DARWINIANA
NUEVA SERIE
www.ojs.darwin.edu.ar
ISSN 0011-6793 impresa - ISSN 1850-1699 en línea

DARWINIANA, nueva serie 12(1): 75-106. 2024
Versión de registro, efectivamente publicada el 27 de mayo de 2024
DOI: 10.14522/darwiniana.2024.121.1208

TYPE STUDIES OF *PLUTEUS* (FUNGI, AGARICALES, PLUTEACEAE)

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Abstract. Rodríguez, O. 2024. Type studies of *Pluteus* (Fungi, Agaricales, Pluteaceae). *Darwiniana*, nueva serie 12(1): 75-106.

A review of the nomenclatural type specimens of *Pluteus* basionyms is presented as part of the monographic study of the genus in Mexico carried out by the author. In this paper, 19 type materials are reviewed, of the 33 taxa cited from Mexico. Corrections and comments are provided for some type species of the original descriptions, and *Pluteus veraecrucis* is synonymized as *P. horridus*.

Keywords. Agaricales, Celluloderma, Hispidoderma, Pluteus, taxonomy.

Resumen. Rodríguez, O. 2024. Estudio sobre los Tipos de *Pluteus* (Fungi, Agaricales, Pluteaceae). *Darwiniana*, nueva serie 12(1): 75-106.

Se presenta una revisión de los especímenes tipo nomenclaturales de basiónimos de *Pluteus* como parte del estudio monográfico del género en México realizado por la autora. En este artículo se revisan 19 materiales tipo, de los 33 taxones citados en México. Se aportan correcciones y comentarios para algunas especies tipo de las descripciones originales, y se sinonimiza a *Pluteus veraecrucis* como *P. horridus*.

Palabras clave. Agaricales, Celluloderma, Hispidoderma, Pluteus, taxonomía.

INTRODUCTION

The genus *Pluteus* Fr., groups saprothrophic species commonly lignicolous, with a wide distribution in the world (Singer, 1986). *Pluteus* is classified within the family *Pluteaceae* Kotl. & Pouzar along with *Volvariella* Speg. and *Chamaeota* (W.G. Sm.) Earle, genera with which maintain a close relationship in agreement with studies based on morphology, but separated by the presence of volva and a ring respectively (Horak & Heinemann, 1978; Orton, 1986; Singer, 1986; Vellinga, 1990). The traditional delimitation of most fungal species was mainly based on morphological, ecological, and rarely biochemical data or their cultivation (Hawsworth & Lücking, 2017); today, the incorporation of molecular data provides us with the ability to interrelate characters or information that serve to resolve taxonomic and relationship problems observed in some groups of fungi (Banerjee, 1992; Hawksworth and Lücking, 2017; Lücking et al., 2020; Xu, 2020).

The genus *Pluteus* is recognized as monophyletic with high statistical support from genetic sequence data, separating itself from the most closely related genera, *Volvariella* and *Chamaeota* (Moncalvo et al., 2000, 2002). The three sections traditionally recognized morphologically are also reflected in phylogenetic analysis (Menolli et al., 2010; Justo et al., 2011a, b; Justo et al., 2014; Menolli et al., 2015a, b; Malysheva et al., 2016; Kaygusuz et al., 2019). Also, various works have included molecular analysis to clarify the taxonomic position of new records and description of species in the genus *Pluteus*; for example Banerjee & Sundberg (1995), Rodríguez et al. (2009, 2010), Vizzini & Ercole (2011), Menolli et al. (2014), Hosen et al. (2018, 2019), Ferisin et al. (2019), Ševčíková et al. (2020, 2021), Malysheva et al. (2020), Altaf et al. (2022), Nopparat et al. (2022).

Original recibido el 1 de febrero de 2024, aceptado el 21 de mayo de 2024
Editor Asociado: Mario Carlos Saparrat

Until now, 33 species of the genus *Pluteus* have been reported from Mexico (Rodríguez, 2006, 2013). In this work, the revision of the nomenclatural types of the basionyms is presented as part of one study that includes the monographic treatment of the genus *Pluteus* in Mexico; 31 specimens were studied from nine Herbaria that included 19 types. Type studies are included here with macroscopic and microscopic data. In some cases, original descriptions are amended and in other cases, detailed morphological studies are provided. The species characters that were not previously included in the original description are mentioned. In a few species, the macroscopic characteristics are noticed on dry specimens, if they were not mentioned before. In general, remarks are mainly considered on the micromorphological description.

MATERIALS AND METHODS

The types studied are from nine herbaria: ENCB, F, FCME, FH, FLAS, K, LIL, NY, and PRM. The herbarium and author abbreviations follow Holmgren et al. (1990) and Kirk & Ansell (1992), respectively. Micromorphological observations were made from sections of the basidiomata mounted in a 3% potassium hydroxide (KOH) solution. The morphological-character terminology follows the terminology proposed by Largent et al. (1977), and Vellinga (1988, 1990) with a special emphasis on the works made by Vellinga for microscopic characters. The basidiospore shape of at least 30 mature and randomly selected basidiospores was determined according to the Q (length-width ratio) (Bas, 1969). The length of the basidium measurements includes the sterigmata. Illustrations were made with the aid of a drawing tube. The figures of micromorphological characters observed are presented in this study with some images of dried type material.

STUDIED TYPE MATERIAL

Pluteus aethalus (Berk. & M.A. Curtis) Sacc., Syll. Fung. 5: 674, 1887. Fig. 1
≡ *Agaricus aethalus* Berk. & M.A. Curtis, Soc. Bot. 10: 289, 1868.

Pileus 5-6 mm broad, umbonate, surface velutinous, margin incurved, dark brown. Lamellae free, close, curved, punctuate edge, dark-brown color. Stipe 10 × 10.5 mm, central cylindrical curved, punctate overall the surface, concolorous to pileus. Context not observed.

Basidiospores 4.5-5.5(-6) × 4-5.5 µm, Q = 1.09-1.2 subglobose to broadly ellipsoid, smooth, thin- walled, with refringent content, hyaline. Basidia collapsed, not observed. Pleurocystidia 38-77 × 10.5-21 µm, smaller than the cheilocystidia, thin-walled, strongly pigmented with dark brown intracellular content, scarcely frequent. Cheilocystidia 34-110 × 11.5-25.5 µm, claviform, sublageniform to subfusiform-ventricose, with obtuse or submucronate apex, thin-walled, with yellowish-brown intracellular pigment. Pileipellis *mixtini* type, with pileocystidia 50-112.5(-200) × 19-31(-37.5) µm, largely fusiform or elongate, intermixed with claviform-ovoid or sublageniform elements 42.5-50 × 22.5-32.5 µm, thin-walled, with strongly pigmented content, more or less homogeneous, dark brown to yellowish-brown. Caulocystidia 50-141 × 13-31 µm, largely fusiform, or with shapes more or less similar to pileocystidia, with abundant intracellular content strongly pigmented, brown-yellowish, in fascicles that cover densely almost the totality of the stipe like fusiform hairs, without clamp connections.

Habitat: Lignicolous, on dead wood.

Specimens examined. CUBA, ex herb. *Berkeley*, 50/804, holotype *K-105763*; C. Wright, isotype FH.

Observations. Just like many other old taxa, this was described from a poorly preserved exsiccata, therefore, presenting an incomplete description. In the original description of Berkeley, the ornamentation stipe was omitted, this is conspicuously punctate with dark brown pilose cells. This character was described later by other authors such as Dennis (1953, 1970), Singer (1956, 1958), Pegler (1983, 1987), and Courtecuisse (1991). Of the two materials that were reviewed, the one of Kew, presented better conditions, thus, allowing a clearer observation of the majority of the microscopic structures. In the lamellar edges, some cheilocystidia with varied forms and sizes were observed, like those cited by Courtecuisse (1991). Additionally, some of the materials cited by Dennis (1953) were observed, such as the *Pluteus aethalus* var. *pulverulentus* (Dennis 152, 152 a, 152 b) specimens deposited in the Kew herbarium. From those, only, the Dennis 152a specimen could be compatible with *P. aethalus* by the pileipellis type and the size of the basidiospores, but different due to the presence of non-fusiform caulocystidia and macroscopically by the whitish, lamella edge differing from the dark brown lamellar edge characteristic to the species. The Dennis 152b material does not correspond to the species description due to the presence of a pileipellis that does not belong to the *mixtini* type, and that present globose elements, some being lageniform and basidiospores of greater size,

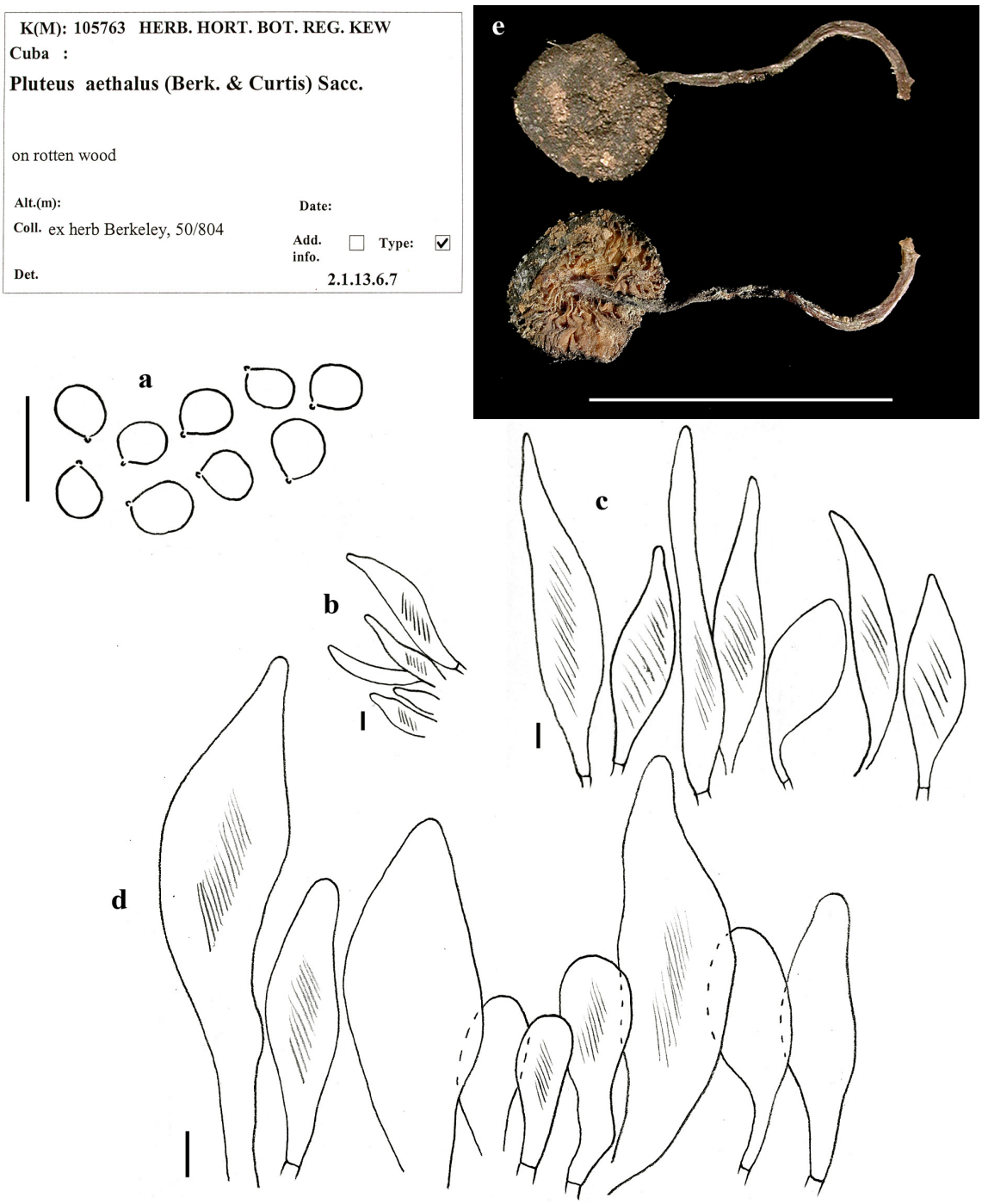


Fig. 1. *Pluteus aethalus,* **a**: basidiospores, **b**: caulocystidia, **c**: pileipellis, **d**: cheilocystidia, **e**: dry basidiomes *(Berkeley K-105763* holotype) (Scale bar: a = 20 µm, b-d = 10 µm, e = 1 cm).

6-7.5 × 5.5-6.5 µm. Finally, the 152 collection Dennis's corresponds to the *Pluteus dennissi* Singer species, a material that was reviewed by Singer (1989) and that was separated of *P. aethalus* due to its non-punctate dark colored stipe and to its more globose basidiospores (4-6 × 3.8-6 µm). *Pluteus aethalus* can be defined macroscopically by the stipe and the punctate (with dark-brown spots), lamella edge and by its micro-morphological characteristics such as the type of pileipellis, the small basidiospores and the presence of conspicuous caulocystidia.

Pluteus albostipitatus var. **poliobasis** Singer, Beih. Sydowia 7: 64, 1973. Fig. 2

Pileus 9-18 mm broad, convex, umbonate, striate-sulcata margin, involute, surface innately fibrillose with smooth appearance, brown-dark to brown-grayish. Lamellae free, close, narrow, light brown-pinkish, fimbriate edges, slightly whitish. Stipe 27 × 1 mm, central, cylindrical, slightly tapering upwards, curved to sinuate, surface glabrous, grayish-brown towards the base, with whitish-yellow mycelium.

Basidiospores 5-6(-7) × (4-)5-6 µm, Q = 1.07-1.25 subglobose to broadly ellipsoid, smooth, thin-walled, hyaline. Basidia 27-42 × 7-9 µm, tetraspored, claviform, frequently with a pedicellate base, hyaline. Pleurocystidia 57-89(-93) × 12-19(-22) µm, lageniform or cylindric-ventricose, with truncate, flattened to obtuse apex, thin-walled, hyaline. Cheilocystidia 41.6-75.2 × 9.6-15.6 µm, claviform, claviform-narrowly, with a long pedicel, hyaline. Pileipellis a cutis, with elements 63-100 × 5-10 µm, cylindrical or subfusiform, subtending to some erects with rounded apex and some acute, hyaline to yellowish-brown. Caulocystidia and clamp connections absent.

Habitat: Lignicolous, gregarious, on wood of dicotyledonous plants in tropical forest (evergreen forests).

Specimens examined. MEXICO, **Veracruz**, Munic. of San Andrés Tuxtla, 7 km to south of Montepío, Estación Biológica Los Tuxtlas, 21-VI-1961, *R. Singer* (type *F M-8117*).

Observations. The complete data of the locality and recollecting date are indicated and corrected since the information mentioned by Singer (1973) in the protologue is incomplete. The date indicated in the label placed inside the envelope is the correct one according to the original publication, contrary to the date on the outside face of the envelope (21-VI-1969).

Pluteus albostipitatus var. *poliobasis* is distinguished from the typical variety by its dark grayish color towards the base stipe instead of the white colour observed in the typical variety (Singer, 1973) The macro and micro-morphological description of the *poliobasis* variety type material was not included by Singer (1973), it was only included in the taxon diagnosis. Certain differences were found from what was cited in the bibliography for *Pluteus albostipitatus* (Dennis) Singer based upon an analysis of the examined microscopic characteristics. It was observed that the basidia, pleurocystidia and cheilocystidia are slightly bigger. Horak & Heinemann (1978) mentioned basidia 20-30 × 7-9 µm, while Courtecuisse (1991) cited a size of 25-32 × 3-9 µm, pleurocystidia 45-80 × 8-25 µm and cheilocystidia 40-50 × 5-15 µm.

Pluteus chrysophlebius (Berk. & M.A. Curtis) Sacc., Syll. Fung. 5: 678, 1887. Fig. 3
≡ *Agaricus chrysophlebius* Berk. & M.A. Curtis, Ann. Mag. Nat. Hist. III. 4: 289, 1859.
= *Agaricus admirabilis* Peck, Ann. Rep. N.Y. St. Mus. 24: 64, 1872.
≡ *Pluteus admirabilis* (Peck) Peck, Ann. N.Y. St. Mus. nat. Hist. 38: 137, 1885.
= *Nolanea bruchii* Speg., Bol Acad. nac. Cienc. Córdoba 29(2-3): 124, 1926.
≡ *Pluteus chrysophlebius* subsp. *bruchii* (Speg.) Singer, Trans. Br. mycol. Soc. 39(2): 196, 1956.

