



Thomas Roberts

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Congratulations to our 2014 AIMS@JCU PhD scholarship recipients

We are happy to welcome AIMS@JCU's five successful new scholarship students to our 2014 cohort, well done on the extremely high quality of their applications:

Kathryn Berry - Physical and chemical effects of coal on tropical marine organisms; primarily supervised by Andrew Negri (AIMS) and Mia Hoogenboom (JCU)

Blake Ramsby - Modelling the net growth of coral reefs under climate change: The neglected role of bioeroding sponges; primarily supervised by Nicole Webster (AIMS) and Marcus Sheaves (JCU)

Thomas Roberts - Environmental and ecological determinants of depth distribution in reef-building corals; primarily supervised by Julian Caley (AIMS) and Andrew Baird (JCU)

Cheng-Han Tsai - Effects of herbivorous fish community structure on dominance of corals; primarily supervised by Hugh Sweatman (AIMS) and Sean Connolly (JCU)

Amin Mohamed Esmail - Distribution and characterisation of chromerids and apicomplexans associated with corals; primarily supervised by David Bourne (AIMS) and David Miller (JCU)

Look out for profiles of these students on the following pages and in subsequent AIMS@JCU newsletters

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Photographs in this publication were submitted by AIMS@JCU members unless otherwise stated

About the AIMS@JCU Newsletter:

This newsletter is produced quarterly and distributed by email to AIMS@JCU members, AIMS and JCU staff.

If you'd like to be added to our mailing list, or have a query regarding this newsletter, please contact:

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2014 AIMS@JCU PhD Candidate

Kathryn Berry

Originally from Canada, Kathryn completed her BSc in Environmental Science and Biology at Dalhousie University, Canada and her MSc at the University of Bremen, Germany. Her MSc research focused on trace metal pollution at coral reefs in the Caribbean, in affiliation with the Smithsonian Tropical Research Institute, Panama and the Berlin Museum for Natural History. Her previous roles include: assistant wildlife biologist and orca conservation warden in Canada. In March 2013, Kathryn began her PhD research under the supervision of Andrew Negri, Mia Hoogenboom and associate advisors, Jon Brodie, Kathy Burns and Diane Brinkman.

Kathryn's research investigates the effects of coal dust contamination on tropical marine organisms. Despite local and international concern related to the shipment of coal through the GBR, there are currently large knowledge gaps pertaining to the risks associated with coal dust contamination in the tropical marine environment.

The overall objective of Kathryn's PhD research is to identify the biological responses of certain tropical marine organisms to coal dust in order to allow more accurate prediction and assessment of the risks of chronic coal dust loss and major coal spills within the Great Barrier Reef World Heritage Area (GBRWHA). She aims to: 1) Quantify threshold concentrations (lethal and sub-lethal) of coal dust that are harmful to corals (at various life history stages), seagrass and reef fish; 2) Improve the accuracy of hydrodynamic models that predict the transport of coal from land to reef; 3) Establish baseline coal contamination values at coral and seagrass environments in the GBRWHA.

Kathryn's research will provide marine park managers, regulators and industry, with scientifically rigorous information and tools to improve impact assessments and risk modelling, as well as prioritise aspects of major coal spill mitigation and clean-up efforts.



Adriana
Humanes

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2014 AIMS@JCU PhD Candidate

Blake Ramsby

Blake completed a B.Sc. in Biology at the University of Richmond (Virginia, USA). As an undergraduate, he investigated the effects of elevated temperature on bio-eroding sponges of the Florida Keys under the supervision of Dr. Malcolm Hill.



Blake is completing a M.Sc. degree at the University of Mississippi (Mississippi, USA) under the supervision of Dr. Tamar L. Goulet. He has conducted experiments testing effects of elevated temperature on photosynthesis in Caribbean octocorals. In particular, he measured photochemical efficiency, oxygen evolution, and light absorption of octocorals under ambient and elevated temperatures.

In June, Blake will start his PhD at AIMS under the supervision of Dr. Nicole Webster (AIMS), Prof. Marcus Sheaves (JCU), Dr. Mia Hoogenboom, and Dr. Steve Whalan (SCU). His project will investigate the hypothesis that under climate change, the rate of sponge bioerosion will exceed the rate of coral calcification. If true, faster bioerosion may make it more difficult for corals to maintain reefs under climate change. Controlled experiments will be used to determine how sponge reproduction and fitness are affected by predicted climate change conditions. These data will be used to develop models to predict sponge fitness, sponge-coral competition, reef erosion patterns, and overall reef resilience under climate change scenarios.



