



THE LINNEAN SOCIETY OF NEW SOUTH WALES

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The Linnean Society of NSW Research Grants

The William Macleay Microbiology Research Fund

Applicants must select the most appropriate funding source and apply to one fund only. Council reserves the right to transfer any application to another fund where this is relevant and improves the likelihood of success.

Information and forms are available from the relevant web page for each fund. All grant applications to be emailed to: linnsoc@inet.net.au

Further information and application forms for all grants can be obtained from the Secretary of the Society by telephoning 0490 542 524, by requesting it via email at secretary@linneansocietynsw.org.au or by writing to the address above.

The William Macleay Microbiology Research Fund

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

1. Applications will be accepted from postgraduate and Honours degree students at recognised Australian universities who are undertaking full-time or part-time studies with a microbiological emphasis.
2. Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in microbiology.
3. In awarding grants, the Council of the Society will assess:
 - a) the quality of the project
 - b) the applicant's ability to carry it out
 - c) a realistic costing and timetable
 - d) the likelihood that successful completion of the research will lead to publication.
4. A grant of up to \$2,300 is available to members of the Linnean Society of NSW and \$1,200 is available to non-members of the Society. The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.
5. Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

6. Deadline for applications will be 1-March in any year. In exceptional circumstances, applications for emergency support will be received at any time. However, judgments for such applications are entirely at Council discretion.
7. Grantees will be required to make a report at the end of the project and to justify their expenditure.
8. Any publication arising from work supported by the William Macleay Microbiology Research Fund should include an acknowledgement to that effect.
9. Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.
10. Applicants should email their signed applications to linnsoc@inet.net.au

Annual awards from the William Macleay Microbiology Research Fund

Summary of the awards made from the William Macleay Microbiology Research Fund since its inception.

| Year | Capital invested | No. grants | Total Awarded |
|-------------|-------------------------|-------------------|----------------------|
| 2012 | \$100,599 | | |
| 2013 | \$103,515 | 2 | \$2,300 |
| 2014 | \$106,695 | 1 | \$2,000 |
| 2015 | | 2 | \$2,640 |

2015 Award

Recipient: LARSSON, Michaela (University of Technology Sydney)

Project: Understanding the ecological niche of toxin producing dinoflagellates.

Synopsis: Ciguatera Fish Poisoning (CFP) is a human illness which arises from consumption of marine fish whose flesh and viscera have been contaminated with ciguatoxins. Globally, it is estimated that between 50,000 and 200,000 people each year are affected by CFP, making it the most prevalent nonbacterial human illness associated with seafood consumption. The aims of my project are to: i) Identify strains of *Gambierdiscus* isolated from Australian waters using molecular methods; ii) Characterise the toxin profiles of identified strains using advanced analytical techniques; and iii) Deposit the strains into a national collection so they are made publically available for further research. As CFP is a global human health issue, this work is significant both nationally and internationally.

Awarded: \$1,640.00

Recipient: NOORIAN, Parisa (University of New South Wales)

Project: Investigation of an iron-dependent antiprotozoal factor in *Vibrio vulnificus*

Synopsis: *Vibrio vulnificus* is an opportunistic pathogen responsible for wound infections and septicaemia following ingestion of contaminated seafood, and has the highest reported mortality rate for seafood-related diseases. It is an autochthonous inhabitant of coastal marine environments where it is exposed to predation by heterotrophic protozoa. Protozoan predation on bacteria acts as a selective force, leading to evolution of antiprotozoal mechanisms that may also function as virulence factors.

An environmental strain of *V. vulnificus* showed toxicity towards the filter-feeding ciliate *Tetrahymena pyriformis*. Further investigations showed that this toxicity is dependent on presence of iron in the media. Next generation sequencing (RNA-seq) will be used to further investigate the antiprotozoal factor by comparing the difference in the transcriptome of *V. vulnificus* in iron replete and deplete conditions.

