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CATATRAMA (TRICHOLOMATACEAE), A NEW GENUS FROM COSTA RICA

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ABSTRACT

Catatrama, a new genus in the Tricholomataceae, is described from Costa Rica. Its taxonomic position and its similarity to other genera are discussed. The combination of echinulate, cyanophilic and inamyloid basidiospores, subfree lamellae, and bilateral hymenophoral trama characterize this new genus and species.

Key Words: Tricholomataceae, *Catatrama*, *Ripartitella*, *Rhodotus*, Costa Rica

A very interesting white-spored agaric with a lepiotoid habit was collected on soil in a *Quercus pilarius* Trel. forest in southern Costa Rica. Macroscopically the fungus has the appearance of a *Lepiota* (*sensu lato*), but it possesses a combination of micromorphological features not previously described. The presence of echinulate, cyanophilic and inamyloid basidiospores, subfree lamellae and bilateral hymenophoral trama are unique in combination. Thus, it is necessary to erect a new genus to accommodate this fungus.

MATERIALS AND METHODS

Color designations within parentheses are from Kornerup and Wanscher (1983). Line drawings were made with the aid of a drawing tube. Nearly 30 measurements were made for calculating basidiospore size.

Material for SEM examination was prepared as follows: 1) Fragments of lamellae were rehydrated overnight in a 5% aqueous solution of Contrad 70 (Schmid and Turner, 1977). 2) Material was rinsed in distilled water to remove traces of the softening reagent prior to fixation with an osmium/thiocarbohydrazide/osmium bridging technique (modified from Kelley *et al.*, 1973): a) fixation in aqueous 2% OsO₄ for 1 h; b) distilled water washes; c) saturated, filtered aqueous thiocarbohydrazide for 30 min; d) thorough washing in distilled water; e) aqueous 2% OsO₄ for 1 h. 3) Material was rinsed in distilled, ice cold water and dehydrated in ethylene glycol monomethyl ether (4%) and ethanol (Feder and O'Brien, 1968). 4) Material was transferred from ethanol into two changes of hexamethyldisilazane (15 min each), and then air dried (Nation, 1983). 5) Fragments of lamellae were mounted

on aluminum stubs with double sticky tape, coated with gold, and observed in a JEOL 3300 SEM at 15 kV.

TAXONOMY

Catatrama costaricensis Franco-Molano, *gen. et sp. nov.* FIGS. 1–8

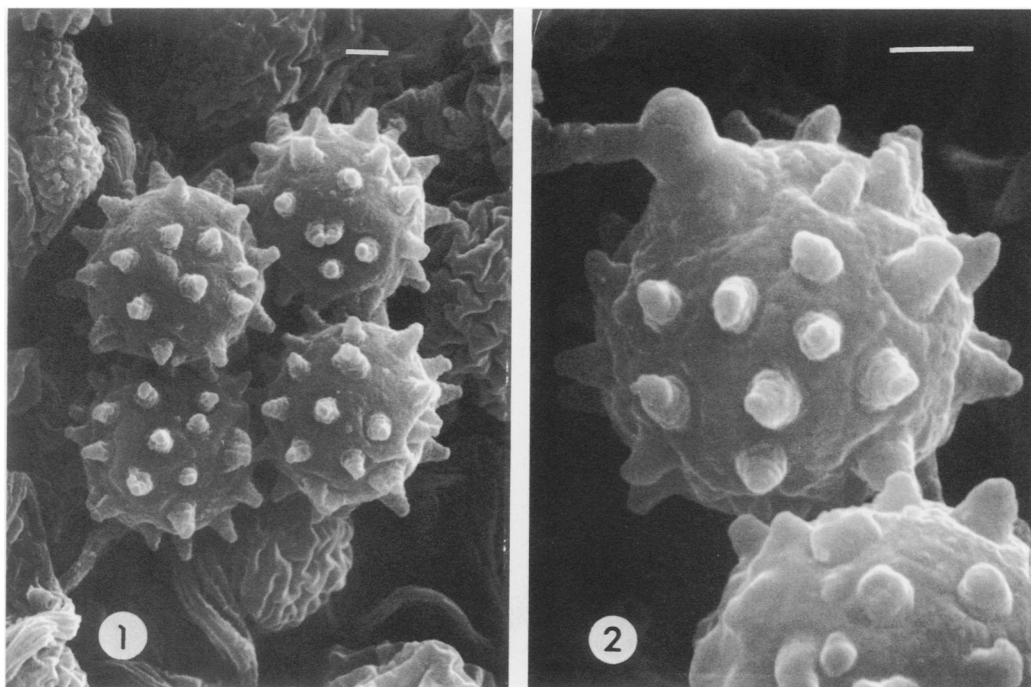
Familiae Tricholomatacearum *Ripartitellam* simulans sed tramae hymenophoralis forma sporisque echinatis diversum.

