

Type Studies in *Tylopilus*. I. Taxa Described by Charles H. PECK

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Abstract. — Type specimens of taxa described by Charles H. PECK and assigned to *Tylopilus* (*Boletus badiceps*, *B. balloui*, *B. eximius*, *B. indecisus*, *B. nigrellus*, *B. jelleus* var. *obesus*, *B. chrysenteron* var. *sphagnorum*, *B. subpunctipes*, *B. subsanguineus*, and *B. tabacinus*) are described. Hymenial and surface cellular details are thoroughly described and illustrated for these specimens using terminology presented by SINGER (1975). On the basis of these studies one new combination, *Tylopilus indecisus* var. *subpunctipes* (PECK) WOLFE, is proposed.

Introduction

Charles Horton PECK served as New York State Botanist from 1883 until his retirement in 1915 (HESLER, 1975). During his tenure as state botanist he named many new species of plants among them species of fungi. Of the boletes which he named many have been placed in a number of the 'split genera' of the Friesian system. *Tylopilus* KARSTEN is just such a genus having been erected to accommodate the pink-spored boletes.

This paper is a report on studies of the type specimens of taxa described by PECK and currently included in *Tylopilus* subg. *Tylopilus* as envisioned by SNELL & DICK (1970), SMITH & THIERS (1971), SINGER (1975), THIERS (1975), and GRUND & HARRISON (1976). Most of these specimens have been studied and redescribed by SINGER (1947) and SMITH & THIERS (1971). These authors' descriptions contributed much to our knowledge of these taxa. They were, however, deficient in some regards, especially the cystidial characters. Since these elements were of major significance in the infrasubgeneric taxonomy of *Tylopilus* subg. *Porphyrellus* (WOLFE, 1979), it is imperative that the morphology of these elements be accurately and thoroughly described and illustrated in detail. During the course of these studies it became evident that the classical use of the terms pleurocystidia and cheilocystidia (BULLER, 1922) was not adequate to describe the diversity of morphology and function observed. It was decided to employ the terminology of SINGER (1975) to describe these elements. Pleurocystidia are morphologically differentiated sterile cells of hymenial origin (i. e., from non-conducting hyphae). Pseudocystidia are sterile cells in the hymenium

derived from conducting elements of the basidiocarp. Cheilocystidia are sterile hymenial cells not homologous with pleurocystidia or pseudocystidia and are located near or upon the tube edges. Cystidia occurring upon the pileus surface, pilocystidia, or upon the stipe surface, caulocystidia, of some specimens described herein may indeed be pseudocystidia in the strictest sense. However, for the sake of simplicity, the terms pilocystidia and caulocystidia have been retained in this work.

Descriptions of the specimens studied occur in alphabetical order of the epithet, specific or varietal. Nomenclatural synonyms are presented for the reader's convenience. Color designations were subjectively determined, and the line drawings were made with the aid of a drawing tube attachment on a Nikon Labophot phase contrast microscope. The following symbols were used in the presentation of the quantitative data collected during the course of these studies: D^m = median dimensions; d^m = median diameter; E = length/width ratio; E^m = median length/width ratio. The term 'spores' as used in this paper refers to basidiospores.

Type Descriptions

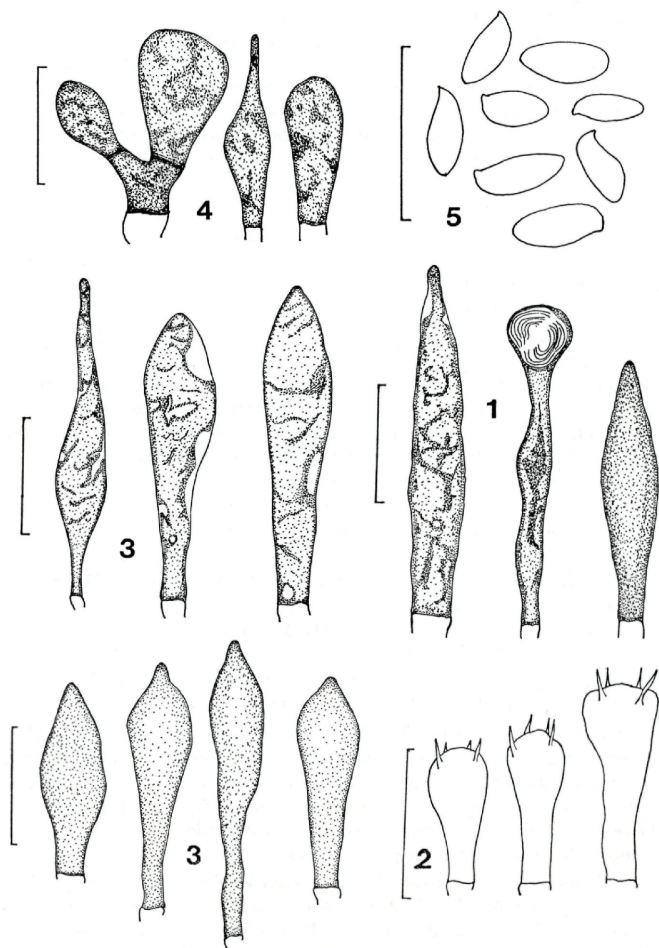
Boletus badiceps PECK 1900, Bull. Torrey Bot. Club 27: 18. — Fig. 1—5
= *Tylopilus badiceps* (PECK) SMITH & THIERS 1971, The Boletes of Michigan p. 122.

