

The Fungal World of the Beech Forest

by Peter Buchanan and Peter Johnston

NEXT TIME you walk through a beech forest, take a closer look around you. You will find a lot more there than just trees and birds. Among the plant world, you will also see the ferns, mosses, and liverworts; among the animal world, the insects. But there is yet another world separated from both the plants and the animals – the world of the fungi. In fact, so different are the fungi from all other organisms, they are considered to belong in a kingdom of their own.

Mushrooms are one group of fungi, but there are many other different kinds. Fungi occur in vast numbers and live in all parts of the forest, from high in the beech tree to below the forest floor. An individual fungus grows as a cottonwool-like network of fine filaments called hyphae. The hyphae absorb the food essential for the fungus to grow. A single hypha is so narrow that it is usually invisible to the naked eye. But hyphae can be clearly seen when they mass together to form the reproductive or spore-producing structure, called a fruit-body.

Common types of fruit-bodies include mushrooms, brackets, and puffballs. The fruit-body has the same function for a fungus (singular form of 'fungi') that a flower has for a green plant. Fruit-bodies enable fungi to produce spores, which are equivalent to the seeds produced in flowers of green plants. Just like seeds, the spores of a fungus can be distributed over wide areas and, when conditions are favourable, can germinate and grow into a new fungus. When the flower of a plant

is picked, the plant continues to grow. So too with a fungus; after the fruit-body has been picked, the hidden hyphae of the fungus keep on growing. Fruit-bodies of different fungi vary enormously in shape, and range in size from less than a pin-head to about half a metre across.

Many fungi found in a beech forest are not found in other types of forest. Many of the species found in New Zealand beech forests are unique to this country. Different species of fungi have different roles in the forest ecosystem. Some are parasites feeding on a living beech tree, others (the saprophytes) are like scavengers and grow on fallen wood, dead leaves, or insect honeydew. Still others grow in the soil along with the living roots of trees, but without causing any harm to the tree. The world of the fungi, although rarely noticed, is one of amazing diversity.

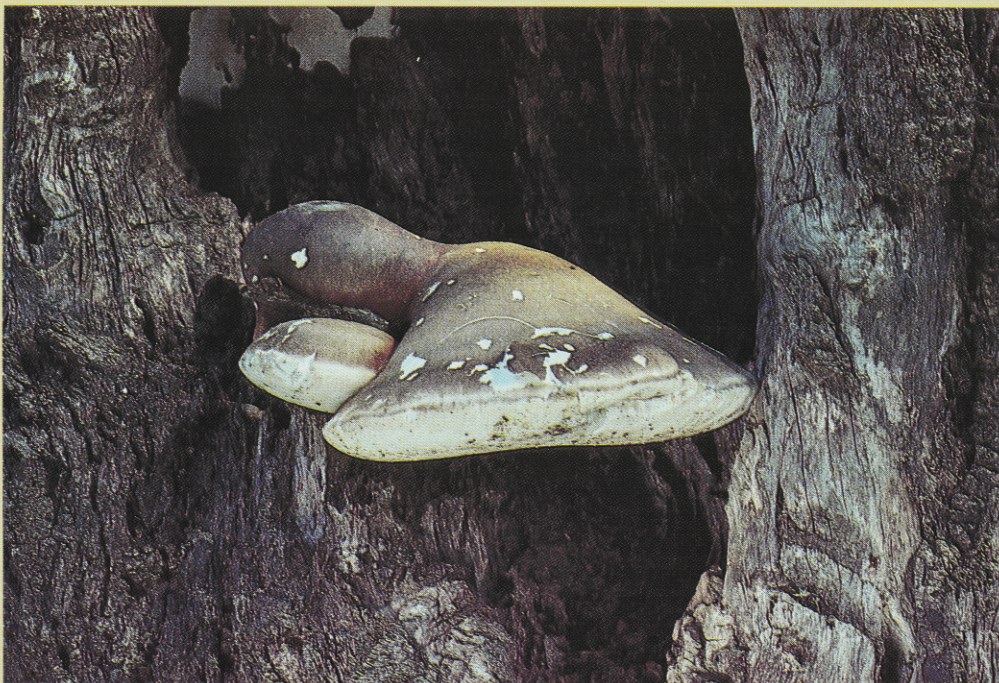
Fungi Growing on Living Trees

Beech trees often look as if their trunks are covered with a lumpy, black carpet. This carpet is made up of millions of dark-coloured hyphae of many different types of fungi called 'sooty moulds'. Sooty moulds appear to be feeding on the bark of the tree, but are in fact growing on honeydew produced by scale insects that are themselves sucking sap from the beech tree. The sweet honeydew is also food for nectar-feeding birds, lizards, wasps and other insects (see *Forest & Bird* November 1987). Sooty moulds are one group of fungi that do not produce their spores within

a visible fruit-body. Instead, their spores form amongst the carpet of hyphae, and are spread in the wind currents and by honeydew feeders.

The 'polypore' fungus, *Piptoporus*, produces a large fruit-body. This fungus causes a wood-rotting disease of beech trees, and has a fruit-body similar in shape to a horse's hoof, but measuring up to half a metre across. The fruit-body has a texture like cork, with a water resistant skin on the upper side, and an underside covered with very tiny pores. About 15 pores would stretch across the head of a pin. The pores are the openings from the vertical tubes in which spores are produced. The spores form on cells lining these tubes and fall out to be carried away in the wind. Because this fungus produces its fruit-body high up in a beech tree, it is rarely seen in fresh condition. It may be better known to trampers and bush walkers in its fallen state; a sodden, amorphous, white mass on the forest floor, reminiscent perhaps of the carcass of some odd albino animal.

Cancer-like swellings on trunks and branches of beech trees are caused by an unusual fungus called beech strawberry, beech orange, or more formally, *Cytaria*. A tree infected by this parasite fungus shows a reaction similar to that of cancer in humans. Cells in affected parts of the tree grow and divide more rapidly than usual, and form hard, woody galls. In spring the fungus forms its pear-shaped or round strawberry-like fruit-bodies on these galls. Spores develop in pits



Reminiscent of a horse's hoof, the polypore fungus, *Piptoporus portentosus*, occurs high up on beech trees. Photo: J. Bedford

Opposite: The mushroom *Armillaria* sp. is common on wood in the beech forest, but it is also an important parasite of pine seedlings and kiwifruit vines. Photo: J. Bedford.