Anales Inst. Biol. Univ. Nac. Autón. México, Ser. Bot. 60(1): 27-36, 30-XI-1990

AGARICALES NEW FOR MEXICO OR CENTRAL AMERICA

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ABSTRACT

Of the 12 species presented as new to science, to Mexico, or to Central America, three (two species of *Marasmius*, one of *Russula*) are considered new taxa.

Key words: *Tricholoma titans, Marasmius dryinus, M. aripoensis, M. nephelogenes, Crinipellis eggersii, Crepidotus palmarum, Boletellus ananaeceps, Russula arcyspora, R. flavisiccans, R. lepidiformis, Lactarius echinatus*, Agaricales.

RESUMEN

De las 12 especies que se presentan como nuevas para la ciencia, para México o para Centroamérica, tres (dos especies de *Marasmius* y una de *Russula*) son consideradas como nuevos taxa.

Palabras clave: *Tricholoma titans, Marasmius dryinus, M. aripoensis, M. nephelogenes, Crinipellis eggersii, Crepidotus palmarum, Boletellus ananaeceps, Russula arcyspora, R. flavisiccans, R. lepidiformis, Lactarius echinatus*, Agaricales.

Some species new for science, for Mexico or for Central America, all belonging to Agaricales (Basidiomycetes) have been studied and compared critically with related forms. They are fully described and illustrated where a complete modern description and/or a satisfactory illustration is not available in the literature. The specimens are mostly conserved at the Field Museum of Natural History (F). The colors are indicated in quotation marks without citation of the author if they are based on Maerz & Paul (1930), otherwise the author of the color atlas is indicated. The families are those recognised by Singer (1986). Spore ornamentation types see Singer (1986). Spore color chart see Roamagnesi (1967).

TRICHOLOMATACEAE

Tricholoma titans Bigelow et Kimbrough, *Mycotaxon 11*:426. 1980.

Tricholoma cystidiosum Cifuentes et Guzmán, *Bol. Soc. Mex. Micol. 16*:18.1981.

Macroscopical description: A correct macroscopical description was provided by both Bigelow and Kimbrough (1980) and Cifuentes and Guzmán (1981) (*"cystidiosa"*).

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Microscopical description: Spores 5.4-7.5 × 3.2-5.5 μm, short ellipsoid, more rarely subglobose (Q = 1.2-1.7, mostly 1.33-1.55) with thin, hyaline wall, without germ pore, without suprahilar depression, inamyloid, acyanophilous, usually with one large oil drop. Hymenium. Basidia 26.5-31 × 6.5-8 μm; basidioles subcylindrical to narrowly clavate, without siderophilous granulation, with basal clamp. Cells on edges and near edges merely a hymenial extension of tramal hyphae, filamentous with or without mediane or basal swelling. Cystidioles on edges and sides of lamellae mostly basidiomorphous, 18-45 × 4-8.3-(15)μm, with obtuse or subacute tip, thin-walled or with apically somewhat thickened wall, hyaline. Pseudocystidia of the gloeocystidium type rather numerous on edges and sides, but not always easily observed, most with granose contents ± bluing in cresyl blue mounts, either broadly rounded and not projecting or not even reaching the level of the basidia, or, more frequently ampullaceous and then reaching the level of the sterigmata or projecting beyond that. 50-60 × 10-13 μm, the neck 1.53-3 μm diam., thin to more rarely firm-walled, hyaline (KOH). Hyphae not gelatinized, with clamp connections, inamyloid. Subhymenium subcellular, ± 15 μm deep, rarely reaching up to 24 μm deep. Hymenophoral trama regular with 1-8 μm thick hyphae which are not noticeably swollen, without elements bluing in cresyl blue, all thin-walled. Covering layer: Epicutis dense, hyaline, prostrate, elongated, only a few hyphae ascendant or suberect and there filamentous and sometimes fuscidulous, all thin-walled. A similar layer on stipe surface.

Carpophores mostly outside forested places, sometimes growing against the wall of houses, singly or subcespitosely to concrescent, fruiting in July.

