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THE STATUS OF *MERIPILUS GIGANTEUS* (APHYLLOPHORALES, POLYPORACEAE) IN NORTH AMERICA

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ABSTRACT

The status of the species names *Meripilus giganteus, Grifola lentifondosa,* and *G. sumstinei* is reviewed with regard to synonymy. Data from studies of nomenclatural types by light and scanning electron microscopy indicate that they represent three distinct species. Data from studies of cultures of *M. giganteus* and *G. sumstinei* also indicate that these two names represent separate taxa. *Meripilus giganteus* and *G. sumstinei* are typified. The new combinations, *Meripilus sumstinei* and *Meripilus lentifrondosa,* are proposed. We conclude that *M. giganteus* does not occur in North America. A key to the species of *Meripilus* is provided, and pathogenicity and edibility of *M. giganteus* and *M. sumstinei* are discussed.

Key Words: *Meripilus giganteus, M. lentifondosa, M. sumstinei. M. talpae, M. tropicalis. Grifola,* root-rotfungi.

The purpose of this communication is to review the existing evidence for the identity of the fungus *Meripilus giganteus* (Pers. : Fr.) Karst., its occurrence in North America, and its relationship to the closely allied species represented by the names *Grifola sumstinei* Murr. (Murrill, **1904)** and *G. lentifrondosa* Murr. (Murrill, **1912).** Both of these latter names were placed in synonymy with *M. giganteus* by Ryvarden **(1985).** Various other authors have also noted the synonymy of *M. giganteus* with *G. sumstinei* as well as *G. mesenterica* (Schaef.) Murr. (Lowe, **1934, 1942;** Murrill, **1920, 1921;** Overholts, **1953;** Wolf, **1931).** In North America, the fungus is widely known as *polyporus giganteus* (Pers. : Fr.) Fr.

Early North American records of *M. giganteus* are sparse. Schweinitz **(1822)** recorded the fungus from North Carolina, Sprague **(1856)** from Massachusetts, Morgan **(1885)** from Ohio, Herbst **(1899)** from Pennsylvania, McIlvaine and Macadam **(1902)** from Pennsylvania and West Virginia, Peck **(1910)** from New York, and Overholts (1915) from Iowa, Missouri, Ohio, and Wisconsin.

Our attention was drawn initially to the possible existence of a species distinct from *M. giganteus* occurring in North America by a specimen and culture (FP 100460) from the Netherlands collected by Dr. R. W. Davidson in 1966. Companson of this isolate with those identified as *M. giganteus* from North America demonstrated differences sufficient to suggest the existence of two species. Guzman and Perez-Silva **(1975),** reporting on their studies of *Meripilus,* also suggested that the fungus known as *M. giganteus* in the United States was perhaps a different species.

MATERIALS AND METHODS

Data on microscopic characteristics of specimens examined were obtained from freehand vertical sections of basidiocarps in 2% (w/v) KOH and stained with 1% (w/v) Phloxine B, Melzer's reagent (IKI) (Melzer, **1924),** and cotton blue (Johansen, **1940).** Other basidiocarp portions were imbedded in plastic, sectioned with a Leitz microtome, and preserved in "Permount" (Fischer Scientific Co.) mounting media. Specimens examined by scanning electron microscopy (SEM) were first rehydrated in 10% KOH for 5 min, dehydrated sequentially in 15, 30, 50, 70, 90, 95, and 100% acetone, and critical point dried (CPD) in Balzer's Union CPD-020 in acetone. CPD specimens were transferred rapidly to SEM stubs and coated with 200 Å gold under argon in a Bio-Rad E5200 auto-sputter coater. Specimens were viewed at 25 kV and electron micrographs prepared with the aid of a Hitachi S-530 SEM. Capitalized color names are from Ridgway **(1912)** and herbarium designations are from Holmgren *et al.* **(1981).**

The methods employed in studying cultures

[1] Maintained at Madison, Wisconsin, in cooperation with the University of Wisconsin.

were the same as used in previous studies (Davidson *et al.*, **1942).** "Key Patterns" were based on 2-wk-old cultures inoculated in the centers of Petri dishes on 1.5% (w/v) malt extract agar (MEA) and incubated at 25 C. The "Species Code" of Nobles **(1965)** was based on 6-wk-old cultures inoculated at the sides of the dishes. Extracellular oxidase production was detected by the Bavendamm test, described by Davidson *et al.* **(1938),** in which cultures are grown on malt agar containing either 0.5% (w/v) gallic (GAA) or tannic (TAA) acids. Test-tube cultures were grown at room temperature (ca 25 C) in diffuse light. For the constant temperature study, cultures on MEA were placed in incubators 24 h after plating and measured at the end of 10 da. Measurements of mat diameters were averages of three replications of 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. Cultures that did not grow were presumed killed at the high test temperatures. An asterisk (*) denotes a specimen from which a culture was obtained and studied.

