

A PRELIMINARY CENSUS OF THE MACROFUNGI OF MT WELLINGTON, TASMANIA – THE ASCOMYCOTA

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(with one appendix)

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This work continues the process of documenting the macrofungi of Mt Wellington. Two earlier publications were concerned with the gilled and non-gilled Basidiomycota, respectively, excluding the sequestrate species. The present work deals with the non-sequestrate Ascomycota, of which 42 species were found on Mt Wellington.

Key Words: Macrofungi, Mt Wellington (Tasmania), Ascomycota, cup fungi, disc fungi.

INTRODUCTION

Two earlier papers in the preliminary documentation of the macrofungi of Mt Wellington, Tasmania, were confined to the 'agarics' (gilled fungi) and the non-gilled species, respectively (Ratkowsky & Gates 2002, Gates & Ratkowsky 2004), all within the Division Basidiomycota. Those papers, which identified 206 macrofungal species between them, completed the preliminary census of the macrofungi whose spores are borne on basidia, with the exception of the truffle-like 'earthballs', which will be the subject of the fourth and final part of this project. Naming of the species in the earlier papers was facilitated by the publication of two recent catalogues of the Australian Basidiomycota (May & Wood 1997, May *et al.* 2003) and the maintenance of an updated interactive version of those catalogues on the Royal Botanic Gardens Melbourne website (www.rbg.vic.gov.au). However, no catalogue exists as yet for the Australian Ascomycota, a large division of fungi in which spores are contained within asci, rather than upon basidia. Although such a catalogue is planned as part of the Fungi of Australia project, it is unlikely to be realised for at least five years (T.W. May pers. comm.). Therefore, so as not to delay unreasonably a listing of the Ascomycota of Mt Wellington, we have undertaken to produce this third paper in the series, without reference to an updated catalogue.

MATERIALS AND METHODS

Details of the survey zones appear in Ratkowsky & Gates (2002); that paper included a map of the survey area. The fieldwork for the project commenced in January 1994 and is part of a continuing programme of fungal surveys throughout Tasmania. Between April 1998 and August 2005, over 300 visits to Mt Wellington were made. Forays were divided into six areas or groups of tracks, viz. (i) the extensive network of tracks centred near Ferntree on the east-facing slopes of Mt Wellington, (ii) Myrtle Gully and Old Farm trails, (iii) Myrtle Forest Creek above Collinsvale, (iv) the track towards Cathedral Rock along the North West Bay River, (v) the Waterworks Reserve, Hobart, and (vi) the Truganini Track from Cartwright Creek, Tarooma, to Mount Nelson. Visits were made in each of the twelve months of the year.

For the purposes of this survey, all Ascomycota having a conspicuous fruiting body were considered, excluding endophytes. Material collected during forays was described macroscopically shortly after collection, and examined microscopically to obtain details such as the size of the asci, details of the paraphyses, and spore shape, size and ornamentation. Species identification was aided by comparing the detailed macro and micro descriptions with those of published species in the scientific literature, from websites and other information on the Internet, and, in a few cases, by consultation with overseas mycologists specialising in the Ascomycota. Voucher material for each species has been deposited in the Tasmanian Herbarium (HO) and, wherever sufficient material was available, in the National Herbarium of Victoria (MEL).

RESULTS

The list of the macrofungal Ascomycota in appendix 1, in keeping with the standard adopted in the previous papers in this series, is confined to those taxa that have been validly named. The 42 named species listed in appendix 1 may only be a fraction of the true number present on Mt Wellington. Other genera such as *Leucoscypha* and *Ascobolus* are represented on Mt Wellington as well as other species of *Mollisia*, *Ciboria* and *Lachnum*. However, the authors have not been able to determine the specimens to species level. When a more comprehensive study has been made on the Ascomycota, further named species will become available.

The species are listed alphabetically within each of five Orders, as given by Kirk *et al.* (2001). In a few cases, there is some doubt about whether the taxa occurring in Tasmania are conspecific with those named from elsewhere (usually the Northern Hemisphere), so "aff." is used to indicate that the species has an affinity with the species of that name from the place of the original description. Only the above-ground (i.e., non-sequestrate) species are considered here, with the truffle-like Ascomycota to be part of the fourth part of this series of papers. For the species listed in appendix 1, wherever there are photographs and/or illustrations available in published sources, references to these are given.