Material studied. MEXICO. CHIAPAS: Bélgica, *Gutiérrez 47* **(FCME). USA.** FLORIDA: Seratoga Co., Saratoga, July 1986. *Williams 301* ***(F)***

This species is new to Mexico only in the sense that it was not collected there under the name. *T. titans. Tricholoma cystidiosum,* published independently of *T. titans* one year later from Mexico is the same species. However, before the type of the cystidia was determined, it was difficult to distinguish from *Tricholoma praegrande* (Berk.) Sacc., another light colored gigantic species, in Mexico known under the name *T. pachymeres* (Berk. and Br.) Sacc. (see Guzmán 1978) because this also is provided with cystidiole-like cystidia or cheilocytidia but not with gloeocystidial elements. *T. praegrande* is much more widely distributed from Brazil (São Paulo, Amapá, Minas Gerais, Pernambuco, Pará), Ecuador, Colombia, Costa Rica (Heredia), to Mexico (Veracruz, Oaxaca) and Trinidad.

Marasmius dryinus Sing. spec. nov.

Marasmius sectio *Hygrometrici*. Ab aliis speciebus huius sectionis sporis minutis (± 6.5 × 2.3 μm) aut lamellis octo vel decem percurrentibus, cremeis differt. Ad folia quercina delapsa. TYPUS: **MEXICO.** MORELOS: NW of Tepoztlán, at 2200 m alt., 27-VI-1969, *Singer M 8251* **(F).**

The species was once described and illustrated (1976, p. 81-82, fig. 40 C) by me from Mexico as *M. crescentiae* which is similar and was confused with the present species on the basis of the type analysis by Dennis (1951) who did not recover spo-

res. However, Pegler (1987) recovered spores from the type specimen (holotype **NY**) of *M. crescentiae* Murr. which are 7.5-11 × 3.5-4.5 μm and agree therefore not with the species we now describe as *M. dryinus*, but with a Bolivian collection of apparently *M. crescentiae*, then (1976) believed to be a form of *M. ilicis* Sing. Consequently we have to rename *M. crescentiae* sensu Sing. 1976, changing it to *M. dryinus* Sing. and exclude the Bolivian specimens (with seven lamellae) from *M. ilicis* Sing. and call them *M. crescentiae* Murr. (*Singer B 758*, **LIL**).

This species is close to *M. minutus*, Peck (*M. capillipes* Sacc.) but differs in somewhat larger size, cream colored lamellae which are more numerous. Other species of the stirps *Corbariensis* have large spores and other hosts.

Etymology. Dryinus: related to oaks (Gr: *drys* = oak).

Marasmius aripoensis (Dennis) Sing. *Sydowia 18:*188.1965

Marasmius trichorrhizus var. *aripoensis* Dennis. *Trans. Brit. Mycol. Soc. 34:*417. 1951

This was described by Singer (1976) and is new for Costa Rica, Puntarenas: Reserva Biológica del Bosque Nuboso de Monteverde, ± 1700 m alt., 25-VII-1986, *Singer B 14476* (**F**). In this collection the spores were slightly larger: 7.5-10 × 3-3.8 μm and the pileus unicolorous.

Marasmius nephelogenes Sing. spec. nov.
(Fig. 1)

Marasmius sect. *Marasmius*; pileo albo, sicco avellaneo vel pallide argillaceo, profunde umbilicato, minute papillato e centro atrobrunneo, sulcato, 2-4 mm lato. Lamellis septem vel novem, albis, latis. Stipite brunneo-nigro apice albo, glabro, nitido, 4-6.5 × 0.2-0.5 mm, insiticio. Sporis 6.5-8 × 4.3-5 μm. Cheilocystidiis elementisque epicutis pilei hymeniformis typi Rotalis. Ad corticem. TYPUS: Costa Rica, Puntarenas: Bosque Nuboso, Reserva Biológica near Monteverde, 25-VII-1986, *Singer B 14453* (F).

