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Quantifying the effect of individual heterogeneity in epidemic spread on a network

Every individual in a network has their own characteristics, some are more social than others and have more contacts, some have fewer contacts but may spend longer overall with this small number. When an infection disease is introduced into the population, this heterogeneity is increased as the disease affects people differently. Some individuals have a higher infectivity than others, some may have a additional health condition that affects their potential to spread the disease. All these factors can have a striking effect on the spread of a disease through a network of individuals. This project will aim to develop models of disease spread on a network that take into account these individual characteristics, quantify their effect on disease spread and identify possible methods for epidemic control.

Human data of this type is often difficult to obtain so we will use an animal population as a test case. Data from the spread of TB in the possum population of the Orongorongo valley combined with full contact tracing data from this population will allow for parameterisation and verification of the models developed. With this population in mind the project will establish methods not only to contain the spread of a disease but also to promote its spread through a given population. Results from this second case will be vital if New Zealand decides to use bio-control methods to control the possum population.

The student will be enrolled at the University of Canterbury and will work under the supervision of Dr Jeanette McLeod. The student will be co-supervised by Dr Dan Tompkins of Landcare Research. They will also spend time at Landcare research as part of their studies.

Applicants for this scholarship should hold an Honours or Masters level qualification in mathematics, statistics or a related discipline and have a strong interest in ecology.

The scholarship is tenable for three years and will pay for tuition fees (for a domestic or international student) and a stipend of $x per annum.