fungimap newsletter 28

fungimap

June 2006

AUSTRALIA'S FUNGI MAPPING SCHEME

Inside this Edition:

NEWS FROM THE FUNGIMAP PRESIDENT

Tarkine Expedition

The Fungimap Tarkine expedition in April was very successful. Fungi were plentiful, and so was rain. More than 200 collections were made, many documenting new and interesting species. Exciting finds included the first sighting of *Humidicutis arcohastata* from Tasmania, a wonderful green-capped waxcap that turns pink in age, and the first collections of the truffle *Richoniella* from Tasmania (this is a close relative of *Entoloma*, with the same angular spores). The large *Laccaria* sp. A was abundant under Myrtle Beech. Another Beech specialists was the blue *Cortinarius metallicus*.

Australian Geographic commissioned photographer Jason Edwards to accompany the expedition. We are eagerly awaiting the results of his endeavors, which involved much crouching in mud whilst being sheltered by an umbrella.

Fungimap Strategy

Whilst in Tasmania, the Fungimap Committee discussed strategy for the coming year. Four areas were identified as priorities: (1) organise Fungimap IV Conference, (2) reprint *Fungi Down Under*, with possibility of expanding target species, (3) revamp website, including on-line maps, and (4) explore preparation of manuals and reference material for use in identification and information workshops.

Bumper Season

Steady rain over the last month in Melbourne has produced a bumper mushroom season. In the Royal Botanic Gardens and surrounds I have seen prolific fruiting of Fly Agaric *Amanita muscaria*, in many places for the first time in the dozen years that I have been at the Gardens. It is very interesting to think that fungi like this might be present as mycelium, but only produce fruit bodies in years of exceptional rain. The Fly Agaric is with Oaks, along with abundant Death Cap *Amanita phalloides* and a variety of other exotic mycorrhizal fungi including species of *Xerocomus*, *Hebeloma*, *Cortinarius* and *Laccaria*. It is also with Deodar *Cedrus deodara*, which is not a host I have previously noticed, although quite consistent with the occurrence of Fly Agaric under other members of the Pinaceae such as *Pinus*.

(Continued on page 3)

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FUNGI INTEREST GROUPS

NSW

Sydney Fungal Studies Group

Fungi forays, talks and workshops in the Sydney area.
Secretary: Donald Gover, Ph: (02) 9661 4898
Email: dgover@bigpond.net.au

Central Coast Fungi Group

Fungi forays in the Central Coast region of NSW.
Contact: Pam O'Sullivan Ph: (02) 4362 1543
Email: pamos@ccregion.com.au

SA

Adelaide Fungal Studies Group

Monthly meetings and forays during the fungi season.
Contact: Pam Catcheside, Ph: (08) 8222 9379
Email: Catcheside.Pam@saugov.sa.gov.au

Qld

Brisbane Queensland Mycological Society

Jutta Godwin: jrgo@bigpond.net.au,

Tas

Fungi Lovers Adventure Group (FLAG)

Fungi activities in northern Tasmania.
Contact: Sarah Lloyd Ph: (03) 6396 1380
Email: sarahlloyd@iprimus.com.au

Vic

Field Naturalists Club of Victoria, Fungi Group

Forays, monthly meetings & presentations.
Contact: Geoff Lay, Ph: (03) 9898 4816
or Arthur Carew (03) 5968 4505
Web: http://www.vicnet.net.au/~fncv then Calendar of Events

WA

Perth Urban Bushland Fungi Project

Fungi workshops, walks, surveys in Perth Urban bush areas.
Contact: Roz Hart, Ph: (08) 9334 0500
Email: rozh@calm.wa.gov.au
Sarah de Bueger. Email: sarahde@calm.wa.gov.au

WA Naturalists' Club,Fungi Study Group

Fungal forays, workshops, identification evenings and talks, based in Perth.
Contact: WA Naturalists' Club
Email: wanats@iinet.net.au
Web: http://www.wanats.iinet.net.au/

William Bay National Parks Association,Fungi Studies Group

Fungi forays around Denmark.
Contact: Katrina Syme. Email: syme@westnet.com.au

(Continued from page 1.)

Fungimap IV
The fourth national Fungimap Conference will be held in southern Queensland in Autumn 2007. Teresa Lebel and Katie Syme have commenced planning for the Conference, and they are currently considering a suitable venue and time. We are very pleased to be liaising closely with the newly formed Queensland Mycological Society on the organisation of the 2007 Conference.

New Co-ordinator
A warm welcome to Sarah Jacob, the new Fungimap Co-ordinator. Sarah has been working as a Ranger at Royal Botanic Gardens Cranbourne. She brings to the position experience in working with community groups, an interest in the environment, and expertise in computers, especially databases. Sarah will be in the Fungimap office each Tuesday and Wednesday.

Tom May

8th International Mycological Congress

Cairns, Australia ~20-25 August 2006

On behalf of the Australasian Mycological Society, we cordially invite our colleagues in the mycology community to participate in the 8th International Mycological Congress, which will be held in Cairns, tropical north Queensland in 2006. This will be the first time the International Mycological Congress will be held in the Southern Hemisphere. For more information on IMC8 please visit the website and register: **www.sapmea.asn.au/imc8**

IMC8 Organizing Committee
Wieland Meyer and Ceri Pearce

MEMBERSHIP FEES 2006

Fungimap membership fees are due each year on the anniversary of joining. A reminder form will be sent out for memberships due each month. 2006 membership fees will remain the same as 2005.

Ordinary	$30
Concessional	$25
Associate	$10
(additional member at same address)	

FROM THE EDITOR

This is the promised 'bumper' issue containing articles and colour insert. We hope you enjoy it. The editorial panel and the Fungimap committee welcome your comments about present issues and your suggestions for future newsletters. We'll do our best to accommodate them.

