

# FUNGAL FIELD STUDY, WENTWORTH COMMON, Sydney Olympic Park, 11<sup>th</sup> May, 2019

Coordinators: Elma & Ray Kearney

GPS: S 33° 50.271 E 151° 04.418; Members and visitors in attendance: 16

The weather had been dry and windy while cool temperatures were typically mid-autumn. Fungi fruiting was well below optimum and was confirmed by this field study. We were gladly joined by enthusiastic members of the Parramatta Hills branch of the Australian Plant Society. Leading the group was Tina Hsu, Ecology Project Officer, Sydney Olympic Park Authority (SOPA). We are grateful to Tina who not only guided us through the different habitats but arranged all-day free parking passes for attendees.

Ray and Elma had a previous meeting with Tina and Jenny O'Meara (Ecology Manager, SOPA) on 15.3.19 at Wentworth Common reserve when conditions of prior rain were much more favourable to the fruiting of fungi. Some species were recorded then by Elma and Ray and are added to the much fewer collections/recordings on the 11.5.19. The following Report and species list are a composite record of both visits.

Species recorded were from a range of genera and groups e.g. *Amanita*, *Calocera*, *Campanella*, *Claviceps* (ergot), *Collybia*, *Coprinopsis*, *Dacryopinax*, *Fomes*, *Ganoderma*, *Geastrum*, *Gymnopilus*, *Hexagonia*, *Inocybe*, *Laccaria*, *Macrolepiota*, *Marasmius*, *Mycena*, *Phallus*, *Pisolithus*, *Postia*, *Schizophyllum*, *Scleroderma*, *Stereum* (*Xylobolus*), *Trametes* and *Xerula* among others.

Rather than just provide a series of specimen photos with names we have decided to emphasize the interdependency of fungi and to raise mycological questions based on keen observations and originality of ideas to try to engender a broader mycological objective than simply a gallery of photos.

## The habitat



Sydney Olympic Park (SOP) provides habitat for over 250 native animal species. A quarter of all bird species found in Australia have been recorded at the Park, as well as many species of amphibians, frogs, reptiles, mammals and fish.

SOP includes approximately 200 hectares of estuarine and freshwater wetlands, which support a high diversity of native plant species. Wentworth Common is one of the primary habitats where the endangered bell frog habitat had been specifically conserved or constructed to promote the long-term viability of the site's population. Sites visited included casuarina habitats around the restricted bell-frog lagoon and adjacent bushlands.





**(A) Stinkhorn** *Phallus (Dictyophora) rubicundus*  
- very toxic to dogs (photos 15.3.19)



The stem has a high content of e.g., manganese, iron and potassium. Flies are attracted by the mal-odour but when their feet touch the brown, spore-laden mass (gleba), the taste-sensors in the feet detect sweetness. The vibration by the fly's proboscis causes the gleba gel to change to a liquid (sol). Spores are siphoned up and dispersed by the fly. The sol reverts to a gel when vibration ceases. This stinkhorn is not mycorrhizal but is common in woodchips and grass verges. The 'egg' has a gel below the outer coat and is important in creating an osmotic differential with moisture to 'pump' up the fruiting structure.



**(B) Entomopathogenic fungi.** Keenly observant attendees noted the large number of empty shells left by cicadas, after the nymph had climbed partly up the fine-mesh wall barrier around the bell-frog ponds. Beyond the mesh-barriers were lines of mature *Casuarina cunninghamiana*. The question arose why so many cicadas have escaped colonization e.g. by parasitic *Isaria cicadae* or an undescribed species of *Cordyceps* found in Lane Cove? See below.



Photos, taken in Lane Cove, show an undescribed species of entomopathogenic fungus, 'cordyceps', infecting the final underground nymph stage of a species of cicada. Two different cicada species were found to be susceptible to such infection in Lane Cove. Grown in the laboratory the parasitic fungus was shown to have anti-tumour properties. Cordycepin (3'-Deoxyadenosine) was detected among other actives in the fungal extracts.



A quick survey beside the walls with cicada shells at Wentworth Common failed to disclose any stroma of infected ground nymphs.

Such is certainly partly due to the time of the year being unfavourable for the emergence of nymphs, usually in mid-summer. How a nymph succumbs to the parasitic fungus when the nymph reaches the surface (before metamorphosis) to allow the dispersal of spores from the fungal stroma, is largely unknown. Cordycepin which inhibits protein synthesis by blocking mRNA transcription is likely to have a role.

Another species of parasitic fungus is *Isaria (Paecilomyces) cicadae* which is quite common in rainforests in the Blue Mountains region. The photo by Elma (2013 Eureka prize awardee) shows growth stages 12 days apart. Again, the fungus grows upwards, against gravity, after the cicada nymph is killed, at ground surface, before the nymph would have emerged to metamorphose into the final stage of the cicada.



That so many nymphs at the Wentworth Common habitat had reached maturity raises many questions.

