

= *Coccomyces dentatus* =

*Coccomyces dentatus* is a species of fungus in the family Rhytismataceae . A widespread species , particularly in temperate areas , it colonizes the dead fallen leaves of vascular plants , particularly oak and chestnut . The fungus apothecia , which form in the epidermal layer of the leaf host , resemble dark hexagonal spots scattered on a multi @-@ colored mosaic pattern bounded by thin black lines . When mature , the apothecia open by triangular flaps to release spores . The anamorph form of *C. dentatus* is *Tricladopsis flagelliformis* . Lookalike species can be distinguished by the shape of the apothecia , or by microscopic characteristics .

= = Taxonomy = =

The species was first described scientifically as *Phacidium dentatum* by Johann Karl Schmidt in 1817 . Italian botanist Giuseppe De Notaris moved it to *Lophodermium* in 1847 . In 1877 , Pier Andrea Saccardo transferred it to *Coccomyces* , giving it its current name . The variety *C. dentatus* var. *hexagonus* , described by Otto Penzig and Saccardo from West Java , Indonesia in 1901 , is sometimes applied to western US collections with large six @-@ sided apothecia . However , its status is unclear , as the type is no longer in Saccardo 's herbarium at the University of Padua , and Penzig 's collection was destroyed during World War II . *C. dentatus* f. *lauri* was described by Heinrich Rehm in 1901 , for a collection found growing on a species of Lauraceae in Rio Grande do Sul ( southern Brazil ) . According to English botanist Martha Sherwood , who revised the genus *Coccomyces* in 1980 , it is indistinguishable from the main type and should be considered synonymous .

One author regarded *C. dentatus* as a synonym of *Coccomyces coronatus* , although later authors have treated them separately . In 1923 , Carlos Luigi Spegazzini tentatively reported the presence of *C. dentatus* on fallen *Nothofagus* leaves in Tierra del Fuego ( southern South America ) ; this species was later identified as a distinct species , *C. australis* .

In 1982 , Enrique Descals described an aquatic hyphomycete *Tricladopsis flagelliformis* growing from submerged leaves found in the shoreline of Windermere ( Cumbria , England ) , which he tentatively assigned as the anamorph state of *Coccomyces dentatus* . The specific epithet *flagelliformis* ( from the Latin *flagellum* " whip " and *formis* " shape " ) refers to the " whip @-@ like " form of the conidium .

= = Description = =

The apothecia of *Coccomyces dentatus* are distributed in bleached spots that are bounded by a black lines inside the outer cell layer of the leaf ( intraepidermal ) . The black lines ? often referred to as zone lines ? are the result of an antagonistic interactions between individuals of different genotypes that colonize the leaf surface . Apothecia are usually accompanied by pycnidia ( asexual fruit bodies ) measuring 0 @. @ 5 ? 1 @. @ 0 mm in diameter . The apothecia are black , and shiny , with four to six sides . They have a star @-@ shaped pattern of grooves formed by lighter colored cells . When the spores are mature , these open ( dehisce ) by triangular " teeth " to expose the dull yellow hymenium ( spore @-@ bearing surface ) .

The layer covering the apothecia is about 30 ?m thick , and made of blackened ( carbonized ) cells measuring 5 ? 6 ?m in diameter . At the base of the apothecia is carbonized supportive tissue about 5 ?m thick . The paraphyses ( sterile filamentous hyphal cells ) are unbranched , threadlike ( filiform ) , gradually enlarge to a width of 2 @. @ 0 ?m at the tip , and have granular contents . The thin @-@ walled cylindrical to club @-@ shaped asci ( spore @-@ bearing cells ) are on a short stalk , and measure 70 ? 105 by 8 ? 10 ?m ; each ascus contains eight ascospores . Ascospores , which measure 45 ? 65 by 3 @. @ 0 ?m , have a thin but distinct sheath , and lack septa ( cross @-@ walls ) . Pycnidia ( which appear before the apothecia mature ) are intraepidermal , lenticular ( having the shape of a double @-@ convex lens ) in cross section , 0 @. @ 1 ? 0 @. @ 3 mm in diameter , and covered with a dark brown layer of cells . The phialides are arranged in a basal layer

, and borne on short conidiophores . They are slender and subulate ( tapering to a point ) , lack a collarette , and measure  $5 \times 10$  by  $2 \times 2$  @. @  $5 \times m$  . The conidia are colorless , rod @-@ shaped , lack septa , and have dimensions of  $4 \times 5$  by  $1$  @. @  $0 \times m$  .

The putative anamorph form of *C. dentatus* has been described as *Tricladopsis flagelliformis* . Grown on 2 % malt agar at standard conditions , it forms black @-@ centered colonies that have a growth rate of 7 cm per week . The conidia produced are thin and curved with a whip @-@ like shape . They have  $13 \times 20$  septa , measure  $65 \times 135$  by  $2 \times 3$  @. @  $5 \times m$  , and usually have a single branch ( typically about  $45 \times m$  long ) that appears before cells are released .

There are only a few species of Rhytismatales known to have anamorphs that do not function as spermatia ( non @-@ motile cells that function as a male gamete ) . *Coccomyces dentatus* is one of only two species that are known to have both a spermatial and a non @-@ spermatial state ( the other is *Ascodichaena rugosa* ) .

= = = Similar species = = =

The species is frequently confused with *Coccomyces coronatus* , which has inflated paraphyses , longer asci and ascospores , less regularly shaped apothecia , and rarely occurs on leaves of evergreens . It prefers to grow on well @-@ rotted leaves , and is found predominantly in northern Europe and eastern North America . *C. tumidus* is somewhat similar in appearance , but distinguished in the field by round to ellipsoid apothecia . *C. australis* has circinate ( rolled up with the tip in the center ) rather than filiform paraphyses , larger asci and somewhat larger ascospores (  $150 \times 180$  by  $14 \times 16$  @. @  $5 \times m$  and  $60 \times 75$  by  $2$  @. @  $5 \times 3 \times m$  , respectively ) . Another lookalike species that is morphological quite similar to *C. dentatus* is *C. kinabaluensis* , found in the Malaysian state of Sabah . However , the latter can be distinguished by the following characters : three- to four @-@ sided ascocarps ; ascospores with a single septum ; and longer , wider asci measuring  $110 \times 135$  by  $10 \times 14 \times m$  .

= = Habitat and distribution = =

*Coccomyces dentatus* is a saprobic species , and grows on dead leaves of a wide variety of angiosperms . It is frequently encountered on members of the heather ( family Ericaceae ) , and the beech family ( Fagaceae ) , such as oak ( red , white , and live oak ) and chestnut , and also on the exotic *Castanea sativa* from Chile . Other common substrates include leaves of trees in the genera *Rhododendron* , *Lithocarpus* , *Berberis* , *Arbutus* , *Gaultheria* , and *Myrica* .

Widely distributed and common , the fungus occurs predominantly in warm temperate areas . It has been found in Africa ( Tunisia ) , Europe , and the Americas . In the northern part of its range , it occurs in the summer and autumn , but in subtropical areas it can be found year @-@ round . Because of its wide geographical distribution , abundance , and conspicuousness , *Coccomyces dentatus* is the most often collected species of *Coccomyces* .