ETYMOLOGY: Cata (Greek), down; trama (Latin), web; the hyphae of the trama are oriented downward.

Pileus 4–7 cm diam, broadly convex to plane with a low broad umbo; surface dry, recurved squamulose with brown squamules (near 7D7) on a light brown ground color (7D5), appendiculate at the margin. Context 0.6 mm thick, white but soon brown (near 7D5). *Odor* sweet or like a bouquet of mixed fresh-cut flowers, then like grass. *Lamellae* ±0.5 cm broad, appearing free but barely attached, white; margin wavy, not marginate. *Stipe* 7–9 cm long, ±0.5 cm diam, equal, central, appressed squamulose at the apex and recurved squamulose below, concolorous with the pileus, squamules brown (7D7) on light brown ground (7D5) or a little paler above the annular zone. *Annulus* fibrillose, superior, forming an indistinct zone between the appressed and recurved squamulose areas, apparently formed from collapse of a peronate veil. *Interior* solid, shiny, pale orange (near 5A3). Dense white rhizomorphs at the base.

Spore deposit not obtained, but the basidiospores are near white in mass as seen at the apex of the stipe.

Basidiospores 4.4–7.2 × 4.4–7.2 μm, globose, rarely irregularly shaped, hyaline in KOH, cy-



FIGS. 1–2. Scanning electron micrographs, basidiospores of *Catatrama costaricensis* (Holotype). Scale lines = 1 μ m. (Photo by Donald Black, NYBG.)

anophilic, inamyloid in Melzer's, echinulate; spines up to 1.8 μ m high; germ pore absent. *Basidia* 30–40 $\times$ 10 μ m, clavate to narrowly clavate, bearing four sterigmata, without siderophilous granules. *Cystidia* absent. *Hymenophoral trama* divergent from a central mediostratum, inamyloid, not gelatinous; subhymenium parenchymatous, $\pm$ 12 μ m thick. *Pileipellis*, as seen in a tangential section, formed by perpendicular hyphae with parallel arrangement; hyphae broad (up to 27 μ m), short or long, septate or not, with round apices, frequently with short to long diverticula. *Trama of the pileus* inamyloid, solid, composed of densely interwoven hyphae. *Stiptipellis* below the annular zone similar to the cuticle of the pileus, at apex formed by smooth parallel hyphae, often with elements similar to the pileipellis. *Clamp connections* present in all tissues. Solitary on soil.

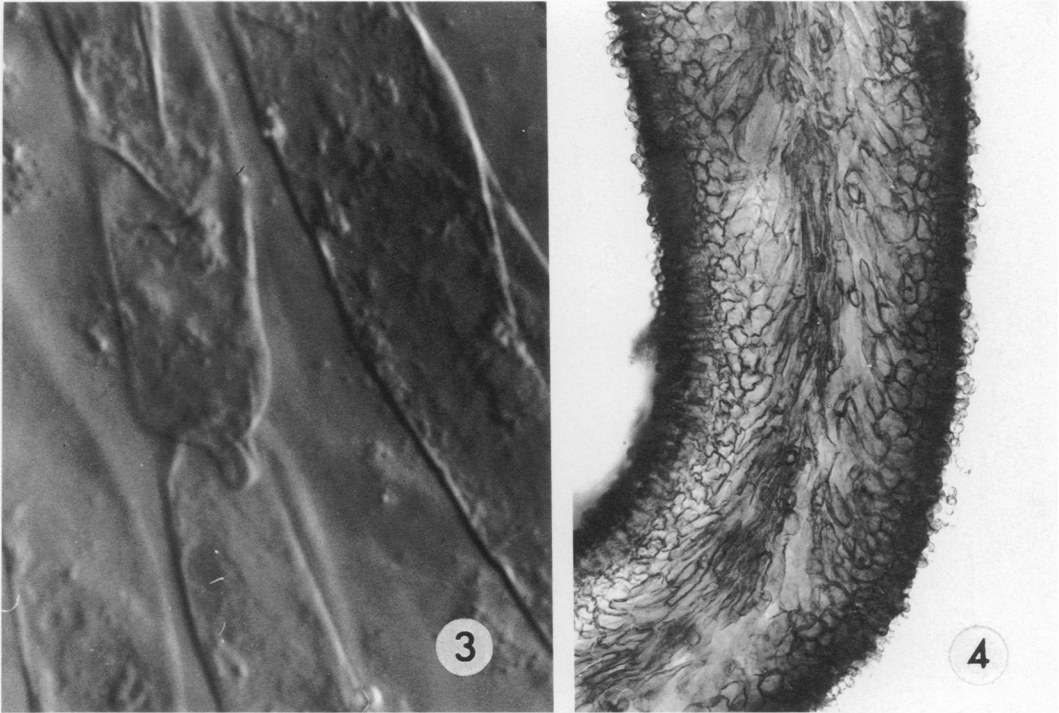
TYPE: Costa Rica. Prov. Puntarenas: Fincas Las Alturas, northwestern boundary with the buffer zone of Parque La Amistad, forest of *Quercus pilarius*, 1600–1700 m, 7 Nov 1989, Ana E. Franco-Molano and G. Mueller #299 (HOLOTYPE: CR). PARATYPES: same locality, 8 Nov 1989, Ana E. Franco-Molano and S. Dercole #304 (NY, DAOM 211663).

