= Leccinum rugosiceps =

Leccinum rugosiceps , commonly known as the wrinkled Leccinum , is a species of bolete fungus . It is found in Asia , North America , Central America , and South America , where it grows in an ectomycorrhizal association with oak . Fruitbodies have convex , yellowish caps caps up to 15 cm (5 @.@ 9 in) in diameter . In age , the cap surface becomes wrinkled , often revealing white cracks . The stipe is up to 10 cm (3 @.@ 9 in) long and 3 cm (1 @.@ 2 in) wide , with brown scabers on an underlying yellowish surface . It has firm flesh that stains initially pinkish to reddish and then to grayish or blackish when injured . The pore surface on the cap underside is yellowish . Fruitbodies are edible , although opinions vary as to their desirability .

= = Taxonomy = =

The species was first described scientifically in 1904 by American mycologist Charles Horton Peck as Boletus rugosiceps . The type collection was made in the woods of Port Jefferson , New York . Rolf Singer transferred it to Leccinum in 1945 . Synonyms include Krombholzia rugosiceps , published by Rolf Singer in 1942 , and Krombholziella rugosiceps , published by Josef ?utara in 1982 . Krombholzia and Krombholziella are now obsolete genera that have since been subsumed into Leccinum .

Leccinum rugosiceps is classified in the section Luteoscabrum of genus Leccinum , a grouping of species that associated with oak and hornbeam . Others in this section include L. albellum and L. pseudoscabrum .

The specific epithet rugosiceps , which is derived from the Latin roots for " rough " and " head " , refers to its wrinkled cap . It is commonly known as the " wrinkled Leccinum " .

= = Description = =

The convex cap measures 5 ? 15 cm (2 @.@ 0 ? 5 @.@ 9 in) wide . Its color is orange @-@ yellow , aging to yellow @-@ brown . The cap margin has a narrow flap of sterile tissue . The surface of the cap is dry , with wrinkles and pits at maturity . It often becomes cracked in age , and the whitish flesh underneath shows through . The cap tends to undergo significant color changes throughout its development ? first bright yellow , then dark brown , then finally pale tan ? which may make it difficult to identify in the field . The flesh is white to pale yellow , and it stains reddish to burgundy when cut or bruised . This staining is most prominent at the junction of the cap and the stipe . Further exposure over the course of 20 ? 60 minutes results in the flesh becoming grayish to blackish . The flesh has no distinctive door or taste . The pore surface is initially dull yellow , and sometimes ages to dingy olive @-@ brown . Unlike many other boletes , it does not turn blue when bruised , although it may have natural blue @-@ green stains . The pores are circular , measuring less than 1 mm , while the tubes extend to 8 ? 14 mm deep . The stipe measures 3 ? 10 cm (1 @.@ 2 ? 3 @.@ 9 in) long by 1 ? 3 cm (0 @.@ 4 ? 1 @.@ 2 in) thick . It is nearly equal in length throughout or tapered from the top to base . Its color is pale yellow to brownish underneath the pale brown scabers that darken in age .

The spore print color ranges from brown to olive @-@ brown . Spores are spindle shaped , measuring 15 ? 19 long by 5 ? 6 µm . They have a smooth surface , and are inamyloid (i.e. , not staining with Melzer 's reagent) . The cap flesh is bilateral and imamyloid . The cystidia on the pores are present as conspicuous pleuro- and cheilocystidia . The cap cuticle is present as a hymeniform layer . Clamp connections are absent .

Several chemical tests can be used to help verify an identification of L. rugosiceps . A drop of ammonium hydroxide solution turns the cap cuticle a reddish color or is unreactive , and yellow or unreactive on the flesh . A drop of dilute potassium hydroxide (KOH) turns the cap surface red , and the flesh yellowish to orangish . Application of iron (II) sulphate solution produces a gray color on the cap surface , and greenish @-@ gray to olive coloration on the flesh .

= = = Similar species = = =

The Costa Rican bolete Leccinum neotropicalis is a closely allied species . It is distinguished from L. rugosiceps by its dark brown to dark reddish @-@ brown color , and flesh that does not stain with injury . L. viscosum , found in Belize , features a similar cap and scaber pigmentation on the stipe , and similar color changes in response to injury in the flesh of the cap and the apex of the stipe ; unlike L. rugosiceps , however , it also stains at the stipe base , and the cap is sticky rather than dry .

L. crocipodium is a lookalike that is difficult to distinguish from L. rugosiceps . It generally has a darker cap , paler scabers , and somewhat wider spores , although these characteristics are variable . L. nigrescens is also similar to L. rugosiceps , but has a darker brownish cap and stipe , flesh that slowly stains with injury (reddish , pinkish gray , or purplish black) . It is usually found in sandy soil . Another Leccinum species that associates with oak is L. carpini , which also has a wrinkled cap . Unlike L. rugosiceps , its flesh stains pink to reddish . In his original species description , Charles Peck noted that L. rugosiceps grew with L. rubropunctum , " from which it is easily separated by its dry pileus , smaller tubes and stouter stem . "

= = Edibility = =

An edible species , Leccinum rugosiceps mushrooms have been described variously as " great " , and " of poor quality " . They have a nutty flavor and firm texture ; older specimens are less firm but retain the flavor . Drying the mushrooms enhances the flavor . The stipe tends to harbor insect larvae and should be cleaned before consumption . The sugar alcohol mannitol is present in the fruitbodies .

= = Habitat and distribution = =

Leccinum rugosiceps is an ectomycorrhizal fungus that associates with oak . In eastern North America , pin oak (Quercus palustris) is a frequent host . The bolete fruits singly or in groups in forests , shaded lawns , and often found in areas disturbed by human activity , such as pathsides and picnic areas . Fruiting typically occurs from July to September . A Chinese study evaluating the concentrations of heavy metals in boletes found that in L. rugosiceps fruitbodies , the levels of cadmium , zinc , copper , and mercury exceeded that of national safety standards for edible fungi .

The bolete is found from eastern Canada south to Florida and Mississippi , west to Michigan in the United States . The distribution extends south to Mexico , Costa Rica , and Colombia . It is one of several boletes that have a north to south clinal trend . In Asia , the species has been reported from India , Korea , China , and Taiwan . Taiwanese specimens tend to have slightly smaller spores (10 ? 16 by 4 ? 5 ?m) than those from mainland China or from America .