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A CULTURAL STUDY OF *PIPTOPORUS SOLONIENSIS* (APHYLLOPHORALES, POLYPORACEAE)

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ABSTRACT

Piptoporus soloniensis causes a butt rot of oaks in the United States. The basidiocarps superficially resemble those of *Laetiporus sulphureus*, although cultures of the two species are readily distinguishable. Cultural characters of *P. soloniensis* are given and compared to those of *L. sulphureus.*

Key Words: Aphyllophorales, Polyporaceae, *Piptoporus soloniensis*, *Laetiporus sulphureus*, butt rot, cultural characters.

For almost 50 years, a culture has been maintained in the collections of the Center for Forest Mycology Research (formerly Division of Forest Pathology) under the name *Polyporus amygdalinus* Berk. et Rav. This culture from Louisiana was isolated from decay in oak (*Quercus* sp.) associated with a basidiocarp. Lowe and Pegler **(1973)** after examining the type specimen of *P. amygdalinus* determined that the concept of that species as held by American mycologists was incorrect. They concluded that the correct name for the misidentified American specimens should be *Polyporus pseudosulphureus* Long. Long **(1917)** chose the epithet for his new species because the basidiocarps superficially resemble weathered specimens of *Laetiporus sulphureus* (Bull. : Fr.) Bond. et Sing. Lowe identified the basidiocarp associated with our rot culture as *P. pseudosulphureus.*

Later, Lowe **(1975)** found an earlier name for *P. pseudosulphureus* and published the combination *Tyromyces trichrous* (Berk. et Curt.) Lowe. Recently, Schumacher and Ryvarden **(1981)** reviewed the synonymy of this fungus, known to occur in Europe and other parts of the world. They determined that the currently acceptable name for the species is *Piptoporus soloniensis* (Fr.) Pilát. A cultural description of *P. soloniensis* is given, and its cultural characters are compared with those of *L. sulphureus.*

METHODS

The methods employed in studying the cultures, the arrangement of the description, and the explanation of the key patterns are the same as used in previous studies (Davidson *et al.,* **1942).** Mat descriptions and growth rates were based on 7- and 14-da-old cultures in 90 mm Petri dishes and incubated at 25 C on 1.5% malt extract agar (MEA) (Davidson *et al.,* **1942).** The species code following Nobles **(1965)** was derived from cultures inoculated on the edge of MEA dishes and examined for up to 6 wk.

Test tube cultures were grown at room temperature (about 25 C) in diffuse light. Extracellular oxidase production was detected by the Bavendamm test described by Davidson *et al.* **(1938),** in which cultures are grown on MEA containing 0.5% gallic acid (GAA) or 0.5% tannic acid (TAA). Nobles **(1958)** gum guaiac test was also used, in which an alcoholic solution of gum guaiac is applied to 3-wk-

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FIGS. 1–3. Cultures of *Piptoporus soloniensis* (HHB-6584-S) grown at 25 C. 1. 2 weeks old on malt agar. 2. 1 week old on gallic acid agar. 3. 1 week old on tannic acid agar. (M 150 996)

old fungal mats grown on MEA. For the constant temperature study, isolates on MEA in Petri dishes were placed in incubators 24 h after plating and were measured at the end of 6 da incubation. Measurements of mat diameters represent averages of three replications of all of the individual isolates. Killing temperatures were determined by removing those cultures having no observable growth from the high test temperatures and incubating them at 25 C for 3 wk. Those that did not grow were presumed to have been killed at the high test temperatures.

Microscopic structures were drawn with the aid of a camera lucida. Capitalized color names are from Ridgway **(1912).** Herbarium designations are those of Holmgren and Keuken **(1974).**

CULTURAL DESCRIPTION

Key patterns.—A-0-1-1-2-11-16B-0-I-1-2-11-16, A-O-M-1-2-11-16.

Species code.—1.3.8.25.34.36.40.43.50.54.59.

