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FIBROPORIA ANGULOPORA, A NEW SPECIES (APHYLLOPHORALES, POLYPORACEAE) ASSOCIATED WITH BROWN-ROT OF *PSEUDOTSUGA MENZIESII* RESIDUE IN WESTERN OREGON

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ABSTRACT

A new wood-inhabiting basidiomycete, *Fibroporia angulopora,* is described from the Cascade Mountains in western Oregon. The fungus is associated with a brown-rot decay of Douglas-fir residue in old growth stands. Characteristics derived from studies of fruiting bodies and cultures are presented and incompatibility system (mating type) determined. The generic position of *F. angulopora* is discussed with reference to *Fibuloporia* and *Stranguli-dium.*

Key Words: cultures, mating type, *Fibroporia angulopora,* brown-rot, Douglas-fir, *Pseudo-tsuga menziesii.*

In a recent survey of wood-rotting fungi, Gilbertson **(1980, 1981)** estimated that only 6% of the number of recorded or known species of wood-rotting fungi (approximately 1700) are associated with or known to cause the brown-rot type of decay. This paucity of numbers of brown-rot fungi is extraordinary when the impact they have on conifer biomass decomposition is considered. Furthermore, the importance of the degradative product of these fungi cannot be underesti-mated. Brown-rotted wood in conifer ecosystems serves numerous and significant ecological functions: e.g., an important site for ectomycorrhizae formation, di-nitrogen fixation, a moisture reservoir during dry periods, and a nutrient sink (Harvey *et al.,* **1976;** Larsen *et al.,* **1980).**

We report here the occurrence of a previously undescribed effuse polypore causing brown cubical decay of conifer residue in western Oregon. Although this fungus is collected infrequently, the unique morphology of basidiocarps, cultural characteristics, and brown-rot decay system justify its recognition.

MATERIALS AND METHODS

Microscopic characters of basidiocarps were studied from sections mounted in Melzer's reagent (Melzer, **1924)** and others in 10% KOH stained with 1% aqueous Phloxine-B. The methods employed in studying the cultures are the same as used in previous studies (Davidson *et al.,* **1942).** The "Key Pattern" is derived from 2-wk-old cultures inoculated in the center of the dish. The "Species Code" of Nobles **(1965)** is derived from 6-wk-old cultures inoculated at the side of the dish. The cultures were inoculated on 1.5% malt extract agar (MEA) and incubated at 25 C. Extracellular oxidase production was detected by the Bavendamm test described by Davidson *et al.* **(1938),** in which the cultures are grown on malt agar containing 0.5% gallic (GAA) and tannic (TAA) acids, and the gum guaiac test described by Nobles **(1958),** in which an alcoholic solution is applied to fungal mats grown on malt agar.