DISCUSSION

Maintenance of high levels of biological diversity is thought to be important for ecosystem health and resilience. Fungi make up a large proportion of the diversity in any ecosystem and are biologically important, especially with respect to nutrient recycling and mycorrhizal associations. The lists of taxa in this series of papers provide the baseline data needed for ongoing assessment of changes in biological diversity and health in Mt Wellington's ecosystems. Although the Ascomycota are the most diverse group of fungi (Kirk *et al.* 2001), the lists provided here are, of necessity, preliminary and incomplete. The authors have tried to determine the specimens they have collected as best as they can. The lack of taxonomic resources for Australia's Ascomycota, there being few monographic studies and no catalogue and bibliography, has meant this has often been impossible.

Three examples where taxonomic study is necessary to resolve problems are mentioned here. One of these involves *Hypoxyton rubiginosum*, whose fruit bodies form large patches of red-purple crusts on dead wood. This species is often reported from Australia (e.g., McCann 2003, Fuhrer 2005). However, a monograph on *Hypoxyton* (Ju & Rogers 1996) suggests that *H. rubiginosum* does not extend to the Antipodes, and the species in Australia may be more closely allied to, or conspecific with, *Hypoxyton placentiforme* (J. D. Rogers pers. comm.). The second example involves the species often reported in Australia as *Xylaria polymorpha* (McCann 2003, Fuhrer 2005). Although believed by some to be a cosmopolitan species, a revision of the genus *Xylaria* in New Zealand (Rogers & Samuels 1986) did not report that species from that country. Tasmanian material sent to one of the authors of that work, Prof. J. D. Rogers, was identified by him as *X. castorea* Berk., a species with very much smaller spores than those of *X. polymorpha*. The third example involves the species often cited in Australia as *Daldinia concentrica*, but which is listed here as *D. grandis* on the advice of Prof. J. D. Rogers.

While it is not possible to predict how many species of Ascomycota might be present on Mt Wellington, it is clearly a greater number than reported in this preliminary study. Only concerted taxonomic efforts will provide a more realistic estimate of the true number.

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APPENDIX 1

Species descriptions of Ascomycota
of Mt Wellington

[Helotiales]

- Ascocoryne sarcoides* (Jacq.) J.W. Groves & D.E. Wilson – The mature sexual stage consists of pink-purple discs having a gelatinous texture, found singly or gregariously on rotting wood in wet forests. The conidial stage has pink, club-shaped fruit bodies. Illustrations – McCann (2003, p. 111); Fuhrer (2005, p. 301); Grey & Grey (2005, p. 111).
- Bisporella citrina* (Batsch ex Fr.) Korf & S.E. Carp. – Consists of small, yellow discs, seldom exceeding 3 mm diameter, flattened with age, the stipe very small, on rotting wood. Cosmopolitan. Illustrations – Fuhrer & Robinson (1992, p. 85); Grgurinovic & Mallett (1996, fig. 17); McCann (2003, p. 112); Fuhrer (2005, p. 304).
- Bisporella sulfurina* (Quél.) S.E. Carp. – Similar to *Bisporella citrina* (q.v.), the tiny, sulphur-yellow discs on wood are rarely greater than 1.5 mm diameter, the habit is gregarious rather than clustered, and the spores are narrower than in the related species. Illustrations – Breitenbach & Kränzlin (1984, species 178).
- Chlorociboria aeruginascens* (Nyl.) Kanouse ex Ramamurthi, Korf & Batra – Easily identified by the small, blue-green discs and the blue-green staining imparted to the wood on which this fungus grows. Shepherd & Totterdell (1988, p. 146, as *Chlorosplenium aeruginascens*); Fuhrer & Robinson (1992, p. 84); Bougher & Syme (1998, p. 95); McCann (2003, p. 112); Fuhrer (2005, p. 306); Young (2005, plate 34, as *Chlorosplenium aeruginascens*).
- Ciboria peckiana* (Cooke) Korf – Occurring on wood, disc concave or depressed at centre, brown or grey-brown, smooth, receptacle cup-shaped with a short stalk, brown or greyish brown, distinctly furrowed towards the stalk. Illustration – Spooner (1987, fig. 50).
- Discinella terrestris* (Berk. & Broome) Dennis – Occurring on soil, often at the base of trees or tree ferns, the pale orange or yellow-orange, flattened discs are irregularly undulate. Illustrations – McCann (2003, p. 113); Fuhrer (2005, p. 315).
- Geoglossum cookeanum* Nannf. – An “earth tongue” on soil, blackish throughout, dry when fresh, ascospores regularly 7-septate. Illustration – A similar-appearing species, possibly the same species, is illustrated by McCann (2003, p. 110, as *Geoglossum* sp.).
- Hymenoscyphus pezizoideus* (Cooke & W. Phillips) Gamundí – Creamy grey to greenish grey discs, often forming colonies on bark, twigs and small branches in forests. Illustrations – McCann (2003, p. 113); Fuhrer (2005, p. 313), both as *Cudoniella pezizoidea*.
- Lachnum lachnoderma* (Berk.) G.G. Hahn & Ayers – Forms small, individual, shortly stalked, cream-coloured or yellowish discs with white hairs densely covering the underside of the fruit body. On small twigs and branches.
- Lanzia lanaripes* (Dennis) Spooner – Occurring on wood, the tack-like apothecia have a greenish black to blackish brown disc, appearing smooth, with a long stalk. Illustrations – McCann (2003, p. 113, as *Rutstroemia* sp.); Fuhrer (2005, p. 325).
- Leotia lubrica* (Scop.) Pers. – Occurring on soil, the fruit bodies have an irregularly spherical, lobed to knobby, viscid to slimy, yellow or yellow-green pileus, mounted on a tall, viscid, yellow or yellow-green stalk. Illustrations – Arora (1986, plate 215); McCann (2003, p. 113); Fuhrer (2005, p. 326); Grey & Grey (2005, p. 117).
- Mollisia* aff. *cinerea* (Batsch ex Mérat) P. Karst. – A blue-grey, sessile disc, 1–3 mm diameter, forming large groups on

