= Turbinellus floccosus =

Turbinellus floccosus , sometimes known as the shaggy- , scaly- , or woolly chanterelle , is a cantharelloid mushroom of the family Gomphaceae native to Asia and North America . It was known as Gomphus floccosus until 2011 , when it was found to be only distantly related to the genus 's type species G. clavatus . It was consequently transferred from Gomphus to Turbinellus . The orange @-@ capped vase- or trumpet @-@ shaped fruiting structures may reach 30 cm (12 in) high and 30 cm (12 in) wide . The lower surface , the hymenium , is covered in wrinkles and ridges rather than gills or pores , and is pale buff or yellowish to whitish .

T. floccosus forms ectomycorrhizal relationships with various types of conifer ; fruit bodies may be found in coniferous woodlands across Eastern Asia , from North Korea to Pakistan , and in North America , more frequently in the west , in late summer and autumn . Though mild @-@ tasting , they cause gastrointestinal symptoms of nausea , vomiting and diarrhea when consumed .

= = Taxonomy = =

This species was first described as Cantherellus floccosus in 1834 by American mycologist Lewis David de Schweinitz , who reported it growing in beech woods in Mount Pocono , Pennsylvania . Its specific epithet is derived from the Latin floccus , meaning " flock of wool " . In 1839 , Miles Joseph Berkeley described a specimen from Canada as Cantharellus canadensis from a manuscript by Johann Friedrich Klotzsch , noting its affinity to C. clavatus . A large specimen collected in Maine by Charles James Sprague was described as Cantharellus princeps in 1859 by Berkeley and Moses Ashley Curtis .

In 1891 , German botanist Otto Kuntze published Revisio Generum Plantarum , his response to what he perceived as a lack of method in existing nomenclatural practice . Three taxa received new names : Kuntze coined the genus Trombetta , which incorporated Cantharellus canadensis (as Trombetta canadensis) , while C. floccosus and C. princeps became Merulius floccosus and M. princeps respectively . However , Kuntze 's revisionary program was not accepted by the majority of botanists .

Franklin Sumner Earle made C. floccosus the type species of the new genus Turbinellus in 1909 , remarking that " They constitute a striking and well @-@ marked genus which seems to have more in common with the club @-@ shaped species of Craterellus than with the following genus where they have always been placed . " However this was not widely taken up . Earle 's new combination was not published validly according to nomenclatural rules .

In 1945 it was transferred to Gomphus by Rolf Singer . The generic name is derived from the Ancient Greek ?????? , gomphos , meaning " plug " or " large wedge @-@ shaped nail " . Alex H. Smith treated the members of Gomphus as two sections ? Gomphus and Excavatus ? within Cantharellus in his 1947 review of chanterelles in western North America , as he felt there were no consistent characteristics that distinguished the genera . The shaggy chanterelle was placed in the latter section due to its scaly cap , lack of clamp connections and rusty @-@ colored spores . Roger Heim classified it in the genus Nevrophyllum , before E. J. H. Corner returned it to Gomphus in 1966 .

The genus Gomphus , along with several others in the Gomphaceae , was reorganized in the 2010s after molecular analysis confirmed that the older morphology @-@ based classification did not accurately represent phylogenetic relationships . Thus the genus Turbinellus was resurrected and the taxon became Turbinellus floccosus .

T. floccosus has been given the common names of scaly vase chanterelle , scaly chanterelle , woolly chanterelle , or shaggy chanterelle , though it is more closely related to stinkhorns than true chanterelles . In Nepal , in the Sherpa language , it is known as diyo chyau or khumbhe chyau , from the words diyo , meaning " oil lamp " and chyau , meaning " mushroom " , as the fruit bodies have a shape similar to the local oil lamps . In Mexico , it is known as corneta or trompeta , or by the indigenous words Tlapitzal , tlapitzananácatl or oyamelnanácatl in Tlaxcala .

= = Description = =

Adult fruit bodies are initially cylindrical , maturing to trumpet- or vase @-@ shaped and reaching up to 30 cm (12 in) high and up to 30 cm (12 in) across . There is no clear demarcation between the cap and stipe . The stipe itself can be up to 15 cm (6 in) tall and 6 cm (2 @.@ 4 in) wide , though it tapers to a narrower base . It is solid in younger specimens , though is often hollowed out by insect larvae in older . At higher elevations , two or three fruit bodies may arise from one stipe . Colored various shades of reddish- to yellowish @-@ orange , the cap surface is broken into scales , with the spaces between more yellow and the scales themselves more orange . The most colorful specimens occur in warm humid weather . Older specimens are often paler .

