

= *Tylopilus alboater* =

*Tylopilus alboater* , commonly known as the black velvet bolete , is a bolete fungus in the Boletaceae family . The species is found in North America east of the Rocky Mountains , and in eastern Asia , including China , Japan , Taiwan , and Thailand . A mycorrhizal species , it grows solitarily , scattered , or in groups on the ground usually under deciduous trees , particularly oak , although it has been recorded from deciduous , coniferous , and mixed forests .

The fruit bodies have a black to grayish @-@ brown cap that measures up to 15 cm ( 5 @. @ 9 in ) in diameter . The caps of young specimens have a velvety texture and are covered with a whitish to gray powdery coating ; this texture and coating is gradually lost as the mushroom matures , and the cap often develops cracks . The pores on the underside of the cap are small and pinkish . The stem is bluish @-@ purple to black , and measures up to 10 cm ( 3 @. @ 9 in ) long by 4 cm ( 1 @. @ 6 in ) thick . Both the pore surface and the whitish cap flesh will stain pink to reddish @-@ gray , and eventually turn black after being cut or injured . The mushroom is edible , and generally considered one of the best edible *Tylopilus* species .

= = Taxonomy and naming = =

The species was first described in 1822 as *Boletus alboater* by Lewis David de Schweinitz from specimens he collected in North Carolina . Elias Magnus Fries sanctioned this name in his 1821 *Systema Mycologicum* . The species was one of several *Boletus* species that Otto Kuntze transferred to *Suillus* in his 1898 *Revisio Generum Plantarum* . American mycologist William Alphonso Murrill transferred it to the genus *Tylopilus* in 1909 . In 1931 , French mycologist Jean @-@ Edouard Gilbert transferred the species to his newly created genus *Porphyrellus* , but this name has since been subsumed into *Tylopilus* .

In 1875 , Charles Horton Peck described *Boletus nigrellus* from specimens he collected in Sand Lake , New York . Murrill reduced this name to synonymy with *T. alboater* in 1916 , and noted that Peck 's description was made from young material obtained " before the white tubes had been colored by mature spores " . Several later authorities have treated Peck 's species as a synonym of *Tylopilus alboater* ; this synonymy , however , is not indicated by either of the taxonomic authorities *Index Fungorum* or *Mycobank* .

The specific epithet *alboater* means " white and black " . It is commonly known as the " black velvet bolete " ; Murrill called it the " blackish bolete " .

= = Description = =

The shape of the cap is initially convex before later becoming broadly convex to eventually flattened in maturity ; the diameter of the cap is typically between 3 and 15 cm ( 1 @. @ 2 and 5 @. @ 9 in ) . The cap surface is dry , with a velvet @-@ like texture , although in age it can become rimose ( developing a network of cracks and small crevices ) . The cap color is initially black to dark grayish @-@ brown ; young specimens can have a whitish bloom ( resembling a dusting of fine powder ) on the surface . Fruit bodies , especially young specimens , tend to be free of maggots and other insect larvae . As the mushroom matures , the bloom disappears and the color fades to become grayish to grayish @-@ brown . The cap flesh is whitish , but after it is cut or injured , it will stain pink to reddish @-@ gray , and eventually turn black .

Spores are produced in basidia that are arranged in a vertically arranged layer of minute tubes on the underside of the cap that create a surface of pores . This surface is whitish when young before turning dull pink or flesh @-@ colored in maturity . When bruised , the pore surface initially stains reddish and slowly turns black . The shape of the pores is angular to irregular , and they are small , with roughly two pores per millimeter . The tubes are 5 ? 10 mm ( 0 @. @ 2 ? 0 @. @ 4 in ) deep , and usually sunken around the area of attachment to the stem . The stem is 4 ? 10 cm ( 1 @. @ 6 ? 3 @. @ 9 in ) long by 2 ? 4 cm ( 0 @. @ 8 ? 1 @. @ 6 in ) thick , and is equal in width throughout its length , slightly thicker towards the base , or somewhat thicker in the middle . It is the same color as

the cap , or paler . The surface texture of the stem is usually smooth , although some specimens may be slightly reticulated near the top . The spore print can range from pinkish to a deep flesh color .

The spores are oval to ellipsoid in shape , smooth , hyaline ( translucent ) , and measure  $7 \text{--}11$  by  $3 \text{--}5 \text{ }\mu\text{m}$  . The basidia are club shaped , four spored , and measure  $15 \text{--}24$  by  $6 \text{--}7 \text{ }\mu\text{m}$  . Pleurocystidia ( cystidia found on the tube faces ) are irregularly club shaped , with dimensions of  $20 \text{--}36$  by  $7 \text{--}10 \text{ }\mu\text{m}$  , while cheilocystidia ( found on the tube edge ) are club shaped , rare , occur singly , and measure  $18 \text{--}32$  by  $7 \text{--}9 \text{ }\mu\text{m}$  . Although rare , there are also caulocystidia ( occurring on the stem ) that are arranged in groups , and which measure individually  $24 \text{--}30$  by  $6 \text{--}9 \text{ }\mu\text{m}$  . Clamp connections are absent from the hyphae of *T. alboater* .

*Tylopilus alboater* is an edible mushroom with a pleasant odor and a mild taste . It is considered one of the best of the edible *Tylopilus* ? a genus that is usually associated with bitter tasting , unpalatable species . Frying slices of the mushroom brings out a " delicate , earthy , nutty flavor " ; longer frying times make the cap " pleasantly crisp " . The mushrooms can be used in mushroom drying .

== Similar species ==

Some *Tylopilus* species have a superficial resemblance to *T. alboater* and might be confused with it , including *T. atronicotianus* , *T. atratus* , and *T. griseocarneus* . *T. atratus* produces smaller fruit bodies with caps up to 9 cm ( 3 in ) in diameter , and its whitish flesh directly stains black without any intermediate reddish phase when injured . It is known from only from western New York state . The " false black velvet bolete " , *T. atronicotianus* , has a brownish cap that lacks the velvety texture of *T. alboater* , and has stems that are minutely velvety and almost black near the base . *T. griseocarneus* , found in the Atlantic and Gulf Coastal Plains of North America , is readily distinguished from *T. alboater* by the strong orange to red discoloration that results when cutting or damaging the flesh of a fresh specimen . Furthermore , *T. griseocarneus* lacks the whitish bloom present on young caps of *T. alboater* , and typically has a more prominently reticulated stem . Specimens of *T. alboater* that are paler than usual can be confused with *T. ferrugineus* , but the latter has yellow cystidia when mounted in KOH , while the cystidia of the former are brownish yellow under similar conditions .

== Distribution and habitat ==

*Tylopilus alboater* is a mycorrhizal species , and its fruit bodies grow on the ground solitarily , scattered , or in groups under deciduous trees , particularly oak . Fruiting occurs in deciduous , coniferous , and mixed forests . Its dark color makes it difficult to notice in the field .

In North America , the mushroom is widely distributed east of the Rocky Mountains . The distribution ranges from Quebec in Canada , south to the New England states down to Florida , extending west to Missouri , Michigan , and Texas . It is also found in Mexico . In Asia , it has been recorded from China ( Anhui , Fujian , Guangdong , Guangxi , and Sichuan ) , Japan , Taiwan , and Thailand .