DESCRIPTIONS OF SPECIES

MERIPILUS GIGANTEUS (Pers. : Fr.) Karst., Bidrag *Kannedom Finlands Natur Folk* **37:** 33. 1882. FIGS. 1-4

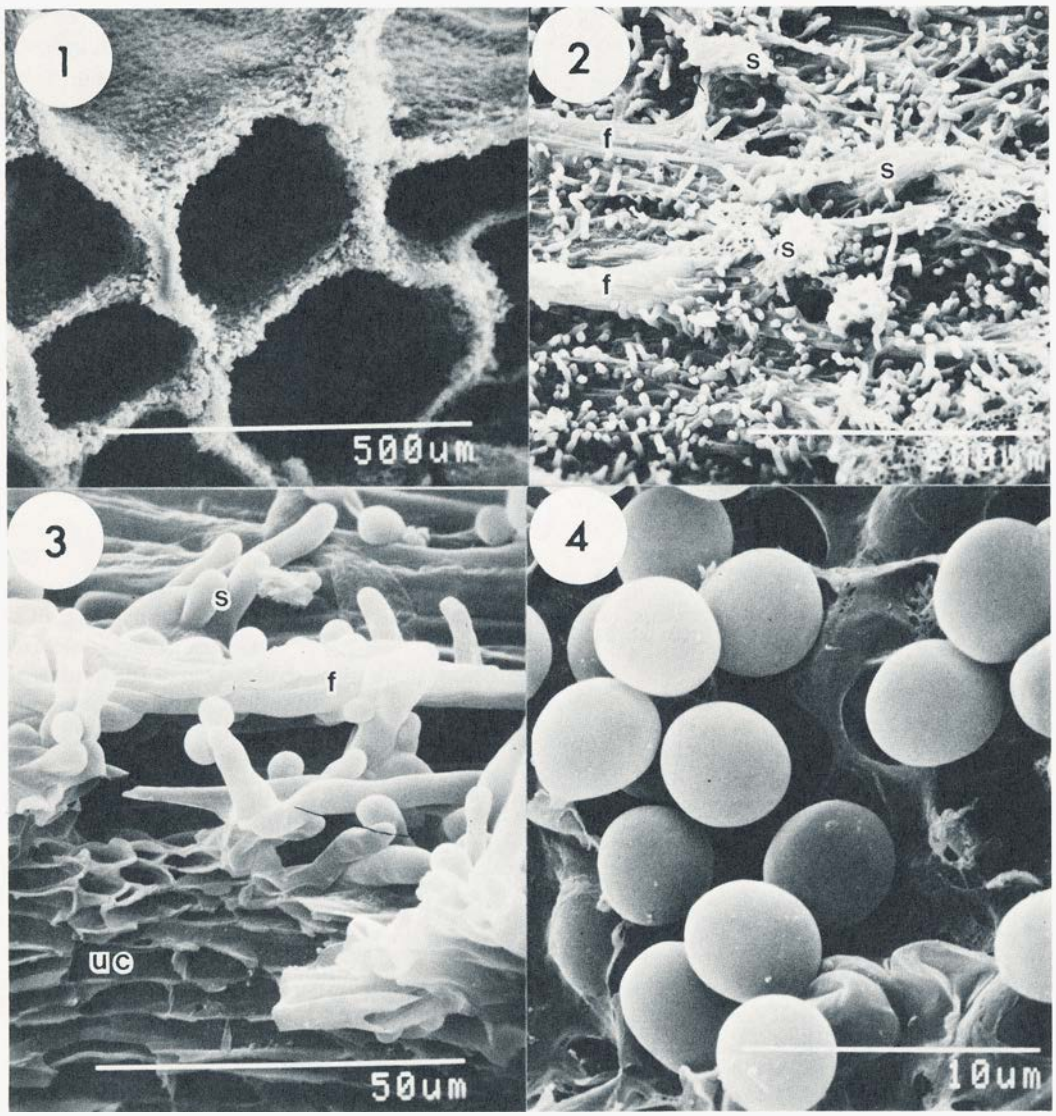
- ≡ *Boletus giganteus* Pers., *Synopsis meth. fung.*, p. 521. 1801.
- ≡ *Polyporus giganteus* (Pers. : Fr.) Fr., *Syst. Mycol.* **1:** 356. 1821.
- ≡ *Polypilus giganteus* (Pers. : Fr.) Donk, *Meded. Bot. Mus. Herb. Rijks Univ. Utrecht* **9:** 122. 1933.
- ≡ *Grifola gigantea* (Pers. : Fr.) Pilát, *Beih. Bot. Centralbl.* **52(B):** 35. 1934.
- ≡ *Flabellopilus giganteus* (Pers. : Fr.) Kotl. *et* Pouz., *Ceská Mykol.* **11:** 155. 1957.
- ≡ *Boletus mesentericus* Schaeff., *Fungi Bav.* Ind., p. 91, pl. 261. 1774.
- ≡ *Grifola mesenterica* (Schaeff.) Murr., *Mycologia* **12:** 10. 1920.

NEOTYPE—Sweden, Göteborg, Nya Allen, Kungsparken, *Fagus sylvatica* L., Ingvar Nordin, 10.IV.77, Flora Suecica 7443, GB-21560 (GB).