Pileus white with a small central, deep brown papilla (this in some early stages only visible with a lens), deeply sulcate outside the papilla, eventually the white part becoming pale avellaneous and by drying pale argillaceous, tending to become minutely diffract in a zone around the papilla, which appears scurfy, convex, deeply umbilicate (with the papilla inside the umbilicus), 2-4 mm broad. Lamellae white with white edge, later pallid with white edge, broad, distant (7-9 through-lamellae), collariate. Stipe brownish black with the apex long remaining white, glabrous, smooth, shiny, slightly tapering toward apex or subequal insiticious; black rhizomorphs not observed to be connected with the stipe or accompanying it. Context thin, odorless.

Spores 6.5-8 × 4.3-5 μm , ellipsoid, hyaline, mostly with one small oil drop, inamyloid, smooth. Hymenium: Basidia 20-24.5 × 6.5-8 μm , 4-spored. Cystidia none. Cheilocystidia see below. Hyphae in pileus not gelatinized, mostly thin-walled, but a few partly thick-walled, some inamyloid, but some becoming orangy in Melzer, with clamp connections. Hymenophoral trama regular. Cortical layer of the pileus: Epicutis hymeniform, consisting of ventricose to subglobose setuliferous cells with a main body

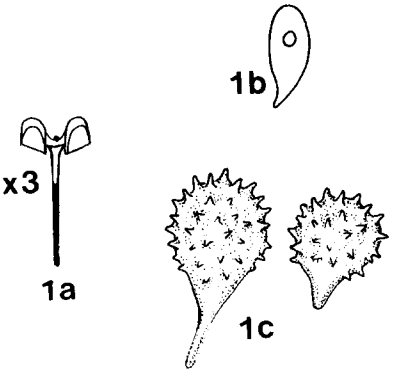

Fig. 1. *Marasmius nephelogenes* Sing. a = carpophores in section, × 6; b = spore × 2000; c = elements of epicutis × 1000. F.

of 11-26 × 8-13 μm with the setulae 1.5-3 × 0.5-1.2 μm, brown or hyaline, similar to the cheilocystidia which differ only in hyaline setulae which are slightly shorter. In all parts were a few oleiferous hyphae observed, 3-5 μm thick.

On the bark of a dicotyledonous tree, gregarious.

This species is close to *M. neorotula* which differs in having more numerous lamellae, narrower spores, and occurring only in Amazonian terra firme forest. *M. baumannii* Henn. is African and has also more numerous lamellae (mostly 12).

Etymology. Nephelogenes: born in fog (Gr. *nephele* = fog).

Crinipellis eggersii Pat. in Pat. and Lagerheim, *Bull. Soc. Mycol. France. 9:*125.1893.

This species and its varieties are described by Singer (1976). It was discovered by J. García in Mexico which extends its known area northward: Tamaulipas: Gómez Farías, 270 m alt., in "Selva baja caducifolia", 10-VII-1986, *García 3885*, det. Singer (F). Everardo Alcalá, García and Castillo, *García 118* (F).

Crinipellis eggersii is closely related to *C. perniciosa* (Stahel) Sing. which differs in having somewhat smaller pileus and less dense hairs which are condensed only in one central spot, and by its pathogenic primary mycelium exclusively on Theobroma where it causes witches broom or krulloten in contrast to *C. eggersii* which grows on many different hosts and if inoculated on *Theobroma cacao* is only very weakly parasitic.

CREPIDOTACEAE

Crepidotus palmarum Sing. in Sing. and Dig., *Lilloa 25*:406. 1951, publ. 1952.

Crepidotus luridus var. *minutus* Sing., *Nova Hedwigia, Beih. 44*:421. 1973.

I consider, now, *C. luridus* var. *minutus* a synonym of *C. palmarum* and consequently its type becomes a new record for *C. palmarum* in Mexico (Veracruz). *C. palmarum* was also observed by me in Ecuador, (Napo, *Singer B 7334* and Puerto Rico (Caribbean Nat. Forest, *Singer B 15008*) all at **F**.

BOLETACEAE

Boletellus ananaeceps (Berk.) Sing., *Sydowia 9:*423.1955.

This species was collected in Costa Rica, Puntarenas: Bosque Nuboso de Monteverde, Reserva Biológica, in mixed frondose forest, probably under *Quercus*, 24-VIII-1986, leg. *Aguero and Singer B 14449* (**F**). It is new for Central America and for the Western hemisphere. It was originally described from Australia. It differs from *B. ananas* in not cross-striate spores 13.2-22 × (5)5.5-7.5 μm and was compared with the type (**K**).