Type specimen (HOLOTYPE): NYS — "Herbarium N. Y. State Museum; oak woods near Philadelphia, Pa.; McILVAINE; 1899." [!]

The holotype consists of one fruitbody; pileus 2.8×0.4 cm, cap dark brown, coffee brown, velvety, cuticle abruptly terminated at the hymenial surfaces, truncated or beveled; hymenium light cream tan, pores and tubes concolorous, pores 3—4 per mm, tubes extending down the stipe as striations. Stipe $4-5 \times 1$ cm (7 mm at the apex), enlarging basally, densely pruinose, appearing felty, brown to dark brown; base cream, mycelial.

Pileus cuticle a hymeniform turf of pilocystidia; pilocystidia (Fig. 1) $28.5-52.0 \times 4.0-10.5$ μ m ($D^m = 40.5 \times 6.5$ μ m), equal to subclavate with acute to obtuse apices, pale yellow to gold in HOH, yellow to rust-gold in Melzer's cyanophilous in cotton blue; hypodermium loosely interwoven, hyaline in KOH, yellow in Melzer's; gloeoplerous hyphae in context $2.5-14.5$ μ m diam. ($d^m = 6.5$ μ m), yellow in KOH, gold in Melzer's, cyanophilous in cotton blue. Tube trama hyphae $2.5-9.0$ μ m diam ($d^m = 6.5$ μ m), boletoid, hyaline in KOH, yellow in Melzer's. Clamp connections absent.

Basidia (Fig. 2) $21.0-30.0 \times 4.0-6.5$ μ m ($D^m = 24.5 \times 6.5$ μ m), clavate to narrowly clavate, hyaline to pale cream in KOH, yellow in



Figs. 1–5. Holotype of *Boletus badiceps*: 1. Pilocystidia. — 2. Basidia. — 3. Pleurocystidia. — 4. Caulocystidia. — 5. Basidiospores. — Standard line = 20 μ m

Melzer's, pale blue in cotton blue. Pleurocystidia (Fig. 3) $27.5-57.0 \times 6.5-10.5 \mu\text{m}$ ($D^m = 41.5 \times 9.0 \mu\text{m}$), narrowly fusoid-ventricose to ventricose with acute to truncate apex, rarely clavate-pedicellate, abundant, pale cream-yellow to refringent gold in KOH, yellow to refringent gold in Melzer's, walls and contents cyanophilous in cotton blue. Cheilocystidia absent. Caulocystidia (Fig. 4) $14.5-31.0 \times 8.0-10.5 \mu\text{m}$ ($D^m = 26.0 \times 8.0 \mu\text{m}$), clavate to narrowly clavate to fusoid-ventricose, yellow to gold in KOH, gold to rust-gold in Melzer's, cyanophilous in cotton blue; caulobasidia occasionally seen in caulohymenium mounts.

Spores (Fig. 5) $6.5-10.5 \times 2.5-4.0 \mu\text{m}$ ($D^m = 8.0 \times 4.0 \mu\text{m}$; $E = 2.0-2.7$; $E^m = 2.3$), oblong-elliptical, inequilateral with a plane to shallow suprahilar area, pale yellow-cream in KOH, yellow in Melzer's, hyaline in cotton blue, surface smooth, walls continuous.

Observations. The qualitative characters presented here agree well with those presented by SMITH & THIERS (1971). They pointed out that this taxon is very distinct because of the presence of a turf of pilocystidia, the yellow pleurocystidia in KOH and Melzer's and small spores. The gold cheilocystidia in KOH and Melzer's as reported by SMITH & THIERS (1971) are herein considered pleurocystidia. Of the PECK types studies in this report, this taxon is the only one to possess distinctive pilocystidia. Many of these pilocystidia have a distal end which is blown out like a balloon (c. f., Fig. 1).

Boletus balloui PECK 1912, New York State Mus. Bull. 157: 22. — Fig. 6-9

= *Gyrodon balloui* (PECK) SNELL 1941, Mycologia 33: 422.

= *Tylopilus balloui* (PECK) SINGER 1947, Amer. Midl. Naturalist 37: 104.

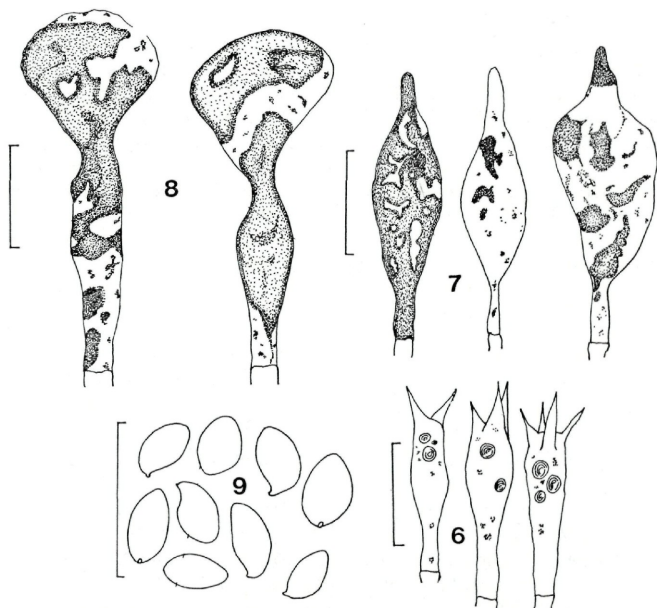
Type specimen (HOLOTYPE): NYS — "Coll. N. Y. State; Orient Point, Suffolk es.; R. LATHAM, 1 Oct. 1911" [!]

