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The Australian Museum Lord Howe Island Expedition 2017—Introduction

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Abstract. In early 2017, as part of the Australian Museum 190th anniversary celebration, the Australian Museum (AM) undertook an extensive expedition survey program on Lord Howe Island (LHI) that included marine and terrestrial sampling of vertebrates and invertebrates and an ambitious terrestrial invertebrate survey of Balls Pyramid, the last remaining wild refuge of the Lord Howe Island phasmid (or stick insect). The outcomes of this expedition are detailed in the papers compiled in this special edition.

Keywords. Lord Howe Island; Balls Pyramid; Australian Museum

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In early 2017, as part of the Australian Museum's 190th anniversary celebration, the Australian Museum (AM) undertook an extensive expedition survey program on Lord Howe Island (LHI) that included marine and terrestrial sampling of vertebrates and invertebrates and an ambitious terrestrial invertebrate survey of Balls Pyramid.

Lord Howe Island is situated 570 km east of Australia and 1350 km northwest of New Zealand. The island is volcanic in origin, sitting on a fragmented arc split off the eastern margin of Australia. It is at least seven million years old (McDougall *et al.,* 1981) and is the eroded remnant of a much larger land mass connecting Lord Howe Island with Balls Pyramid (McDougall et.al. 1981). Lord Howe Island is 11 km long and 2.8 km at its widest, and is dominated by two large mountains, Mount Gower (875 m) and Mt Lidgbird (777 m), on the southern end of the island.

Lord Howe Island is one of only five oceanic islands on the World Heritage Register. It was listed in 1982 in recognition of its unique biota and its diverse and largely intact ecosystems and habitats for threatened species, including the world's southernmost coral reef. The fauna and flora of Lord Howe Island is of particular biological interest because of its diversity and high levels of endemism. The age of the island, its protected status, its remote location and the fact it wasn't settled until 1834 has left it as one of the least modified of the few islands located at this latitude in the Pacific Ocean. Diverse biogeographical relationships are represented on the island, with different components of the fauna showing affinities with New Zealand, Australia and New Caledonia (Green, 1994). The island is 85% natural forest, of which 75% is preserved as Permanent Park Preserve. The remaining 15% has been cleared for housing, grazing and transport.

The AM has conducted over 50 expeditions since the AM was founded in 1827, and has a long and valued history with Lord Howe Island (see numerous works listed in Reference section). The Museum's first multidisciplinary expedition to Lord Howe Island took place in 1887, the findings were published in *Australian Museum Memoirs* no. 2 (Etheridge *et al.,* 1889). Since then there has been many publications by Australian Museum staff detailing marine and terrestrial fauna of Lord Howe island (see Reference section). Perhaps the most significant of these is the "Recher Report" (Recher & Clarke, 1974), a book that details the most extensive environmental survey ever undertaken on Lord Howe Island. The survey, between the years of 1969 and 1973, looked at

Figure 1. View of the unique landscape of Lord Howe Island from the north looking south towards Mt Gower.

plant communities, birds, land snails, spiders and the general ecology of the Island and has been a fundamental document in environmental planning for Lord Howe Island ever since.

Balls Pyramid

In 2016, during discussions about an expedition to Lord Howe Island between the LHI Board, the NSW Office of Environment and Heritage and the Melbourne Zoo it became clear that Balls Pyramid needed to be included in the expedition for two reasons:

- To carry out a survey of the Balls Pyramid terrestrial insect and mollusc fauna as very little work had been done in that area.
- To do a comprehensive survey of Lord Howe Island phasmids, collect individuals to strengthen the Melbourne Zoo's breeding program and to support overall efforts to conserve the phasmid particularly with the opportunity provided by the impending rat eradication on Lord Howe Island.

A special approach to the Balls Pyramid expedition was required due to the extreme nature of the collecting environment and so the Australian Museum engaged six expert climbers to access areas never before surveyed. The logistics and safety aspects of surveying Balls Pyramid were extreme. It can only be accessed by swimming from a moored boat, so landing a team of 10 scientists and climbers, and equipment for a stay of up to 10 nights was very challenging. Additionally the nocturnal behaviour of the phasmid meant that surveys needed to be conducted at night, which given the extremely steep and treacherous nature of Balls Pyramid was a highly and dangerous exercise requiring highly experienced and expert climbers.

