Unusual Mushrooms in the Morrell Nature Sanctuary: Bleeding Tooth Fungus (*Hydnellum peckii*)

Bleeding Tooth Fungus, *Hydnellum peckii* (Photo by Bob Harvey)

As Andy MacKinnon and Kem Luther comment in their guide to Mushrooms of British Columbia, "coming across a fresh specimen of this mycorrhizal species with its spectacular drops of burgundy "blood" can be a defining experience for the new mycologist." *Hydnellum peckii* is a fungus in the genus Hydnellum of the family Bankeraceae. The unusual appearance of the young fruit bodies has earned the species several descriptive common names, including strawberries and cream, the bleeding Hydnellum, the bleeding tooth fungus, the red-juice tooth, and the Devil's tooth. The fruit bodies typically have a funnel-shaped cap with a white edge, although the shape can vary greatly. Young, moist fruit bodies can "bleed" bright red guttation droplets. Although the fruit bodies are readily identifiable when young, they become brown and nondescript with age. It is a hydnoid species, producing spores on the surface of vertical spines or tooth-like projections that hang from the undersurface of the fruit bodies. The species is found in North America, Europe, and was recently discovered in Iran (2008) and Korea (2010). It is mycorrhizal, forming mutually beneficial relationships with a variety of coniferous trees, growing on the ground singly, scattered, or in fused masses. They are considered inedible, but the guttation droplets contain atromentin, a pigment with anticoagulant properties similar to heparin.

Description

As in all mushroom-producing fungi, the fruit bodies (sporocarps) are the reproductive structures that are produced from fungal mycelium when the appropriate environmental conditions of temperature, humidity and nutrient availability are met. *Hydnellum peckii* is a stipitate hydnoid fungus, meaning that it has a cap atop a stipe (stem), and a form characterized by a teeth-like hymenium, rather than gills or pores on the underside of the cap. Fruit bodies growing closely together often appear to fuse together (this is called "confluence"). They can reach a height of up to 10.5 cm. Fresh fruit bodies exude a striking, thick red fluid when they are moist, present even in young specimens, which are lumplike in appearance. The "teeth" covering the cap's underside are specialized structures that produce spores. The cap's surface is convex to flattened, more or less uneven and sometimes slightly depressed in the center. It is usually densely covered with "hairs" that give it a texture similar to felt or velvet; these hairs are sloughed off in age, leaving the caps of mature specimens smooth. Its shape varies from somewhat round to irregular as a result of confluence. The cap is initially whitish, but later turns slightly brownish, with irregular dark-brown to nearly black blotches where it is bruised. In maturity, the surface is fibrous and tough, scaly and jagged, grayish brown in the upper part of the cap, and somewhat woody. The flesh is a pale pinkish brown. The spore print is brown.

Old Bleeding Tooth Fungus (Photo by Bob Harvey)

Habitat and distribution

The fungus has a wide distribution in North America, and is particularly common in the Pacific Northwest; its range extends north to Alaska and east to North Carolina. In the Puget Sound area of the U.S. state of Washington, it is found in association with Douglas-fir, fir, and hemlock. Along the Oregon Coast it has been collected under lodgepole pine. In addition to North America, the mushroom is widespread in Europe. The fruit bodies of *Hydnellum peckii* are found growing solitary, scattered, or clustered together on the ground under conifers, often among mosses and pine needle litter. *H. peckii* is a "late-stage" fungus that, in boreal forests dominated by jack pine, typically begins associating with more mature hosts once the canopy has closed.

Ecology

Hydnellum peckii is a mycorrhizal fungus, and as such establishes a mutualistic relationship with the roots of certain trees (referred to as "hosts"), in which the fungus exchanges minerals and amino acids extracted from the soil for fixed carbon from the host. The subterranean hyphae of the fungus grow a sheath of tissue around the rootlets of a broad range of tree species, in an intimate association that is especially beneficial to the host (termed ectomycorrhizal), as the fungus produces enzymes that mineralize organic compounds and facilitate the transfer of nutrients to the tree.

It forms ectomycorrhizal associations primarily with conifer species, exchanging soil nutrients for photosynthetically derived carbon from its host trees. Field studies suggest that it prefers acidic, moss-covered soils and can act as a bioindicator of undisturbed old-growth forest ecosystems. The ectomycorrhizal structures of H. peckii are among a few in the Bankeraceae that have been studied in detail. They are characterized by a layer of tissue made of hyphae tightly arranged in a parallel orientation, or palisade, and which rarely branch or overlap each other. These hyphae, along with adhering mineral soil particles, are embedded in a gelatinous matrix. The hyphae of the ectomycorrhizae can become chlamydospores, an adaptation that helps the fungus tolerate unfavorable conditions. Chlamydospores of *H. peckii* have a peculiar structure—markedly distinct from those of other Bankeraceae, with thick, smooth inner walls and an outer wall that is split radially into warts. The most striking characteristic of the ectomycorrhizae as a whole is the way the black outer layers of older sections are shed, giving a "carbonized" appearance.

Fruit bodies of *H. peckii* have been described as resembling "Danish pastry topped with strawberry jam". Hydnellum species are not known to be poisonous, but they are not particularly edible due to their foul taste. This acrid taste persists even in dried specimens.