The holotype consists of three fruitbodies; pilei $5-7.5 \times 0.3-0.5$ cm, red-gold, cinnamon-rust, surface smooth, uninterrupted. Hymenial surfaces concolorous with pileus to somewhat darker, tubes to 5 mm long, pores 2-3 per mm, simple and compound. Stipes $3-3.5 \times 1-1.5$ cm, concolorous with pilei, pruinose to subpruinose, base pinched to a point, subradicate.

Pileus cuticle a loosely interwoven trichodermium, appressed occasionally; terminal cells $4.0-6.5$ diam. ($d^m = 5.0 \mu\text{m}$), equal to subclavate with rounded apices, yellow-gold in KOH, rust-gold in Melzer's, dark blue-green in cotton blue; context of tightly interwoven inflated to subinflated hyphae; gloeoplerous hyphae of context blue-green in cotton blue. Tube trama hyphae $2.5-10.5 \mu\text{m}$ diam. ($d^m = 4.0 \mu\text{m}$), boletoid, hyaline in KOH, yellow in Melzer's, hyaline in cotton blue; gloeoplerous hyphae in tube trama $4.0-10.5 \mu\text{m}$ diam.

($d^m = 6.5 \mu m$), yellow to gold in KOH, dark gold in Melzer's, blue-green in cotton blue. Clamp connections absent.

Basidia (Fig. 6) $22.0-35.0 \times 5.0-8.0 \mu m$ ($D^m = 28.5 \times 5.0 \mu m$), narrowly clavate, 2-4 sterigmate, sterigma very long $5-10 \mu m$, hyaline in KOH, yellow in Melzer's, cyanophilous in cotton blue. Pseudocystidia (Fig. 7) $39.0-54.5 \times 10.5-15.5 \mu m$ ($D^m = 45.5 \times 10.5 \mu m$), abundant, fusoid-ventricose to broadly fusoid-ventricose to



Figs. 6-9. Holotype of *Boletus balloui*: 6. Basidia. — 7. Pseudocystidia. — 8. Cheilocystidia. — 9. Basidiospores. — Standard line = $20 \mu m$

ventricose-mammilate, yellow to dark gold in KOH, gold to rust-gold in Melzer's dark blue-green to blue-black in cotton blue, staining contents restricted to cytoplasm and interrupted by hyaline vacuoles, cytoplasm appearing like a reticulum. Cheilocystidia (Fig. 8) $58.5-76.5 \times 19.5-39.0$ (-60) μm ($D^m = 64.0 \times 26.0 \mu m$), spheropedunculate to broadly spheropedunculate, gold in KOH, rust-gold in Melzer's dark blue-green to dark blue-black in cotton blue, contents distributed like those of the pleurocystidia. Caulocystidia $27.5-56.0 \times 2.5-13.0 \mu m$

($D^m = 31.0 \times 6.5 \mu m$), clavate to fusoid-ventricose to ventricose, thin-walled, yellow-gold in KOH, rust-gold to gold in Melzer's, cyanophilous in cotton blue, contents distributed like those of pseudocystidia and cheilocystidia.

Spores (Fig. 9) $5.0-10.5 \times 4.0-5.0 \mu m$ ($D^m = 6.5 \times 4.0 \mu m$; $E = 1.3-2.7$; $E^m = 1.7$); ovate to ovate-elliptical; inequilateral with an inflated suprahilar area, hyaline in KOH, yellow to faintly dextrinoid in Melzer's, walls cyanophilous and contents hyaline in cotton blue; surface smooth, walls continuous.

Observations. This specimen has basidia with unusually long sterigma, $5-10 \mu m$ long (c. f., Fig. 6). The cheilocystidia and pseudocystidia both have differentially staining cytoplasm which give them the appearance of being incrustated as SINGER (1947) reported in his study of the type. The pseudocystidial and cheilocystidial contents are similar if not the same; the shape and location are different. They are, therefore, not homologous at this time. Further studies of the species will hopefully shed more light on these characters.

Boletus eximius PECK 1887, J. Mycol. 3: 54.

≡ *Tylopilus eximius* (PECK) SINGER 1947, Amer. Midl. Naturalist 37: 109.

≡ *Leccinum eximium* (PECK) POMERLEAU 1959, Bol. Bull. du Cercle des Myc. Amat. de Quebec 6: 117.

[≡ *Leccinum eximium* (PECK) SINGER 1973, Persoonia 7: 319.]

Type specimen for this taxon is not available from NYS and apparently lost.

