Opposite: *The hydnoid fungus has a series of teeth on its underside, rather than gills.*
Photo: J. Bedford.

a foot, and although the hyphae penetrate between the outer cells of the root, the root is not damaged. In this association between tree and fungus both partners derive benefits; the fungus takes organic compounds such as carbohydrates from the tree, while the tree uses the fungus as an extension of its own root system, to absorb minerals from a larger mass of soil. Mycorrhizas form only between certain tree/fungus combinations, and beech trees, along with tea tree, are the most prolific mycorrhizal forming trees in New Zealand. Many species of mushrooms are involved as mycorrhizas including species of *Amanita*, *Russula*, *Cortinarius*, and *Paxillus*. These mushrooms are often brightly coloured, such as the green *Russula*, violet and red *Cortinarius* species, and the orange-brown *Paxillus*.

Another closely related group of mycorrhiza-forming fungi are the boletes. With their stalked, mushroom-shaped fruit-bodies and pores instead of gills on the underside of the cap, they look like they might be a cross between a mushroom and a polypore. Among the boletes are some good edible species, including in France the famous 'cepe'.

Yet another group, the hydnoid fungi, has mushroom-like fruit-bodies but the underside is covered not with gills or pores but with pointed teeth. And then there is the elegant violet pouch fungus, *Thaxterogaster*, that looks a bit like a puffball, but is in fact a mushroom that has lost its way, forgetting how to open up its gills. Other fungi related to *Thaxterogaster* grow only below the ground, but such 'hypogeous' species are unlikely to be encountered except by kiwis and the most persistent fungal enthusiasts. In parts of Europe, it is the hypogeous 'truffle' that is so sought after, but so hard to find unless you own a pig trained to sniff out the delicacy. If the fruit-body is below the ground, how are the spores released to allow the fungus to spread? It would seem that in New Zealand where native fungus-eating mammals are absent, slugs, insects, and birds such as the kiwi and weka may eat and hence spread the fungus.

The tremendous variety of shape, colour, texture, and structure of fungi mentioned by no means exhausts the range. Within the beech forest live hundreds of other types of fungi, such as those growing on dead insects, on dung, and even in water. The fungi are a integral component of the beech forest. In number and diversity they far exceed the meagre range of green plants, and without them the forest could not survive.

Nothofagus (beech) forests are restricted to certain parts of the southern hemisphere, and their origins can be traced back to similar forests of 100-150 million years ago that grew on the giant land mass of Gondwanaland. The present distribution of both *Nothofagus* and of beech fungi provide evidence for the breakup of Gondwanaland and for continental drift. Many species of fungi in New Zealand beech forests have close relatives on beech in Tasmania and in South America.

For further information on fungi of New Zealand, consult the excellent illustrated guide: Mushrooms and Toadstools, *by Marie Taylor (1981), Mobil New Zealand Nature Series, A.H. & A.W. Reed.*

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'Artist's conk', Ganoderma applanatum.
Photo: P. Buchanan.

Above: *The violet pouch fungus* Thaxterogaster porphyreum.