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fungimap

AUSTRALIA'S FUNGI MAPPING SCHEME

Inside this Edition:

INTRODUCING FIVE NEW LICHEN TARGET SPECIES

This issue of *Fungimap Newsletter* contains a number of articles about lichens, and introduces five new lichen target species.

Lichens are fungi that grow symbiotically with a photobiont (an alga or a cyanobacterium). Generally, each different lichen is a different fungus, in association with one of a small range of photobionts. Lichens are therefore classified as fungi. Lichenisation has evolved independently multiple times, and there can be lichenised and non-lichenised fungi in the same fungal order or family.

Most lichens belong in the Ascomycota (which also contains non-lichenised fungi such as morels and cup and disc fungi). However, there are also lichens among the Basidiomycota. One of these is already a target species—the agaric *Omphalina chromacea*. Its fruit-bodies arise from an algal mat, and there are special structures at the base of the stipe where fungal hyphae enclose algal cells. A recent name change for this species to *Lichenomphalia chromacea* emphasises the lichen nature.

Their characteristic structure and physiology means that lichens are often studied independently to non-lichenised fungi. There are good reasons for treating lichens separately in taxonomic and ecological studies, but it also makes sense to welcome them into the broad fungal fold without diluting their identity.

Australia has been very fortunate to have a close-knit and highly productive community of lichenologists, which has resulted in numerous new species being described in recent decades, and production of five impressively detailed volumes of the *Flora of Australia* series devoted to lichens. However, there have been fewer contributions by field naturalists, perhaps because of the difficulty of identification of many species.

Mapping lichens as one way of raising their profile was one of the recommendations from discussions at the Australian Network for Plant Conservation forum 'What lies beneath?' in April 2007.

Distribution data on lichens is reasonably good for many species. There are more specimens on average for lichens than for most other groups of fungi and maps are already included for lichens covered in the *Flora of Australia* series. However, mapping lichens not only adds to distribution and ecological data, but draws attention to the diversity and vital ecological roles of lichens, such as in rock weathering and as components of the biological soil crusts that stabilise the soil of semi-arid Australia.

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Field Naturalists Club of Victoria, Fungi Group

Forays, monthly meetings & presentations.
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WA

Perth Urban Bushland Fungi Project

Fungi workshops, walks, surveys in Perth Urban bush areas.
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(*continued from page 1*)
The possibility of introducing lichen target species to Fungimap was further explored at the 18th meeting of Australasian lichenologists at Traralgon, Victoria, in April 2008, at which there was a positive response. Several lichenologists contributed suggestions for target species, and from this shortlist the five species described and illustrated in this issue were chosen.

Selecting lichen target species that are unambiguously identifiable in the field proved more difficult than choosing the 100 or so existing targets. This underlines how lucky we are that there are so many highly distinctive macrofungi, particularly as far as the range of colours and forms.

Species of *Cladia*, the coral lichens, are common lichens that were considered when choosing targets; but differentiating species is rather difficult. We may end up including lichens like these as species complexes, in the same way that we currently map the *Ileodictyon gracile* group inclusive of *I. cibarium*. We are always open to suggestions for new target species, and intend to add more lichen targets in future.

We were fortunate that Simone Louwhoff presented a talk and workshop about lichens at the recent Fungimap V Conference, and we will include activities about lichens in future conferences and encourage contributions about them to the *Fungimap Newsletter*.

One advantage of including lichen targets is that the lichen fruit-body (thallus) is not ephemeral, as in many macrofungi such as the fleshy agarics. The five new lichen targets occur in a variety of habitats from rainforest to the arid interior. We hope you see some on your forays.

Acknowledgements
Thanks to Alan Archer, Ray Cranfield, David Eldridge, Simone Louwhoff, Pat McCarthy and Kath Ralston for suggestions for lichen targets and to Ray Cranfield, Gintaras Kantvilas and Simone Louwhoff for preparing their contributions to this issue at such short notice.

Tom May & Pam Catcheside

EDITORIAL

We hope you enjoy this issue of the *Fungimap Newsletter*. It is a special issue highlighting lichens, which are featured in the colour plate section, along with fungi to illustrate other articles, such as the various species of *Auricularia*. Plate 4 (c–l) also includes a selection of photographs of some beautiful and interesting species of *Hericium*, *Coprinus*, *Pseudohydnum*, *Dictyopanus*, *Fuligo*, *Aleuria*, *Volvariella* and *Cortinarius*.

We have updated and expanded the 'Instructions to authors'. These will be posted on the Fungimap website in the new year, and may be obtained from me, on request. If you have any queries, please contact me. Authors may now ask that their articles be refereed and, especially for articles on taxonomy of genera and species, we may suggest that they be sent for external review.

The deadline for the next issue is Friday 12th March 2010.

But to less serious matters: we wish you a very happy Christmas and very best wishes for the New Year—and an excellent and productive fungal season in 2010.

Pam Catcheside

DERMOCYBE CONFUSION

Katrina Syme

Dermocybe erythrocephala and *D. kula* (Plate 3h, 3k) are often found growing in close proximity and are not easy to tell apart—especially when you are pressed for time and it's raining! This year, while conducting field work with Richard Robinson and Jon McCalmont in the Walpole area, we made two collections only a few metres apart in the same plot, but weren't absolutely certain they constituted two different species.

While writing up the descriptions back in the lab, I tested a section of the gills and cap from each collection with a 3% KOH solution, with different results. *Dermocybe erythrocephala* oozed a bright purple colour, while the liquid from *D. kula* gradually turned from a dull purple to brown.

On my way home for the weekend, I searched a spot in the Shannon National Park where I'd seen them before. Luckily they were fruiting, so I made two collections and repeated the test at home, with the same results. I hadn't realised that I'd gathered a slug as well! It had taken on a slight, but distinct purplish tinge. Some days later, I found some more *D. erythrocephala* being nibbled by the same species of slug.

AN INTRODUCTION TO THE LICHENS

Simone Louwhoff

Lichenised fungi are mutualistic, forming a symbiotic relationship with one or more partners. The organism with which they form a partnership is a green alga, or a cyanobacterium (blue-green alga), or on occasion both. These two or three partners form a little ecosystem called lichen, which functions very successfully. Lichens occur in almost every type of habitat and on many different kinds of substrates. What makes them particularly interesting is that the organisms making up a lichen represent two or three different kingdoms; the Fungi, Plantae (green alga) and/or Monera (cyanobacterium).

From a nomenclatural perspective the starting point for lichens lies with Linnaeus, who in 1753 recognised about 80 species and classified these with the Algae. The 'Father of Lichenology', Erik Acharius, was the first scientist to undertake serious studies on lichens and he described many new species. However, the true dual nature of lichens was not revealed until 1869, when Schwendener discovered that the green structures inside the lichen were not gonads as was previously thought, but were in fact green algal cells. Today, estimates of the number of lichen species worldwide ranges widely, from 13,000 to as many as 30,000.

The vast majority of lichens belong to the fungal phylum Ascomycota, in which spores are produced inside asci. Roughly half of all ascomycetes are lichenised. Lichenisation has occurred in various distantly related ascomycete groups, as well as among some other fungal groups (but much less commonly so). It appears that the evolution of lichenisation is very ancient. The oldest undisputed evidence of fossil lichen is from the Rhynie chert formation in Scotland and dates back to ca. 400 million years ago.

The fungal partner (mycobiont) protects the algal partner (photobiont) against dehydration and harmful UV rays. This enables the algal partner to survive in habitats that would normally be inaccessible. The mycobiont is also mostly responsible for the lichen shape and for the sexual reproductive structures. The photobiont's role is to photosynthesise and produce carbohydrates, which the fungus metabolises. A large array of secondary metabolites (lichen chemicals), many unique to lichens, is produced by the fungal partners. If a cyanobacterium is present then the fungal partner can obtain nitrogen compounds also, as the former is able to capture and fix atmospheric nitrogen. The degree to which the symbiosis is an obligate one varies depending upon the partners involved. The green alga *Trebouxia* has rarely been found outside of the lichen relationship, but some of the other algal genera also occur as free-living populations, for example *Nostoc* and *Syctonema* (cyanobacteria) and *Trentepohlia* (green alga).