Newsletter 28 contains articles ranging from new records of native and introduced species, fascinating observations of fungi/insect inter-relationships, to some of the wonderful survey work that is happening in the country. New records include **Neale Bougher**'s report of the discovery, in several localities in the Perth region, of a recently described agaric from the Hawaiian Islands; **Matt Barrett** describes his and his brother's find in the Kimberley of *Rhacophyllus lilacinus*, a species that is not only beautiful but has an extraordinary method of spore production. **Chris Burwell** tells of dung beetles using mushrooms both as food and to make brood balls for their young. **Katrina Syme** shows us some of the fungal diversity in William Bay Park, WA. **Virgil Hubregtse** gives a report on **Paul George**'s talk on slime moulds, timely in view of the proposed new Fungimap 'myxotargets'. **Pam Catcheside** reports two introduced but previously unrecorded gasteromycetes for SA. An interesting observation of a butterfly's behaviour on a stinkhorn is made by **Heino Lepp**. **Richard Robinson** requests sightings of a fungus associated with burnt sites; the species is rare in Europe but possibly more common in southern Australia. To round off the smorgasbord, **Roz Hart** shows what a band of dedicated and enthusiastic fungal hunters are achieving in WA. All in all, the articles demonstrate that fungology is very much alive around Australia.

Please continue to send us material related to fungi, including images, questions, puzzles, comments, reviews, quirky bits of news. Articles should be no more than 800 words; images should preferably be jpg, resolution at least 300dpi and submitted in at least the size that they are to be published. Avoid images larger than 1kb (which are preferably to be posted on CD-ROM).

Please send your contributions to Pam (Catcheside.Pam@saugov.sa.gov.au) or Fungimap, RBG Melbourne, Private Bag 2000, South Yarra, Victoria 3141 (fungimap@rbg.vic.gov.au).

The deadline for the next issue, Fungimap Newsletter 29, is Friday, 14th July 2006.

Pam Catcheside

THE HAWAIIAN FUNGUS *AGARICUS ROTALIS* IN AUSTRALIA

Neale L. Bougher
Department of Conservation and Land Management, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

Agaricus rotalis K.R. Peterson, Desjardin, & Hemmes is a very distinctive fungus characterised by black marshmallow-shaped buttons, and black and white radial pattern on mature caps (Plate 1a). The fungus was documented in 2000 as a new species from the Hawaiian Islands, where it occurs in woodchips and also in litter under *Casuarina equisetifolia* (Peterson *et al*. 2000, Hemmes and Desjardin 2002). Until recently *A. rotalis* had been unknown outside the tropical Hawaiian Islands. The species recently was reported from Estonia in cool-temperate northern Europe (photo by Klas Jaederfeldt at http://nrm.museum/kbo/krypt/svampplats/svampplats3.html.se). *Agaricus rotalis* also now has been identified in a Mediterranean climatic region in Australia, at Perth, Western Australia.

During 2005, the second year of the Perth Urban Bushland Fungi Project, several collections of a large *Agaricus* were identified as *A. rotalis* (see www.fungiperth.org.au). These collections occurred in widely varied habitats and locations within the greater Perth region, including the Swan Coastal Plain and Darling Scarp: (1) Edith Cowan University Campus, Pearson Street, Churchlands, among uncut grass under an old *Eucalyptus grandis* tree, with some trees from pre-existing bushland nearby - Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*), collected by Neale Bougher 5 April 2005. (2) Floraland Nursery, Great Eastern Highway, Mahogany Creek, collected by Kevin Griffiths 5 April 2005. Growing indoors in humid fernery shade house along floor line with wood borders. (3) Kings Park, off Kings Park Road, West Perth, in several massive clusters of up to 100 fruit bodies amongst the leaf litter under an exotic hardwood tree with an old *Pinus* tree also nearby, collected by Neale Bougher 14 April 2005. (4) Cliff Sadlier Reserve, Cunningham Terrace, Daglish, in leaf litter and woodchips in area of *Eucalyptus marginata*, *Agonis flexuosa* woodland, collected by Neale Bougher 26 May 2005.

Descriptive notes on *Agaricus rotalis* from Western Australia:

Cap: up to 70mm diameter; convex, finally flat. Margin incurved and fused to a thick veil in the button, later with a membranous white flap, and finally deeply split radially. Surface dry, very dark grey to almost black in young buttons, then paler and covered with minute appressed dark scales. Remaining black and contiguous at the cap centre. Then the surface splits radially from near centre to the margin with striking alternative radial strips of blackish-grey with minute scales, and white where the underlying white context is exposed. **Veil:** white, membranous, thick, forming a superior, pendulous but collapsing ring that becomes ragged and torn with age and may disappear entirely in some specimens. **Gills:** free, to 7mm deep, cream in button, then pale pink, dull pink, finally chocolate, crowded; edge smooth entire and concolorous; lamellules abundant. **Stem:** up to 80 x 8mm, cylindrical or slightly broadening towards base; with an abruptly swollen base to 15mm broad; solid then developing a narrow hollow in part. Surface dry, smooth, shiny white below the annulus dulling especially near the apex with age; pinkish when young above annulus. **Flesh:** white and up to 5mm thick in pileus, unchanging except rapidly becoming bright yellow when cut at and near the base. Yellow stain fades after several minutes.

With photographs and descriptions of *Agaricus rotalis* now widely available, further records of this distinctive fungus are likely to be confirmed in other parts of Australia and the world, including tropical and temperate regions. Perhaps this fungus may be a candidate future Fungimap target species?

References

Hemmes, D.E. and Desjardin, D.E. (2002). *Mushrooms of Hawai'i*. Ten Speed Press, Berkeley/Toronto.

Peterson, K.R., Desjardin, D.E., and Hemmes, D.E. (2000). Agaricales of the Hawaiian Islands. 6. Agaricaceae I. Agariceae: *Agaricus* and *Melanophyllum*. *Sydowia* 52: 204-257.

