to brown-grey, very copious; *cortina* yellow-grey. *Context* greyish white, yellowish in pileus, marbled weakly violet. *Odour* and *taste* insignificant. *Macrochemical reactions*: NaOH trivial.

Spores (8.9–)9.5–10.3–11.1(–12.0) × (5.5–)5.7–6.2–6.7(–7.1) μm, Q=1.68±0.15 (n=27), elliptical, weakly verrucose. *Marginal elements* crowded, subcapitate to clavate, hyaline, a few densely dark incrusted, 15–26 × 7–12 μm. *Basidia* 22–30 × 8–10 μm, 4-spored. *Pileipellis* of repent hyphae, 4–7 μm wide, many with a brown vacuolar or cytoplasmatic pigment. *Hypocutis* of ellipsoid to irregular hyaline elements, 40–70 × 20–35 μm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, very rare.

COMMENTS. This is a robust species with a violaceous tint in lamellae and context and a copious, yellowish veil. It recalls *Cortinarius xenosma* Soop and *C. cupreonatus* Soop, but is generally larger with larger spores. Available molecular data place *C. trichocarpus* near the *Rozites*-like *C. wallacei* Soop. Moreover, the species may be regarded as an agaricoid form of a morphospecies that includes the secotioid *C. ohauensis* (Soop) Peintner & M. Moser, since their sequences (ITS+LSU) deviate by only four nuclear substitutions. The species has not been recorded again in New Zealand, but it was deemed worth publishing it in this study in view of its importance for the taxonomy of the genus.

Cortinarius entheosus Soop sp. nov. (Fig. 1F, 4F)

MycoBank 814853.

TYPIFICATION: New Zealand. Fiordland, Milford Rd, Totara Rest Area, in *Lophozonia menziesii* forest, 4 May 2001, *K. Soop* CO1210, holotype PDD 103639, GenBank KF727381 (ITS), KF727301 (LSU).

ETYMOLOGY: From Greek ενθεος " inspired" , due to its bright and warm colours.

Pileus 25–60 mm diam., rounded, later convex to ± plane, viscid, weakly hygrophanous; tan to yellowish with a brownish orange disk, glabrous to finely innate-fibrillose; margin more greyish, flushing violet, not striate. *Lamellae* saturated lavender violet when young; thick, adnate, medium distant. *Stipe* 50–80 × 5–8 mm, cylindrical to ± fusoid, dry, white fibrillose with a faint violet sheen when young, later dirty greyish yellow; apex violet. *Veil* white to pale violet, fairly copious; *cortina* white to pale violet. *Context* greyish buff, marbled violet. *Odour* faint of *Syringa* flowers; *taste* strong but hardly unpleasant. *Macrochemical reactions*: NaOH none.

Spores (8.2–)8.7–9.3–9.9(–10.9) × (5.1–)5.5–5.9–6.4(–6.8) μm, Q=1.58±0.12 (n=32), elliptic to subamygdaloid, moderately verrucose. *Marginal elements* crowded, vesiculose, hyaline, 18–26 × 7–9 μm.

Basidia 20–24 × 7–9 μm, 4-spored. *Pileipellis* of repent hyaline hyphae, 2–4 wide, deeper strata 5–7 μm. *Hypocutis* of irregular hyaline elements, 40–65 × 20–26 µm. *Clamp connections* present but sparse.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago Lakes, Kepler Track, 28 Apr 2009, *K. Soop* CO1880, PDD97508, GenBank KJ635234 (ITS+LSU).

COMMENTS. This attractive but rare phlegmacioid fungus presents bright and warm colours with an apricot tinge on the pileus and violet lamellae. It recalls several other species described from the same habitat in New Zealand: *Cortinarius bellus* E. Horak has a viscid stipe and longer spores, *C. ionomataius* Soop exhibits similar colours but is dry, and *C. artosus* Soop has a bulbous stipe. A BLAST search has revealed no close genetic relative.

Cortinarius dulcamarus Soop sp. nov. (Fig. 1E, 4E)

MycoBank 814854.

TYPIFICATION: New Zealand. North Canterbury, Craigieburn, in *Fuscospora solandri* forest, 5 May 2009, *K. Soop* CO1909, holotype PDD 97534, isotype S F140318, GenBank KJ635238 (ITS+LSU).

ETYMOLOGY: From Latin *dulcis* " sweet" and *amarus* " bitter" , due to the combination of characters.

Pileus 40–50 mm diam., convex to expanded or ± plane; strongly viscid, not hygrophanous; tan to orange-brown with flammeous zones, glabrous; margin not striate. *Lamellae* pale cinnamon, moderately crowded. *Stipe* 35–45 × 7 mm, cylindrical to clavate, dry; white, flushing yellow-brown, base with a thin white coating. *Veil* white, sparse; *cortina* not noted. *Context* yellowish white, marbled yellow-brown. *Odour* strong, melleous; *taste* strongly bitter. *Macrochemical reactions*: NaOH red on brown parts of context and stipital veil, elsewhere none.

Spores (6.5–)6.7–7.3–7.9(–8.2) × (3.3–)3.6–3.9–4.2(–4.6) μm, Q=1.88±0.19 (n=28), fusoid, pale, weakly verrucose. *Marginal elements* crowded, clavate, hyaline, 18–28 × 5–7 μm. *Basidia* 18–22 × 5–7 μm, 4-spored. *Pileipellis* of a thin gelified layer of hyaline, repent to slightly entangled hyphae, 1.5–2.5 μm wide, deeper hyphae repent 3–4 μm. *Hypocutis* of rounded rectangular, hyaline elements, 40–60 × 10–15 µm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Nelson, Wangapeka Track, 13 May 2004, *K. Soop* DAO2069, OTA 60285, GenBank JX178615 (ITS).

COMMENTS. A rare phlegmacioid species presenting generally ochraceous hues, and characterised by its remarkably narrow and fuse-shaped spores. *Cortinarius dulcamarus* recalls certain forms of *C. orixanthus* Soop, described from the same habitat in New Zealand, however, the latter produces a yellow veil and wider spores. A BLAST search reveals its close affinity to *C. verniciorum* Soop, another viscid, yellow-brown species with fusoid spores, but smaller and telamonioid in habit.

Cortinarius vitreofulvus Soop sp. nov. (Fig. 3A, 5E)

MycoBank 814855.

TYPIFICATION: New Zealand. Taupo, Cascade Hut Track, in *Fuscospora fusca* forest, 9 May 2009, *K. Soop* CO1920, holotype PDD 97545, isotype S F140326, GenBank KJ635243 (ITS+LSU).

ETYMOLOGY: From the similar *C. vitreopileatus* and Latin *fulvus* " yellow-brown" , due to its general appearance.