Basidiocarps annual, multipileate and in the form of a rosette, up to 45 cm across and 20–30 cm high, composed of numerous individual pilei up to 25 cm across and 1.5 cm thick arising from a common basal stem, somewhat flabelliform, fleshy-coriaceous when fresh, tough-friable when dry; pilear surface pale tan to dull chestnut brown when fresh, darkening to almost fuscous when dry, fibrillose with scattered small squamules; pore surface grayish white when fresh and becoming fuscous to black when handled and bruised, becoming pale to dark gray brown when dry; pores 3–5(-6) per mm, entire, and somewhat angular, often decurrent to the bases of individual pilei and then becoming somewhat lacerate; trama darker than the context, waxy-cartilagnous; context pale tan to almost white, firm-fibrous, up to 1 cm thick, no color change in KOH or IKI; frequently with a strong fetid-mushroom odor that persists in dried material. Associated with a white rot.

Hyphal system monomitic, with clamp connections absent throughout. *Context hyphae* of three kinds: principal context hyphae in parallel arrangement, 4–7(–10) µm diam, septate, hyaline, becoming thick-walled with lumen frequently absent, branching and giving rise to additional parallel hyphae; some hyphae growing laterally resembling binding hyphae, dimensions variable, up to 10 µm diam, form very variable and apparently due to intrusive growth, with or without septa, becoming thick-walled, hyaline; gloeoplerous hyphae up to 16 µm diam, staining strongly in phloxine solution (pale ochre in KOH or H_2O), some with infrequent septa, thin-walled, branching infrequently, arranged parallel to principal context hyphae; *hyphae next to the tube layer* short-celled and intricately branched, 2–4 µm diam, appearing as a pseudoparenchyma, hyaline; *tramal hyphae* 2–2.5(–3) µm diam, parallel, septate, hyaline, thin-walled; *basidia* (14-)22(–27) × (5.3–)6.0-6.5(–7.5) µm, septate at base, clavate, hyaline, 4-sterigmate; *basidiospores* (5.5–)6-6.5(–7) × (4.5–)5.5-6(–6.5) µm, subglobose to less frequently broadly ovoid to broadly ellipsoid, without a prominent apiculum, hyaline, smooth, acyanophilous, inamyloid; *cystidioles* broadly fusoid, (14-)20-21(-25) × (4.5–)6.0-6.5(–9) µm, hyaline, not projecting beyond basidia, infrequent.

SPECIMENS EXAMINED. - ENGLAND: RICHMOND, Surrey, Kew, Kew Gardens, *Quercus* sp. stump, M. J. Larsen, 15.IX.86, Forest Pathology Herbarium (FP) 135346 (CFMR). RICHMOND, Surrey, Kew, Kew Gardens, *Quercus* sp. stump, M. J. Larsen, 21.IX.86, FP 135345 (CFMR). Virginia Waters, fruiting just above root collar of living *Fagus* sp., M. J. Larsen, 18.IX.86, FP 135344* (CFMR). Windsor Great Park, fruiting at and just above root collar of living *Fagus* sp., M. J. Larsen, 4.X.86, FP 135371 (CFMR). GERMANY: SAXONY, Leipzig, ad trunc. emort., 2.VIII. 1900,11824



FIGS. 1-4. Scanning electron micrographs of *Meripilus giganteus.* 1. Pore mouths (FP 135371). 2. Pilear surface with squamules (s, some broken off) and fibrils (f) (FP 135344). 3. Detail of pilear surface and upper context (uc) (FP 135344). 4. Basidiospores (FP 135371).

(GB). NETHERLANDS: Appledoorn, at base of diseased *Fagus* sp., R. ,W. Davidson, 5.VIII.66, FP 100460* (CFMR). NORWAY: Oslo, Holmendammen, *Quercus robur* L., L. Ryvarden, 24.IX.84, Ryvarden 22086 (0). POLAND: Siemianice, distr. Kepno, *Aesculus hippocastanum* L.. S. Domański, 30.VII.66, 5059 (GB). SWEDEN. SKANE, Hyby parish, Bokebergsslatt, *F. silvatica,* O. Anderson and J. Eriksson, 5.X.51, Anderson 6341 (3027 UPS in GB). VASTERGOTLAND. Trollhattan, Drottninggatan x Stridsbergsgatan, host unknown, Gerd Gertgard, 22.VIII.76 (GB). GÖTEBORG, Kungsladugardsgatan 23, Brostromska Stiftelsen, under *Syringa* sp., Helge Hermansson, 22.VIII.79, Flora Suecica 8138 (GB). BLEKINGE, Ronneby sn, på murken bokstubbe, S. Lundell, 22.IX.46 (Fungi Suecici No. 2523; UPS). BLEKINGE, Tromtö, associated with buried *Fagus* roots, S. Lundell and S. Wikland, 8.IV.46 (Fungi Exsiccati Suecici No. 1801; UPS).

Cultural description FIG. 5

Key pattern — A-P-I-10, A-P-M-10.
Species code. — 2.6.1 1.32.36.38.43.54.