Acknowledgement

This work was undertaken during the Perth Urban Bushland project supported by Lotterywest - a collaborative project with the Urban Bushland Council, Department of Conservation and Land Management's WA Herbarium and the WA Naturalists' Club Inc.

RHACOPHYLLUS LILACINUS IN THE KIMBERLEY REGION OF WA

Matthew Barrett
Perth, WA

In February 2006, my brother Russell and I conducted a field trip to a station in the remote northern Kimberley, with the aim of collecting unusual plants and fungi during the wettest months of the year. With the generous assistance of Dunkeld Pastoral Co., we were able to stay and work for 10 days at Theda Station, 80 km south of Kalumburu. Theda receives about 1400 mm of rainfall, nearly all concentrated into 5 months (December to April), so has an extreme seasonal climate. Vegetation in the area is mostly savannah woodland dominated by eucalypts, which have a surprisingly rich variety of larger fungi, provided you can get access during the wettest months of the year (preferably during a monsoon or cyclone). There are also pockets of closed forest and swamps that harbour many species of larger fungi.

Despite relatively dry conditions during our stay we saw about 200 species of larger fungi, many of which I have never seen in the Kimberley before.

The highlight of the trip was locating some tiny (10-25 mm) pink-capped mushrooms (Plate 1c,d,e) growing singly or in small clusters on very rotten *Pandanus* (screw-palm) wood beside a lagoon, and growing with two species of *Coprinus* (strictly speaking *Coprinopsis*). In the pink-capped form, none of the caps expanded normally, but remained appressed to the stipe (secotioid), or only partially opened as the pileus started to disintegrate and the margins split longitudinally. On closer inspection, there appeared to be no gills at all, but instead the entire 'hymenium' was densely packed with radial rows of bright pink, tiny sac-like structures which eventually fell individually. The pinkish colour of the caps was derived from the colour of the sacs penetrating through the thin pale cap surface. The cap surface was covered by a thin membrane, later breaking into scales, remnants of a universal veil which also left a ring just above the base of the stipe. Microscopically the sacs contained angular, colourless, many-angled spores reminiscent of those of *Entoloma*! Instead of being produced on basidia, the spores are broadly attached to each other in long chains.

I remembered seeing an illustration of similar little sacs lining gills in Pegler's work on the agarics of Sri Lanka (Pegler 1986). Sure enough, our little fungi perfectly matched the description of Sri Lankan material of *Rhacophyllus lilacinus* in the family Coprinaceae (now Psathyrellacae) (browsing through odd books and articles from overseas can be rewarding!). *Rhacophyllus lilacinus* is known from a handful of collections scattered throughout the tropics and subtropics (Texas, Florida, Cuba, Sri Lanka, Vietnam, Tunisia, Guadeloupe, Hawai'i), but I have been unable to find any record from Australia.

The angular spores of *Rhacophyllus* are not produced on basidia like other agarics, but develop inside individual sacs (lysomeres) which are modifications of gills. It has been shown that *Rhacophyllus* fruit bodies are a modified ('abasidiosporic') species of *Coprinus*. True *Coprinus*-type fruit bodies can be produced in culture (described as *Coprinus clastophyllus* from cultures obtained from Texas). The *Rhacophyllus* form is apparently the only one found in nature, and this species appears to have adopted a different type of spore dispersal than normal for other species of *Coprinus*. Initially the sac-like structures (lysomeres) fall entire as the hyphae holding them in place disintegrate (in true *Coprinus* fashion). Presumably the lysomeres later break open to release the spores inside.

When more than one type of fruit body is produced for different stages of the life cycle in the same species of fungi, each stage (or state) is often given a different generic name. This naming practice is especially useful when it is not known which states belong together in a single species ('holomorph'), and when only one state is known or produced. Since basidia and basidiospores are not usually produced in *Rhacophyllus lilacinus,* it is best treated as an anamorph (asexual form) of *Coprinus clastophyllus*, the teleomorph (sexual form) which formed only in culture. Just to complicate matters however, it has been reported that meiosis (sexual recombination) occurs in at least some parts of the *Rhacophyllus* fruit bodies, and on that basis the *Rhacophyllus* form could also be treated as a teleomorph! It has been suggested that the species has two teleomorphs, an almost unique situation in the fungi. A granular form producing chlamydospores (oidia) like those of some *Coprinus* species can also be formed in some cultures.

Reference

Pegler, D.N., (1986), *Agaric Flora of Sri Lanka*. Kew Bull., Addit. Ser. 12: 373-375.

DUNG BEETLES WITH A TASTE FOR MUSHROOMS

Chris Burwell

The true dung beetles (Scarabaeinae) are a specialised group of scarab beetles that use dung, particularly mammal dung, as a food source for their larval stages. Dung beetles are high profile insects in Australia by virtue of a CSIRO program that introduced numerous exotic species to deal with the large, sloppy dung pats of cattle. One consequence of this program is that many people think that we have no native dung beetles; but in reality Australia has nearly 400 native species. Introduced dung beetles were needed to deal with cattle dung because the native species are adapted to deal with the smaller and drier pellets of our native mammals.

Around the world, some species of dung beetles are able to use alternative food sources (other than dung) for their larvae. Some can use rotten fruit or carrion, and Australian species of *Cephalodesmius* are able to 'manufacture' a dung-like material from fallen leaves, flowers and fruits (Monteith & Storey 1981).