1 In cooperation with the University of Wisconsin.

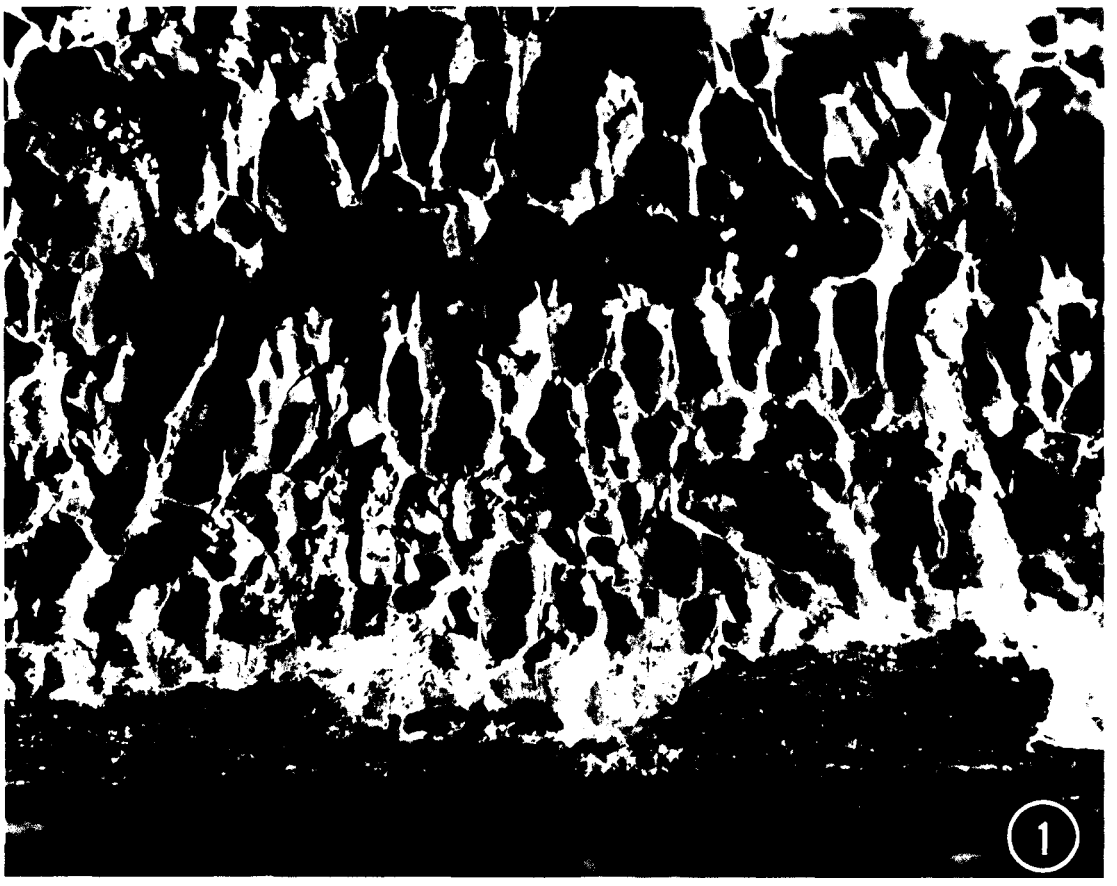


FIG. 1. *Fibroporia angulopora*. Macrophotograph of a portion of a basidiocarp depicting angular nature of pores, ×5. (From holotype FP 133431)

Microscopic structures were drawn with the aid of a camera lucida. Color designations are from Munsell **(1929–1942).** Herbarium designations are those of Holmgren and Keuken **(1974).**

DESCRIPTION OF BASIDIOCARPS

Fibroporia angulopora M. Larsen et Lombard, sp. nov. FIGS. 1–6

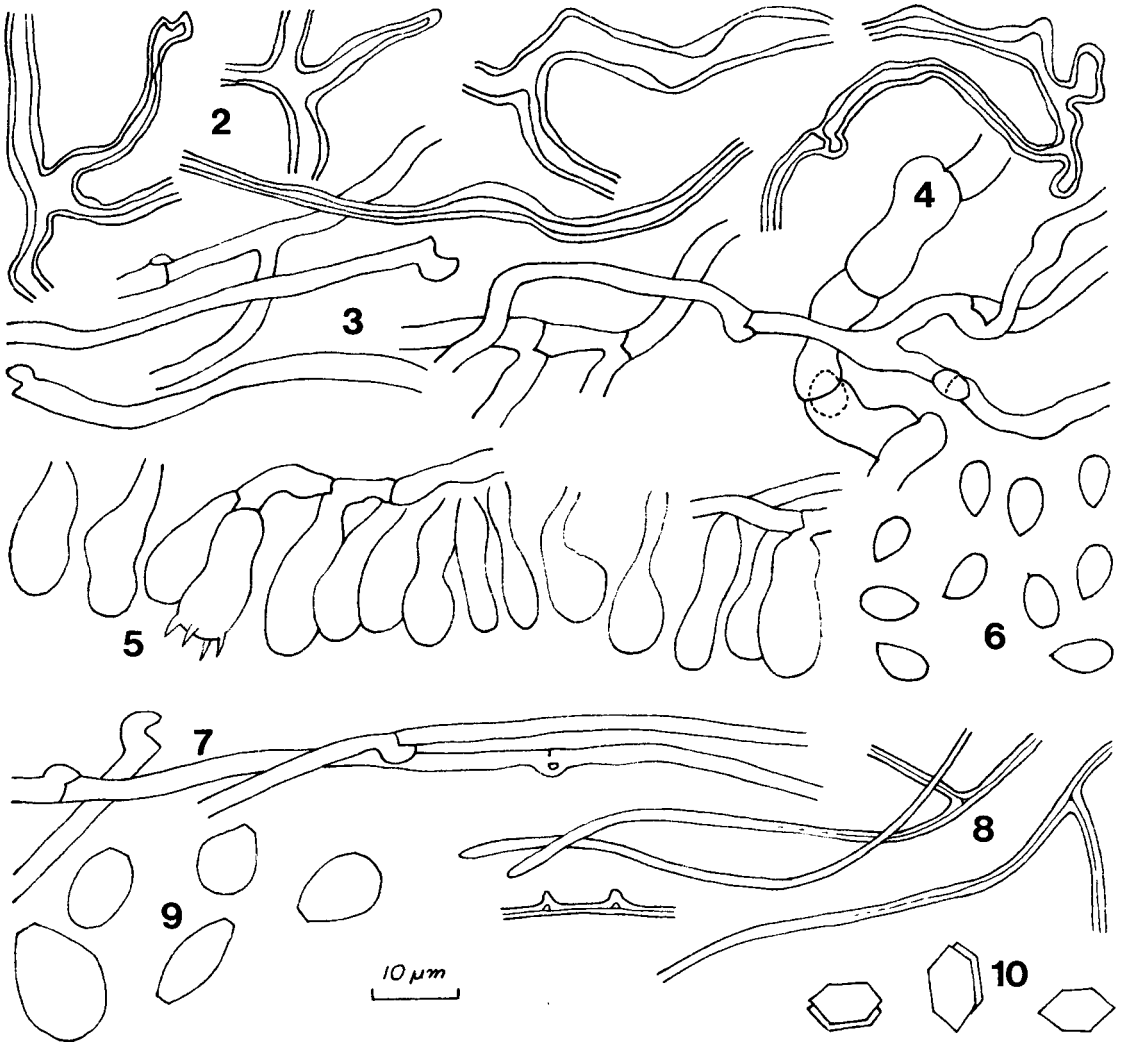
Basidiocarpis annuis, effusis; poris 1-4 mm latis, angulosis, laceratescens; hypha systemate monomitico; hyphis subiculis tortuosis, fibulatis; cystidiis absentibus; basidiosporis 5-6.5(-7) × 3-4 μm, ellipsoideis vel late ovoideis.

