TEXAS J. SCI. 52(4) SUPPLEMENT:65-78 NOVEMBER, 2000

STUDIES ON GULF COAST AGARICS (BASIDIOMYCOTA: AGARICACEAE); NOTES ON SOME INTERESTING AND RARE SPECIES

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Abstract.—This study reports the results of recent investigations on the club fungi of the Gulf Coast Plain in the Big Thicket area of east Texas and the Harrison Experimental Forrest in southern Mississippi. While these areas are rich in species of *Amanita, Lactarius, Russula, Boletus, Cantharellus, Entoloma* and others, only those 19 species considered noteworthy are reported in this study. Amended descriptions are given for *Hygrophorus firmus* var. *trinitensis, Hygrophorus mississippiensis, Amanita hesleri, Amanita levistriata, Lactarius petersenii, Oudemansiella canarii, Boletus albisulphureus, Fistulinella jamaicensis* and *Rhizopogon baxteri*.

Research on Gulf Coast fungi has accelerated in the past 30 years. Murrill (1972), Singer (1945a; 1945b; 1945c; 1946; 1947) and Thiers (1956; 1957; 1958; 1959a; 1959b; 1963) studied the flora from the 1930s to the early 1960s. Since the early 1970s long term research has centered in the Big Thicket area of eastern Texas and the Harrison Experimental Forest in southern Mississippi.

Approximately 8000 collections of basidiomycote fungi have been made since the early 1970s. From these studies and others, a number of new taxa have been described (Bigelow 1977; Bigelow & Kimbrough 1980; Cibula 1979; Cibula & Weber 1996; Desjardin & Petersen 1989; Desjardin 1991; Feibelman et al 1996; Guzman & Pollock 1978; Jenkins 1988; Jenkins & Vinopal 1979; O. K. Miller 1993; S. L. Miller 1986; Mueller 1984; Singer et al. 1990; Singer & Williams 1992; Wolfe & Halling 1989) and many rare and interesting fungi have been rediscovered or discussed (Bessette et al 1993; Desjardin & Petersen 1989; Guzman & Thiers 1978; Jackson & Alexopoulos 1976; Lewis & McGraw 1984; Ovrebo 1988; Singer et al. 1990; Smith & Weber 1982; Tulloss & Lewis 1994; Weber & Smith 1985).

This study was undertaken to provide recent range extensions and additional descriptions for a variety of rare fungi previously undocumented in the Big Thicket and surrounding West Gulf Coastal Plain.

METHODS AND MATERIALS

Notes were taken on fresh material to support the taxonomic literature and also with comments on their distribution. Color data were determined by Reinhold Color Atlas (Kornerup & Wanscher 1962) or Munsell notation (Munsell 1976). Where possible, the Ridgway equivalent is given after the Munsell notation. Voucher specimens are deposited with the Field Museum of Natural History (FMNH) in Chicago, the University of Michigan (MICH), Oregon State University (OSC) and the New York Botanical Garden (NYBG); DPL and WGC denotes those specimens deposited by the authors. The following is a listing of those species considered noteworthy. Amended descriptions are given for nine of these species.

Division Basidiomycota
Family Agaricaceae

Hygrophorus firmus var. *trinitensis* Dennis 1953:266

Description.—**Pileus** 6-13 mm broad, convex-umbilicate, moist to slightly viscid, silky, color 10D8 cardinal (red) = fez = strawberry, fading to yellowish between the red; margin undulating from gill spacing; context less than 1 mm thick, concolorous with the pileus, odor and taste mild. **Lamellae** adnate with a slight notch and becoming decurrent, subdistant, 3-4 mm broad, acute, thick toward base, scant veins on some gill faces, color 4A6 maize (yellow) but usually concolorous with the pileus; lamellulae one tier. **Stipe** 2-2.5 cm by 1-2.5 mm, equal to slightly larger at base, glabrous, shiny, solid to stuffed with yellowish pith, concolorous with the pileus, base moderate orange yellow; basal mycelium white in some collections.