Another alternative food source is mushrooms. The adults of several species of dung beetles are attracted to mushrooms. Compared with elsewhere in the world, Australia has a relatively high proportion, around 10%, of its dung beetle species attracted to fungi. However, many of these species are also attracted to dung and probably use dung as the larval food. Using mushrooms as food for the larvae is much rarer, and has been documented for only two species in the world, one from Mexico and the other from Australia. The Australian species is *Onthophagus dunningi* that is found along the east coast from Townsville, Queensland to Victoria. It belongs to a group of five closely related species (the *dunningi*-group). All five species probably use mushrooms as the larval food, but only the biology of *O. dunningi* has been investigated.
The remarkable biology of *O. dunningi* was elucidated by George Bornemissa (Bornemissa 1971), a famous dung beetle researcher who worked for CSIRO and was instrumental in the introduction of African dung beetles into Australia. *Onthophagus dunningi* can use a number of different species of 'mushroom' including agarics and boletes, but in coastal areas the extremely toxic *Amanita verna* (although there is dispute whether this species occurs in Australia) is preferred. The adult beetles, both males and females, penetrate the bulb of the mushroom beneath the soil. Up to 14 beetles have been found in a single mushroom and 6 to 8 beetles per mushroom are common. The adult beetles feed on the mushroom, shredding the mushroom tissue from the inside, burrowing up the stem and hollowing out the cap. Mating also occurs within the mushroom. Pairs of male and female beetles then work together to provision a nest. The female beetle burrows into the soil beneath the mushroom and the male passes to her pieces of shredded mushroom tissue that she fashions into brood balls and lays an egg within each. The brood ball is placed within a chamber in the burrow. Each completed nest consists of 2-6 brood balls. The eggs hatch and the developing beetle larva feeds on the brood ball. Bornemissa tested whether the developing larva could also feed on dung. He found that the larvae could not complete development on dung and it seems that this species only uses mushrooms as a larval food source.

After talking about these very beetles on a very wet Saturday at the fungi conference held in Brisbane I was inspired to look for mushrooms at Mt Coot-tha the following day. Incredibly I found a patch of boletes, one of which had been shredded from the inside by two male and one female *Onthophagus dunningi*. Also inside was a single male *Boletoscapter cornutus*, another species of dung beetle often attracted to mushrooms, but whose precise biology is still unknown.

Fig.1. A male *Onthophagus dunningi*, one of only two species of dung beetles proven to use mushrooms as a food source for their larvae.
Photo Chris Burwell

Fig.2. A male *Boletoscapter cornutus*. As the generic name implies, the two species of *Boletoscapter* (known only from Australia) are attracted to 'mushrooms' as well as dung. Their nesting habits have not been investigated.
Photo Chris Burwell

DUNG BEETLES WITH A TASTE FOR MUSHROOMS (continued from page 6)

References

Bornemissa, GF. 1971. Mycetophagous breeding in the Australian dung beetle, *Onthophagus dunningi*. *Pedobiologia* 11: 133-142.

Monteith, GB. & Storey, RI. 1981. The biology of *Cephalodesmius*, a genus of dung beetles which synthesizes "dung" from plant material (Coleoptera: Scarabaeidae: Scarabaeinae). *Memoirs of the Queensland Museum* 20: 253-277.

This article was previously published in *Catchments Cooee* in December 2005.

FUNGI IN WILLIAM BAY NATIONAL PARK, WESTERN AUSTRALIA

Katrina Syme

The south coast of Western Australia has a ruggedly magnificent coastline with massive granite outcrops interspersed with white, fine-grained, sandy beaches. The rocks which underlie the region are part of the Nornalup complex, the eroded roots of a mountain chain formed when two ancient continents collided.

William Bay National Park, fifteen kilometres west of Denmark, is small in scale but has a range of habitats and vegetation types. The massive rocks in the Park are of gneiss, a metamorphic rock older than granite, some of which tower above the ridges of the old, stable sand dunes like sentinels. The wind-pruned coastal heath contains a broad diversity of plants dominated by *Agonis flexuosa*. A variety of eucalypts - Karri, Marri, Jarrah, Bullich and Yate grow in pockets of richer soil with small clusters of Sheoak (*Allocasuarina fraseriana)* in the deeper sand. Two small freshwater lakes are fringed by an acid, peaty soil which harbours insectivorous plants such as sundews, bladderworts and pitcher plants.

An interesting suite of fungi is found in the Park, and the greatest variety of fruiting bodies appears from May to August. Many common species, including *Austroboletus occidentalis*, *Cortinarius archeri*, and *Russula clelandii* are found in the loamy soils under eucalypts. *Austropaxillus infundibuliformis* fruits under *Taxandra juniperina* on the shores of Lake Byleveld (Plate 1 f,g) while the exotic fungi *Coprinus comatus* and *Psathyrella asperospora* grow in disturbed soil near the former ranger's quarters.

Among the interesting places to search for fungi in the Park are the old, stable sand dunes. Two diminutive agarics found in this habitat have very distinctive odours. One, tiny, pale yellow and Omphalina-like, smells overpoweringly of naphthalene, and the other, a tough, brown species which grows from the base of rushes, exudes a garlicky odour. Emerging from the white sand are a variety of wax caps (Plate 1 h,i) including *Hygrocybe polychroma* (which is seen each season), as well as pink-spored Entolomas in a variety of colours and sizes (Plate 4a). Fungimap target species *Amanita xanthocephala, Anthracophyllum archeri, Stereum hirsutum* and *Tremella mesenterica* are very common, as is a very small species of *Pisolithus*. In the moss beds are two or three species of tiny brown agarics and, last season, I collected a group of pinkish, chunky *Lepista* and saw the tiny stalked puffball *Tulostoma* for the first time.

Fig 3. *Austropaxillus infundibuliformis* with *Cortinarius* sp. Photo Katrina Syme

Some more unusual finds have been of a lovely grey-capped, lilac-gilled, white-spored species, whose identity I haven't yet determined; *Hygrophoropsis aurantiaca* (found almost ten years ago and never seen again – but I did see it in Nova Scotia in 1999!). *Aecidium* (a rust fungus) appeared in golden circles on leaves of *Clematis pubescens* following warm, moist weather one August, where a dozen or so small, semi-translucent brown and yellow *Cantharellus* had shown themselves amid a carpet of flowering helmet orchids (*Corybas dilatatus*) four weeks earlier. Near the *Cantharellus* were tiny, pale apricot wax caps, slender dark clubs of *Geoglossum glutinosum*, clumps of white, semi-translucent finger-like *Clavulina vermicularis* and diminutive, tough orange corals.