Expedition research and collection goals

Goal 1: Carry out surveys in terrestrial and marine environments on Lord Howe Island for the following taxon groups.

- terrestrial malacology
- terrestrial invertebrates (insects)
- ichthyology (fish)
- terrestrial vertebrates
- marine malacology and marine invertebrates

Goal 2: A survey of Balls Pyramid in collaboration with the LHI Board, Office and Environment and Heritage, Melbourne Zoo and Lord Howe Island Museum to:

- Collect phasmid eggs and possibly adults to enable them to broaden the DNA of the breeding group
- Sample invertebrates to see whether unique species exist there or species that once may have inhabited Lord Howe Island.

Goal 3: Collect tissue and DNA samples for use in:

- Studies to explore genetic diversity in Lord Howe Island populations. Target species being woodhens, bats, and some invertebrate species.

Goal 4: Exhume the skeletons of three rare Blainville's Beaked Whales *(Mesoplodon densirostris)* for inclusion in the Museum's collections. The whales were beached and died in the lagoon in 2011 and were then buried on private property.

Goal 5: Publication of results of the Expedition

Figure 2. This snail is *Pseudocharopa whiteleggei*, a rare and endangered species found by Dr Frank Köhler during the Lord Howe Island survey. This rarely found species is merely c. 5 mm long. It is threatened both by predatory exotic rodents and a changing climate, the latter impacts on habitat structure and the extent of cloud forest on the Mt Gower and Mt Lidgbird summits.

The reports published here in *Technical Reports of the Australian Museum* no. 26, are a preliminary summary of the expeditions findings. Taxonomic research is a precise and exacting process often requiring many years and the comparative examination of many specimens. Sometimes important specimens for research are housed in museums outside Australia. Consequently there is an inevitable delay in the publication of major scientific discoveries and in this report Australian Museum scientists are offering mere glimpses into the details of their discoveries. As taxonomic work proceeds and organisms are fully identified, relevant papers will be published describing them and further extending our understanding of the importance of, and threats to, the Lord Howe Island fauna. These papers will reference this original descriptive work, providing a comprehensive linkable documentation of the expeditions findings.

Collaborations

- LHI Board and Museum were collaborators on all aspects of the expedition.
- The NSW Office of Environment and Heritage was an advisor and collaborator on all aspects of the expedition.
- Melbourne Zoo was a collaborator on the Balls Pyramid component.
- The Australian climbing community.

Alignment with museum and government priorities

Australian Museum priorities

The Expedition supported the following Australian Museum Research Institute (AMRI) Science Strategy “clouds”:

Contemporary Discovery

- Through discovery of new species and undescribed diversity,
- The spatial and genetic distributions of animals and the interactions of animals in different ecosystems.
- A number of DNA analyses are planned on collected specimens to explore relationships between mainland and Lord Howe Island species as well as for identifying best outcomes for pairing of Lord Howe Island Woodhens during the rat eradication.
- Engagement with communities to record biodiversity values.
  - Interactions between the local Lord Howe Island community and the AM scientists
  - Use of volunteer climbers as citizen scientists in the sampling of Balls Pyramid.

Impacts of Change

- Impacts of invasive animals and plants.
  - Sampling for exotic species
- Impacts of environmental change including climate change.

Figure 3. Two members (Amanda Hay and Mark McGrouther) of the ichthyology team sampling at Cobby's Corner using a fine mesh seine net.

- Research on animals of Australian and international conservation concern to support effective conservation management.
  - Lord Howe Island Phasmid
  - Lord Howe Island Woodhen

NSW Government priorities

The expedition aligned with the Biodiversity Knowledge Strategy (Office of Environment and Heritage (OEH)) to support NSW Government and corporate objectives to:

Figure 4. The Lord Howe Silvereye Zosterops lateralis tephropleurus has a larger bill, feet and claws than its mainland counterpart.

- Support and provide information for land-use planning and management decisions.
- Protect biodiversity by managing threats.
- Maintain ecosystem services and processes through improved techniques for ecological restoration.
- Guide investment in conservation programs to areas of high conservation need.

Commonwealth Government priorities

The expedition supported the following National Science and Research Priorities:

- Environmental Change.
- Improved accuracy and precision in predicting and measuring the impact of environmental changes caused by climate and local factors.
- Options for responding and adapting to the impacts of environmental change on biological systems, urban and rural communities and industry.