Pileus 8-9 mm broad, rugous-sulcata margin, decurved to slightly incurved, light brown, with grayish shades. Lamellae free, scarce broad, subclose, concolorous to pileus, even edges concolorous. Stipe from 10-25 × 0.5-0.8 mm, central, cylindrical, slightly thickened in the base, curved to slightly sinuate in one of the specimens, concolorous to pileus.

Basidiospores 6-6.5 × 5-6 µm, Q = 1.08-1.3 subglobose to broadly ellipsoid, smooth, thin-walled, hyaline. Basidia 25-28 × 6-7 µm, tetraspored, claviform, hyaline. Pleurocystidia 33-66 × (10-)13-24 µm, lageniform, fusiform, with amorphous incrustations in the apex, thin-walled, hyaline to pale yellowish in KOH. Cheilocystidia 36-69 × 12-23 µm, more or less similar to pleurocystidia, some claviform, also with incrustations in the apex, hyaline. Pileipellis hymenodermis type with 25-32.5 × 20-26 µm elements, subglobose to globose or broadly claviform, hyaline. Caulocystidia and clamp connections were not observed.

Habitat: Lignicolous, gregarious, on rotten tree trunks.

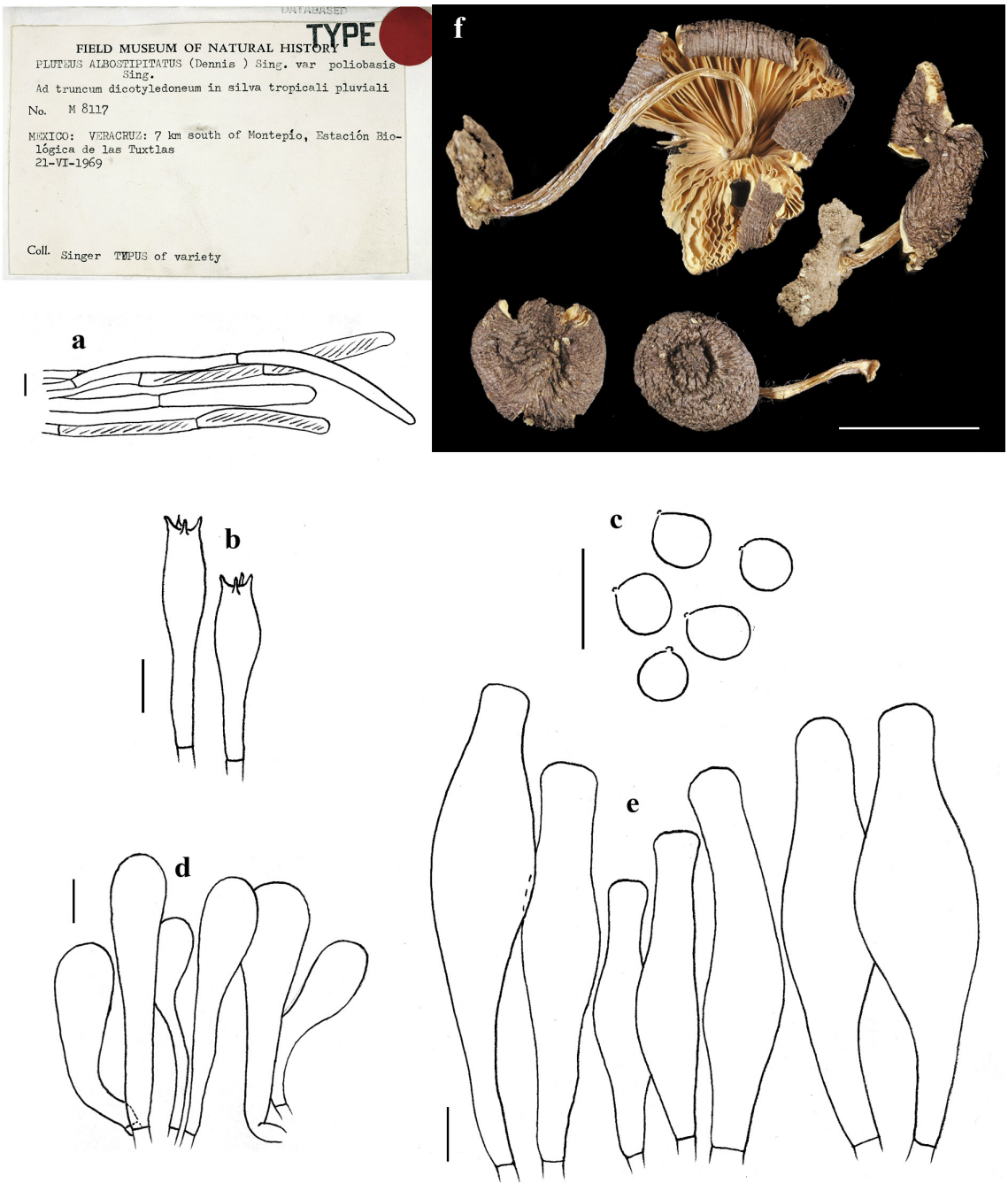


Fig. 2. *Pluteus albostipitatus var. poliobais*, **a**: pileipellis, **b**: basidia, **c**: basidiospores, **d**: cheilocystidia, **e**: pleurocystidia, **f**: dry basidiomes (*R. Singer M 8117-F* type) (Scale bar: a, b, d, e = 10 µm, c = 20 µm, f = 1 cm).

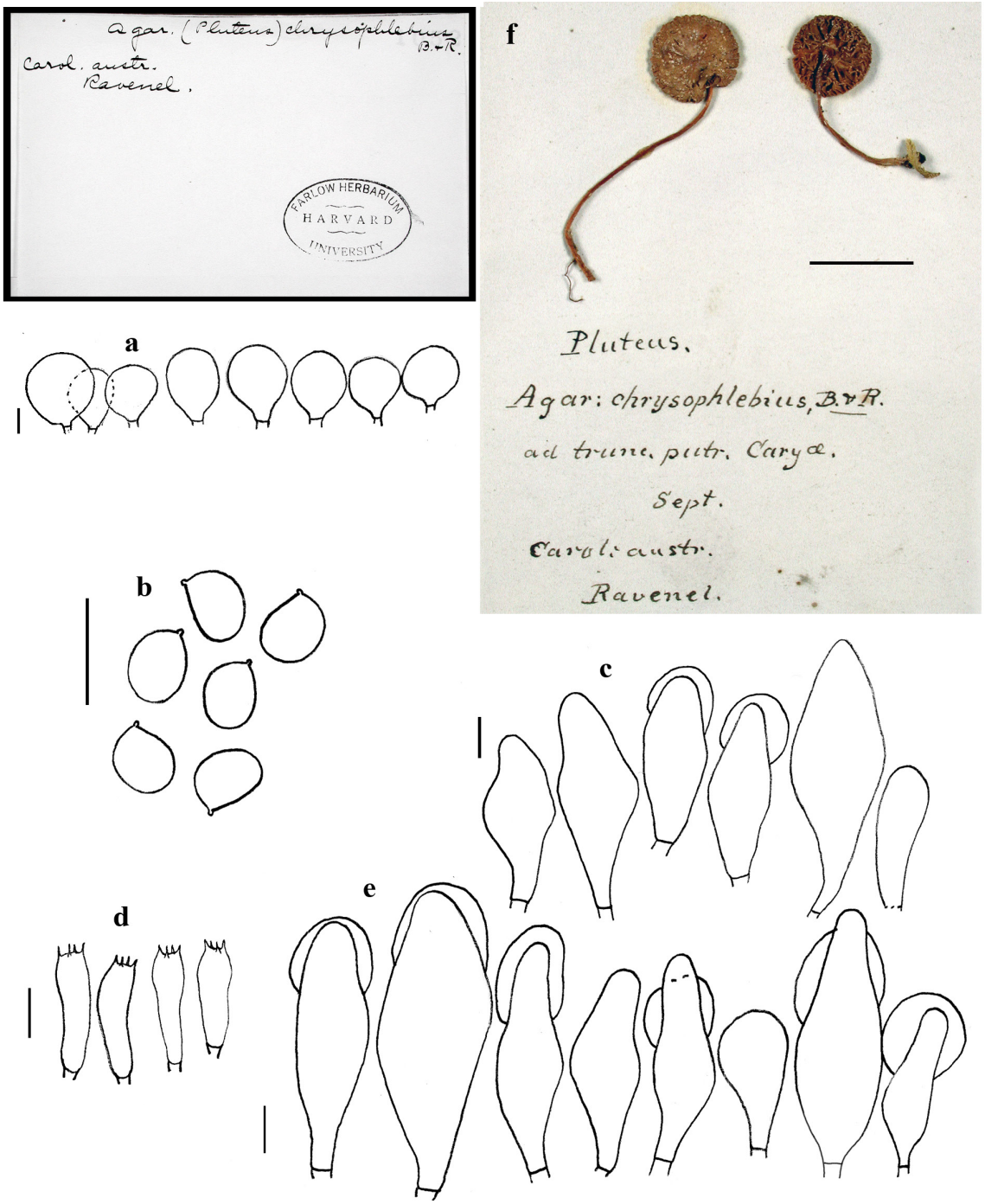


Fig. 3. *Pluteus chrysophlebius,* **a***: pileipellis,* **b**: basidiospores, **c**: cheilocystidia, **d**: basidia, **e**: pleurocystidia, **f**: dry basidiomes (*Ravenel s.n.-K* holotype) (Scale bar: a, c, d, e = 10 µm, b = 20 µm, f = 1 cm).

Specimens examined. USA, **South Carolina**, IX-1852, *Ravenel*, holotype *K s.n.*

Observations. *Pluteus chrysophlebius* has been cited, so far, only in America, it is characterized by a yellow basidiome and a reticulate rugose pileus, characters that are mentioned in the diagnosis. Nevertheless, it could only be observed a rugose surface in the dry type material. It has been cited as a synonym of *P. admirabilis* (Peck) Peck by several authors (Murrill, 1917; Singer, 1956; Pegler, 1983), even though some other authors such as Homola (1972) have recognized them separately. In respect to the microscopic study of the type material, it was found that it was not in good condition since many of the structures collapsed. Some differences were observed according to a report by Pegler (1983), who mentioned the presence of ventricose-clavate pleurocystidia and cheilocystidia, even though he drew them presenting a clavate inflate or obovoid form. In addition, this author indicated a greater interval in the width of the pleurocystidia and in the pileipellis elements, omitting the presence of incrustations in the cheilocystidia.

Pluteus exilis Singer, Fieldiana, Bot. 21: 94, 1989. Fig. 4

Pileus 40 mm broad, umbonate, smooth, margin not striate, incurved, disc blackish-brown and the rest brown-castaneous. Lamellae free, closed, broad, pinkish-cream with lighter shimmer, even edges, concolorous. Stipe 45 × 5 mm, central, thickened in the base, fibrillose, brown with shades paler than the pileus and mycelium in the base.

Basidiospores 6.5-10 × 4.5-6 µm, Q = 1.3-1.8 ellipsoid to elongate, smooth, thin-walled, hyaline. Basidia 26-33 × 7-8 µm, tetraspored, claviform, claviform-cylindric, with granulose content, hyaline. Pleurocystidia metuloid *cervinus* type, (50-) 63-97(-122) × (13-)16-28.5(-30) µm, ventricose-fusiform, apex with 2-3(-4) hooks, sometimes branched that can be divided, straight or recurved, hooks up to 5 µm long, most with a more or less uniform wall with a thickness of (1.5-)2-3.5 µm, thickened almost all along its length, some with lateral short acute projections towards the apex, hyaline; near the edge metuloid of *magnus*-type, 48-68(-108) × 13-19(-25) µm, thick-walled (1-2.5 µm), scarce frequent, hyaline. Cheilocystidia 30-62.5 × (11.5-)14-29.5 µm, broadly claviform, claviform, subfusiform, dimorphic not observed, thin-walled, hyaline. Pileipellis a cutis with terminal elements of 37.5-75 × 5-8(-11.5) µm, cylindrical, obtuse apex, thin-walled, with a tenous-yellowish-brown dissolved intracellular pigment, without clamp connections. Caulocystidia and clamp connections absent at the stipe.

Habitat: Lignicolous, solitary, on dead trunks of *Lithocarpus gregatum*.

Specimens examined. USA, **California**, Muir Woods (Marin Co.), 14-I-1983, *R. Singer*, type *F N-5105*.

Observations. Species that at first sight has the appearance of *Pluteus cervinus*, nevertheless, Singer (1989) separated it from this by the dimorphic cheilocystidia, the absence of dark fibrils on the pileus and the thin stipe. Additionally, this author indicated the wood of *Lithocarpus* (Fagaceae) as its specific habitat which separates it from its compatible species, *P. xylophilus* (Speg.) Singer among other characters. Respecting the presence of dimorphic cheilocystidia described by Singer (1989), these were not observed like that, due to our consideration that these are only size and not form differences. The study of type material of *P. exilis*, according to what was cited by Singer (1989); however, we consider that this could be really *P. cervinus* sensu lato. The lack of the type material from this last species, has brought taxonomic problems related to it that have not been clarified yet. It is considered as necessary to neotypify the *P. cervinus* species, and probably to do more molecular studies of all related taxa, in order to solve its taxonomic location.

Pluteus globiger Singer, in Singer & Digilio, Lilloa 25: 266, 1951. Fig. 5

Pileus 5-15 mm broad, weakly sulcata-striate margin, reddish-brown. Lamellae free, scarcely close, broad, dark brown in dried condition, entire edges and concolorous. Stipe 0.6-10 × 0.05-1 mm, central, cylindrical, concolorous to pileus.

Basidiospores 5-7.5 × 5-7 µm, Q = 1.07-1.11 subglobose, smooth, thin-walled to slightly subthick, hyaline. Basidia 27-39 × 8-12 µm, tetraspored, claviform, hyaline. Pleurocystidia 30-59 × 12-34 µm, claviform to broadly claviform, thin-walled, hyaline. Cheilocystidia 38-50 × (16-)20-32 µm, claviform, thin-walled, hyaline. Pileipellis is a hymenodermis type, with elements 22.5-32.5 × 10-22.5 µm, subglobose to globose, obovoid, with irregular intracellular content, no homogeneous, yellowish-brown. Caulocystidia and clamp connections absent.

Habitat: Lignicolous, gregarious, on dead trunks in subtropical forest.

Specimen examined. ARGENTINA, **Prov. Tucumán**, Anta Muerta, 16-IV-1950, *R. Singer*, type LIL *T-973*.