Heterothallinis et bipolaribus.

Holotypus: U.S.A., Oregon, Siuslaw National Forest, Mary's Peak, ad lignum *Pseudotsuga menziesii* (Mirb.) Franco, legit M. J. Larsen, 6 IX 1972, FP[2] 133431 (CFMR); isotypus in BPI, DAOM, et PRM.

ETYMOLOGY. From *angulosus* (L., adj., angular) + *porus* (L., n., pore) = *angulopora*, indicating the angular nature of pore mouths of basidiocarps.

[2] Designation for CFMR herbarium accession numbers.



FIGS. 2–6. *Fibroporia angulopora.* Line drawings of microscopic characteristics from holotype. 2. Thick-walled subicular hyphae. 3. Thin-walled hyphae proximal to pore layer and in tramal tissue. 4. Thin-walled tramal hyphae constricted at septa. 5. Clavate to suburniform basidia. 6. Basidiospores. FIGS. 7–10. Line drawings of microscopic characteristics from culture of holotype. 7. Clamped thin-walled hyphae. 8. Fiber hyphae. 9. Chlamydospores. 10. Crystals.

Basidiocarps annual, effuse, up to 6 mm thick, adnate, odor or taste not distinctive, margin abrupt, narrow, matted, cordons or rhizomorphs absent; pore surface pale cream to buff (near 10.0 YR 8/6); pores 1–4 mm or more across, waxy and somewhat fragile when fresh, becoming firm and slightly brittle when dry, angular, often coalescing and then becoming incised and lacerate (particularly on inclined surfaces); trama thinning towards pore dissepiments and increasing in width towards the subiculum; subiculum white, up to 2.5 mm thick and continuing unchanged into the trama, fairly compact.

Hyphal system monomitic. *Subicular hyphae* of two kinds, some (FIG. 2) 2.5-

4 μm diam, up to 6.5 μm in diam in swollen and irregularly shaped portions, intricately branched and becoming constricted and tortuous (hyphal growth apparently intrusive), thick- to very thick-walled, hyaline, septa with or without clamp connections, clamps not readily observed in tissues adjacent to the substratum, but septa with and without clamps were observed on hyphae of similar morphology more proximal to the pore layer; other subicular hyphae similar to those in the trama (FIG. 3) and found proximal to the pore layer; *tramal hyphae* of two kinds, some (FIG. 3) 2.5–3.5μm diam, septate with clamps, hyaline, thin-walled; other *tramal hyphae* (FIG. 4) not readily observed, up to 8 μm diam, septate with clamp connections, hyaline, thin-walled, constricted at septa: *cystidia* and *cystidioles* absent; *basidia* (FIG. 5) clavate to suburniform, 25–35(–40)× 6–9 μm, 4-sterigmate, septate with clamps at the base; *basidiospores* (FIG. 6) 5–6.5 (–7)× 3–4 μm, broadly ellipsoid, hyaline, tapering slightly toward the apiculus, frequently without contents or contents not staining, inamyloid, acyanophilous, apiculus sometimes prominent.

