

= Tremella mesenterica =

Tremella mesenterica (common names include yellow brain , golden jelly fungus , yellow trembler , and witches ' butter) is a common jelly fungus in the Tremellaceae family of the Agaricomycotina . It is most frequently found on dead but attached and on recently fallen branches , especially of angiosperms , as a parasite of wood decay fungi in the genus *Peniophora* . The gelatinous , orange @-@ yellow fruit body of the fungus , which can grow up to 7 @. @ 5 cm (3 @. @ 0 in) diameter , has a convoluted or lobed surface that is greasy or slimy when damp . It grows in crevices in bark , appearing during rainy weather . Within a few days after rain it dries into a thin film or shriveled mass capable of reviving after subsequent rain . This fungus occurs widely in deciduous and mixed forests and is widely distributed in temperate and tropical regions that include Africa , Asia , Australia , Europe , North and South America . Although considered bland and flavorless , the fungus is edible . *Tremella mesenterica* produces carbohydrates that are attracting research interest because of their various biological activities .

= Taxonomy and phylogeny =

The species was originally described from Sweden as *Helvella mesenterica* by the naturalist Anders Jahan Retzius in 1769 . It was later (1822) sanctioned by Elias Magnus Fries in the second volume of his *Systema Mycologicum* . It is the type species of the genus *Tremella* . Its distinctive appearance has led the species to accumulate a variety of common names , including " yellow trembler " , " yellow brain " , " golden jelly fungus " , and " witches ' butter " , although this latter name is also applied to *Exidia glandulosa* . The specific epithet is a Latin adjective formed from the Ancient Greek word ?????????? (mesenterion) , " middle intestine " , from ?????- (meso- , " middle , center ") and ???????? (enteron , " intestine ") , referring to its shape .

The species formerly recognized as *Tremella lutescens* is now seen as a form of *T. mesenterica* with washed @-@ out colors and considered a synonym .

Based on molecular analysis of the sequences of the D1 / D2 regions of the large subunit ribosomal RNA gene and the internal transcribed spacer regions of rRNA , *T. mesenterica* is most closely related to *T. coalescens* , *T. tropica* , and *T. brasiliensis* . This analysis included 20 of the estimated 120 *Tremella* species .

= Description =

The fruit body has an irregular shape , and usually breaks through the bark of dead branches . It is up to 7 @. @ 5 cm (3 @. @ 0 in) broad and 2 @. @ 5 to 5 @. @ 0 cm (1 @. @ 0 to 2 @. @ 0 in) high , rounded to variously lobed or brain @-@ like in appearance . The fruit body is gelatin @-@ like but tough when wet , and hard when dry . The surface is usually smooth , the lobes translucent , deep yellow or bright yellow @-@ orange , fading to pale yellow , rarely unpigmented and white or colorless . The fruit bodies dry to a dark reddish or orange . The spores , viewed in mass , are whitish or pale yellow .

= Microscopic characteristics =

The basidia (spore @-@ bearing cells) are ellipsoid to roughly spherical in shape , not or rarely stalked , and typically 15 ? 21 µm wide . They contain two to four septa that divide it into compartments ; the septa are most frequently diagonal or vertical . Asexual reproduction in *T. mesenterica* is carried out through the formation of spores called conidia , which arise from conidiophores ? specialized hyphal cells that are morphologically distinct from the somatic hyphae . The conidiophores are densely branched and normally abundant in the hymenium ; young specimens may be entirely conidial . The conidia are roughly spherical , ovoid , or ellipsoid , and about 2 @. @ 0 ? 3 @. @ 0 by 2 @. @ 0 ? 2 @. @ 5 µm . They may be so numerous that young fruit bodies may be covered in a bright yellow , conidial slime . The spores are broadly ellipsoid to oblong

, on average 10 @. @ 0 ? 16 @. @ 0 by 6 @. @ 0 ? 9 @. @ 5 µm ; they germinate by germ tube or by yeast @-@ like conidia of identical form to the conidia produced on the conidiophores .

