

Lycoperdaceae of Costa Rica. I. The genus *Morganella*

by

María Isabel Morales*, Maryssia Nassar* and J. A. Saénz*

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ABSTRACT: Three species of *Morganella* are reported for Costa Rica: *M. fuliginea* (Berk. & Curt.) Kreisel & Dring, *M. velutina* (Berk. ex Mass.) Kreisel & Dring (first record for the country) and *M. costaricensis* Morales, new species.

Relatively little is known about the Lycoperdaceae of Costa Rica. Reports of collections are included by POLAKOWSKY (12), BOMMER & ROUSSEAU (1), GARNER (7), KREISEL and DRING (10) and PONCE DE LEÓN (13), but most mycologists who collected or studied this area have largely neglected the group.

We began a taxonomic study of Lycoperdaceae in 1964, the senior author being largely responsible for their identification. Of the twenty-two species that will be described in this series of papers, *Lycoperdon perlatum* Persoon was cited as *L. gemmatum* S. M. (12); *Morganella fuliginea* (Berk. & Curt.) Kreisel & Dring was reported not only under this name (10, 13), but also as *Lycoperdon epixylon* Berk. & Curt. (1) and *L. subincarnatum* Peck (7). We have been unable to collect two species previously reported for Costa Rica: *Bovista nigrescens* Persoon (1) and *Bovista acuminata* (Bosc.) Kreisel, cited as *Lycoperdon acuminatum* Bosc. (12). Nineteen species, including three new to science, are new records for the country.

Morganella Zeller emend. Kreisel & Dring

Fruiting bodies epigeous, seldom exceeding 3 cm major diameter, depressed-globose to pear-shaped; peridium double; exoperidium velutinous, furfureous, granular, verrucose or spinulose, flesh-colored or deep red-brown to purplish-black; endoperidium papery above, thickened below, flaccid, opening

* Departamento de Biología, Sección Botánica, Universidad de Costa Rica.

by an apical, irregularly torn mouth; subgleba compact or chambered (perhaps lacking in some poorly known species), without a diaphragm; mature gleba pulverulent, without a true capillitium, but with abundant paracapillitium, the threads of which are joined by hyaline, corrugated radiating membranes (glebal membranes) which sometimes form a pseudocolumella; spores globose to broadly ovoid, smooth, verruculose to spinose. Usually growing on dead wood.

ZELLER (16) established *Morganella* as monotypic: *M. mexicana*, based on the glebal membranes that are characteristic of the mature fruiting bodies of most species of this genus. KREISEL & DRING (10) segregated from *Lycoperdon* those species with paracapillitium but without diaphragm and included them in *Morganella*, thus emending the original description by Zeller. The term "paracapillitium" was introduced by KREISEL (8) to describe the hyaline filaments which are regularly septate and have not undergone the lysis that occurs in most of the gleba.

PONCE DE LEÓN (13) recognized nine species of *Morganella*, of which *M. fuliginea* (Berk. & Curt.) Kreisel & Dring has been reported from Costa Rica (10, 13).

MATERIAL AND METHODS

As no Costa Rican material of Lycoperdaceae was available at the Herbarium of the University of Costa Rica (UCR) and only a few collections were recorded at the National Herbarium (CR), most descriptions are based on samples collected by the authors. We also examined some samples of Lycoperdaceae from Costa Rica that were loaned by the Field Museum of Natural History, Chicago (F) and the Kew Botanic Gardens, England.

Gross morphological observations were made with a stereoscopic microscope, noting such characters as color, nature of peridial layers, presence and characteristics of the subgleba and diaphragm, and other similar features. Small portions of the fertile tissue were mounted in 2% KOH solution or in Amann's lactophenol with cotton blue for microscopic examination and measurements. A number of Gasteromycete treatments were consulted in the identification of genera and species. The most heavily relied upon, especially for description of most of the taxa were COKER & COUCH (2), CUNNINGHAM (3), SMITH (14), DENNIS (5), KREISEL (8, 9), DRING (6), ZELLER and SMITH (17), KREISEL and DRING (10) and DEMOULIN (4). Some of the original descriptions of the species have been modified according to personal observations of Costa Rican material.

