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Elotespora, an enigmatic anamorphic fungus from Tabasco, Mexico

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Abstract — *Elotespora mexicana* anam. gen. & sp. nov., found on decaying wood of an unidentified plant, is described and illustrated. It is distinguished by minute, scattered, cupulate conidiomata in which a single, large, muriform, elongate ellipsoid to cylindrical brown conidium is produced. The conidial development of this fungus is unclear.

Key words — tropical rainforest, systematics, conidial fungi

Introduction

During an expedition in 2003 through the protected areas of Tabasco State, Mexico, several interesting and uncommon microfungi were encountered. A conspicuous and enigmatic fungus, collected on decaying wood, is the topic of the present paper.

Materials and methods

Individual collections were placed in paper bags and taken to the laboratory incubated at 25º C in Petri dishes placed in a moist chamber composed of plastic containers (50 L capacity) with 200 ml of sterile water plus 2 ml of glycerol, and examined at regular intervals for the presence of microfungi. Mounts were prepared in polyvinyl alcohol-glycerol (8.0 g in 100 ml of water, plus 5 ml of glycerol) and measurements made at a magnification of × 1000. Micrographs were obtained with a Zeiss Axioskop 40 microscope, Leitz Dialux 20 EB microscope and a Jeol JSM-6400 scanning electron microscope using the techniques described previously by Figueras & Guarro (1988). The fungus was isolated into pure culture by placing conidia on the surface of corn meal agar plus carrot extract (Castañeda et al. 2005).

Results

Sterile hyphae grew in culture but after two weeks growth ceased and the culture died. The following description of the fungus is derived entirely from the original material on its natural substratum.

Taxonomy

Elotespora R.F. Castañeda & Heredia, **anam. gen. nov.**

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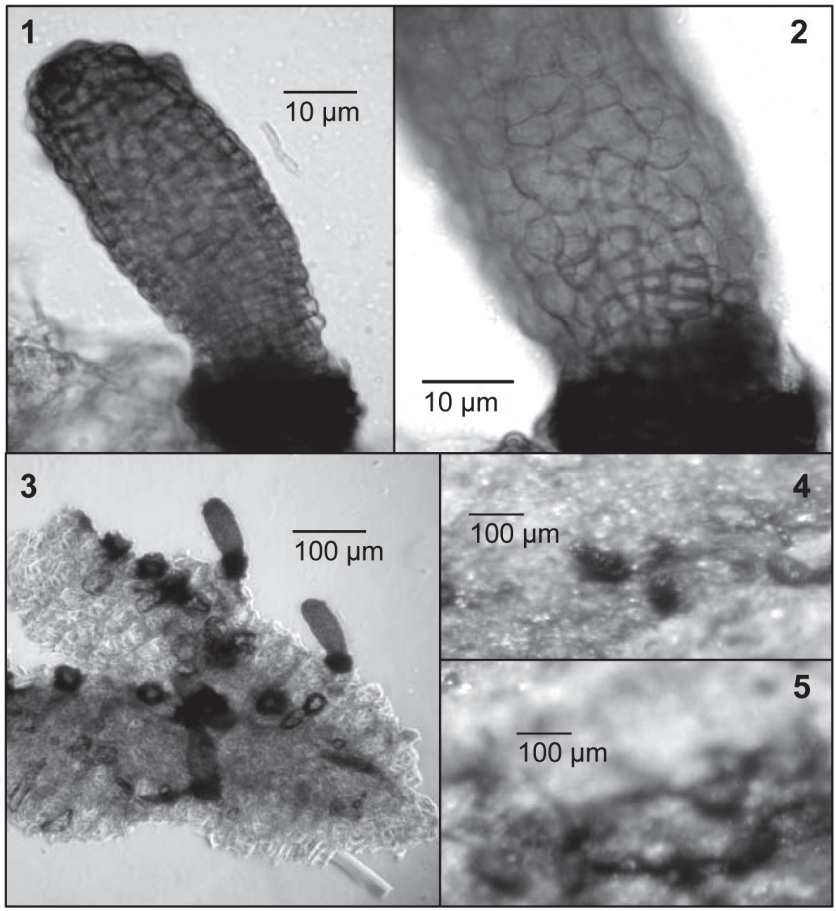
Fungus anamorphicus. Conidiomata in substrato naturali superficialia vel leviter immersa, stromatica, unilocularia, dissita, nidulantia, concava usque ad cupulata vel irregularia, brunnea vel atrobrunnea usque ad nigra, cum pariete ex cellulis texturae modo angularis composita; singulari quaeque singulo conidio praedita. Conidiophora non visa. Cellulae conidiogenae non visae. Conidiogenesis obscura, probabiliter holoblastica et monoblastica, probabiliter discreta, cum secessione fortasse schizolytica vel fortuitus rhexolytica. Conidia solitaria, muriformia, brunnea vel atrobrunnea, sicca, fusiformia, ovalia vel ellipsoidea vel cylindrica usque ad obovata, levia vel verrucosa. Teleomorphosis ignota.