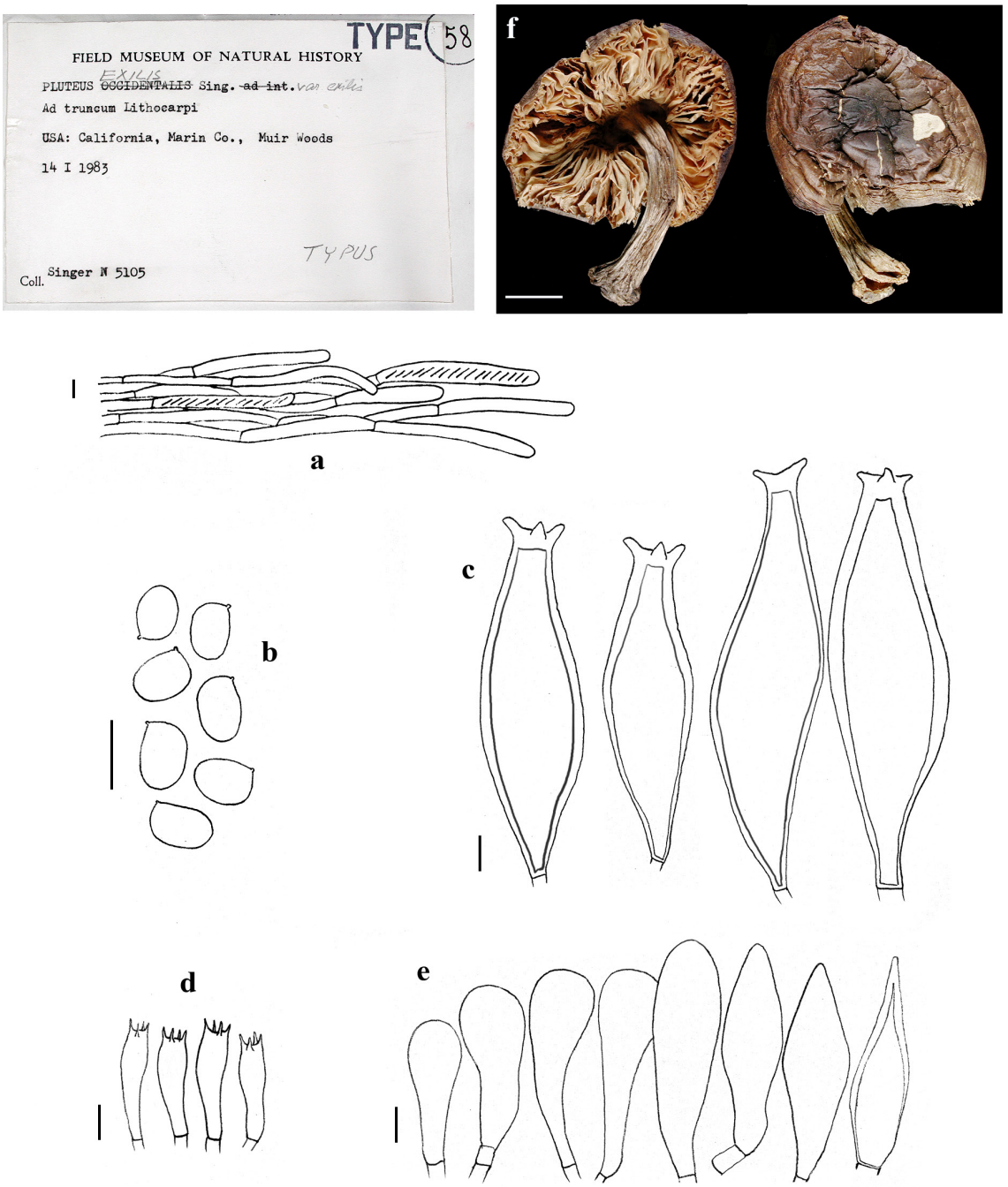
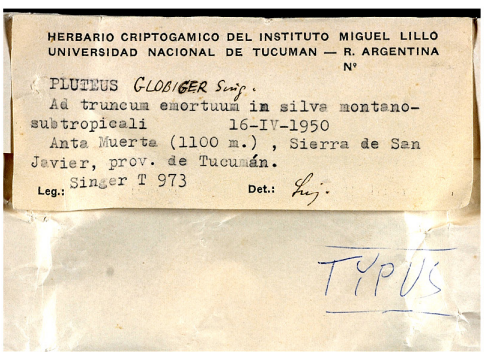


Fig. 4. *Pluteus exilis,* **a**: pileipellis, **b**: basidiospores, **c**: metuloid cystidia cervinus type, **d**: basidia, **e**: cheilocystidia, **f**: dry basidiomes (*R. Singer N 5105-F* type) (Scale bar: a, c-e = 10 µm, b = 20 µm, f = 1 cm).



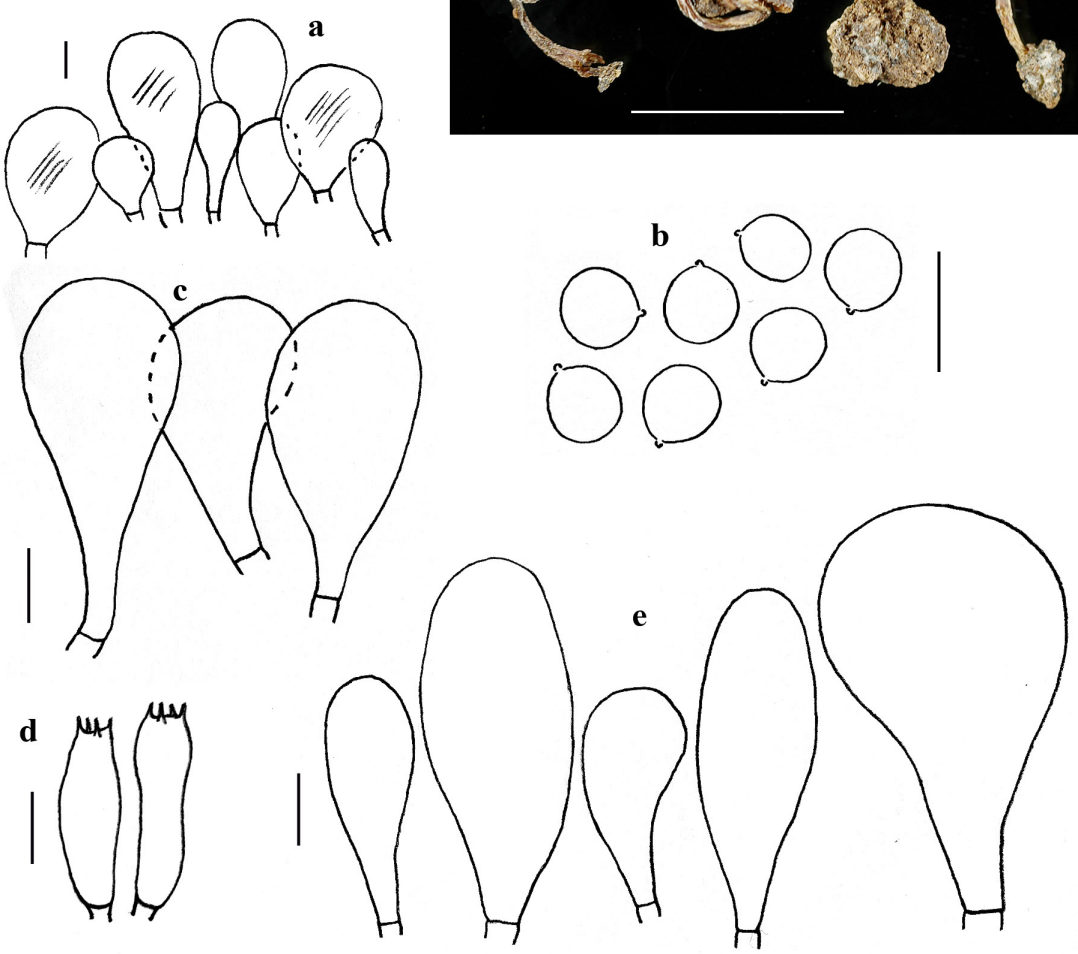


Fig. 5. *Pluteus globiger,* **a**: pileipellis, **b**: basidiospores, **c**: cheilocystidia, **d**: basidia, **e**: pleurocystidia, **f**: dry basidiomes (*R. Singer T 973* type) (Scale bar: a, c, d, e = 10 µm, b = 20 µm, f = 1 cm).

Additional studied material. ARGENTINA, Prov. Tucumán: Parque Aconquija, Sierra of San Javier, 1-IV-1949, R. Singer, LIL T-351; 8-V-1949, R. Singer, LIL T-553; Anta Muerta, Sierra of San Javier, 1100 m s.m., 10-IV-1949, R. Singer, LIL T-408; 2-I-1950, R. Singer, LIL T- 803; Santa Rosa, 17-XII-1950, R. Singer, LIL T-1055; BOLIVIA, Dpto. La Paz, Prov. Nor- Yungas, Río Yariza, 16-II-1956, R. Singer, LIL B-1218.

Observations. Revisions of type material and all collections mentioned by Singer (1951, 1958) were done in the original diagnosis (Singer: 351, 553, 408, 803, 1055, 1388). Abundant cheilocystidia in the lamellar edge were observed in almost all reviewed specimens, nevertheless, most of them collapsed in the type material. In some examined specimens, it was only possible to observe basidiospores, and pileipellis elements, the rest of the structures were hardly distinguishable or collapsed, this is the reason why some of them had to be reconstructed slightly.

Pluteus harrisii Murrill, Mycologia 3(6): 277, 1911. Fig. 6
= *Pluteus cervinus* var. *bambusinus* R.E.D. Baker & W.T. Dale, Mycol. Pap. 33: 93, 1951.

Pileus 11-14 mm broad, surface glabrous or innately fibrillose, margin striate-sulcate, brown-castaneous to darker on disc. Lamellae free, close, broad, whitish-pink. Stipe 12-15 × 1 mm, central, cylindrical, glabrous, straw-yellow.

Basidiospores 6-7.5(-8) × 5.5-6.5(-7) µm, Q = 1.07-1.27 broadly ellipsoid, some subglobose, smooth, thin-walled, hyaline. Basidia 30 × 10 µm, tetraspored, claviform, hyaline. Pleurocystidia metuloid *cervinus* type 60-91 × 18-27 µm, ventricose-fusiform, with 2-3 hooks at apex, coralloid type or bifurcate hooks, straight or recurved, with wall 1.5-2 µm of thickness, hyaline. Cheilocystidia (40-)42-72 × (11-)12-21.5 µm, claviform, thin-walled, hyaline. Pileipellis a cutis with terminal elements 57.5-115 × 14-19 µm, cylindrical, rounded to subfusiform apex, thin-walled, with intracellular pigment dissolved irregularly, brown-yellowish. Caulocystidia and clamp connections absent.

Habitat: on dead wood, gregarious, no vegetation mentioned.

Specimen examined. JAMAICA, **Troy and Tyre**, on dead wood, 2000 pies, 12-14-I-1909, *W.A. Murrill & W. Harris*, type *NY 956*. CUBA, El Yunque, 1800 ft., III-1903, Underwood & Earle, paratype NY 425.

Observations. The original diagnosis of Murrill (1911) was based on both collections, although the macroscopic description corresponds more to the paratype and the scarce microscopic characters that were cited correspond to holotype. The figure in watercolor and the photography that are included here corresponds to the last one. The basidiospore form mentioned in the diagnosis was corroborated, however, the absence of cystidia was no corroborated, cystidia are abundant, particularly the metuloid cystidia, with typical coralloid hooks, without short obtuse hooks or even without hooks just like what was mentioned by Pegler (1983, 1997).

In the revision of the specimen from Cuba, it was observed that the majority of the basidiospores has a very conspicuous apiculus, they are slightly greater (6.5-9.5 × 6-8.5 µm). The metuloid cystidia with a thinner wall and with the hooks barely developed, different from what was observed in the holotype. Probably, this corresponds to a material in a young state.

Pluteus horridus Singer, Beih. Sydowia 7: 62, 1973. Fig. 7, 8
= *Pluteus verae-crucis* Cifuentes & Guzmán, Boln. Soc. mex. Micol. 16: 43, 1981.

Pileus 22-42 mm broad, convex, umbonate, margin not striate, radially fibrillose innate, probably viscose in fresh since it showed substrate remains, dark brown in the small specimen to light brown with grayish shimmers in the other two specimens. Lamellae free, close, broad, brown-pinkish, edges even, concolorous to lamellae to lighter. Stipe 20-55 × 40-50 mm, central, slightly thickened in the base, fibrillose, concolorous to pileus to more tenuous toward the apex.

Basidiospores 6-8 × 5-6.5 µm, Q = 1.08-1.3 broadly ellipsoid to subglobose, smooth, thin-walled, hyaline. Basidia 25-33 × 7-8.5(-9) µm, tetraspored, claviform, hyaline, with granulose content, clamp connections present. Pleurocystidia metuloid *magnus* type, (77-)88-102(-122) × 13-17 (-19.5) µm, ventricose-fusiform, without hooks, with or without spines or lateral ornamentation present towards the apex, wall 2-4 µm of thickness, apex that are mostly acute hyaline; near the lamellar edge metuloid show a greater number of spines. Cheilocystidia 30-48(-55) × (8-)10-16 µm, claviform, thin-walled, hyaline. Pileipellis a cutis, with terminal elements 3.5-9.5 µm broad, filamentosus with rounded apex, prostate, some suberect, thin-walled, with intracellular pigment dissolved irregularly intense brown-yellowish, with clamp connections in some septum. Caulocystidia and clamp connections at the stipe.

Habitat: Lignicolous, gregarious, on trunks of dicotyledons, in tropical evergreen forest.

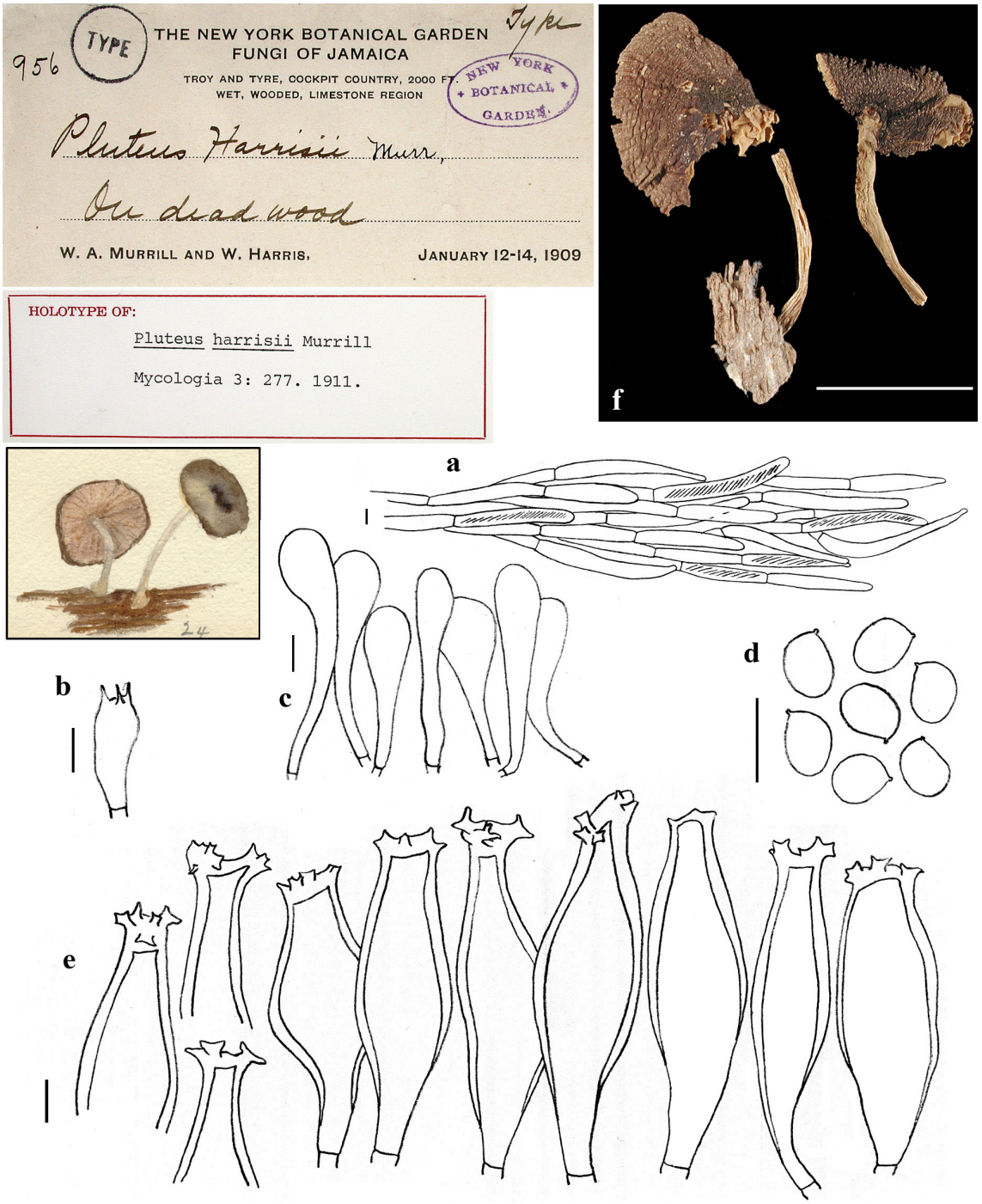


Fig. 6. *Pluteus harrisii,* **a**: pileipellis, **b**: basidia, **c**: cheilocystidia, **d**: basidiospores, **e**: metuloid cystidia cervinus type, **f**: dry basidiomes (*W. A. Murrill & W. Harris 956-NY* type) (Scale bar: a, b, c, e = 10 µm, d = 20 µm, f = 1 cm).