RUSSULACEAE

Russula arcyospora Sing. spec. nov.
(Fig. 2)

Pileo colore Russulae foetenti similis, partim vel ex integro verrucis vel granulis obtecto, viscido, dein sicco, levi in centro, margine per ± 7 mm sulcato in maturis, acuto vel subobtuso praedito, 40-45 mm lato. Lamellis albidis dein pallide subcremeis, margine haud brunneis, interdum lacrimantibus, Sporis in cumulo Ia vel Ia-Ib, sed haud Ib nee magis flavescentibus. Stipite ad apicem extremum ferrugineo, ceterum albido, demum partim brunneolo sed granulis punctiformibus brunneolo-albidis vel brunneis obtecto, cavo, 50-76 × 7-15 mm; velo nullo. Carne albida, immutabili; sapore acri; odore Russulae foetentis vel simili. Sporis 10-13-(14.5) × 8.5-11.5-(13.5) μm, ornamentatione 1-2 -(2.5) μm alta typi II, II-IIIb, II-IV. Cystidiis sulfovanillinae ope caerulescentibus. Epicute trichodermiali, dermatopseudocystidiis praesentibus. Ad terram sub Quercubus. TYPUS: Costa Rica, Cartago: El Jardín, sw of Empalme, 6-VIII-1986. *Singer B 14628* (F).

Pileus in the colors of *Russula foetens*, cracked-squamose-verrucose in some, but always at least with areas which under a lens show tiny brown dots or granules, appearing viscid in wet weather but usually collected dry, with acute to eventually subobtuse margin which is sulcate in mature specimens, not rugose or wrinkled in the center, or elsewhere, convex with depressed center, 40-45 mm broad, Lamellae whitish, soon very pale and dull cream pallid, with pallid edge (only on drying the lamellae become somewhat browned towards the edges), sometimes beset with droplets in wet weather, close, medium broad, subequal (1 or 2 lamellulae), narrowly adnexed to subdecurrent. Spore print near Ia, by far not reaching Ib when fresh. Stipe white, or whitish, at the extreme apex distinctly rusty brown, below that mostly sooner or later with ± browned areas, glabrous at the apex, otherwise beset with punctiform granules which are brownish white to brown (both the rusty brown apex and the granules best seen when material dried), subsmooth, then subrugulose, hollow, with thickened, more rarely attenuated base, 50-76 × 7-15 mm. Veil none. Con-

text whitish, unchanging when bruised; taste acrid; odor complex, of nitrobenzine (*R. laurocerasi*) + anise (*Agaricus arvensis*), or rarely slightly fetid (*R. foetens*).

Spores with ornamentation 10-13-(14.5) × 8.5-11.5 μm , without 8.5-10 × 7.5-9.5 μm, ornamentation projecting 1-2-(2.5) μm, of type II, II-IIIb, II-IV, i.e. with heavy or thin ridges which may be short or very long, and are mostly interconnected with fine lines which however do not form a complete network, a few exceptional spores may have type IV, V, or IX, with a distinct and often very large suprahilar amyloid dot, and frequently an inamyloid perisporium. Hymenium: Basidia 38-39 × 10-12-(15)μm, rarely longer, 4-spored with 7-9 μm long sterigmata. Cystidioles 22-40 × 9.5-14 μm, ventricose, clavate or vesiculose and pedicellate, contents neither bluing in sulfovanilline nor in cresyl blue mounts. Pseudocystidia either bluing in sulfovanilline and not in cresyl blue mounts (macrocystidia), or vice versa (gloeocystidia) or in both, mostly with amorphous contents, shaped like the cystidioles but rooting deeper, or more frequently fusoid, sometimes short (to 6 μm) appendiculate, thin-walled, 65-85-(95) × 5-11-(13) μm if fusoid, otherwise 47-66 × 7-11 μm. Hyphae without clamp connections, inamyloid. Hymenophoral trama with numerous nests of large spherocysts. Oleiferous hyphae numerous in trama, 4-7 μm diam. Cortical layers: Epicutis of pileus a trichodermium of filamentous, in places slighly gelatinized, in others non-gelatinized hyphae with thin to firm wall but not thick-walled, with acute or obtuse tip; among these hyphae there are numerous dermatocystidia with or rarely without contents, 20-125 × 2.5-11 μm, the contents granular, often banded or amorphous, bluing in sulfovanilline. Subclavate dermatocystidia e.g. 30 × 5.5 μm, also observed on the surface of the stipe. Granules of the stipe consisting of a densely interwoven trichodermium of yellow to brown hyphae 2.5-6 μm diam, the outer layer off the thin wall formed by a layer of brown pigment. There is no well distinguishable layer of a gelatinous subcutis on the pileus and the hypodermium is a cutis 40-80 μm deep. The localization of the pigment here as well as in the epicutis is difficult to establish. Epicutis + hypodermium together ca. 225 μm deep.

