THE PSILOPEZIOID FUNGI X. CHARACTERISTICS OF *PACHYELLA BABINGTONII* IN CULTURE

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Abstract. *Pachyella babingtonii* (Pezizales, Pezizaceae) produces both hyaline, thin-walled, 1-, 2- or 3- celled conidia and pale brown, thick-walled chlamydospores in axenic culture. The blastic conidia are produced on short denticles either directly on the assimilative hyphae or on short, erect, slightly swollen branches. The conidia and their mode of production are similar to those reported for some other members of the Pezizaceae but this is the first report of an anamorph for a species of the genus *Pachyella*. Chlamydospores have been found near apothecia of *P. babingtonii* in field-collected material; conidia have not been observed in nature.

Keywords: *Pachyella,* Pezizaceae, Pezizales, psilopezioid fungi, taxonomy.

The psilopezioid fungi are a polyphyletic assembleage of operculate discomycetes (Pezizales) that occur in similar habitats—on wet or water-soaked wood in running water. Here we report the details of the formation of chlamydospores and conidia in cultures of *Pachyella babingtonii* (Berk. & Broome) Boud., one of the psilopezioid fungi. Pfister and coauthors outlined the taxonomy of the genera included in the psilopezioid fungi in a series of publications, the most pertinent to this paper being Pfister's (1973) monograph of the genus *Pachyella* Boud. Because of their aquatic or semi-aquatic habitat, one might expect specialized aquatic anamorphs to be produced but the only anamorph reported is the staurosporous hyphomycete *Actinospora gigantea* Ingold (Webster and Descals, 1979) for *Miladina lechithina* (Cooke) Svrček (Svrček, 1972; Pfister and Korf, 1974), a member of the Otidiaceae.

MATERIALS AND METHODS

Collection studied

On water-soaked wood, outlet of Hutchins Pond, Punkatasett Hill, Concord, Massachusetts, USA, D. H. Pfister, 2 July 1997 (FH, specimen, substrate and dried culture; culture deposited NRRL 26829).

Ascospore isolation

Water agar plates of 5.5 cm diam were inverted over apothecia collected within the previous 24 hours. Ascospores were collected for 4–6 hours at room temperature (ca 20 C). The plates were incubated at ca 4 C and checked for germination every 3–5 days. After ascospores germinated they were transferred to malt-yeast extract agar plates (Stevens, 1974); cultures were incubated at room temperature and at 4 C. To encourage sporulation pieces of agar on which the fungus was growing were removed and floated in sterile distilled water in petri plates. These blocks were incubated at room temperature and at 4 C and periodically examined.

Terminology

Descriptive terminology for conidial ontogeny and development follows Hennebert and Sutton (1994).

RESULTS

Ascospore germination

Ascospores germinated 12–14 days after deposition. Broad, thin-walled hyphae, 6–8μm diam were produced. The hyphae frequently anastomose. The resulting colonies were white and grew closely appressed to the surface of the media with few aerial hyphae.

Conidial formation

Conidia were observed about four weeks after germination. The conidia were hyaline, aseptate or, more rarely, 1- or 2-septate, blastic, hologenous, and solitary on short denticles. The conidiogenous cells were determinant, persistent and produced one conidium at each

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Follows Pfister, D. H. 1995. The psilopezioid fungi. IX. *Pachyella habrospora*, a new species from Brazil. Mycotaxon 54: 393–96.