We are beginning our surveys again this year and eagerly anticipate a good start to the fungi season – when we can bring our finds back to describe, photograph and examine microscopically – all part of the exciting detective work to find out what fungus we have.

COLOUR SUPPLEMENT

Introducing five new Target Species (Plate 3)

Fungi illustrated include those which are topics of various articles in this issue, some curiosities and five new target species. The first new target is *Favolaschia calocera*, a recently introduced 'fungal weed'. The other new target fungi are all **slime moulds**, timely with the summary of Paul Georges' illustrated talk by Virgil Hubregtse in this issue.

Favolaschia calocera R.Heim ex R.Heim
Common name: Orange ping pong bats

The **fruit body** is bright orange and has pores on the underside of the cap, which is up to 20 mm in diameter. There is a **stipe** up to 15 mm long, attached near the edge of the pileus. It grows in large colonies on fallen dead wood. This fungus occurs naturally in Asia and Madagascar, but has been introduced to New Zealand and Europe. It has recently been sighted around Melbourne and at Lamington NP in Queensland as a 'fungal weed'.

Myxotargets

IDENTIFICATION: the plasmodial stage can be quite similar in different species, so identification should be confirmed from spore-producing fruit-bodies.

Fuligo septica (L.) Wiggers
Common name: Dog vomit slime mould

Plasmodium a slimy, usually yellow, sometimes white, creamy or dull pink, indistinct blancmange-like mass. **Fruiting body** an aethelium; cushion-like, rather irregular, spongy, fragile 2-20cm diameter, 1-3cm thick, white, pink, yellow to reddish, outer surface a chalky crust, interior a powdery mass of dark grey spores. Spreading over moss, leaf litter, mulch or decaying wood and bark. When mature the interior is like a puffball, but the outer covering is chalky and easily disrupted, and the fruit-body is not spherical, but flows over the substrate.
Fruiting time: throughout the year.
Comments. A less common species, *F. cinerea*, may be distinguished from *F. septica* by its thinly spread, white aethelium and large, elliptic spores more than 10 µm diameter.

Lycogala epidendrum (L.) Fr.
Common name: Wolfs Milk

Plasmodium pink, coral red, orange, cream; round; interior liquid, slimy, cinnabar red. **Fruiting body** an aethelium. Occurring in small groups, scattered to crowded, globular, pinkish-grey, yellowish-brown, olive to almost black; 3-15 mm diameter, outer surface dry, interior powdery at maturity, pink, grey or brown. On rotting wood, sometimes on bark and wood debris.
Comments. The few puffballs that grow on wood often have a sterile section at the base (pseudostipe), and are never pink and slimy inside when young.

Ceratiomyxa fruticulosa (O.F. Mull.) T. Macbr.
Common name: Icicle fairy fans

Plasmodium watery and translucent. **Fruit bodies** of tiny, fragile, erect, simple or branched clubs arranged in rosettes; usually white, sometimes pink, pale yellow to yellowish-green; individual clubs to 10 mm high. Often forming extensive masses on wet bark and wood. **Comments**. Extremely fragile, and collapsing when touched. There is nothing else that can be confused with this species.

Hemitrichia serpula (Scop.) Rostaf. Ex Lister
Common name: Yellow Scribbles

Plasmodium white, becoming yellow when fruiting. **Fruiting body** a plasmodiocarp forming a net to several cm, each 'arm' of the net 0.5 mm across, rounded, bright yellow to red-brown. Outer surface transparent, thicker below, splitting longitudinally to expose spore mass. On decaying wood.
Comments. This is a very distinctive myxomycete with its yellow to red-brown reticulum spreading over the substrate.

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- Fuhrer, BA. (2005). *A field guide to Australian Fungi*. Blooming Books. [D CP]
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- Stephenson, SL. (2003). *Myxomycetes of New Zealand*. Fungi of New Zealand Volume 3. Fungal Diversity Research Series 11 [D I CP].

SLIME MOULDS

*This is a summary of an illustrated talk given by **Paul George** to the Fungi Group of the **Field Naturalists Club of Victoria** on 7th November 2005. The report is written by **Virgil Hubregtse.***

What are slime moulds?

Slime moulds belong to the Kingdom Protista (or Protoctista): they are neither plants, animals nor fungi. Slime moulds are peculiar protists that normally take the form of amoeba, but also develop fruiting bodies that release spores, and are superficially similar to the sporangia of fungi.

One of the earliest references to slime moulds is in *The Garden of Earthly Delights* by Hieronymus Bosch (c.1504), in which 22 slime moulds are depicted. There are almost 1000 species worldwide, and they occupy nearly every habitat on earth (primarily moist terrestrial). They eat bacteria, fungi and decaying organic matter. *Amazingly, they seem to have an ability to communicate and organize themselves, and can solve maze puzzles*!

There are two types of Slime Moulds, **Plasmodial Slime Moulds** and **Cellular Slime Moulds**. Cellular Slime Moulds are rarely observed in their vegetative state because of their small size. They spend most of their life as single-celled amoeboid protists, but upon the release of a chemical signal, the individual cells aggregate into a great swarm (known as a pseudoplasmodium) and eventually into multicellular slugs. Plasmodial Slime Moulds are easier to observe in nature.

Life Cycle of Plasmodial Slime Moulds

The plasmodium is a single cell bound only by a thin, elastic membrane. It has multiple nuclei and is often pigmented. At this stage the slime mould feeds on decaying organic matter, bacteria, protozoa and other minute organisms by actively engulfing the small particles and by absorbing soluble food directly into the mass. The stage is capable of locomotion, and a rapid flow of cytoplasm can readily be seen in the vein-like regions of the plasmodium.