The names of colors used throughout this work were taken from the comparison of Saccardo's and Ridgway's nomenclatures made by VILLALOBOS-DOMÍNGUEZ and VILLALOBOS (15); and when cited, they are followed by an "S" or an "R".

The material described in this series was deposited at the Herbarium of the University of Costa Rica (UCR).

KEY TO THE COSTA RICAN SPECIES OF *MORGANELLA*

- A. Spores smooth *M. costaricensis*
 AA. Spores ornamented
 B. Exoperidium velvety, consisting mainly of setose cells. *M. velutina*
 BB. Exoperidium consisting of chains of almost rectangular cells, often with a lateral outgrowth resembling a clamp connection *M. fuliginea*

Morganella velutina (Berk. ex Mass.) Kreisel & Dring

Fructing bodies up to 2.7 cm diameter, lignicolous, gregarious or cespitose, depressed globose to pulvinate and sometimes with an umbo. Exoperidium persistent, mahogany color shading to tan below when fresh, Mars brown, Dresden brown or Bister, shading to pale bittersweet pink (R) when dry, densely velutinous, slightly rough to the touch, consisting of setose hyphae mixed with occasional chains of approximately isodiametric cells. The setose hyphae are of two kinds: some irregularly club-shaped, 100 μ long and some slender, about twice as long and tangled at their apices. Endoperidium smooth, or with a few basal wrinkles on drying, clay color to wood brown, very thin; gleba tawny olive, Isabella or Verona brown (R); pseudocolumella small and flattened, very well marked in some specimens; spores globose, light yellow with a DeBary bubble, delicately to strongly spinulose, the spines projecting from a hyaline envelope, (3.15) 3.85-5.5 (6.3) μ diameter including spines; subgleba tan, compact.

SPECIMENS EXAMINED. CARTAGO: Sobre troncos y restos de materia orgánica, km 80, Carretera Panamericana Sur, José A. Sáenz (JAS & MNC 1050) 23/10/70. HEREDIA: Sobre materia orgánica. La Virgen, Sarapiquí, colector? (MIM 15), 1/5/64. Sobre suelo y madera, Las Chorreras, José A. Sáenz (MIM 212), 16/7/66.

DISCUSSION: The exoperidial structure distinguishes this from all other species of *Morganella*. In Costa Rican material exoperidial setae range from 70 μ to over 200 μ .

Morganella fuliginea (Berk. et Curt.) Kreisel & Dring

Fructifications up to 2.2 cm, gregarious or cespitose, on wood or on soil rich in organic matter, subglobose, seated on a white cord mycelium. Exoperidium falling at maturity, brown (Verona brown or brownish drab to mummy brown, (R) or reddish (Etruscan red, R) in the apex, shading to ochraceous salmon (R) at the base, consisting of clusters of minute spines which are composed of chains of almost isodiametric cells, often with a lateral outgrowth resembling a clamp connection. Endoperidium tawny-ochraceous or pale bittersweet pink (R), smooth, thin, papery, dehiscent by an irregular apical rupture. Sterile base compact, very small or almost lacking. Gleba olive buff or avellaneous to antique brown (R) at maturity. Spores globose, 3.85-5.5 (6.05) μ diameter, light yellowish brown with a DeBary bubble, with spines projecting from a thin hyaline envelope.

SPECIMENS EXAMINED. **HEREDIA:** Sobre madera, bosque de *Cupressus lusitanica* var. *Benthamii*, La Uvita, María Isabel Morales y Luis D. Gómez (MIM 172), 19/5/66. Sobre madera, Finca La Selva, Sarapiquí, José A. Vargas (MIM 198), 9/6/66. En un árbol, Finca La Selva, Sarapiquí, Dr. L. Holdridge y María Isabel Morales (MIM 199), 9/6/66. En un tronco, Finca La Selva, Sarapiquí, José A. Vargas y E. Solís (JAS & MNC 1075), 10/6/66. On rotting wood, Bosque de la Hoja, 1700 m, Luis D. Gómez 3107 (F), 7/17/69 (as *M. velutina*). On a log, San José de la Montaña, Josefa Vargas (MIM 344), 11/11/71. **PUNTARENAS:** Sobre madera y tierra, Golfito, José A. Sáenz (MIM 131) 17/11/65. **SAN JOSÉ:** En suelo, El Empalme, José A. Sáenz y María Isabel Morales (MIM 157), 17/5/66. Sobre un tronco lleno de briófitos, La Palma, camino a Carrillo, 1500-1550 m, Luis D. Gómez (MIM 235), 6/5/67. Sobre briófitos a la orilla de un riachuelo, Charcalillos de Puriscal, M. Boza (MIM 584), 11/6/67. En suelo con trozos de madera, El Empalme, Maryssia N. de Cortez (MIM 401), 19/4/72. Sobre un tronco con briófitos, 2 km antes de Londres, Pico Blanco, 1700-1800 m, Luis D. Gómez 3468, 9/10/72. Sobre madera, La Cima, Santa María, R. A. Ocampo (sin número), 27/10/72. Sobre madera, Tablazo, 1750 m, R. A. Ocampo 223, 12/72.