Pileus 35–50 mm diam., obtusely rounded, later expanded, with a 2 mm thick, glutinous layer, hygrophanous; tan with greyish white zones when young, later darker yellow-brown, glabrous; margin paler when young, later striate. *Lamellae* white to grey-white when young, free, moderately crowded (L=48, l=3). *Stipe* 35–60 × 7–12 mm, cylindrical to slightly clavate, viscid, white, flavescent below apex. *Veil* hyaline, ± brunnescent, copious as gluten on stipe; *cortina* rudimentary. *Context* white. *Odour* and *taste* insignificant. *Macrochemical reactions*: NaOH reddish on brown zones of cutis, elsewhere trivial.

Spores (10.0–)10.7–11.3–12.0(–12.8) × (6.0–)6.4–6.8–7.2(–7.6) μm, Q=1.66±0.12 (n=31), amygdaloid, strongly verrucose. *Marginal elements* numerous, mostly vesiculose, some clavate, often finely greyish encrusted, 18–27 × 9–12 μm. *Basidia* mostly finely greyish encrusted, 25–36 × 10–12 μm, 4-spored. *Pileipellis* a thick gelified layer of entangled, hyaline hyphae, 2–3 μm wide, deeper hyphae repent 3–4 μm wide. *Hypocutis* of irregular, hyaline elements, 12–27 × 9–18 µm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, uncommon but possibly overlooked.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago Lakes, Kepler Track, 28 Apr 2009, *K. Soop* CO1886; Taupo, 27 Apr 2001, *E. & A. Horak,* PDD 72615, GenBank KT833621 (ITS+LSU).

COMMENTS. A typical cortinar in subgenus *Myxacium* with a thick gluten on most of the basidiome. *Cortinarius vitreofulvus* resembles the very common *C. vitreopileatus* E. Horak, which may be separated by its pale pileus colour and moderately verrucose spores. From available molecular data the genetic affinity to the latter is also evident, while its closest relative appears to be *C. marmoratus* E. Horak, characterised by a dark, chocolate-coloured pileus and violet lamellae. According to the protologue, *C. viscostriatus* E. Horak (Horak & Wood 1990) can be separated by its pale colours and minutely warty spores.

Cortinarius psilomorphus Soop sp. nov. (Fig. 2D, 5B)

MycoBank 814856.

TYPIFICATION: New Zealand. Nelson, Wangapeka Valley, in grassland close to *Kunzea ericoides* trees, 13 May 2004, *K. Soop* CO1492, holotype PDD 103885, GenBank KF727393 (ITS), KF727347 (LSU).

ETYMOLOGY: From Greek ψιλος " smooth" and μορφη " shape" , due to its general appearance.

Pileus 15–40 mm diam. broadly conical with a small umbo, viscid, sticky with a ± gelatinous cutis, weakly hygrophanous; pale tan, young finely granulose to innate fibrillose; margin slightly paler, striate. *Lamellae* almost white when young, later pale grey-brown, somewhat decurrent. *Stipe* 25–50 × 2–4 mm, slender, cylindrical, waxy, pale brownish grey, base bristling from white rhizoids. *Veil* thin, yellow-brown; *cortina* pale. *Context* greyish yellow. *Odour* insignificant. *Macrochemical reactions*: NaOH orange to red-brown on cutis, yellow on context and stipital veil, ± red on lamellae.

Spores (5.5–)6.0–6.5–7.0(–7.6) × (4.0–)4.4–4.6–4.9(–5.1) μm, Q=1.41±0.13 (n=30), elliptical, often obtusely, rather pale, finely verrucose. *Marginal elements* crowded, clavate, of varying sizes 15–32 × 7–8 μm. *Basidia* 22–28 × 7–8 μm, 4-spored. *Pileipellis* thick with a gelified layer of entangled, hyaline hyphae, 1.5–3 μm wide, deeper hyphae repent 3–4 μm wide. *Hypocutis* of oblong irregular, hyaline elements, 20–35 × 6–10 µm. *Clamp connections* present.

HABITAT: Gregarious, probably with myrtaceous trees, very rare.

COMMENTS. From several phenotypic traits (growth in a lawn without evident associated host, sticky basidiomata with decurrent lamellae) this fungus was originally taken for a *Psilocybe*, though the spore characters readily dispelled the error. One notes that the surprising lamellae attachment may, of course, be an occasional character. The species may be placed in subgenus *Paramyxacium* E. Horak, where the closest taxon appears to be *Cortinarius gemmeus* E. Horak. But the latter deviates by an absent alkaline reaction and a strongly glutinous stipe, and the colour photo of collection PDD 27268 (E. Horak), available at the NZ Fungi website, clearly shows a different species. No genetic sequences have been published for the holotype of *C. gemmeus*, but available molecular markers place *C. psilomorphus* in the bihemispherical section *Vibratiles* Melot together with the South Pacific taxon *C. melleomitis* E. Horak, which may be separated by its white stipe and longer spores.

Cortinarius* sectio *Cycnei Soop sect. nov.

MycoBank 814857.

Basidiomata agaricoid or secotioid. Pileus and stipe viscid to glutinous, rarely hygrophanous, ± glabrous with white, brownish, or violet hues. Lamellae/gleba whitish or violaceous when young. Stipe cylindrical to slightly clavate, viscid. Universal veil hyaline, often with a pale violet tinge. Alkaline reaction weak or

absent. Spores elliptic to amygdaloid, 9–14 µm long, moderately to rather coarsely verrucose. In native forests, mostly associated with Nothofagaceae. Australasia and Patagonia.

TYPIFICATION: *Cortinarius cycneus* E. Horak, 1990, typus sectionis. In Horak & Wood..Sydowia 42, p. 94.

Currently known taxa in the section (with area of provenance):

C. cucumeris E. Horak	New Zealand
C. cycneus E. Horak	New Zealand
C. lubricanescens Soop	New Zealand
C. maculobulga Danks, T. Lebel & Vernes	Australia
C. magellanicus Speg.	South America
C. cf. *magellanicus*	South America

COMMENTS. This is a section of myxacioid fungi confined to the Southern Hemisphere. The section is monophyletic (Fig. 6). Even if the genetic support is modest (60%), the section is morphologically rather homogeneous. The Australian taxon is the only secotioid member, and the only member currently associated with myrtaceous plants.

Cortinarius lubricanescens Soop 2001.

MISAPPLIED NAME: *C. magellanicus* Speg. ss auct. plur.

