

## RESOLVING SPECIES IN THE *GROSMANNIA SERPENS* COMPLEX.

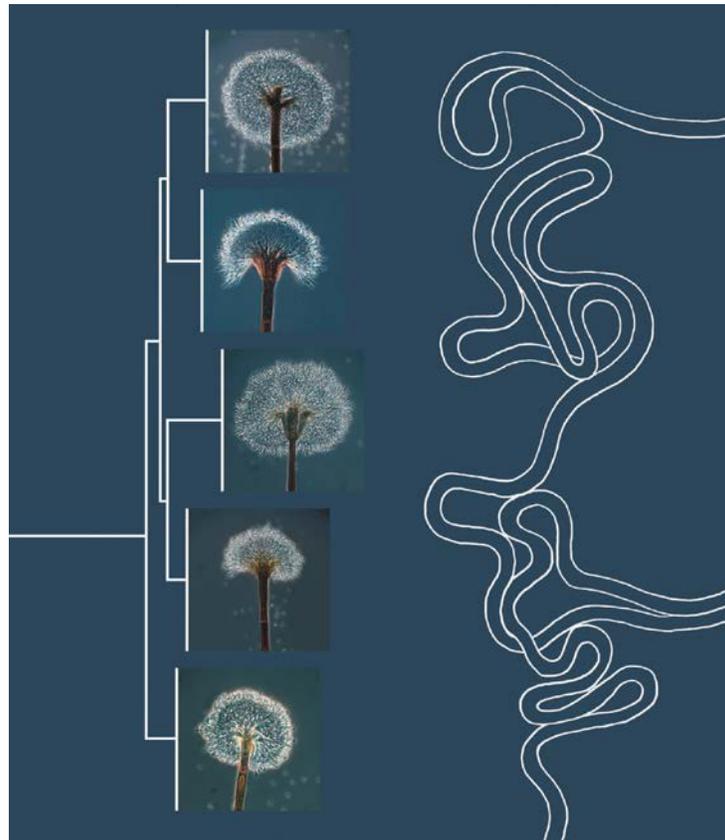
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The term “species complex” was coined to describe a group of closely related species. Species that belong to a species complex are often referred as cryptic species, which means they cannot be distinguished from each other based on morphological differences. Because of this, molecular characters such as DNA sequences are often used to differentiate species in a complex. One of the most popular methods dealing with this type of data is through molecular phylogenetic analyses (a method that enables researchers to study the relationship among organisms based on molecular characters such as DNA sequences). Analyses of DNA sequence data using phylogenetic methods have led to the discovery of several species in the *Grosmannia serpens* complex.

*Grosmannia serpens* was first described in 1936 as a fungal species causing root disease of pine in Italy. Since then, isolates of this species have been recorded in South Africa, USA, France, UK, Portugal, Spain, the Dominican Republic and Japan. The many reports of *G. serpens* and *G. serpens*-like isolates and their association with a wide variety of hosts and insects has raised questions regarding their identity. Therefore, we reconsidered the identity of a global collection of *G. serpens* isolates based on a molecular phylogenetic study conducted at the Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria.

Phylogenetic analyses of sequences from five different DNA regions (including the ribosomal DNA (ITS2-LSU), actin, beta-tubulin, calmodulin and translation elongation factor-1 alpha gene regions) revealed that these morphologically similar isolates represent a complex of five cryptic species. *Grosmannia serpens* was redefined and comprises isolates from Italy. The second species, *Grosmannia alacris*, includes isolates from South Africa, USA, France, Portugal and some from Spain. The remaining three species were named *Leptographium gibbsii* (representing isolates from the UK), *Leptographium yamaokae* (representing isolates from Japan) and *Leptographium castellanum* (representing isolates from Spain and the Dominican Republic). Of these five species, *G. serpens* has been associated with a root disease of pine in Italy and *G. alacris* has been reported to contribute to pine-root disease in South Africa and the USA.

The results of this work laid the foundation for a better understanding of the biology, population biology and pathogenicity of these species. The global distribution of *G. alacris* raises questions regarding the diversity and movement of this species. We will focus on resolving these questions in our future research.



An illustration of a four-gene phylogeny differentiating five cryptic species in the *Grosmannia serpens* complex. All the species produce serpentine hyphae in culture (illustrated on the right), a character unique to this species complex. This picture was featured as the cover in the May-June 2012 issue of *Mycologia* - the official bimonthly publication of the Mycological Society of America.

#### **Related article**

Duong TA, De Beer ZW, Wingfield BD, Wingfield MJ, 2012. Phylogeny and taxonomy of species in the *Grosmannia serpens* complex. *Mycologia* **104**, 715-732.