



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

Faculty of Natural  
and Agricultural Sciences



### Position Announcement

Three PhD positions are available to study the molecular, chemical and behavioral ecology of *Sirex* woodwasp – *Amylostereum* fungus – *Deladenus* nematode symbioses. These positions have Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, South Africa as the home institution, but will involve extensive collaborative work with the Canadian Forest Service (CFS) and the University of the Sunshine Coast in Australia.

### The projects

Invasive pests are one of the most significant threats facing plant ecosystems and production systems globally; from agriculture to forests and forestry. *Sirex noctilio* and its fungal mutualist, *Amylostereum areolatum*, is a growing model system for understanding processes that affect these invasions, as well as the development and implementation of management tools for it. One of the primary management tools for this invasive pest is biological control using the nematode *Deladenus siricidicola*.

1. How and which visual and olfactory stimuli affect the behavior of *Sirex noctilio*, and how can these be integrated in management programs? Potential areas of inquiry may include elucidating kairomone, pheromone, visual and genomic stimuli that influence the behavior of *S. noctilio*. The consequences of these stimuli and their potential to contribute management tools will be actively explored.
2. What factors influence the reproductive biology of *Sirex noctilio*, and how does this influence invasive populations? Potential areas of inquiry may include elucidating physiological and behavioral traits that influence the complex and fascinating reproductive system of this wasp. Ultimately the successful candidate will explore molecular tools to manipulate outcomes of sexual reproduction.
3. How do invasion processes and micro-evolution affect symbioses, invasive pest adaptation and their biological control agents? The project, termed 'Petri-dish Australasia' will use the *Sirex noctilio*/*Amylostereum areolatum*/*Deladenus siricidicola* as a model system to study microevolutionary processes in invasion and biological control in Australia and New Zealand.

The projects have the potential to include a combination of field, molecular and chemical ecology and genomics. All three projects will deal with fundamental questions on the ecology of this intricate, tripartite symbiosis, but will either include or contribute directly to applied aspects of the management of this global invasive pest complex.

## Requirements

Candidates should have a Masters or equivalent degree. Candidates are not expected to possess advanced skills in all the fields linked to the projects, but experience and an interest in at least two of these fields will be an advantage. Thus a background in molecular genetics and ecology, chemical ecology, behavioral ecology, entomology, microbiology, nematology or related fields would be considered an asset. Resources and support to develop these diverse skills in candidates will be provided. While the projects will explore novel questions at the frontiers of understanding these particular symbioses, as well as symbioses and invasive pests in general, they are built on strong baseline datasets, extensive resources and support, and a long history of excellence and leading work in the field.

## Where

Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, South Africa. FABI is a global leader in plant biotechnology related research, with a strong focus on tree health. The successful candidates will join a vibrant, dynamic, highly international (both in terms of students, postdocs, staff and networks) and interdisciplinary research team, which includes strong research groups in tree health research, mycology, entomology, tree and crop genetics, plant-microbe-insect interactions, genomics, chemistry and more. The laboratories involved have strong links to industry, government and international research networks making them a unique and rewarding environment to work and launch your research career. For more information please visit [www.fabinet.up.ac.za](http://www.fabinet.up.ac.za).

## Partners

Prof Bernard Slippers, Dr Brett Hurley, Prof Michael J Wingfield and others

Dr Jeremy Allison, Natural Resources Canada and University of Toronto, Canada

Dr Helen Nahrung, University of the Sunshine Coast, Australia

Dr Angus Carnegie, New South Wales Department of Primary Industries, Australia

## Remuneration

Full scholarships are offered for all three positions in South Africa that will be sufficient to cover accommodation, living costs, registration fees, and basic medical aid. Additional funds will cover running costs associated with the project.

## When

We are hoping to fill these positions as soon as possible, but no later than March 2016. The positions will remain open until a suitable candidate has been identified.

## Applications

Please provide an updated CV, a full academic record and two letters of reference, ideally from academic mentors or supervisors that can comment on your potential as a future research leader.

## Contacts

If you are interested in any of these positions or require additional information please contact Smeetha Singh ([smeetha.singh@up.ac.za](mailto:smeetha.singh@up.ac.za)) with Sirex PhD position in the subject line.

### Examples of work from the research group

- Slippers B, de Groot P, Wingfield MJ. (eds) 2012. The Sirex woodwasp and its fungal symbiont: Research and management of a worldwide invasive pest. Springer.
- Boissin E, Hurley B, Wingfield MJ, Vasaitis R, Stenlid J, Davis C, Groot Pd, Ahumada R, Carnegie A, Goldarazena A. 2012. Retracing the routes of introduction of invasive species: the case of the *Sirex noctilio* woodwasp. *Molecular Ecology* 21, 5728-5744.
- Wooding AL, Wingfield MJ, Hurley BP, Garnas JR, De Groot P, Slippers B. 2013. Lack of fidelity revealed in an insect–fungal mutualism after invasion. *Biology Letters* 9, 20130342.
- van der Nest MA, Steenkamp ET, Wilken MP, Stenlid J, Wingfield MJ, Wingfield BD, Slippers B. 2013. Mutualism and asexual reproduction influence recognition genes in a fungal symbiont. *Fungal Biology* 117, 439-450.
- Yek SH, Slippers B. 2014. Biocontrol opportunities to study microevolution in invasive populations. *Trends in Ecology & Evolution* 29, 429-430.
- Slippers B, Hurley BP, Wingfield MJ. 2015a. Sirex Woodwasp: A Model for Evolving Management Paradigms of Invasive Forest Pests. *Annual Review of Entomology* 60, 601-619.
- Wingfield MJ, Bockerhoff E, Wingfield BD, Slippers B. 2015. Planted forest health: The need for a global strategy. *Science* 349, 832-836.