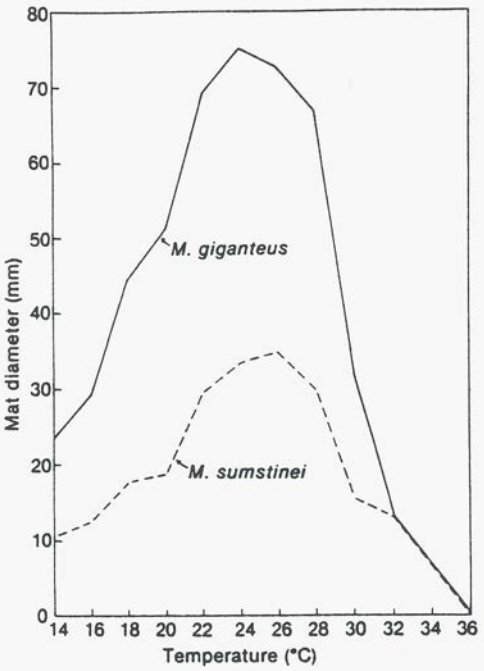


FIG. 5. Average mat diameters of cultures of *Meripilus giganteus* and *M. sumstinei* on MEA after 10 & incubation at 12 constant temperatures.

Growth characteristics.—Growth moderately rapid to medium, forming mats (86-)88-90+ mm diam in 14 da ($\bar{x}$ = 88.9, SD = 1.4, n = 10); mycelium white at 14 da, very fine thin woolly-cottony to radiating short downy, adherent, appressed to intermediate, by 18 da slightly raised white crustose areas develop, by 6 wk small scattered areas of Olive-Buff, Deep Olive-Buff, or Buckthorn Brown may develop; margin indistinct, fimbriate; no reverse discoloration at 14 da, slight discoloration under colored areas when present at 6 wk; odorless; oxidase reactions positive, strong, making 0 to a trace[2] of growth on GAA and TAA in 7 da.

Hyphal characteristics.—Hyphae staining in phloxine, simple-septate, with hyaline walls, 1–5.5(–7.5) µm diam; interlocking hyphae in a plectenchyma by 6 wk, 3–16 µm diam, with hyaline slightly thickened walls, staining smoothly at first, then empty, becoming thick-walled in old cultures, walls unevenly thickened up to 3 µm diam; crystals small octahedrons.

Test-tube cultures.—I28 da mat white, small dense appressed cottony patches interspersed with thin sodden areas on slant and extending down over agar cylinder almost to bottom of tube; reverse discoloration very slight.

Temperature relations.—Optimum 24 C with good growth at 32 C, not killed at 36 C; killed at 40 C (FIG. 5).

Cultures studied. - Polysporous isolates from basidiocarps FP 100460 and FP 135344. Only the later isolate was used in the constant temperature study.

Remarks.—*Meripilus giganteus* is diagnosed by the minutely squamulose and fibrillose pilear surface, pores 3-5(-6) per mm, and moderately rapid to medium growth rate in culture (FIG. 5). It occurs in Europe, Scandinavia, and Soviet Union.

Bondartsev **(1953)** reported basidiocarps up to 80 cm across. CartWright and Findlay **(1958)** found terminal chlamydospores up to 25 µm across in old cultures. We have observed similar structures up to 20 µm diam in 2-mo-old cultures; however, we consider these structures to be extruded ends of sclerified plectenchymatous hyphae.

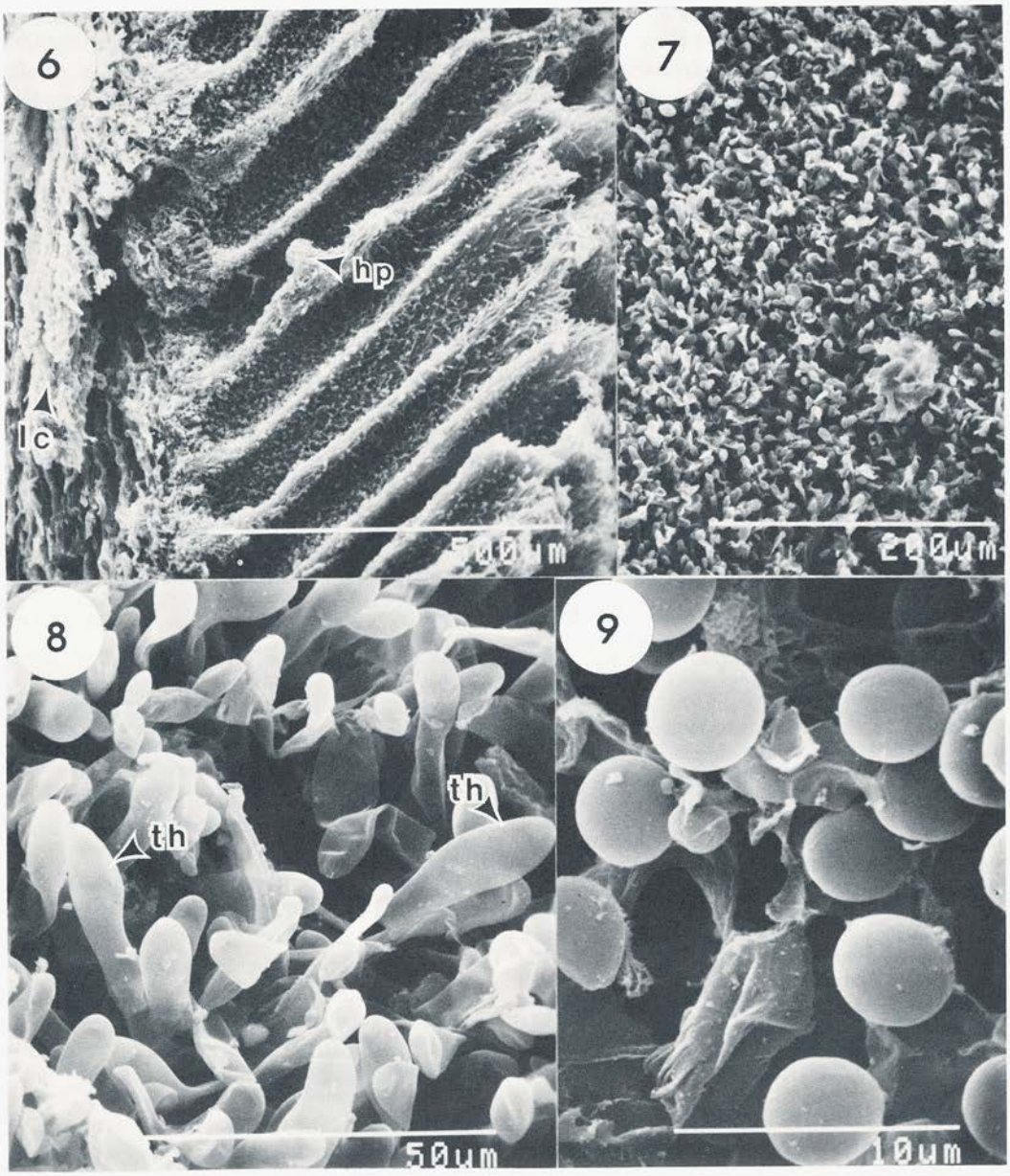
Meripilus sumstinei (Murr.) M. Larsen *et* Lombard, *comb. nov.* FIGS. **6–9**