COMMENTS. The South American species *Cortinarius magellanicus* has been reported repeatedly from New Zealand (Segedin & Pennycook 2001), but available molecular data show that it is a question of a violet form of *C. lubricanescens*. This form is rare, while the normal form, presenting white to greyish white colours, is fairly common. The normal form may also occasionally exhibit pale violet parts of the basidiome. According to Spegazzini's protologue (1887), the only morphological difference seems to be the lamellar colour: white with *C. magellanicus*, violaceous with the violet form of *C. lubricanescens*. Possibly, the latter form also presents a more red-lilac shade of violet.

Apparently there exists a third species, collected in South America, which has been named *C." magellanicus"*. This taxon (labelled *C.* cf. *magellanicus* in the list) is part of sect. *Cycnei*, but not cotaxic with any of the other members. Moreover, a fourth taxon, collected in New Caledonia, has also been so named (F. Carriconde pers. comm.).

COLLECTIONS EXAMINED: New Zealand. Normal form: Buller, St Arnaud Range, 3 May 2008, *K. Soop* CO1777, PDD 94031, S F93231, GenBank KU885995 (ITS); Nelson, Brightwater, Eves Bush, 11 May 2004, *K. Soop* CO1473, PDD78803, S F44443. Violet form: Nelson, Floral Saddle, 10 May 2004, *K. Soop* CO1466, PDD 78801, GenBank KJ421073 (ITS+LSU); Rangitikei, Lake Waikareiti Track, 9 May 2001, *K. Soop* CO1243, PDD107508.

SUMMARY DESCRIPTION of *C. lubricanescens* (violet form). Fig. 3C.

Pileus 18–40 mm diam., rounded, later convex, glutinous, not or weakly hygrophanous; violet, mostly with a red-lilac shade, disk darker, glabrous; margin often sinuate, not or weakly striate. *Lamellae* pale violet when young. *Stipe* 25–50 × 2–4 mm, cylindrical to tapering downwards, slender, tough, pale blue to violet. *Veil* saturated reddish violet, viscid, fairly copious, often peronate on stipe; *cortina* rudimentary. *Context* violet, sometimes paler, fragile. *Odour* faint, pleasant like "pastry", *taste* insignificant. *Macrochemical reactions*: NaOH none or trivial. *Spores* amygdaloid to subelliptic, 9–11 × 5.5–6.3 μm, moderately verrucose.

HABITAT: As the type, this form is found in Nothofagaceae forest.

Key to sect. *Cycnei*

1	Habit secotioid	*Cortinarius maculobulga*
1*	Habit agaricoid	2
2	Basidiome deep violet, often with a purple tinge	3
2*	Basidiome with at most a pale violet tint	4
3	Habitat Nothofagaceae forest in New Zealand, lamellae violet	*C. lubricanescens* (forma)
3*	Habitat Nothofagaceae forest in South America, lamellae white	*C. magellanicus*
4(2)	Odour strong of cucumber, pileus brownish, possibly with a violet tint	*C. cucumeris*
4*	Odour different, pileus pale	5

5 Pileus white, often >50 mm diam., odour insignificant..... *C. cycneus*
5* Pileus white to pale grey, occasionally with a violet tinge, smaller, odour usually distinct of "lubricant" ..... *C. lubricanesces*

Cortinarius mysoides Soop sp. nov. (Fig. 2C, 5A)

MycoBank 814858.

TYPIFICATION: New Zealand. Otago Lakes, Haast Pass, Bridle Track, in *Fuscospora fusca* forest, 1 May 2008, *K. Soop* CO1771, holotype PDD 94027, isotype S F93227, GenBank KJ635232 (ITS+LSU).

ETYMOLOGY: From Greek μυς " mouse" and ειδος " similar" , due to its greyish hues and modest size.

Pileus 20-40 mm diam., obtusely conical, later broadly conical with a shallow umbo, dry, hygrophanous; light red-brown to yellow-brown with a greyish smoky shade, rather coarsely radially innate-fibrillose with a glabrous disk; margin paler with sparse brownish fibrils, weakly striate by translucent darker streaks. *Lamellae* saturated brick red when young, distant to medium crowded (L=40, l=2). free. *Stipe* 60–90 × 2–5 mm, cylindrical, slender, tough, often hollow, greyish yellow with red-brown to brown tufts and girdles. *Veil* red-brown, fairly copious; *cortina* yellowish grey. *Context* yellow-brown marbled orange-brown. *Odour* raphanoid; *taste* nil. *Macrochemical reactions*: NaOH dark red to red-brown on cutis, lamellae, and stipital veil.

Spores (7.1–)7.6–8.1–8.7(–9.3) × (4.6–)4.7–5.0–5.3(–5.5) μm, Q=1.62±0.15 (n=30), elliptical to subamygdaloid, moderately to rather strongly verrucose. *Marginal elements* crowded, cylindrical to clavate, hyaline, 24–30 × 6–8 μm. *Basidia* 24–28 × 7 μm, 4-spored. *Pileipellis* thin with hyaline, repent hyphae, 3–4 μm thick. *Hypocutis* of oblong, rectangular elements, 20–35 × 6–10 μm. *Clamp connections* present.

HABITAT: Caespitose to gregarious in Nothofagaceae forest, uncommon.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago Lakes, Haast Pass, Bridle Track, 14 May 2015, *K. Soop* CO2191, PDD 107721, GenBank KT875189 (ITS+LSU); *idem*, Cameron Creek, 15 May 2015, *K. Soop* CO2194, PDD 107724, S F267764, GenBank KT875190 (ITS+LSU).

COMMENTS. A small grey fungus characterised by the remarkable smoky or cloudy appearance of the cutis, especially when young, and by the reddish lamellae and reddish veil remnants on the stipe. A BLAST search reveals no close genetic relative. *Cortinarius mysoides* is rather similar to *C. rattinus* Soop and to *C. rattinoides* Soop, which however, both display bluish lamellae. They also exhibit different molecular markers, placing the latter in the bihemispherical section *Anomali* Konrad & Maubl.

Cortinarius chrysoconius Soop sp. nov. (Fig. 1B, 4B)

MycoBank 814859.

TYPIFICATION: New Zealand. Fiordland, Borland Lodge Track, in *Fuscospora solandri* forest, 25 Apr 2004, *K. Soop* CO1428, holotype PDD 107635, GenBank KU136438 (ITS), KU136440 (LSU).

ETYMOLOGY: From Greek χρυσος " golden" and κονια " powder" , due to the aspect of the cutis.

Pileus 25–30 mm diam., convex, dry, weakly hygrophanous; bright yellow, more yellow-brown at disk, golden yellow towards margin, finely innate fibrillose or slightly granulose, ± covered by disparate white squamules, margin with white fibrillose tufts. *Lamellae* golden brown, medium crowded. *Stipe* 50–100 × 3–4 mm, cylindrical with a small rounded bulb, coated white, partly flushing yellow-brown. *Veil* white, fairly copious; *cortina* not noted. *Context* pale ochre to yellow. *Odour* distinctly raphanoid, *taste* nil. *Macrochemical reactions*: NaOH trivial.

