



MACQUARIE
University
SYDNEY · AUSTRALIA

PhD Opportunity

Genetics and Genomics of Qfly Sexual Performance



Closing Date: Expressions of interest close at midnight on **Friday 20 January 2017**

A PhD opportunity is available on a project investigating the genetics and genomics of sexual performance in the Queensland fruit fly (Qfly; *Bactrocera tryoni*). This project is part of a significant collaboration between Drs John Oakeshott and Ronald Lee at Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Prof Phil Taylor at Macquarie University's Department of Biological Sciences (<http://bio.mq.edu.au/>).

Sexual performance is key to Darwinian fitness. In some insect systems the key elements of sexual performance (e.g. pheromonal communication, courtship rituals) exhibit strong genetic influences. However, the genetic factors governing sexual performance in Qfly are yet to be discovered. The emergence of powerful 'omic technologies has vastly advanced the scope and depth of mating system research, and the recent development and deployment of such tools for Qflies enables unprecedented opportunities for investigation of traits underpinning sexual performance in this species.

The approaches and methods will be **highly multi-disciplinary**. The PhD candidate will combine bioassays to measure reproductive behaviours with state-of-the-art genomic, proteomic and metabolomic technologies to understand the **genetic basis and molecular mechanisms underpinning male mating success**. Traits of potential interest include pheromone synthesis and composition, calling behaviour, reproductive effort and sperm transfer. Strains from a wide variety of locations and with different histories of domestication (which inevitably impose different selection pressures on reproductive behaviour) are already available for study.

In addition to being of fundamental interest, knowledge gained in this PhD project will contribute to environmentally sustainable pest management through the Sterile Insect Technique (SIT). In SIT millions of mass-reared sterile male flies are released to mate with wild females and induce reproductive failure through the transfer of sterile sperm and induction of sexual inhibition. For SIT programs to succeed, the released male flies must be sexually competitive. Knowledge gained in this PhD will later assist in the development of field-competitive strains for use in SIT control programs.

The project will be based mainly at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Canberra but with significant involvement also from Macquarie University in Sydney. The two laboratories provide an ideal environment for this research; both



have invested heavily in the infrastructure necessary for Qfly research and have deep experience in Q-fly biology, molecular and quantitative genetics and the various 'omics' technologies that will underpin this research. Numerous PhD students and Research Fellows are already working in the two laboratories on diverse aspects of Qfly biology, genetics and genomics, providing an exciting learning environment and an opportunity to contribute meaningfully to an environmentally sustainable new technology for controlling a major horticultural pest.

The value and tenure of the scholarship is:

- \$30,849 pa (2016 rate, subject to annual indexation, tax free) for 3 years. This includes a stipend of \$25,849 pa plus a scholarship 'top up' of \$5,000 pa.
- For International candidates, scholarships will also cover all tuition fees.

To be eligible for a scholarship, applicants are expected to have a record of excellent academic performance and preferably, additional relevant research experience and/or peer-reviewed research activity, awards and/or prizes in line with the University's scholarship rating guidelines. Refer to the [Rating Scholarship Applicants](#) section for more information about these guidelines.

Students on scholarships are not obliged to contribute to teaching, but may do so to supplement their income if desired. In addition to substantial financial resources to draw on for research, several generous schemes are available to fund travel to visit overseas laboratories or to attend overseas conferences.

Interested applicants should email a letter of interest, academic transcripts, curriculum vitae and the names and contact information of three referees to Dr John Oakeshott (john.oakeshott@csiro.au).

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