Microscopic characters.—Basidiospores white in deposit, non-amyloid, smooth, ellipsoid, 8.6-10.1 by 4.5-5.1 μm; lamellar trama parallel.

Habit and habitat.—Gregarious on lawns usually among St. Augustine grass.

Material examined.—**TEXAS**: **ORANGE COUNTY**, Vidor, 455 Virginia Lane, 11-15 May 1977, DPL-936 (FMNH); 30 Nov. to 4 Dec. 1977, DPL-1301 (FMNH); 3-16 April 1978, DPL-1352 (FMNH); **HARDIN COUNTY**, Ranger Station on FM 420, Turkey Creek Unit, Big Thicket National Preserve, 18 September 1983, DPL-3610 (FMNH).

Remarks.—This tropical agaric, previously known only from Trinidad, has been collected from three east Texas sites, including the Ranger Station located at the south end of the Turkey Creek Unit of the Big

Thicket National Preserve. Unlike typical *H. firmus*, the basidia are not dimorphous and the spores do not fall into two size groups.

Hygrophorus mississippiensis Cibula 1979:106

Description.—**Pileus** 4-10 mm broad, convex to flattened or becoming broadly convex, depressed at disk, moist to dry but not viscid, densely radially squamulose at disk, less so toward the margin, color vivid red 5R 4/14 (Spectrum Red) to deep red 7.5R 4/12 (Scarlet), somewhat lighter near the margin with a very narrow white to yellowish margin in some mature specimens (which contrasts with the deep red of the disc), red color retained well in older basidiocarps; context; thin, hygrophanous, and concolorous with the pileus. **Lamellae** convexly arcuate emarginate with an acuminate decurrent tooth on the stipe, subdistant, 1.5 mm broad, thick, ± triangular, acute, entire, color pale yellow to light yellowish brown 7.5YR 7/6 (Light Pinkish Cinnamon) occasionally with a slight reddish tint (often nearer to the pileus); lamellulae of 1 tier. **Stipe** 1.5-2 cm by 0.5-1 mm, cylindrical over entire length, tapered toward apex, becoming equal with age, dry, stuffed with pith, interior concolorous with the exterior; surface with a silky sheen, glabrous, ± concolorous with the pileus, lighter at apex, color 7.5YR-10YR 5/12 (No Ridgway Equivalent); basal mycelium white.

Microscopic characters.—Basidiospores chalky white in deposit, 7.5-8.4 by 4.7-5.8 μm, non-amyloid, smooth, ellipsoid, with a distinct hilar appendage, hyaline in water mounts but the contents in water are granular; cystidia not observed; basidia 31-38 by 7-9.4 μm clavate, 4-spored monomorphic; cuticular hyphae strongly pigmented, thin walled, cells 95-205 by 18-19 μm with the pigment distributed evenly throughout the cell.

Habit and habitat.—Gregarious in low areas beneath scattered pine and mixed bottomland hardwoods with *Ilex coriacea* (Pursh) Chapm. nearby, summer.

Material examined.—**MISSISSIPPI: HARRISON COUNTY**, WGC 485, 8 August, 1974; WGC 554, 16 June 1975; WGC 608 and 610, 9 July 1976 and WGC 711, 8 Sept. 1977; all from the Harrison experimental Forest, USFS, DeSoto National Forest, Saucier, Mississippi. All collections at NYBG. **TEXAS: ORANGE COUNTY**, Vidor, off FM 105, near Stubblefield's residence, 30 June 1981, DPL-2651 (FMNH).

