

## Amateur mycologists can assist to conserve fungi

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### Abstract

The conservation of all members belonged to the forgotten kingdom (*FUNGI*) is overlooked all the time worldwide. Mycologists carry the responsibility to discuss these issues and communicate with public and politicians but what about amateur mycologists? This is a very heavy burden, as even the majority of scientists deny the true importance of fungi and their essential role in the conservation, recycling and protection of biomes. A hard mission for the amateur mycologists is to get the attention of decision makers and is even more difficult as national legislation is strongly focused on protecting of plants and animal and ignoring fungi. The amateur's role in the history of mycology in Australia dated back to the mid nineteenth century. For more than 24 years as amateur mycologist, I studied fungi close to Dalmeny, New South Wales, Australia and this work will shed the light on twelve species and their conservation status.

**Key words**– Biodiversity, Dalmeny, *Gliophorus graminicolor*, *Phallus multicolor*.

### The Story

Free and paid amateurs collected Australian samples for Sir 'Baron' Ferdinand von Mueller, Government Botanist in Victoria of which was sent to Europe for identification. These samples were sent to M.C. Cooke at the Royal Botanic Garden, Kew and also to K. Kalchbrenner, an Austro-Hungarian priest. Also working at the end of the nineteenth century was F. M. Bailey, who as Colonial Botanist in Queensland encouraged amateur fungus collectors.

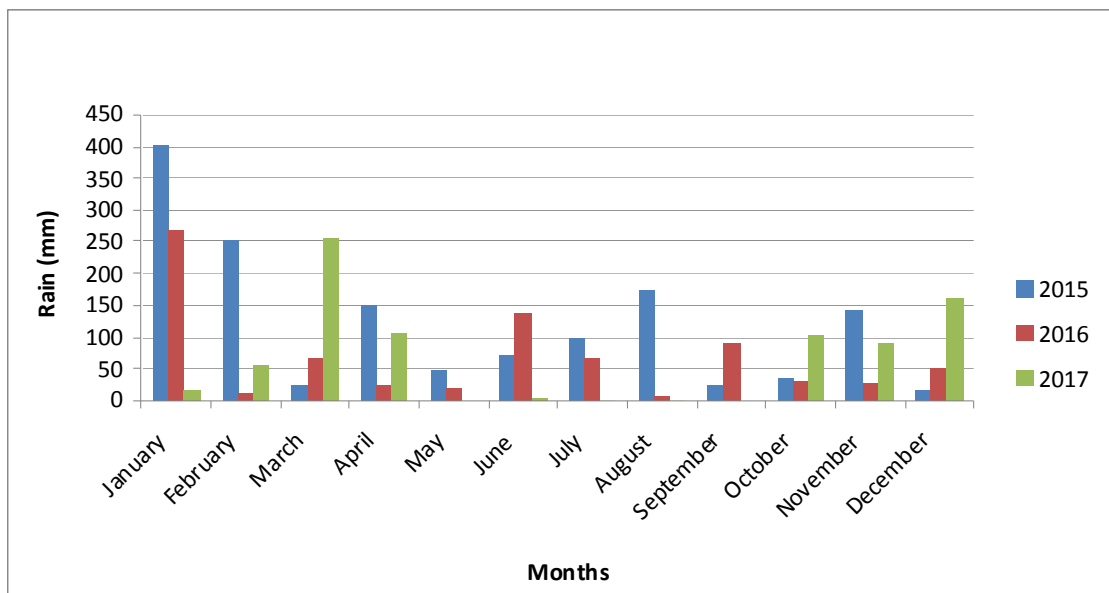
Due to such lack of attention and under-fund of mycological activities, the true biodiversity of Kingdom Fungi is unknown, since many fungi are inconspicuous and with *incertae sedis* taxonomic position, and therefore, many fungi species are treated as the 'Cinderella' among step-sisters; lost between both Animal and Plant kingdoms (Abdel-Azeem *et al.* 2012).

Close to home there remains a small pocket of natural vegetation, a left over remnant of warm tropical rain forest from a bygone era. It is advertised as a 'thirty five minute rainforest walk'! What does anyone see if they only spend thirty five minutes walking there? It is buried in a dry sclerophyll forest, along a dirt road, relatively easy to get to, away from shops and people in a perfect place of solitude where one can simply commune with nature of all kinds, from the birds and insects, snakes and lizards, invertebrates and flora and most exciting the fungi and its allies, the Forgotten Kingdom.

