= Boletellus ananas =

Boletellus ananas , commonly known as the pineapple bolete , is a mushroom in the family Boletaceae , and the type species of the genus Boletellus . It is distributed in southeastern North America , northeastern South America , Asia , and New Zealand , where it grows scattered or in groups on the ground , often at the base of oak and pine trees . The fruit body is characterized by the reddish @-@ pink (or pinkish @-@ tan to yellowish if an older specimen) scales on the cap that are often found hanging from the edge . The pore surface on the underside of the cap is made of irregular or angular pores up to 2 mm wide that bruise a blue color . It is yellow when young but ages to a deep olive @-@ brown color . Microscopically , B. ananas is distinguished by large spores with cross striae on the ridges and spirally encrusted hyphae in the marginal appendiculae and flesh of the stem . Previously known as Boletus ananas and Boletus coccinea (among other synonyms) , the species was given its current name by William Alphonso Murrill in 1909 . Two varieties of Boletellus ananas have been described . Although the mushroom may be considered edible , it is not recommended for consumption .

= = Taxonomy = =

The species was first named by Moses Ashley Curtis as Boletus ananas in 1848 , based on specimens he found near the Santee River , in South Carolina . In 1909 , William Murrill described the new genus Boletellus and made Boletellus ananas the type species . According to Murrill , the taxon Boletus isabellinus , described by Charles Horton Peck in 1897 from specimens collected in Ocean Springs , Mississippi , is a synonym of B. ananas ; Peck described this species from undeveloped specimens . Wally Snell later doubted Murrill 's conclusion in a 1933 publication ; he considered the differences in the spore structure too great to consider the species conspecific with B. ananas , although he admitted it was impossible to come to any definitive conclusions until mature fruit bodies and spore prints were available for study . Rolf Singer and colleagues (1992) suggested the name Boletellus coccineus for Boletellus ananas . Singer created this name , however , in the mistaken belief that the earliest available name for the taxon was Boletus coccineus , proposed by Elias Magnus Fries in 1838 . However , Fries ? s name is an illegitimate later homonym (compare with Boletus coccineus , named by Bulliard in 1791) , and Singer ? s combination is actually based on Strobilomyces coccineus , named by Pier Andrea Saccardo in 1888 . The earliest available name for the species is therefore Boletus ananas M.A. Curtis 1848 , the basionym of Boletellus ananas .

Boletellus ananas , as the type species of the genus Boletellus , is in section Boletellus that Singer based on the scaly , dry cap with red @-@ pink tones , a marginal veil that clasps the stem when immature , and longitudinally ridged spores that are greater than 16 ?m long . The genus name Boletellus means " small boletus " , while the specific epithet ananas alludes to the name for pineapple , referring to the pineapple @-@ like pattern of scales on the cap surface . The mushroom is commonly known as the " pineapple bolete " .

= = Description = =

The cap of B. ananas is 33 ? 74 mm (1 @.@ 3 ? 2 @.@ 9 in) wide and plano @-@ convex (flat on one side and rounded on the other) . It is covered with squamules (small scales) that can be either pressed against the cap or curved back on itself . The squamules range in color from reddish @-@ brown to red @-@ tan , to pink to pinkish @-@ gray , and they are more concentrated and more scaly in the center of the cap , extending out of cream to light orange @-@ pink to light pink @-@ red floccose ground . The margin clasps the stem when young ; at maturity it separates into triangular veil remnants (appendiculae) that measure 6 ? 12 by 3 ? 10 mm . The color of these appendiculae range from buff @-@ white to faint pink . The flesh is 2 ? 3 mm thick at the edge of the cap , 7 ? 10 mm over the tubes , and 11 ? 18 mm centrally . It is buff white to light yellow , and quickly turns bluish upon exposure to air . The tubes are 1 ? 5 mm long at the margin , 10 ? 20 mm

in the center , and 4 ? 6 mm at the stem . They are broadly and deeply depressed around the stem , of irregular lengths , bright yellow to olive @-@ yellow to mustard @-@ yellow , and also rapidly turn blue upon exposure . The pores are the same color as the tubes , and rapidly turn blue @-@ green with pressure ; they are angular , and there are about 0 @.@ 5 ? 1 @.@ 5 pores per mm . The stem is 53 ? 115 cm (20 @.@ 9 ? 45 @.@ 3 in) by 6 ? 14 mm (0 @.@ 2 ? 0 @.@ 6 in) wide , and gradually becomes larger towards the base to 10 ? 19 mm . The top part of the stem is cream to pink , the middle finely longitudinally striate , with the striations darkening with handling , red @-@ lavender to brown @-@ red , lighter with age . Immediately above the basal tomentum the stem surface is cream @-@ colored with few striations . The basal tomentum is made of stiff , coarse white hairs over the lower 6 ? 50 mm . The flesh of the stem is solid (i.e. , not hollow) white to buff @-@ tan to light yellow , and turns slightly blue with exposure . The odor is not distinctive (although it has been described as " musty ") and the taste is mild .