Spores (7.6–)8.3–9.1–9.9(–10.9) × (4.9–)5.2–5.5–5.8(–6.2) μm, Q=1.66±0.12 (n=28), elliptical, moderately to finely verrucose. *Marginal elements* crowded, clavate, hyaline, 18–26 × 5–8 μm, a few differentiated (cheilocystidia) 30–38 × 7–9 μm. *Basidia* 25–32 × 7–9 μm, 4-spored. *Pileipellis* thin with pale yellow, repent hyphae, 4–6 μm thick. *Hypocutis* of oblong, ellipsoid to rectangular, pale yellow elements, 35–70 × 10–25 μm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago Lakes, Kepler Track, 26 Apr 2004, *K. Soop* CO1489; Nelson, Mount Arthur, 13 May 2004, *D. Orlovich* DAO2002, OTA 60292, GenBank JX178607 (ITS).

COMMENTS. This fungus, characterised by the bright golden pileus, punctuated by white granules, may evoke a *Pholiota* in sect. *Flammans*. *Cortinarius peraureus* Soop is somewhat similar, but lacks the granulose pileipellis structure and possesses a more robust habit. Available molecular data place *C. chrysoconius* in an isolated position.

Cortinarius urbiculus Soop sp. nov. (Fig. 2F, 5D)

MycoBank 814863.

TYPIFICATION: New Zealand. Fiordland, Kepler Track, in *Fuscospora solandri* forest, 24 Apr 2006, *K. Soop* CO1627, holotype PDD 88259, GenBank KJ547668 (ITS+LSU).

ETYMOLOGY: From evoking a small form of the boreal species *C. urbicus*.

Pileus 20–35 mm diam., obtusely rounded to subconical, later convex-expanded, dry, weakly or not hygrophanous; young with a white, felty or pruinose coating that soon absorbs to grey-brown; margin paler with a silky white rim, not striate. *Lamellae* violet when young, sometimes greyish with a violet shade, narrowly adnexed, medium crowded (L=40–60, l=1–2). *Stipe* 20–60 × 4–9 mm, clavate to ± cylindrical, white, with a thin white pruinose coating, sometimes with a violet tinge. *Veil* white, sparse; *cortina* white to greyish white. *Context* white, often marbled violet, rather soft. *Odour* insignificant; *taste* ± bitter. *Macrochemical reactions*: NaOH and guayac trivial.

Spores (5.5–)6.3–6.9–7.5(–8.2) × (3.8–)4.0–4.3–4.6(–4.9) µm, Q=1.61±0.15 (n=30), elliptical, moderately to finely verrucose. *Marginal elements* crowded, clavate, hyaline, 15–24 × 6–8 µm. *Basidia* 20–25 × 6–7 µm, 4-spored. *Pileipellis* thin of repent hyphae, 4–6 µm thick. *Hypocutis* of oblong rectangular elements, 40–85 × 20–25 µm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Fiordland, Kepler Track, 16 May 2015, *K. Soop* CO2195, PDD 107725, S F267765, GenBank KT875180 (ITS+LSU).

COMMENTS. A small greyish species, typically presenting a clavate stipe and a matt, slightly grainy coating. It evokes cortinars in sections *Malachii* (e.g., *C. urbicus* Fr.) and *Anomali*. Available molecular markers place *Cortinarius urbiculus* close to *C. laquellus* Soop, which deviates by possessing a viscid surface and a thin stipe. Both are closely related to the *Lustrati* clade (cf. Ammirati et al. 2007).

Cortinarius amblyonis Soop sp. nov. (Fig. 1A, 4A)

MycoBank 814866.

TYPIFICATION: New Zealand. Otago, Dunedin, Waipori Falls, in *Leptospermum scoparium* forest, 13 Apr 1997, *K. Soop* CO796, holotype PDD 103634, GenBank KF727364 (ITS), KF727300 (LSU).

ETYMOLOGY: Fantasy name inspired by the similar *C. obtusus* (Greek αμβλυς "obtuse").

Pileus 15–30 mm diam., obtusely conical, later conical-expanded, dry, hygrophanous; dark red-brown to orange-brown, thinly white frosty when young, finely innate-fibrillose; margin striate. *Lamellae* red-brown to cinnamon when young, free, distant (L=30, l=2–3). *Stipe* 30–40 × 3–5 mm, cylindrical to somewhat tapering downwards with a thin white coating that absorbs to pale brown. *Veil* white, sparse; *cortina* white. *Context* yellow-brown, paler in stipe base, often with a green-blue tinge when young. *Odour* faintly raphanoid or of iodine; *taste* insignificant. *Macrochemical reactions*: NaOH dark saturated red-brown on cutis and lamellae, elsewhere nil.

Spores (6.5–)6.8–7.3–7.8(–8.2) × (4.3–)4.4–4,7–5.0(–5.5) µm, Q=1.56±0.10 (n=26), elliptical, moderately verrucose. *Marginal elements* crowded, clavate, hyaline, 16–28 × 6–8 µm. *Basidia* 25–30 × 7–8 µm, 4-spored. *Pileipellis* thin of repent hyphae, 3–6 µm thick. *Hypocutis* of oblong elliptical, pale yellow-brown elements, 40–55 × 14–20 µm. *Clamp connections* present.

HABITAT: Gregarious in myrtaceous forest, uncommon.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago, Dunedin, Waipori Falls, 12 May 2008, *K. Soop* CO1801, PDD 94049, S F93246.

COMMENTS. Available molecular data indicate that the species belongs to the bihemispherical section *Obtusi* Melot, where it is a typical member: small with a dry red-brown pileus, a whitish stipe, and a faint odour of iodoform. However, the lamellae do not exhibit the differentiated cheilocystidia which are prominent on several taxa in the section. *Cortinarius amblyonis* also recalls the New-Zealand species *C. paraoniti* Soop and *C. saturniorum* Soop, which both grow in Nothofagaceae forest.

Cortinarius cypripedii Soop sp. nov. (Fig. 1D, 4D)

MycoBank 814867.

TYPIFICATION: New Zealand. Otago Lakes, Haast, Cameron Creek Track, in *Fuscospora fusca* forest, 15 May 2015, *K. Soop* CO2193, holotype PDD 107723, GenBank KT875199 (ITS+LSU).

ETYMOLOGY: Due the colours recalling the orchid *Cypripedium calceolus*.