Etymology: Nahua tongue, *elote-*, meaning ear of corn; Latin, *-spora*, referring to the conidia.

Species typica: *Elotespora mexicana* R.F. Castañeda & Heredia

Anamorphic fungi. Conidiomata on the natural substrate superficial or somewhat immersed, stromatic, unilocular, scattered, cyathiform, concave, cupulate to irregular, brown, dark brown to black. Conidiophores absent. Conidiogenous cells not observed. Conidiogenesis obscure, probably holoblastic, monoblastic, discrete and conidial secession probably, fortuitously rhexolytic. Conidia solitary, muriform, brown or dark brown, fusiform, oval, ellipsoid, cylindrical to obovate, smooth or verruculose, dry. Teleomorph unknown.

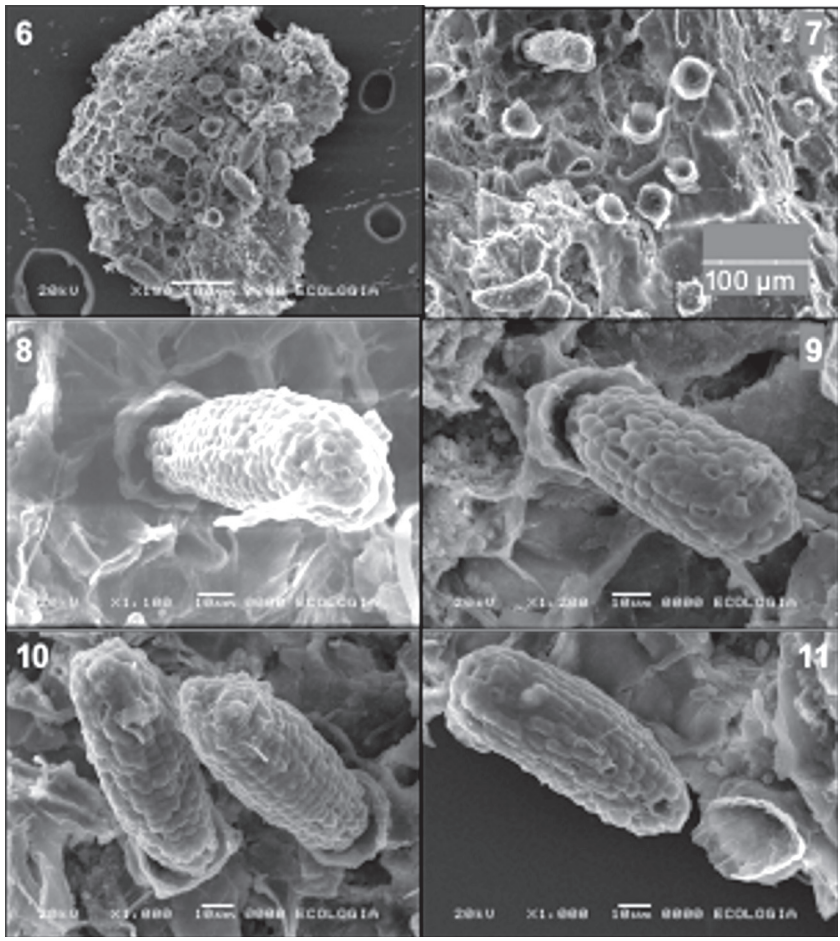


Figs. 1–5. *Elotespora mexicana*, from holotype (XAL CB883). Figs. 1–3. Conidiomata and conidia. Figs. 4–5. Conidiomata on the substratum. Scale is indicated by bars.

Elotespora mexicana R.F. Castañeda & Heredia, **anam. sp. nov.**

MycoBank MB 514127 Figs. 1–14

Mycelium plerumque in substrato immersum. Conidiomata in substrato naturali superficialia vel leviter immersa, stromatica, unilocularia, dissita, nidulantia, concava ad usque cupulata vel irregularia, brunnea vel atrobrunnea usque ad nigra, 26–40 µm diam, 13–16 µm profunda, cum pariete ex cellulis uniseriate dispositis texturae modo angularis composita, sed bi- vel triseriate infra. Conidiophora non visa. Cellulae conidiogenae non visae, sed ad centrum in parte interna conidiomatis fortasse dispositae. Conidiogenesis obscura, probabiliter holoblastica et monoblastica, probabiliter discreta, cum secessione fortasse schizolytica vel. fortuitus rhexolytica. Conidia solitaria, muriformia, brunnea vel atrobrunnea, sicca, fusiformia, ovalia vel ellipsoidea vel cylindrica usque ad obovata, levia



Figs. 6–11. *Elotespora mexicana*, photographs (SEM) from holotype (XAL CB883) Scale is indicated by bars.

vel verrucosa, interdum leviter curvata, 95–105 × 36–42 µm, truncata ad basim, obtusa ad apicem. Teleomorphosis ignota.