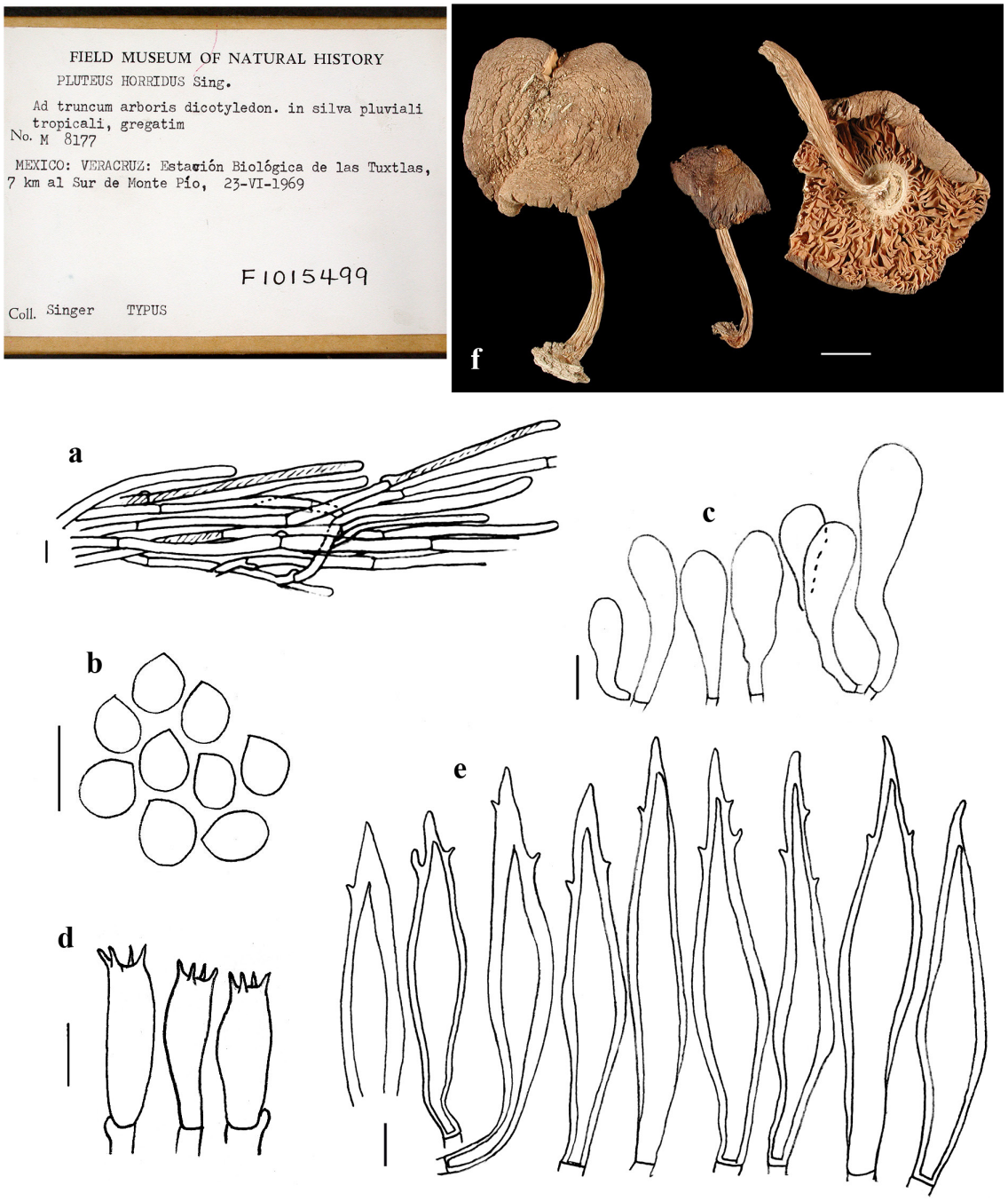


Fig. 7. *Pluteus horridus,* **a**: pileipellis, **b**: basidiospores, **c**: cheilocystidia, **d**: basidia, **e**: metuloid cystidia, **f**: dry basidiomes (*R. Singer M 8177-F* type) (Scale bar: a, c-e = 10 µm, b = 20 µm, f = 1 cm).

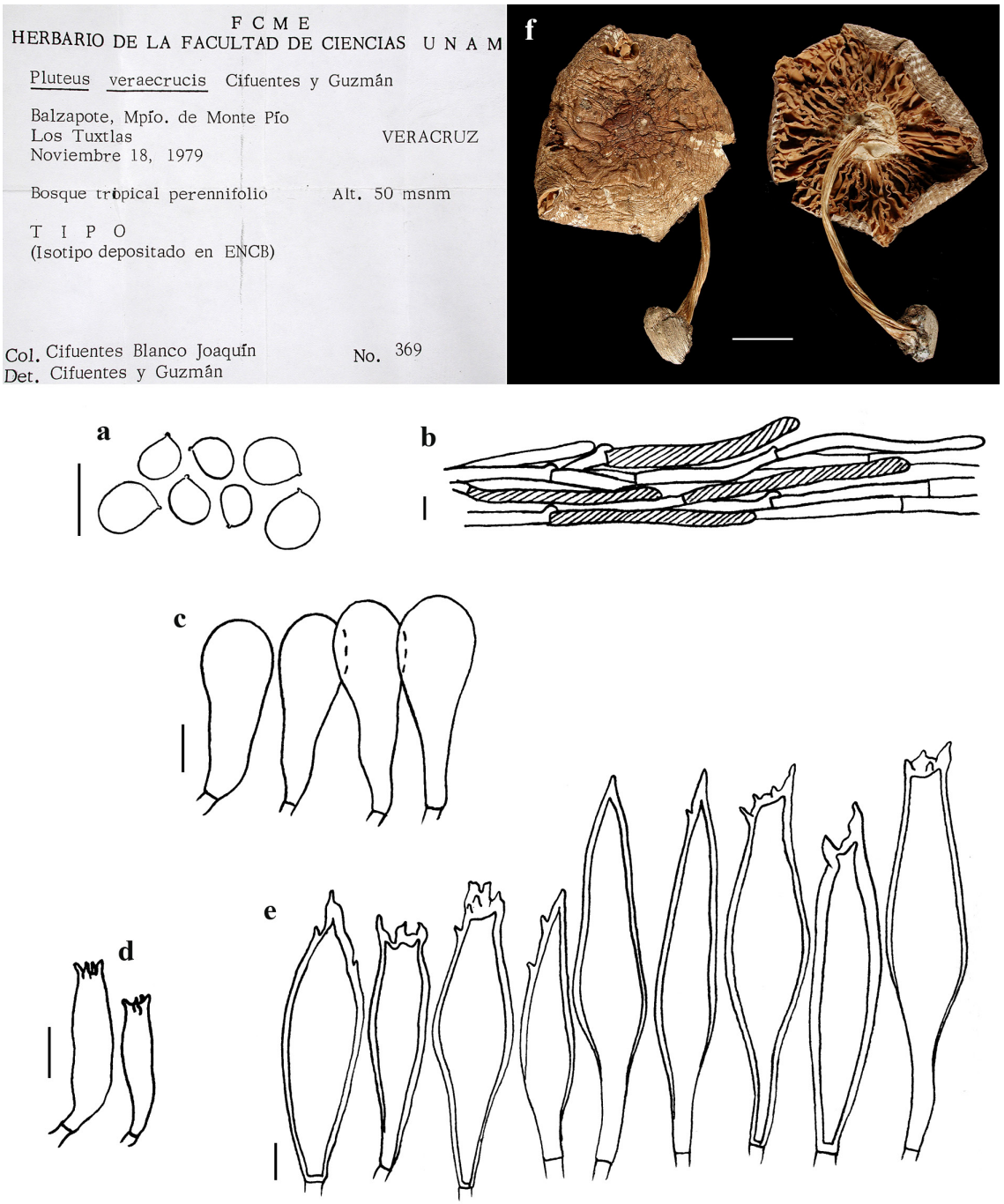


Fig. 8. *Pluteus veraecrucis,* **a**: basidiospores, **b**: pileipellis, **c**: cheilocystidia, **d**: basidia, **e**: metuloid cystidia, **f**: dry basidiome (*J. Cifuentes 369-FCME* type) (Scale bar: a = 20 µm, b-e = 10 µm, f = 1 cm).

Specimen examined. MEXICO, **Veracruz**, Munic. of San Andrés Tuxtla, Estación Biológica Los Tuxtlas, 7 km to south of Montepío, 23-VI-1969, *R. Singer*, type *F M-8177*.

Additional studied material. HONDURAS BRITÁNICAS, 1906, Morton E. Peck s.n., holotype of *P. spinulosus* NY. MÉXICO, **Veracruz**, Munic. of San Andrés Tuxtla, Estación Biológica Los Tuxtlas, UNAM, camino Catemaco to Montepío, 50 m s.m., 18-XI-1979, *J. Cifuentes*, holotype *FCME 369*; isotype of *P. veraecrucis* ENCB.

Observations. This species is characterized by metuloid without hooks, but with lateral hooks (up to 6 µm of length) present generally towards the apex, these last ones can be very acute. In addition, the majority of the metuloid show a long pedicel. In the lamellar edge, all the stages of development of the metuloid cystidia can be observed, in which they can even be so abundant that they can hide the cheilocystidia, which are very hyaline. Singer (1973) only mentioned the size of the metuloid cystidia present near the edge (54-85 × 12-18 µm) and did not mention the size of the rest of the lamellae that can reach up to 122 µm in length. Basidiospores were observed presenting a slightly greater size than the one indicated by Singer (1973). In addition, this author mentioned trimorphic cheilocystidia, but we consider them to be only clavate, and that the other forms observed by Singer are intermediate stages of metuloid cystidia. The studied material resembles *Pluteus spinulosus* Murrill due to the presence of the same type of metuloid cystidia. Nevertheless, macroscopically, it presents lamellae with pruinose and brown marginate edges (Smith & Stuntz, 1958). In addition, according to the revision of the type material of this species, some differences were observed that separate it from *Pluteus horridus*, it can be separated by the size of the metuloid cystidia (64-98 ×13-21 µm), the thickness of its wall (1-2 µm), as well as by the size of the cheilocystidia (37-65(-72) × (9-)11-17.5 µm).

Another similar species is *Pluteus subspinulosus* E. Horak, that microscopically distinguishes from *P. horridus* and *P. spinulosus* by the presence of black fibrillose scales on the surface of the stipe and microscopically by its basidiospores (5-6.4 × 4-4.5 µm) and smaller metuloid cystidia (50-65 × 10-14 µm) (Horak, 1964).

It is important to mention that taxa which present metuloid spinose cystidia show a tropical distribution: *Pluteus subspinulosus* is known from South America (Argentina), *P. spinulosus* from Central America (Belice), and *P. horridus* from North America (EUA) (Horak, 1964; Cifuentes & Guzmán (1981).

Pluteus leucocyanescens Singer, Beih. Sydowia 7: 64, 1973. Fig. 9

Pileus 7 mm broad, surface glabrous, margin striate-sulcata over one-four of radio, pallid brown to darker on disc. Lamellae free, scarce close, narrow, brown-pink, edges even, lighter. Stipe 18 × 0.9 mm, central, cylindrical, slightly thickened towards the base, glabrous, pale brown.

Basidiospores 5-6 × 4-5 µm, Q = 1.1-1.33 subglobose, some broadly ellipsoid, smooth, thin-walled, hyaline. Basidia 35-46.5 × 6.5-9 µm, tetraspored, claviform, hyaline. Pleurocystidia (32-)44-58(-79) × (17-)22-29(-32) µm, claviform to broadly claviform, thin-walled, hyaline. Cheilocystidia 33-51(-65) × 9.5-16(-17.5) µm, claviform, thin-walled, hyaline. Pileipellis a cutis, with elements 87.5-130.5 × 5-11 µm, cylindrical, rounded apex, with irregular intracellular content yellowish-brown, with clamp connections. Caulocystidia and clamp connections are absent in the stipe.

Habitat: Lignicolous, solitary, on wood of dicotyledons in tropical rainforest.

Specimen examined. MEXICO, **Veracruz**, Munic. of San Andrés Tuxtla, Estación Biológica Los Tuxtlas, 7 km to south of Montepío, 21-VI-1969, *R. Singer*, type *F M-8130*.

Observations. Species from Mexico that has been cited, so far, only by Singer (1973). The microscopic description that appears here, defers a little from what was mentioned in the literature, since we observed, in general, that the structures are greater than what was established by Singer (basidia 21-29 × 7 µm; pleurocystidia 14-57 × 11.5-21 µm; cheilocystidia 22-44 × 8-15 µm). Additionally, in contradiction with Singer (op. cit.), the pileipellis presents clamp connections.

Pluteus leucocyanescens is probably a species rarely common in Mexico since collecting new specimens in the field has not been possible and material deposited in different national herbaria has not been found either.

Pluteus multistriatus Murrill, Mycologia 3(6): 277, 1911. Fig. 10

Pileus 16 mm broad, umbonate, striate-sulcate over one-third the radio of pileus, margin involute, brown-castaneous on disc to fuscous toward to edge. Lamellae free, close, broad, colour brown- pinkish light, edges even, concolorous. Stipe 16 mm × 0.1 mm, central, cylindrical, curved, slightly thickened to the base, glabrous, concolorous to pileus.

Basidiospores 6-7 × 4.5-5.5 µm, Q = 1.1-1.33 subglobose to broadly ellipsoid, smooth, thin-

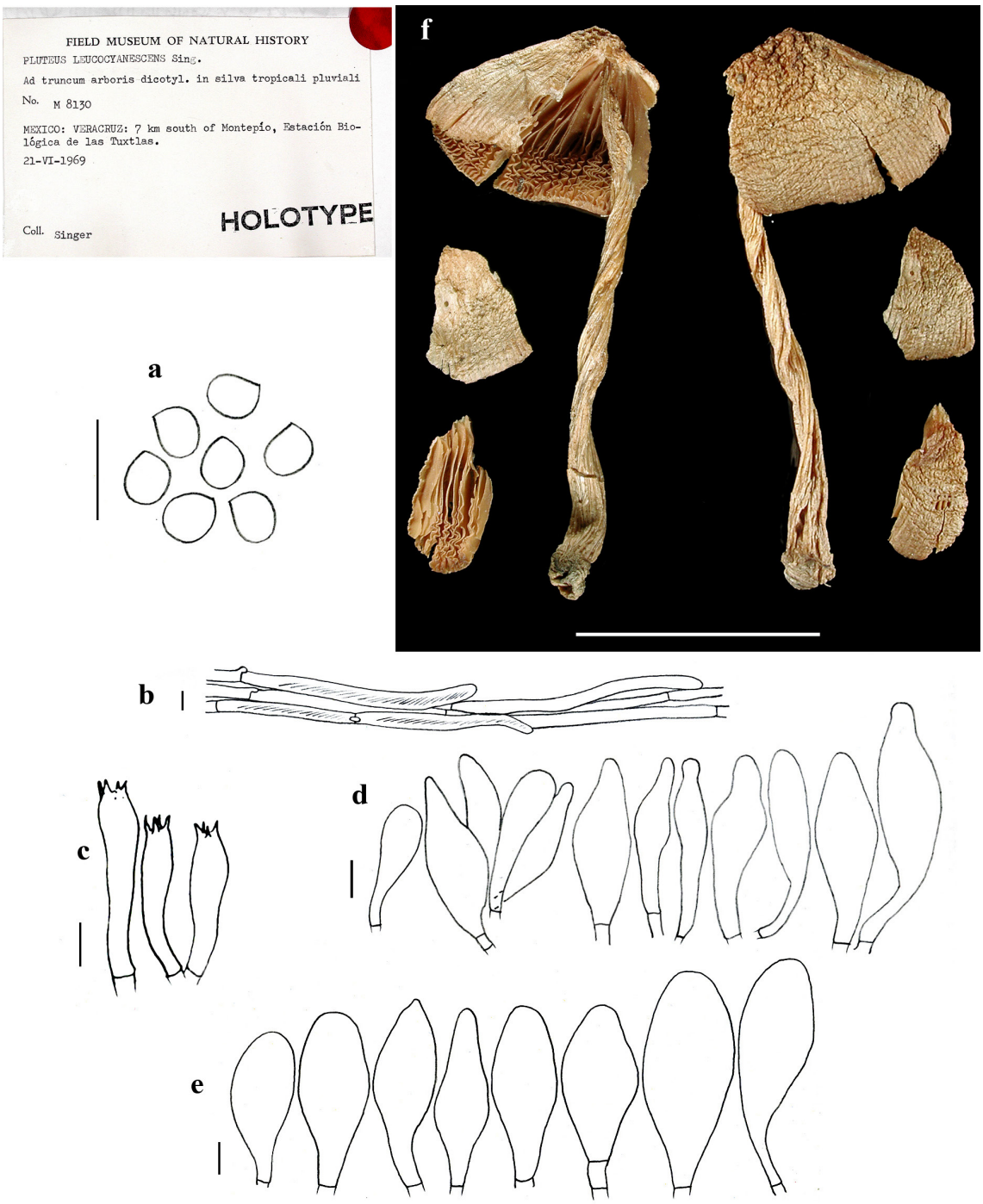


Fig. 9. *Pluteus leucocyanescens,* **a**: basidiospores, **b**: pileipellis, **c**: basidia, **d**: cheilocystidia, **e**: pleurocystidia, **f**: dry basidiomes (*R. Singer M 8130-F* holotype) (Scale bar: a = 20 µm, b-e = 10 µm, f = 1 cm).