rotting wood. Illustration – Breitenbach & Kränzlin (1984, species 274).

Torreodiella eucalypti (Berk.) Spooner – Cup to 2 mm diameter, yellowish white when fresh, drying pale yellow, on a slender cylindrical or downward tapering stalk, the margin rimmed with stiff, well-spaced, dark brown, septate hairs, the remainder of the receptacle without hairs. Often found on fallen phyllodes of *Acacia melanoxylon*. Illustration – Beaton & Weste (1977, fig. 1, as *Zoellneria eucalypti*).

[Hypocreales]

- Cordyceps gunnii* (Berk.) Berk. – *Cordyceps* are insect pathogens, the exposed, fertile part of the fruiting body arising from parasitised insect larvae. The above-ground portion is a stout, elongated club with a yellowish stem and a dark olive-green to blackish head. The below-ground portion, emerging from a buried caterpillar host, may be as long as, or longer than, the above-ground portion. Illustrations – Grgurinovic & Mallett (1996, fig. 16); Mallett & Grgurinovic (1996, fig. 29); Fuhrer (2005, p. 311); Grey & Grey (2005, p. 104).
- Cordyceps robertsii* (Hook.) Berk. – The above-ground portion is brown-coloured, may be simple or branched, and tapers gradually to a long, slender point. Illustrations – Fuhrer & Robinson (1992, p. 90); Fuhrer (2005, p. 312).
- Cordyceps taylori* (Berk.) Sacc. – The above-ground portion of the fertile head of this large species may divide into numerous stout, staghorn-like branches. Illustration – Willis (1950, plate 16).
- Hypocrea* aff. *sulphurea* (Schwein.) Sacc. – Forming broad patches on the undersides of dead wood in forests, the bright, sulphur-yellow resupinate surface is densely covered throughout with fine, dark ostioles. Illustration – Fuhrer (2005, p. 320).
- Nectria cinnabarina* (Tode) Fr. – This parasitic species on wood has perithecia clustered in small, red or red-orange, erumpent groups, and may be accompanied by a cushion-like, pinkish anamorph. Illustration – Courtecuisse & Duhem (1995, p. 129).