Remarks.—Known only from Texas and Mississippi this species prefers low wet areas. Both rhodohygrocybin and flavohygrocybin are

abundant (Cibula 1976; R_f = 0.18 and 0.48, acetone/H_2O 6:4), and additionally, another yellow pigment (R_f = 0.24) is moderately abundant. *Hygrophorus mississippiensis* differs from *H. firmus* Berkeley & Broome in not having dimorphous basidia and spores. Furthermore, in their original publication, Berkeley & Broome (1871) report that the pilei of their collection (No. 880) were yellow and minutely tomentose. Importantly, in light of this, more recent interpretations of *H. firmus* and its variatal forms are probably incorrect. It is necessary to have a magenta pigment (rhodohygrocybin) in addition to the yellow to produce a red color. This represents a significant metabolic difference between red and yellow Hygrocybes. For this reason, this species is not considered a variety of *H. firmus* in the modern sense and it is certainly different from *H. firmus sensu* Berkeley & Broome (1871).

Hygrophorus chamaeleon Cibula 1979:109

Despite 20 years of collecting since first described, this species has not been found outside of Harrison County, Mississippi. This appears puzzling, since the low, wet forests of sweetbay magnolia and gallberry holly (baygalls) (Watson 1975) in which this agaric is found in abundance in Mississippi also occur frequently in the Big Thicket.

Amanita hesleri Bas 1969:370

Description.—**Pileus** 42-70 mm broad, plane, moist to slightly viscid, covered in a concentric pattern with 2-3 mm high scales, color 10YR 3/4 (near Raw Umber) to 10YR 4/4 (near Dresden Brown); context 6 mm thick, odorless to that of an old sock, taste not determined, color white. **Lamellae** adnate to adnexed by lines to stipe, 5-8.5 mm broad, close to subdistant, acute, fimbriate, white; lamellulae 2 tiers. **Stipe** 6-9 cm by 6-23 mm, tapering upward from an enlarged base, dry, finely-felty floccose to powdery, solid, white with some 10YR 4/4 (near Dresden Brown) at base; annulus apical, floccose-powdery, white; volva an enlarged base with obscure (brownish) concentric rings.

Microscopic characters.—Basidiospores white in deposit, 9-11.5 by 5.5-6.5 μm, elliptical, amyloid.

Habit and habitat.—Gregarious to scattered in a hardwood stream floodplain forest, summer.

Material examined.—**TEXAS**: **NEWTON COUNTY**, one mile north of Bleakwood off SH 87, near Lewis residence, 1 July 1996, DPL-5667 (FMNH).

Remarks.—Previously known from Tennessee and North Carolina, *Amanita hesleri* has now been collected in southern Mississippi and from one site in Newton County, Texas.

Amanita levistriata Jenkins 1988:415

Description.—**Pileus** 23 mm broad, plano-depressed, dry, covered with fine scales mostly on margin, color on disk 2.5Y 6/8 (near yellow ocher); margin striate 3-4 mm 5Y 8/6 (deep colonial buff); context thin, odor none, concolorous pileus to white. **Lamellae** just free, close, 2 mm broad, acute, finely fimbriate, white; lamellulae unequal and few. **Stipe** 4 cm by 2-3 mm, dry, covered with fibrillose scales, solid, white with "yellowish" patches (scales); annulus central, ample, pale on top, yellow on bottom; volva 10 by 9 mm, with a free limb, white.

Microscopic characters.—Basidiospores 7-11 by 5.8-9.5 μm, globose to subglobose, smooth, varying from non-amyloid to weakly amyloid; reddish-brown granular material (in Melzer's reagent) observed in many basidia.

Habit and habitat.—Solitary to scattered in white oak forests, summer.

Material examined.—**TEXAS: TYLER COUNTY**, Forest Lake Experimental Forest, Plot 39, 10 June 1995, DPL-5440 (FMNH).

Remarks.—Described from the Honey Island Swamp on the Louisiana/Mississippi border, this Amanita was found in Texas in a plantation of white oaks planted in 1962. The reaction to Melzer's reagent is a puzzle. It has been found in Arkansas and southern Missouri (Justice pers. comm.).

Amanita westii (Murr.) Murr. 1944 (1945):127

Originally described from the Gainesville, Florida area, this rare species was rediscovered in eastern Texas and Southern Mississippi (Tulloss & Lewis 1994). A single collection is also known from Wakulla Springs, Florida (DPL-5313; FMNH).