Boletus indecisis PECK 1888, Annual Rep. New York State Mus. 41: 76. — Fig. 10—15

≡ *Tylopilus indecisis* (PECK) MURRILL 1909, Mycologia 1: 15.

≡ *Porphyrellus indecisis* (PECK) GILBERT 1931, Les Bolets p. 99.

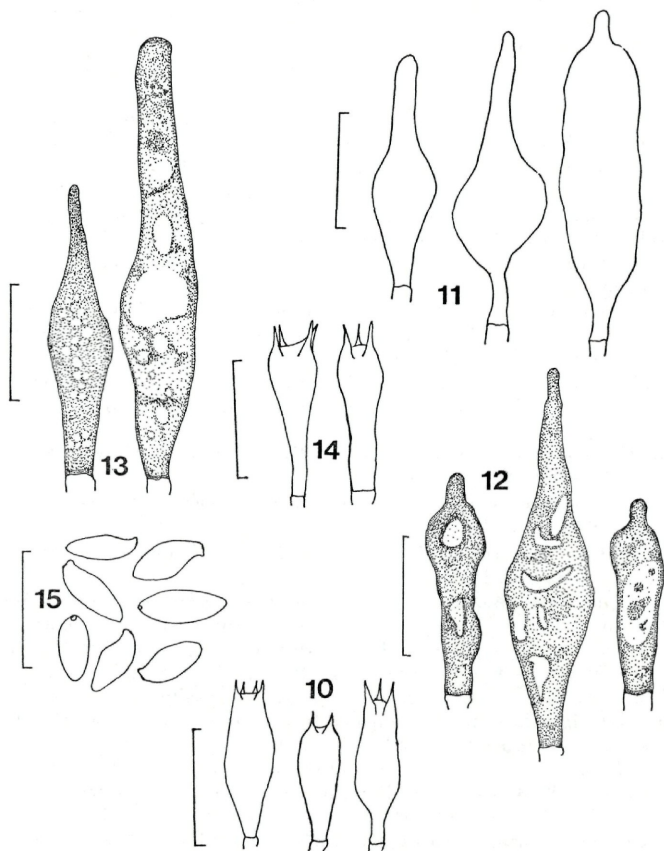
Type specimen (HOLOTYPE): NYS — "Coll. N. Y. State; Menands; Aug.; Leg. Chas. H. PECK; *Hyporhodii*" [!]

The type collection consists of 5 fruitbodies and a single water color illustration showing in addition to a faint flesh colored hymenial surface, stipes with distinct reticulations. Pilei $4-8 \times 0.3-0.9$ cm, smooth, pruinose, dark tan to red-brown; tubes $0.3-0.9$ cm long, pores 2—3 per mm; stipes $6.2-8.5 \times 0.8-1.7$ cm, concolorous with hymenium, rust-tan, reticulate upper 2 mm to one half the length.

Pileus cuticle a loosely interwoven trichodermium; terminal cells $2.5-5.0 \mu m$ diam. ($d^m = 2.5 \mu m$), equal with slightly rounded apex, yellow in KOH, gold in Melzer's, walls blue and contents hyaline in cotton blue. Tube trama hyphae $2.5-6.5 \mu m$ diam. ($d^m = 5.0 \mu m$), boletoid, mediostrium walls gelatinous, hyaline in KOH, yellow in Melzer's, hyaline in cotton blue; gloeoplerous hyphae $4.0-6.5 \mu m$

diam. ($d_m = 4.0 \mu m$), yellow-gold in KOH, dark gold in Melzer's, cyanophilous in cotton blue. Clamp connections absent.

Basidia (Fig. 10) $19.5-32.5 \times 5.0-9.0 \mu m$ ($D_m = 22.0 \times 6.5 \mu m$), equal to clavate, 2-4 sterigmate, rather broad at basal septum, hyaline to cream-yellow in KOH, yellow in Melzer's, light blue in cotton blue. Pleurocystidia (Fig. 11) $39.0-52.0 \times 9.0-13.0 \mu m$



Figs. 10-15. Holotype of *Boletus indecisis*: 10. Basidia. — 11. Pleurocystidia. — 12. Caulocystidia. — 13. Caulobasidia. — 14. Basidiospores. — 15. Basidiospores. — Standard line = $20 \mu m$

($D^m = 48.0 \times 11.5 \mu m$), broadly fusoid-ventricose with long flexuous neck, ventricose portion located in proximal half of cystidium, hyaline in KOH, yellow in Melzer's, hyaline in cotton blue. Pseudocystidia (Fig. 12) $37.5-58.5 \times 9.0-15.5 \mu m$ ($D^m = 41.5 \times 10.5 \mu m$), fusoid-ventricose to broadly fusoid-ventricose to ventricose mammillate, light brown to gold-brown in KOH, red-gold to rust colored in Melzer's, blue in cotton blue, hyaline vacuoles present in otherwise pigmented cytoplasm. Cheilocystidia absent. Caulocystidia (Fig. 13) $26.0-66.5 \times 6.5-11.5 \mu m$ ($D^m = 48.0 \times 10.5 \mu m$), fusoid-ventricose, gold in KOH, dark rust-brown in Melzer's, walls and cytoplasm dark blue to blue-green in cotton blue. Caulobasidia (Fig. 14) $23.5-26.0 \times 6.5 \mu m$, narrowly clavate, hyaline in KOH, yellow in Melzer's, pale blue in cotton blue.

