= Amanita thiersii =

Amanita thiersii , commonly called Thiers ' lepidella , is a North @-@ American saprotrophic basidiomycete fungus in the genus Amanita . It is a white mushroom originally described from Texas but today found in nine states of North America . It was named after Harry Delbert Thiers . The cap of this small mushroom is white and convex , measuring 35 ? 100 mm (1 @.@ 4 ? 3 @.@ 9 in) and covered by volval remnants . It is sticky to the touch when wet . The gills are variable in length and number and are densely packed in some specimens and widely spaced in others . They are not attached to the stipe , which is 8 ? 20 cm (3 ? 8 in) long and about 1 cm (0 @.@ 4 in) thick , with a white ring . The spores measure 7 @.@ 8 ? 9 @.@ 8 by 7 @.@ 3 ? 9 @.@ 0 µm and are roughly spherical in shape . The spore print is white .

The mushroom grows in lawns , pastures and prairies . It is a saprotroph , living on decaying plant material , and not mycorrhizal as is the case in most other species of Amanita . Fruit bodies appear during July and August , either in isolation or in groups , and often form fairy rings . The genome of A. thiersii is being sequenced as part of the United States Department of Energy 's Joint Genome Institute Community Sequencing Program . It is hoped that this will provide a better understanding of the cellulose decomposition capabilities of the fungus . The toxicity of A. thiersii has not been studied but it is suspected of being poisonous .

= = Taxonomy = =

Amanita thiersii was first described in 1957 by Harry Delbert Thiers , an American mycologist , who had spotted it on a campus lawn when he was a student . He named it Amanita alba but that name was disallowed as it had already been used for another species . In 1969 it was renamed by the Dutch mycologist Cornelis Bas as Amanita thiersii in honour of its finder . It is placed in the genus Amanita in the section Lepidella and subsection Vittadiniae . Bas created the stirps (an informal ranking below species level) Thiersii , in which he places A. thiersii along with A. albofloccosa , A. aureofloccosa , A. foetens and A. praeclara . The mushroom is commonly called " Thiers ' lepidella " .

= = Description = =

The cap is white and dry , measuring 35 ? 100 mm (1 @.@ 4 ? 3 @.@ 9 in) wide , and convex in shape (conico- or plano @-@ convex) . It often has a broad low umbo . The cap 's flesh may be 10 mm (0 @.@ 4 in) thick . At first the cap is covered by the soft , white fragmentary remains of the universal veil , which become more widely separated as the cap expands . They are shaggy and somewhat sticky .

The gills are of varying lengths . They are free from the stipe and vary from crowded to widely spaced . They may be narrow or broad and are white to creamy yellow in color . The stipe is white and is 80 ? 200 mm (3 ? 8 in) long and 10 ? 20 mm (0 @.@ 4 ? 0 @.@ 8 in) wide . In some specimens , the stipe bruises to a yellow color . It is either hollow or lightly stuffed with a cottony tissue . The bulb at the base is slightly broader than the rest of the stipe . The bulb is 25 mm (1 @.@ 0 in) long and 22 mm (0 @.@ 9 in) wide . A shaggy , drooping ring is present which is often shed before maturity .

Spores of A. thiersii are white and roughly spherical . They measure approximately 7 @.@ 8 ? 9 @.@ 8 by 7 @.@ 3 ? 9 @.@ 0 µm and are amyloid . In an analysis , both monokaryotic (one nucleus per cell) and dikaryotic (two nuclei per cell) strains were isolated from fruit bodies . All the spores were found to be binucleate but the researchers believed that in the monokaryotic strain , the second nucleus had failed to pass through the germ tube .

The odor of this mushroom is indistinct but with age can become unpleasant , like that of decay or cheese . The fungus is said to taste oily bitter or bitter metallic .

= = = Identification = = =

A. thiersii may be gathered inadvertently and thought to be edible due to the fact that it grows on lawns among grasses . This is in contrast to most of the other Amanita species which grow around trees and are thus usually seen in forests . It can be distinguished from other white fungi growing in grassland by its fluffy cap , though the white veil fragments may eventually get washed away by rain .

It is similar in appearance to a number of other Amanita species . It can be distinguished from A. praegraveolens microscopically by the absence of clamp connections between the cells in A. thiersii . Both A. thiersii and A. aureofloccosa have hollow stems but the latter has a more tapering stipe and the whole fruit body is yellower . A. silvifuga is another species that grows in similar locations in grassland in Texas and H. D. Thiers described the taste of both it and A. thiersii as being bitter . It can be distinguished by its darker coloration and more warted appearance .

= = Toxicity = =

The species is suspected of being toxic as is the case in most of its close relatives . Handling the mushroom is harmless ; poisoning occurs only on ingestion . A case of poisoning that may have been caused by A. thiersii has been reported from the state of Puebla , Mexico . The outcome of this case is unknown . Symptoms of poisoning in humans include reversible impairment of kidney function . A Meixner test revealed that amatoxins were not involved in the Puebla case .

= = Ecology and habitat = =

Amanita thiersii inhabits lawns , pastures and prairies throughout the Mississippi River Basin . It often forms fairy rings or arcs but also sometimes fruits as isolated specimens . It has been found growing in the same lawn as Chlorophyllum molybdites . Analysis using stable carbon isotopes has proved that this mushroom is saprotrophic in nature , unlike the other mycorrhizal Amanitas .

The fruit bodies of A. thiersii grow during the mid or late summer until early fall . Since it was first reported in 1952 in Texas , this species has been expanding its range . It appeared in southern Illinois in the 1990s and has since spread to central Illinois , where it is the most common mushroom found in lawns during July and August . Today it occurs in nine states including Missouri , Oklahoma , Texas , Kentucky , Ohio , Kansas and Illinois . It also occurs in Mexico .

= = Genome project = =

The main source from which A. thiersii derives its carbon is the cellulose of the decomposing plant material found in its grassland habitat . The enzymes that degrade cellulose are homologous to the enzymes used by ectomycorrhizal fungi that have symbiotic associations with plant roots . In an attempt to identify the genes involved in these processes , researchers at the United States Department of Energy and Harvard University are jointly working to sequence the A. thiersii genome and to compare it with that of Amanita bisporigera , a species which forms mycorrhizal relationships with tree and which has already been partly sequenced . They hope to better understand the genetic pathways involved in the evolution of ectomycorrhizal associations . Another research objective is to establish whether the enzymes used by A. thiersii to degrade cellulose can be cost @-@ effectively used in the conversion of crop residues into biofuels . A. thiersii seems to be expanding its range northwards and its genome may provide clues as to how it is adapting to climate change and further information on mycorrhizal relationships .

This research has shown that there was a single origin of ectomycorrhizal symbiosis in the Amanita genus . DNA analysis has shown that a group of species in the subsection Vittadiniae (which includes A. thiersii) has few derived characteristics . This clade has a single ancestor (or a very small number) and seems to have come into being at a very early stage in the evolution of the genus .