PhD Scholarship – Plant Biochemistry & Molecular Biology

**Evolution and conservation of membrane-associated effector proteins in plant pathogens**

We seek a PhD candidate to join a 3-year research program based at the University of Canterbury (UC) to investigate the 3D structure of effector proteins targeting the membrane associated NAC transcription factors. Funding for this research has been made available from the UC College of Science Doctoral Scholarship for the research in the group of Dr Claudia Meirsmihler.

**The person**

We seek a PhD candidate with a demonstrated a high level of academic achievement at the undergraduate and postgraduate level. They will be required to have a MSc or equivalent to enrol as a PhD candidate at the University of Canterbury.

The candidate will require a background in biochemistry and plant molecular biology. Some background in cell biology and/or bioinformatics would be an advantage. The PhD candidate will be required to undertake lab-based investigations in the course of their research. To be eligible for enrolment as a PhD student at the University of Canterbury, IELTS or a comparable certificate must not have lower scores than 6.0.

The stipend will be for three years at NZD21,000 p.a. (tax free) plus payment of tuition fees at the domestic rate. The candidate will also have the opportunity to conduct part of their research on the structural resolution with the group of Dr Jodie Johnston at the University of Canterbury.

**The project**

Throughout their evolutionary history, plants have been exposed to diverse microbial organisms with potential impact on their fitness. The innate immune system is the dominant immune system found in plants. Plant immunity is tiered system that includes the detection of common microbial motifs by pattern recognition receptors as an early line of (Boller et al., 2009, Bressendorf et al., 2016, Zhang et al., 2010, Meng et al., 2013). Conversely, microbes evolved effector proteins that suppress innate immunity and other host cellular activities to render hosts susceptible and promote disease. This close host–microbe-interaction represents a paradigm for rapid co-evolution of the interacting partners involved.

Recently effector proteins from a variety of plant pathogens have been identified to target the evolutionary conserved translocation mechanism of membrane-associated NAC transcription factors (maNAC TF). These TF are key player in adaptation to drought, heat, cold and osmotic stress inland plants. Furthermore, we hypothesis that they play a role in cross-talk between immunity and abiotic stress.

Our present data show that the effectors proteins are not significantly conserved on the sequence level, but conversely result in the disruption of the maNAC TF translocation mechanism. Resulting from this knowledge, we hypothesise that different effector proteins have evolved either in-/dependently a 3D-conserved structure or different structures targeting the same maNAC TF translocation mechanism. This project aims to understand how these effector proteins have evolved in different pathogenic systems (fungi, oomycetes and bacteria).
For this the candidate will express effector proteins in E.coli or Pichia pastoris, followed by purification, crystallization and structural analysis and comparison. The second aim of the PhD is to identify the exact interaction site of the effector proteins with the maNAC TF (Yeast-two-hybrid, coIP, native MS, NMR approach) and to compare the plant phenotypes of effector over-expression lines.

The advertised PhD project is in close collaboration with a second PhD project on the role of maNAC TF translocation and down-stream gene targets in plants.

The proposed start date for the research is April/May 2020, depending on the availability of appropriate candidates.

The project is in collaboration with Prof Dr Richard Morris at the John Innes Centre, Norwich, UK and Dr Jodie Johnston at the University of Canterbury.

**Applications + Contact**

For more information please contact:

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Please send the application in writing to claudia.meisrimler@canterbury.ac.nz and include:  
Cover letter  
CV (including IELTS results or comparable)  
Copies of your university transcripts  
3 references

Deadline for the application is Friday the 25\textsuperscript{th} of February, 2020.