Chemical characters: KOH on pileus brown ("leafmold") Metol on context positive.

In mixed and *Quercus* woods., on the ground:

A Florida, USA collection seems to be conspecific *Singer F 585*, **FH** (see Singer 1957, p. 164).

This species differs from all similar species of the stirps Foetens by its white spore print. But the exact spore print color is unknown in *R. punctipes* Singer (1935) = *R. senecis* Imai (1938). Singer's species was published 1932 without Latin diagnose but is valid according to Art. 36.1. This species from China and Japan has the same punctations on the stipe and similar spores as *R. arcyospora*, but differs in several characters, particularly the rugose or wrinkled center of the pileus and the discolorous (brown to fuscous brown) edge of the lamellae.

Etymology. Arcyospora: (Gr.) reticulate-spored.

Russula flavisiccans Bills, *Mycologia 81*:57. 1989.

This species is fully described l.c. and was by me described under a herbarium name (*R. eperythra* Sing.). In an earlier paper (Singer 1957, p. 207-208) the species

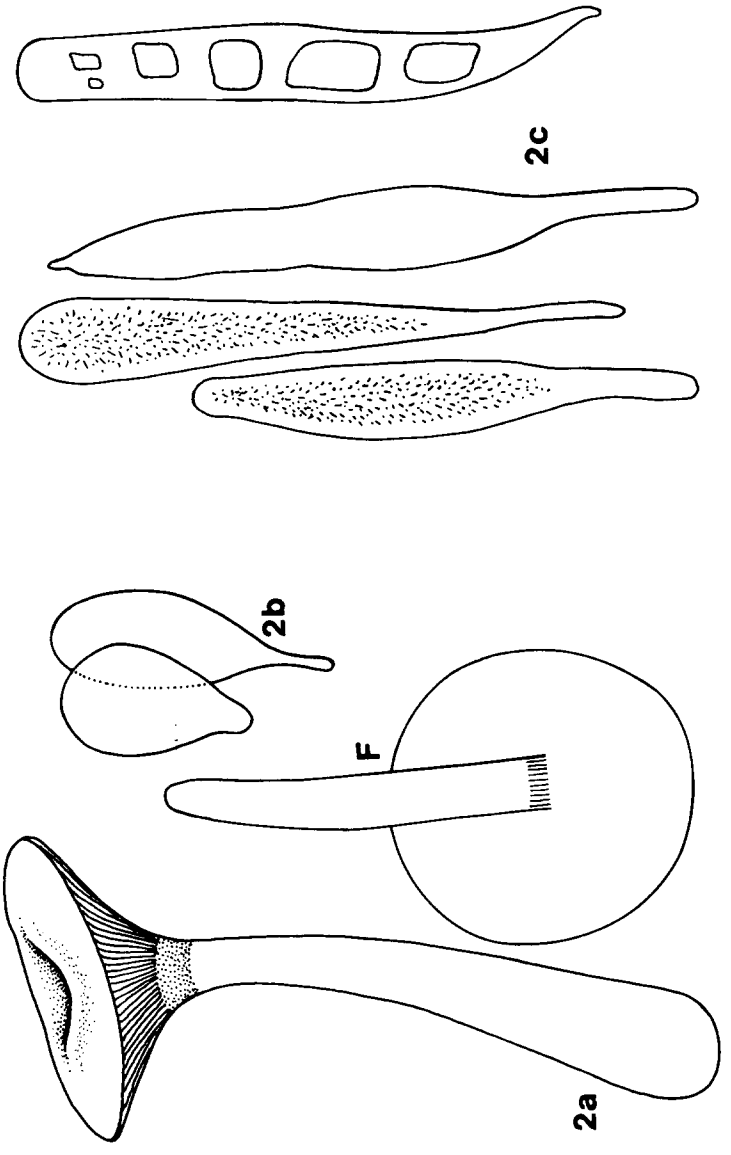

Fig. 2. *Russula arcyospora* Sing. a = two carpophores x1; b = short dermatopseudocystidia of pileus × 1000; c = long pseudocystidia of hymenium × 1000. F. The carpophore marked F is from Florida (FH).

was combined with *R. lepidiformis* Murr. (see below) which is closely related but slightly different.

Material studied. COSTA RICA. CARTAGO: San Cristóbal Sur near *Quercus,* at 1860 m alt., 9-VI-1984, *Singer B 14586A* **(F). USA.** ALABAMA. Robinson Springs *Burke 162* **(FH).** VIRGINIA: Mountain Lake, 21-VII-1947 **(FH).** It is new for Central America. (Both USA collections as *R. lepidiformis,* see also Bills 1.c.).

Russula lepidiformis Murr., *Mycologia 30:*363 1938.

Russula amarissima Romagnesi, and *R. lepida* var. *amara* Maire are the same species. It is widely distributed in Europe and North America, and has been well described by Romagnesi (1967). It is new for Costa Rica: Costa Rica, Cartago, El Jardín, SW of El Empalme, solitary under *Quercus*, 6-VIII-1986, *Singer B 14627* **(F).**

Lactarius echinatus Thiers, *Mycologia 49:*716. 1957.
(Fig. 3)