Relevant genes (or sets of genes) that are differentially expressed will be further investigated through generation of knockout mutants and qPCR.

The aim of this study is to identify the genetic features that are likely to contribute to the survival of the opportunistic pathogenic bacteria *V. vulnificus* in the natural aquatic environment by resisting its natural predators.

Awarded: \$1,000.00

2014 Award

Recipient: RANASINGHE, Purnika L, (Queensland University of Technology)

Project: Analysis of bacterial diversity, abundance and dynamic responses to environmental challenge in an insect microbiome using “next generation” sequencing and data visualization.

Synopsis: Lepidopteran insect species have complex communities of microorganisms the “microbiome” in their guts that are important in the insect biology. The composition, ecology and functional responses are poorly understood. Molecular analysis has allowed identification of multiple microbes with previously unexplained communities. The diamondback moth (*Plutella xylostella* L. (Lepidoptera: Plutellidae), DBM) is a pest of brassicas and has evolved resistance to many insecticides. Two molecular methods of analyses have established an initial base line of the presence of microbial phyla and differences between two populations, one on cabbage and the other on broccoli. The ‘next generation’ sequencing is able to establish generic identity. Experiments raising DBM larvae on cabbage for three generations then switching onto the broccoli for three generations shows that the microbial communities in the gut change to those resembling the ones in larvae permanently reared on broccoli. Similarly, those changed from broccoli to cabbage have changed microbial communities. This project will use next generation sequencing to follow the changes in the microbial populations during the changeover.

Awarded: \$2,000.00

2013 Awards

Recipient: Armbrecht, Linda H (Macquarie University)

Project: Phytoplankton characterization and related biogeochemical processes in a biological hotspot: Solitary Island Marine Park, Eastern Australia.

Synopsis: In the light of climate change, the global subtropical western boundary currents are experiencing an above-average sea surface temperature warming. The East Australian current, which transports warm tropical water masses to temperate latitudes, is one of these currents. As the physical parameters of the East Australian current have changed over the past 60 years, changes are expected for the inhabitants of the currents, the free-floating phytoplankton. This research will provide the first detailed taxonomic phytoplankton survey in the Solitary Island Marine Park region, an area that is regarded as a hotspot for climate change. By sampling throughout a complete annual cycle, covering various oceanographic regimes, and along an elaborated sampling design, temporal and regional

small-scale variations in phytoplankton distribution will be determined. This dataset will comprise the first comparison to the Port Hacking Station (Sydney) and in addition, reveal further information about phytoplankton microhabitats and carbon, nitrogen and silica uptake and export, which cannot be determined from depth-integrated net sampling.

Awarded: \$1,102.00

Note: *The above recipient has also received an award from the Joyce Vickery Scientific Research Fund.*

Recipient: Vardeh, David (University of New South Wales)

Project: Assessing the microbial composition of extant Australian stromatolites from differing geochemical settings.

Synopsis: Stromatolites, accretionary microbial structures, were the dominant life forms on early Earth for billions of years, but due to grazing pressure and competition today, are limited to a few isolated places. In the development of a stromatolite, phototrophic cyanobacteria are the first to settle on a substrate. Through filaments and production of extracellular polymeric substances cyanobacteria create the foundation for biofilm development by providing micro-niches in which other microbes can find favourable conditions in terms of light, oxygen availability and pH. Stromatolites are mostly found in hypersaline, marine or freshwater settings, thus very little is known about caves specimens (semi-open Nettle Cave in Jenolan and Victoria Arch in Wombeyan Caves in NSW). The proposed study will focus on microbial diversity, not geological processes. Therefore, only small amounts of stromatolite material will be removed during sampling, as DNA extraction from the living part of the stromatolite (top 5mm) will yield enough microbial cells for genetic analysis. Extracted DNA samples will be sent off for sequencing and sequences will be analysed and compared.

Awarded: \$1,198.00