In unfavourable conditions the plasmodium may revert to a dormant hardened mass. When the weather gets too cold or dry, the plasmodium hardens into a sclerotium. The sclerotium consists of irregular hardened masses of large cysts (macrocysts), each containing a number of nuclei. In this dormant form the slime mould is viable for a period of years, and often survives winter in this state.

When conditions are right and/or the food supply is exhausted, the mature plasmodium begins spore formation (sporulation). The plasmodium moves to an exposed, drier portion of the substrate, and begins the formation of fruit bodies (e.g. sporangia). The fruit bodies produce spores that are subsequently dispersed in the environment.

The spores of slime moulds are nearly always round. They range from smooth, finely warty, echinate or spiny, roughened, to coarsely reticulated. The spores are typically fairly large (9 -15 µm, but some are as small as 5 µm).

Spores germinate to form either amoeboid cells (myxamoebae) or flagellated swarm cells. These can revert to a dormant microcyst when conditions are unfavourable. In favourable conditions, fusion of cells occurs to produce a single cell zygote, which feeds and grows to form the plasmodium.

Types of Fruit Bodies

There are four types of fruit bodies: **Sporangium**, **Aethalium**, **Pseudoaethalium** and **Plasmodiocarp**.

The **Sporangium** is the most common type. It is a small spore container, sessile or stalked, with wide variations in colour and shape. Typical components of a sporangium, useful for identification, are a peridium (outer wall), spores, a capillitium (delicate network of hair-like elements), a columella or pseudocolumella, a stalk and a hypothallus (thin membranous structure at the base). Sporangia usually occur in groups, since they form from separate portions of the same plasmodium. Examples are *Hemitrichia calyculata*, which looks a little like a coffee-coloured ice-cream cone, *Trichia favoginea*, appearing somewhat similar to honeycomb, *Arcyria denudata*, resembling pink fairy floss, *Stemonitis splendens*, and *Ceratiomyxa fruticulosa.* (Plates 2,3)

The **Aethalium** is cushion-shaped, sessile and relatively large. Examples include *Lycogala epidendrum*, which grows on wood and is commonly called 'Wolf's milk', and *Fuligo septica*, often seen on wood chip mulch and sometimes called 'Dog's Vomit'. (Plate 3)

The **Pseudoaethalium** is composed of sporangia closely crowded together, and is usually sessile, although a few may be stalked. An example is *Tubifera ferruginosa*, which takes the form of attractive bright coral-pink 'cakes'. (Plate 2)

The **Plasmodiocarp** is usually sessile. Plasmodiocarps take the form of the plasmodial veins from which they were derived. An example is *Hemitrichia serpula*, which is usually a yellow mustard colour. The Plasmodium coalesces to form a network of swollen veins. (Plate 2)

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TWO NEW FUNGI IN SOUTH AUSTRALIA

Pam Catcheside

In late January this year, walking through the rainforest section of the Adelaide Botanic Garden, I noticed pinkish, claw-like fruit bodies protruding through the woodchip mulch. These proved to be *Lysurus mokusin*, the Lantern Stinkhorn, which does not seem to have been collected previously in South Australia. A week later, I took a group from the Adelaide herbarium to suffer the smell. Across the path from the stinkhorn, Graham Bell picked up some bird's nest fungi hiding amongst the woodchips. These fit *C. striatus*, Fluted Bird's Nest in all micro- and macro-characters. Another new record for S.A.!

The Lantern Stinkhorn (Plate 4d) has a sickly-faecal smell, a mixture of sewage and rotting meat. The smell attracts flies, the spore dispersers, which land on the evil-smelling, spore-filled slime lining the 'lantern' at the top of the stalk. Like all Stinkhorns, the fruit body 'hatches' from a gelatinous 'egg'. The egg of *L. mokusin* may be up to 30 mm diameter, 60 mm high and is whitish, rubbery, with substantial white root-like cords. The eggs rupture to release a white to dark pink stalk that branches into 4-6 'arms'. These arch into a turret-like structure or 'lantern'. The fruit body may reach 150 mm high. The rather spongy stalk consists of four to six ribs or jutting 'buttresses' running the whole length and continuous with the arms. The ribs are flattened and slightly darker than the rest of the stalk. On either side of each of the arm's ribs is the convoluted, reddish-brown fertile surface bearing the brownish slime. Arms are slightly bowed and joined at the top, forming a pinkish-orange 'top-knot' or spire. Throughout February to mid-March the Stinkhorn was found in a number of places; the most spectacular troop of well over 100 fruit bodies formed a circle amongst the mulch. Not surprisingly, the miasma emanating from them kept away most admirers.

Lysurus mokusin was one of the first phalloids to be described. It was collected in Mokusin Province, China in 1774 by a missionary, Father Cibot. The fungus occurs in Japan, in California, Texas and Washington D.C. in the U.S.A., and in Australia in Queensland, Victoria and New South Wales (it is a regular feature in Bettye Rees' backyard and very common around Sydney [B. Rees, *pers. comm.*]). In China it is considered a great delicacy and it is reputed to be a cure for gangrenous ulcers.

Another species of *Lysurus*, *L. cruciatus*, also occurs in Australia. It differs from *L. mokusin* by having a cylindrical, unribbed stipe. Its 'arms' are not always joined at the top to form the 'spire' of *L. mokusin*.

In comparison with their odoriferous neighbours, *Cyathus striatus* (Plate 4c), clustered on the rotting woodchips, had little or no smell. Each Bird's Nest is conic to barrel-shaped, 6-10 mm high and 5-8 mm diameter at the top. Its exterior is covered with tufted, brown, bristle-like hairs. Initially the 'nest' is closed but then opens to reveal a white membranous lid which in turn ruptures. The 'nest' opens out into a slightly flaring cup with a grey-brown lining, fluted with shallow, vertical grooves to the base of the cup. Inside, each of the 12-16 pale grey, lens-shaped 'eggs' or peridioles is attached to the lining by an elastic thread or funiculus. These peridioles are 1-2 mm in diameter and contain the fungus' spores. The nests act as splash cups. When a raindrop falls inside a cup, one or more peridioles, with their funiculi attached, may be splashed out, even to distances of just over two metres. The funiculus has a sticky end which, on contact, adheres to a substrate such as a leaf or twig. On sticking, a coiled up thread within the funiculus rapidly unwinds, extending the peridiole a further 5-18 cm.