Water and nutrients are taken up directly across the surface of the lichen, which means that lichens are able to survive in areas with very low rainfall. Even atmospheric moisture in the form of fog or dew appears to meet their requirements and this includes whatever mineral nutrients are present. This is supplemented with nutrients contained in run-off from soil, leaves, etc, which are actively taken up. Unfortunately, any atmospheric pollutants present are usually taken up by the lichen also and can accumulate in the thallus (main body of lichen). Sensitivity to these polluting air particles appears to vary according to the species.

Lichens take on many different shapes and forms and typically grow on rock, bark and soil. However, they can also grow on leaves, roof tiles, metal surfaces, asphalt, and many other surfaces. In general, the lichen body (thallus) is composed of an upper cortex comprising tightly packed fungal hyphae. Situated immediately below the upper cortex is the photosynthesising algal layer, comprising either a green alga, a cyanobacterium or, less commonly, both. Below the algal layer lies the medulla, a loosely woven cottony layer of fungal hyphae where most of the secondary metabolites are deposited in the form of crystals. These metabolites are mostly determined by the fungal layer and are often useful in identification. Some lichens also have a lower cortex, comprising fungal hyphae, which either directly attaches the lichen to the substratum, or produces hair-like, felt-like or other protuberances performing such a function.

Compared to most plants, lichens grow only slowly and growth rates range from less than a millimetre per year in the case of some of the micro-lichens, to almost 10 cm per year for some of the macro-lichens. Similarly, they vary greatly in size, ranging from only a few millimetres in diameter to over 2 metres in length.

Lichens are often categorised according to their general growth form and, despite this being a purely artificial classification system, it is nevertheless a useful one for the purpose of identifying lichens. The most commonly used categories are crustose, foliose and fruticose. Crustose lichens (Plate 1a) have a thallus that forms a 'blotch' (Plate 1b) on the substratum upon which it grows and cannot be removed from that without removing part of it too. Foliose lichens (Plate 1c) are more flattened in appearance, with a distinguishable upper and lower surface, and they are usually readily removed by using a chisel or penknife. Fruticose lichens (Plate 1d–e) are bushy, upright or pendulous in shape. They are usually attached by a single anchoring point, often referred to as a holdfast. It goes without saying that there are many intermediate growth forms too, and many species are not composed of recognisable layers at all, merely forming a mass of intertwined fungal and algal cells.

The sexual reproductive structures produced by the lichens represent the fungal partner (mycobiont) only. Sexual reproductive organs can vary greatly, and range from almost invisible pinpricks to large and/or elaborately shaped structures. The fruit-body can be directly attached to the surface of the thallus, embedded in it, or slightly to conspicuously raised from it by a stalk. Fungal spores are released when mature and need to form an association with an appropriate algal species in order to re-establish a lichen thallus.

Asexual reproduction is common in lichens and a wide variety of different types of vegetative propagules have been described. However, the two most commonly considered are soredia and isidia. The former consist of small clusters of algal cells enveloped by fungal hyphae, and they range in size from flour- to sugar grain-sized particles. Isidia are actual outgrowths from the upper cortex and these small, fingerlike structures range from 0.3 mm to more than 1 mm in height. They are often simple and cylindrical but can be inflated, and/or branched as well. Apart from their role as diaspores, they may also play an important role in increasing the surface area of the thallus.

Just over 3500 lichen species have been recorded for Australia and approximately 35% of these are thought to be endemic (McCarthy 2009). The greatest number of species occurs in Queensland (1796), which also has most endemics (260 species), followed by NSW (1498) with 112 endemic species, then Tasmania (1063) with 102 endemics, Victoria (988) with 54 endemics, Western Australia (703) with 85 endemics, South Australia (474) with 21 endemics, the Australian Capital Territory (424) with five endemics and the Northern Territory (310) with 18 endemics (McCarthy 2009).

Reference

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LICHEN ALERT FOR FUNGIMAPPERS

Gintaras Kantvilas
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There are more than 3500 species of lichens recorded for Australia according to the latest checklist maintained by Pat McCarthy[1]. However, that number continues to grow steadily and almost any collecting trip, even a casual holiday, is likely to turn up hitherto unrecorded species.

Today lichens are classified with the fungi, mainly in the Ascomycota, class Lecanoromycetes, and 'lichenisation' is regarded as essentially a life-style rather that the basis for higher taxonomy. Nevertheless, the fact remains that: very few lichen-forming genera occur as free-living fungi; lichenologists tend not to study fungi just as mycologists don't often study lichens; lichens are photosynthetic and behave ecologically more like plants than fungi; and lichenologists probably find more kindred spirits amongst bryologists and other botanists rather than amongst mycologists.

Lichens can occur almost anywhere, from sub-tidal seashore rocks to the summits of the highest mountains, and from being semi-submerged in lakes and streams to binding soils in the driest deserts. So prevalent and dominant can lichens be that they may colour the entire landscape: the orange of sea-shore rocks, the whiteness of calcareous cliffs, the mottled yellowish and white of tree 'bark', the greens, browns and greys of rock outcrops, are all due to lichens, some large and widespreading, others tiny and displaying only their speck-like fruit-bodies (apothecia). Whilst cool moist habitats such as rainforests or shady gullies may be the strongholds for lichen diversity or biomass, equally significant are the arid rangelands of the Australian interior, seemingly bare, rocky mountain tops and open eucalypt woodlands.

The five lichen target species for Fungimap span a range of key habitats, which means that at least some of these species can be looked for in the hinterland of anyone's place of residence.

1. Dry grasslands and rangelands

This habitat is one where lichens are extremely important, binding fragile, easily eroded soils. An excellent book by David Eldridge and Merrin Tozer[2] provides a wonderful insight into this easily overlooked flora. Some of the species are very inconspicuous, dark blue-green coloured (especially when dry) and may require a hand-lens to be spotted, at least in the first instance. Others are brightly coloured yellow, brown or white. Most are crustose and tightly appressed to their substrate, whereas others are larger and leafy (foliose).

Xanthoparmelia semiviridis (Plate 2h-k) is one of Australia's most prominent vagrant lichens (meaning that it grows unattached and free on the surface of the ground). Until recently it was classified in a separate genus, *Chondropsis*, but it is now included in *Xanthoparmelia*, the huge genus that accommodates the myriad of leafy green, olive or grey species that cover rocks in drier, open habitats throughout much of Australia. It is easily recognised, with pale yellowish lobes that are identical on both surfaces. When dry it rolls up into a loose ball, but when moist it unfurls into a star about 1–4 cm wide. It can be found loosely scattered amongst grasses and small herbs, sometimes forming 'drifts' against rocks, shrubs or fence-lines.

Psora decipiens (Plate 2d–f) is a crust-like lichen that grows tightly appressed to the soil. Its orange to red-brown lobes are up to about 5 mm wide, but these may be aggregated into extensive clumps to 10 cm across. Such clumps are often easily kicked over by sheep. This lichen has several look-alikes that grow in the same habitats. The lobes of *P. decipiens* are essentially smooth and naked; *P. crystallifera* has deep, angular fissures in the upper surface, whereas *P. crenata* (Plate 2g) has pinkish lobes, often with a faint dusting of a grey powder (pruina). The species are further distinguished by their chemical composition.

2. Open woodlands

Dry sclerophyll, usually eucalypt-dominated woodlands are another treasure-trove of lichens. Many species can be found on rotting or charred eucalypt wood, on the bark of understorey trees, on banks of soil, and on sunny, exposed rocks and boulders. Most eucalypts themselves tend to be poor lichen hosts, mainly because their bark is too unstable and is shed too frequently, but wattles, she-oaks, banksias and other smaller trees provide excellent lichen habitats.

Heterodea muelleri (Plate 2g–l) is one of Australia's most characteristic lichens. When dry it can be hard to spot, forming dark brown lumps that some authors compare with sheep droppings (although this author has certainly never seen a sheep that managed to mimic a *Heterodea* thallus!). When wet, the thallus of *Heterodea* unfurls into a vivid, green clump of tightly packed lobes with a bushy brown tomentum on the lower surface.

3. Wet eucalypt forest and cool temperate rainforest

The moist forests of southern Australia and Tasmania are rich in lichens, especially ones that display ancient connections with Gondwana, and today are shared with New Zealand and southern South America. An introduction to this flora is given in the book by Gintaras Kantvilas and Jean Jarman[3]. In these forests, the lichen flora changes dramatically from the ground to the canopy, and a hint of what species grow overhead can often be obtained only by studying fallen twigs and branches. In the shady understorey, there are many prominent leafy lichens, many of which contain cyanobacteria, either as their main algal partner or in special structures called cephalodia; such lichens are important in nitrogen cycling in the forest.