DISCUSSION

Although *Catatrama* is best placed in the Tricholomataceae, some of the macroscopic and microscopic features are shared with genera of Amanitaceae and Agaricaceae.

Catatrama shares some characters with *Rhodotus*. *Rhodotus*, like *Catatrama*, has clamp connections, inamyloid, cyanophilic, echinulate spores and lacks cystidia. However, *Rhodotus* differs from *Catatrama* in its gelatinous-reticulate pileus and lack of a veil, lack of a mediostratum in the bilateral hymenophoral trama, and the microscopic structure of the pileipellis. The suprapellis in *Rhodotus* is composed of pedicellate-vesiculose or ampullaceous bodies subtended by a gelatinized zone, and in *Catatrama* the pileipellis consists of a trichodermal layer. Additionally, *Rhodotus* is lignicolous while *Catatrama* is terrestrial. Furthermore, the electron micrograph of a carbon replica spore of *Rhodotus* shows an even spore wall with the spines not embedded in shallow depressions (Pegler and Young, 1971).

Although Singer (1986) states that no member of Tricholomataceae has the syndrome of bilat-



FIGS. 3–4. Microscopic features of *Catatrama costaricensis* (Franco-Molano 299, Holotype). 3. Clamp connection. 4. Hymenophoral trama.

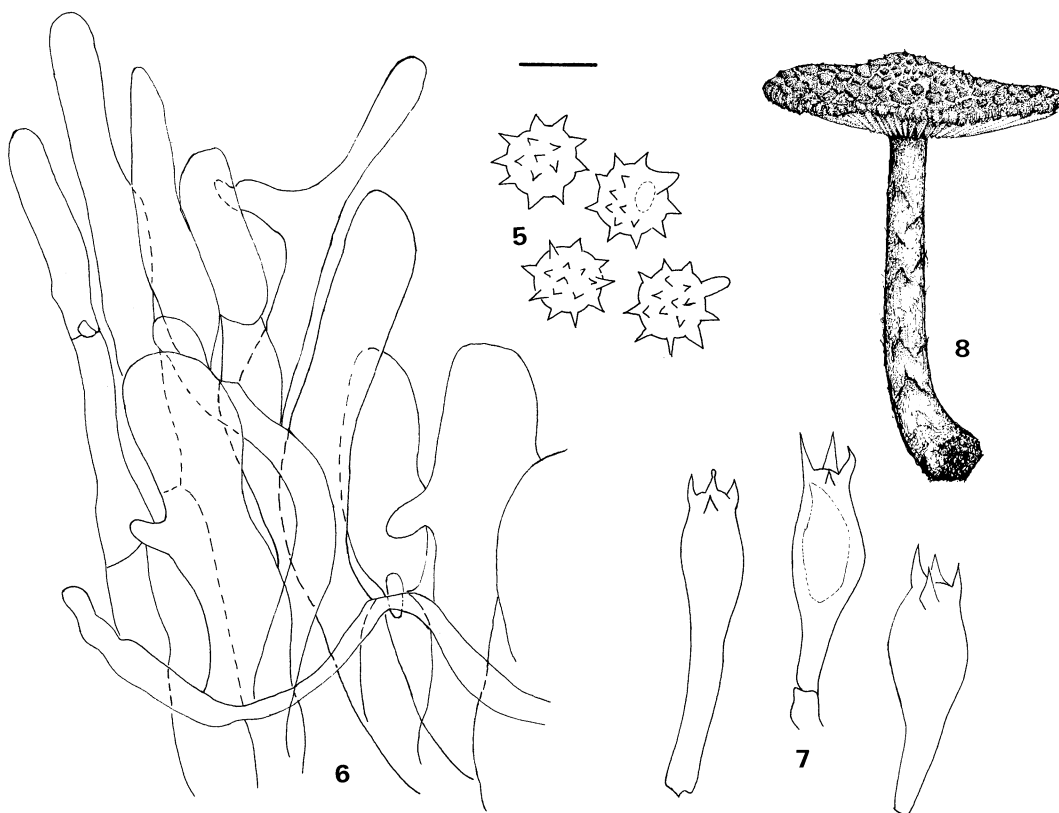
eral hymenophoral trama, inamyloid spores and free lamellae (features that characterize *Catatrama*), he places some genera with these features, in the Tricholomataceae, e.g., *Rhodotus*. Bas (1988) pointed out that none of the features characteristic of *Rhodotus*, including the bilateral hymenophoral trama, are good reasons to remove it from the family where it is placed by Singer.

