



Title: 'Cup fungus'

Description: A cup fungus (*Cookeina colensoi*) found at Pelorus Bridge

Photographer's name: Noelle Bennett

Where and when: Pelorus Bridge, Marlborough. June 2020.

Sustainability: This delicate little cup fungus (*Cookeina colensoi*) is found in Australia, the West Indies and Africa as well as here in New Zealand. The cup can vary from pale cream to pale pink in colour and is usually between 10mm and 15mm wide. It is attached to wood that the bark has peeled away from by a short stalk.

Cup fungi belong to the class Ascomycota. The ascomycetes are the largest subdivision of fungi, comprising over 15,000 known species. Species from yeasts and bread moulds to morel and truffles all share the ascomycetes' distinguishing feature of producing spores inside sac-like cells known as 'asci', each of which generally contain eight spores. Each cup fungus is divided into a spore-producing ('fertile') upper surface and a non-spore producing ('sterile') lower surface. As for all propagules of sexually reproducing plants and animals, the spores are produced by 'meiosis', a type of cell division that results in two daughter cells, each with half the number of chromosomes of the parent cell.

All the *Cookeina* species have the tell-tale cup-shaped fruiting body which is known as the 'apothecium'. It's inner spore-bearing surface varies from pale cream to red, depending on the species. The apothecium fills with water from rainfall condensed moisture in the atmosphere which swells the asci until they eventually burst, releasing their spores into the air. Many cup fungi get more proactive to ensure dispersal of their offspring – they produce 'ballistospores', which are spores that are forcibly shot out of the cup. They can be discharged in such numbers that they form a cloud above the fruiting body, and amazingly, the multitude of tiny explosions causes a hissing sound.

If a spore settles somewhere favourable and germinates, it grows into a network of underground fungal tissue (hyphae) similar to plant roots. When the hyphae of two different individuals meet, they undergo a process where the two cells—but *not* their nuclei —fuse together. These cells with two nuclei then also grow into a network of hyphae, which, in turn, can produce fruiting bodies. Then, inside the developing asci in the fruiting body, the two nuclei finally fuse together and are destined to become spores. This bizarre life cycle is supplemented by asexual reproduction which generates special spores, known as conidia, with genotypes identical to that of the parent mycelium. These then germinate and produce their own mycelium. Phew! How's that for a belt and braces approach to making sure you get your offspring established and into the next generation.

As with many fungi, the cup fungus gets its energy from decomposing organic matter. These 'saprobic fungi' are the only multicellular organisms capable of digesting cellulose and lignin, two of the main components of wood. They are therefore of utmost importance as decomposers and nutrient recyclers in the environment. In fact, when left to their own devices, some species of fungi have been found to reduce the mass of a quantity of leaf litter by 57% in under two years. You can read a lot more about fungi in the descriptions of 7 other photographs of fungi and two of lichens in this gallery.

Photographer's notes: This cup fungus was in a prime position to be overlooked. It was quite deep within the native bush and almost at head height...which wasn't actually where I was looking seeing as I spend most of my time gazing at the ground for fungi. But what a fascinating find it proved to be.

Photo specs: This individual image was focus-stacked using 50 images taken at two unit increments to ensure the whole of the structure was in sharp focus. Technical specs: The image was taken using a Panasonic DC-G9 camera and a Panasonic Leica DG Macro-Elmarit 45mm f/2.8 macro lens. Exposure details - 1/20 sec at f5.6 with an ISO of 800 and a focal length of 45mm (90mm full frame equivalent).

Digital specs: 5976 x 4836 pixels (28.9MP) @ 300dpi

Key words: fungi, fungus, mushroom, cup fungus, *Cookeina colensoi*, saprobe, mycorrhizal, hyphae, spores, dispersal. Pelorus Bridge, Noelle Bennett, Ecosystems Photography, sustainability.

Price: \$150 (incl. GST) for use of the digital image. Visit www.ecosystemsp photography/sales for details & to order, or to get a quote if you would like a high-quality print.

Donation: The price includes a \$100 donation to a sustainability organisation or project of your choice, or otherwise for the Fifeshire Foundation in Nelson <https://www.fifeshirefoundation.co.nz/>.

I recommend that the donation goes to the Fifeshire Foundation because they promote social sustainability and resilience. Amongst many ways they help, they have fund young people, for example with school fees or one-off expenses like getting a drivers' license. That support fits the photo of the young swallows being buffeted by wind, but more generally, sustainability is nurtured when communities are healthy and people support each other – the Fifeshire Foundation do just that.

Image ref: NB#020 (please use this reference in all orders and correspondence).

Noelle Bennett

22 December 2021