



## New higher taxa in the lichen family Graphidaceae (lichenized Ascomycota: Ostropales) based on a three-gene skeleton phylogeny

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### Abstract

We provide an updated skeleton phylogeny of the lichenized family Graphidaceae (excluding subfamily Gomphilloideae), based on three loci (mtSSU, nuLSU, *RPB2*), to elucidate the position of four new genera, *Aggregatorygma*, *Borinquenotrema*, *Corticorygma*, and *Paratopeliopsis*, as well as the placement of the enigmatic species *Diorygma erythrellum*, *Fissurina monilifera*, and *Redingeria desseiniana*. Based on the resulting topology, in addition to three tribes described previously, we recognize four further tribes in the subfamily Graphidoideae: *Acanthothecieae* Lumbsch, Kraichak & Lücking, *Diploschisteae* (Zahlbr.) Lumbsch, Kraichak & Lücking, *Leptotremateae* Lumbsch, Kraichak & Lücking, and *Wirthiotremateae* Lumbsch, Kraichak & Lücking. The phylogenetic position of *Aggregatorygma* and *Borinquenotrema* was not resolved with support, whereas *Corticorygma* forms part of *Acanthothecieae*, supported sister to *Acanthothecis*, and *Paratopeliopsis* belongs in *Thelotremateae*, unsupported sister to *Leucodecton*. *Diorygma erythrellum* is confirmed as a member of the *Diorygma-Thalloloma* clade, while *Fissurina monilifera*, in spite of its myriotremoid ascomata, belongs in *Fissurina* s.str. *Redingeria desseiniana*, although resembling the genus *Phaeographopsis*, is supported sister to *R. glaucoglyphica*. *Topeliopsis darlingtonii* forms the sister group to *Gintarasia megalophthalma*. Consequently, *T. darlingtonii* and the closely related *T. elixii* are recombined in *Gintarasia* as *Gintarasia darlingtonii* (Frisch & Kalb) Lumbsch, Kraichak & Lücking, and *G. elixii* (Frisch & Kalb) Lumbsch, Kraichak & Lücking.

**Key words:** Brazil, classification, Diploschistaceae, Puerto Rico, *Xalocoa*.

### Introduction

The lichenized fungal family Graphidaceae now includes the previously separated families Graphidaceae, Thelotremataceae, Gomphillaceae, and Solorinellaceae (Rivas Plata *et al.* 2012a). Molecular data support four distinct clades within the emended family, classified as subfamilies Fissurinoideae, Gomphilloideae, Graphidoideae, and Redonographoideae (Rivas Plata *et al.* 2012a; Lücking *et al.* 2013). These do not correspond to

tribe as a whole, but tendencies to have an internal anatomy, ascospores, and chemistry similar to tribe Thelotremateae are apparent. Most of the genera included in this tribe were previously assigned to tribe Thelotremateae s.lat., but further analyses showed that they are not closely related (Lücking *et al.* 2013; Rivas Plata *et al.* 2013).

Generic delimitation in this tribe, including resurrection of the genus *Asteristion*, is currently under revision and will be dealt with in a forthcoming publication.

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