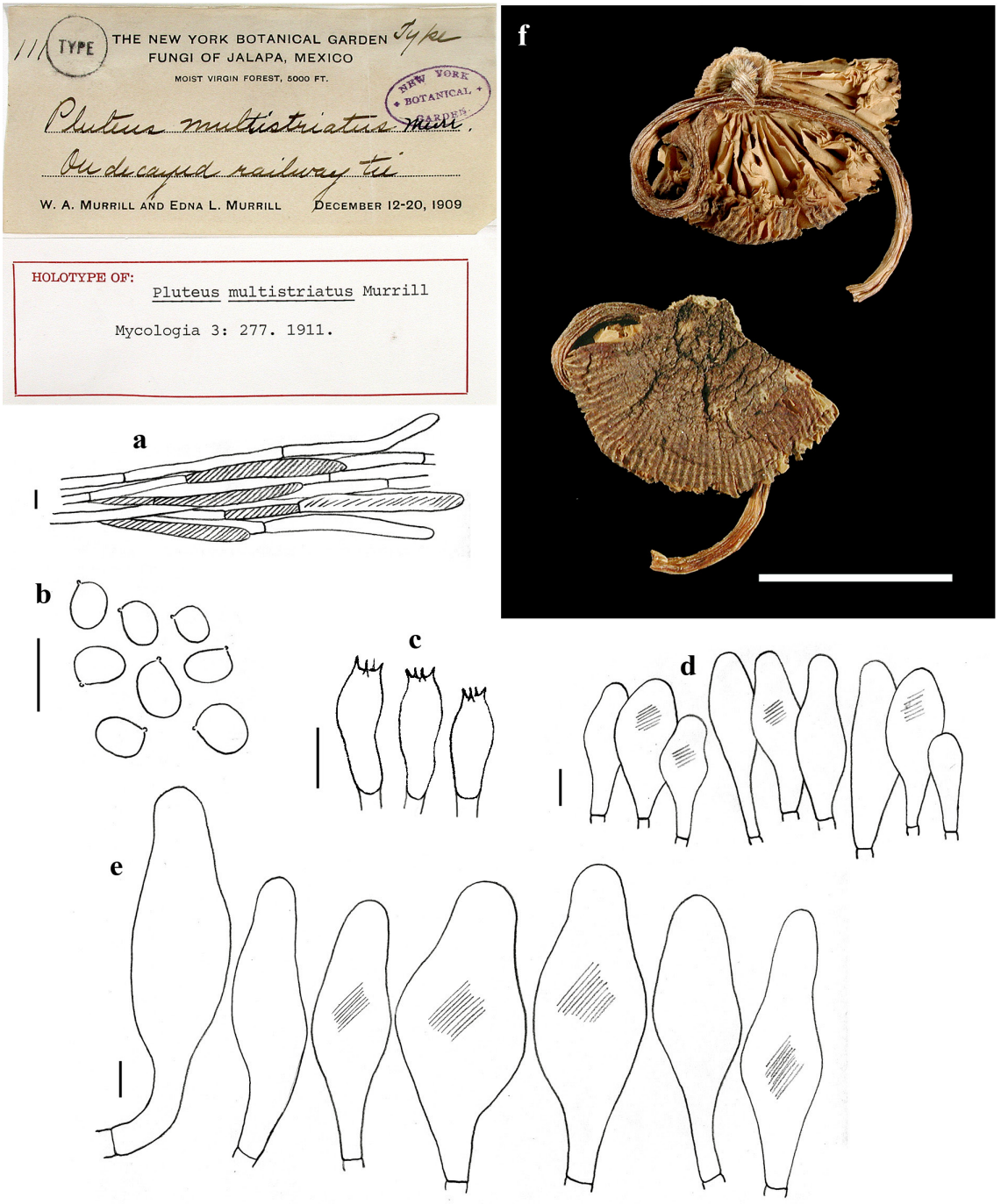


Fig. 10. *Pluteus multistriatus,* **a**: pileipellis, **b**: basidiospores, **c**: basidia, **d**: cheilocystidia, **e**: pleurocystidia, **f**: dry basidiomes (*W. A. Murrill & E. L. Murrill 111-NY* type) (Scale bar: a, c, d, e = 10 µm, b = 20 µm, f = 1 cm).

walled, hyaline. Basidia 20-22 × 6-7 µm, tetraspored, short claviform, hyaline. Pleurocystidia (58-)60-96 × (12-)19-33 µm, lageniform, with short neck to elongate, subutriform, rotund to sub truncate apex, thin-walled, with yellowish-brown content, some hyaline. Cheilocystidia 30-53 × (9-)11-21 µm, claviform, sublageniform and subutriform, thin-walled, some slightly pigmented with yellowish tint. Pileipellis a cutis, with elements 3.7-9.6 µm broad, cylindrical, apex rotund, with intracellular irregular content yellowish-brown, without clamp connections. Caulocystidia and clamp connections absent.

Habitat: Lignicolous, solitary, on a railway sleeper, there is no precise data about the type of vegetation in the collecting site, but it might be a tropical evergreen forest according to the locality data.

Specimen examined. MEXICO, **Veracruz**, Munic. of Xalapa, Xalapa, 5 000 pies (1500 m s.m.), 12-20-XII-1909, *W.A. Murrill & E.L. Murrill*, type *NY 111*.

Observations. The identity of the species is confirmed, which has been reviewed by several authors (Singer, 1956; Smith & Stuntz, 1958; Banerjee & Sundberg, 1993). The study of type material agrees with the original diagnosis of Murrill (1911); it is characterized by the conspicuous fluted-sulcata margin almost in a third part of the pileus. Microscopically, it was observed that the majority of the basidia collapsed and pleurocystidia were greater than those mentioned by Banerjee & Sundberg (1983), 35-90 × 8-9 µm. The examined cheilocystidia were smaller than the pleurocystidia. In addition, the presence of yellowish intracellular content in both structures was observed. Smith & Stuntz (1958) found basidiospores smaller, 5.4-6.5 × 4.7-5.5 µm, than those described here, and two types of pleurocystidia: narrow lageniform of long neck, 40-70 × 9-12 µm, and wider lageniform but of short and narrow neck, 70-120 × 15-33 µm. Such pleurocystidium forms. Such pleurocystidium forms -although were not delimited so well, were observed generally by Banerjee & Sundberg (1983), Singer (1956) and Rodríguez (2006).

Pluteus longistriatus (Peck) Peck is similar to *P. multistriatus* by the presence of long striate margin of pileus; nevertheless, the first species is distinguished by *mixtini* type pileipellis that locate it within of the *Celluloderma* section. The material (W.A. & E.L. Murrill 112) was reviewed, it was mentioned by Murrill as an impoverished form of the species, and which, according to the observed micromorphological characters, is considered by us to correspond to different taxa.

Pluteus nigrolineatus Murrill, Bull. Torrey bot. Club. 66: 30, 1939. Fig. 11

Pileus 20 mm broad, plane, surface radially fibrillous towards the margin, dark fibrils on disc, with fibrils agglutinate giving a squamulose and reticulate appearance, brown. Lamellae dried wrong, broken and collapsed, difficult to observe the edges. Stipe 28 × 1.5 mm, cylindrical, thickened at the base (3 mm broad), fibrillose, concolorous to pileus.

Basidiospores 6-9 × 5-6(-7) µm, Q = 1.21-1.38 broadly ellipsoid to ellipsoid, smooth, thin-walled, hyaline. Basidia 35-46.5 × 6.5-9 µm, tetraspored, claviform, thin-walled, hyaline. Pleurocystidia 46-80 × 18-26 µm, lageniform, with short neck to elongate, subutriform, rotound apex to subtruncata, thin-walled, hyaline. Cheilocystidia 49-56 × 21-24 µm, broadly claviform, sublageniform or subutriform, thin-walled, hyaline. Pileipellis not observed. Caulocystidia and clamp connections absent.

Habitat: Lignicolous, solitary, on an oak log.

Specimen examined. USA, **Florida**, Gainesville, 8-IX-1938, *W.A. Murrill*, type *F18103*; 11 millas to NW of Gainesville, Alachua Co., Murrill s.n., FLAS 9375.

Observations. The type material is conserved in poor conditions, the basidiospores and pleurocystidia can only be observed, but pileipellis and caulocystidia could not be observed whose characteristics are important in the confirmation of the species. It seems that Mexican collections do not correspond to this taxa due to the type of elements observed in pileipellis (the majority cylindrical and no fusiform as just like what is mentioned by *Pluteus nigrolineatus* description and by the presence of clamp connections in one of the specimens. Besides the mentioned characters, this species is also characterized by the presence of blue tones towards the base of the stipe (Murrill, 1939; Singer, 1961) this character was observed in the specimens studied here.

Pluteus nitens Pat., Bull. Soc. mycol. Fr. 14: 53, 1898. Fig. 12

Pileus 9-20 mm broad, umbonate, margin slightly striate and transversely wrinkled, fibrillose, with dark fibrils more abundant on disc and greyish-brown toward the margin. Lamellae free, close, ventricose, straw-yellowish-pink, edges even and more pallid color. Stipe 12-23 × 0.8-1.5 mm, central, cylindrical to slightly thickened toward the base, glabrous, concolorous to pileus to dark with reddish shades.

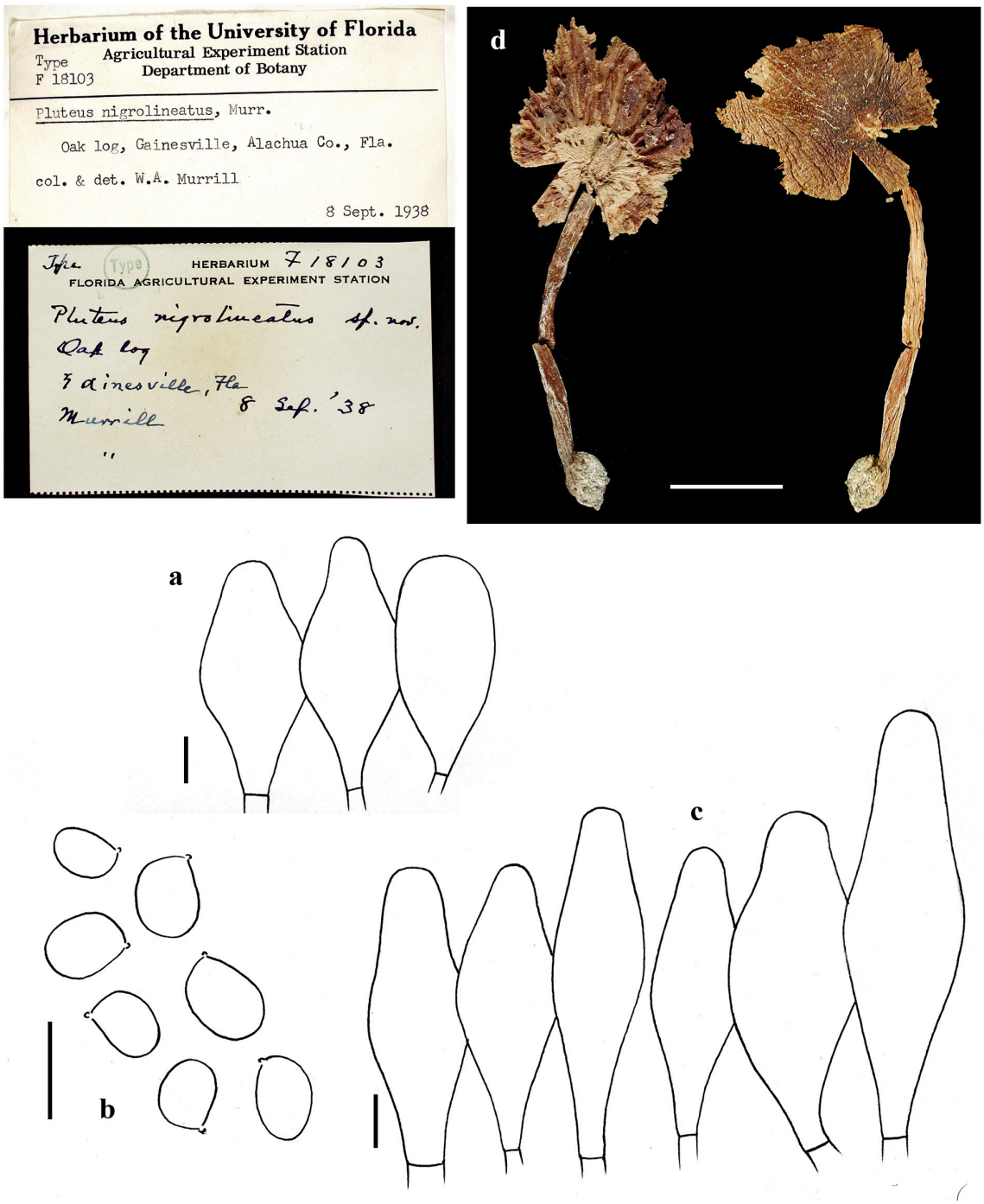


Fig. 11. *Pluteus nigrolineatus,* **a**: cheilocystidia, **b**: basidiospores, **c**: pleurocystidia, **d**: dry basidiomes (*W.A. Murrill 18103-F* type) (Scale bar: a, c = 10 µm, b = 20 µm, d = 1 cm).

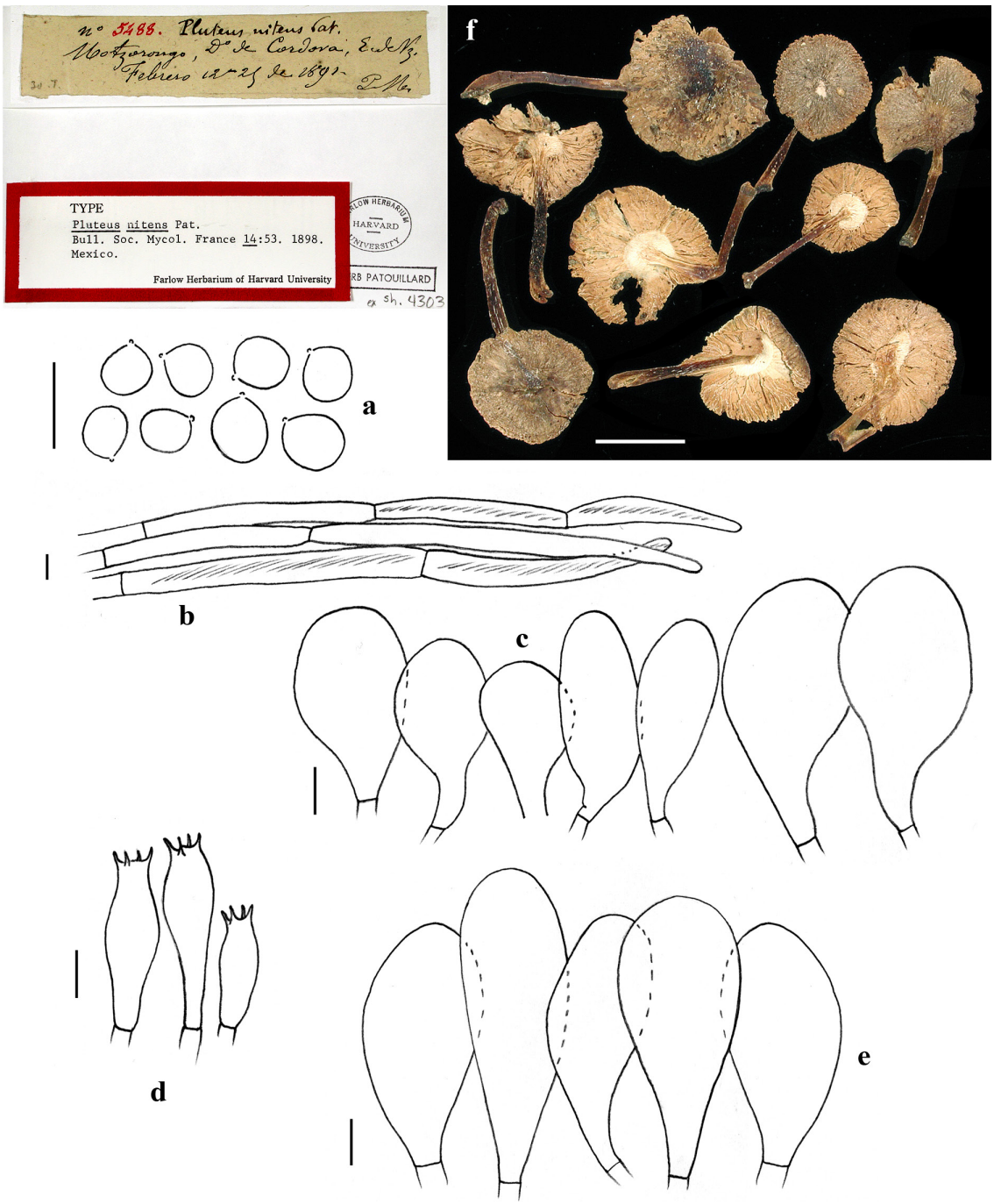


Fig. 12. *Pluteus nitens,* **a**: basidiospores, **b**: pileipellis, **c**: pleurocystidia, **d**: basidia, **e**: cheilocystidia, **f**: dry basidiomes (*Paul Maury 5488-FH* type) (Scale bar: a = 20 µm, b-e = 10 µm, f = 1 cm).