Joe Pollock

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2014 AIMS@JCU PhD Candidate

Thomas (Ed) Roberts

Ed grew up in Sydney and moved to Townsville to study Marine Biology at JCU in 2005. After several years working in public aquariums, and on the Great Barrier Reef as a SCUBA instructor, he completed his BSc in 2012. In 2013 Ed researched largely unknown shoal habitats on the GBR for his honours project, supported by an AIMS@JCU Pilot Research Award, under the supervision of Dr James Moloney and Dr Tom Bridge. Ed was awarded first class honours for this thesis, and will be publishing these results imminently. Ed commenced his PhD in February 2014, under the supervision of Dr Andrew Baird (JCU), Dr Julian Caley (AIMS), Dr Tom Bridge (AIMS, JCU) and Professor Geoff Jones (JCU), aiming to model the ecological mechanisms of depth distribution in reef-building corals, especially vertical connectivity and source-sink dynamics.



Ecological processes driving depth distributions in reef building corals are still largely unknown, despite these patterns being one of the most obvious on coral reefs. Although much research focuses on shallow (0-10m) regions, reef-building corals can extend far below in some situations (>100m), and species richness consistently peaks in the mid-depth regions (~20m). These mid-depth regions house extensive habitat on the GBR, with deeper regions showing greater environmental stability. Understanding the extent of vertical connectivity over depth regions, through uncovering the ecological mechanisms driving coral depth distribution, will be critical to understanding how reef-building corals will respond to current and future anthropogenic impacts such as climate change.

Ed will survey reef-building corals from 0-40m depth over the Eastern Pacific, and the Great Barrier Reef, recording patterns in species abundance over depth. This data will be used to identify species distribution strategies (deep or shallow specialists, and depth generalists), and the life history traits that are common to each strategy. Representatives of these three groups will then be the subject of experiments to determine larval settlement preferences, and colonisation ability over depth, as well as relative fecundity over depth for each species. This information will be used to model potential vertical connectivity, source-sink dynamics of mid-depth regions, and likely outcomes of depth dependent disturbance events.

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2014 AIMS@JCU PhD Candidate

Cheng-Han Tsai

Cheng-Han comes from Taiwan, where he studied forestry and ecology at the National Taiwan University and completed his MSc degree and thesis entitled "Plant-plant interaction and habitat heterogeneity shape individual spatial patterns of woody plant community in a subtropical rainforest" under the supervision of Dr T. S. Ding. After this he joined a research project in Dr Chih-hao Hsieh's lab at the Institute of Oceanography National Taiwan University to investigate the climate and anthropogenic impacts on the Lake Biwa ecosystem. This project encompassed diverse topics ranging from environmental changes to phytoplankton, zooplankton, and fish ecology. During this time, he developed interests in aquatic ecology, fisheries, and theoretical ecology and led a research project entitled "Phytoplankton functional group dynamics explain species abundance distribution in a directionally changing environment". This was a time series approach of classical species-abundance patterns.

Cheng-Han's PhD project will develop an integrated framework and new quantitative tools to investigate the effects of herbivorous fish community structure on dominance of corals in fluctuating environments, under the supervision of Dr Sean Connolly (JCU) and Dr Hugh Sweatman



(AIMS). It is generally assumed that herbivorous fish biodiversity sustains coral reef ecosystem functions and resilience, with species richness in a community increasing with niche partitioning among species, such that the top-down control (trophic cascade) can maintain the coral dominated state. However, the functional consequences of fish species richness remain largely uncertain. This is because different coexistence mechanisms underlie responses to environmental stochasticity, which then structure communities and determine the net effect of species richness. This project will use a large-scale spatio-temporal coral reef monitoring data set, to explore coexistence mechanisms underlying fish communities (especially species' niche differences, interactions, and responses to environmental stochasticity), and their influence on the spatio-temporal changes in benthic coral versus algal coverage (proxy for top-down control). The resulting integrated framework and quantitative techniques developed to link the role of ecological community structure to ecosystem function, can improve future predictive ecosystem modelling.