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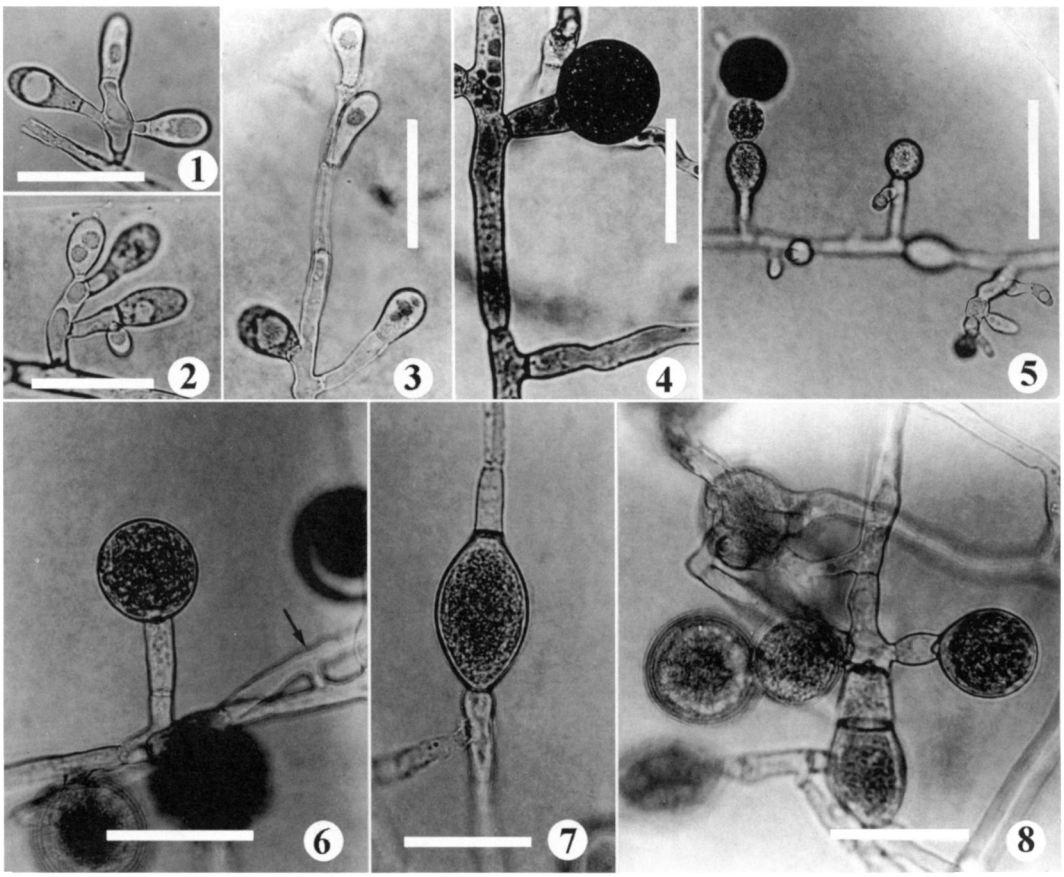
locus. A single conidiogenous cell produced one or several loci. Secession of the conidium was schizolytic and produced a closed denticle or protuberant unthickened scar. Conidia occurred singly or in groups directly on the vegetative hyphae or on short, club-shaped branches (Figs. 1–3, 9, 10, 14–20). Conidia were truncate proximally, elongate-elliptical, but their shape was variable, 21–40 × 9–13 µm. The contents of the conidia were densely cytoplasmic and contained refractive inclusions. Conidia and chlamydospores were produced in close proximity (Fig. 5). Conidia did not germinate in culture.

Chlamydospore formation

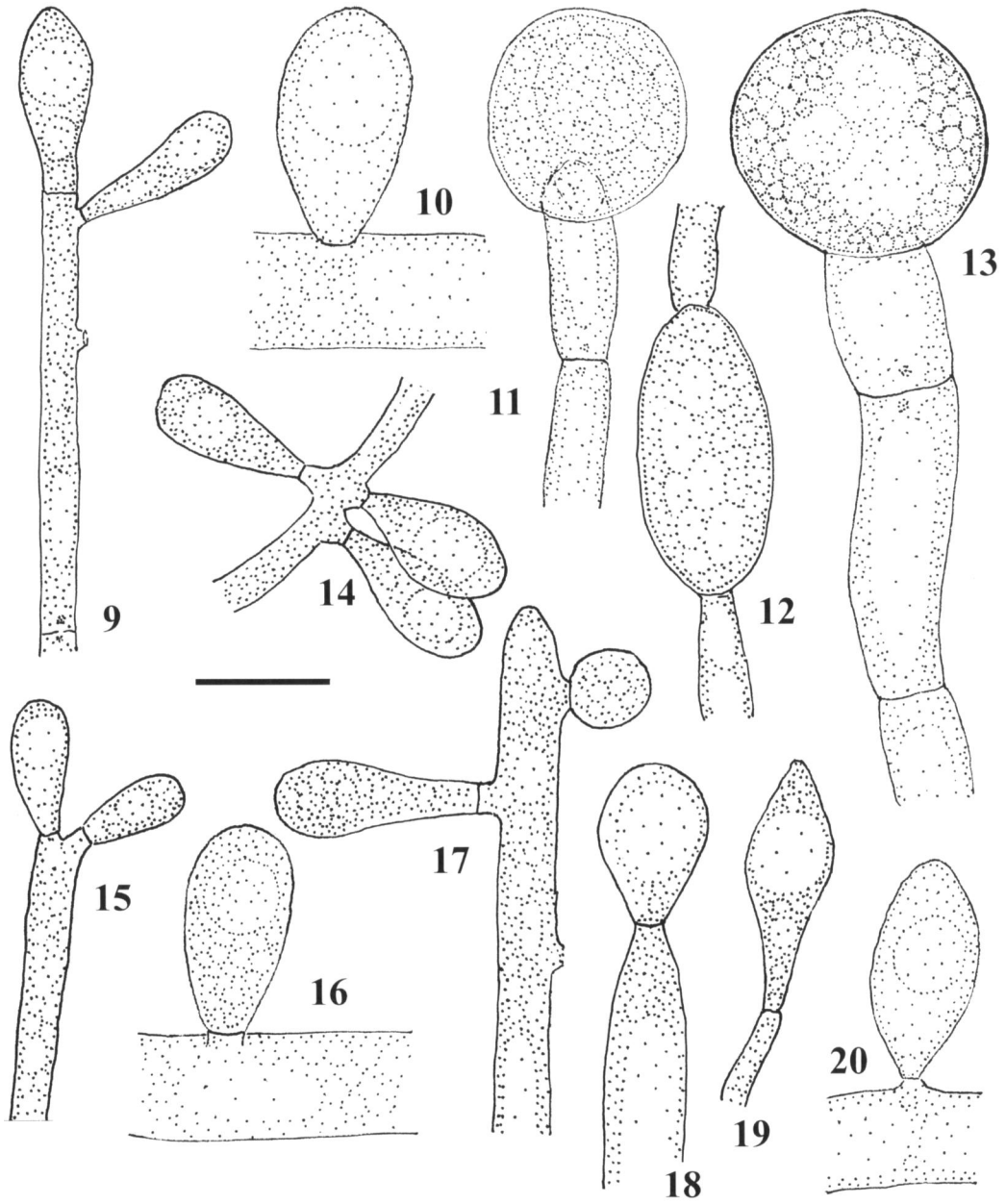
After two days of growth, spherical, 20–48 µm diam, to pyriform, 20–24 × 12–32 µm, chlamydospores began to form on short hyphal branches along the primary hyphal axes (Figs. 4, 5–6, 11, 13). Mature chlamydospores were smooth, pale brown with walls reaching a thickness of 1.6 µm. In older cultures the chlamydospores germinated to produce either hyphae or another chlamydospore. In older cultures both basipetal chains of chlamydospores and intercalary chlamydospores were observed (Figs. 7–8, 12).