Pileus cream, on drying becoming pearl gray, but dried again cream to browish ochraceous, not viscid, not sulcate at the straight margin, scrobiculate-corrugate, convex with depressed center, 60 mm broad. Lamellae cream, dicymous, distant, moderately broad, decurrent. Stipe cream white, with a fleeting pale grayish shade in the middle or below, scrobiculate at apex, dry, glabrous, in upper half equal, in lower tapering down, not radicant, 46 × 12 mm; basal mycelium sparse, pallid white; veil none. Context pallid or white in pileus, unchanging in all parts; taste acrid; odor weak,"lactarioid". Latex white, unchanging.

Spores 8-19.5 × 6.5-7.5 μm (with ornamentation), ornamentation projecting 0.3-0.4 μm, type IV or almost IIIb (i.e. fine connecting lines between rod shaped spines not forming a reticulum), with mostly distinct plage but without amyloid suprahilar dot. Hymenium: Basidia 28-58-(80) × (7.5)-9.5-10.5 μm, 4-spored. Macrocystidia 46-94.5 × 7.5-9.5 μm, densely crowded at edge, more scattered otherwise, but still numerous, with finely granular-banded contents and thin walls, subcylindrical with mostly narrowed apex which is obtuse, or else fusoid with rounded-obtuse or appendiculate tip. Hyphae: Hymenophoral trama subregular, consisting of mostly radially arranged but interwoven, multi-septate hyphae not intermixed with spherocyst nests or large spherocysts, round cells rare, small, not spherocystoid but resulting from swollen hyphal cells; all hyphae without clamp connections and inamyloid. Cortical layers: Epicutis of pileus a subpalisadic, trichodermium of 1-3 erect hyphal cells, the terminal one 15-25 × 4-7 μm, cylindric or tapering upwards, with thin wall, hyaline, rising from the uppermost of a layer of spherocysts which form an epithelium and are 10-19 μm diam.; sometimes hyphae without septum between them and underlying spherocyst. No gelatinized subcutis and no hypodermium visible. Covering of stipe consisting of ascending hyphae about 4 μm broad with rounded tip, hyaline, and moderately numerous dermatopseudocystidia 4.5-6 μm broad, with obtuse or subacute tip, with the same kind of contents as the hymenial macrocystidia, subhyalin or yellowish.