≡ *Grifola sumtinei* Murr., *Bull. Torrey Bot. Club* **31:** 335. 1904.

LECTOTYPE—United States, Pennsylvania, [on *Quercus* sp.—MJL], date of collection unknown, D. R. Sumstine No. 11 (NY).

Basidiocarps annual, multipileate, near imbricate in some parts, up to 30 an across and 15–20 cm high, composed of numerous individual pilei that may be fused but ultimately arising from a common short basal stem that may become black and tuberous; individual pilei flabelliform to spathulate, 6–8 × 4–5 cm; pilear surface brown to dark fuscous, finely velvety-tomentose; pore surface dark grayish brown with an olive tint in dry immature specimens, becoming tan to dull golden brown in mature dry specimens, bruising readily in fresh immature areas and becoming dark brown to black; pores 6-8 (–9) per mm, round to mostly angular, pore mouths frequently fimbriate, decurrent to basal stem and then lacerate; trama and pore layer slightly darker than the context, cartilaginous; context pale tan to white, 1–3 mm thick in in-

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



FIGS. 6–9. Scanning electron micrographs of *Meripilus sumstinei*. 6. Hymenophore section depicting pore mouths, a single hyphal peg (hp), and lower context (lc) tissue (JL-201). 7. Tomentum of pilear surface (FP 105329). 8. Clavate terminal hyphae (th) of pilear tomentum (FP 105329). 9. Basidiospores (JL-201).

dividual pilei and up to 1–1.5 cm where pore layer is decurrent, firm-fibrous, no color change when exposed to KOH or IKI. Associated with a white rot.

Hyphal system monomitic, with clamp connections absent throughout. *Context hyphae* of three kinds: principal context hyphae 4–7(–9) µm diam, wall thickening apparent, septate, parallel in orientation, hyaline; lateral branches of the principal context hyphae 3–4 µm diam, hyaline, thin-walled, frequently branched; gloeoplerous hyphae, 6–8(–9) µm diam, staining strongly in

phloxine solution, septate, not colored in KOH or H_2O, thin-walled. *Hyphae next to the tube layer* sometimes forming a distinct and recognizable layer 200 μm thick, dense and refractive, 2–3 μm diam, short-celled, frequently septate, thin-walled, hyaline; *tramal hyphae* 2–3(-4) μm diam, parallel, septate, thin-walled, hyaline, frequently branched; *basidia* (12–)21–22(–25) x (4–)6.5–7(–9) μm, septate at base, clavate, hyaline, 4-sterigmate; *basidiospores* (4.5–)5.0–5.5 (-6.5) x (4-)4.5-5(-5.5) μm, subglobose to less frequently broadly ellipsoid, apiculum distinct, hyaline, acyanophilous, inamyloid; *cystidioles* (18–)24–25(–27) x (5.5–)6.5–7(–8) μm, not projecting beyond basidia, acuminate, hyaline, thin-walled; *hyphal pegs* rare.