Spores (Fig. 15) $10.5-15.0 \times 4.0-5.0 \mu m$ ($D^m = 11.5 \times 4.5 \mu m$; $E = 2.3-3.0$; $E^m = 2.8$), narrowly elliptical, inequilateral by a suprahilar depression and slight adaxial swelling in profile view, pale yellow-tan in KOH, subdextrinoid to dextrinoid in Melzer's, contents hyaline to pale blue to blue in cotton blue; surface smooth, walls continuous.

Observations. The stipe reticulation occurrence in the holotype varies from a 2 mm band at the apex in one specimen to a broad band covering the upper half of the stipe in other specimens. Pleurocystidia and pseudocystidia are clearly differentiated in the specimens observed in this study. Cheilocystidia were not observed in this study.

Boletus nigrellus PECK 1878, Annual Rep. New York State Mus. 29: 44. — Fig. 16–18

== *Porphyrellus nigrellus* (PECK) GILBERT, Les Bolets, p. 99. 1931.

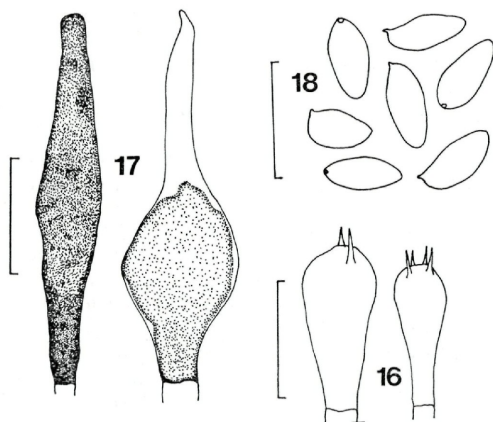
== *Suillus nigrellus* (PECK) KUNTZE, Rev. Gen. Pl. 3: 535.

Type specimen (HOLOTYPE): NYS — "Coll. N. Y. State; Sandlake; Leg. C. H. PECK" [!]

The holotype consists of four fruitbodies; pilei $4.5-7.0 \times 0.5-0.8$ cm, dingy, dark gray-brown to black-brown, surface smooth to pruinose; hymenium concolorous with pileus to somewhat lighter, pores small, 3–4 per mm, tubes up to 5 mm long; stipes 5–6.5 cm long, 1 cm broad apically expanding to 1.5 cm basally, base pinched to a point, dark brown-black, smooth to pruinose, reticulate from tube dissepiments upper 1 mm only.

Pileus cuticle a palisade to tightly interwoven trichodermium; terminal cells $4.0-8.0 \mu m$ diam. ($d^m = 4.0 \mu m$), acute to broadly rounded, gold-tan in KOH, rust-brown in Melzer's, olive-gold in cotton blue. Tube trama hyphae $2.5-8.0 \mu m$ diam. ($d^m = 5.0 \mu m$), boletoid, hyaline in KOH, yellow in Melzer's, pale blue in cotton blue; gloeoplerous hyphae $5.0-8.0 \mu m$ diam. ($d^m = 6.5 \mu m$), dark gold to gold-brown in KOH, dark gold in IKI, olive-gold in cotton blue.

Basidia (Fig. 16) $17.0-26.0 \times 6.5-9.0 \mu\text{m}$ ($D^m = 22.0 \times 8.0 \mu\text{m}$), narrowly clavate to clavate, 2-4 sterigmate, faintly yellow-green in KOH, yellow in Melzer's, pale blue in cotton blue. Pseudocystidia (Fig. 17) $41.5-71.5 \times 11.5-22.0 \mu\text{m}$ ($D^m = 56.0 \times 15.5 \mu\text{m}$), broadly fusoid-ventricose with long acute apex, pale yellow-tan to gold-brown in KOH, red-brown (dextrinoid) in Melzer's, olive-gold in cotton blue. Cheilocystidia absent. Caulocystidia $22.5-34.0 \times 8.0-14.5 \mu\text{m}$ ($D^m = 26.0 \times 9.5 \mu\text{m}$), broadly clavate with moderately thick refringent walls, dingy gold-tan in KOH, yellow to gold-brown in Melzer's, blue-green in cotton blue.



Figs. 16-18. Holotype of *Boletus nigrellus*: 16. Basidia. - 17. Pseudocystidia. - 18. Basidiospores. - Standard line = $20 \mu\text{m}$

Spores (Fig. 18) $9.0-11.5 \times 4.0-5.0 \mu\text{m}$ ($D^m = 10.5 \times 5.0 \mu\text{m}$; $E = 1.8-3.0$; $E^m = 2.3$), elliptical to broadly elliptical in face view, inequilateral in profile view by a moderate to shallow supra-hilar depression and a slight adaxial swelling, surface smooth, walls continuous, pale yellow-tan in KOH, pale rust to rust-cinnamon in Melzer's, walls and contents cyanophilous in cotton blue.