[Pezizales]

- Aleuria aurantia* (Fr.) Fuckel – The stalkless, flattened, and often irregularly undulate, orange-coloured cup fungus grows on soil in forests and disturbed areas. Illustrations – Arora (1986, plate 208); Shepherd & Totterdell (1988, p. 148); McCann (2003, p. 114); Fuhrer (2005, p. 298).
- Aleuria rhenana* Fuckel – Distinguished from *A. aurantia* (q.v.) by its more pronounced, deeply concave, orange cup and the presence of a well-defined, pallid orange or whitish stalk, found on soil in forests. Illustrations – Arora (1986, plate 209); Bougher & Syme (1998, p. 93); McCann (2003, p. 115); Robinson (2003, p. 59); Fuhrer (2005, p. 299).
- Aleurina calospora* (M.A. Rifai) Korf & W.Y. Zhuang – The fruit bodies, found on litter in wet forests, are dark rusty brown to purple-brown cups up to 1 cm diameter, with the outer surface covered by numerous dark brown, conical warts. The darker colours of the fruit body, the more broadly ellipsoidal spores, and the massive spore ornamentation help distinguish this species from *Aleurina ferruginea* (q.v.). Illustration – Rifai (1968, figs 62–64, microscopic characters only).
- Aleurina ferruginea* (W. Phillips ex Cooke) W.Y. Zhuang & Korf – The brown or rusty-brown, concave discs found on soil are covered with fine warts over its margin and lower surface. Illustrations – McCann (2003, p. 115); Fuhrer (2005, p. 299).
- Anthracobia muelleri* (Berk.) M.A. Rifai – The small brownish orange discs, only a few millimetres in diameter, concave or flattened, with short marginal hairs, often form densely crowded masses on burnt soil and plant material

after bushfires. Illustration – Fuhrer (2005, p. 300). The illustration in McCann (2003, p. 115, as *Anthracobia* sp.) may be of the same species.

Cheilymenia coprinaria (Cooke) Boud. – Cups orange to red, stalkless, with a fringe of stiff hairs, the hairs septate, brownish, rooted in the outer tissue of the excipulum. On dung. Illustration – Bell (1983, fig. 32); Bell (2005, fig. 36 A–F). The illustration in McCann (2003, p. 115, as *Cheilymenia* sp.) may be of the same species.

Gyromitra esculenta (Pers.) Fr. – The contorted, lobed, wrinkled or brain-like stalked caps on soil have a different internal structure from the morels (*Morchella*) and are never conical or deeply pitted. Usually brown or purple-brown. Illustrations – Arora (1986, plate 206); McCann (2003, p. 114); Fuhrer (2005, p. 318).

Morchella elata Fr.: Fr. – The Black Morel is a very variable, cosmopolitan species or species group, occurring in narrow-headed or broad-headed forms, usually quite dark, with vertically-aligned ridges and pits. Found on soil. Illustrations – Arora (1986, plates 199 and 202); McCann (2003, p. 114); Robinson (2003, p. 63); Fuhrer (2005, p. 329); Grey & Grey (2005, p. 114).

Nothojafnea cryptotricha M.A. Rifai – Occurring on soil or amid moss. Apothecia deeply concave, dark reddish brown to dark brown cups, outer surface smooth or indistinctly hairy, stalk furrowed. Illustrations – Rifai (1968, figs 78–84, microscopic characters only); McCann (2003, p. 117).

Peziza tenacella W. Phillips ex Cooke – Cups deep lilac-violet and smooth on the inside, paler and minutely scurfy on the outside. Cups may reach 8 cm diameter, on burnt ground. Illustration – Fuhrer (2005, p. 333).

Peziza vesiculosa Bull.: Fr. – Fruit bodies large, gregarious, light brown, deeply concave, margin usually inrolled, often irregularly incised, brittle. Spores large, smooth. Found on dung, manured ground and decaying woody materials. Illustrations – McCann (2003, p. 118); Fuhrer (2005, p. 334); Young (2005, p. 63, watercolour); Bell (2005, fig. 34 A–E).

Peziza thozetii Berk. – Apothecia brown, often bluish beneath and with blue trama, medium sized, with inrolled, entire margin. The spores are microscopically distinctive in having a conical apiculus at each end. On soil. Illustrations – Rifai (1968, fig. 267, spores only); Fuhrer (2005, p. 333).

Plectania campylospora (Berk.) Nannf. – The fruit body is a large, rubbery cup up to 8 cm diameter, the inner surface brown, smooth, the outer surface brown to black, rough, mounted on a short, rough, central stem. On rotting wood or on soil. Spores subballantoid, 23–32 x 9–14 µm, smooth. Illustrations – Rifai (1968, figs 4–5, microscopic characters only); Grgurinovic & Mallett (1996, fig. 18); McCann (2003, p. 119); Fuhrer (2005, p. 335); Grey & Grey (2005, p. 109).