Lactarius petersenii Hesler & Smith 1979:106

Description.—**Pileus** 4.7 cm broad, plane to depressed with arched margin, dry, glabrous to radially rugose-rivulose, very finely velvety, color 10YR 3.5/4 (Dresden Brown) to 7.5YR 2.5/4 (No Ridgway Equivalent); margin even; context 4-5 mm thick, white to 10YR 6/4 (Tawny Olive) from latex, odor spermatic, taste mild. **Lamellae** adnate-

decurrent, close to subdistant, arched, 3-4 mm broad, acute, entire, forking near stipe, color 2.5Y 8.5/4 (Cream Buff) and staining 10YR 3/4 (Dresden Brown) from latex; lamellulae 1-2 tiers; latex moderately abundant, instantly 10YR 6/4 (Tawny Olive). **Stipe** 4-5 cm by 7-10 mm, ± equal, base tapered in some, dry, varying from pruinose to finely velvety, hollow, concolorus with pileus except diffused with more whitish; basal mycelium white.

Microscopic characters.—Basidiospores white in deposit, 9-11 by 7-8.5 μm, amyloid, elliptical, densely covered with blunt spines connected by thin lines, promineces 0.5-1 μm high; hilar appendage prominent, tapered and non-amyloid, subhiliar area depressed with small amyloid particles; cuticle composed of ascending cylindrical hyphae arising from a cellular-like zone, brownish in 5% KOH, end cells (pilocystidia) 17-49 by 2-5 μm, adhering together.

Habit and habitat.—Solitary to gregarious in oak and mesic forest, spring to summer.

Material examined.—**TEXAS**: **HARDIN COUNTY**, Kinky Branch Creek, Lance Rosier Unit, Big Thicket National Preserve, near Saratoga, 20 October 1984, DPL-3748 (FMNH); along Kirby Nature Trail, Turkey Creek Unit, Big Thicket National Preserve, 24 September 1983, DPL-3612 (FMNH); 22 October 1983, DPL-3641 (FMNH); **SAN JACINTO COUNTY**, Big Creek Scenic area, Sam Houston National Forest, 10 July 1982, DPL-3163 (FMNH); **BRAZOS COUNTY**, Lick Creek Park, near College Station, 1 May 1994, DPL-5175 (FMNH).

Remarks.—First described from Tennessee and also known from Ohio, this species is often found along the Gulf Coast from Texas to Mississippi in mixed pine/hardwood forests. The authors have also collected it under oak in Brazos County, Texas. The initial change to brown of the latex is unique to this species.

Oudemansiella canarii (Jungh.) von Höhnel 1909:276

Description.—**Pileus** 2.5-8.5 cm broad, convex becoming plane, slightly depressed at disk, moist to tacky in button stages, glabrous except for the irregular 10YR 5/2 (near drab) patches which are denser at disk, rest of cap whitish; context up to 5 mm thick, odor slightly fungoid, taste not determined. **Lamellae** adnexed by a line to the stipe, close to subdistant, up to 10 mm broad, broader towards the stipe, acute, finely fimbriate, white; lamellulae 2-3 tiers; **Stipe** centrally attached but growing laterally from the substrate, 3-7 cm by 2-14 mm,

tapered towards apex, subbulbate at base, dry, covered with a fine down, easily removed, solid, fibrous, color white; annulus thin, very emphermal, leaving a thin ring at the base of the stipe.

Microscopic characters.—Spore slightly cream in deposit, 15-20 μm, globose to subglobose, smooth, thick-walled, hilar appendage 2 μm long.

Habit and habitat.—Gregarious, overlapping on standing dead beech and fallen hardwood logs, spring to summer.

Material examined.—**TEXAS**: **HARDIN COUNTY**, off Walton Road, Lumberton, 10 June 1981, DPL-2583 (MICH; FMNH); **TYLER COUNTY**, Woodlands Trail, Beech Creek Unit, Big Thicket National Preserve, 1 July 1982, DPL-3146 (FMNH).

