= Mycena purpureofusca =

Mycena purpureofusca , commonly known as the purple edge bonnet , is a species of agaric fungus in the family Mycenaceae . First described by Charles Horton Peck in 1885 , the species is found in Europe and North America , where it grows on the decaying wood and debris of conifers , including cones . Fruit bodies have conical to bell @-@ shaped purple caps up to 2 @.@ 5 cm (1 in) set atop slender stipes up to 10 cm (4 in) long . The mushroom is named for the characteristic dark greyish @-@ purple color of its gill edges . In the field , M. purpureofusca mushrooms can usually be distinguished from similar species by characteristics such as the dark purple gill edges , the deep purple cap center , and its cartilagineous consistency . The fungus contains a laccase enzyme that has been investigated scientifically for its potential to detoxify recalcitrant industrial dyes used in textile dyeing and printing processes .

= = Taxonomy = =

The species was first described as Agaricus purpureofuscus by American mycologist Charles Horton Peck in 1885 . The type collection was made in Caroga , New York , from a moss @-@ covered trunk of spruce . Pier Andrea Saccardo transferred it to Mycena in 1887 , giving it the name by which it is currently known . William Alphonso Murrill moved it to Prunulus in 1916 , but this genus has since been subsumed in Mycena . In 1879 , Petter Karsten described a collection made in Scandinavia as Mycena atromarginata var. fuscopurpurea , but Rudolph Arnold Maas Geesteranus later placed this in synonymy with M. purpureofusca . Another synonym , according to Maas Geesteranus , is Mycena sulcata , described by Josef Velenovský in 1920 from Czechoslovakia .

Alexander H. Smith classified the species in section Calodontes , subsection Ciliatae of Mycena in his 1947 monograph on North American Mycena . Rolf Singer put it in the section Rubromarginata in his 1986 The Agaricales in Modern Taxonomy , a group characterized by having distinct red marginate gills . The specific epithet purpureofuscus combines the Latin words purpur (purple) and fusco (dark or dusky) . It is commonly known as the " purple edge bonnet " .

= = Description = =

The cap is conical to bell @-@ shaped , flattening in age , and reaches a diameter of 0 @.@ 5 ? 2 @.@ 5 cm (0 @.@ 2 ? 1 @.@ 0 in) . The cap margin is usually bent inwards initially . The cap surface is initially covered with tiny white hairs , but later becomes smooth . It is slightly hygrophanous , and when moist , is slightly translucent , so that the outline of the gills underneath are apparent . Its color is dark purple in the center , fading to pale lilac at the margins ; older specimens are purplish @-@ gray . The flesh is thin and pliant , with a texture similar to cartilage . It is initially purplish @-@ gray , becoming pale lilac to white in age . The odor and taste of the flesh are not distinctive . The narrow gills have an ascending attachment to the stipe and are narrowly adnate . They are somewhat closely spaced , with pallid to grayish face color and dark grayish purple edges that are sometimes fringed . The tubular stipe measures 3 ? 10 cm (1 @.@ 2 ? 3 @.@ 9 in) long by 1 ? 2 mm thick . It is tough and cartilaginous , and its base it covered with white hairs . Overall , its color is that of the cap or paler , and often paler near the top . The edibility of the mushroom is unknown .

Spores are broadly ellipsoid in shape , amyloid , and have dimensions of either 8 ? 10 by 6 ? 7 µm or 10 ? 14 by 6 @.@ 7 ? 8 @.@ 5 µm depending on whether they originated from four @-@ or two @-@ spored basidia (spore @-@ bearing cells) , respectively . There are abundant cheilocystidia on the gill edges . They measure 30 ? 50 by 7 ? 12 µm , and are fusoid @-@ ventricose , with tips that are broadly rounded . They are filled with a purplish sap and have granular contents . The cap tissue comprises a well @-@ differentiated cuticle , a distinct hypoderm , and a filamentous tramal body . Clamp connections in the hyphae are rare or absent .

= = = Similar species = = =

Field characteristics that help to distinguish Mycena purpureofusca from similar species include the dark purple gill edges , the deep purple cap center , and its cartilagineous consistency . M. californiensis (formerly M. elegantula) is similar , but has gill edges colored rosy to vinaceous @-@ brown , and its cap is browner than that of M. purpureofusca . It has an orange to orange @-@ brown cap , a stipe the exudes red juice when injured , and grows in lead litter under oaks . Mitchel and Smith noted that there was considerable intergradation between the two species . The bioluminescent fungus M. lux @-@ coeli is another allied species , but it has smaller spores (8 @.@ 5 ? 12 by 6 @.@ 5 ? 9 µm) and its cystidia are more lobed . Another similar " bleeding " Mycena is M. haematopus , which usually grows in clusters on rotting wood . In his original protologue , Peck mentioned that he considered the species closely related to M. rubromarginata , but could be distinguished by its darker color and " non @-@ hygrophanous striate pileus . " Microscopically , M. rubromarginata differs from M. purpureofusca in having abundant clamp connections and narrow necks on the cheilocystidia .

= = Habitat and distribution = =

The fruit bodies of Mycena purpureofusca grow singly or in clusters on the decaying wood of conifers , particularly spruce , pine , and Douglas @-@ fir . It is commonly found on decaying pine cones . In a European study , the fungus was found growing on logs in a state of decay where the wood was mostly hard , with most of the bark left , to wood that had decayed to the point that it was mostly soft throughout .

In North America , the fungus has been recorded in North Carolina , Tennessee , New York , Michigan , Montana , Idaho , Washington , Oregon , California , Virginia , and South Dakota . In Canada , it has been found in Ontario . Smith noted that collections from Michigan are likely to be found on old hemlock knots lying in the soil , where it usually fruits singly ; it tends to grow in clusters on logs and stumps . In Europe , it has been recorded from Britain , Scotland , the Czech Republic , Poland , Germany , and Turkey . In the UK , the fungus is commonly found in Caledonian pine woods , and it is considered an indicator species for that habitat type .

= = Research = =

Mycena purpureofusca has been investigated for its potential to decolorize industrial dyes . These dyes , used in textile dyeing and printing processes , are difficult to degrade due to their highly structured organic compounds and pose a major environmental threat . The fungus mycelium produces high levels of laccase , an oxidoreductase enzyme . Laccases are widely used in biotechnology and industry due to their ability to break down various recalcitrant compounds . M. purpureofusca laccase efficiently breaks down Remazol Brilliant Blue R , an industrially important dye that is frequently used as a starting material in the production of polymeric dyes . A Chinese group purified the enzyme and described its biochemical characteristics in a 2013 publication .

Strobilurin A has been isolated from the fruit bodies . Strobilurins have fungicidal activities and well known for their broad fungicidal spectrum , low toxicity against mammalian cells , and environmentally benign characteristics .