SPECIMENS EXAMINED. —CONNECTICUT: Hartford Co., Southington, *Quercus* sp., J. E. Adaskaveg, 18.VIII.86, JA-474 (AN 012550) (ARE, CFMR). DISTRICT OF COLUMBIA: Washington, host unknown, F. M. Milburn, VII.32, FP 57021* (CFMR). LOUISIANA: Concordia Parish, Ferriday, *Quercus* sp., L. O. Overholts and F. H. Kaufert, 25.VIII.31, FP 50382* (CFMR). St. Landry Parish, Opelousas, Thistlewaite Preserve, hardwood root, G. H. Hepting, 9.VIII.32, #16* (CFMR). MARYLAND: Prince Georges Co., College Park, host unknown, L. W. R. Jackson, VIII.32, FP 57026* (CFMR); host unknown, L. A. Roure, 8.VII.53, FP 103296* (CFMR); host unknown, J. W. McKay, 26.VIII.54, FP 104061 (CFMR); Laurel, *Quercus* sp., J. A. Lindsay, VI.68, JL-201*, (CFMR); Beltsville, hardwood, R. W. Davidson, 24.VII.59, FP 105329* (CFMR). NEW JERSEY: Gloucester Co., New Field, on *Quercus* sp., J. B. Ellis, VIII.1878, North American Fungi exsiccati No. 306 (in BPI). NORTH CAROLINA: Cherokee Co., Murphy, *Quercus alba* L. roots, G. G. Hedgcock, 24.VII.25, FP 43133 (CFMR). PENNSYLVANIA Armstrong Co., Kittanning, host unknown, D. R. Sumstine, 1903, CM 2548 (NY). Franklin Co., Mont Alto, *Quercus prinus* L., G. G. Hedgcock, 4.IX.15, FP 20182 (CFMR). WISCONSIN: Dane Co., Madison, at base of living *Hicoria* sp., J. M. McMillen, 13.VIII.73, FP 101441* (CFMR).

Overholts (1953) reported this fungus (as *M. giganteus*) from Alabama, District of Columbia, Indiana, Iowa, Louisiana, Maryland, Massachusetts, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Additional reports are Idaho (Weir, **1914;** Lowe and Gilbertson, **1961),** and Florida (Murrill and Kimbrough, **1972).**

Cultural description FIG. 5

Key patterns. - A-P-M-10, A-P-S-10.

Species code. - 2.6.(11.)32.36.38.(39.)47.54.

Growth characteristics.—Growth medium to slow, forming mats (33–)40–70(–82) mm diam in 14 da ($\bar{S}$ = 55 mm, SD = 15.2, n = 12); mycelium white at 14 da, appressed, very fine downy to thin subfelty, sodden, adherent, most isolates remain thin subfelty by 6 wk but one isolate with small white crustose areas and one isolate with Chamois to Buckthorn Brown areas; margin indistinct, fimbriate to even; most isolates without reverse discoloration, Clay Color reverse discoloration for one isolate; odorless; oxidase reactions positive, strong, making 0 to a trace of growth on GAA and TAA in 7 da.

Hyphal characteristics.—Hyphae staining in phloxine, simple-septate, with hyaline walls, some with slight swellings, some from brown areas with pale brown contents, 2–5.5(–7.5) μm diam; interlocking hyphae in a plectenchyma by 6 wk in 3 isolates, with hyaline, slightly thickened walls, some to 3 μm diam with short stubby branches in 16-S, others with rounded lobes 4-9 μm diam in FP 57026-S and FP 103296-Sp; crystals small to medium octahedrons.

Test-tube cultures.—In 28 da mat creamy white to Chamois, mycelium scant, appressed, barely visible on slant; creamy white to Tawny-Olive on agar cylinder, thin to dense appressed cottony to subfelty, extending part way down agar cylinder, brown agar discoloration showing through the thinner mats; reverse discoloration ranging from slight to Natal Brown.

Temperature relations.—Optimum 26 C with good growth at 32 C; not killed at 36 C, killed at 40 C (FIG. 5).

Cultures studied.—Seven polysporous or basidiocarp tissue isolates and one rot isolate with associated basidiocarp as indicated under "Specimens Examined." Only five isolates were used in the constant temperature study.

Remarks. – ***Meripilus sumstinei*** may be distinguished by the finely tomentose pilear surface, pores (5–)6–8(–9) per mm, medium to slow growth rates in culture (FIG. 5), and occurrence in North America. In contrast, *M. giganteus* has a fibrillose and squamulose pilear surface, pores 3–5(-6) per mm and moderately fast growth rates in culture, and occurs in Europe, Scandinavia, and Soviet Union.

The North American fungus was initially referred to *M. giganteus* until Murrill (1904) renamed it *G. sumstinei.* Murrill **(1921)** eventually incorporated *G. sumstinei* into the concept of the

European *M. giganteus,* but used instead the name *G. mesenterica.* Murrill also reported a specimen under the name *G. gigantea,* the dimensions of which were 60 cm across and 30 cm high. Seaver **(1938)** reported a large specimen under the same name measuring nearly 90 cm in diameter. However, since all the material that we have seen to date from North America represents *M. sumstinei,* we assume that these large specimens also represent this species.

Meripilus lentifrondosa (Murr.) M. Larsen *et* Lombard, *comb. nov.* FIGS. 10, 11

≡ *Grifola lentifrondosa* Murr., *Bull.* New York Bot. *Gard.* **8:** 144. 1912.

HOLOTYPE—Mexico, Jalapa, on the roots of an oak stump on an exposed railway embankment, 12–20.XII.09, W. A. and E. L. Murrill No. 56 (NY).

Basidiocarp annual, stipitate, 20 cm across and 15 cm high, woody, multipileate to imbricate, individual pilei 3–5 cm wide and up to 8 mm thick, narrowing toward the base, laterally attached to buried wood by a thick tuberous base approximately 7 cm long and 4 cm diam, upper surface dull pale brown to blackish brown, finely tomentose, pore surface pale brown to fuscous, apparently not bruising when handled or injured, pores 5–7 per mm, pore mouths irregular to angular, entire, becoming decurrent on stem and then somewhat lacerate; trama and pore layer sharply delimited from the context, brittle-cartilaginous; context tan to dull brown, hard, fibrous, up to 4 mm thick in individual pilei, no pigment change in KOH or IKI. Associated with a white rot.