Observations. This fungus has only pseudocystidia with both pleurocystidia and cheilocystidia being absent. The fruitbody morphology is very distinct being a dingy brown to brown-black which becomes darker upon handling. The name of this fungus has been treated as a taxonomic synonym of *Tylopilus alboater* (SCHWEINITZ) MURRILL by SINGER (1947). From published accounts of *T. alboater*, it

appears this synonymy may be correct. A study of authentic material, if available, may verify this synonymy.

Boletus felleus var. *obesus* PECK 1899, Annual Rep. New York State Mus. 2: 154.

This taxon is known only by the name and original description. No specimens bearing this name have been found in the PECK collections at NYS.

Boletus chrysenteron var. *sphagnorum* PECK 1910, New State Mus. Bull. 50: 64. — Fig. 19—21

= *Tylopilus sphagnorum* (PECK) SMITH & THIERS 1971, The Boletes of Michigan p. 123.

Type specimen (HOLOTYPE): NYS — "Herbarium N. Y. State Museum; Stow, Mass. Collected by S. DAVIS; Sept. 23, 1909" [!]

The holotype consists of two fruitbodies; pilei 2.0—2.5×1 cm, red-cinnamon becoming paler toward the margin; hymenium cinnamon to pale cinnamon, tubes and tube mouths concolorous, tubes up to 1 cm long, tube mouths small, 3—4/mm; stipe 4—4.5×0.5—1.0 cm, enlarged basally, pruinose, pale yellow cinnamon.

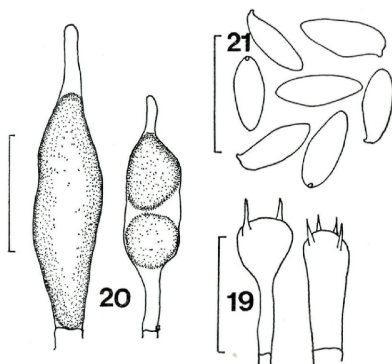
Pileus cuticle an interwoven trichodermium; terminal cells 52—105×6.5—22.0 μm ($D^m = 71.5 \times 10.5 \mu\text{m}$), clavate to fusoid-ventricose, hyaline to yellow in KOH, yellow in Melzer's, hyaline to pale blue in cotton blue. Tube trama hyphae 2.0—10.5 μm diam. ($d^m = 6.0 \mu\text{m}$), boletoid, hyaline in KOH, yellow in Melzer's, pale blue in cotton blue. Clamp connections absent.

Basidia (Fig. 19) 17.0—35.0×6.5—9.0 μm ($D^m = 22.5 \times 7.0 \mu\text{m}$), clavate to clavate-pedicellate, hyaline to pale cream in KOH, yellow in IKI, blue in cotton blue. Pleurocystidia (Fig. 20) 36.5—54.5×8.0—10.5 μm ($D^m = 50.5 \times 9.0 \mu\text{m}$), fusoid-ventricose to ventricose-mammilate, distal portion collapsing, contents appearing to occupy greatest portion of the cystidium, vacuolate, pigmented contents condensing in age with vacuolar size reduction and increased pigmentation, pale yellow-cream to yellow-gold in KOH, gold-yellow to pale cinnamon-gold in Melzer's blue to blue-green in cotton blue. Cheilocystidia absent. Caulocystidia 13.0—27.5×3.0—6.0 μm ($D^m = 16.0 \times 4.0 \mu\text{m}$), clavate to rarely ventricose-pedicellate, hyaline in KOH, yellow in Melzer's, hyaline to blue in cotton blue.

Spores (Fig. 21) 9.5—17.5×4.0—4.5 μm ($D^m = 13.0 \times 4.0 \mu\text{m}$; $E = 2.5—3.9$; $E^m = 2.9$), narrowly elliptical in face view, inequilateral by a suprahilar depression and adaxial swelling, bright yellow-green in KOH, cinnamon-yellow to pale rust in Melzer's, hyaline in cotton blue, surface smooth, walls continuous.

Observations. SMITH & THIERS (1971) transferred this taxon to *Tylopilus* at the species rank. Notes presumably by the collector

(S. D.) are present in the holotype and indicate several interesting aspects concerning this taxon. There is a reported blueing reaction of the hymenophore on injury. If this blueing reaction was correct with this specimen, then this taxon should not be placed in *Tylopilus* subg. *Tylopilus*. The cystidial characteristics reported in this work are similar to other taxa in the genus *Boletus*. In the absence of spore print color to the contrary, this taxon should not be placed in *Tylopilus* but rather belongs to the genus *Boletus* as originally indicated by PECK.



Figs. 19—21. Holotype of *Boletus chrysenteron* var. *sphagnorum*: 19. Basidia. — 20. Pleurocystidia. — 21. Basidiospores. — Standard line = 20 μ m

Boletus subpunctipes PECK 1907, New York State Mus. Bull. 116: 19. — Fig. 22—26

= *Tylopilus subpunctipes* (PECK) SMITH & THIERS 1971, The Boletes of Michigan p. 119.

