Topic / Project Title: Wētā metabolism – does it vary by season, sex and elevation?

Length of Summer Bursary 10 weeks ($500 per week)-mid November to mid- February (dates negotiable)
Supervisor(s) Cilla Wehi (Landcare) and Keith King (Zoology)
Contact person Keith King (keith.king@otago.ac,nz)

Information about the project:

Indigenous tussock grasslands contain numerous habitats for endemic insects that support diverse ecosystem functions. These insects include the rarely seen, the Otago stone wētā *Hemideina maori*, that inhabit tors (rocky outcrops) during the day before emerging at night. These wētā occur across a broad elevation range of <1000m -1450 m in many tussock grassland and mixed cushionfield sites in southern New Zealand. As ectotherms, wētā have limited ability to regulate their body temperature, and freeze during the winter at these elevations. However, even while frozen, these wētā are metabolising. Come spring, the wētā thaw and become active through the warmer months.

We wish to undertake a pilot study to explore metabolic rate in the Otago stone wētā . Metabolic rate is a key indicator of physiological processes that predict life span and growth. Evidence suggests that slower growth and a larger body can help animals survive in cold environments. In addition, elevated metabolic rate at low temperatures is thought to be adaptive. The study will provide baseline data for a larger study of how metabolic rate changes seasonally in a freeze tolerant invertebrate, and how metabolic rate interacts with other physiological processes during the shift from freezing, to activity and reproduction in the summer and autumn. Respirometry will measure oxygen consumption and carbon dioxide production that can be used as an estimate of metabolic rate. In addition, the respiratory quotient of these two gases provides information on metabolic substrate use (i.e. whether animals are mobilising carbohydrate, protein or lipids for energy use).

In this summer project, the successful applicant will collect baseline respirometry data consisting of measurements of oxygen consumption and carbon dioxide production for Otago stone wētā. This will be used to quantify how metabolic rate changes with size, sex and elevation, and to determine what metabolic substrates are used during summer. In addition, the respiratory quotient of these two gases provides information on metabolic substrate use (i.e. whether animals are mobilising carbohydrate, protein or lipids for energy use). As these wētā freeze during winter, determining seasonal patterns of metabolic substrate use is likely to provide insights into their annual life cycle and survival processes, as well as foraging behaviour and thus their interactions with the ecosystems in which they live.

Skills: Set up and use respirometry equipment, after training by supervisors

- Travel to field locations in Otago/Southland district, may require overnight stay in hut or other accommodation
- Use of the respirometry equipment with invertebrates, in the lab and field
- Handle invertebrates, and take morphological measurements
- Microscopic examination of weta frass
- Enter data into spreadsheets
- Other activities as required

If you wish to apply, email keith.king@otago.ac.nz or WehiP@landcareresearch.co.nz by the 16th of November 2017 with:

• a CV/resume, including any relevant research experience or skills. Contact details for at least one academic referee should be included.

You can get in touch via email (keith.king@otago.ac.nz) or pop by my office (Marples Building, MG07) if you have any questions.