Nephroma australe (Plate 1f) is one of the most striking of these lichens. It has bright, lettuce-green lobes and is easily recognised by having its flat reddish brown apothecia on the white underside of the thallus. It is mostly found on low branches in the understorey.

Living leaves are an important habitat for lichens, especially in the tropics where hundreds of different species have been recorded. In cooler latitudes they are far less common, but nevertheless a few species are present, especially in the darkest, moistest sites. Foliicolous lichens are mainly crustose and form an array of greyish and greenish mottling on leaves. One of the most striking of these is *Badimiella pteridophila* (Plate 2a–c). This has a pale thallus and tiny apothecia, but its most obvious feature is its condiomata that are shaped liked tiny radar-dishes on their edge. This species tends to be most common on the fronds of *Blechnum wattsii*, although here it is pictured on the leaves of *Atherosperma*.

To many naturalists, lichens often represent a bewildering and daunting group of plants, with many superficially similar species that can be separated only by means of subtle anatomical features (requiring high-power microscopy) or chemical characters (requiring specialist equipment or solvents). Whilst it is true that without a good microscope and a few standard chemicals, identifying many lichens can be extremely difficult, it is also true that lichens are no more challenging than many other groups of organisms. With a little knowledge of spotting characters and lichen ecology, many species become very distinctive and easily recognised in the field. One can look forward to further lichens becoming targets for Fungimap.

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[1] McCarthy, P.M. (2009) *Checklist of the Lichens of Australia and its Island Territories.* Australian Biological Resources Study, Canberra. Version 22, October 2009. <http://www.anbg.gov.au/abrs/lichenlist/introduction.html>

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NEW LICHEN TARGETS FOR FUNGIMAP

Compiled by Tom May, Pam Catcheside, Ray Cranfield and Gintaras Kantvilas

Badimiella pteridophila (Plates 2a–c)

Radar-dish Lichen

The most distinctive feature of this lichen is the campylidia, which are special structures that produce asexual spores (conidia). Campylidia are tiny, 0.4–0.7(–1.0) mm wide and 0.2–0.6 mm high, white to pale cream and cup- or helmet-shaped. Initially campylidia are minute discs with a hollow apex, but at maturity are attached towards one side of the cup, with the opening of the cup pointing upwards at an angle, or horizontally, rather like a radar-dish. There are two small, white teeth, to 0.3 mm long, on either side of the cup, pointing outwards at maturity. The microscopic conidia are produced on the upper part of the interior of the convex cup.

The thallus (vegetative part) is a very thin, barely visible, pale grey layer on the substrate. In addition to the campylidia, scattered over the thallus there can be tiny disc-shaped apothecia, to 0.4 mm diam., with a flat, pale brown upper surface and contrasting paler margin. Sexual ascospores are produced from a layer of asci (microscopic sacs) in the apothecia. Campylidia often occur in the absence of apothecia.

Badimiella pteridophila grows on fronds of ferns and leaves of trees in cool temperate rainforest and wet forest in southern New South Wales, Victoria and Tasmania, often with other leaf-inhabiting lichens, in genera such as *Arthonia* or *Porina*. It is also found in New Zealand and southern South America. In Australia, the most common host by far is the fern *Blechnum wattsii*, but it also occurs on other ferns (*Microsorium diversifolium* and *Polystichum proliferum*) and shrubs and trees (*Atherosperma moschatum*, *Olearia argophila* and *Richea pandanifolia*).

The Radar-dish Lichen was originally known only from the campylidia and was first described in the basidiomycete genus *Cyphella* in 1886. Only recently was the connection with the apothecia discovered, and the species placed in the Ascomycota. *Badimiella serusiauxii* is a synonym. While the campylidia are distinctive in the field, the apothecia are not and records of the apothecial stage need to be confirmed from examination of spores and other microscopic structures.

Some other lichens on leaves in Australia produce tiny white discs or cups. However, the twin teeth on the campylidia of the Radar-dish lichen are unique. White disc-fungi, such as *Lachnum*, may be hairy on the exterior, but the hairs are more numerous, and evenly distributed around the disc.

Illustrations: Lumbsch *et al*. (2001: p. 48, campylidia and apothecia in colour), Malcolm & Vězda (1994: black & white drawings of campylidia).

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Heterodea muelleri (Plates 1g–l)

This interesting terrestrial species of foliose lichen is usually noticed growing on clay soils but it is found occasionally amongst organic litter. The thallus may be seen as a series of small isolated clumps or as larger individuals, depending upon location. The thallus forms a rosette type of structure. When wet it is a vivid green, sometimes yellow-green, mass of lobes tightly clumped together. When dry it curls up into yellow-brown to dark brown lumps. The raised thallus lobes display a dense brown (occasionally black) tomentum or mat of rhizines (felt-like hairs), a character that makes this species readily recognisable. The under surface of the thallus has a net work of dark veins and pale pit-like depressions. The fruit-bodies (apothecia) are pale reddish-brown (occasionally darker) discs, approximately 1 mm wide, located on the lobe margins.

Heterodea muelleri can usually be located at the base of trees or shrubs in woodlands and open forests, taking advantage of the shade provided. It can occasionally be confused with *Heterodea beaugleholei* which is normally located in drier areas but in some instances the two species can co-exist. *Heterodea muelleri* differs from *H. beaugleholei* in its lower surface having being pale-spotted with a dark vein network, dense brown (to black) rhizines. It has longer lobes and is more robust. *H. beaugleholei* has a pale to dark grey undersurface which lacks veins or spots and has sparse black rhizines.

Illustrations: Eldridge & Tozer (1997: Fig. 4.20, whole lichen in colour).

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Nephroma australe (Plate 1f)

Dark kidney disc lichen

Nephroma australe is found mostly on twigs and young branches, less commonly on older trees, rocks or mosses. Its palm-shaped to circular thallus (vegetative part) is 2–13 cm wide, rather thin and attached to the substrate. It is formed of flattish, spreading lobes with smooth margins which may be subdivided into lobules. These lobes become ascending at their tips, often overlap and bear numerous red- to dark-brown apothecia that are 2–8 mm wide. Apothecia are rounded to kidney-shaped, occasionally shallowly lobed and have a thin, slightly raised margin; their dorsal surface is ridged and scale-like.

The upper surface, when wet, is yellowish due to usnic acid and yellow in bright sunlight, greenish brown in shade, undulating and smooth to finely wrinkled. The lower surface is pale cream or buff to brown, matt, smooth or wrinkled, glabrous (hairless) and has white margins. Small (0.5 mm diam.), prominent, pimple-like structures (cephalodia) are infrequent on the lower surface and contain the photobiont, the blue-green alga *Nostoc*.

Nephroma australe varies in form from broad-lobed plants on rocks, mosses or tree boles to small-lobed ones on twigs. It has been recorded in New South Wales, Tasmania and Victoria, and is most variable in cool temperate parts of Tasmania.

There are three other species of *Nephroma* described for Australia: *N. cellulosum*, *N. helveticum*, *N. rufum*. *Nephroma helveticum* and *N. rufum* both have dark brown to black lower surfaces and thus may be distinguished from *N. australe* with its pale cream to buff underside. *N. cellulosum* differs from the almost smooth lobed *N. australe* with its definitely reticulate to honeycombed upper surface.

Illustrations: Kantvilas & Jarman (1999: p.92, Fig. 64, whole lichen in colour), Louwhoff (thallus, in colour, <http://www.anbg.gov.au/abrs/lichenlist/images/Nephrom_aust2.jpg>), Malcolm (apothecia on underside of thallus, in colour, <http://www.anbg.gov.au/abrs/lichenlist/images/Nephrom_aust.jpg>).

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Psora decipiens (Plates 2d–f)

Blushing Scale

Psora decipiens is a species of squamulose (scaly) lichens that forms scattered to overlapping pink, orange, red-brown to brown irregular though smooth, disc-shaped thalli, approximately 4 mm wide. These may form clumps up to 10 mm across. The centre of the squamule may appear to be concave or sunken while the margins are upturned and often white. The fruit-bodies (apothecia) are dark brown to black domed shaped apothecia that develop on the margin of squamule.