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Ian McLeod

AIMS@JCU Awards now available

Deadline 30th March 2014

AIMS@JCU are excited to invite applications for the following awards:

Student Travel Awards: Applications are invited from any AIMS@JCU student member, at the level of support for individuals at \$750 for an activity within Australia and \$1,500 for an activity outside Australia. Acceptable uses would be:

- Attendance at a national or international conference to present AIMS@JCU research, in Australia or overseas. Usually only considered after 2nd year of candidature
- Attendance at an institution for the purposes of completing collaborative research resulting in a manuscript or thesis chapter, learning a new technique, or liaising with potential future post-doc employer. Usually only considered in 3rd or 4th year of candidature

Student Pilot Research Awards: Applications are invited from any AIMS@JCU student member who is not currently receiving an AIMS@JCU PhD scholarship. These awards are one-off pilot research grants, to explore a new method or initiate a new experiment that might not have been possible and are for a maximum of \$1,000.

Joe Baker AMSA Memberships: Once again this year we have been provided the very generous offer of paid one year memberships to the Australian Marine Sciences Association for AIMS@JCU students who are NOT currently members of AMSA. This offer is to encourage new membership of students in AMSA and is personally contributed by Professor Joe Baker.

- Joe has kindly offered up these memberships so please get back to me as soon as possible to ensure you are in the running.
- If you have not heard of AMSA I encourage you to take a look at their site: <https://www.amsa.asn.au/>
- If you are interested in this membership offer please contact the AIMS@JCU office.

For more information and application forms please visit our website: <http://aims.jcu.edu.au/current-funding-opportunities.aspx>

2013 Pilot Research Award recipient update

Pasang Tenzing

Pasang grew up in Sydney and graduated from James Cook University, Townsville in 2012 with a BSc in Marine Biology. With a keen interest in marine conservation from a young age Pasang had always planned to move to North Queensland to study at one of the world's best marine science institutions. After finishing his degree, Pasang decided to pursue his interest in studying the potential effects of climate change on the physiology of fish. In particular Pasang hopes to shed more light on the effects future global warming may have on elasmobranchs, a group already facing serious threats worldwide from over-fishing and habitat degradation.

To address this issue, Pasang is currently enrolled in an Honours research program with AIMS@JCU support, supervised by Timothy Clark and Michelle Heupel (AIMS), and Colin Simpfendorfer (JCU). The project involves the use of laboratory based respirometry techniques to quantify the effects of temperature change on metabolism, using two species of stingray native to the GBR (mangrove whipray *Himantura granulata* & cowtail ray *Pastinachus atrus*). The project will undertake and synthesise three main methods: 1) Measuring the resting metabolism at ambient temperatures as well as those approaching high and low thermal thresholds, 2) Determining the specific dynamic action (SDA) post-feeding at these temperatures, 3) Comparing the results from the previous methods with field data detailing habitat use and temperature levels. This project aims to answer questions about the role climate change will play in this group, and understand the impact of future temperature change under current projections.



Thomas Roberts

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Research Director Report

A very warm welcome to our new AIMS@JCU scholarship recipients, as well as all new AIMS@JCU members who are commencing study in 2014. I look forward to meeting some of you at either AIMS or JCU in the coming months, and wish you well for your studies.

We have a busy year ahead with lots of AIMS@JCU activities and opportunities for support in store, which I encourage you to keep track of by reading emails from us, and checking our website from time to time. We are fortunate to again secure the excellent teaching services of Dr Murray Logan from AIMS, who will run a two weeks intensive biostatistics course using R. Full details will go out via email soon, but the dates are set for 2-6 June and 26-20 June (with a one week rest/reflection break in the middle).

Congratulations to our recent graduates: Drs JB Raina and Adrian Lutz who looked fabulous in their gowns and floppy hats at the graduation ceremony, and Drs Charlotte Johanssen, Paulina Cetina Heredia, Greg Torda and Patricia Warner who were awarded their PhD's in absentia. Well done to you all – we look forward to keeping in touch with you as alumni members of AIMS@JCU.

Libby Evans-Illidge, AIMS@JCU Research Director

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A note from the editor

If you were wondering why this AIMS@JCU newsletter is a little late, I have been on a lovely trip to the UK to visit family and friends, but am happy to get back to sunny Queensland!



Thanks, Lauren

Thomas Roberts