Remarks.—A common tropical species found from Florida to East Texas in the US and throughout the neotropics.

Boletus albisulphureus (Murr.) Murr. 1944 (1945):326

Description.—**Pileus** 5.5-8.0 (17) cm broad, convex to plano-convex, circular to oblong, moist to dry, glabrous to pitted to uneven, with some deep cracks in parts, "white", with some 10YR 6/4 (Tawny Olive) to 7.5YR 3/4, 4/4 (Brussels Brown) to 1.25Y 5/6 (Orange Citrine) to 2.5Y 8.5/4, 8/4 (Cream buff) to 2.5Y 6/4 (Isabelle Color) to 5Y 8.5/6 (Baryta Yellow) in spots; context 10-23 mm thick, taste mild, "white" to a tint of 7.5Y 6/4 (No Ridgway equivalent but "yellowish") with a thin 10R 4/4 (No Ridgway equivalent but "reddish") line at context-tube junction and a 2 mm zone of 7.5YR 5/4 (Prout's Brown) to 10YR 5/4 (Tawny Olive) above it, odor strong, pleasant, taste mild. **Tubes** adnate by decurrent line to stipe, ventricose, 2-7 (15) mm broad, 1-2 pores/mm, pores somewhat irregular, easily separating from context, when young colored 5Y 9/2 (Ivory Yellow) becoming 5Y 8/4 (Colonial Buff) at margin, tube mouths (DPL-2001) a mosaic of 5Y 7/8 (Olive Color) and 10R 3/4 (near Bay), 7.5Y 7/8 (near Orange Buff) within, not bruising. **Stipe** 4.5-9 cm by 1.3-2 (5) cm, curved in middle, more or less equal but tapered at base, dry, solid, fine reticulation on upper part, "white" to 2.5Y 8.5/2 (Cartridge Buff), some 2.5Y 8/4, 8/5 (Cream Buff) near apex with a 5 YR 6/6 (Orange Cinnamon) to 7.5YR 6/6 (near Cinnamon) ring at apex; stipe context "white" some 5Y 8/4 (Colonial Buff) areas.

Microscopic characters.—Basidiospores 5Y 3/4, 4/4 (No Ridgway equivalent but "olivaceous") in deposit, 12-14 (15) by 3.5-4 (4.5) μm,

subfusiform, smooth, a few dextrinoid in Melzer's reagent; cheilocystidia 37-47 by 5-10 (13.5) μm, hyaline, some walls slightly thickened in middle, mostly ventricose; pleurocystidia 37 by 12 μm, hyaline, broadly ventricose; cuticle a trichoderm with somewhat clavate end cells; basidia 30-35 by 9-12 μm, 4-spored; tube trama bilateral, 6-12 μm broad.

Chemical tests.—5% KOH - cuticle very slight "pale pinkish" context little reaction, tube darker, "brownish"; concentrated ammonia-no reaction on all parts; 10% FeSO4 - cuticle and context little reaction, tubes more "greenish".

Habit and habitat.—Solitary to gregarious, generally in pine uplands, summers.

Material examined.—**MISSISSIPPI: JACKSON COUNTY**, Van Cleave, near old sand and dirt pit, home of Grace Road, 15 July 1987, DPL-4070 (FMNH); **TEXAS: ANGELINA COUNTY**, Graham Creek Wilderness Area, Angelina National Forest, 21 September 1979, DPL-2001 (FMNH); **TYLER COUNTY**, along road to Lake Hyatt, 1/2 mile from US 96, 8 August 1982, DPL-3264 (FMNH); 12 August 1982, DPL-3302 (FMNH); Sun-dew Nature Trail, near trailhead, Hickory Creek Savannah Unit, Big Thicket National Preserve, 28 August 1983, DPL-3576 (FMNH).

Remarks.—First described by Murrill from Florida, this bolete has been collected in Texas and Mississippi. Phillips (1991) and Metzler & Metzler (1992) have published pictures of it collected during the NAMA foray in southern Mississippi in 1987. The authors agree with Singer (1945b) who suggested that it belong in the genus *Boletus*.