Type: **MEXICO. Tabasco,** La Venta, on decaying wood of an unidentified plant, 18.II.2004. G. Heredia (**HOLOTYPE**: XAL CB883).

Etymology: Latin, *mexicana*, in reference to Mexico.

Mycelium mostly immersed. Conidiomata unilocular, scattered, superficial or somewhat immersed, cyathiform, concave to cupulate, eustromatic, dark brown to black, 26–40 µm diam., 13–16 µm deep, composed of a series or layer of cells

forming a textura angularis, with 2–3 layers in the lower part. Conidiophores not observed. Conidiogenous cells not observed. Conidiogenesis earlier stages not observed, but each conidium clearly produced from the lowest region inside the conidiomatal "cup" and, on the basis of observations with the scanning electron microscope, not attached at any point to the "cup" side walls. Conidial secession not observed but seceded conidia sometimes with part of the lowest portion of the conidial "cup" still attached. Conidia with a remarkable visual similarity to the cob of a maize plant, solitary, brown, dry, muriform, 95–105 × 36–42 µm, elongate ellipsoid, cylindrical to obovate, sometimes slightly curved, truncate at the base, obtuse or rounded at the apex. Teleomorph not observed.

Discussion

This beautiful fungus is astonishing because apparently only one conidium is produced in each conidioma and the spore is larger than the conidioma itself. It was not possible to elucidate the events of conidiogenesis in this fungus, particularly the earliest stages of development, as all attached conidia in the specimen were already multicellular and brown, an indication that much of the process of conidiogenesis had already occurred. It is not even clear whether each conidium is the product of a single conidiogenous cell, or of several cells acting in concert rather like a meristem. It seems likely that, in either case, the initiation of each conidium is probably holoblastic. Enteroblastic development is usually associated with systems producing large numbers of conidia, a strategy clearly not adopted by the present fungus.