Cyathus striatus is common in parts of Europe and N. America, and is known from India, China and Japan. There is one record for Australia, collected by E. Cheel from Jellore Creek, N.S.W. in 1912. Bird's Nest Fungi are useful medicinally: an antibiotic, cyathin, has been extracted from species of *Cyathus*, including *C. striatus*.

Cyathus striatus may be distinguished from *C. olla* and *C. stercoreus* by its grooved inner wall, the other two bird's nests have smooth linings. It has 12-16 whitish-grey peridioles, spores ellipsoid, 16-20 x 7-10 µm (*C. olla:* 8-10 white to grey-brown peridioles, spores ellipsoid, 9-12 x 5-8 µm; *C. stercoreus:* black peridioles, spores subglobose, 18-23 x 15-20 µm, sometimes larger).

Possibly the two species, which are saprobes, came in with the mulch. Almost certainly they are 'imports'. And Australia has done its own 'exporting', one example is *Aseroe rubra*, the Anemone Stinkhorn, found fruiting in a greenhouse at the Royal Botanic Gardens, Kew in 1829.

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A BUTTERFLY AND A STINKHORN

Heino Lepp

Stinkhorns are the subject of many (possibly the majority) of the fungal enquiries that I get at the Australian National Botanic Gardens (ANBG) in Canberra.

A recent Stinkhorn enquiry was particularly interesting because it was accompanied by a photo showing a butterfly on the Stinkhorn. The fungus in question is *Dictyophora multicolor* and the sighting was in Queensland, at Moore Park Beach, 25 km north of Bundaberg. When I looked at an enlargement of the photo it was clear that the butterfly's proboscis, though a little fuzzy, was uncoiled and with its further end either in contact with, or very close to, the fungal surface. The angle makes it hard to tell.

It is well-known that various dung-living and carrion-loving insects are attracted to Stinkhorns and that such invertebrates are responsible for carrying the spores away. Shaw and Roberts (2002) note an 1833 observation of bees and beetles being attracted to a Stinkhorn (probably *Phallus hadriani*) and also refer to two much more recent reports (published in 1989 and 2000) of stingless bees (in the genus *Trigona*) visiting Stinkhorns of the genera *Dictyophora*, *Phallus* and *Staheliomyces* in the American tropics. I cannot immediately recall any report of butterflies visiting Stinkhorns – but such reports may well be around. The photographer had noted seeing a couple of small butterflies on the fungus, but was unaware of the nature of the fungus.

You will find the photograph and some explanatory text on this page (http://ibis.anbg.gov.au/fungi/ecology-invertebrates.html) of the ANBG's fungal website. On the basis of the limited view of the butterfly shown by the photo, CSIRO Entomology in Canberra have noted that the closest match is with the genus *Prosotas*, of the family Lycaenidae. The wing details most closely match the species *Prosotas dubiosa*.

Reference

Shaw, DE & Roberts, P. (2002). Bees and phalloid exudate. *Mycologist*, **16**, 109.

COTYLIDIA UNDULATA: A RARE SPECIES IN EUROPE FINDS LIFE IN AUSTRALIA TO ITS LIKING.

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I had been collecting a small creamy yellow funnel-shaped fungus for a number of years on recently burnt sites in Western Australia (WA). When I finally had time to work on its identification I was surprised to find it was *Cotylidia undulata*. *Cotylidia undulata* was known only from Europe and North America, until 2005 when it was recorded in Tasmania. In the Northern hemisphere it is also known to occur in association with moss on burnt sites, but is also thought to be rare. In Western Australia it is very common on recently burnt soil in both karri and jarrah forest and always fruits in association with *Funaria hygrometrica*, a well-known fire-associated moss (Plate 4e).

If *C. undulata* is also associated with burnt sites in Tasmania then I expect it is common throughout southern Australia. That it is rare in Europe and common in WA is of interest and may reflect the difference in both the natural occurrence and social acceptance of fire in the Australian landscape. It is not known why *C. undulata* prefers burnt soil. However, if it is a saprotroph and its presence is simply associated with a lack of competition from other soil-born species due to the increased alkalinity of post-fire soil, then it is not surprising to find that it is a cosmopolitan species and is common in Australia. What is surprising is that it has not been recorded before now.

C. undulata is small but readily recognised. It has a creamy yellow upper surface with a light orange lower surface, is usually 10-15 mm tall and 3-7 mm in diameter. I'm interested to gather records of this little fungus and if you do see and photograph it please contact me with details of its location and habitat.

PERTH URBAN BUSHLAND FUNGI PROJECT

Roz Hart

Phase One of the Perth Urban Bushland Fungi Project (PUBF) was funded from March 2004 to August 2005 and it is timely to look back and review what was achieved during this innovative fungi project. The project has been a collaboration between the Urban Bushland Council and the WA Naturalists' Club in conjunction with the WA Herbarium, with financial support from Lotterywest. The project has vastly exceeded initial commitments, with encouraging results, particularly in fungi data collected and public involvement.

One of the huge strengths of the project has been the massive involvement of the public, who have provided eyes and legs, assisting the PUBF team to collect, photograph and document fungi from 26 different urban bushlands, while enthusiastically enjoying learning about the role and importance of fungi in these local bushlands. We have worked together with Friends of Bushland groups and Local Government Environment Officers to organise two different types of fungi events, two hour walks and all-day workshops.