The white flesh is fibrous and thick , though thins out in old specimens . Somewhat brittle , it can sometimes turn brown when cut or bruised . The smell has been reported as indistinct or " earthy and sweet " , and the taste " sweet and sour " . The spore @-@ bearing undersurface is irregularly folded , forked or ridged rather than gilled and is pale buff or yellowish to whitish in color . These ridges are up to 4 mm high . The surface is decurrently attached to the stipe , though irregularly so . The spore print is brownish , the spores ellipsoid with dimensions of 12 @.@ 4 ? 16 @.@ 8 x 5 @.@ 8 ? 7 @.@ 3 ?m . The spore surface is roughened with ornamentations that can be made visible under the microscope by staining with methyl blue .

The fruit bodies can last for some considerable time , growing slowly over a month . Mushrooms in subalpine and alpine areas are typically heavy @-@ set with a short stipe , their growth slower in the cold climate . This form is slower growing , and is seen at lower altitudes in colder seasons . Smith gave this the name forma rainierensis . Conversely , mushrooms at low altitudes , such as in the redwood forests , can grow and expand rapidly with large caps that have prominent scales . Smith described a paler form with a solid stipe from the Sierra Nevada as forma wilsonii . R. H. Petersen described an olive @-@ capped form that is otherwise identical to the typical form . These forms are not recognised as distinct .

= = = Similar species = = =

The related Turbinellus kauffmanii , found in western North America , is similar @-@ looking but has a pale brown cap . Younger specimens of the latter species also have a pungent smell . Turbinellus fujisanensis , found in Japan , is another lookalike that has smaller spores than T. floccosus . The fruit bodies of Gomphus bonarii , found in northwestern North America , are typically more yellowish to brownish compared to T. floccosus , and they tend to fruit in clumps .

= = Distribution and habitat = =

The fungus appears to form ectomycorrhizal relationships with various conifers including Douglas @-@ fir (Pseudotsuga menziesii) , fir (Abies) species such as momi fir (Abies firma) , European silver fir (A. alba) and Khinghan fir (A. nephrolepis) , Pine (Pinus) species such as Pinus densiflora and western hemlock (Tsuga heterophylla) . In Mexico , the fungus associates with Abies religiosa ? the mycorrhizal association between these two species has been synthesized under controlled laboratory conditions . T. floccosus is more abundant in older stands of trees and places where there is more decomposed wood on the forest floor . The species occurs in coniferous forests in North America , particularly the western states in late summer and autumn . They are most abundant in rainy parts of the Pacific Northwest , northern California and the Sierra Nevada . It also occurs through Asia , having been recorded from India , Nepal , Pakistan , Tibet , China , North Korea , and Japan .

Turbinellus floccosus has been occasionally recorded from introduced conifer plantations in Australia .

= = Toxicity = =

Turbinellus floccosus is poisonous to some people who eat it , but has been eaten without incident by others . Nausea , vomiting and diarrhea may occur , though are sometimes delayed by up to 8 ? 14 hours . A tricarboxylic acid known as ? @-@ tetradecylcitric- or norcaperatic acid may be responsible for the extreme gastrointestinal symptoms . Laboratory experiments showed it increased tone of guinea pig smooth muscle of the small bowel (ileum) , and that when given to rats , it led to mydriasis , skeletal muscle weakness , and central nervous system depression . The concentration (4 @.@ 4 %) of the presumed active ingredient ? norcaperatic acid ? extracted from fruit bodies of Turbinellus floccosus was over double that extracted from the related T. kauffmanii .

Despite its toxicity , T. floccosus is one of the ten wild mushrooms most widely consumed by ethnic tribes in Meghalaya , northeast India , and is highly regarded by the Sherpa people in the vicinity of Sagarmatha National Park in Nepal . What is not known is whether the populations of T. floccosus are lacking in the toxin , or whether the local people have developed an immunity to it . It is also eaten in Mexico . Mycologist David Arora reported some enjoyed it while he felt it had a sour taste that he found off @-@ putting .

The fruit body of T. floccosus produces oxylipin (biologically active lipids generated from fatty acids) that have antifungal activity against the plant pathogens Colletotrichum fragariae , C. gloeosporioides , and C. acutatum . Extracts of the fungus have shown in standard laboratory tests to have antimicrobial activity against several human pathogenic strains . T. floccosus also contains the spermidine derivative pistillarin , a bioactive compound that inhibits DNA damage by hydroxyl radicals generated by the Fenton reaction . Pistillarin is responsible for the green color obtained when iron salts are applied to the fruit body surface .