= Agaricus bernardii =

Agaricus bernardii , commonly called the salt @-@ loving mushroom , is an agaric fungus in the family Agaricaceae . A short , squat mushroom , the thick stem is usually less than the diameter of the cap , which ranges from 5 ? 15 cm (2 @.@ 0 ? 5 @.@ 9 in) . Found in Asia , Europe , North America , and New Zealand , it is a salt @-@ tolerant species that grows in salt marshes , dunes , and coastal grassland . The fungus produces fruit bodies (mushrooms) with convex to flattened caps up to 15 cm (5 @.@ 9 in) in diameter , atop thick stems up to 10 cm (3 @.@ 9 in) long . The cap surface is whitish to buff , and can develop scales or warts in age . Gills are initially pink before turning brown when the spores mature . The flesh turns reddish when it is cut or bruised . The mushroom somewhat resembles Agaricus bitorquis but it differs from that species by the reddish @-@ brown staining of cap and stem tissue , the nature of the ring on the stem , as well as its briny odor . An edible mushroom , it is stronger in flavor but similar to the store @-@ bought button mushrooms , Agaricus bisporus .

= = Taxonomy = =

The species was first described by French mycologist Lucien Quélet as Psalliota bernardi in 1879 , based on collections made in La Rochelle , a seaport on the Bay of Biscay (France) . Pier Andrea Saccardo transferred it to Agaricus in 1887 . Synonyms include Psalliota bernardii , Pratella bernardii , Fungus bernardii , and Agaricus campestris subsp. bernardii .

The infrageneric (below genus @-@ level) classification of A. bernardii is not known with certainty . In his 1978 proposed classification , Paul Heinemann placed it in the subsection Bitorques of the section Agaricus . Although the species has some similarities with species in the section Duploannulatae based on the structure of its veil and its tendencies towards rufescence (developing a red coloration) , molecular analysis shows that it does not belong in this section . An earlier (1999) analysis suggested that it is closely related to the " Agaricus clade " , which contains A. subperonatus , A. devoniensis , A. bisporus , A. spissicaulis , A. bitorquis , and A. impudicus . In 1986 , Henri Romagnesi placed it in section Chitonioides ; Solomon Wasser demoted this to a subsection of Duploannulatae in 1995 , and later provided molecular support for his decision . In addition to A. bernardii , species in Wasser 's concept of subsection Chitonioides include A. rollanii , A. bernardiiformis , A. gennadii , A. pequinii , and A. nevoi .

The species was named after the original collector , G. Bernard . Agaricus bernardii is commonly known as the salt @-@ loving mushroom .

= = Description = =

Fruit bodies of Agaricus bernardii have caps that range in shape from convex to flattened , and reach a diameter of 5 ? 15 cm (2 @.@ 0 ? 5 @.@ 9 in) . The cap surface is dry and smooth , with a white or buff color that can develop brownish spots in maturity . In age , the surface often forms scales or warts . The flesh is thick , firm , and stains reddish @-@ orange or reddish @-@ brown when cut , although this reaction can be slow to develop . Its odor ranges from mild to briny to pungent . The gills are free from attachment to the stem , and packed close together . Initially grayish @-@ pink to pinkish , they turn reddish @-@ brown and then chocolate brown as the spores mature . The stem is solid (i.e. , not hollow) , firm , and measures 4 ? 10 cm (1 @.@ 6 ? 3 @.@ 9 in) long by 2 ? 4 cm (0 @.@ 8 ? 1 @.@ 6 in) thick . A thick , white , rubbery partial veil covers the gills of the immature mushroom , and eventually remains as a ring on the middle of the stem .

Although the mushrooms sometimes have an odor that is briny or pungent (" though not inappropriate ") , they are edible and good . David Arora compares its taste to that of the closely related Agaricus bitorquis , " but a little chewier and sometimes with a slightly salty or briny taste . "

Agaricus bernardii mushrooms produce a dark brown spore print . The spores are smooth , broadly elliptical , and have dimensions of 6 ? 7 @.@ 5 by 5 ? 6 ?m . The basidia (spore @-@ bearing cells

) are four @-@ spored and club @-@ shaped , measuring 14 ? 25 by 4 ? 7 ?m ; the sterigmata are 4 ? 5 ?m . Cheilocystidia (cystidia on the gill edge) are broadly club @-@ shaped to cylindrical , hyaline (translucent) , and measure 17 ? 30 by 4 ? 8 ?m .

= = = Similar species = = =

Agaricus bitorquis , also edible , has a similar appearance , but can be distinguished by its double ring , and the lack of a fishy or briny odor . Additionally , A. bitorquis does not stain reddish when cut , and usually does not have a scaly or warty cap . The Hungarian species A. bernardiiformis , named for its similarity to A. bernardii , is distinguished from the latter by its smaller spores (6 @.@ 2 ? 8 @.@ 2 by 5 @.@ 4 ? 6 @.@ 2 ?m) and its club @-@ shaped cheilocystidia that measure 17 ? 35 by 7 ? 9 @.@ 5 ?m . MycoBank , however , considers the two species to be conspecific .

= = Habitat and distribution = =

Agaricus bernardii is a saprobic species . Its mushrooms fruit singly , scattered , or in groups on the ground . They grow in sandy soils , lawns , and in habitats with a high salt concentration , like along ocean coasts and salt marshes . Once primarily a maritime species , the fungus has spread inland to roadside verges where salt has been applied to de @-@ ice the roads . Fruit bodies sometimes form underground . Mushrooms can also grow in fairy rings , especially when in grasslands or pastures . A Czech study determined that the mushrooms will strongly bioaccumulate silver from contaminated soil . Although the average concentration of silver in the soil is typically less than 1 milligram per kilogram of soil , it can be significantly elevated near industrial sites such as mines and smelters . The concentration of silver in the caps ? which reached levels of up to 544 mg per kg of mushroom tissue (dry weight) ? was about twice that of the stems .

The species is found in Asia , Europe , North America (including Mexico) and New Zealand .