Plectania platensis (Speg.) M.A. Rifai – The fruit bodies are medium to large cups, the upper surface deeply concave, brownish black to almost black, smooth, with the lower surface marked by vertical ridges, brownish black, finely tomentose or velvety. On dead eucalypt wood. Spores 19–23 x 8.5–12 µm, ornamented with horizontal striations. Illustration – Rifai (1968, figs 10–14).

Scutellinia margaritacea (Berk. ex Cooke) O. Kuntze – This species of *Scutellinia* found on soil is characterised by orange, flat cups with a margin of multiple tiers of fine black or blackish hairs. Spores 27–33 x 14–19 µm. We have also found specimens with smaller spores (17–23 x 11–13 µm) on Mt Wellington, and these are probably referable to *Scutellinia scutellata* (L.: Fr.) Lamb. Schumacher (1990) considered that the Tasmanian species described as *S. pseudomargaritacea* Le Gal was conspecific with *S. margaritacea*. Illustrations – Bougher & Syme (1998, p. 109) and McCann (2003, p. 116) illustrate species of this complex genus.

[Rhytismatales]

Therrya eucalypti Z.Q. Yuan – Fruit bodies immersed to erumpent, irregularly shaped, ca. 1.2 x 1.5 mm, black, the hymenium orange. Spores long and narrow, 78 x 2.6 µm, hyaline, fusiform, 2–5 septate. Paraphyses filiform. On dead eucalypt branches. Illustration – Yuan & Mohammed (1997, figs 1–5).

[Xylariales]

Daldinia grandis Child – The broadly rounded, pinkish brown, firm to hard fruit bodies, found on decaying wood, blacken with age and are covered with minute ostioles. Concentric growth zones are seen when the fruit bodies are cut in half. Illustrations – Bougher & Syme (1998, p. 97); McCann (2003, p. 119); Robinson (2003, p. 67); Fuhrer (2005, p. 315), all as *Daldinia concentrica*.

Hypoxyylon bovei Speg. – The black fruit bodies on wood may be single or coalesced into broad, hard patches, each fruit body shaped like a truncated cone with an upraised pimple-like apex and ostiole. Spores 10.5–13 x 5–6.5 µm. Illustration – Fuhrer (2005, p. 321).

Hypoxyylon crocopeplum Berk. & M.A. Curtis – Forms reddish brown or orangey brown flat cushions on wood with the spherical or obovoid perithecia embedded in the cushion, and the ostioles lower than or at the same level as the stromatal surface. Spores 9.5–15 x 4–7 µm.

Hypoxyylon diatrypeoides Rehm – The fruit bodies look like flattened black spots or scabs covering dead or decaying logs in wet forests. Spores 17–23 x 8.5–10 µm. Illustration – The photo in McCann (2003, p. 120, as *Hypoxyylon* sp. 'Black Spot') may be of the same species.

Hypoxyylon howeanum Peck – The small fruit bodies on wood form hemispherical mounds in patches up to 2 cm long, the surface fulvous, rust or dark brick, the perithecia spherical to obovoid, embedded in the stromatal surface. Spores 7–9.5 x 3–4.5 µm.

Hypoxyylon aff. *placentiforme* Berk. & M.A. Curtis – The fruit bodies have the form of thin crusts, red-purple, lilac or violaceous, on the undersides of dead logs, up to a metre or more long. The ostioles cover the surface as fine, whitish dots. Illustrations – McCann (2003, p. 120); Fuhrer (2005, p. 323), both as *H. rubiginosum*.

Xylaria castorea Berk. – Fruit bodies unbranched, cylindrical or spatulate, to 8 cm high, black, the surface with fine ostioles. Interior flesh white, with the black perithecia near the margin. Spores 9–11 x 5–6 µm. Widespread in Tasmania on dead wood, this species is often reported as *X. polymorpha*, which has much larger spores. Illustrations – McCann (2003, p. 121); Fuhrer (2005, p. 341), both as *X. polymorpha*.

Xylaria aff. *hypoxyylon* (L.) Grev. – On wood. Fruit bodies cylindrical, clavate or flattened, often branched at the apices, upper portion powdery white in the conidial stage, becoming black at maturity, with the stalk black, hairy. Illustrations – McCann (2003, p. 121); Robinson (2003, p. 65); Fuhrer (2005, p. 340).

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