In addition, we conducted biological surveys of fungi for three of CALM's (Conservation and Land Management) Regional Parks and a ground breaking section of the Bold Regional Park Management Plan, a biological survey of fungi. Kings Park and Bold Park, iconic Perth urban bushlands, are both managed by the Botanic Gardens and Parks Authority. Bold Park is the first regional park for which the Management Plan includes fungi as one of the key performance indicators.

Another fantastic strength has been our Fungi leaders, our wonderful team of twelve volunteers who were already fungi enthusiasts, who worked with us initially to refine how to supervise small groups of people collecting and recording fungi for the project. In 2005 we were generously provided with access to five sets of GPS units and cameras. Our volunteers rose to the occasion and patiently and conscientiously learnt how to incorporate the use of these into the forays they conducted for the project. The consistent and careful use of this equipment allowed us to produce comprehensive fungi reports for each bushland, with maps, tracks and fungi photos linked into the routes that were walked. All twenty six of these fungi reports are now available on the PUBF website.

Out in the rain collecting fungi for the PUBFP, Mindarie workshop, June 2005. Photo: PUBF

Numbers of events, participants and fungi recorded during the eighteen months of the PUBF project, Phase One

	Events 2004	Events 2005	People participating 2004	People participating 2005	Records of fungi 2004	Records of fungi 2005
Leaders' workshop	1	1	35	36	n/a	104
Walks	10	6	189	212	194	307
Workshops	4	4	119	153	321	344
Microscopy training for leaders	1	0	9	0	n/a	n/a
UWA Extension Course	1	-	24	-	58	-
Tertiary Practical classes	1	2	16	59	12	82
Biological surveys	2	3	37	22	98	134
Talks	10	9	511	436	n/a	n/a
Bold Park Contract	7	6	6	23	164	176
Total	**37**	**31**	**946**	**941**	**847**	**1147**

Over the 18 months of Phase One of the Perth Urban Bushland Fungi Project, almost 2000 fungi have been recorded from 48 public events. The project has overseen the vouchering of 320 new fungi specimens into the WA Herbarium. Every bushland visited has had at least one species of fungus vouchered as part of the PUBF survey.

PUBFP, Mindarie workshop, learning about the fungi, June 2005
Photo: Roz Hart

In May 2005, our talented volunteer John Weaver finished production of the comprehensive Perth Urban Bushland Fungi Project website, which is to be found at **www.fungiperth.org.au** Our Project website first came online during the Fungimap Conference in Gowrie Park, Tasmania in April-May 2005. This website was officially launched by our WA Minister for the Environment at the PUBF North Lake Fungi workshop in July 2005 and has logged thousands of visits from local, national and international users.

When it comes to the fungi themselves, the Project has listed 250 species of fungi of which Fungimap members will be interested to learn that sixteen are Fungimap Target species.

In 2004 the Project produced a colourful A2 sized fungi poster with six common fungi from the Perth region. The poster is available on the website and at events, where we sell them for $5. The poster was produced to show people that the common fungi are easy to recognize and to encourage them to learn a few fungi. It also provides an attractive and interesting talking point.

At the beginning of 2005, Neale Bougher, with electronic assistance from volunteer John Weaver, produced our online fungi field book which is available as part of our website. This is a totally new concept. However with the limited time available and the need to have a Perth region fungi fieldbook available to use quickly, Neale and John took the plunge and created a downloadable version. Once the 2005 season finished and with the data from a whole extra season's fungi collecting, Neale and John revised and greatly expanded the online field book so it now covers 74 species of fungi which occur in the Perth Metropolitan region.

During the 2004 and 2005 fungi seasons, PUBF conducted fungi events, surveyed and produced fungi inventories for 29 urban bushlands. The project recorded approximately 2000 individual fungi during two fungi seasons on the Swan Coastal Plain area of the Perth Metropolitan region.

The PUBF Project has been the catalyst for the transfer of the CSIRO Fungi Herbarium to the CALM WA Herbarium. This has greatly boosted our State's fungi information resources.

The PUBF team: Roz Hart, Community Education Officer, Sarah de Bueger, Project Officer.

9 LETTER JUMBLE WORD ANSWERS

Source: Readers Digest Illustrated Dictionary

Adam; among; dame; damn; demon; derma; dogma; dome; dram; drama; dream; edam; ***Ganoderma***; germ; gram; made; manage; manager; mane; mange; manger; mango; mare; marge; mean; mead; mega; megadon; mend; menu; moan; mode; mona; monad; monger; mora; morae; more; morgan; morgen; morn; name; nomad; norm; omega; omen; rame; ream.

Mary Hart

NEW FORTHCOMING EVENTS (not included in events column, Fungimap NL27)

Perth Urban Bushland Fungi Project (PUBFP). Website: www.fungiperth.org.au

Contact: Roz Hart, the PUBF Community Education Officer or Sarah de Bueger, PUBF Project Officer on 9334 0547 weekdays or by email at pubf@iinet.net.au. Bookings for workshops are essential.
Details of meeting times and places for the walks are on the website.

Event	Date	Place	Type of activity	Contact
PUBFP	10th JUNE	Koondoola Bushland	WORKSHOP	Roz or Sarah
PUBFP	18th JUNE	Whiteman Park	WALK	Roz or Sarah
PUBFP	2nd JULY	Trigg Bushland	WALK	Roz or Sarah
PUBFP	9th JULY	Modong Bushland, Oakford	WORKSHOP	Roz or Sarah
PUBFP	16th JULY	Maida vale Bushland	WORKSHOP	Roz or Sarah
PUBFP	23rd JULY	Queens Park Bushland	WORKSHOP	Roz or Sarah

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FUNGIMAP WEBSITE:

http://www.rbg.vic.gov.au/fungimap/
The Fungimap Website is in the process of being updated.

This Fungimap Newsletter was edited by Pam Catcheside, Teresa Lebel & Tom May.

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