Pileus 20–35 mm diam., obtusely conical, later campanulate to bonnet-shaped with a wide umbo, dry, hygrophanous; warmly brown-red to dark orange, disk very dark brownish, almost black, glabrous to very finely innate-fibrillose; margin paler with fine reddish fibrils, striate. *Lamellae* brownish red to cinnamon when young, narrowly adnexed, distant (L=30–32, l=1–2). *Stipe* 20–50 × 3-6 mm, cylindrical, ± pointed at base, pale brownish yellow with rather dense red-brown fibrils. *Veil* orange brown to brick red, fairly copious; *cortina* white. *Context* dark yellow-brown to saturated brownish red. *Odour* raphanoid; *taste* insignificant. *Macrochemical reactions*: NaOH trivial.

Spores (5.5–)5.9–6.3–6.7(–7.1) × (4.9–)5.1–5.5–5.8(–6.2) µm, Q=1.16±0.09 (n=26), subglobose, moderately verrucose. *Marginal elements* crowded, clavate, hyaline, of various sizes 12–17 × 6–7 µm or 20–32 × 4–9 µm. *Basidia* 24–32 × 7–8 µm, 4-spored. *Pileipellis* of repent, pale yellow-brown hyphae, 6–8 µm. *Hypocutis* of rectangular elements, 45–70 × 12–20 µm. *Clamp connections* present.

HABITAT: Gregarious in Nothofagaceae forest, rare.

OTHER COLLECTIONS EXAMINED: New Zealand. Otago Lakes, Haast, Cameron Creek Track, 2 May 2009, *K. Soop* CO1902, PDD 97527, S F140311.

COMMENTS. The interesting colour combination of the pileus of this small but decorative fungus recalls certain flowers. It is further characterised by reddish lamellae and veil, and subglobose spores. *Cortinarius cypripedii* superficially resembles several other small, vividly coloured cortinars in the forests of New Zealand: *C. viscilaetus* Soop is viscid; *C. palissandrinus* Soop is more evenly coloured without an orange tinge; and *C. ignellus* presents paler pileal hues and a strong alkaline reaction. Available molecular data also show these taxa to be genetically disparate, while *C. cypripedii* is placed in the bihemispherical section *Illumini* Liimat. et al., which mainly contains red-brown taxa with subglobose spores.

Discussion

Cortinarius is the most diversified of macrofungal genera with an estimated 2700 species worldwide, present in all regions with a temperate climate (cf. Liimatainen et al. 2014). Since most *Cortinarius* species (c. 1900) have been described from Europe, the Northern Hemisphere tends to dominate in extant studies (cf. Peintner et al. 2004). It is nevertheless evident that the genus is well represented in the Southern Hemisphere, where it often forms a dominant element in the ectomycorrhizal forests of New Zealand during the fruiting season, and its diversity in this habitat appears to be at least as high as in the ectomycorrhizal forests of Europe (pers. obs.). The aim of the present study, as well as of the six previous instalments cited in the Introduction, has been to uncover and describe many formerly anonymous taxa, in an attempt to bridge an important taxonomical gap in the mycota of the country.

In their barcoding study, Garnica et al. (2016) addressed the genus on a global scale and revealed a clade structure of c. 900 species based on the internal transcribed spacer regions (ITS) of the rDNA genome. Many southern species were included, among others most species described in the instalments mentioned. The

present study recovers two of the clades as new sections, and corroborates the diversity demonstrated by the barcoding study.

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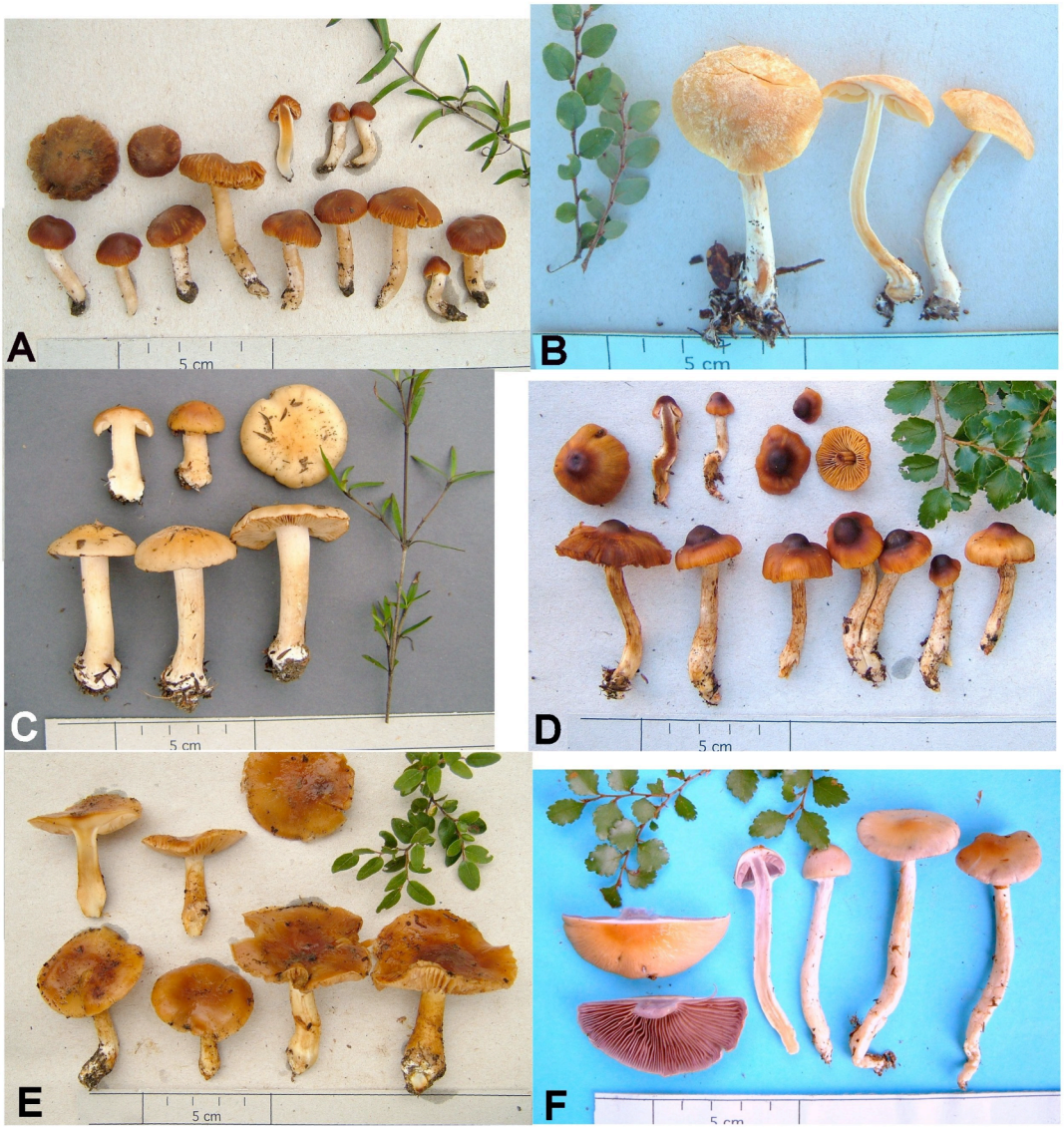

Figure 1 Basidiomata. **A,** *Cortinarius amblyonis*. **B,** *C. chrysoconius*. **C,** *C. cremeorufus*. **D,** *C. cypripedii*. **E,** *C. dulcamarus*. **F,** *C. entheosus*.