The species is usually found on exposed clay soils of open woodlands and scrub but it is also frequent on the edges of semi-saline or calcareous lake edges. This is a common soil species in arid regions.

Species with which this lichen may be confused are *P. crystallifera* and *P. crenata* (Plate 2g). The margins of *P. decipiens* are smooth and naked; the margins of *P. crenata* are undulating and lobed (crenate) and discs are pinkish and often covered with a fine powder (pruinose); *P. crystallifera* is usually grey or brownish, its surface looks cracked and is covered with warty-looking, pyramid shaped polygon crystals. Species of *Psora* often form part of soil crusts and are therefore important as soil surface stabilisers.

Illustration: Eldridge & Tozer (1997: Fig. 4.9, whole lichen in colour).

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Xanthoparmelia semiviridis (Plates 2h–k)

Rolling ball lichen

Xanthoparmelia semiviridis, formerly known as *Chondropsis semiviridis*, is a semi arid species that appears to be able to withstand extreme temperatures. It has the ability to respond rapidly to moisture.

This unusual foliose lichen is readily recognised when dry by its yellowish-brown thallus that forms rolled-up clumps or rosettes with a dry, hard, tough cartilage-like texture. The lichen consists of long, narrow, forked lobes, 2–3 mm across, their margins are entire; the tips are brown and curl inwards when dry. The upper surface is smooth, often shining and finely spotted, the lower surface is pale yellow and very finely wrinkled. The thallus rolls are easily blown around and can often be observed at the bases of trees and shrubs or open area positions in dry, mallee country. When hydrated the thallus unrolls into a flat rosette 1–4 cm across and colours up to a bright green. The rosettes appear to just lie on the soil surface or they may become tangled up in organic litter.

Fruit-bodies (apothecia) are very rarely seen. Apothecia are prominent discs, 0.5–2.5 cm across, usually sessile (stalkless) or with very short stalks, and are the same colour as the thallus.

Illustrations: Eldridge & Tozer (1997: Fig. 4.19, whole lichen in), Elix (1994: Fig.6, whole lichen in colour). Both as *Chondropsis semiviridis*.

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IS THIS AUSTRALIA'S MOST BEAUTIFUL FUNGUS?

Tom May & Steve Axford

It is not really fair to pick out Australia's most beautiful fungus, because there is such an abundance of beauty of colour and form among our fungi. However, a newly discovered species of *Leratiomyces* (Plate 4b) is surely a contender. Blue is an unusual colour for macrofungi, and so it was a great surprise to find this sky-blue fungus growing on wood in northern New South Wales (see also <http://steveaxford.smugmug.com/The-Northern-Rivers/NR-Fungi/Leratia-sp>). What seems to be an identical fungus has been sighted on Lord Howe Is. by Jamie Derkenne <http://www.blueswami.com/australian_fungi.html?page=0&scope=1&sortby=id&dir=desc&pic=665>.

Young fruit-bodies have a covering of delicate spine-like scales, and resemble an immature puffball. At maturity the spore-bearing layer under the pileus is made up of convoluted plates, as in truffle-like (sequestrate) fungi.

This genus *Leratiomyces* contains an intriguing mix of agaric and sequestrate species. One of the agarics is the red-capped *Leratiomyces ceres* (more familiar under the previous names *Stropharia aurantiaca* or *Hypholoma aurantiacum*). Several green sequestrate *Leratiomyces* are known from Caledonia. We are currently establishing if the Australian and Lord Howe Is. species matches up to any of the known species of *Leratiomyces* or is new.

AURICULARIA IN QUEENSLAND

Patrick Leonard

Introduction

Jelly fungi in the genus *Auricularia* are a common sight on forays in Queensland. The dark reddish brown, translucent, ear shaped fungi are usually attached to wood by a small stalk at the apex of the upper surface. Whilst they are easy to place in their genus and most field mycologists readily recognise them as 'ear fungi', there is often considerable difficulty in identifying them to species level. The most commonly used name in field guides is *Auricularia auricula-judae* the 'Jew's Ear' fungus. Literature on the other species is difficult to obtain. This article provides a simple key and species descriptions and illustrations for the five species reported in Queensland.

Characteristics of *Auricularia*

- fleshy, tough gelatinous to cartilaginous, ear or cup shaped
- usually translucent; usually reddish brown
- dorsally attached to wood
- solitary or more usually in groups
- tomentose (finely hairy) or hirsute upper surface
- smooth or reticulate hymenium (lower surface)
- white spored with cylindrical or allantoid spores; basidia are cylindrical with three transverse septa.

Species recorded in Queensland

At least six names appear in the available literature about *Auricularia* in Queensland, but only five species have been collected and are supported by material deposited in the Queensland Herbarium (BRI):

- *Auricularia auricula-judae*. There are 16 confirmed records for this species. American and some older European publications use the synonym *A. auricula.*
- *Auricularia cornea*. The most commonly collected and seen species with 42 records, mostly recorded under its synonym of *A. polytricha.*
- *Auricularia delicata*. Another common species with 30 confirmed records.
- *Auricularia mesenterica*. The least known species with only 5 confirmed records, two under the synonym of *A. lobata*.
- *Auricularia* sp 1. Collected by Tony Young in the Lamington National Park and seemingly intermediate between *A. auricula-judae* and *A. delicata.*

Species descriptions

1. *Auricularia auricula-judae* (Plate 3a)

Fruit bodies tough gelatinous; yellow to reddish brown; sessile (stalkless) to substipitate (with a very small stalk); up to 120 mm diam., 1–2 mm thick; pileus (cap) minutely tomentose with hyaline (colourless) hairs; hymenium (lower, fertile surface) smooth; growing in gregarious or caespitose groups, occasionally solitary.

Microscopic characters. Pileus made up of densely compacted gelatinised hyphae with cuticular hairs 85–100 × 5–6 µm, hairs with rounded tips; basidia cylindrical, 50–60 × 5–6 µm, with transverse septa; spores allantoid (bean-shaped), 13–15 × 5–6 µm.

Notes. Known as 'Jew's Ear' or 'Wood Ear' (in North America) this fungus is recognised by its reddish brown colour, smooth lower surface and minutely hairy cap. This fungus is edible, if tasteless, and was collected for use in Chinese cookery; indeed it was collected in Queensland and exported to China in the 19th century.

2. *Auricularia cornea* (Plate 3b)

Fruit-bodies tough cartilaginous gelatinous; mouse grey to olive brown; substipitate; up to 100 mm diam. 1–2 mm thick; pileus pilose (densely hairy), hairs hyaline, some in tufts; hymenium smooth; growing in gregarious or caespitose groups, occasionally solitary.

Microscopic characters. Pileus made up of densely compacted gelatinised hyphae with cuticular hairs up to 450 µm long, average 185–200 × 5–7 µm, hairs with rounded tips; basidia cylindrical, 45–55 × 4–5 µm, with 3 transverse septa; spores allantoid, 14–16 × 5–6 µm.

Notes. Known as the 'Hairy Wood Ear' or 'Cloud Ear' this fungus is recognised by its mouse grey to olivaceous brown colour, smooth lower surface and densely hairy cap. This fungus is also edible, tough and tasteless and was collected for use in Chinese cookery and exported to China in the 19th century.

3. *Auricularia delicata* (Plate 3c)

Fruit bodies soft rubbery gelatinous; translucent reddish to pinkish brown; sessile to substipitate; reniform (kidney-shaped) to semicircular; up to 80 mm diam. 1–2 mm thick; pileus minutely tomentose to almost glabrous (hairless), with fine hyaline hairs; hymenium conspicuously merulioid to porose-reticulate (pored network), with veins a pale hyaline cream colour and hymenium surface pale pinkish cream to pale reddish brown; gregarious or in caespitose groups, occasionally solitary.

Microscopic characters. Pileus made up of densely compacted gelatinised hyphae with cuticular hairs 60–175 × 5–6 µm, hairs with rounded tips; basidia cylindrical, 40–45 × 4–5 µm, with 3 transverse septa; spores allantoid 10–13 × 5–6 µm, with 2–3 prominent oil globules.

Notes. This fungus is readily recognised by its reticulate to poroid pale coloured veining on the hymenium.