Growth characteristics.—Growth rate intermediate, rarely medium, forming a mat 83–90+ mm in diam in 14 da (FIG. 1); mycelium white, appressed to intermediate, of distinct threads radiating from the inoculum and branching as they near the margin of mat, occasionally thinly overlaid with short fine downy growth and with or without a slight roll against edge of dish or with scattered, cottony balls white to Straw Yellow, fragile, adherent at 14 da; as mats age the distinct threads may become completely obscured by thin fine downy-cottony growth that may have large or small scattered areas ranging from Pinard Yellow to Apricot Yellow; by 6 wk mounds of finger-like fruiting primordia may develop near edge of dish, the latter of which may be as deep in color as Capuncine Orange; margin proper distinct, fimbriate; reverse discoloration none, bleaching MEA in 6 wk; odor fragrant, near sweet almond; oxidase reactions negative with Bavendamm and gum guaiac tests, in 7 da forming a mat 48–66 mm diam on GAA (FIG. 2) and 45–61 mm diam on TAA (FIG. 3), bleaching TAA.

Hyphal characteristics.—Hyphae staining in phloxine with abundant simple clamps, 1.5–6 μm diam (FIG. 4a); fiber hyphae of two kinds: (a) hyaline, aseptate, long flexuous, branching rarely, arising from small clamped staining hyphae, few by 14 da, 1.5–2.5 μm diam (FIG. 4b) and (b) hyaline, septate, with partially and frequently unevenly thickened walls, lumina staining at first, then remaining vis-

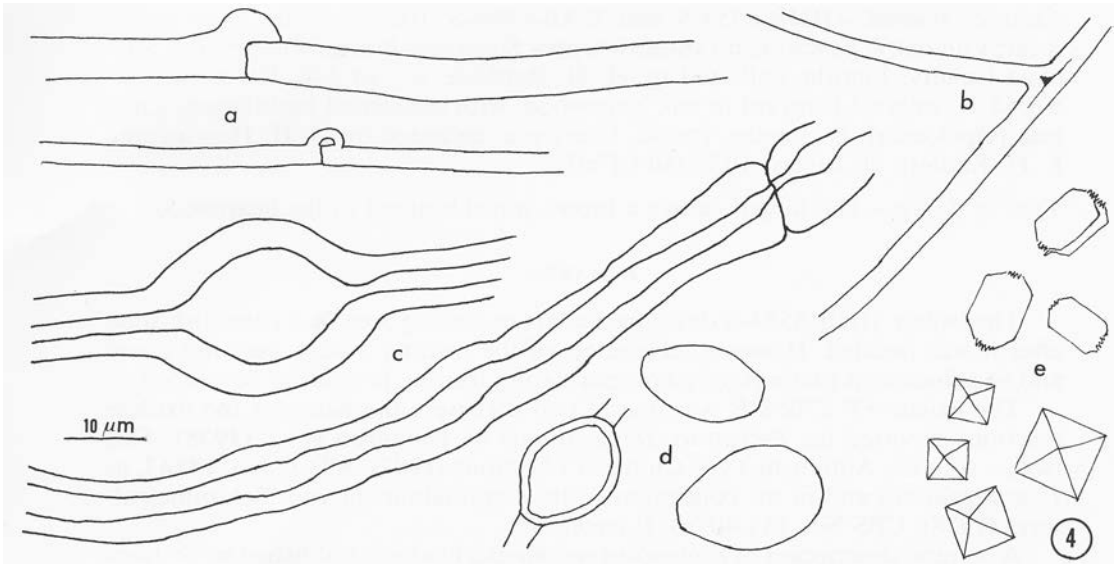

FIG. 4. Microscopic structures from culture of *Piptoporus soloniensis* (HHB-6584-S): a, generative hyphae; b, fiber hypha; c, fiber hyphae with partially thickened walls; d, chlamydospores; e, crystals. (M 150 997)

ible but nonstaining, 4–9 μm diam, diam varying irregularly, with expansions up to 18 μm diam in fruiting primordia (FIG. 4c); chlamydospores terminal or intercalary, with medium thick walls, ellipsoid to subglobose, 13–16.5 × 10–14 μm diam (FIG. 4d); crystals thin, single or layered plates and small octahedrons (FIG. 4e).

Test tube cultures. — In 28 da mat on agar slant white-tinged Pale Orange-Yellow to Antimony Yellow, deeply raised, loose, cottony-woolly, partially filling tube above slant, on top of which lumps or finger-like fruiting primordia develop against sides of tube, these Light Orange-Yellow to Orange-Buff, with terminal knobs Mikado Orange; mycelium on agar cylinder white, fine downy, intermixed with coarse threads radiating from the inoculum to bottom of agar cylinder; reverse at tip of slant Russet.