Basidiospores 6-7(-8) × 5-6.5(-7) µm, Q = 1.07-1.14 subglobose, smooth, thin-walled, hyaline. Basidia 26-40.5 × 8-12 µm, tetraspored, claviform, hyaline. Pleurocystidia (35-)40-56 × 16-29 µm, claviform to broadly claviform, thin-walled, hyaline. Cheilocystidia 55-73 × 23-28 µm, claviform, thin-walled, hyaline. Pileipellis a cutis, with elements 47.5-100 × 5-17.5 µm, cylindric, rotund apex to sub attenuate, with irregular intracellular content, not homogeneous, yellowish-brown. Caulocystidia and clamp connections absent.

Habitat: Lignicolous, gregarious, on dead trunk; there was not precise data about the type of vegetation where it was collected, but it was probably a tropical deciduous forest according to the information of the locality.

Specimen examined. MEXICO, **Veracruz**, Munic. of Tezonapa, Motzorongo, 12-29-II-1891, *Paul Maury*, type *FH 5488*.

Observations. The type material was deposited in the herbarium of Patouillard in Paris, which is accompanied by a drawing and original notes from the collector about some microscopic characters: basidiospores, cystidia and elements of the pileipellis. In addition, a label with the locality data is included that we suppose was written by the collector, in which the number of collection 5488 is indicated, - an information that had not been mentioned in any of the citations reviewed. *Pluteus nitens* is considered a valid species, and until now it is only known for Mexico (Murrill, 1911, 1917; Singer, 1956, 1957). It was studied and redescribed by Singer (1956), who indicated smaller basidiospores (5.5-6.5 × 5-6.5 µm), in comparison to the ones we observed in the type and the ones mentioned by Murrill (1917), of 6-8 µm. *Pluteus riberaltensis* var. *missionensis* Singer is found among the species related to *P. nitens*, due to the presence of subglobose basidiospores, a characteristic shared by only a few taxa within the Nitens stirpe of the *Hispidoderma* section. It differs from *P. nitens* by the presence of a radially rimose pileus.

Pluteus pouzarianus Singer, Sydowia 36: 283, 1983. Fig. 13

Pileus 36 mm broad, plane-convex, umbonate, margin flat incurved, not striate, surface smooth, glabrous, shining or silky, glutinous since it remains of sawdust adhered to the pilleipelis and a samara of *Betula pendula*, gray, with a center dark fuscous-grayish coloured. Lamellae free, close, broad, brown-ochraceous light salmon colored, edges even, concolorous or lighter. Stipe 60 × 0.3 mm, central, cylindrical, curved towards the base and slightly thickened, smooth, concolorous, without mycelium in the base, inserted in a wood piece.

Basidiospores 6-8 × 4-5.5 µm, Q = 1.2-1.6 broadly ellipsoid to ellipsoid, smooth, thin-walled, hyaline. Basidia 24-31 × 6.5-8 µm, tetraspored, claviform, with sterigm up to 2.4 µm long, with granulose content, hyaline, clamp connections present. Pleurocystidia metuloid *cervinus* type, 61.5-83 × 13-22(-25) µm, ventricose-fusiform, with 2-4 hooks in the apex, sometimes are bifurcate, straights or recurved, with 1.5-3 µm thick-walled, hyaline, some clamp connections present in the base; near of the edges metuloid *magnus* type present, 38-68.5 × 10-21 µm, fusiform, with or without lateral spine, thick-walled (1-1.5 µm), hyaline. Cheilocystidia (25-)31-46 × (9-)12.5-16 µm, claviform, claviform-narrowly, thin-walled, hyaline. Pileipellis a cutis, with terminal elements 2.5-8 µm broad, rotound apex, attenuate or subfusiformis, thin-walled, hyaline or with intracellular pigment irregularly disuelt yellowish-brown, with clamp connections in some septa. Caulocystidia absent but with hyphae 3-9 µm broad, hyaline or with pigment yellowish-brown, some with amorphous content, clamp connections present mainly towards the apex.

Habitat: Lignicolous, solitary, on dead wood, mainly of conifers.

Specimen examined. CZECH REPUBLIC, 22-IX-1967, Pouzar s.n. deposited in the herbarium as *Pluteus emarginatus*, type *PRM 628956*.

Observations. Species characterized by the presence of clamp connections in the pileipellis, though not in all the septum, and by its habitat on coniferous wood. Contrary to what was mentioned by Singer (1983), clamp connections were observed towards the apex and less frequently in the stipe of type material studied. A pileipellis composed of two layers, a superior layer of hyaline hyphae and the inferior of yellowish-brown intracellular pigment was cited as a distinctive character of *Pluteus pouzarianus* according to Vellinga (1990); nevertheless, this character was not described by Singer (1983) nor observed here in the type material. Bonnard (1987) mentioned that the presence or absence of clamp connections can be used for the separation of species and can be quantifiable. Some authors do not even consider them, others put in doubt their value as a diagnostic character and others like Singer (1961) even mentioned that the frequency of clamp connections can be very variable, inclusively within the same species, and therefore it is not a constant character.

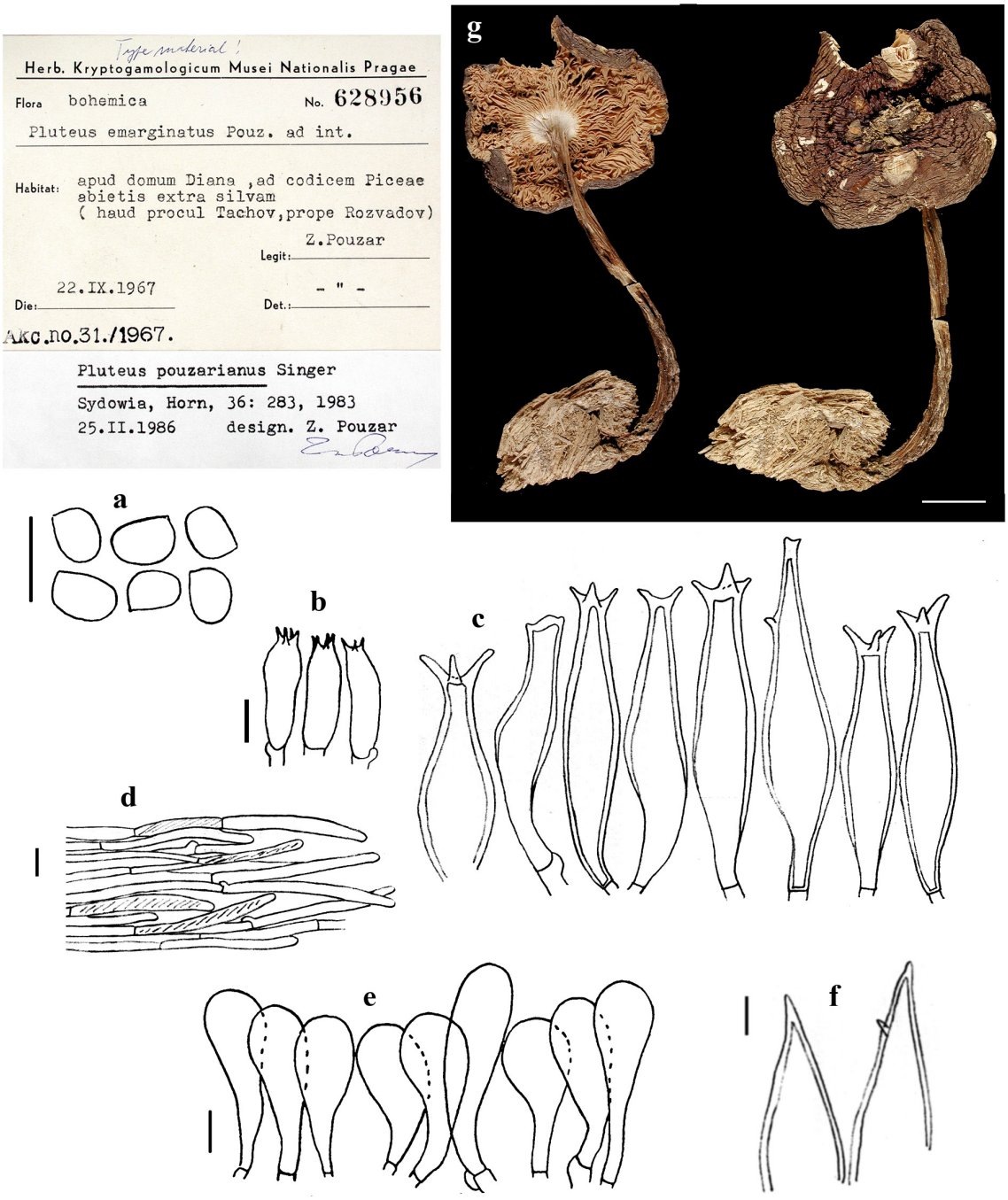


Fig. 13. *Pluteus pouzarianus,* **a**: basidiospores, **b**: basidia, **c**: metuloid cystidia cervinus type, **d**: pileipellis, **e**: cheilocystidia, **f**: metuloid cystidia magnus type, **g**: dry basidiomes (*628956-PRM* type) (Scale bar: a = 20 µm, b-f= 10 µm, g = 1 cm).

Nevertheless, we consider that the presence of clamp connections and not the amount of these structures, can support the differentiation of taxa, together with other characters.

Pluteus pulverulentus Murrill, N. Amer. Fl. (New York) 10(2): 137, 1917. Fig. 14
≡ *P. aethalus* var. *pulverulentus* (Murrill) Dennis, Bull. trimest. Soc. mycol. Fr. 69(2): 153, 1953.

Pileus 5 mm broad, surface weakly rugose, brown to darker on disc. Lamellae free, close, broad, brown with yellowish-orange shades, edges even, concolorous. Stipe 12 × 1 mm, central, cylindrical, slightly thickened in the base, glabrous, lighter colour than the pileus.

Basidiospores 5.5-7.5 × 5-6.5 µm, Q = 1.07-1.18 subglobose to broadly ellipsoid, smooth, thin-walled to slightly subthick, hyaline. Basidia p. ej. 26 × 9 µm, tetraspored, claviform, hyaline. Pleurocystidia 35-65 × 19-27(-33) µm, claviform, subfusiform, thin-walled, hyaline. Cheilocystidia 37-43 × 25-27 µm, broadly claviform, thin-walled, hyaline. Pileipellis is an epithelium, elements 22.5-42.5 × 15-29 µm, subglobose, obovoid, with intracellular content more or less homogeneous, yellowish-brown. Caulocystidia and clamp connections absent.

Habitat: Terrestrial, solitary, in shadowy places.

Specimen examined. WEST INDIAS, The Bower, St. George's, Grenada, 10-X-1905, *W.E. Broadway s.n.*, type NY.

Observations. According to what is mentioned in the bibliography, *Pluteus pulverulentus* is a species of tropical regions with a distribution in America and Central and Eastern Africa (Horak & Heinemann, 1978). The frequent presence of incrustrate mucilage in the apex of the pleurocystidia, as well as the lageniform form was not observed in the type material studied according to what was mentioned by Smith & Stuntz (1958) and Banerjee & Sundberg (1993). Mucronate cheilocystidia were not observed that corresponded to what was registered and drawn by Singer (1956). We do not agree with Banerjee & Sundberg (1993) in that globose and subglobose basidiospores are a distinctive character, since we consider that they are very variable, not only in this species, but within the same genera. However, several authors insist on segregating species according to the form and size of basidiospores, like Singer (1958), who divided the taxon into two varieties *Pluteus pulverulentus* var. *pulverulentus* Murrill and *P. pulverulentus* var. *pseudonanus* Singer, based on the size of basidiospores. We think that the interpretation of Singer could not be sustained by a character so poorly constant as we have mentioned, besides, more collections that exhibit such variation in a discrete way are lacking. Unlike what was described by the original diagnosis, pleuro- and cheilocystidia were observed structures that were not described by Murrill (1917). Also, according to the notes of the same author included with the type material, it is indicated that "it is related to *P. nanus* but seems to be distinct", an interpretation that we consider correct by the morphological characters that distinguish both species.

Pluteus riberaltensis var. **riberaltensis** Singer, Lloydia 21: 255, (1959) 1958. Fig. 15

Pileus surface radially sulcata verrucose, brown-date palm. Lamellae free, close, broad, brown light colored with shades pinkish, edges even, concolorous.

Basidiospores 4.5-6.5 × 4-6 µm, Q = 1.08-1.12 subglobose, smooth, thin-walled to slightly subthick, hyaline. Basidia 23-29 × 7-9 µm, tetraspored, claviform, thin-walled, hyaline. Pleurocystidia 44-70 × 20-34 µm, claviform, subutriform, thin-walled, hyaline. Cheilocystidia 38- 61 × 14-18 µm, subutriform, lageniform, thin-walled, hyaline. Pileipellis a cutis, with elements 12.5-20 µm broad, elongated hyphae, rotound apex or slightly attenuate with intracellular content brown-yellowish. Caulocystidia and clamp connections absent at the stipe.

Habitat: Lignicolous, on rotten debris, rotten log, in subtropical mountain cloud forest.

Specimen examined. BOLIVIA, **Oriente (Depto. Beni)**, Prov. Vaca Diez. Riberalta, 30-III-1956, *R. Singer*, type *LIL B-2336*.

Observations. The type material consists of a single small fragment of pileus that when manipulated has broken into three pieces, which can be equivalent to a sixth of it.

Pluteus rimosellus Singer, in Singer & Digilio, Lilloa 25: 262, (1952) 1951. Fig. 16

Basidiome with pileus and stipe fragmented in part, difficult to study. Basidiospores 6.5-8(-8.5) × 6-7.5(-8) µm, Q = 1.06-1.25 subglobose to broadly ellipsoid, smooth, thin-walled, hyaline. Basidia, cystidia and pileipellis not observed.

Habitat: Lignicolous, gregarious, on live trunks of *Urera viva* but also dead wood, in subtropical forest.