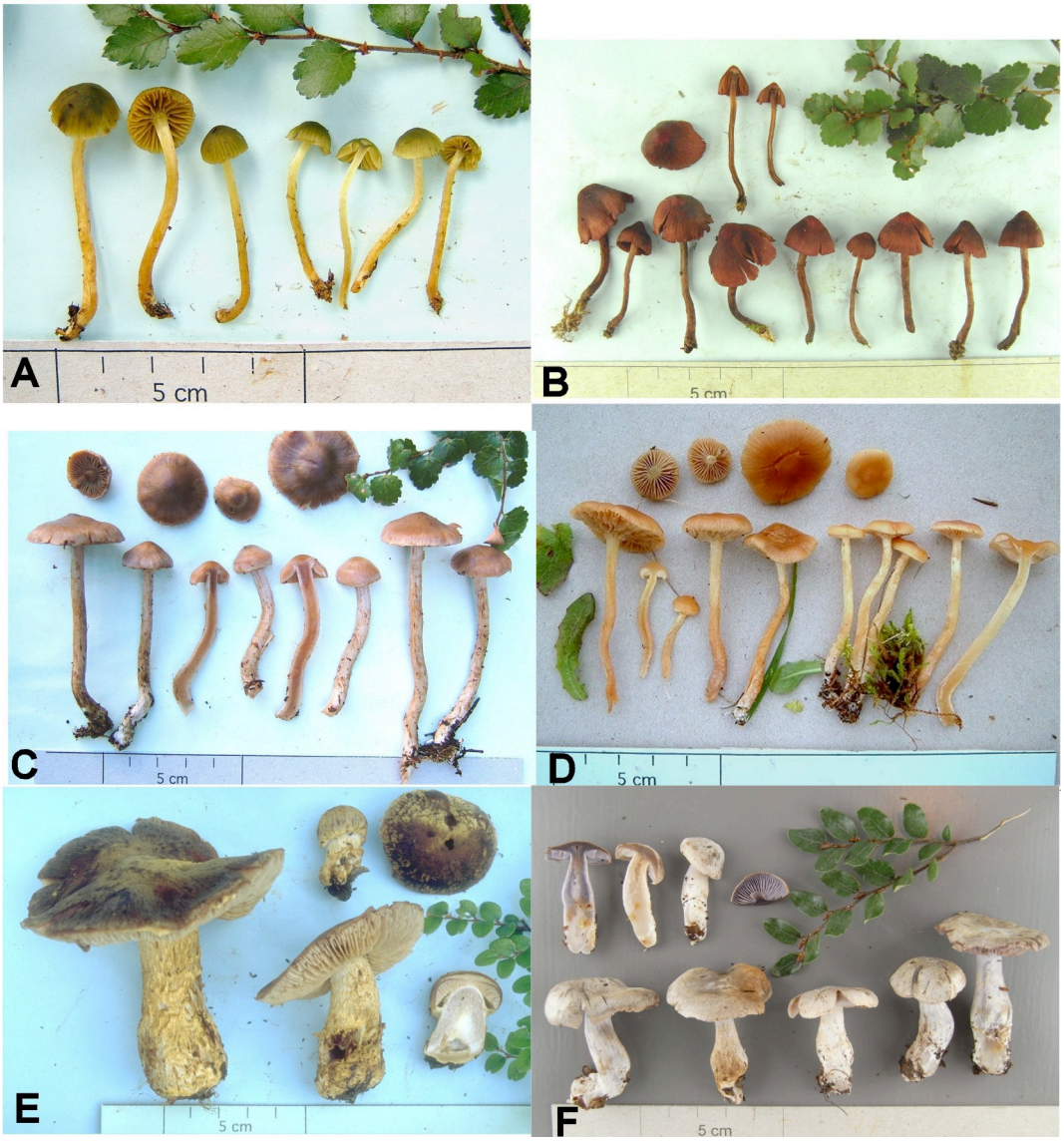

Figure 2 Basidiomata. **A,** *C. lachanus*. **B,** *C. mycenarum*. **C,** *C. mysoides*, **D,** *C. psilomorphus*. **E,** *C. trichocarpus*. **F,** *C. urbiculus*.