= = = Microscopic characteristics = = =

The spores are olivaceous @-@ brown in medium to heavy deposit . They are inamyloid , almond @-@ shaped , contain one or more oil droplets , and measure 17 @.@ 5 ? 22 @.@ 2 by 6 @.@ 4 @-@ 8 µm . The spore wall is 0 @.@ 5 ? 1 µm thick , with 12 ? 14 longitudinal ridges . These ridges are less than 1 µm tall , occasionally bifurcating , converging at poles , with minute cross @-@ striae . Although these cross @-@ striae are visible when observed with light microscopy , they are not evident when viewed with scanning electron microscopy . The hilar appendage (the region of a spore which attaches to the basidium via the sterigma) is 0 @.@ 3 ? 1 µm long . The basidia are four @-@ spored , club @-@ shaped , and have numerous refractive globules ; they measure 39 ? 57 by 11 ? 15 µm . The pleurocystidia (cystidia on the face of a gill) are 42 ? 47 by 8 @-@ 12 µm , swollen and beaked , slightly capitate . They are abundant , arising from the subhymenium , projecting 19 @.@ 3 ? 29 @.@ 6 µm above the hymenial palisade , thin @-@ walled , hyaline , and devoid of refractive contents . The cheilocystidia (cystidia on the edge of a gill) are 19 ? 42 by 5 ? 11 µm , swollen , cylindrical to narrowly cub @-@ shaped , thin @-@ walled , and infrequent . The flesh of the hymenium is boletoid and strongly divergent (composed of different tissue layers) . The mediostratum (middle tissue layer) is 24 @.@ 7 ? 45 @.@ 7 µm wide , and made of many parallel , slightly interwoven hyphae . The lateral stratum hyphae are 4 @.@ 4 ? 8 @.@ 4 µm wide , hyaline , gelatinized in a dilute solution of potassium hydroxide (KOH) , and regularly septate . The cap cuticle is a densely interwoven trichodermial palisade (an erect , roughly parallel chains of closely packed cells) of cylindrical elements with inflated terminal cells . The terminal cells are 23 @.@ 5 ? 51 @.@ 9 by 9 @.@ 4 ? 16 @.@ 8 µm , inamyloid , cylindrical to club @-@ shaped , interwoven , and concentrated on the squamules . The marginal appendiculae are composed of wefts of interwoven inflated hyphae , some with faint golden spirally arranged encrusting pigments that are evident when mounted in water , KOH , and Melzer 's reagent . The flesh of the cap is composed of highly interwoven hyphae measuring 7 @.@ 4 ? 11 @.@ 1 µm wide that are hyaline in water , gelatinized and hyaline in KOH , and regularly septate . The stipitipellis (stem cuticle) is a trichodermial palisade of cylindrical elements with inflated terminal cells . The terminal cells project 30 @.@ 4 ? 63 µm , and they are cylindrical to club @-@ shaped , occasionally with an abrupt tapering point . The flesh of the stem is made of densely interwoven hyphae that are 4 @.@ 9 ? 7 @.@ 2 µm wide , with spirally arranged , faint golden encrusting pigments that can be seen in KOH , Melzer 's reagent , and water . Clamp connections are absent in this species .

= = = Varieties = = =

The typical variety of Boletellus ananas has consistently larger fruit bodies than B. ananas var. minor Singer from Brazil and Nicaragua , and lacks the thick @-@ walled cheilocystidia of B. ananas var. crassotunicatus Singer from Nicaragua and Panama .

= = = Edibility = = =

Although the mushroom is used as a food in Mexico , field guides list it as " inedible " or " not recommended " .

= = Similar species = =

Strobilomyces strobilaceus is roughly similar in appearance because of its rough scaly cap and lacerated margin , but may be distinguished from B. ananas by smooth stem without a ring , different spores , and flesh that is less tough . The Australian species Boletellus ananiceps has spores with narrow longitudinal ribs that do not have cross @-@ striae . B. dissiliens has colors that are not red as in B. ananas , and pores that can become reddish in maturity . Further , the cap flesh of B. dissiliens turns blue upon exposure to air .

= = Ecology , habitat and distribution = =

The fruit bodies of B. ananas typically grow scattered or in groups under oak and pine trees , often on their bases . In Guyana , the mushroom typically fruits singly or in pairs within 1 ? 2 m (3 @.@ 3 ? 6 @.@ 6 ft) above ground level on the trunks of the tropical tree Dicymbe corymbosa (subfamily Caesalpinioideae) , associated with ectomycorrhizas within humic accumulations . It is rarely found fruiting on the ground on heavily decayed , root @-@ penetrated wood . Rolf Singer suggested that the fungus was not mycorrhizal , noting that as well as occurring under or on the bases of both pine and oaks , it occurred in scanty humus and debris accumulated on rock walls . Singer concluded that the species prefers to grow on hard surfaces . Harry D. Thiers , in his study of the bolete flora of Texas , wrote that B. ananas was a rare species that often fruited abundantly following an extended period of rain and high humidity .

Some varieties of B. ananas from southeastern North America , Costa Rica , Brazil , Panama , Nicaragua , and Guyana have been noted to fruit on tree trunks , although terrestrial fruiting has been reported in Malaysia and Central America . Due to the typically elevated fruiting habit and occurrence on dead wood , the ectomycorrhizal status of B. ananas has been debated ; in the protolog Murrill noted " it always occurs either as a wound parasite on pine trunks or about the base of living pine trees . " All collections have been made in association with ectotrophic host trees including Pinus and Quercus species in southeastern North America and Central America , Quercus humboldtii in Colombia , various Fagaceae and Dipterocarpaceae species in Malaysia , and Leptospermum and Pinus species in New Zealand . In Guyana , the humic deposits on Dicymbe trunks bearing B. ananas are consistently permeated with abundant ectomycorrhizas . The fungus was reported as forming mycorrhizal associations with eucalypts in Australia , based on fruit body association with trees .

Its North American distribution encompasses a range extending north from North Carolina to Florida , west to Texas and south to Mexico , and Central America . In 2008 , it was reported for the first time in the Upper Potaro and Upper Ireng River Basins in Guyana . It has also been collected from New Zealand , Asia (including China , Korea , Malaysia , and Taiwan) , and possibly Australia .