

***Protea*-associated ophiostomatoid fungi in focus**



The Stellenbosch-based core CTHB team members, Leanne Dreyer and Francois Roets, have declared 2015 the year in which to delve deeper into the complexities of the *Protea*-associated ophiostomatoid fungi. During Francois' PhD he shed much light on the diversity, ecology and complex interactions of the organisms associated within this complex ecosystem. But, for every question answered, as host of new ones emerged....the joy of science! Obvious aspects that needed further study were to document the diversity and ecological role of mites in this system, and to explore the possibility that, in addition to beetles, birds may also vector spore-carrying mites through the system. These are all questions currently being explored by Natalie Theron, whose Ph.D thesis should be completed by December 2015. The evolution and population genetic structure of the ophiostomatoid fungi utilizing this specialized niche remained poorly understood, until Janneke Aylward completed an outstanding M.Sc. thesis on the population genetics of *Knoxdaviesia proteae* on *Protea repens* hosts in 2014. Her results were surprising, as it revealed the genetic diversity of this fungus to be panmictic over extended geographical ranges. She has subsequently taken this work further, and is currently in her second year of a Ph.D thesis. Thus far, the genomes of *K. proteae* and the closely related *K. capensis* have been sequenced through this study and will be used, amongst other things, to further investigate the biology of *Knoxdaviesia* species in the unique ecological niche of *Protea* seed cones.



Natalie Theron

We welcomed three new girls into our laboratory in 2015, Tessa Laas and Lelani Smith both pursuing B.Sc. Hons. degrees, while Nombuso Ngabane enrolled for an M.Sc. Tessa and Lelani will work on *K. capensis*, the other *Knoxdaviesia* species associated with *Protea* infructescences in the Cape Floristic Region (CFR). Unlike *K. proteae* that is near host specific on *Protea repens*, *K. capensis* has been isolated from many different host species throughout the CFR. They will work together on developing polymorphic microsatellite markers from the recently sequenced *K. capensis* genome and apply these markers to two different research questions. Tessa will explore the genetic diversity of this fungus from *Protea coronata* populations across the extended range of this host species, and will compare the genetic diversity of *K. capensis* on this host to the panmictic diversity Janneke found in the closely related species of this fungus. Lelani, in turn, will use the microsatellite markers to compare the genetic diversity of *K. capensis* across diverse *Protea* host species in the Kogelberg area in the CFR.



Nombuso aims to break new ground by initiating the first population genetic study on the other ophiostomatoid genus *Ophiostoma* that is associated with *Protea* infructescences. She will develop microsatellite markers for *Ophiostoma splendens*, which she will then apply to two research questions. Firstly we wish to find out what the population structure of this fungus looks like across the range of its *Protea repens*, the same host plant Janneke isolated *K. proteae* from. *P. repens* is the most widespread *Protea* species in the CFR, and it should be extremely interesting to compare the genetic diversity of *O. splendens* to that of *K. proteae* from the same host. In the Eastern Cape sister species of *O. splendens* occurs on different *Protea* hosts, that are thought to hybridize in contact zones. By studying the genetic diversity of *O. splendens* in these northern hosts, we hope to gain insight into the similarities / differences in genetic structure between and among the northern hosts, and between members of the *O. splendens* species group associated with northern and southern *Protea* hosts.

To date our research on the *Protea*-associated ophiostomatoid fungi has resulted in a total of 14 publications, and we are excited and optimistic that both the on-going and new studies will increase our depth of understanding of this remarkable system, and lead to many more exciting publications.