4. *Auricularia mesenterica* (Plate 3d)

Fruit bodies rubbery gelatinous; pale grey to olive brown; resupinate and commonly lobed; up to 50 mm diam., 1.5–2 mm thick; pileus conspicuously zoned, pilose with fine hyaline hairs; margin undulating, often pale from spores; hymenium purplish brown, conspicuously veined, wrinkled; gregarious or in caespitose groups, occasionally solitary.

Microscopic characters. Pileus made up of densely compacted gelatinised hyphae with cuticular hairs up to 500 µm long and only 2–4 µm wide, hairs with rounded tips; basidia cylindrical, 45–70 × 3–4 µm, with 3 transverse septa; spores allantoid, 15–18 × 6–7 µm.
Notes. Known as the 'Tripe Fungus' it is recognised by its zoned pileus, wrinkled to veined hymenium and large spores. The Queensland collections are all over 50 years old, with very small fruit bodies and a densely hairy pileus. It is not certain that they are conspecific with *A. mesenterica.*

5. *Auricularia* sp 1
Fruit body ear to fan shaped; very gelatinous, moist in appearance; glabrous; cinnamon to fulvous to almost brick colour near the point of attachment. Upper surface cracking to reveal the watery gelatinous context. Cap margins even or scalloped or irregular but never torn. Hymenium smooth but with a few veins or wrinkles arranged concentrically, but never forming a reticulum, may appear to have a chalk-like bloom; clay buff or vinaceous. The fungus is translucent when held up to the light. Cap up to 60 mm diam., 30 mm radius. Dorsally attached to woody substrates.
Microscopic characters. Pileus made up of densely packed gelatinised hyphae, 4–6 µm wide, with a distinct cuticular layer of finer hairs 2–3 µm wide with ± pointed ends; basidia septate with two sterigmata; spores allantoid, 10–12.5 × 4.5–6 µm; prominent cylindrical, brown pigmented pileal hairs 35–50 × 5–8 µm, with 1–4 septa and a sub-bulbous base.
Habitat. Gregarious on rotting logs in rainforest.
Notes. The cap surface is similar to that of both *A. auricula-judae* and *A. delicata,* but the hymenium is distinct, being neither smooth nor meruloid.
Collections examined. Lamington National Park, Tony Young, AQ 807883, 4 Nov. 1984.

Key to *Auricularia* species in Queensland

1. Hymenium (lower surface) smooth 2
1. Hymenium veined or reticulate like tripe 3

2. Upper surface minutely tomentose (finely hairy) ***A. auricula-judae***
2. Upper surface pilose (densely hairy) ***A. cornea***

3. Fruit body resupinate, lower surface with paler radial ridges, upper surface pilose/ hirsute, usually zoned ***A. mesenterica***
3. Fruit body sessile to sub-stipitate, upper surface tomentose 4

4. Hymenium pinkish white to cream and meruloid or reticulate, like tripe ***A. delicata***
4. Hymenium with veins, some concentric but at most forming a partial reticulum ***Auricularia* sp. 1**

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A FUNGAL CURIOSITY FROM NORTH WESTERN TASMANIA

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Introduction
While looking for macrofungi at Hellyer Gorge in north western Tasmania in June 2009, Esther and her daughter Emily encountered a most unusual, small, coralloid, pinkish red fungal structure on old rotten wood (Plate 3e). Since they knew that a project on the coral-fungus genus *Ramaria* was currently in progress in Queensland, the material was suitably photographed, documented, dried and forwarded to the first author for examination and possible identification. A second collection of the red coralloid fungus had been found at Warra (cool temperate rainforest) in southern Tasmania where it was collected from woody debris in 2006 (Plate 3f). This collection also displayed the red colouration and 'spiky' nature of the Hellyer Gorge material, although its branches tended to be thicker and coarser.

Description (based on the Hellyer Gorge collection)
Fungal structure forming a small tuft, approximately 1–2 cm high, brilliant pinkish red, spiky and very finely coralloid in appearance. Each emergent stem has at least 3–5 (often many more) small side branches that project either directly outwards or slant upwards and the main stem is always no more than 1 mm in diameter. The side branches are smooth and finely needle-point-tapered, while the main stem is often a little shaggy towards its base and may even apparently divide near the wood substrate into two diverging stems. The colour does not change if the material is bruised or broken and the stems are flexible rather than brittle. No odour was detected and the fungus was found on rotten, moss-covered, dead wood (twigs or debris) in cool temperate rainforest.

The material is sterile and is composed of large numbers of parallel, thin-walled, occasionally septate, hyaline hyphae (2.5–4.0 µm). There appeared to be traces of a reddish pigment coated over the outer walls of the hyphae and the hyphal contents are tinted brownish under examination in warmed 5% KOH solution. Near the apices of the main stem and branches, the septa display clamp connections that are quite large and delicately transparent in appearance. Towards the base of the main stem, both septa and clamp connections become increasingly rare. The basal trama (flesh) of the main stem contains large numbers of hyphae (2.5–4.0 µm) with markedly thickened walls. (No attempt was made to ascertain whether these were true skeletal hyphae or secondarily skeletalised hyphae.)

Material Examined: Tasmania: Hellyer Gorge, 21 Jun. 2009, *E. & E. van de Belt EV2009-0001* (HO); Warra, 43º05.6′S, 146º38.5′E, 15 Jul. 2006, *G. Gates W251* (GG personal herbarium).

Discussion

Inspection of the photographs from Hellyer Gorge at first suggested a hitherto unknown species of *Pterula*, although this would have been quite unusual because most members of that genus are brownish and pinkish shades are rare. The first two authors also considered the possibility that the Hellyer Gorge collection might be a form of the northern hemisphere species *Anthina flammea*, a very curious 'coralloid' species which is sterile, and therefore placed in older classifications in the 'Fungi Imperfecti' (asexual fungi). Fries (*Systema Mycologicum* 3: 283, 1832) provided a description of *Anthina flammea* from Europe, where it appears to be widespread (if not often found). There do not appear to be any previous records of *Anthina flammea* from the southern hemisphere. There are several images of *Anthina flammea* available on the internet but these show simple, reddish clubs rather than the delicate and spiky structures produced by the Tasmanian collections. Treu (*Mycotaxon* **45**: 71–81, 1992) found *Anthina flammea* to lack clamp connections and considered that it was most likely an ascomycete and possibly the asexual stage of a species of *Cordyceps*.

Clamp connections were positively identified in a first examination of the Hellyer Gorge material and then re-confirmed in a second examination made on separate portions of the fruit-body. Clamps were also confirmed from the Warra collection. This suggested that the fungus was a basidiomycete because clamp connections are very uncommon in ascomycetes. The possibility that *Anthina flammea* was the identity of the unknown fungus was discarded at this point, however a pteruloid species remained an option.

The identity of the material was then discussed with Dr Roy Halling of the New York Botanical Garden who suggested that since the fungal material did look pteruloid, the person most likely to be able to make a decision might be the Curator of Fungi at the University of Minnesota, Dr David J. McLaughlin, because David is studying this particular group of fungi. David in turn agreed that it was pteruloid in appearance, but indicated that further work would be needed to establish the identity of the fungus. He suggested that the next step should be to forward a fragment for analysis to Dr Bryn Dentinger, a Postdoctoral Fellow at the Royal Ontario Museum in Toronto, Canada. The photographs were also transmitted to Bryn and his immediate comments were that the material was likely to prove to be aerial rhizomorphs of an agaric because he had seen similar structures previously.

Bryn has now completed his genetic analysis using the ITS (Internal Transcribed Spacer) region of the ribosomal RNA gene and compared the results with specimen banks. (Note: direct citations from Bryn's communication now follow.) Bryn: 'generated a partial ITS sequence (the 5' end is a little short) from the sample' and then completed a GenBank BLAST search in order to compare the sequence from the Tasmanian material with sequences of known taxa lodged in GenBank. This comparison produced matches against 'a lot of uncultured, unidentified sequences (not surprisingly), but also in this list are some Agaricales, notably *Mycena* spp. and a few *Nolanea* spp.' Bryn then did a similar search against the Museum's 'ITS barcode database and the first 15 matches (>94% similarity) are all *Mycena* spp., followed by *Gymnopus* (93%)'. (Bryn also noted that for this second search the 'first hit is a root-associate of the Australian-Tasmanian ericoid *Epacris pulchella*'.)

