= Chroogomphus vinicolor =

Chroogomphus vinicolor , commonly known as the wine @-@ cap Chroogomphus or the pine spike , is a species of mushroom in the family Gomphidiaceae . Found in North America and the Dominican Republic , mushrooms grow on the ground under pine trees . Fruit bodies have reddish @-@ brown , shiny caps up to 7 @.@ 5 cm (3 @.@ 0 in) wide atop tapered stems up to 7 @.@ 5 cm (3 @.@ 0 in) long . The gills are thick , initially pale orange before turning blackish , and extend a short way down the length of the stem . Although the mushroom is edible , and sold in local markets in Mexico , it is not highly rated . Distinguishing this species from some other similar Chroogomphus species is difficult , as their morphology is similar , and cap coloration is too variable to be a reliable characteristic . C. vinicolor is differentiated from the European C. rutilus and the North American C. ochraceus by the thickness of its cystidial walls .

= = Taxonomy = =

The species was first described as Gomphidius vinicolor in 1898 by American mycologist Charles Horton Peck , based on specimens collected near Lake Mohonk in Ulster County , New York . Peck noted a resemblance to Gomphidius roseus , which he thought was closely related . It was transferred to the newly created genus Chroogomphus by Orson K. Miller , Jr. in 1964 .

Molecular analysis of internal transcribed spacer DNA sequences shows that C. vinicolor groups in a clade with the closely related C. jamaicensis and C. pseudovinicolor . All of these species feature darkly @-@ amyloid flesh and thick @-@ walled cystidia . Based on this analysis , Miller considered C. jamaicensis to be insufficiently distinct genetically from C. vinicolor to warrant designation as a separate species ; however , as of 2012 , both MycoBank and Index Fungorum list it as a valid species .

The specific epithet vinicolor means " wine @-@ colored " . It is commonly known as the " wine @-@ cap Chroogomphus " or the " pine spike " .

= = Description = =

The fruit body of C. vinicolor has caps that are initially conical to convex before later flattening out , sometimes developing a small umbo , or a central depression ; the caps measure 2 ? 10 cm (0 @.@ 8 ? 3 @.@ 9 in) wide . Its color is highly variable , ranging from wine @-@ red to reddish @-@ brown to orange @-@ brown or yellow @-@ brown . Wine @-@ red stains develop where the surface has dried or become rotten . The smooth cap surface is shiny , somewhat sticky when wet , and often radially streaked . The flesh is thick and orangish to ochraceous in color ; its taste and odor have been variously described as " not distinctive " or " pleasant " . The thick gills are decurrent (attached to and extending a short ways down the stem) , well spaced , ochraceous buff to pale orange when young , but turning to blackish after the spores mature . In his original description , Peck noted that the gills , when viewed with a hand lens , " appear velvety due to the abundant spores " . The fruit bodies are initially covered with a thin , web @-@ like partial veil that soon disappears as the cap expands . The cylindrical stem measures 2 @.@ 5 ? 15 cm (1 @.@ 0 ? 5 @.@ 9 in) long by 0 @.@ 2 ? 2 cm (0 @.@ 1 ? 0 @.@ 8 in) thick , and taper towards the base . It is ochraceous to wine red or reddish @-@ brown with a dry , smooth to fibrillose surface . The partial veil sometimes leaves an indistinct , thin fibrous ring on the upper stem .

The spore print is greyish @-@ black . Spores are narrowly elliptical to spindle @-@ shaped , smooth , and measure 17 ? 23 by 4 @.@ 5 ? 7 @.@ 5 ?m . The cystidia are somewhat spindle @-@ shaped or narrowly club @-@ shaped , and measure 112 ? 164 by 13 ? 20 µm . They have characteristically thick walls , up to 7 @.@ 5 µm wide in the middle portion .

Although the mushroom is edible , and is often free of insect damage , it is not highly recommended , " except as " fillers " to include with the more flavorful species " . The flavor may improve with drying . C. vinicolor mushrooms are sold in local markets at Tetela del Volcan in the state of Morelos , Mexico . There is a report of this species causing a contact sensitivity , in which an individual who

had handled the mushroom developed a burning sensation in the eyes and an itchy rash on the eyelid after rubbing the eyes .

= = = Similar species = = =

Two other Chroogomphus species with a morphology and coloration similar to C. vinicolor include C. rutilus and C. ochraceous . C. vinicolor is most reliably distinguished from these on the basis of having thick @-@ walled cystidia (up to 5 ? 7 @.@ 5 ?m at the widest part) . The other two species have been separated on the basis of color , with C. ochraceous having brighter colors (yellowish @-@ orange to ochraceous) than C. rutilus . Molecular analyses of European and North American collections suggest that C. rutilus is restricted to Europe , C. ochraceous only occurs in North America , and that cap coloration cannot be reliably used for species determination .

Another nearly identical species is C. jamaicensis , found in the Dominican Republic , Jamaica , and the Greater Antilles . It is distinguished microscopically by its slightly smaller spores measuring 17 ? 20 by 4 @.@ 5 ? 6 ?m , cystidia with more uniformly thickened walls up to 5 ?m thick , and cuticular hyphae that measure 2 ? 5 ?m wide . The fruit bodies of C. pseudovinicolor are more robust , with wooly or scaly reddish stems up to 5 cm (2 @.@ 0 in) thick . Further , this species tends to produce spore prints that are greener than those of C. vinicolor .

= = Habitat and distribution = =

The mycorrhizal fungus sometimes fruits singly , but more often in scattered or groups on the ground under pines and other conifers . Fruiting usually occurs in the cooler weather of later summer and autumn . In coastal California , however , fruiting occurs in winter . It is often found near Suillus luteus and Suillus brevipes , and is known to parasitize the mycelium of both those and the truffle @-@ like Rhizopogon species . Chroogomphus vinicolor has a widespread range in North America , extending south to Mexico . It has also been recorded from the Dominican Republic .