Specimen examined. ARGENTINA, **Prov.**

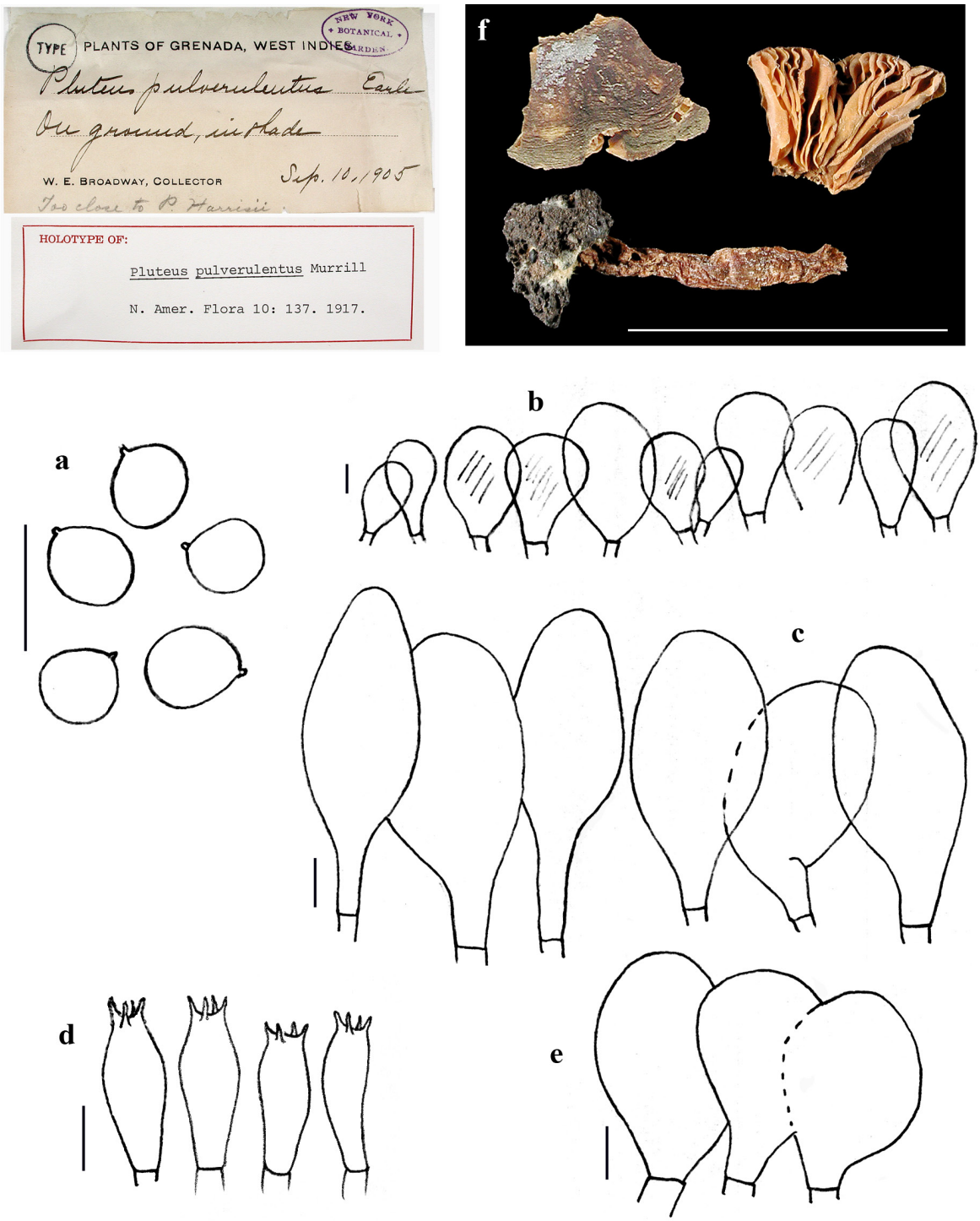


Fig. 14. *Pluteus pulverulentus,* **a**: basidiospores, **b**: pileipellis, **c**: pleurocystidia, **d**: basidia, **e**: cheilocystidia, **f**: dry basidiome (*W. E. Broadway s.n.-NY* type) (Scale bar: a = 20 µm, b-e = 10 µm, f = 1 cm).

Tucumán, Río of the Sosas, 1-3 m s.m., 1-I-1951, R. Singer, type LIL T-1089; Quebrada of Lules, 13-V-1951, *R. Singer,* paratype LIL *T-1544*.

Observations. The type material is not in very good conditions, only basidiospores were observed.

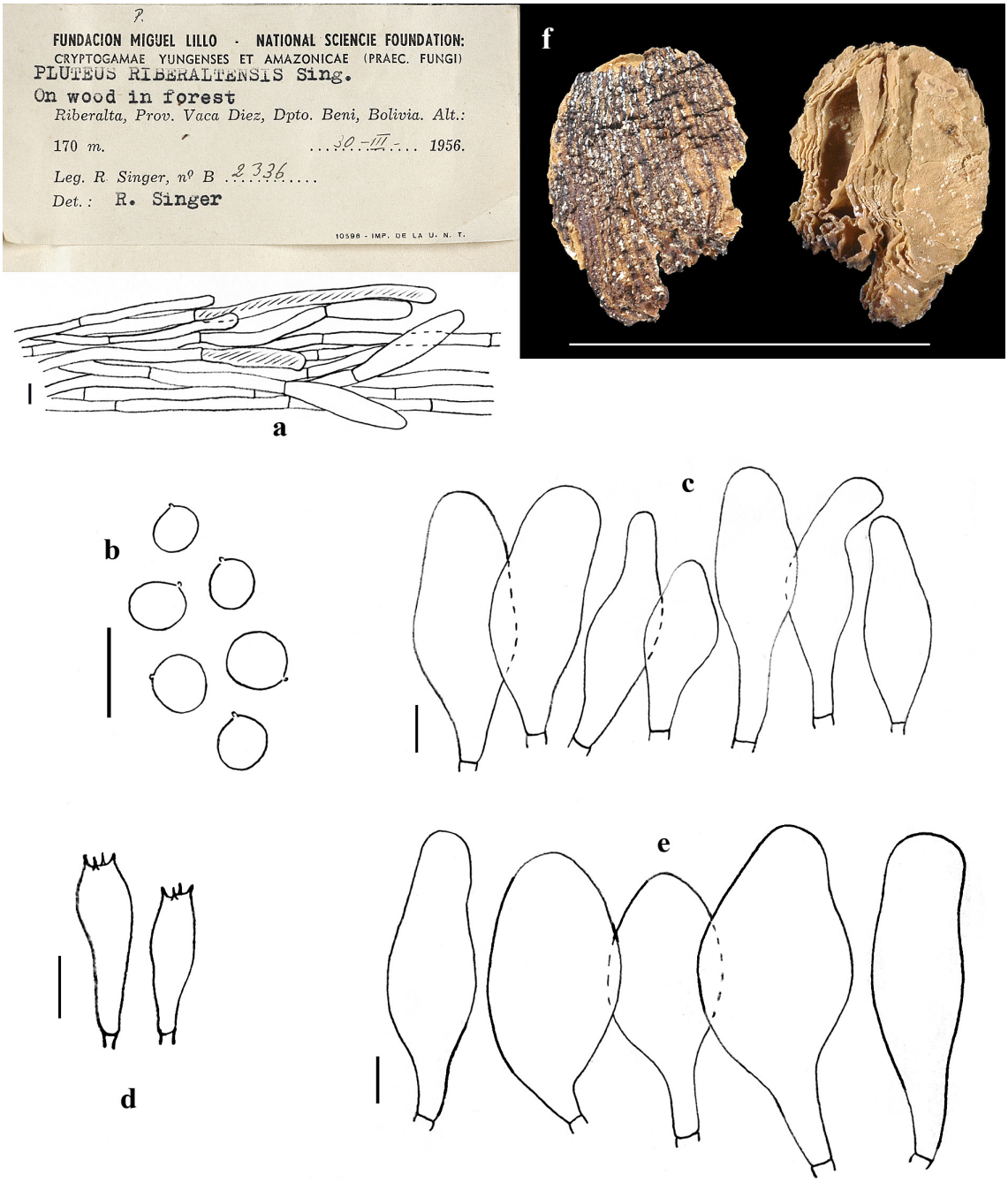


Fig. 15. *Pluteus riberaltensis* var. *riberaltensis*, **a**: pileipellis, **b**: basidiospores, **c**: cheilocystidia, **d**: basidia, **e**: pleurocystidia, **f**: dry basidiome (*R. Singer B-2336-LIL* type) (Scale bar: a, c-e = 10 µm, b = 20 µm, f = 1 cm).

Pluteus sancti-xaverii Singer, Lloydia 21: 264, (1959) 1958. Fig. 17

Pileus 8 mm broad, surface with glabrous appearance, color brown. It is impossible to observe other macroscopic characters. Basidiospores 7-8 × 6-8 µm, Q = 1.07-1.25 subglobose to broadly ellipsoid, smooth, thin-walled, hyaline. Basidia, cystidia and pileipellis not observed.

Habitat: Lignicolous, on wood *Phoebe porphyra* (Lauraceae), in subtropical forest, collected in summer.

Specimen examined. ARGENTINA, **Prov. Tucumán**, San Javier, 13-I-1957, *R. Singer* type LIL *T-2878*.

Observations. According to the study of type material, we could only observe basidiospores, since the rest of the structures collapsed.

Pluteus satur Kühner & Romagn., Bull. trimest. Soc. mycol. Fr. 72: 182, 1956. Fig. 18
= *Pluteus pallescens* P.D. Orton, Trans. Br. mycol. Soc. 43(2): 360, 1960.

The type comprises two specimens, but only the material with the biggest basidiome indicated as "a" corresponds to the species described by Orton (1960). The other specimen indicated as "b" is a different taxon.

Specimen indicated as "a"

Pileus 26 mm broad, margin sulcata-striate almost up to the disc of the pileus, brown. Lamellae free, close, ventricose, brown-pink, edges fimbriate, slightly lighter. Stipe 30 × 1.5 mm, central, cylindrical, slightly striate, brown light colored.

Basidiospores 6-7.5 × 5.5-6.5 µm, Q = 1.07-1.16 broadly ellipsoid to subglobose, smooth, thin-walled to slightly subthick, hyaline. Basidia 23-29 × 7-10 µm, tetraspored, claviform, hyaline. Pleurocystidia (28-)40-59 × 17-31 µm, claviform,

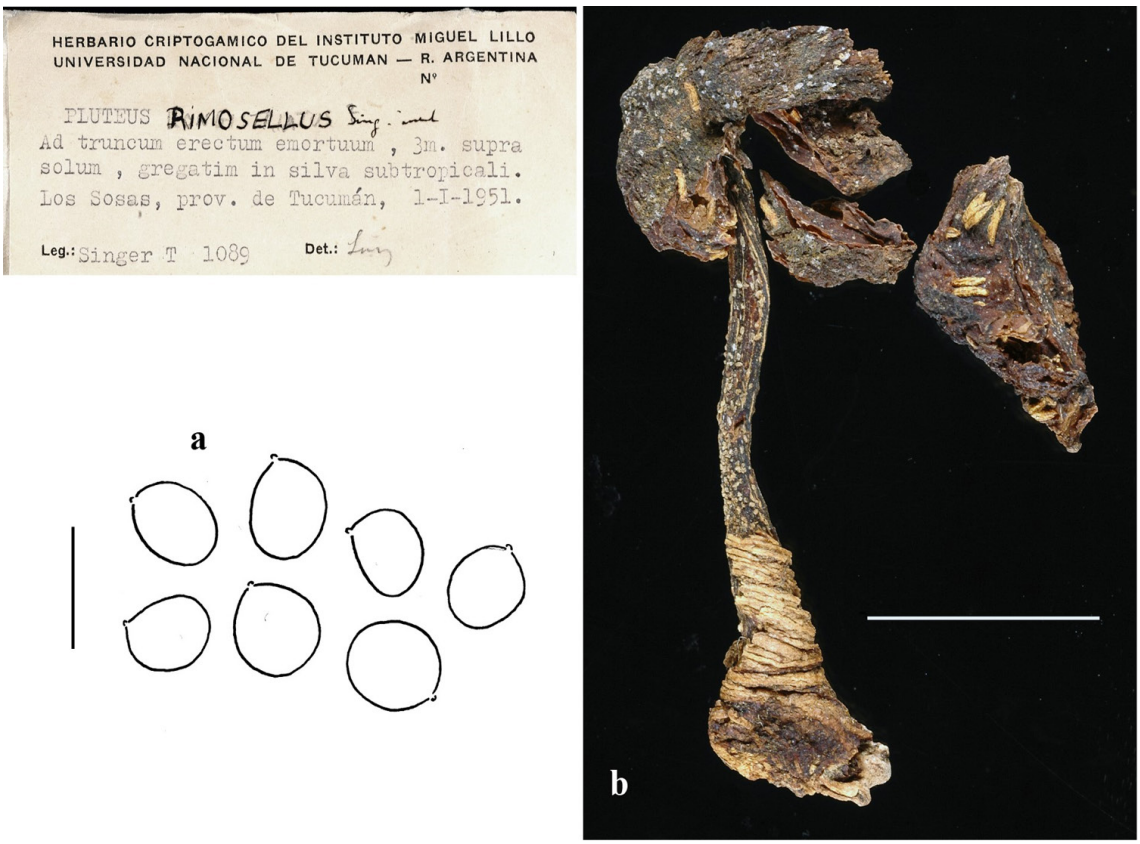


Fig. 16. *Pluteus rimosellus,* **a**: basidiospores, **b**: dry basidiome (*R. Singer T 1544*, LIL paratype) (Scale bar: a = 23 µm, b = 1 cm).

broadly claviform, more scattered than cheilocystidia, thin-walled, hyaline. Cheilocystidia (25-)30-56 (-66.5) × (11-)14-32(-37) µm, claviform, broadly claviform, ellipsoid, thin-walled, hyaline. Pileipellis an epithelium with elements of 25-50 × 20-42.5 µm, subglobose, sphaeropedunculate, broadly claviform, with intracellular content is more or less homogeneous, yellowish-brown, without clamp connections. Caulocystidia and clamp connections absent.

Specimen indicated as "b"

Pileus 16 mm broad, surface glabrous with the disc slightly wrinkled, color brown-greyish. Lamellae free, close, ventricose, color brown-pinkish. Stipe 60 × 0.5 mm, central, cylindrical, thin, glabre, color brown slightly darker than pileus.

Basidiospores 6-7.5 × 5-6 µm, Q = 1.08-1.27 broadly ellipsoid to subglobose, smooth, thin-walled, hyaline. Pleurocystidia 42-66 × 14-21 µm, lageniform, with neck more or less short to elongate, thin-walled, hyaline. Cheilocystidia 30-64 × 11-22 µm, claviform, subfusiform, attenuate and obtuse apex, thin-walled, hyaline. Pileipellis not observed.

Habitat: On soil near the wood of *Fraxinus*.

Specimen examined. ENGLAND, **Wheatfen Carr**, Surlingham, Norfolk, 7-VII-1958, *Orton*, type of *P. pallescens* K, *1691*.

Observations. *Pluteus pallescens* is characterized by the hygrophanous pileus, dark brown, stipe white with yellowish shades towards the base, and microscopically by the form of the pleurocystidia (Orton, 1960). The type material of *P. pallescens* includes two specimens, named here as "a" and "b", that correspond to two different species. The macroscopic characters described in the diagnosis seem to be based on both specimens in the contrary to the microscopic characters described by this author; the cystidia that differed in size and form from what was described by Orton (1960) were observed in specimen "b", for example, pleurocystidia are lageniform. The characters described by this author correspond to what was observed in the specimen "a", mainly in the forms of the pleuro- and cheilocystidia, clavate and vesiculosus-fusiform, and clavate or vesiculosus-fusiform, rarely lageniform cheilocystidia, respectively (see figure of *P. pallescens*). Orton (1986) invalidated and synonimized another name of *Pluteus pallescens*

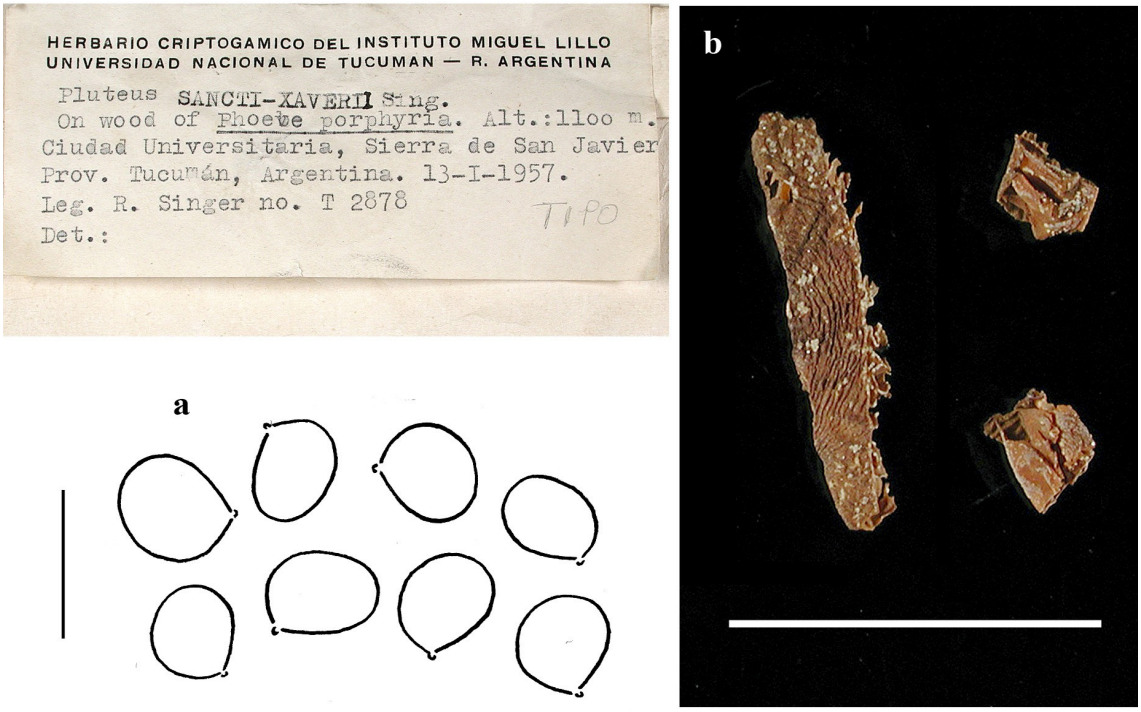


Fig. 17. *Pluteus sanctixaverii,* **a**: basidiospores, **b**: dry basidiome (*R. Singer T 2878*, LIL type) (Scale bar: a = 23 µm, b = 1 cm).