Fistulinella jamaicensis (Murrill) Singer 1983:142

Description.—**Pileus** 1.5-4.5 cm broad, hemispherical to convex to plano-convex, dry, glabrous to finely tomentose, color 10R 7/4 (Safrano Pink) to 2.75-3.75YR 6/6 (Onion Skin Pink) with some 5Y 8/8 (Amber Yellow) spots, in age 10YR 6/5.5 (near Clay Color) to 5Y 7/6, 8/6 (Deep Colonial Buff); context 1-6 mm thick, odor and taste mild, "white" to "dingy yellow", unchanging. **Tubes** depressed, ventricose, 5-15 mm long, small, 2 pores/mm, surface irregular, color at first "whitish", becoming 5YR 7/2 (No Ridgway equivalent) to a "brownish pink". **Stipe** 3-6 cm by 3-7 mm, base curved and tapered, dry, apex reticulated on some, some with small "brownish" scales, solid becoming cavernous, color at apex "whitish", towards and at base 5Y 8/12

(Lemon Chrome); context at base 1.25Y 7/15 (No Ridgway equivalent).

Microscopic characters.—Basidiospores 8.5-14.5 by 4.5-6.5 μm (DPL-2316), generally 11-13 by 5-6 μm, "brownish" in KOH, ellipsoid-inequilateral; cuticle hyaline to "pale yellowish" trichoderm of cylindrical, up to 10 μm hyphae, arising from interwoven, rather broad context hyphae.

Chemical tests.—5% KOH cuticle and context "dingy Yellow", tubes some darkening; conc. ammonia no reaction.

Habit and habitat.—Gregarious in wetter areas such as oak flats and baygalls, among moss, summer.

Material examined.—**MISSISSIPPI**: **PERRY COUNTY**, Black Creek Wilderness trail, DeSoto National Forest, 11 July 1998, DPL-6027 (FMNH). **TEXAS**: **POLK COUNTY**, center of Big Sandy Unit, Big Thicket National Preserve, 11 September 1976, DPL-542 (FMNH). **HARDIN COUNTY**, Kirby Nature Trail, Turkey Creek Unit, Big Thicket National Preserve, 20 September 1980, DPL-2316 (FMNH).

Remarks.—For years one of us (DPL) considered this to be a form of *Tylopilus chromapes* because of the similar coloration. Singer saw the collections and believed it to be *Fistulinella jamaicensis*. Apparently this is the first time it has been collected since Murrill described it from Jamaica in a growth of coppice among grass on a small hill. Murrill does not mention the yellow color on the stipe. In Texas and Mississippi it is almost always found in wet areas such as baygalls and low hardwood flats.

Rhizopogon baxteri A. H. Smith 1966:105

Description.—**Basidiocarp** soft, subglobose, about 10 mm long, outside covered with a yellowish (dingy) tomentose mycelium; context soft, dark brown, sticky.

Microscopic characters.—Basidiospores 7.5-8.5 by 3.2-3.8 μm, smooth, subfusiform; context hyphae with clamps, forming irregular rosettes.

Habit and habitat.—Gregarious among pine bark chips on a beech-magnolia-loblolly slope forest, December.

Material examined.—**MISSISSIPPI**: **HARRISON COUNTY**, Choctaw, near Harrison Experimental Forest, DeSoto National Forest, 6 December 1997, DPL-5996 (OSC; FMNH).

Remarks.—Apparently this is the second collection made of this rare fungus. Previously it was known only from a single collection from Michigan.

Boletellus ananas (Curt.) Murr. 1909:10

This taxon was first described from South Carolina in 1848 by Curtis and is found along the Gulf Coastal Plan associated with pine or oak trees. Its western range in the US is the Lost Pines near Bastrop, Texas. It is also known from Central and South America, Southeast Asia, Australia, New Zealand and New Caledonia.