Additional specimen examined.—U.S.A., Oregon, Siuslaw National Forest, Mary's Peak, on *P. menziesii,* coll. M. J. Larsen, 6 IX 1971, FP 133019 (CFMR).

DESCRIPTION OF CULTURES

Key Pattern: A-O-S-1-2-11, Species Code: 1.3.8.34.36.38.46.50.55.59. **FIGS. 7–10**

Growth characteristics. Growth slow, forming a mat 38–43 mm diam in 14 da on MEA; mycelium white, intermediate to more or less appressed, very fine downy, soft, homogeneous, faintly zonate, covered with small clear guttations that can be seen with a 10× handlens, in occasional platings a slightly opaque halo develops around the mat in advance of the hyphal growth; margin proper finely fimbriate, almost indistinct; no reverse discoloration; odor slight, fruity; oxidase reactions negative with the Bavendamm and gum guaiac tests, making a trace–12 mm diam mat on GAA, no growth on TAA in 7 da; mat on GAA at 14 da similar in texture to that on MAA but with more distinct zonations, 23–32 mm diam.

Hyphal characteristics. Hyphae with abundant, simple clamp connections, staining in phloxine, with hyaline thin walls, 1–5.5μm diam (FIG. 7); non-staining fiber hyphae develop at the tips of very small clamped staining hyphae, few, with hyaline walls, with or without noticeable lumina, rarely branched, occasionally with short stubby branches, 1–2.5(–3.5)μm diam (FIG. 8); chlamydospores terminal or intercalary, with medium hyaline walls, subglobose, obovate, or oblong, 11–16.5× 6.5–13μm (FIG. 9); crystals single or bundles of thin plates (FIG. 10).

Incompatibility system. Heterothallic, bipolar, with the following distribution of mating types among a sample of 17 single basidiospore isolates from dikaryotic isolate FP 133019-R that sporulated in a Petri dish:

A$_1$: 1, 2, 3, 4, 5, 8, 10, 15, 18, 19.
A$_2$: 6, 7, 9, 11, 12, 14, 20.

Cultures studied. A polysporous isolate from the type FP 133431, and a rot isolate from decayed wood associated with FP 133019.

REMARKS

Fibroporia angulopora is readily identifiable by the nature of the pores, subicular hyphae, spore shape and size, and rot character. We are not particularly satisfied with the generic placement because the fungus possesses a combination

of characteristics that suggest a relationship to several genera, e.g., *Fibuloporia* Sing., and *Strangulidium* Pouz.

Fibuloporia, typified by *Polyporus molluscus* Fr. (≡ *Fibuloporia donkii* Domanski), is characterized by isodiametric pores, monomitic hyphal system with some slightly thick-walled hyphae, cordons, soft fibrous subiculum, and small, subglobose to broadly ellipsoid spores. *Strangulidium,* typified by *Polyporus sericeomollis* Rom., has a monomitic hyphal system with many thick-walled hyphae, thick-walled encrusted cystidia, oblong-ellipsoid spores, and suburniform basidia. *Fibroporia,* typified by *Polyporus vaillantii* DC.: Fr., is dimitic with thick-walled skeletal hyphae and broadly ellipsoid spores.

Because it is our contention that the type of decay (brown-rot vs. white-rot) caused by wood-rotting fungi is a fundamental generic character, we conclude that *Fibuloporia,* a genus of white-rot fungi, is an inappropriate taxon for our species. *Strangulidium* and *Fibroporia* are genera of brown-rot fungi. The morphology of *Strangulidium,* however, is too divergent to accommodate *F. angulopora.* Of the three genera, *Fibroporia* is the only one with characteristics more similar than dissimilar to those of *F. angulopora,* with the spore shape and size appearing as the most fundamental and unifying characteristics of *F. vaillantii* (DC.: Fr.) Parm. and *F. angulopora.*

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