FUNGI FORAGERS

No. 6, December 2017

OUR PURPOSE: TO RAISE AWARENESS AND INTEREST IN FUNGI OF THE CAIRNS REGION

This newsletter is not formally published and is not associated with any club or organisation, but is emailed free of charge to anyone who may be interested. Anyone who wishes to contribute to the newsletter with observations, anecdotes, corrections, comments or photographs is welcome to do so. Although this "newsletter" is science-based we try not to make it too "scientific". We recognise that there are school children, bush-walkers and others just interested in fungi, and we hope this leaflet will become a medium for furthering that interest.

Barry Muir, editor Jenn Muir

Editors Note:
Despite a comment that the Cairns Fungi Forager (CFF) newsletter is "too scientific", we have continued the trend of presenting information on fungus ecology and behaviour in this issue because these topics are rarely covered in most newsletters. If you think that CFF is too technical, please let us know (unit57.may@gmail.com) and if more readers feel that way we will reconsider the newsletter content.

Good times are a'comin'
Most of the Cairns region was well provided with rain this year, with April, May and June getting close to average rainfalls, and July, September, October and November above average rainfalls. This of course, depended on where the Trade Winds dropped their rain and the local topography, as explained in CFF No.3 and CFF No. 4. Only August let us down, with less than 10% of the average rainfall. This regular rainfall has seen a slow but steady supply of fungi in almost every month, especially in gullies and protected areas and even in gardens. It looks like December is going to have at least an average fall and, of course, January to March are our wettest times and fungi are expected to be prolific, so start watching for them **now**. They usually peak in numbers two days after the heaviest falls although some appear almost at once.

Identifications
We have attached for your interest a small article written by us and published in "Green Space Our Place" magazine (Issue 16 September 2017) produced by the Cairns Regional Council. It shows a few types of fungi found in our area. If you find anything fantastic, I and other CFF readers will try and identify it for you from photographs. Photographing fungi is pretty easy because they *don't run away*. Most of them you can just point your camera and shoot, but there are a couple of tricks with brackets and mushrooms (see the article). Remember to photograph the underside to show if it has gills or pores. Showing how the stalk (if it has one) is attached to the cap is also very important. Don't hesitate to use a flash if it is dark – a good picture with harsh shadow from the flash is better than a natural light photo where camera shake makes the picture unusable.

If you want to collect something for formal identification at the Queensland Herbarium we need at least three specimens in good condition (that usually means examined the same day as the fungi were sighted). Barry Muir provides a specimen preservation service for good material, which is then passed on to the Queensland Herbarium in Brisbane on your behalf and with ***YOUR*** name on the label.

THERE IS A LOT HAPPENING HERE IN TROPICAL NORTH QUEENSLAND (TNQ)

1. A guide to fungi in landcare

Dr Sapphire McMullan-fisher from Queensland Mycological Society (QMS) Brisbane and Roz Hart from the Perth Urban Bushland Fungi Project (PUBF), are concerned about the lack of information on fungi that is available to farmers, horticulturists, gardeners and other land managers. To address this deficiency, they **propose development of a guide to fungi in landcare operations**. Details are provided in an email appended to this newsletter. Please help if you can.

2. Building Community Capacity for Study of Tropical Queensland Fungi

In early November Dr Frances Guard, representing the Queensland Mycological Society (QMS) visited Cairns. In brief, the QMS is planning to hold two fungi **Training Workshops** in **March 2018 (10th at Kuranda, and 18th at TREAT, Lake Eacham)**. At these Workshops participants will be given training in the roles of fungi, identifying and photographing them, and using the simple and accessible App, iNaturalist, to submit records for science. There will be a short fungal foray included.

As well, there will be a **Microscopy/Polypore Workshop at JCU (Cairns) on Sunday March 11th.** This is for those people interested in pursuing study of the fascinating world of fungi and trying to come to grips with one of the large and important groups of fungi – the polypores and brackets.

Between those dates, several of us plan to undertake **Forays** in local Parks and Reserves to make collections, for study of the local fungi that may be new to science or just never before collected in northern Qld. This will be a chance for small groups of local enthusiasts to work with experienced mycologists. Eventually, we hope to produce field identification guides for the enjoyment and education of locals and tourists to the region. Some additional information and comments are appended.