DISCUSSION: *Morganella fuliginea* is a common species in the country, easily distinguished by the kind of exoperidium, consisting of minute spines, each formed by clusters of hyphae composed of chains of almost isodiametric cells often with a lateral outgrowth resembling a clamp connection.

We have examined the collections by Gómez (3107, 3108, 3135) from the Field Museum of Natural History, originally classified as *M. velutina*. We agree with PONCE DE LEÓN (13) in classifying them as *M. fuliginea*.

Morganella costaricensis Morales, sp. nov.

(Figs. 1-5)

Fructificatio usque 2 cm diametro, subglobosa vel pyriformis, supra depressa, infra brevissime stipitata. Exoperidium spinis fusco-olivaceis subpyramidalibus usque 1 mm longis, ad basim liberis, apicem versus conniventibus, infra fructificationem pallidiores sparsioresque sed magis persistentes. Spinae in genere inter majores, cellularum pluribus stratis more *M. subincarnatae* cellulis catenatis irregularibus constantes. Endoperidium ochraceum post exoperidii lapsus reticulo-areolatum, irregulari orificio dehiscens. Subgleba cellularis in stipite sita; gleba ochracea; pseudocolumella inconspicua. Sporae laeves, late ovatae, mucronatae, 3.5-4.5 μ diametientes.

Fruiting bodies up to 2 cm diameter, subglobose or pyriform, depressed above and compressed below into a short stem-like base. Exoperidium of subpyramidal olive-brown spines up to 1 mm long, separate at the base and connivent at the apex, less compact and lighter in color but more persistent towards the base of the fructification. Spines several layers of cells thick, consisting of chains of somewhat irregular cells, very much like those of *M. subincarnata*. Endoperidium ochre yellow, reticulate-areolate after shedding of the exoperidium,

dehiscent by an irregular opening; subgleba cellular, occupying the stem-like base. Gleba pale ochraceous; pseudocolumella inconspicuous. Spores smooth, slightly ovate, mucronate, 3.5-4.5 μ diameter.

TYPE. SAN JOSÉ: Sobre madera, Cerro de la Muerte, 3338 m. José A. Sáenz (MIM 8), 16/10/64 (deposited at UCR).

DISCUSSION: *Morganella costaricensis* belongs to the Subincarnata section (13). It is very close to *M. compacta* (Cunn.) Kreisel & Dring, having the same kind of exoperidium and a similar reticulate-areolate endoperidium. However, *M. costaricensis* has smooth and slightly ovate spores, while *M. compacta* shows the "episore olivaceous, closely and finely verrucose" (3). The type of spores relates *M. costaricensis* to *M. stercoraria* Ponce, from which it differs because of its reticulate-areolate endoperidium, lignicolous habitat and slightly larger spores.

RESUMEN

Tres especies de *Morganella* se describen para Costa Rica: *M. fuliginea* (Berk. & Curt.) Kreisel & Dring, *M. uelutina* (Berk. ex Mass.) Kreisel & Dring, nueva para el país, y *M. costaricensis* Morales, especie nueva.

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Figs. 1 - 5 *Morganella costaricensis* Morales sp. nov.

Fig. 1. Fruiting bodies; endoperidium exposed above.

Fig. 2. Spine clusters of the exoperidium.

Fig. 3. Endoperidium showing reticulated surface.

Fig. 4. Low-power view of cells of exoperidial spines and spores.

Fig. 5. High-power view of cells of exoperidial spines and spores.