- Do the casuarina trees, known to affect mycelium of certain fungi in the rhizosphere also suppress these enteropathogenic fungi?
- Casuarina trees are found not to produce ectomycorrhizae while formation of arbuscular mycorrhizae and cluster roots in *Casuarina cunninghamiana* seedlings are dependent on supply of phosphorus. *Casuarina cunninghamiana* occurs naturally along stream and riverbanks. Cluster roots may be advantageous at these sites but, being near water, is unlikely to be favourable to mycorrhizal formation and activity.
- Casuarina root exudates are substances released that show a significant role in mediating the plant-microbe/fungi interactions in soil. Any role here?
- Nocturnal birds (e.g., Tawny Frogmouth) have been recorded in Lane Cove by Ray and Elma feeding cicada nymph to fledglings in trees, including casuarinas. See photo above (10.12.18)



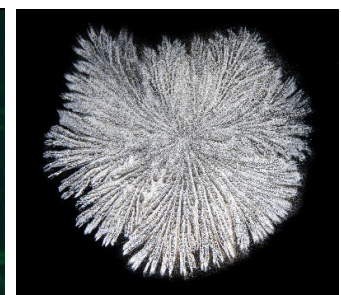
The complex ecology of the cicada in terms of the factors affecting its survival in the Wentworth Common casuarina habitat, from a mycological perspective, is of interest, including a possible absence of these pathogenic fungi.

### (C) *Schizophyllum commune*.

The basidiomycetous fungus *S. commune* is emerging as one of the important agents of sinusitis. Cases of *S. commune* infections also include allergic pulmonary disease, fungus ball in the lung, chronic lung disease, ulcerative lesions of the hard palate, nail infection and atypical meningitis. Though infections are rare, care should be undertaken in handling dead wood



Split gills



White spore print

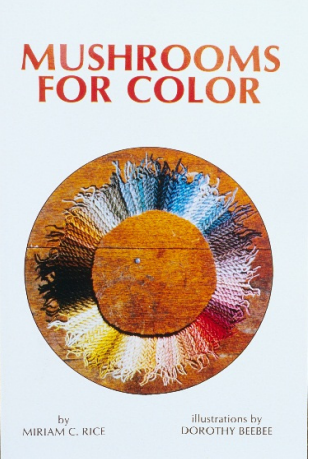
on which this fungus grows. It has recently attracted the pharmaceutical industry for its immune-modulatory, anti-fungal, anti-neoplastic and anti-viral activities. The species was recorded at Wentworth Common.

**(D) *Pisolithus arhizus* (previously *P. tinctorius*)**

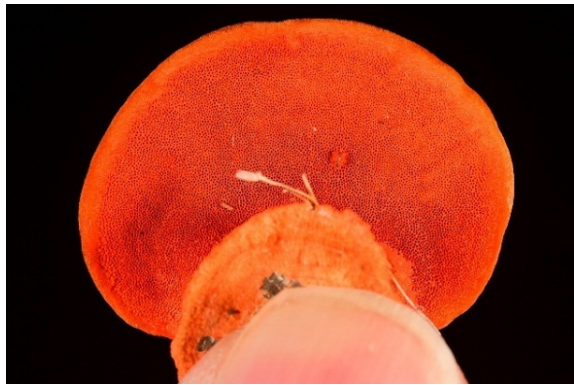
An unusual *earthball* because its gleba is composed of small peridioles and displays a beautiful pattern. The young peridioles are



white/yellow and move up the mushroom as they mature. The fruiting bodies of older specimens become distorted and can be mistaken for anything from animal faeces to decomposing tree stumps. Despite its unsightly appearance, this earthball is used to dye wool, thus earning it the common name, "Dyeball." The fungus is also prized by foresters for its ability to form robust mycorrhizas in extremely poor soil conditions. Old peridioles at the top are full of mature spores. It survives bushfires. The broken specimen above, has had its spores scattered by e.g., a bird with a pointed bill e.g., a common *White Ibis*. Recorded in several locations in Wentworth Common.



**(E) Selection of other specimens recorded 15.3.19 and 11.5.19 in Wentworth Common:**



*Trametes (Pycnoporus) coccinea* (anti-bacterial)



*Campanella junghuhnii* (sesquiterpenes in medicine)



dry *Geastrum saccatum*



mixed vegetation beside bell-frog pond



*Dacryopinax spathularia* (Jelly Fungi)

# FUNGAL FIELD STUDY, WENTWORTH COMMON, Sydney Olympic Park, 15<sup>th</sup> March and 11<sup>th</sup> May, 2019

## Species list:

### Division Ascomycota

#### Sub-division Pezizomycotina

##### Class Sordariomycetes

##### Order Hypocreales

*Claviceps paspali*

### Division Basidiomycota

#### Sub-division Agaricomycotina

##### Class Agaricomycetes

##### Order Agaricales

*Amanita ochrophyloides*  
*Amanita cheeli* (= *punctata*)  
*Campanella junghuhnii*  
*Collybia putilla*  
*Coprinopsis atramentaria*  
*Gymnopilus sapineus* (= *penetrans*)  
*Inocybe austrofibrillosa*  
*Laccaria laccata*  
*Macrolepiota clelandii*  
*Marasmius alveolaris*  
*Mycena albidofusca* (?)  
*Schizophyllum commune*  
*Xerula australis*

##### Order Boletales

*Pisolithus arrhizus* (*arrhizus*)  
*Scleroderma citrinum*

##### Order Dacrymycetales

*Calocera cornea*  
*Dacrymyces palmatus*  
*Dacryopinax spathularia*

##### Order Geastrales

*Geastrum saccatum*

##### Order Phallales

*Phallus rubicundus*

##### Order Polyporales

*Amauroderma rude*  
*Fomes hemitephrus*  
*Ganoderma australe*  
*Hexagonia tenuis*  
*Postia stiptica*  
*Trametes coccinea* (= *Pycnoporus coccineus*)  
*Trametes versicolor*

##### Order Russulales

*Xylobolus* (*Stereum*) *illudens*

### Collection/recording: 2.5 hours

(List prepared by Elma and Ray Kearney)

**Note:** Species names and classification are current as reported by *Mycobank*.