3. Queensland Mycological Society (QMS)

Membership of QMS in 2018 commences on 1 January (to 31 December 2018) and we recommend that if you are planning to join QMS or renew your existing membership that you do so now for just $25 per person. There are many benefits, including access to members-only parts of the QMS website with masses of information. There is also a free quarterly newsletter, with identifications, field trip reports, etc. Go onto http://qldfungi.org.au to learn more. A membership form is attached to print out, fill in and post snailmail, or scan and email to QMS at memsec@qldfungi.org.au.

Calendars

The QMS has produced a superb fungus calendar for 2018. These are available from info@qldfungi.org.au for $15 each for non-members ($10 for QMS members) plus postage.

Did you know?

Fungi probably colonised land during the Cambrian Period, 542–488 million years ago (mya), long before land plants. Fossilized hyphae and spores recovered from the Ordovician of Wisconsin in USA (460 mya) resemble some modern-day fungi. *Prototaxites*, which was probably a fungus or a lichen, would have been the tallest organism at the time, **growing to 8 m tall**. All modern classes of fungi were present by the Late Carboniferous Period (318 to 299 mya).

Artist's reconstruction of what the landscape may have looked like. The three tall structures are *Prototaxites* fungus, the green plants are giant mosses.

Webphoto

Feature Article

One of our readers, Ray Palmer, has taken some wonderful photos of a fascinating tiny fungus called *Pilobolus* (probably *P. crystallinus*). *Pilobolus* means “hat-thrower”, an apt name, as you will see below.

Ray photographed them on horse dung in a paddock at his home in Redlynch. According to Wikipedia this **10 mm** tall fungus starts life as spores on grass which is then eaten by a horse or cow. The spores survive the passage through the gut of the animal and are then deposited in its dung. The spores then germinate, producing a mycelium (a mass of hyphae) within the dung pile where it is a primary coloniser, using the ammonia in the dung as an energy source. The fungus then produces, when conditions are right, a transparent stalk-like fruiting body about 10 mm tall with a balloon-like structure at the tip. On top of this a single black spore-filled mass develops. Jenn says they look like light globes wearing French berets! The balloon-like structure acts as a lens, focussing light on pigments near the base of the balloon. You can see these pigments as yellow staining near where the balloon joins the stalk. This causes the fruit body to grow with an orientation towards the light.

Pressure within the balloon builds by water absorption until the spore mass is fired off the tip of the fruit body. This spore mass can travel up to two metres. This involves an acceleration subjecting it to a force of over 20,000 Gs (G is the force of gravity), equivalent to a human being launched at 100 times the speed of sound, or twice the speed of a rifle bullet. The launching of a NASA space shuttle generates about 3 Gs and humans die after a few seconds at about 100 times the force of gravity (i.e. 100 Gs). The spore mass sticks to a grass blade away from the pile of dung from which it was launched. That grass is then eaten by another horse or cow and the cycle starts again.

Another adaptation is that the spore mass is covered with minute crystals of a chemical called sodium oxalate. These crystals repel water and cause the spore mass to flip over when they land in a dew drop, so that the spore mass sticky bottom can stick to the blade of grass.

In some countries parasitic lungworm larvae climb up onto the spore mass and are fired off with it. They complete their life cycle in the cow, horse, deer or elk when the spore mass and hanging-on worm larvae are eaten by their new host.

Plants, animals or just being themselves?

In the olden days fungi were considered to be part of the plant kingdom. It was not until the invention of the microscope, intensely critical study and, in more recent times chemical and DNA studies that have shown they deserve a taxonomic Kingdom of their own, now known as the Kingdom Fungi. The table below compares plants, fungi and animals for features in common.