For twenty four years my family have been walking this track, now well beaten to me, and have witnessed the many changes brought about by nature during that time; of interest are the changes in species which appear with the fluctuations in temperatures and the amounts of

rainfall that occur (Figure 1). Is it ‘Climate Change’ or is just another natural cycle happening within nature? Entire trees have fallen to the earth, had animals scratching around, on and in their hollows; water has flowed through them and fungi have flourished upon them. The co-operation between so many different organisms living together within one environment has been a unique pleasure to witness. There is an obligation for this generation to pass on the beauty of nature, to care for it, to conserve it, and pass it on to our future generations.

The path through my tiny patch of vegetation measures seven hundred meters, but some days I can be down there for five to eight hours, depending on how many fungi I may find on that particular day. My knowledge is not great. I have no formal education in this field and I work alone and learn from books and scour the internet. During the last ten years I have spent most time trying to learn about the Myxomycetes but recently have turned to the Ascomycetes. Physical distance separates me from laboratories and professional people but email has helped greatly to gain information and assistance. Below are a few of the most interesting and possibly the more endangered species found in this small area.



**Fig. 1-** Rain fall amount (mm) recorded by the author in the study area during the last three years.

Fungi in particular are so important in so many areas of life, in fact, they are vital to keep our world in a state of equilibrium, for the forest and rebirth of the earth and soil, for forests, for food, for medicines and health of both humans and animals. There are many studies happening around the world and most importantly is the study for the conservation of fungi. Fungi MUST be conserved. They must NOT be ignored any longer. Governments must be obligated to fund studies of mycology and stop pushing fungi onto the back burner as a non essential topic.

Studies of fungi to date have saved many lives with the production of antibiotics. Current studies have already proven there is a way to stop reproduction of *Candida* biofilms, anticancer, rheumatoid, alzheimer, liver diseases and future studies may lead to even greater findings. Life cannot exist on earth without fungi.

Twelve species collected and discussed below from my small area through which runs the Cowdroy Creek, which is currently dry. The names of authors of fungal taxa are abbreviated according to Kirk and Ansell (1992). Taxa were identified according to relevant identification keys mentioned in the references section. All name corrections, authorities, and taxonomic assignments

were checked against the Index Fungorum database ([www. indexfungorum.org](http://www.indexfungorum.org)). Species of each group are given in a taxonomic sequence and accepted names are highlighted in bold.

## Ascomycota, Geoglossomycetes

### Geoglossales, Geoglossaceae

#### *Microglossum viride* (Pers.) Gillet

Green earth tongues are relatively common in this area. They range from 1 to 5 cm tall, are club shaped but have a furrowed flattish shaped head. Easily distinguished from the other *Geoglossum* species which are black, but can often be found growing side by side the other species. Usually grows in small groups but is easily overlooked due to its small size and colour (Figure 2).



**Fig. 2-** *Microglossum viride*.

## Ascomycota, Sordariomycetes

### Xylariales, Xylariaceae

#### *Xylaria cubensis* (Mont.) Fr. recorded as *Xylocoremium flabelliforme* (Schwein.) J.D. Rogers

Taxon found throughout the forest this year, yet in the past years found only occasionally. Here it is found always on dead wood, usually on small branches at ground level and can be in extensive colonies (Figure 3). They appear to assist with metabolism of lignin which will allow transport of simpler carbon compounds into the soil profile. This year there have been a few species within the Xylariales.



**Fig. 3-** *Xylocoremium flabelliforme*.

## Basidiomycota, Agaricomycetes

### Agaricales, Clavariaceae

*Phaeoclavulina ochracea* (Bres.) Giachini recorded as *Ramaria ochracea* (Bres.) Corner

A small delicate branched cream coloured coral growing on wood. It has fine pointed white branch tips that are sometimes rounded at the tips. Habit: amongst deep litter. No microscopy studies carried out (Figure 4).



**Fig. 4-** *Phaeoclavulina ochracea*.

*Phaeoclavulina abietina* (Pers.) Giachini recorded as *Ramaria abietina* (Pers.) Quél.

Attractive green tipped or green staining coral fungi, which have upright, bluntly pointed, yellow branches which are green tipped and produce yellow spores which are often evident with the branches below. It is quite small and can be easily overlooked as it is often buried in the deep dry leaf litter (Figure 5).