Bryn is of the opinion that the Hellyer Gorge material 'is most likely the sterile rhizomorph of a *Mycena* sp. The strong rosy-pink pigmentation and the tendency for some *Mycena* spp. to have 'hairy' stipe bases ... are features that seem consistent with this ID'. (Probably the term 'aerial rhizomorph' is more applicable. Species such as *Marasmius crinisequi* can festoon low shrubs in rainforests with aerial rhizomorphs.) The authors concur with Bryn's analysis. Even without a perfect match for the gene sequence, there is a better than 94% probability that the Hellyer Gorge material is most likely to be a species of *Mycena*. The habit and colour of the coralloid growth suggest that this *Mycena* will be wood-inhabiting and have reddish pigments. The next step will be to find, if possible, both the spiky structures and agaric fruit-bodies together because there are several Australian species of *Mycena* with reddish pigments. Obtaining DNA sequences from the red *Mycena* species might also provide an identification for the red coralloid fungus.

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A REPORT FROM AFAR ...
FUNGAL CONSERVATION - SCIENCE, INFRASTRUCTURE AND POLITICS

Alison Pouliot

An important fungal conference was held recently in Whitby, northern England entitled *Fungal Conservation—Science, Infrastructure and Politics*. Organised by the European Mycological Association under the auspices of the International Union for the Conservation of Nature (IUCN), it was the first IUCN conference where fungal conservation was the explicit topic, with delegates from 24 countries, representing every inhabited continent. The conference provided a useful and enlightening extension of the *Threat Status Listing of Australian Fungi* meeting held at the last Fungimap conference in May 2009.

The conference was a valuable opportunity to share information on the current state of global fungal conservation, as well as to discuss infrastructure for addressing conservation issues. Organiser, David Minter opened the conference and emphasized the need for a collective voice for fungal conservation and proposed the possibility of forming a world federation representing all continental mycological groups. The proposal received full support from delegates and a steering committee of five was formed, with Peter Buchanan (NZ) representing Australasia.

Among the presentations were reviews of important recent developments in fungal conservation including the IUCN's official recognition of fungi as being fundamentally different from animals and plants and the need for separate representation within the Commission's structure. Other developments in fungal conservation from various countries can be viewed on the conference website at: <http://www.cybertruffle.org.uk/whitbymycosynod/index.htm>

There were many excellent presentations on both the science and politics of fungal conservation as well as individual country fungal conservation status reports. Many countries share common issues in fungal conservation including the lack of funding, resources and mycologists, paucity of baseline fungal taxonomic and distribution data, poor public profile and the absence of or inappropriate protective legislation. However, despite these challenges, the atmosphere and approach was one of positivity and possibility.

Another issue identified was the dearth of tools available to laypeople for fungi monitoring. Speakers from several countries remarked that increasing public interest in fungi was being hindered by a lack of interpretative information in the form of basic keys, guides and other resources to monitor and record fungi. It was exciting to observe that several delegates were familiar with Fungimap and highly commended it, with some planning to adopt a similar system in their countries.

There were also presentations on mycology and public relations. Alan Bennell from the RBG in Edinburgh gave an entertaining presentation about the poor public perception of mycology and mycologists. Surprisingly no-one threw a shoe at him when suggested we all take a good long look at ourselves in the mirror!

The conference also included a special workshop presented by Craig Hilton-Taylor and Julie Griffin from the IUCN on the Red List assessment process. Following a detailed seminar and interpretation of criteria, participants broke into groups and worked through actual fungal species submissions, interpreting and applying criteria (see <www.iucnredlist.org>). The workshop also addressed the challenges of interpreting criteria across different taxonomic groups. As Craig noted, the assessment process is not perfect and never will be as it is based on probabilities; on estimating the risk of extinction. However, the listing process is a critical step toward attracting recognition, funding, research and management for listed species/communities. Craig also spoke of the reality that with many fungal species, we don't have enough information on species biology and threats and hence the need for a pragmatic approach in interpreting criteria based on the best available knowledge to make estimates using the specified guidelines. He encouraged a cautionary but credible (supported by data) approach in preparing submissions. While there has been a move away from species-level conservation in recent years in Australia, the species-level approach still provides a valuable indicator of biodiversity status and loss.

The message was constantly brought home that while listing of fungal species was critical to attract funding, research and management, listing in itself was not enough and on-ground conservation work is imperative to ensure effective conservation. Several presenters also emphasised that mycologists must become more aware of conservation biology; that science is not enough to ensure fungal protection and that conservation is also about politics.

Conference participants were fortunate to experience a week of unusually mild and sunny weather, which certainly made for an enjoyable foray through the North York Moors National Park. The end of the conference was marked by the arrival of hearses and thousands of fantastically attired people for the Whitby Goth Weekend whose motto is Goth, Post Punk, Deathrock, Dark Indie, Alternative & Twisted. A local publican commented that he couldn't decide whether the mycologists or the Goths were the more weird!

Proceedings from the conference (including the Australian country report) will be published in the next issue of *Mycologia Balcanica* (<www.mycobalcan.com>)

KEEPING RECORDS ON A FORAY

Pat Leonard

INTRODUCTION

The Queensland Mycological Society's (QMS) objectives state that amongst other things we will seek to increase knowledge about macrofungi in Queensland. Our main method of gathering information about fungi is through our forays, and through the records and collections made by our members. Keeping good records has proved much more difficult and less fun than going on forays. Indeed one member has described the process of matching mountains of photographs to records as being worse than trying to identify a box full of poorly annotated *Cortinarius* specimens.

We are also now acutely aware that, in addition to the many fungi that we cannot name in the field, there are as many again that have never formally been described by a fungal taxonomist. For these, we have little hope of ever finding a name or identity. It is also far from clear what characters might need to be recorded, since the taxonomic value of various characters is yet to be determined. We are gradually getting to know those genera where there is some hope of doing something useful, but there is a long long way to go.

All the usual things have been done to try and sort things out. We have formed a subcommittee, held a working bee, written guidance notes, designed a database, collected books and keys, but like others before us we have found that keeping good records can be problematical. This is a progress report. Constructive criticism will be gratefully received.

WHAT HAPPENS AT A FORAY?

A foray is a fun day out where we go to interesting places, often sites which are well known to one QMS member but not necessarily to the rest of us. We meet other like minded people and we usually manage to see fungi that none of us have seen before. We learn from each other by frequently asking what is it or why is it that? Lots of photographs are taken, and someone tries to make a list.

Gradually this has been formalised so that now we have a designated foray leader and a recorder. We have developed a recording sheet which the recorder fills in and each fungus we spot is allocated a field number. A particularly difficult problem has been that the recorder on a foray, the person taking the fungus home for identification and the photographer are often different people. To solve the resultant matching problems, the recorder now numbers jeweller's tags with the field number from the record sheet and photographers include the numbered tag in at least one image of each find. The person taking the specimens home then adds the tag to the specimen in their collecting box.

QMS forayers at Baroon Pocket on the Sunshine Coast. L to R: Gretchen Evans (recorder), Patrick Leonard (leader) and James Hansen (enthusiast!). Photo: Sapphire McMullan-Fisher.

WHAT ARE FUNGAL RECORDS?

At first we thought that records were simple, just a name or number on a list. After long discussion we define a fungal record as 'an observation of a fungus at a particular place and time that normally includes the species name of the fungus, its location, details of the habitat, who collected it and, for fungi that are not in Q-Fungi or Fungimap, who confirmed the identification'.

Each record may consist of *either*:

1. ***A paper record*** for fungi that can be determined in the field (Fungimap targets plus a few common Queensland species) - usually less than 20% of fungi seen on a foray *or*
2. ***A record plus a specimen*** where microscopic examination is necessary to confirm a name. After identification the specimen is discarded - 5 to 30 % of what we find *or*
3. ***A herbarium collection*** where there are good specimens, the fungus is unknown or little known and a QMS member is prepared to work up full notes to deposit with the specimens - less than a dozen records on a foray.

There should also be ***images,*** especially of collections: photograph(s), or more rarely a sketch or painting. An image should be linked to a record or collection by its record number and the fungus' name. There may be many images for one record including images of microscopic features.

WHAT ARE COLLECTIONS?

A collection consists of 'one or usually several specimens of a fungus from the same mycelium, which relate to a single record, and which have been properly dried and described to a standard acceptable to the Brisbane herbarium (BRI)'.

There cannot be a collection without a record. Collections should be accompanied by a photograph; unfortunately, all too often they are not. There may be more than one collection for a record, for example where a duplicate is being sent to another herbarium. Collections of species new to Queensland must be deposited at BRI.