PLANTS	FUNGI	ANIMALS
Chlorophyll (the green stuff)	No chlorophyll	No chlorophyll
Use carbon dioxide and produce oxygen (in daylight)	Use oxygen and produce carbon dioxide (all the time)	Use oxygen and produce carbon dioxide (all the time)
Cell walls of cellulose	Cell walls mostly of chitin	Cell walls of chitin or fats
Internal structure of cells different to those of animals	Internal structure of cells similar to those of animals	
Store energy as starch	Store energy as glycogen	Store energy as glycogen
Fungal proteins about 5% similar to plants	Fungal proteins 80% similar to humans and other mammals	
No cholesterol or cholesterol derivatives	Cholesterol and cholesterol derivatives	Cholesterol and cholesterol derivatives
Bioluminescence (glowing) rare	Bioluminescence not uncommon	Bioluminescence not uncommon
Do not synthesise polyunsaturated fatty acids	Synthesise polyunsaturated fatty acids	Synthesise polyunsaturated fatty acids
Do not secrete enzymes to digest food	Secrete enzymes to digest food	Secrete enzymes to digest food

Consider this next time you are standing in the forest looking at fungi…..you are more closely related to the fungus than you are to the trees! Sobering thought, isn't it, but a pleasant one if you're a Fungi Forager.

Apology and Correction

In the last edition of CFF was a picture of *Macrotyphula fistulosa* variety *contorta* which I stated was taken by Fay Adams from Port Douglas at Mowbray National Park (NP) and that it was identified by Dave Largent. For a start Fay lives at Mossman, not Port Douglas: a Senior's Moment for which I apologise. With regard the identification of the fungus, the formal name is as supplied by Lorelei Norvell as a suggestion to Dave Largent *SPECIFICALLY* in reference to a photograph and later specimens collected by Fay Adams' friend, Joan Gray, and photographed in Mt Lewis NP 24 October 2016. That particular fungus Fay delivered to Sandra Abell at JCU Herbarium, Smithfield on Joan Gray's behalf. Fay believes Dave Largent liaised with Sandra Abell over that sample.

The photograph used in CFF No 5. was taken by Fay Adams in Mowbray NP – enroute to the top of Big Mowbray Falls off the Bump Track on 22 Jan 2017 and "looked to be similar" to the Mt Lewis photos taken by Joan Gray the previous October. This latter (January) specimen was not specifically identified by Dave Largent. In other words, no professional mycologist actually confirmed the Mowbray photo, only the Mt Lewis photos. Apologies to all for my confusion.

Great Piccy

These hairy little guys are believed to possibly be *Mycena lomavritha* (previously called *M. indica*), or an Australian variant of a species from India, or perhaps a new species. Highly variable in colour and size (10-12 mm), they were found by Peter Newling at Stoney Creek. Peter suspects the hairs may be involved in capturing moisture from humid air. Many thanks to Peter for the photo.

Disclaimer: we have tried to use only our original material in preparation of this newsletter. Any text, photographs or other material used herein, and from other sources, is for research, educational and/or non-profit purposes only and is thus not limited by copyright. References have been provided where appropriate.

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Glossary

Fruit body – the fruiting structure of a fungus – equivalent to the apples on an apple tree
Hypha (plural hyphae) – the individual fine thread-like cells that make up the body of a fungus
Larva (plural larvae) – the immature form of some animals e.g. a caterpillar is the larva of a butterfly
Lichen – a cooperative agreement between a fungus and an alga (see CFF No. 3 page 3)
Mycelium – the collective name for a mass of hyphae
Spores – fungal reproductive “seeds”
Topography – the varying altitude and landforms of the region

Attachments

1. Extract from “Green Space Our Place” Issue 16, September 2017 produced by the Cairns Regional Council
2. Fungi for Land - Guide for Land Managers information
3. Tropical Fungi Project – Building Community Capacity information
4. QMS membership form

HOW MANY TYPES OF LARGE FUNGI ARE THERE?

Extract from "Green Space Our Place" No.16, Sept. 2017, Cairns Regional Council

Barry Muir

When asked how many types of large fungi there are, most people think only of mushrooms and toadstools. While mushrooms and toadstools are amongst the commonest of fungi, there are many other types of large fungi and many ways of grouping them. People who study fungi (known as mycologists) group fungi on features such as spore colour, shape of the cells that make up their tissues, the way they react to certain chemicals, and many other characters. This can become very complex and is almost impossible without a good microscope, access to chemicals, and a lot of study.

Another, simpler, way is to group them according to some basic and obvious features. The groups constructed this way may not always be closely related to the scientific classification of the fungi, but they are convenient and helpful for the amateur fungi forager. Here are some of the common groups.