Hyphal system monomitic, clamp connections absent throughout. *Context hyphae* of three kinds: principal context hyphae parallel in arrangement, 4–6 μm diam, septate, hyaline, thin- to thick-walled; some growing laterally, 2-4 μm diam, septate, hyaline, branching frequently but not presenting the appearance of "binding-type" hyphae as in *M. giganteus;* gloeoplerous hyphae, 4–10 μm diam, thin-walled, staining strongly in phloxine solution (hyaline in KOH and H_2O), septate, infrequently branched, arranged parallel to principal context hyphae; *hyphae next to the tube layer* sometimes forming a distinct and recognizable layer more dense and refractive than the context, 1.5–2 μm diam, short-celled, septate, hyaline, gelatinized and not easily separating; *tramal hyphae* of two kinds: principal tramal hyphae 1.5–2 μm diam, hyaline, septate, thin-walled, parallel in arrangement; gloeoplerous hyphae 2-4 μm diam, staining strongly in phloxine solution (hyaline in KOH and H_2O), septate, thin-walled, branching infrequently; *basidia* not seen; *basidiospores* 5(–5.5) x (3.5-)4-4 μm, short-obovate and strongly attenuated toward a prominent apiculum, hyaline, smooth, acyanophilous, inamyloid; *cystidioles* not seen.

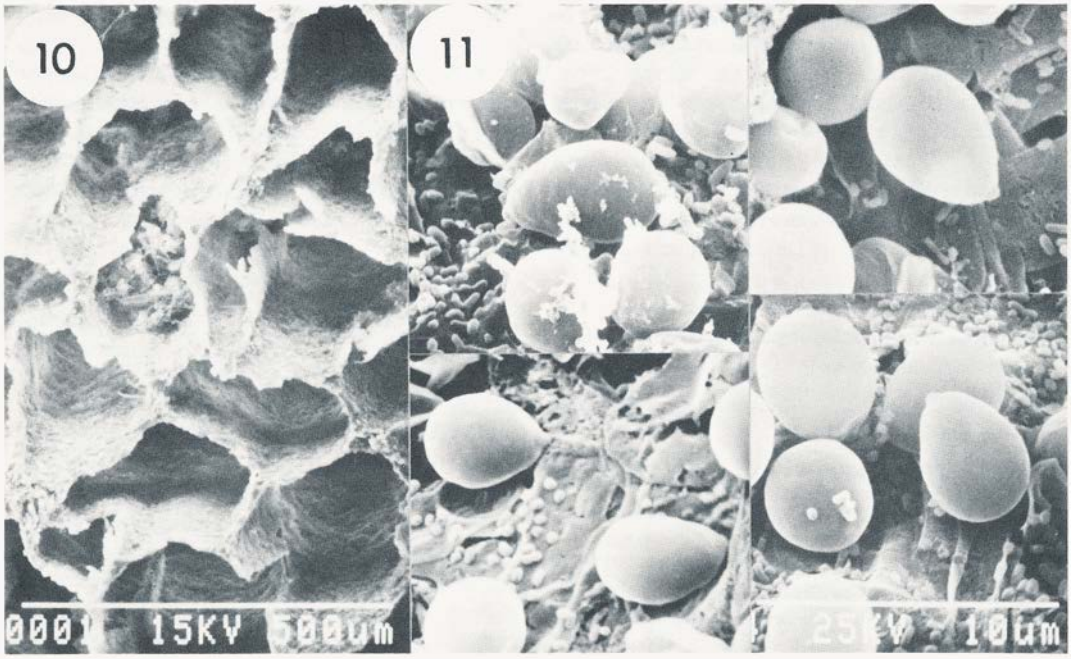
Remarks. —*Meripilus lentifrondosa* is known only from the type and may be diagnosed by the shape of basidiospores, finely tomentose pilear surface, pore size (5–7 per mm), and apparent lack of darkening when bruised. Murrill **(1912)** apparently saw no resemblance of *M. lentifrondosa* to either *M. giganteus* or *M. sumstinei,* but likened it instead to *Grifola frondosa* (Dicks. : Fr.) S. F. Gray. In his notes on the type specimen he stated: "Much too woody for known species," and "Large and many times imbricate. Old, but apparently different from *frondosa.* Pileoli lie very close together, white and tough within, tubes brown when seen. Surface isabelline with a roseate tinge and somewhat hairy."

Ryvarden **(1985)** has placed *M. lentifrondosa* in synonymy with *M. giganteus,* and his notes with the type of *M. lentifrondosa* state that the spores are ellipsoid.

