



## Two new genera and twelve new species of Graphidaceae from Puerto Rico: a case for higher endemism of lichenized fungi in islands of the Caribbean?

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### Abstract

Two new genera and twelve new species of Graphidaceae are described from Puerto Rico. The two new genera, *Borinquenotrema* and *Paratopeliopsis*, are based on a combination of molecular sequence data and phenotype characters. *Borinquenotrema*, with the single new species *B. soredicarpum*, features rounded ascomata developing beneath and persistently covered with soralia and with an internal anatomy reminiscent of *Carbacanthographis*; it is close to the tribe Ocellularieae. *Paratopeliopsis*, including the single new species *P. caraibica*, resembles a miniature *Topeliopsis* but differs in the distinctly farinose thallus and the small, brown ascospores; it is not closely related to the latter genus but belongs in tribe Thelotremateae. The other ten new species belong in the genera *Acanthotrema*, *Clandestinotrema*, *Compositrema*, *Fissurina*, *Ocellularia*, and *Thalloloma*. *Acanthotrema alboisidiatum* is closely related to *A. brasilianum* but differs in the short, white isidia resembling insect eggs. *Clandestinotrema portoricense* has a unique ascospore type with a longitudinal septum only in the proximal cell. *Compositrema borinquense* resembles a species of *Stegobolus* but belongs in *Compositrema* based on sequence data, and is characterized by ascomata with a unique columella composed of thick, irregularly radiating strands. The second new species in this genus, *C. isidiofarinosum*, differs by its ecorticate, farinose thallus with scattered, corticate isidia and by its small ascomata with inconspicuous columella. The three new species of *Fissurina* all have 3-septate ascospores and are otherwise characterized by an isidiate thallus and stellate, orange-yellow lirellae (*F. aurantiacostellata*), a verrucose thallus strongly encrusted with calcium oxalate crystals and white, irregularly branched lirellae (*F. crystallifera*), and myriotremoid ascomata arranged in short lines (*F. monilifera*). *Ocellularia portoricensis* belongs in the core group of *Ocellularia* and differs from *O. cavata* in the white medulla and the larger ascospores becoming brown, whereas *O. vulcanisorediata* produces prominent soralia and immersed ascomata with apically carbonized excipulum and columella and small, transversely septate, hyaline ascospores; it is closely related to *O. conformalis*. Finally, *Thalloloma rubromarginatum* resembles *T. haemographum* in the brownish lirellae with bright red margin but differs from that and other species in the corticate thallus and the norstictic acid chemistry. The new combination *Ampliotrema rimosum* (Hale) Mercado-Díaz, Lücking & Parnmen is also proposed. Considering the current biodiversity knowledge on this family, the high level of endemism observed in other groups of organisms in the island, and the relatively high number of Graphidaceae described, it is highly likely that at least some of these new taxa are endemic to the island. This view is further supported by the unique features of several of the new species, representing novel characters in the corresponding genera.

**Keywords:** Caribbean, conservation

### Introduction

Considering its relatively small size (8,900 km<sup>2</sup>), the Caribbean island of Puerto Rico is among the biologically richest islands of the world. For instance, Puerto Rico harbors about 2,255 native species of vascular plants, compared to 1,300 species in the Hawaiian Islands (Santiago-Valentín 2008; Imada 2012). Amphibian diversity per

**Remarks:**—*Thalloloma rubromarginatum* is unusual in the genus in producing norstictic acid as secondary substance and having a distinct cortex. In other characters, the new species resembles *T. haemographum* (Nyl.) Staiger (2002: 435), which also has brownish discs with bright red margins and muriform ascospores but, apart from the lack of other secondary substances and the ecorticate thallus, also has larger ascospores (20–30 µm long).

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