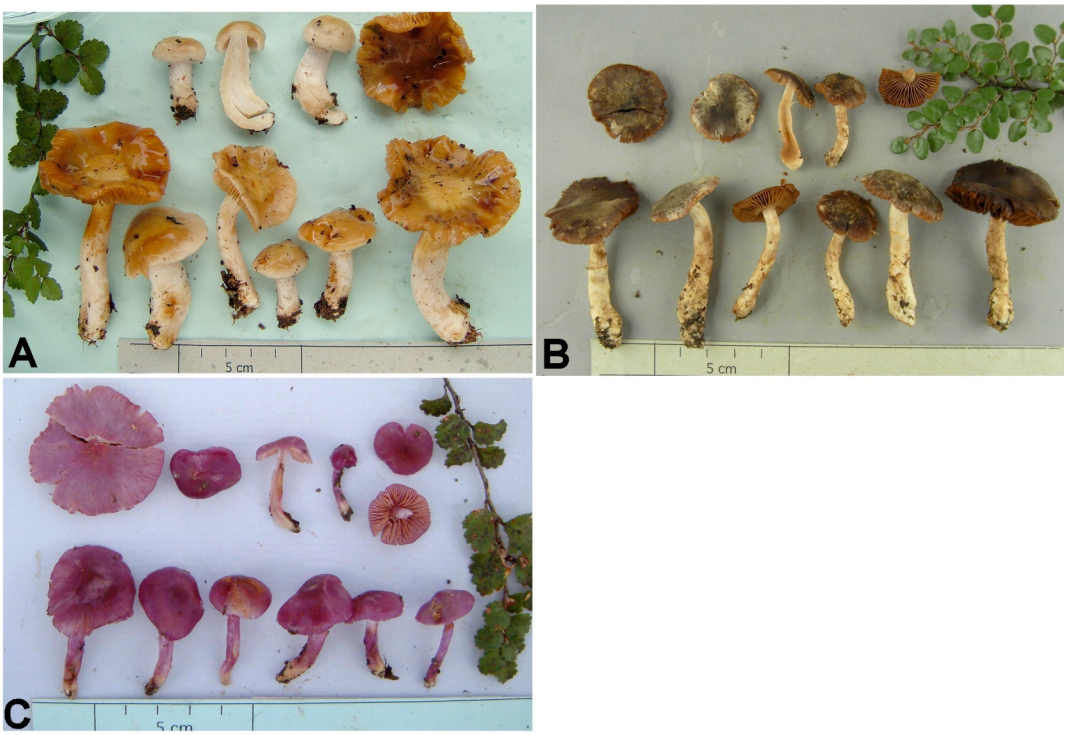

Figure 3 Basidiomata. **A,** *C. vitreofulvus*. **B,** *C. xenosmatoides*. **C,** *C. lubricanescens* (violet form).

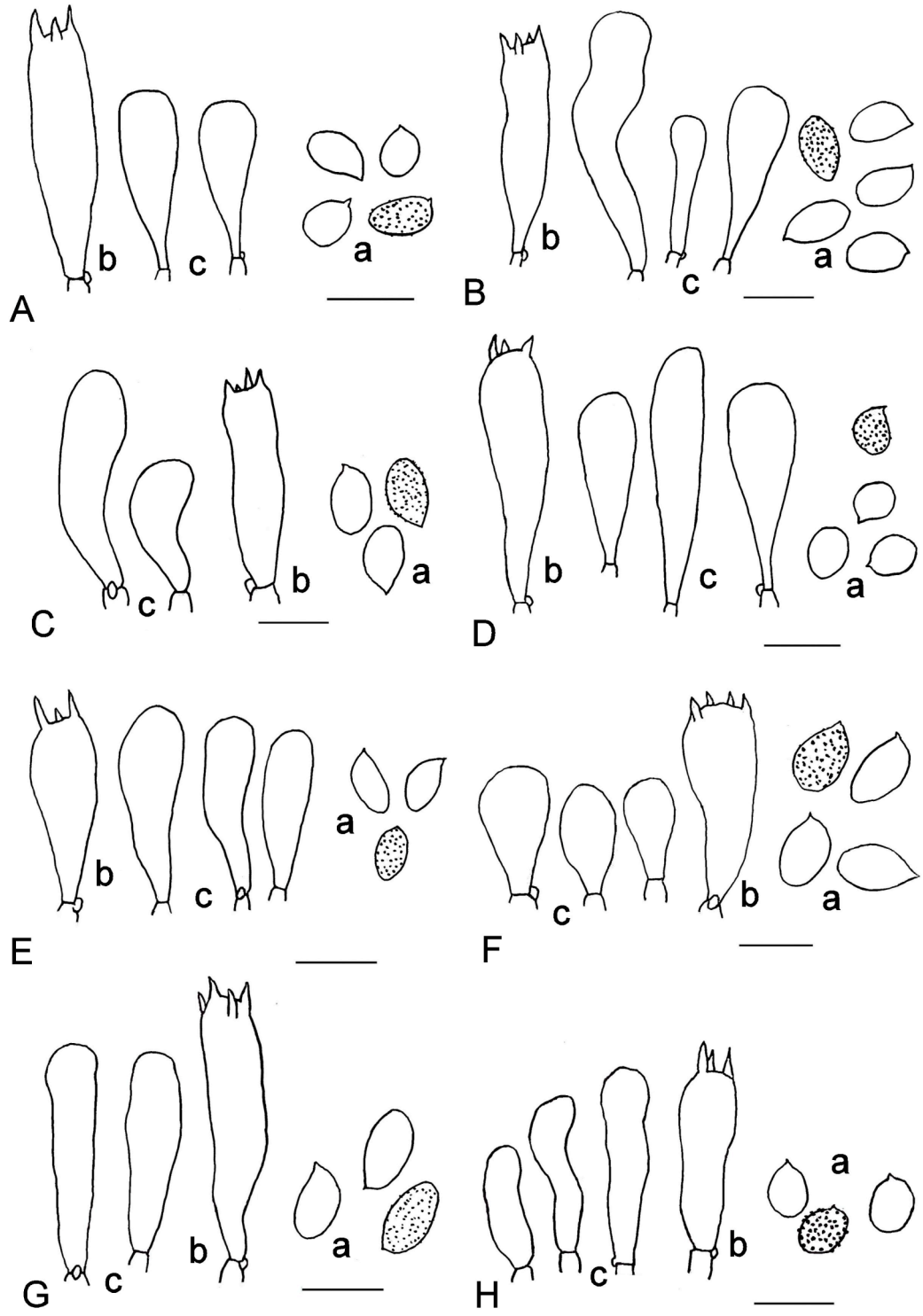

Figure 4 Microscopic details. a: spores, b: basidia, c: sterile marginal elements, scale = 10 µm. **A,** *Cortinarius amblyonis*. **B,** *C. chrysoconius*. **C,** *C. cremeorufus*. **D,** *C. cypripedii*. **E,** *C. dulcamarus*. **F,** *C. entheosus*. **G,** *C. lachanus*. **H**, *C. mycenarum*.