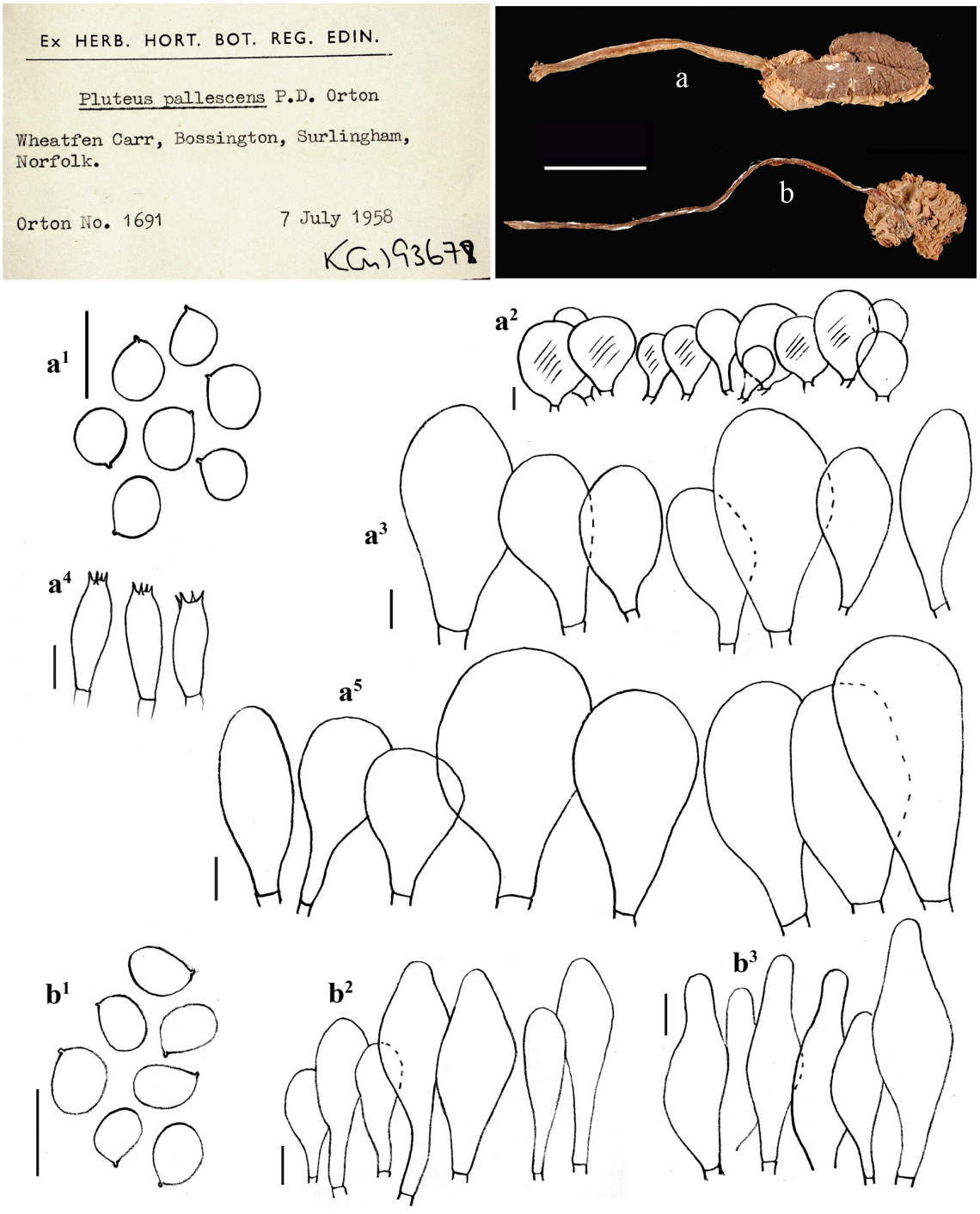


Fig. 18. *Pluteus satur,* **a**[1]: basidiospores, **a**[2]: pileipellis, **a**[3]: pleurocystidia, **a**[4]: basidia, **a**[5]: cheilocystidia, **b**[1]: basidiospores, **b**[2]: cheilocystidia, **b**[3]: pleurocystidia, **a** and **b**: dry basidiomes (*P. D. Orton 1691*, K *pallescens* type (Scale bar: a[1], b[1] = 20 µm, a[2], a[3], a[4], a [5], b[2], b[3] = 10 µm, a y b = 1 cm).

by *P. satur* Kühner & Romagn., whose epithet is the correct one and has priority over the first. The correction was done by the same author according to the study of type material of *Pluteus satur* and the revision of the diagnosis in Latin and French of Kühner & Romagnesi (1977).

Pluteus thomsonii (Berk. & Broome) Dennis [as 'thonsoni'], Trans. Br. mycol. Soc. 31(3-4): 206, 1948. Fig. 19

Pileus 40 mm broad, surface more or less tomentose, ridge-reticulate on disc, brown-dark to brown toward the margin. Lamellae could not be described due to the bad dried conditions. Stipe 30-34 × 3 mm, cylindrical, slightly enlarged in the base, fibrillose-tomentose, brown with blackish shades in some areas. Basidiospores 7-9 × 5-6.5 µm, Q = 1.15-1.5 broadly ellipsoid to ellipsoid, few subglobose, smooth, thin-walled, hyaline. Basidia, cystidia and pileipellis structures could not be observed. Caulocystidia and clamp connections absent.

Habitat: Lignicolous, between herbaceous plants in a plantation.

Specimen examined. ENGLAND, **West Farleigh** (near Maidstone), ex herb. *M.J. Berkeley*, type *K 93764*.

Observations. The type material is not in very good condition, it is only possible to see basidiospores, since the rest of the structures were collapsed probably due to bad conservation.

Pluteus triplocystis Singer, Beih. Sydowia 7: 63, 1973. Fig. 20

Pileus 36 mm broad, umbonate, surface fibrillose, on the umbo fibrils silky and other dark observed like a bunch of fibrils, margin slightly incurved, sulcate, rimulose, brown on disc to grayish toward the margin. Lamellae free, close, narrow, cream-yellowish with cream-salmon colored, edges even, slightly paler. Stipe 80 × 4 mm, central, cylindrical, bulbose with 5 mm broad, velutinous, brown color, with yellowish-white mycelium.

Basidiospores 5.5-6 × 5-5.5 µm, Q = 1.1-1.22 subglobose to broadly ellipsoid, smooth, thin-walled, hyaline. Basidia 25-37 × 6.5-8 µm, tetraspored, claviform, sterigm up to 4 µm long,

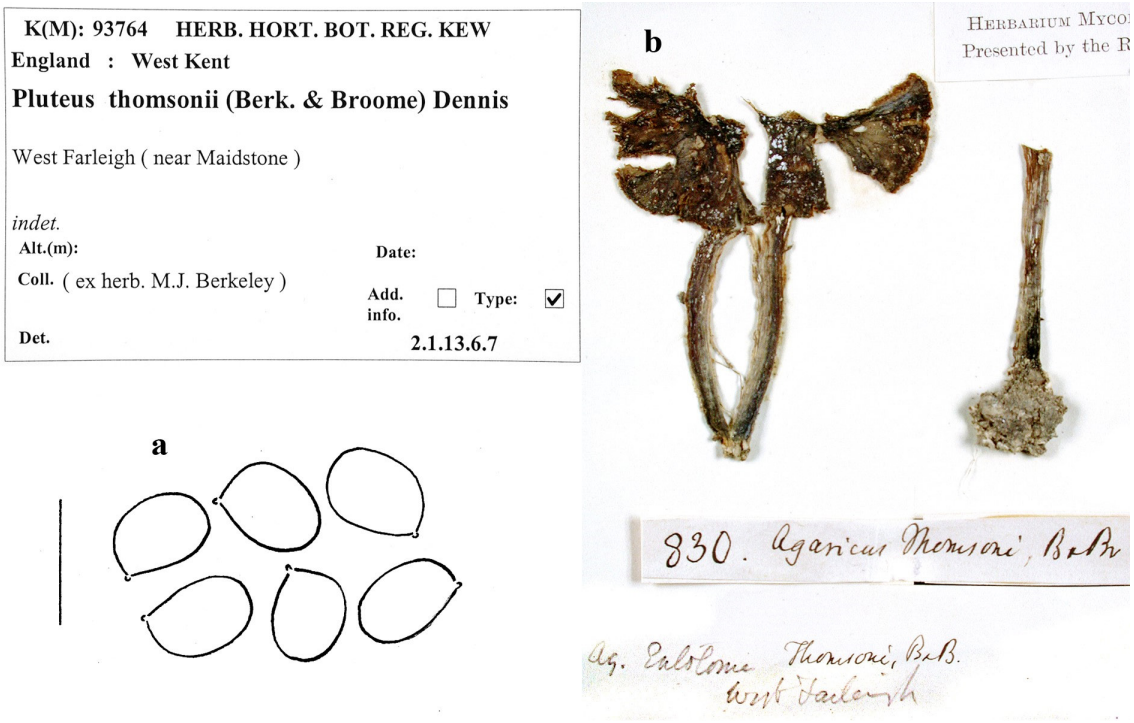


Fig. 19. *Pluteus thomsonii,* **a**: basidiospores, **b**: dry basidiome (*M. J. Berkeley K-93764* type) (Scale bar: a = 23 µm, b = 1 cm).

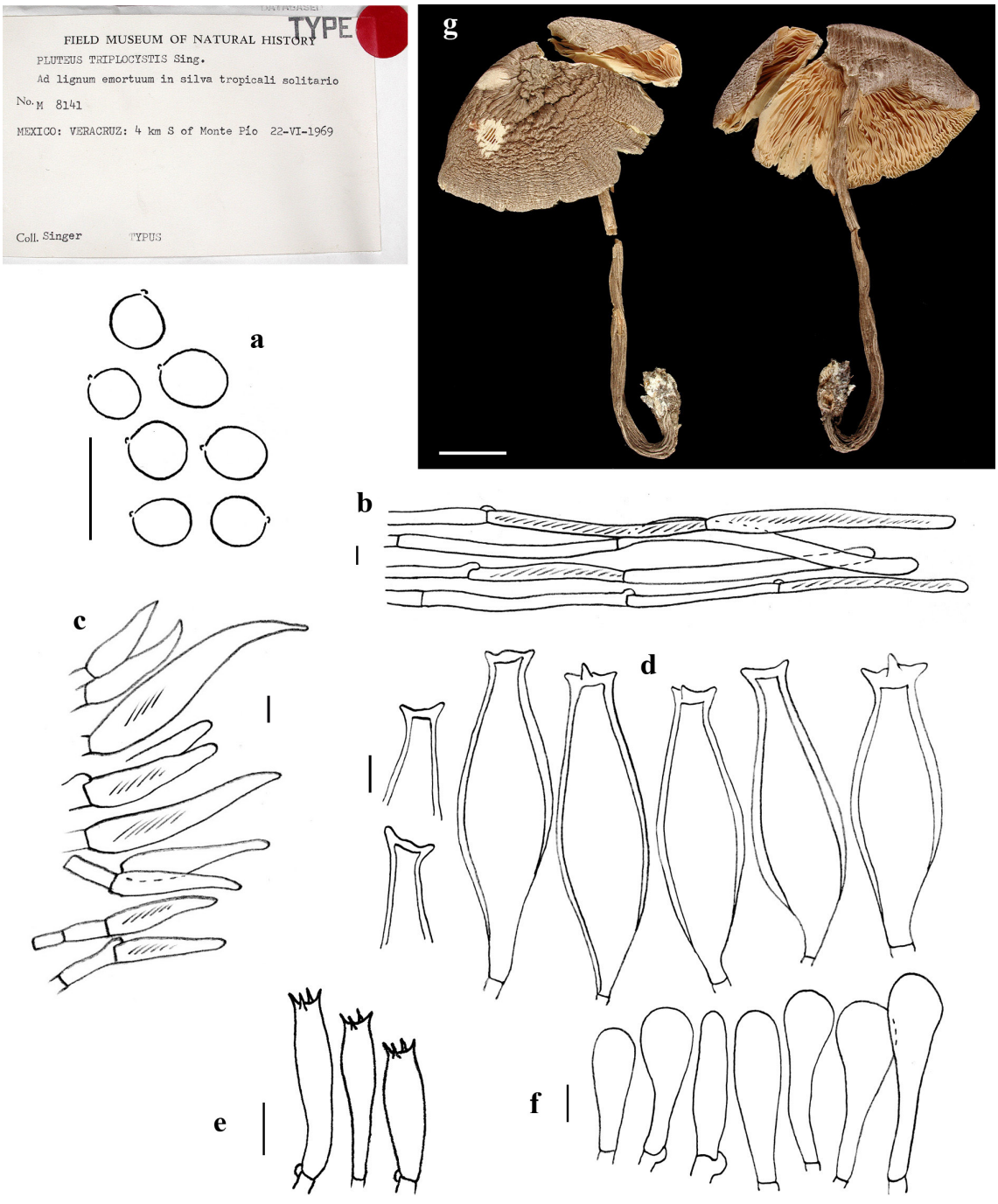


Fig. 20. *Pluteus triplocystis,* **a**: basidiospores, **b**: pileipellis, **c**: caulocystidia, **d**: metuloid cystidia cervinus type, **e**: basidia, **f**: cheilocystidia, **g**: dry basidiomes (*R. Singer M 8141-F* type) (Scale bar: a = 20 µm, b-f = 10 µm, g = 1 cm).

hyaline, with clamp connections. Pleurocystidia metuloid *cervinus* type, 70-92 × 18.5-26 µm, ventricose-fusiform, apex with 2-4 hooks, generally with hooks short or some up to 5 µm long, with 0.5-1.5 µm thick-wall, thickened regularly towards the apex or hooks, hyaline. Cheilocystidia 34-61 × 10-16 µm, claviform, broadly-claviform, thin-walled, hyaline, with clamp connections in the base. Pileipellis a cutis with terminal hyphae 80-162.5 × (4-)9-12.5 µm, filamentose, rotound apex or slightly attenuated, thin-walled, hyaline or with intracellular pigment yellowish-brown, clamp connections more or less frequent, some elements suberect. Caulocystidia 42.5-71(-107.5) × 9-16(-22.5) µm, sublageni-form, with intracellular pigment homogeneous, yellowish-brown deep, clamp connections in all the stipe.

Habitat: Lignicolous, solitary, on wood of dicotyledons in tropical evergreen forest.

Specimen examined. MEXICO, **Veracruz**, Munic. of San Andrés Tuxtla, 4 km to south of Montepío, 22-VI-1969, R. Singer, type F M-8141.

Observations. So far, *Pluteus triplocystis* is a species that has been mentioned only for Mexico. It is considered one of the few taxa within the *Pluteus* section that present caulocystidia, a character that is little observed in the genus and even in this section, where it is only known *P. amphicystis* Singer and *P. martinicensis* Singer & Fiard with caulocystidia.

Some microscopic differences were found in the description of type material respecting to what was cited by Singer (1973), observing a greater interval in the size of the basidia, metuloid and caulocystidia from what was cited by Singer: 21-30 × 6.5-8 µm, 62-72 × 11-23 µm and 37-60 × 7- 17 µm, respectively. Based upon the study of *Pluteus triplocystis* type material, it confirmed its determination and presence in mexican micobiot.

ACKNOWLEDGEMENTS

This research was supported by Universidad de Guadalajara, PROMEP/103.5/07/2449 and CONACYT (CONACYT-SEP-2003-C02-42957). The author is grateful to E. Horak (Geobotanisches Institut, ETH, Zürich, Switzerland) for his valuable help in the study of *Pluteus*.

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