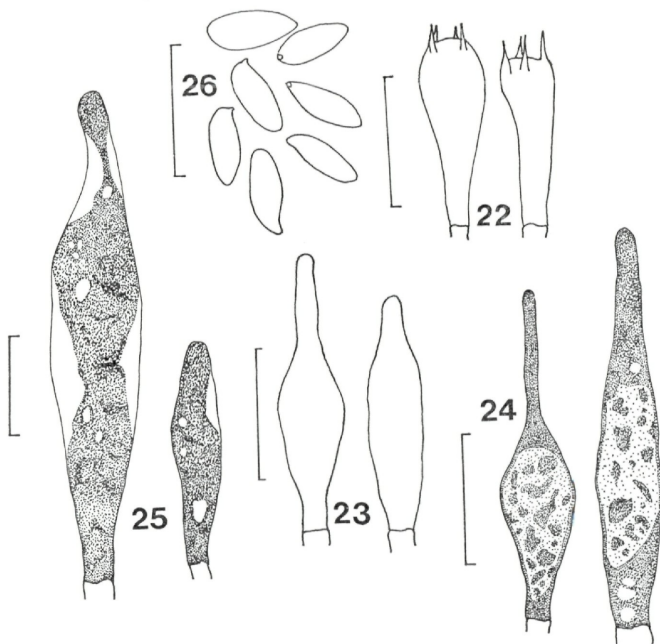
Type specimen (HOLOTYPE): NYS — „Coll. N. Y. State; Menands, Albany Co.; Leg. Chas. H. PECK; 8 Aug. 1906”.

The holotype consists of four fruitbodies; pilei 6.5—8.5 \times 0.7—1.5 cm, smooth, dark brown to cinnamon-brown; hymenium pale cinnamon, pores 2—3 per mm, tubes 3—6 mm long; stipe 5.5—7.0 \times 0.7—1.1 cm, reticulate upper 5—15 mm, otherwise pruinose, equal to obclavate.

Pileus cuticle a loosely interwoven trichodermium; terminal cells 2.5—5.0 μ m diam. (d^m = 4.0 μ m), equal with broadly rounded apex, hyaline to gold in KOH, gold to red-gold in Melzer's, blue to blue-green in cotton blue, cuticular hyphae generative and gloeoplerous; gloeoplerous hyphae red-gold in Melzer's and contents appear uniform to somewhat granular. Tube trama hyphae 2.5—8.0 μ m

diam. ($d^m = 6.5 \mu\text{m}$), boletoid, hyaline in KOH and cotton blue, yellow in Melzer's, gloeoplerous hyphae $1.5\text{--}8.0 \mu\text{m}$ diam. ($d^m = 4.0 \mu\text{m}$), pale cinnamonrust in KOH, cinnamon-gold in Melzer's, blue-green in cotton blue. Clamp connections absent.

Basidia (Fig. 22) $23.5\text{--}31.0 \times 7.0\text{--}9.0 \mu\text{m}$ ($D^m = 24.5 \times 8.5 \mu\text{m}$), clavate, 4 — sterigmate, hyaline in KOH, yellow in Melzer's, cyano-



Figs. 22—26. Holotype of *Boletus subpunctipes*: 22. Basidia. — 23. Pleurocystidia. — 24. Pseudocystidia. — 25. Caulocystidia. — 26. Basidiospores. — Standard line = $20 \mu\text{m}$

philous in cotton blue. Pleurocystidia (Fig. 23) $44.0\text{--}57.0 \times 6.5\text{--}13.0 \mu\text{m}$ ($D^m = 49.5 \times 10.5 \mu\text{m}$), fusoid-ventricose, hyaline in KOH and cotton blue, yellow in IKI. Pseudocystidia (Fig. 24) $31.0\text{--}62.5 \times 9.0\text{--}13.0 \mu\text{m}$ ($D^m = 45.5 \times 9.5 \mu\text{m}$), fusoid-ventricose to narrowly fusoid-ventricose, gold-brown in KOH, rust-gold in Melzer's, blue to blue-green in cotton blue, contents dense in proximal and distal portions and appearing granular and less dense in the ventricose

portion. Cheilocystidia absent. Caulocystidia (Fig. 25) $21.0-74.0 \times 6-11.0 \mu\text{m}$ ($D^m = 41.5 \times 8.0 \mu\text{m}$), fusoid-ventricose to narrowly fusoid-ventricose, gold-brown in KOH, rust-gold in Melzer's, blue-green in cotton blue, contents distributed like those in the pseudocystidia; caulobasidia $15.5-26.0 \times 6.5-8.5 \mu\text{m}$ ($D^m = 24.5 \times 7.0 \mu\text{m}$), clavate, hyaline in KOH, yellow in Melzer's, blue in cotton blue.

Spores (Fig. 26) $9.0-12.5 \times 3.0-4.0 \mu\text{m}$ ($D^m = 11.5 \times 4.0 \mu\text{m}$; $E = 2.3-3.7$; $E^m = 3.0$), elliptical in face view, inequilateral in profile by a shallow suprahilar depression and moderate adaxial swelling, surface smooth, walls continuous.