Bird-nest fungi are quite small, less than 1 cm across, and look like tiny bird nests with grey or white eggs inside. These "eggs" contain the spores and are flicked out of the "nest" by the impact of rain drops. When they first develop they have little caps which cover the top of the nest and protect it until the spores are mature. They are common in many places that have moist mulch or litter, and are often found in garden beds where they break down wood or leaves into nutrients plants can use.

Bracket-gilled fungi are, as their name implies, bracket-shaped and usually grow from the sides of dead or living trees, or on fallen branches or twigs. On the underside they have "gills" – plate-like structures which produce the spores. Many are white or brown but some may be brightly coloured. This picture shows the underside of the fungus, exposing the beautiful delicate gills. It is growing on a fallen dead palm frond which it will help to decompose, releasing nutrients.

Bracket-pored fungi are also bracket or shelf-shaped but underneath they have tiny pores or tubes, not gills. The spores form within these tubes and then drop out the bottom to be picked up by wind currents. Some of the bracket-pored fungi are parasites on living trees and may kill their host. Those in the picture are growing on fallen decaying wood which they help to decompose. One bracket has been broken off and turned over so that the underside of the bracket is exposed. It is paler than the upper surface. The pores are sometimes minute and difficult to see, but may be quite large in other species.

Coral fungi, as their name implies, look like coral, although there are many that just form a single, stick-like fruiting body, often brightly coloured. The spores form within the tissue of the coral and are distributed by wind and animals. They may grow on decaying wood or on soil and are often seen after heavy rains in rainforest. They assist in decomposing wood and fallen leaves and converting it into nutrients for nearby plants.

Corticoid (outer layer) **or "paint" fungi** form a paint-like skin or fleshy coating on living or dead wood. They cause decay in the wood and help to break logs and stumps down into nutrients that plants can use. They also aid in removing, over time, large logs that would otherwise make rainforest impassable. Several are brightly coloured in yellows, reds or purples.

Cup fungi, technically known as ascomycetes, are a highly varied group ranging from tiny flake-like specks on soil or decomposing leaf litter to fruiting bodies (like this one which is over 100 mm tall) and helping to break down wood-chip mulch. The term cup fungi refers to the reproductive structures, not the overall shape of the fungus. Many cup fungi look like thick black hairs or like tiny coloured wine-glasses.

Jelly fungi look and feel like jelly and come in white, red-brown or yellow and in the shape of blobs, layers and seaweed-like or brain-like masses. They are amongst the first fungi to appear on decaying wood after rain and are important food for slugs, snails and insects.

Slime moulds are not technically fungi but are very common around Cairns on mulch and lawns, and often attract attention with their bright colour. They are included here because they are frequent in gardens and on roadsides. With age they turn brown then a purplish-grey colour and are then sometimes referred to as "dog-vomit" fungi – an apt description. They decompose wood and return nutrients to the soil. There are many types of slime moulds, some of them very beautiful.

Stinkhorn fungi are so named because of the bad smell produced by the spore-bearing slime formed between the ridges on the cap. This odour attracts blow-flies, which then walk on the spore mass, pick up spores on their feet and carry them to new places. The stinkhorns are decomposers of organic matter including wood and manure. There are many types of stinkhorn from simple tubular structures to complicated ones with delicate skirts of netting.

Puffballs and earthstars are highly variable, from simple golf-ball-like structures to star-shaped forms and some that grow on stalks. One type, *Pisolithus,* can force its way up through bitumen roads. All burst or disintgrate to release their spores which are stored inside the structure. Many are important associates of plant roots, passing nutrients to the plant and receiving sugars in return.

Stalked-gilled fungi are the mushrooms (some edible species) and toadstools (not–edible) with which most of us are familiar. Most have gills (flat plates under the cap) on which the spores are produced and then drop down between the gills to be picked up in breezes and moved around to new growing sites. There are dozens of types of stalked-gilled fungi, in every colour and many different forms. Some are decomposers, some live in cooperation with plant roots and some are parasites.

Stalked-pored fungi also have stalks to raise the cap above the ground to assist in spore dispersal but they have pores beneath the cap instead of gills. Many are large and fleshy and some are brightly coloured. Many are associated with plant roots in a mutually agreeable relationship where the fungus passes minerals to the plant and the plant passes carbohydrates (made by photosynthesis) to the fungus.