= = = Edibility = = =

Although some have claimed the fungus to be inedible or merely " non @-@ poisonous " , most other sources agree that it is edible but flavorless . The gelatinous to rubbery consistency lends texture to soups . In China , the fungus is used by vegetarians to prepare " an immunomodulating cooling soup with lotus seed , lily bulbs , jujube , etc . "

= = Similar species = =

Tremella mesenterica is frequently confused with *Tremella aurantia* , a widespread species parasitic on the plant pathogenic fungus *Stereum hirsutum* . *Tremella aurantia* can often be recognized by the presence of its host , which typically grows on logs , stumps , and trunks . Though the two species are similarly colored , the surface of *T. aurantia* is usually matte , not greasy or shiny , and its lobes or folds are thicker than those of *T. mesenterica* . Fruit bodies of *T. aurantia* contain unclamped , thick @-@ walled host hyphae and consequently retain their shape when dried , rather than shriveling or collapsing to a film (as in *T. mesenterica*) . Microscopically , *T. aurantia* has smaller basidia and smaller , differently shaped spores measuring 8 @. @ 5 ? 10 by 7 ? 8 @. @ 5 µm . *T. brasiliensis* , known from neotropical areas and Japan , and the North American species *T. mesenterella* are also similar .

Tremella mesenterica may also be confused with members of the *Dacrymycetaceae* family , like *Dacrymyces chrysospermus* (formerly *D. palmatus*) , due to their superficial resemblance . Microscopic examination shows that the *Dacrymycetaceae* have Y @-@ shaped basidia with two spores , unlike the longitudinally split basidia characteristic of *Tremella* ; additionally , *D. chrysospermus* is smaller , has a whitish attachment point to its substrate , and grows on conifer wood .

= = Life cycle = =

Tremella mesenterica has a yeastlike phase in its life cycle that arises as a result of budding of basidiospores . The alternation between asexual and sexual propagation is achieved by mating of yeast @-@ form haploid cells of two compatible mating types . Each mating type secretes a mating pheromone that elicits sexual differentiation of the target cell having the opposite mating type to the pheromone @-@ producing cell . The sexual differentiation is characterized by the arrest of the growth in the G1 phase of the cell division cycle and subsequent formation of an elongated mating tube . Formation of the mating tube , initiated by the pheromones A @-@ 10 and a @-@ 13 , is similar to the process of bud emergence during bipolar budding in yeasts . Tremorogen A @-@ 10 has been purified and its chemical structure found to be S @-@ polyisoprenyl peptide . Fruit bodies arise from a primordium located beneath the wood bark , and sometimes more than one fruit body can originate separately from the same primordia .

= = Habitat and distribution = =

Tremella mesenterica has a cosmopolitan distribution , having been recorded from Europe , North , Central , and South America , Africa , Asia , and Australia . Fruit bodies are formed during wet periods throughout the year . In British Columbia , Canada , it is sometimes found on maple , poplar , or pine , but is most abundant on red alder . It prefers to grow in habitats ranging from mesic to wet . The fungus grows parasitically on the mycelium of wood @-@ rotting corticioid fungi in the genus *Peniophora* . Occasionally , *T. mesenterica* and its host fungus can be found fruiting together .

= = Bioactive compounds = =

Some *Tremella* species produce polysaccharides that are of interest to the medical field , because of their biological activity ; several patents have been filed in China pertaining to the use of these compounds for cancer prevention or immune system enhancement . In 1966 , Slodki reported discovering an acidic polysaccharide from haploid cells of *T. mesenterica* that closely resembled those produced by the species *Cryptococcus laurentii* . The structural similarity of the polysaccharides from the two species suggested a phylogenetic relationship between them . Subsequently , researchers chemically synthesized the polysaccharide , and determined the chemical identities of the component sugar units . The polysaccharide , known as glucuronoxylomannan ? produced by fruit bodies and in pure culture conditions ? has been shown to consist of a mannan backbone that is acetylated with xylan chains in a regular repeating structure . Laboratory tests have associated a number of biological activities with *T. mesenterica* glucuronoxylomannan , including immunostimulatory , protecting against radiation , antidiabetic , anti-inflammatory , hypocholesterolemic , hepatoprotective , and antiallergic effects .