Temperature relations. — Average mat diameters of three isolates grown in triplicate on MEA in the dark, measured at the end of 6 da at the following constant temperatures: 12 C, trace,; 16 C, trace; 20 C, 23.2 mm; 22 C, 35.7 mm; 24 C, 43.1 mm; 26 C, 48.7 mm; 28 C, 55.3 mm; 30 C, 59.0 mm; 32 C, 54.0 mm; 36 C, trace; 40 C, trace; 44 C, no growth. Optimum, 30 C; killing, 44 C.

Incompatibility system. — Bipolar, with the following distribution of mating types among a sample of 30 single basidiospore isolates from dikaryotic isolate HHB-6584-S:

A,: 1, 2, 3, 5, 8, 9, 14, 15, 16, 20, 22, 25, 26, 27, 30.
A,: 4, 6, 7, 10, 11, 12, 13, 17, 18, 19, 21, 23, 24, 28, 29.

[2] Less than 11 mm diam including 4 mm inoculum plug.

Cultures studied. — HHB-6554-S and HHB-6584-S, tissue isolates from basidiocarps on oak (*Quercus* spp.) stumps, Upper Sugarfoot Prairie, Gainesville, Alachua County, Florida, collected by H. H. Burdsall, Jr., 14 July 1972; and FP[3] 57058-R, isolated from rot in oak heartwood, with associated basidiocarp, Opalusa [Opelousas], St. Landry Parish, Louisiana, collected by G. H. Hepting and F. H. Kaufert, 20 August 1932 (all CFMR).

Type of decay. — The fungus causes a brown piped butt rot in the heartwood.

REMARKS

The isolate HHB-6584-S developed a fertile fruiting area in a Petri dish soon after it was isolated. However, characters of the fruiting tissues were not noted and in subsequent platings only nonsporulating fruiting primordia developed.

The isolate FP 57058-R was one of two that were the basis for the oxidase reactions reported (as *Polyporus amygdalinus)* by Davidson *et al.* **(1938).** This isolate is in the American Type Culture Collections **(1982),** ATCC No. 14843, as *P. amygdalinus* and in the collections of the Centraalbureau voor Schimmelcultures **(1978),** CBS No. 151.40, as *T. trichrous.*

A cultural description of *Piptoporus soloniensis* has been published by Stalpers **(1978)** as *T. trichrous.*

Although the basidiocarps of *P. soloniensis* and *L. sulphureus* are somewhat similar, the cultures of the two species are readily distinguishable. Cultural descriptions of *L. sulphureus* have been published by several authors including Bakshi *et al.* **(1969),** Davidson *et al.* **(1942),** Nobles **(1948, 1965),** and Stalpers **(1978).** The cultures of *L. sulphureus* are characterized by pale pink to white mats, generative hyphae without clamps, chlamydospores, and conidia. The Key Patterns are: E-O-I-2-3-10, A-O-I-2-3-10, and E-O-M-2-3-10. The Species Code is: 1.6.7.33.34.36.38.43.44.54.55 (Nobles, **1965).** In contrast to these characters, cultures of *P. soloniensis* have white to yellow mats, clamped generative hyphae, fiber hyphae, and chlamydospores, but lack conidia. Both species give negative oxidase reactions.

The majority of the records of *P. soloniensis* in the United States have been based on collections of basidiocarps. The species has been found only on oak and has been reported from Alabama, Florida, Lousiana, and South Carolina (Lowe, **1975;** Lowe and Pegler, **1973).** According to these authors the basidiocarps occur on down branches and trunks, especially those lying in wet localities. However, two of the cultures used in this study were isolated from basidiocarps on oak stumps. One basidiocarp specimen (HHB-9791) in CFMR was collected 6–7 ft up on the trunk of a living live oak (*Q. virginiana* Mill.) in Leon County, Florida.

Hepting **(1941)** isolated the fungus (reported as *Polyporus pseudosulphureus)* from rot in a decay study of cull in oak following fire in the Appalachian Mountain region. The decay in the butt of the infected tree in his study extended to 5.3 ft above ground level. The mountainous areas in which the survey was conducted ranged from northern Georgia to northern Virginia, west into West Virginia, and south into eastern Tennessee. The specific area from which the decay specimen was collected is not recorded. However, this record may extend the range for the fungus in the United States and pathologists should be alert to the possible presence of this wood-decaying species in a broader area than records on the basidiocarps would indicate.

[3] Designation for CFMR herbarium specimens and cultures.

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