= Suillus sibiricus =

Suillus sibiricus is a fungus of the genus Suillus in the Suillaceae family . It is found in mountains of Europe , North America and Siberia , strictly associated with several species of pine tree . Due to its specific habitat and rarity in Europe , it has been selected for inclusion in several regional Red Lists . Its fruit bodies are characterised by having slimy caps in wet weather , which can reach diameters of up to 10 cm (3 @.@ 9 in) . On the underside of the cap are yellow angular pores that bruise a pinkish to cinnamon colour . The stem is up to 8 cm (3 @.@ 1 in) tall and 2 @.@ 5 cm (1 @.@ 0 in) wide and typically has a ring , a remnant of the partial veil that covers the fruit body in its early development . In North America , it is commonly called the Siberian slippery jack . Phylogenetic analysis has shown that S. sibiricus is closely related to S. umbonatus and S. americanus , and may in fact be conspecific with the latter species .

= = Taxonomy , naming , and phylogeny = =

The species was first described scientifically under the name Ixocomus sibiricus by American mycologist Rolf Singer in 1938 , based on material that was collected under Pinus cembra var. sibirica in the Altai Mountains of central Asia . In 1945 , he transferred it to Suillus . Alexander H. Smith called the species Boletus sibiricus in 1949 , but this is today considered a synonym . Singer named the subspecies S. sibiricus subsp. helveticus in 1951 , based on material collected by Jules Favre from Switzerland in 1945 . Roy Watling later considered this a nomen nudum ? not published with an adequate description , and therefore failing to qualify as a formal scientific name .

According to Singer 's 1986 arrangement , S. sibiricus is classified in the subsection Latiporini of section Suillus in the genus Suillus . Section Suillus includes species with glandular dots on the stem , and a partial veil which becomes appendiculate on the cap edge . Characteristics of species in subsection Latiporini include cinnamon @-@ coloured spore prints without an olive tinge , and wide pores on the underside of the cap (wider than 1 mm when mature) . Other species in the subsection include S. flavidus , S. umbonatus , S. punctatipes , and S. americanus .

A phylogenetic analysis of various eastern Asian and eastern North American disjunct Suillus species revealed that S. sibiricus forms a well @-@ supported clade with S. americanus and S. umbonatus ; these relationships are corroborated by a previous analysis (1996) , which used a larger sampling of Suillus species to determine taxonomic relationships in the genus . Within this clade , S. umbonatus and U.S. S. sibiricus can be separated from the rest of the group . However , the phylogenetic relationships among the tested isolates determined from different methods of analysis are not always consistent and could not be established with confidence . In general , there is little phylogenetic divergence detected in this clade .

= = Description = =

The fruit body of Suillus sibiricus is a medium @-@ sized bolete . The cap is at first hemispherical and straw yellow , but expands with maturity and finally flattens out becoming darker with reddish brown spots or fibrils . The cap diameter is up to 10 cm (3 @.@ 9 in) . The cap cuticle is mucilaginous especially when moist and can be peeled off . A partial veil extends from the stem to the cap periphery in immature specimens . In mature specimens , it is obliterated leaving a felty ring around the stem and fragments hanging from the cap periphery . The tubes are initially yellow but become brown , adnate or slightly decurrent . The pores are angular , wider than 1 mm in diameter and the same colour as the tubes but stain dirty pink or vinaceous when bruised . The tubes that make up the pores are 7 to 10 mm (0 @.@ 3 to 0 @.@ 4 in) long . Droplets can be present and these leave dark brown spots after drying out .

The stem is cylindrical , up to 8 cm (3 @.@ 1 in) tall and 2 @.@ 5 cm (1 @.@ 0 in) wide . It is yellow , becoming pink to red towards the base and covered throughout with granules which become darker as the fruit body matures . The partial veil , and later ring , is cottony , off @-@ white and attached to the top third stem . Because the ring is fugacious (short @-@ lived) it is not always

present ; it is thought that fruit bodies that develop in dry conditions are less likely to have a ring . The flesh is pale yellow and stains red @-@ brown when bruised . At first firm , with maturity it becomes increasingly soft . The spore deposit is coloured brown . The spores are ellipsoid , sized 9 ? 12 by 3 @.@ 8 ? 4 @.@ 5 ?m , thin @-@ walled , and smooth when seen through a microscope . The basidia (spore @-@ bearing cells) are club @-@ shaped , four @-@ spored , and measure 22 ? 34 by 5 ? 8 ?m . The flesh reddens and then blackens when potassium hydroxide solution is applied . With iron (II) sulphate solution , the flesh slowly discolours to grey .

Suillus sibiricus is reportedly edible , but it is without any commercial or culinary value . It is one of over 200 species of mushrooms frequently collected for consumption in Nepal . Its taste has been described variously by authors as sour (Europe) and not distinctive or slightly bitter (North America) . Its odour is not distinctive .

= = = Similar species = = =

In North America , Suillus americanus has a similar appearance , but a more easterly distribution . It is associated with eastern white pine . Although some authors have tried to distinguish between the two with by using width of the stem , or by differences in fruit body colouration , it is acknowledged that these characteristics are variable , and depend on environmental factors . The phylogenetic analysis of Wu and colleagues (2000) suggests that the two taxa may be the same , although more samples from different geographical areas will be needed to verify this .

= = Distribution and habitat = =

Suillus sibiricus has been recorded in parts of Europe , North America and Siberia . The fungus forms strict ectomycorrhizal associations with pines of the subgenus Strobus . These include Swiss pine (Pinus cembra) in the Alps and Tatras of central Europe , Macedonian pine (P. peuce) in the Balkans , western white pine (P. monticola) and limber pine (P. flexilis) in the Pacific Northwest of North America , P. banksiana in Quebec , Canada , and Siberian pine (P. sibirica) and Siberian dwarf pine (P. pumila) in Siberia and the Russian Far East . The range of the fungus is hence limited by the distribution of the host tree . S. sibiricus has also been shown to be able to form ectomycorrhizae with the Himalayan species P. wallichiana in pure culture conditions in the laboratory .

The fungus is rare in Europe and its distribution typically corresponds with high elevations at or near the alpine tree line . It is found in at least 11 countries , and has been included in the Red List of 8 countries . It is considered critically endangered in the Czech Republic . The European Council for Conservation of Fungi (ECCF) has suggested Suillus sibiricus be listed in Appendix II of the Bern Convention . Factors that threaten the habitat of S. sibiricus include deforestation and construction of skiing pistes and other infrastructure for winter sports .

The fungus fruits in summer and autumn in Europe , and in western North America where it often occurs abundantly . The North American distribution extends south to Nuevo Leon , Mexico .