

## Introduction to the larger fungi of Matang Wildlife Centre

### Introduction

Matang Wildlife Centre is part of Kubah National Park, Sarawak, Malaysian Borneo.

Larger fungi, mushrooms, are found anywhere in Matang Wildlife Centre. In the secondary and dipterocarp forests along the trails, the lawns and even on some of the wooden fences. Mushrooms are the reproductive structures of a more extended organism, the mycelium, which is made up of thin, white threads that live in the forest floor, decaying wood and leaves (fig. 1). Not all fungi produce mushrooms. This flyer is about the larger fungi, which are visible without using a microscope.



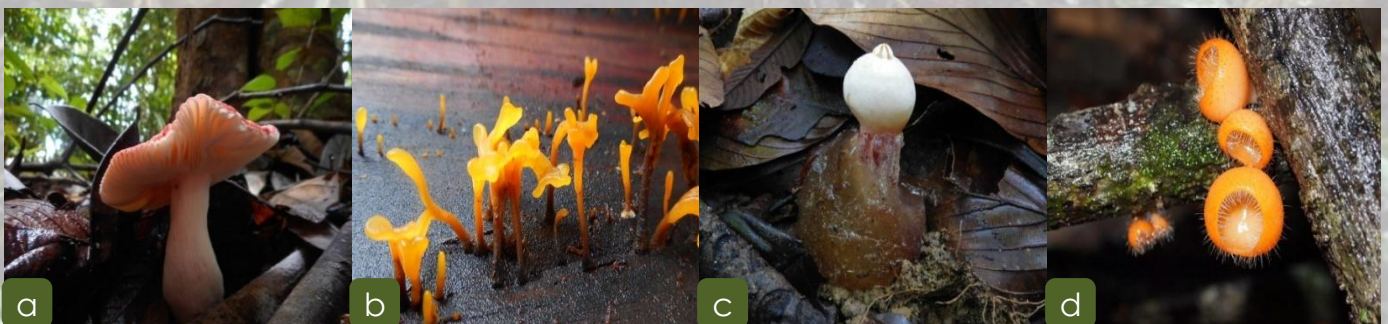
**Fig. 1** Mycelium on a leaf

### What are fungi?

All organisms are made up of cells. To keep the cells alive, they need organic substances, like carbohydrates. Plants produce the sugars in chloroplasts -green particles- inside their cells, using sunlight, water and carbon dioxide. Animals and fungi rely on other organisms to obtain organic substances. Animals eat plants and/or other animals. The mycelium cells of most fungi produce enzymes that digest organic materials and absorb the products of this digestion. That is why biologists group plants, animals and fungi in three separate kingdoms.

### Reproduction

A mycelium develops when a single-celled spore germinates in a moist place with proper nutrients, mostly organic material. Two "opposite" mycelium threads fuse and form a new mycelium. Mushrooms grow only from this mycelium. Mushrooms are the reproductive parts or fruiting bodies of a fungus that produce the tiny spores, from which, after dispersal, new mycelia will grow.

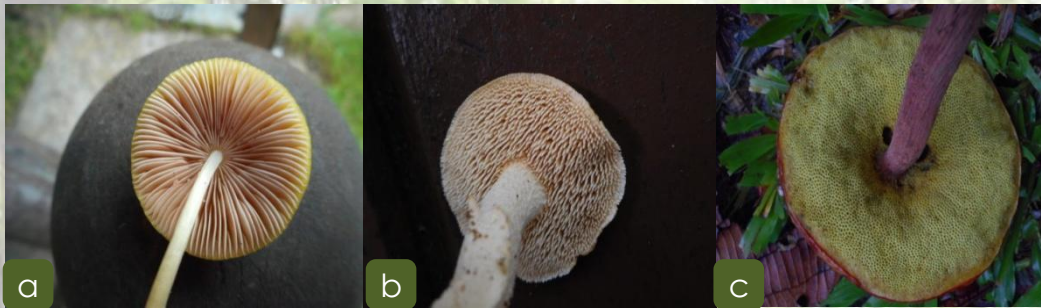


**Fig. 2** **a** *Russula* sp. **b** *Dacryopinax spathularia* - Sweet osmanthus ear **c** *Calostoma* sp. **d** *Cookeina tricholoma*

Mushrooms come in all sizes, colours and shapes (fig. 2). The cap-and-stalk mushrooms are well known. Others resemble small clubs, cups or just appear to be a ball. Spores develop in a special layer of cells. Mushrooms with a cap may have different extensions on the underside of the cap where the spores are produced: gills, spines or pores (fig. 3).



In other mushrooms, this layer with spore-producing cells is just flattened, as it is on the upper outside of *Dacryopinax spathularia* (fig. 2b) and on the inside of cupshaped mushrooms like *Cookeina tricholoma* (fig. 2d). Mushrooms that are ball-shaped grow spores inside the ball: *Calostoma sp.*(fig. 2c). Spores are dispersed by the wind or insects. In cupshaped mushrooms the spores are released during tiny explosions.



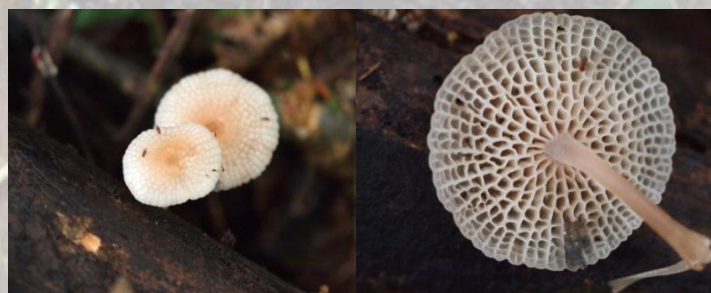
**Fig. 3** a Gills: *Pluteus sp.* - Shield mushroom b Spike: *Hydnum repandum* -Hedgehog fungus c Pores: *Heimioporus sp.* - Bolete

### **The role of fungi in an ecosystem**

Fungi do not have chlorophyll and therefore cannot produce the organic substances they need. There are different ways to obtain these substances. Some fungi break down complex organic molecules. Subsequently, the mycelium absorbs the products of digestion. When the complex molecules originate from a dead organism, the fungi are called saprophytes (*Dacryopinax spathularia*, *Cookeina tricholoma*, *Pluteus sp.*). They are the “cleaners” in an ecosystem as they break down dead animals and plants. Saprophytic mushrooms grow on dead leaves and wood on the forest floor. Parasitic fungi depend on living organisms. Among them are the fungi which cause disease in plants and animals. Some parasitic fungi grow a mycelium in a living insect. After some weeks or months, the insect dies, and tiny mushrooms pop up from the dead insect's body. A third group belongs to fungi, whose mycelium grows in a close connection or symbiosis with forest trees: mycorrhizal fungi (*Russula sp.*, *Hydnum repandum*, *Heimioporus sp.*). The fungus obtains smaller organic molecules like sugars from the root of a tree, and the root gets water and minerals from the mycelium. Many trees in Matang Wildlife Centre flourish because of this symbiotic relationship with the fungi, whose mushrooms grow on the forest floor near the trunk and large roots of the tree.

### **Bioluminescent fungi**

Some of the mushroom species in Matang glow in the dark. This applies to the fruiting body as well as the mycelium. One of them is *Filoboletus manipularis* – *Glow in the dark mushroom*, a fungus that grows on rotting wood (fig. 4).



**Fig. 4** *Filoboletus manipularis* – *Glow in the dark mushroom*

**Warning. Quite a few mushroom species in Matang are very poisonous! Don't pick and eat them!**