DISCUSSION

We conclude that *Meripilus giganteus, M. lentifondosa.* and *M. sumstinei* represent three taxa. They are separated by the shape and size of basidiospores, nature of the pilear surface, and, for two of them, growth rates in culture. *Meripilus giganteus* apparently does not occur in North America, and records of this name in the North American literature should be referred to *M. sumstinei.*

In addition to these three species, two others, *M. tropicalis* and *M. talpae,* deserve comment. Guzmán and Pérez-Silva **(1975)** described *M. tropicalis* from Mexico, associated with roots of *Ficus* sp. However, no information was provided on the nature of the decayed wood (brown- or white-rot). Guzmán and Pérez-Silva stated that *M. tropicalis* is characterized by ovoid to mucronate basidiospores measuring 6–8.5(–9) x (4.5–)5.2-6(-6.7) μm and is allied to *M. talpae* (Cke.) Reid and *M. giganteus.* Recently, Ryvarden and Johansen **(1980)** placed *M. talpae* in synonymy with *M. persicinus* (Berk. *et* Curt.)



FIGS. 10, 11. Scanning electron micrographs of *Meripilus lentifrondosa* (from holotype). 10. Pore mouths. 11. Basidiospores.

Ryv. In a synopsis of brown-rot fungi in North America, Gilbertson **(1981)** placed *Polyporus persicinus* Berk. *et* Curt. in *Laetiporus,* which contains fungi that have dimitic hyphal systems and cause brown rots. Gilbertson and Ryvarden **(1986)** use the name *L. persicinus* (Berk. *et* Curt.) Gilbertson, with which we concur. Previous detailed analyses of *M. talpae* were provided by Reid **(1963)** and Fidalgo and Fidalgo **(1967),** but data on the nature of the decay were unknown or not reported.

To our knowledge the genus *Meripilus* contains only white-rot fungi with monomitic hyphal system. Thus, the question concerning the nature of the decay caused by *M. tropicalis* becomes important. However, data on hyphal and basidiospore characteristics strongly suggest that this fungus belongs in *Meripilus.* A key to the four accepted species of *Meripilus* is provided below.

Key to species of Meripilus

1. Basidiospores, short-obovate and strongly attenuated toward the apiculum, ovoid, mucronate; known from Mexico 2
1. Basidiospores subglobose to broadly ellipsoid; known from Europe, Scandinavia, Soviet Union, unitedstates 3
2. Basidiospores 5(−5.5) x (3.5-)4 μm, short-obovate, strongly attenuated toward the apiculum . . . . . *M. lentifrondosa*
2. Basidiospores 6-8.5(−9) x (4.5-)5.2-6(-6.7) μm, ovoid, mucronate . . . . . *M. tropicalis*
3. Pilear surface finely velvety-tomentose; basidiospores (4.5—)5.0-5.5(-6.5) x (4-)4.5-5(-5.5) μm; known from the United States . . . . . *M. sumstinei*
3. Pilear surface finely fibrillose with minute squamules; basidiospores (5.5-)6-6.5(-7) x (4.5-)5.5-6(-6.5) μm; known from Europe, Scandinavia, and Soviet Union . . . . . *M. giganteus*

The pathogenicity of species of *Meripilus* is generally unknown. Spaulding **(1961)** described *M. giganteus* as a root rot and reported its occurrence around the bases of *Fagus sylvatica* in Russia (Caucasia), *Pinus sylvestris* L. in Sweden, *Quercus suber* L. in Russia (Caucasia), and *Q. suber* var. *occidentalis* (Gay) Arcang. in Russia (Caucasia). Bondartsev **(1953)** reported that *M. giganteus* causes a rapidly spreading white rot in the hosts and fruits around stumps and old diseased trees of *Abies, Picea, Pinus, Fagus, Quercus,* and *Ulmus* in the Soviet Union. Solovieff **(1932)** reported that *M. giganteus* occurs at the

bases of beech trees. He later indicated that *M. giganteus* deserved mention as a cause of trunk rot of cork oaks in Russian Caucasia due to the method of debarking the trees (Solovieff, **1936).** In England, *M. giganteus* is common on beech and several other broad-leaved hosts, developing on stumps or on decayed roots several feet from the base of the trunk (Cartwright and Findlay, **1958).** These authors characterized the decay as an active white rot that is confined to the roots and lower trunks, and suggested that rot caused by the fungus may lead to windthrow. The observations of Kreisel **(1961)** are in general agreement with these previous studies, as are those of Breitenbach and Kranzlin **(1986).** However, Kreisel **(1961)** reported hosts in the genera *Aesculus, Populus, Salix, Sorbus,* and *Chamaecyparis* from Germany. Our observations on the occurrence of basidiocarps above the root collar of living *Fagus* sp. in England also support the concept that *M. giganteus* is a root- and lower trunk-rot pathogen. *Meripilus giganteus* is reported to be inedible because of its very coarse flesh and slightly acid taste (Bondartsev, **1953).**

Reports on the pathogenicity of *M. sumstinei* (as *M. giganteus*) in North America are similar to reports on *M. giganteus.* Murrill **(1921:** 267) described the fungus as a "polypore that grows . . . from buried roots, stumps, and about the base of trees, the mycelium being parasitic on oak and other deciduous trees." Weir **(1914:** 273) reported that the fungus is "associated with conifers in the forests of Idaho, more often in connection with old decayed roots of Douglas-fir." McIlvaine and Macadam **(1902)** noted that *M. sumstinei* is edible. Lincoff and Mitchel **(1977)** and Ammirati *et al.* **(1985)** reported that the fungus may be a gastrointestinal irritant, based on data published by Lee *et al.* **(1975).**

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