The fact that part of the conidioma is sometimes seen still attached to the base of seceded conidia suggests that conidial secession is not through the simple schizolytic separation of a single two-ply septum. Like enteroblastic proliferation, schizolytic secession is particularly advantageous where many spores are produced from the same fertile cell. In the present fungus, where only one spore is produced from the conidioma, it seems likely that there has been no selective advantage to develop or maintain a system of schizolytic secession. Unpredictable conidial secession by fracture at a random point on the conidiophore is known from other fungi with conidiogenous development resulting in a single complex spore, for example *Slimacomyces* Minter.

Although there are many anamorphic fungi that produce muriform spores, almost all are hyphomycetous. Very few have acervular, pycnidial, or sporodochial conidiomata. Most of the superficially similar fungi produce their conidia through well established patterns of conidial development.

Camarosporellum Tassi, *Camarosporium* Schulzer, and *Scolecosporiella* Petr. all form well-defined ostiolate pycnidia. Although conidiogenous cells of *Camarosporellum* and *Scolecosporiella* apparently each produce a solitary

conidium, unlike *E. mexicana* there are many conidiogenous cells within each conidioma and the conidiogenous cells themselves can be easily observed. In the case of *Camarosporium* conidiogenous cells proliferate enteroblastically with or sometimes without elongation, and thereby each produce several muriform spores. In passing, *Scolecosporiella* is a particularly interesting fungus; given that teleomorphs are known in the *Pleosporales*, the *Alternaria*-like muriform conidia inside a *Phoma*-like pycnidium suggest some rather plastic truncation of two synanamorphs into one.

Dichomera Cooke, *Camarosporula* Petr. and *Myxocyclus* Riess all produce stromatic conidiomata. Those of *Dichomera* are enclosed and ostiolate; those of *Camarosporula* and *Myxocyclus* are acervular. All three produce many conidiogenous cells within each conidioma, and in all three, the conidiogenous cells can be readily observed. Conidiogenous cells of *Camarosporula* and *Myxocyclus* typically each produce a single spore, while those of *Dichomera* may occasionally proliferate percurrently with some elongation to produce "annellides".

Some hyphomycetous fungi have micronematous or semi-macronematous conidiophores which produce muriform conidia, and some of these are produced from sporodochia with or without a rudimentary stroma. These include *Berkleasmium* Zobel, *Canalisporium* Nawawi & Kuthub., *Coleodictyospora* Charles, *Hermatomyces* Speg., *Monodictys* S. Hughes, *Oncopodiella* G. Arnaud ex Rifai, *Oncopodium* Sacc., and *Pithomyces* Berk. & Broome. None of them has the distinct cupulate structure of the present fungus.

In *Zelosatchmopsis sacciformis* (R.F. Castañeda) Nag Raj & R.F. Castañeda (Saikawa et al. 1991) the initiation of conidia was described as holoblastic by apical wall-building in the first conidium and by replacement wall-building in subsequent conidia; maturation occurred by moderate diffuse wall-building asynchronously with ontogeny; conidium delimitation occurred by a double septum; secession was schizolytic. All information was obtained from a pure culture of *Z. sacciformis* (Saikawa et al. 1991). *Colemaniella ossoorii* Agnihothr. (Ellis 1976), also superficially similar to the present fungus, has superficial mycelium and globose to irregular hyphopodia on the hyphae; individual conidiogenous cells are cyathiform, striate and disposed on short branches; events of conidiogenesis are not clear. According to Ellis (1976), *C. ossoorii* is "considered by the author of the genus to be monotretic although this is difficult to establish with certainty."

Conclusion

Although many developmental aspects remain to be elucidated, it is evident that the current organism is remarkable and, apparently, unique among anamorphic fungi. No other conidial fungus known to us is at all similar to it in terms of the

general form of its conidiomata and its highly distinctive cob-shaped conidia. We conclude that this fungus represents a new species in a new genus. These are now formally described.

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