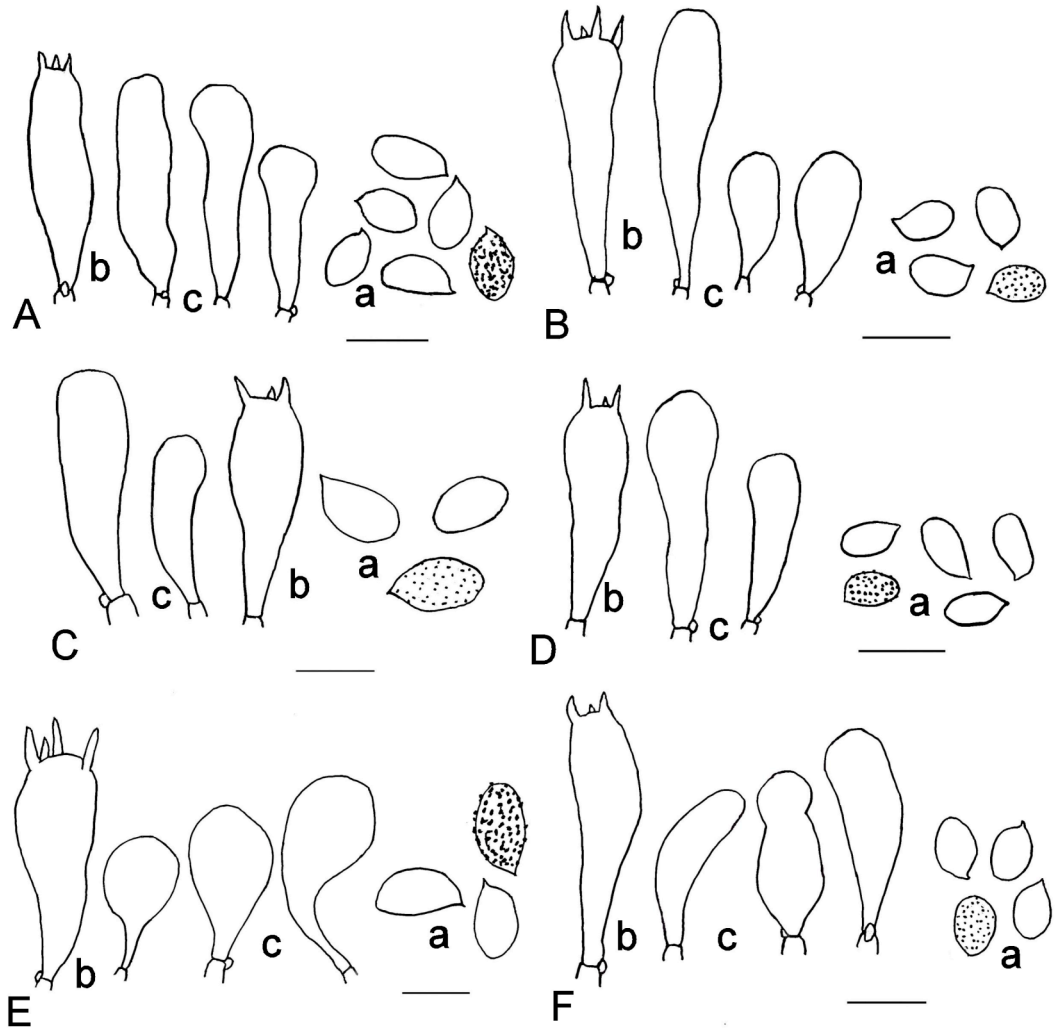

Figure 5 Microscopic details. a: spores, b: basidia, c: sterile marginal elements, scale = 10 µm. **A,** *C. mysoides*. **B,** *C. psilomorphus*. **C,** *C. trichocarpus*. **D,** *C. urbiculus*. **E,** *C. vitreofulvus*. **F,** *C. xenosmatoides*.

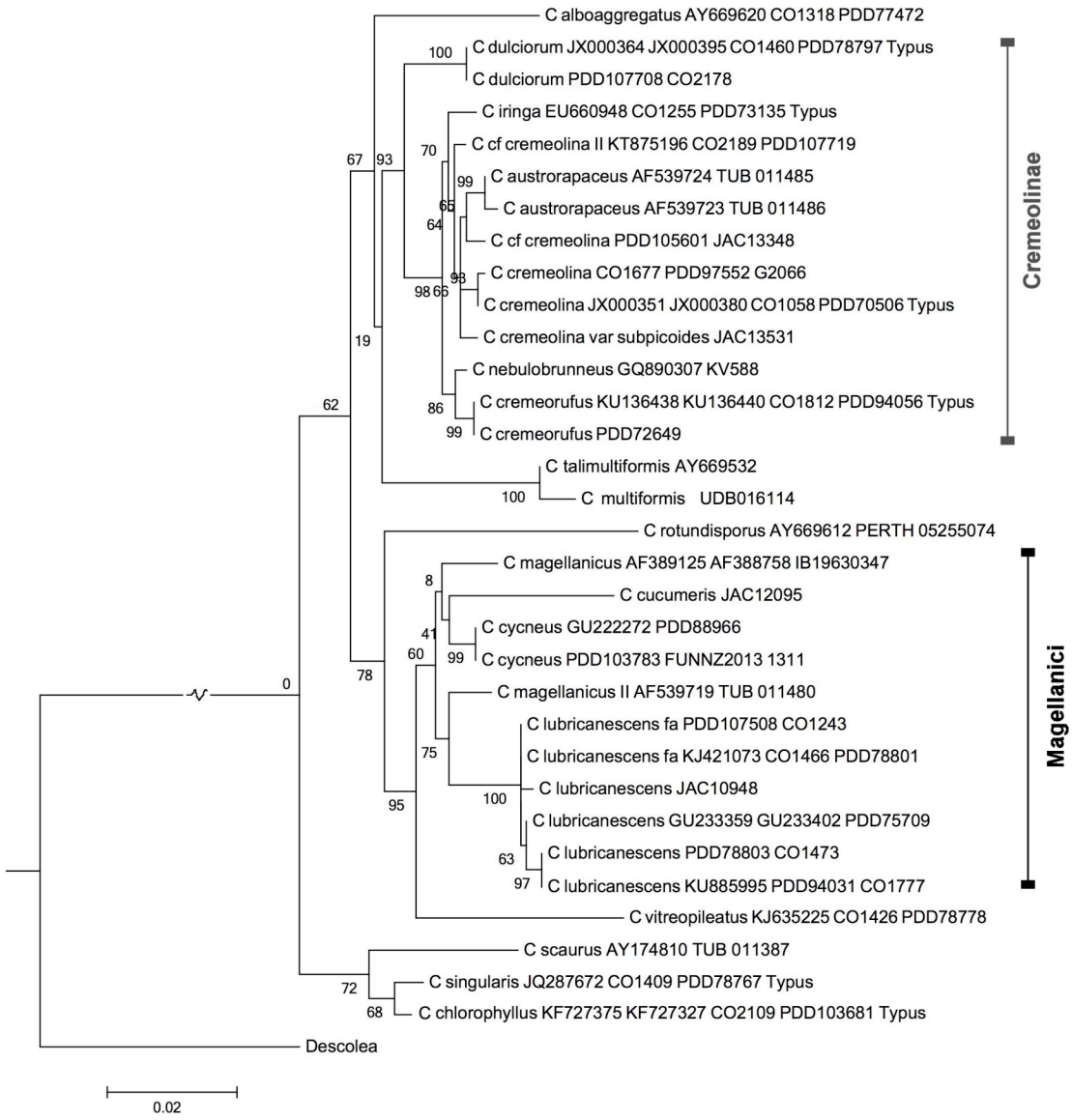

Figure 6 Maximum likelihood tree of *Cortinarius* sect. *Cremeolinae* and *Cycnei*.