Even though free to barely attached lamellae, and bilateral hymenophoral trama are features of the Amanitaceae, *Catatrama* is not placed in that family because of the presence of cyanophilic spores and the absence of the *Amanita*-structure (acrophysalides) in the trama of the pileus and stipe (Bas, 1969; Singer, 1986).

Because of the lepiotoid habit and pallid spores that are inamyloid, echinulate, cyanophilic, and lack a germ pore, *Catatrama* resembles *Ripartitella*. Under SEM examination (Figs. 1, 2), the spores of *Catatrama* show an overall rugulose surface with the ornamentation consisting of large conical spines with flattened to rounded apices, wholly or partially fused, less than 1 μm high, whose bases occupy shallow depressions. *Ripar-*

titella, on the other hand, lacks bilateral hymenophoral trama, has relatively even spore walls with crowded, narrow to broad, low tuberculate warts (Franco-Molano, unpubl. data), is lignicolous, and possesses hymenial cystidia. Although Pegler (1977, 1983) described *Ripartitella* as lacking pleurocystidia, the isotype and authentic material of *Marasmius squamosidiscus* Murr. [= *Ripartitella brasiliensis* (Speg.) Sing.] from Florida (NY) bears cystidia corresponding to those described by Singer (1946) and Ovrebo (1988).

Considering the features that *Catatrama* shares with *Ripartitella*, these two genera should belong in the same family. *Ripartitella* was assigned by Singer (1947) to the Agaricaceae tribe Cystodermateae because of the way in which the lamellae are attached to the stipe and because of the similarity of the cystidia of *Ripartitella* to those of *Cystoderma cinnabarinum* (Alb. & Schw.) Fayod. *Ripartitella*, according to Pegler (1977, 1983) and supported by Ovrebo (1988), belongs to the Tricholomataceae. Pegler indicated that *Ripartitella* should be placed in the Tricholomataceae



FIGS. 5–8. Habit and microscopic features of *Catastrama costaricensis* (Franco-Molano 299, Holotype). 5. Basidiospores. 6. Elements of pileus surface as seen in a tangential section. 7. Basidia. 8. Habit (approx. $\times 1/2$). Scale line = 5 μ m in 5; = 10 μ m in 6, 7. (Habit by Amy Melson.)

tribe Clitocybeae, near *Lepista* and *Ripartites*, based on the lack of any amyloid reaction, lack of an epithelium or sphaerocytes, attached lamellae, and the echinulate spores. However, *Ripartites* differs from *Ripartitella* in having a brown colored spore-print, strongly decurrent lamellae, and in lacking pileal squamules.

In support of Pegler's and Ovrebo's opinions, *Ripartitella* correctly belongs in Tricholomataceae, rather than Agaricaceae tribe Cystodermateae, because the pileus squamules are formed of repent hyphae which are trichodermal and not epithelial. Also, the spores are unreactive in Melzer's. Therefore, if *Catastrama* shares features with both *Rhodotus* and *Ripartitella*, which are considered members of the Tricholomataceae, then I refer *Catastrama* to that family.

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