WHAT DO WE DO ABOUT UN-NAMED FUNGI?

On all the fungal forays the QMS has conducted to date there have been quite large numbers of fungi observed (40–60%) that none of the members can name to even generic level. This may be due to lack of expertise amongst the membership, but it is equally likely that the fungi have not been named or described. There are some types of fungi where there are virtually no members with expertise at present, notably the ascomycetes and many genera of the polypores. Fungi with no names are normally counted in order to estimate the proportion of such finds on a foray, but they are often also photographed. They do not represent records, in that the information is of no scientific value. However, if someone is prepared to write a full description, it may be deposited in BRI as a collection.

AFTER THE FORAY

At home, collectors write up notes and descriptions, work on identifications and dry and label specimens for the herbarium. The photographers seek to identify their images. They also give a unique number to each image linking it to the foray, date, field number and their name. (Details of how this is done are on the QMS website.) This information is passed on to the foray leader. The foray leader prepares a report which will be presented to the next bimonthly meeting of the QMS.

THE QMS MEETING PRESENTATION

The foray leader makes a presentation, usually centred on the most interesting finds during the foray. As we have developed better record keeping and the naming of images, this has become much easier for the presenter. But we all have memories of famous occasions where a series of fuzzy images appeared with great rapidity and the foray leader adlibbed. On other occasions three photographers had all brought images of the same fungus that the leader had not identified. It was a bit like being at the opening night of a new film in the days of the silent movies, when the pianist, had not seen it either. These presentations are a key part of the QMS's programme and of the learning process. Like forays they are entertaining and serve all the members interests.

AFTER THE MEETING: MANAGEMENT OF DATABASES AND COLLECTIONS

The database manager must then enter the records. Images need to be put in the images database. Collections must be matched with notes and images and deposited at the herbarium.

Records Database

The records database consists of all the records made on QMS forays and those submitted by QMS members. The aim of the database is to build a set of information about the macrofungi of Queensland that will allow the species diversity, frequency, distribution and other attributes of fungi to be determined. Where images exist, the record will include a link to a preferred image of that record. Our database has been built in Microsoft Access and outputs reports on forays, lists of Fungimap target species recorded and an annual report to the Environmental Protection Agency (EPA). It contains about 1000 records and is still under development.

Images Database

A separate images database is now being developed which will consist of all the images submitted to the QMS for records. In many cases there will be many images for a single record. The image database may also hold several formats of the same image for use in publications, for displays or on the website. Each image will need to have a fungal name and to be linked to a specific record. The Images Database may also hold named images that do not relate to records. For example, preferred images of fungi not yet found in Queensland. Normally these will be named and relate to non-Queensland records or published sources. The image database is being built in Extensis and currently contains over 2500 images.

Collections

Collections are assembled. These consist of the dried specimens and their field tag, macro and microscopic descriptions and, ideally, a set of images. They are sent to the Herbarium in batches to be processed and entered in to the collection. A number of problems have emerged: it has proved surprisingly difficult to accurately match specimens and notes with the correct images, not least because this may happen some weeks or even months after the foray. Issues have also arisen over poor quality collections and the large backlog of un-named specimens.

OUTPUTS AND AIMS OF THE QMS

- **Foray report:** available to the forayers and other QMS members at meetings and on the website.
- **Annual report to the EPA:** required as a condition of the collecting licence issued to the QMS. Its key purpose: to enable the EPA to begin to understand the occurrence and distribution of fungi in Queensland's protected environments.
- **Annual report to Fungimap:** prepared from database.
- **Collections for the Herbarium:** number has increased, their quality has improved and a greater proportion of specimens are now being identified to species level.
- **Sets of detailed descriptions** are being developed, using already worked on and identified specimens. About 200 species descriptions have been accumulated thus far.
- **Species lists and keys.** Some QMS members have started to assemble species lists for genera present in Queensland and to develop field keys that relate directly to what has been found.

REMAINING PROBLEMS FOR THE QMS?

Several problems remain to be addressed, not least of which is the large accumulation of un-named fungi and un-named photographs. Neither QMS members nor the staff at the Brisbane Herbarium has the resources to process the current backlog which is accumulating much more rapidly than it is being processed. The QMS needs to decide whether to continue to record, photograph and collect fungi that cannot be named and where no member of the society is willing to work on the specimens to make them scientifically useful in future. Opinions remain divided on this issue.

Our ability to identify and process foray records can be improved but there are issues surrounding what the society should do to further this. Holding identification sessions at the end of a foray so that all participants can look at what has been collected and named may help. Some forays, such as the weekend meetings, have included microscope and identification sessions. Better identifications and notes have resulted and members have found them interesting. Identification and microscopy workshops should also help. Both these are being tried out at present. Members are tentatively feeling their way towards specialising by adopting a genus. That allows a certain amount of expertise to be developed. But this can be a daunting task for beginners.

CONCLUSIONS

Writing down the process of what we do as a voluntary society carries with it the danger of making it sound like some sort of complicated administrative nightmare. But is has never been quite like that! The long and tedious process of sorting out how to keep records on a foray is in a real sense an exploration of how we can work effectively as a society making best use of our very varied skills and interests.

The QMS has come a long way in the three years since it was founded. It has brought together people with very different skills who have a common interest in fungi. There are members who grow, cook, photograph, paint, identify and describe fungi. There are scientists, editors, doctors, librarians, computer experts, chemists, and administrators. Keeping records on a foray has been one theme around which we have tried to develop understanding of how our skills and interests fit together and that includes the numbered tag which will hopefully help us to stop worrying and have fun. The great thing is that once we have started keeping good records we may go on to tackle that badly annotated box full of *Cortinarius*.

FUNGAL NEWS

Central Coast Fungal Group, NSW

Pam O'Sullivan

The usual fungal display in September of the Australian Plant Society, Central Coast Branch generated a lot of interest. In early October, it was a challenge to take students from the Australian Flora course (Newcastle University) out in the field to look at fungi! There had been horrendously dry conditions and a really bad dust storm—not the most propitious conditions to go 'fungi hunting'. The students had to find, name and make field notes for 10 fungi. We surveyed part of Strickland State Forest a couple of weeks before the student visit. There was much evidence of fungi in the form of mycelium binding litter. There was also wood in various stages of decay, with obvious 'brown rot' and 'white rot' to show beginners. Then, to our amazement, there were at least 16 easily recognizable (and nameable) species, including six Fungimap Target species (*Dictyopanus pusillus, Mycoacia subceracea, Piptoporus australiensis, Schizophyllum commune, Stereum hirsutum* and *S. ostrea*), though many were in a very dehydrated state. Two slime moulds were found, *Stemonitis splendens* and an *Arcyria*.
Other obvious species were *Ganoderma australe, G. cupreum, Chlorociboria* aff. *aeruginascens, Hypoxylon bovei* (which students, on first seeing, thought was evidence of fire damage), *Morganella subincarnata, Cyclomyces (Hymenochaete) setiporus* and *Stereum illudens.* There were a few rusts on leaves of Cabbage Palm (*Livistona australis*) and Gymea Lily (*Doryanthes excelsa*), displaying its spectacular red flowers. There was also a wonderful array of fascinating resupinate/corticioid fungi on the underside of dead wood. Fortunately, a few days before the field trips we had some great rain which not only washed a lot of the dirt off the vegetation and brightened up the fungi but, to the fascination and delight of the students, also rehydrated some spectacular displays of the jelly fungus *Dacryopinax spathularia.* A great time was had by all, with a number of students wanting to do Honours projects and further studies on fungi. As a result of the field work, I have put together a 40 page display book of resupinate/corticioid fungi with a key and photos of fresh specimens, to cover the main species seen.

I was very excited this year to see my first *Hypocrea* sp. *(Creopus* aff. *?gelatinosus)* on rotten wood in the hind dunes on the coast.

Sydney Fungal Studies Group Inc.

Ray Kearney

Each year, at the SFSG AGM, the program of field studies is planned. Dr Alec Wood leads in this item of the AGM Agenda. The program tries to maintain consistency from year-to-year, for site and date, so that annual comparisons can be made. For each foray, a coordinator is appointed to ensure a point of contact for any cancellation as well as to obtain permission from local authorities to undertake the respective field study.