Phylloporus boletenoides Smith & Thiers 1964:105

This species was described from Florida and also is known from Alabama, Mississippi, Texas and New Jersey. It appears to be endemic to the Atlantic and Gulf Coast plain. See Singer et al. (1990) for a detailed description.

Gyroporus phaeocyanescens Singer et al. 1983:37

This bolete, first described from Belize by Singer et al. (1983), has been found in the Big Thicket in xeric oak forests.

Pulveroboletus lewisii Singer 1998:224

This bolete, recently described from Texas by Both (1998), is only known from eastern Texas and is associated with water oaks.

Cantharellus tabernensis Feibelman & Cibula 1996:295

This small chanterelle is commonly found from Mississippi to eastern Texas and is probably found east to Florida. It differs from other species with its yellowish brown pileus with a brown disk and a bright orange hymenophore and stipe. It is an edible species.

Melanomphalia globulifera Singer et al. 1990:47

This small, wood inhabiting agaric, is only known from Texas and Mississippi sites and has been found several times since first described.

Cortinarius lewisii O. K. Miller 1993:461

Common in the Big Thicket, this agaric has been collected in southern Mississippi. The spores of the Mississippi material (DPL-5820, FMNH)

is in the range reported for the Texas collections.

Naematoloma (*Hypholoma*) *sublateritium* (Fr.) Karsten 1879:495

This excellent edible usually found growing in dense caespitose clusters on or around old stumps (usually oak or beech) in the northeast, is quite rare in the gulf south. A fine collection was obtained at Percy Quin St. Pk., McComb, Mississippi on 4 Dec. 1999. Cultural studies conducted by Toby Feibelman of Microbia (Cambridge, Massachusetts), indicate that summer temperatures in this region may be lethal to the vegetative mycelium. Smith(1949) notes, "*N. sublateritium* is a highly prized esculent in regions where it is abundant."

DISCUSSION

The Gulf Coastal plain of the southern United States has a rich mycota and is a transition zone from the temperate into subtropical areas. Species have affinities to the American tropics, the Appalachian and Atlantic Piedmont, the central United States hardwood oak-hickory forest, Southeastern Asia and Australia. Many Gulf Coast fungi are of pantropical occurrence and it also has a rich endemic flora.

Species with tropical affinities include *Panus crinitius*, *Oudemansiella canari*, *Psilocybe cubensis, Hygrophorus firmus* var. *trinentensis, Gyroporus phaeocyanescens, Boletellus ananas* and *Fistulinella jamaicensis*. Species with Appalachian and Piedmont affinities include *Lactarius petersenii, Amanita hesleri* and *Phylloporus boletenoides*. Species with affinities to the oak-hickory forest of the central United States include *Amanita levisitrata* and *Rhizopogon baxteri*. Endemics include *Amanita westii, Hygrophorus mississippiensis, H. chamaeleon, Melanomphalia globulifera, Cantharellus tabernensis, Cortinarius lewisii* and *Pulveroboletus lewisii*. Cosmopolitan species include *Laccaria laccata, Pleurotus ostreatus, Pluteus cervinus* and *Cantharellus cibarius*.

Although the mycota of the Gulf Coast region has had much study since the 1930s, it still has many unknown aspects. With its diverse plant associations and the lack of mycologists, many areas have not been searched for fungi. For examples, the live oak mottes along the Louisiana and Texas coast, the endangered longleaf pine forests, and the sandbar communities along its rivers and streams with its associated ectomycorrhizal birch and willow trees, have had no systematic search of its agarics. Clearly this area represents one of the most promising areas for mycological research in North America.

ACKNOWLEDGMENTS

We wish to express thanks to Dr. Jim Trappe for the identification of *Rhizopogon baxteri*, Dr. Rod Tulloss for confirmation of *Amanita heseleri* and J. Justice of Alexandria, Arkansas for information regarding the distribution of *Amanita levistriata*. Also we thank Pat Lewis for the collection of *Rhizopogon baxteri*.

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