Discussion

Some *Peziza* species produce *Oedocephalum* states. These typical *Oedocephalum* states have conidia that are produced on globose, swollen conidiogenous heads. Conidial states similar to the one we describe in *P. babingtonii* have been referred to as "reduced *Oedocephalum*" states



Figures 1–8. *Pachyella babingtonii* conidia, conidiogenous cells and chlamydospores. 1–3. Conidia and conidiogenous cells, scale = 35µm; 4, Chlamydospore, scale = 35µm; 5, Chlamydospores, conidia and conidiogenous cells. Note the 3 chlamydospores forming a chain, scale = 70µm; 6, Chlamydospore and hyphal anastomosis (see arrow), scale = 35µm; 7, Intercalary chlamydospore, scale = 35µm; 8, Group of chlamydospores, single and in chains, scale = 35µm.



FIGURES 9–20. *Pachyella babingtonii* conidia, conidiogenous cells and chlamydospores. Scale = 20μm; 9, 10, 14–20, Conidia and conidiogenous cells in various arrangements; 11–13, Clamydospores showing terminal clamydospores in 11 and 13; and an intercalary clamydospore is shown in 12.

in some species of *Peziza* (Berthet,1964; Paden, 1972). In these reduced forms only a few conidia are produced on slightly swollen, cylindrical or clavate conidiogenous cells. The conidial anamorph of *P. babingtonii* differs from these reduced forms in the near absence of differentiated conidiogenous cells and the tendency for some conidia to become septate. In part because of these differences, we have not placed the conidial state of *P. babingtonii* in a form genus but these observations on the morphology and the mode of conidial development in *P. babingtonii* are consistent with those of other members of the Pezizaceae.

Chlamydospores have been sporadically reported in cultures of the Pezizaceae. Berthet (1964) found similar structures in cultures of *Peziza phyllogena* Cooke (as *Galactina badioconfusa*) and Paden (1967, 1972, 1973) referred to such structures in other members of the family. We have used the term chlamydospore for thick-walled, non-seceding mitospores as defined by Griffiths (1974). Paden (1972) referred to similar structures as aleurospores in reference to other members of the Pezizaceae. Size, shape and pigmentation of the chlamydospores of *P. babingtonii* vary and the extent to which chains form also varies depending on growing conditions and age of the cultures.

Conidia have not been observed on natural substrates and their function is unknown; we have not seen them germinate. On the other hand, chlamydospores have been found on the wood on which apothecia of *Peziza babingtonii* were collected. The presence of chlamydospores in *P. babingtonii* might be correlated with the habitat in which this fungus grows. Over many years of collecting these fungi the junior author has found that the wood, on which *P. babingtonii* grows, is wet in the spring and early summer but is often dry in the late summer and fall when streamlets and pools dry down. Additionally, a particular piece of wood produces ascomata over several years if left undisturbed. The presence of chlamydospores in older cultures and on field-collected samples suggests that these propagules may play a role in the persistence and survival of these fungi in nature.

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