In 2009, each two-hour foray was attended by between 12 and 18 collectors and began at 10 am. Expert mentoring by professional mycologists—Drs Alec Wood and Bettye Rees—is always greatly valued and appreciated. The only foray to be cancelled, because of the weather, was that in Strickland State Forest on 30th May.

Among the many records for each site the following species were either unusual or recorded for the first time.
Coachwood Glen, March 7 (Elma & Ray Kearney) *Trametes aurea*; *Fomes hemitephrus.*
Mt Wilson rainforest, March 21 (Alec Wood)
Omphalotus olearius; *Amanita* sp., cap 60 mm diam., brownish-grey with large pyramidal warts,; gills, white; stipe, brilliant yellow.
Robertson Reserve, April 4 (Joan Freere)
(?) *Grandinia* sp. Fruit-body fully resupinate, approx. 120 × 300 mm, surface un-even tuberculate, vinaceous, shading to dull cream margin, consistency to waxy; on base of tree; *Pseudocolus fusiformis.*
Minnamurra rainforest, April 7 (Don & Judith Gover)
Thelephora sp., fruit-body black, narrow, strap-like arms with bluntly-forked white tip; *Ganoderma lucidum* or closely related species that grows in Queensland.
Bola Creek precinct, April 18 (Don & Judith Gover)
Craterellus cornucopioides probably var. *mediosporus* and *Hygrocybe bolensis.*
Sassafras rainforest, May 2 (Alec Wood)
Austroboletus novaezelandiae; *Fomes hemitephrus*; Boletes sp., cap and stipe, bright orange, pores, cream.
Mill Creek precinct, June 13 (Bettye Rees)
Lepiota sp., fruit-body white, with small, honey-coloured globules, fragile, always found on rotten wood (Fuhrer, 2005, *A Field Guide to Australian Fungi*, p. 110); *Hygrocybe griseoramosa* (listed as endangered); *Russula* sp., cap deep chrome yellow, gills and stipe white. (Pl. 3g).

Photo: Frank Taeker (left) dictates a fungal collection record while mycology enthusiasts and Dr. Alec Wood (background) ponder and photograph labelled specimens from the Bola Creek precinct of Royal National Park.

Queensland Mycological Society

Sapphire McMullan-Fisher

The summer rains have finally begun again in south-east Queensland—we went from a record wet autumn to a record dry winter. During this dry winter QMS members have attended a couple of ‘shoebox’ identification workshops where members get help in identifying a fungal specimen by using the QMS library and microscopes, but mostly by accessing the other people’s knowledge. These ‘shoebox’ workshops have been led by Patrick Leonard. He has helped members to understand the difficulties of fungal identification and given tips on how to use keys and field guides. One important point he makes is that you cannot use northern hemisphere keys to identify fungi in Australia! He reminded us that the Australian herbaria are full of specimens with northern hemisphere names, which are most likely to be wrong! Pat has been testing a beta version of a Funkey, a multiple character key (Lucid) to the agaric genera of Australia. Seeing Pat’s successes I can hardly wait for Funkey to come out!
To celebrate finally finishing a PhD which took nearly a decade, I spent winter travelling around Western Australia and the Northern Territory. We started at the Fungimap V conference which, as usual, was fabulous and gave me my biennial mental cross-sporulating of ideas with the Fungimap Folk. I find learning on my own is slow—so I look forward to the peak learning time of Fungimap conferences. Seeing the diversity of fungi in other regions is also great. This time my fungal highlight was seeing *Cortinarius globuliformis* in the flesh (Plate 3i). I had read about this golden truffle-like *Cortinarius* but it is even more glorious, glowing under the leaf litter.

After the fun of the Conference I headed west where my cross-sporulation continued with Katie Syme and Richard Robinson at Manjimup. They kindly shared some of their knowledge and fungal spots in the awesome Jarrah and Karri forests. My fungal stimulation continued in Perth where I got a Myxomycete and *Amanita* fix staying with the very kind Davisons. I also went on a fun foray with the PUBF folk where the mycological highlight was a little black labyrinthine fungus, a *Glonium* sp. on wood (Plate 3j). From Perth we headed north, spending most time in the Pilbara and Kimberley. Despite winter rains, which made the Acacias bloom beautifully, these regions were pretty dry. Thanks to Mark's eagle eyes while driving, we recorded the geographic coordinates for half a dozen *Pisolithus* specimens. These puffballs, sometimes scattered over several hundred metres, popped up along roadsides, one even in the middle of a dirt road!

In the Northern Territory the mycological mystery was a strange fungus on a termite mound (Fig. 1). I thought it might be a young *Podaxis beringamensis* until I split it longitudinally to find strange empty chambers and no sign of spores (Fig. 2). The structure was tough like bark. I was baffled and emailed other mycologists, Matt Barrett and Tony Young, who consider that my pictures are of an old *P. beringamensis* without spore mass, and suggest that termites made chambers in the stem. It would be interesting to know if other *P. beringamensis* can be similarly chambered.

Fig. 1. Old fruit-bodies of *Podaxis beringamensis*, Northern Territory.

Fig. 2. Fruit-bodies of *Podaxis beringamensis* split longitudinally, showing chambered interior, Northern Territory.

The QMS website now has a section for gardeners to use to identify their garden fungi. Check out <www.qms.asn.au/garden/index.html>, click on an appropriate substrate in the garden diagram and hopefully you will find a picture that matches 'your' fungus. The pages are aimed at gardeners rather than more mycologically aware people. We'd be happy to include further Australian garden fungi on our web page: photograph any fungi in your garden that you have identified, provide an information page and contact QMS. Fungal groups in other areas could set up similar garden fungi sites and all sites could be linked.

News from South Australia

Pam Catcheside

Since July 2009, the Adelaide Fungal Studies Group has had three forays and a four-day workshop in the south-east, staying at Naracoorte. The first foray was to Scott Creek CP, where our finds included *Lachnum virgineum*, a small white disc fringed with 'eyelashes', some splendid Ghost Fungus, *Omphalotus nidiformis*, and the seemingly-ubiquitous *Amanita xanthocephala*. On the margins of a burnt patch, thick, gelatinous, dull yellow-brown 'cups' of *Aleurina ferruginea* were collected, as were dark brown flattish discs of *Plicaria endocarpoides*. I do not associate the first species with fire, but have found *P. endocarpoides*, usually in the second year after fire. *Plicaria* have globose spores; those of *P. endocarpoides* are smooth, whereas those of *P. recurva* are ornamented with curved spines.

In the south-east, we surveyed parks and reserves, taking our specimens back to the Wirreanda centre at the Naracoorte caves. Here, collections were described, identified, photographed and prepared for deposition into the State Herbarium of South Australia (AD). Among the collections were truffles *Hysterangium inflatum*, with its blue-green gelatinous gleba (spore-bearing interior), and the white, waxy *Hydnoplicata convoluta*, its surfaces twisted into spherical fruit-bodies; the earth-tongue *Geoglossum nigricans* and an uncommon black-spined puffball, *Lycoperdon nitidum*. Among the spectacular finds were many 'Vegetable Caterpilllars', *Cordyceps gunnii* in a swampy area in Nangwarry Forest Reserve.

A final foray to Onkaparinga CP south of Adelaide was almost rained out but we were pleased to find 'sheets' of the tiny hoofs of *Porodisculus pendulus* (Plate 4a) on bark of burnt *Eucalyptus obliqua*. I first saw this little polypore, later identified by Paul George, on blackened, burnt trees on Kangaroo Island, in the first year after fire. This year, on KI and the second year after fire, it was fruiting abundantly and we were intrigued that the fires at Onkaparinga occurred two years ago.

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QLD

Denis	1
Jutta Godwin	1
Ian Martin	2
Sheila Rowland	1
Sonya Rowland	1
Leanne Summerfield	1

TAS

Carolyn Hall-Jones	52
Patricia Harrisson	290

VIC

Andrew Barker	2
Robert Bender	7
Wendy Cook	11
Cicely Fenton	1
Field Naturalists Club of Victoria	85
Richard Hartland	17
Jenny Holmes	1
Brigitte Kny	1
Jean Lightfoot	1
Ivan Margitta	13
Jenny O'Donnell	18
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Graham Patterson	11
Kylie Singleton	1
Nigel Sinnott	2
Gidja Walker	1

WA

Jolanda Keeble	1
Leonie Stubbs	1

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