**Fig. 5-** *Ramaria abietina*.

**Agaricales, Hygrophoraceae**

***Gliophorus graminicolor* E. Horak**

One of the many wax caps often found in this area has been noticeably absent this last season, due to the lack of rain fall over the entire year (Figure 6). These are usually good leaf decomposers but with the lack of moisture the mycelium appears to move deeper into the earth and we see less fruit bodies. In wetter years they appear among the moss and litter and are often difficult to see until they start to change from the green to brown colours as they age. They have a glutinous convex cap with entire margins; gills are decurrent, widely spaced, white and waxy. Stem is straight with a hollow centre and the entire fruit body changes colour from green to an apricot orange when placed in a dryer.



**Fig. 6-** *Gliophorus graminicolor* gills and waxy cap.

***Hygrocybe* sp.**

Few basidiomata were recorded amongst forest litter characterized by reddish caps with yellow decurrent gills. Not uncommon in this area during wetter months but notably absent this past season (Figure 7).



**Fig. 7-** *Hygrocybe* sp. Coloured basidiomata.

**Agaricales, Physalacriaceae**

***Gloiocephala epiphylla* Masee**

This was a first record in 20017 grown on leaf litter. It is very tiny, but under the lens it was just a beautiful concave cap with no gills and fringed with “eye-lashes”. Apparently it belongs with the reduced Marasmioid and Mycenoid agarics and does require more advanced microscopic study than so far given from the home office. Specimens have been sent to the herbarium (Fungarium) for further examination (Figure 8). Initial identification thanks to Mushroom Observer.



**Fig. 8-** *Gloiocephala epiphylla*.

**Agaricales, Pterulaceae**

***Deflexula fascicularis* (Bres. & Pat.) Corner**

Looks like a small icicle. Gregarious, thousands of individuals present on old wood. The base is inconspicuous and buried within the wood. Each individual body is gravitropic, (downward pointing) spines, and gregarious (Figure 9). One year only a few groups were found on the upturned roots of a tree yet the following year these bodies appeared to cover the entire length of fallen trees some up to forty meters long, including the cut faces of some logs. Once again this was during the years of heavier rainfall. This last year they have not been observed.



**Fig. 9-** *Deflexula fascicularis*.

**Phallales, Phallaceae**

***Phallus indusiatus* Vent.**

Growing on the ground this emerged from a whitish egg as a spongy stem with a conical head. It could be smelt for at least twenty four hours before it was located. The slimy, olive brown spore mass formed on the head of this phallic shaped fungus, smelt like fetid meat or excrement and was surrounded with flies. The indusium (net like skirt) is suspended from the base of the head and hung delicately to the ground. Again this was a first sighting of this species in this area after walking through this small remnant pocket of warm temperate rainforest on a regular basis for so many years (Figure 10).



**Fig. 10-** *Phallus indusiatus*.

***Phallus multicolor* Berk. & Broome**

Very similar to *Phallus indusiatus* in appearance with its whitish cylindrical stem and yellowish head covered in an olive-brown gleba which had a strong odour of fetid meat for twenty four hours before it could be located (Figure 11). The indusium (net like skirt) is suspended from the base of the head and hung delicately to the ground but appeared to be longer than that of *P. indusiatus* and was orange in colour thus giving it its name of multicolor. Again, this was a first find in this area which was quite amazing, two species belonging to the same genus, one on the downward slope and one on the upward slope of this tiny rain forest. Both species attracted flies.





**Fig. 11-** *Phallus multicolor*.

## Protozoa, Mycetozoa

### Incertae sedis, Physaraceae

#### *Craterium minutum* (Leers) Fr.

A protozoan fungal analogue (myxomycete) found growing gregariously on leaf litter and twigs. It is stalked, erect, goblet shaped, yellowish brown about 0.2mm to 0.6mm in diameter and 0.2 to 1.5mm tall (Figure 12). Its outer peridium is thickly doubled layered which is clearly evident when the cap dehiscences sharply from the rest of the cup to reveal the physaroid capillitium often connected by large white lime nodes. The spores are brown, minutely warted. First noted by the yellow plasmodium initially thought to be another physarum, but on following its trail fruit bodies were found in a slightly drier area. Once again this was another first find this season in this drier year.



**Fig. 12-** *Craterium minutum*.

Finally, I concluded that in most cases in my area and due to that I'm the only amateur mycologist and the scarcity of information and updated checklists about fungal populations makes conservation status evaluations beyond "data deficient", difficult or impossible.

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