= Banksiamyces =

Banksiamyces is a genus of fungi in the order Helotiales , with a tentative placement in the family Helotiaceae . The genus contains four species , which grow on the seed follicles of the dead infructescences or " cones " of various species of Banksia , a genus in the plant family Proteaceae endemic to Australia . Fruit bodies of the fungus appear as small (typically less than 10 mm diameter) , shallow dark cups on the follicles of the Banksia fruit . The edges of dry fruit bodies fold inwards , appearing like narrow slits . The first specimens of Banksiamyces , known then as Tympanis toomansis , were described in 1887 . Specimens continued to be collected occasionally for almost 100 years before becoming examined more critically in the early 1980s , leading to the creation of a new genus to contain what was determined to be three distinct species , B. katerinae , B. macrocarpus , and B. toomansis . A fourth species , B. maccannii , was added in 1984 .

= = Taxonomy = =

In 1887 , English mycologists Miles Joseph Berkeley and Christopher Edmund Broome described a species of fungus they named Tympanis toomansis , collected from dead infructescences (" cones ") of Banksia growing on the banks of the Tooma River in southern New South Wales , Australia . Its generic placement was a result of its resemblance to Tympanis , a genus in the family Helotiaceae of the Ascomycota .

Additional collections , then still believed to be T. toomansis , were made from South Australia in 1952 , again on dead cones of unspecified Banksia , and also in 1956 on dead cones of Banksia marginata . In 1957 and 1958 , R. W. G. Dennis redescribed the species , and after consultation with Canadian mycologist James Walton Groves , who had earlier completed a monograph on the genus Tympanis , transferred the taxon to the genus Encoelia (family Sclerotiniaceae) . Encoelia species are small , tough , brownish discomycetes that typically grow in clusters on hardwood or woody substrates . Because the original collections were incomplete and certain microscopic features inadequately described , various collections made from Australia were presumed to be variations of the original 1887 collection .

In the 1980s , the availability of fresh specimens of the fungus ? collected by Australian mycologist Bruce A. Fuhrer from the cones of Banksia spinulosa ? prompted Gordon Beaton and Gretna Weste to reexamine the previous collections . Various apparent and microscopic differences were found which suggested that three distinct species were represented in the collections , and further , the species differed enough from other Encoelia species to warrant the creation of a new genus , which Beaton and Weste named Banksiamyces . The three Banksiamyces species they described in 1982 were the original B. toomansis (those initially named T. toomansis) , as well as B. macrocarpus and B. katerinae . A fourth species , B. maccannii , was added to the genus by the same authors in 1984 . A 2006 study identified two additional taxa that did not quite meet the description for previously published species ; these have been called Banksiamyces aff. macrocarpus and Banksiamyces aff. toomansis . Some existing species were found on other banksia species , so evidence strengthened that the individual Banksiamyces fungi did not exclusively parasitize only one banksia species , a suggestion proposed by Beaton and Weste in 1982 .

Banksiamyces is classified in the Helotiaceae , a widespread but poorly known family of fungi , many species of which are saprobic on herbaceous or woody tissues . The placement in the Helotiaceae is tentative , and no molecular analysis has yet been performed that might clarify the phylogenetic relationships of Banksiamyces to other taxa in the Helotiales order . Based on physical similarity , Wen @-@ Ying Zhuang included Banksiamyces under Encoelia in his 1998 study of the Encoelioideae subfamily of the Helotiaceae . He conceded , however , that he had not examined any specimens .

= = Description = =

The fruit bodies , or apothecia , of Banksiamyces species are cup @-@ shaped receptacles borne

on a stipe (stalk) , colored dark brown to black with a dark grey center . When dry , the apothecia are covered with a whitish powder . The edges of the cup may be rolled inwards (especially when dry) , or be twisted and somewhat flattened . Both the outermost tissue layer (the ectal excipulum) and the tissue of the stalk are made of fungal cells with brown pigments that can be variously thick- or thin @-@ walled , covered with small particles (granules) , and spherical to ellipsoid . The middle tissue layer (the medullary excipulum) of both the cup and the internal tissue layer (the medulla) of the stalk contain a layer of tissue made of hyphae similar to the ectal excipulum . A second layer of tissue is made of hyphae that are translucent and gelatinous ; this layer may be present in either the medullary excipulum , the medulla , or both .

The asci are elongated reproductive structures that bear ascospores , in groups of eight . Banksiamyces species have asci that are cylindrical to club @-@ shaped , and contain a plug at their extreme tips that will absorb color when stained with iodine . The ascospores may be arranged in one or two rows (uniseriate and biseriate , respectively) , or rarely , irregular . The ascospores are ellipsoid , translucent , have a slight curve and may be tapered ; most ascospores contain two oil drops . When in the ascus , the ascospores are covered with a translucent mucilage that is highly refractive to light . Paraphyses are filamentous hyphal cells present in the fertile spore @-@ bearing tissue , distributed amongst the asci . The free ends of the paraphyses fork and branch , combining with the tips of the asci to form a translucent to brown pigmented layer of tissue .

= = Species = =

B. katerinae is named after G. Beaton 's wife , the senior author of the 1982 protologue . It was first discovered in 1964 , growing on the seed follicles of dead cones of Banksia ornata in the Mount Zero Area in the Grampians in northwestern Victoria .

B. maccannii , first described in 1984 , was found on dead Banksia saxicola cones . The specific epithet was chosen to honor Ian McCann , for his " discovery of the type collection and ... his years of ecological , educational and conservation work in the Victorian Grampians . " The fungus is distinguished from the other Banksiamyces species by its larger asci , larger spores , and tapering paraphyses tips . Further , the type collection was found fruiting in December and January , compared to winter and autumn for other Banksiamyces .

B. macrocarpus grows on the dead cones of Banksia spinulosa , and was first collected near Tonimbuk , Victoria in 1981 . It is the type species of Banksiamyces .

B. toomansis is the species originally described and illustrated by Berkeley and Broome . The type collection was found on a cone of Banksia marginata on the banks of the Tooma River of New South Wales . It has also been recovered from a cone of Banksia sphaerocarpa from near Busselton in Western Australia , B. nutans , B. pulchella , B. speciosa , and B. occidentalis , all from Mount Merivale , 20 km (12 mi) east of Esperance , B. baxteri cultivated at Cranbourne Botanic Gardens , B. integrifolia from the Blue Mountains , and B. marginata from Kangaroo Island . Synonyms include Tympanis toomansis Berk . & Br . , and Encoelia toomansis (Berk . & Br .) . Its ascospores can range in shape from elliptical to cylindrical , and have dimensions of 6 ? 10 by 2 @.@ 5 ? 3 µm .