On the ground under Sapotaceae and other (probably non-ectomycorrhizal) trees, solitary.

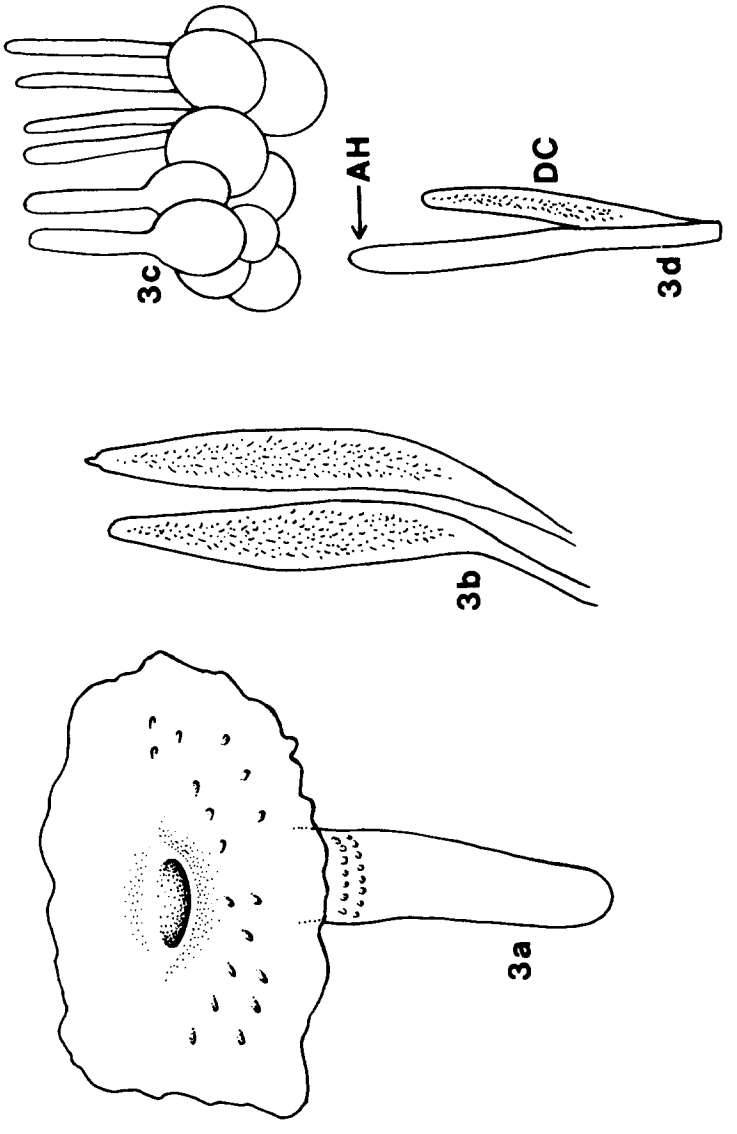

Fig. 3. *Lactarius echinatus* Thiers - a = carpophore × 1; b = macrocystidia of hymenium × 1000; c cortical layer of pileus × 1000; d = elements of covering layer of stipe. Material from México, F.

Material studied. MEXICO. TAMAULIPAS: Gómez Farías, 21-X-1988, *García, Mueller, and Singer M 9556* (F).

I am not fully convinced that this collection is indeed conspecific with *L. echinatus* Thiers but it comes very close to it and keys out with it in Hesler and Smith (1979) who insert it in sect. *Lactiflui* (= *Dulces* Heim ex Sing.) as only acrid species of the group. It belongs probably in some at present ill-defined tropical section of *Lactarius*, probably sect. *Caperati* Heim, group *Gymnocarpi* from Africa. But none of the species from the Congo may be considered identical. The type of *L. echinatus* differs from our species or form in the context never changing to "avellaneous" when exposed, less distant lamellae, and shorter stipe. Also, the scrobiculate pileus and stipe are not mentioned by Thiers. On the other hand, the fungus seems to be quite variable and only a single collection from Texas and one from Mexico is available for comparison. At any rate the species described here is new for Mexico.

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