Observations. The stipe reticulation, presence of pleurocystidia and pseudocystidia, and absence of cheilocystidia all indicate this taxon as being very similar to the type of *Boletus indecisis*. Furthermore, PECK collected these two specimens in "... Menands, Albany Co. ...". Closer examination of the two types revealed that the two differ only in the contents of the terminal cells of the trichodermium. In *B. indecisis* there are no rust-gold pigment granules in the trichodermium terminal cells, whereas, in *B. subpunctipes* there are rust-gold pigment granules in Melzer's. Since these two type specimens differ in only the single character state the following new combination is proposed:

Tylopilus indecisis var. *subpunctipes* (PECK) WOLFE, comb. nov.

Basionym: *Boletus subpunctipes* PECK 1907, New York State Mus. Bull. 116: 19.

Boletus subsanguineus PECK 1900, Bull. Torrey Bot. Club 27: 17.

This taxon has been indicated as being a taxonomic synonym of *Boletus balloui* PECK by SINGER (1947). COKER & BEERS' (1945) concept was taken from MURRILL's account of *Ceratomyces subsanguineus* (PECK) MURRILL. However, as was noted by MURRILL (1909) this taxon is without a type. In the absence of a type specimen which is not available from NYS (or existed only as an illustration) this taxon must remain as a nomen dubium.

Boletus tabacinus PECK 1898, Bull. Torrey Bot. Club 23: 418. — Fig. 27—29

= *Tylopilus tabacinus* (PECK) SINGER 1944, Mycologia 36: 362.

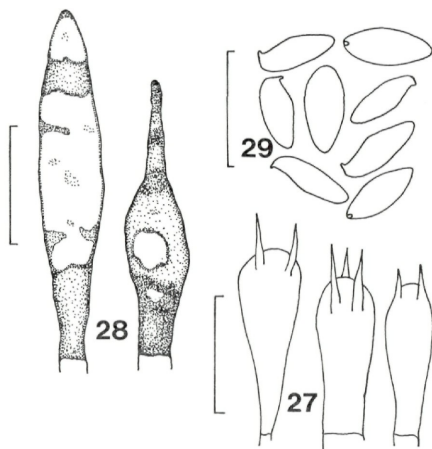
[= *Ceratomyces tabacinus* (PECK) MURRILL, Mycologia 1: 151. nom. inval.]

Type specimen (HOLOTYPE): NYS — "Coll. N. Y. State; Alabama; leg. L. M. UNDERWOOD" [!]

The holotype consists of six fruitbodies; pilei $4.5-12.5 \times 0.6-1.5 \text{ cm}$, cinnamon-brown, subtomentose, continuous in smaller specimens to finely and heavily areolate in larger specimens; hymen-

ium dark brown to cinnamon-brown; pores lighter than tubes, pores 1–2/mm, tubes up to 8 mm long; stipe 5.5–10.0×1.5–2.3 cm, cinnamon-brown, darker above, ventricose to bulbous, closely and prominently reticulate in upper half to broadly reticulate below.

Pileus cuticle an interwoven trichodermium; terminal cells 6.5–11.5 μm diam. ($d^m = 9.5 \mu\text{m}$), encrusted, equal, hyaline to pale yellow in KOH, gold in Melzer's, blue in cotton blue. Tube trama hyphae 5.0–13.0 μm diam. ($d^m = 7.0 \mu\text{m}$), boletoid, hyaline in KOH, yellow in Melzer's, hyaline to pale blue in cotton blue. Clamp connections absent.



Figs. 27–29. Holotype of *Boletus tabacinus*: 27. Basidia. — 28. Pleurocystidia. — 29. Basidiospores. — Standard line = 20 μm

Basidia (Fig. 27) 23.5–37.0×8.5–13.0 μm , ($D^m = 31.0 \times 9.5 \mu\text{m}$), clavate to narrowly clavate, hyaline to pale yellow in KOH, dark yellow to yellow-gold in Melzer's, blue in cotton blue. Pleurocystidia (Fig. 28) 45.0–60.0×6.5–12.5 μm ($D^m = 52.0 \times 9.0 \mu\text{m}$), lanceolate to narrowly fusoid-ventricose, hyaline to yellow in KOH, dark yellow to rust-gold in Melzer's, blue to blue-green in cotton blue, contents appear foamy with hyaline vacuoles occasionally present. Cheilocystidia absent. Caulocystidia 21.0–40.5×6.5–10.5 μm ($D^m = 26.0 \times 7.0 \mu\text{m}$), clavate rarely to fusoid-ventricose, pale hyaline to light yellow in KOH, yellow to dark gold in Melzer's, pale blue in cotton blue; caulocystidia forming reticulations on the stipe.

Spores (Fig. 29) $11.5-13.0 \times 4.0-5.0 \mu\text{m}$ ($D^m = 12.5 \times 4.0 \mu\text{m}$; $E = 2.5-3.3$; $E^m = 2.9$), elliptical in face view, inequilateral in profile view with a suprahilar depression and adaxial swelling, pale yellow to cream green in KOH, pale yellow-rust in Melzer's, blue in cotton blue, surface smooth, walls continuous.

Observations. The terminal cells of the trichodermium of this specimen are encrusted, an uncommon condition in this group of taxa. Gloeoplerous hyphae, the conducting hyphae, are absent in the tube trama. The pleurocystidia are, therefore, the only cystidia distinguishable even though the contents are similar in microchemical reactivity to the pseudocystidia of other taxa.

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