Acknowledgments. A special thanks to the many donors and the Australian Museum Foundation for their interest and generosity which made the 2017 Expedition to Lord Howe Island possible. The 2017 Lord Howe Island Expedition was primarily funded by private donors with only 11% of the total expenditure on the expedition being from government sources. This is an impressive statistic and further underlines the contribution made by private donors to the success of this expedition.

The Australian Museum thanks the generosity of major donors:

Graeme Wood Foundation
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Dick and Pip Smith Foundation

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Ken and Roddy Bell
Ms Stephanie Chinneck
The Hon Justice Robert McDougall
Mr Hugh Dixson
Mr Howard Lewis
Ms Vera Vargassoff
Ms Michelle Atkinson
Pauline & Alan Campbell
Ms Belinda Gibson
Mrs Judy Lee
Ms Anne Pickles
Ms Cassandra Seaton
Mrs Alison Scott
Miss Caitlin Woods
Mrs Belinda Allen
Dr Rae and Mr David Allen
Ms Dinah Beeston
Mr Phillip Cornwell
Dr and Mrs Margaret Donovan
Mr Jeffery & Mrs Christine Goss
Greg and Beth Hammond
Ms A. J. Loewenthal
Mr Bruce Norton
Mrs Judy Ranka
Mr Alan and Mrs Yvonne Sebesfi

The scientific community did not have the requisite climbing capabilities to undertake the survey and so reached out to the climbing community to enable the survey to take place. As a result six climbers volunteered their time, equipment and expertise to the survey of Balls Pyramid. The six climbers were Zane Priebbenow, Paul Priebbenow, Vanessa Wills, David Gray, Keith Bell and Brian Mattick. The Australian Museum thanks the climbers involved for their incredible contribution to the planning and execution of what was an extremely ambitious and daring survey of Balls Pyramid.

Figure 5. Kara Layton (West Australian Museum) and Ian Hutton (Lord Howe Island Museum) sampling for marine invertebrates on the lagoon reef.

We thank the Lord Howe Island Board, Hank Bower and Ian Hutton for their unflagging assistance, support, encouragement and advice. Simon Meehan and Clive Wilson for their support and assistance with the Balls Pyramid landing, support and extraction. Jim Smith for his support and invaluable reference documentation of Balls Pyramid climbing history. Melbourne Zoo's Michael McGrath and Kate Pearce for their support and collaboration in preparing for the phasmid survey and in extraction and holding of "Vanessa" the phasmid brought back from Balls Pyramid. Nicholas Carlile of the Office of Environment and Heritage for his support and advice on carrying out the phasmid survey and extraction. Tom Bannigan for his whole hearted commitment and contribution to the expedition and his magnificent footage of the expedition and subsequent video documentary.

Thanks to Australian Museum CEO Kim McKay and Director of the Australian Museum Research Institute (AMRI) Dr Rebecca Johnson for their support of this ambitious project and all the Australian Museum staff involved in the planning and execution of the expedition. In particular Rhiannon Stephens and Jessica O'Donnell for their substantial efforts in organizing the logistics of the Expedition and getting people and equipment to and from the Island; Anthony MacVean for communications and safety logistics; Michel Zwecker and his team for coordinating the fund raising; and the AMRI team of scientists whom contributed to the scientific outcomes of the expedition.

Expedition 2017—teams

Entomology and terrestrial malacology: 5–19 Feb 2017
- Isabel Hyman (Australian Museum)
- Joshua Jenkins Shaw (student)
- Arn Jensen (student)
- Frank Köhler (Australian Museum)
- Chris Reid (Australian Museum)

Ichthyology: 4–11 Mar 2017
- Amanda Hay (Australian Museum)
- Mark McGrouther (Australian Museum)
- Sally Reader (Australian Museum)

Mammals and birds: 10–24 Mar 2017
- Anja Divljan (Australian Museum)
- Mark Eldridge (Australian Museum)
- Sandy Ingleby (Australian Museum)
- Richard Major (Australian Museum)
- Leah Tsang (Australian Museum)

Marine invertebrates and malacology: 25 Mar–3 Apr 2017
- Alex Hegedus (Australian Museum)
- Steve Keable (Australian Museum)
- Elena Kupriyanova (Australian Museum)
- Kara Layton (Western Australian Museum)
- Alison Miller (Australian Museum)
- Mandy Reid (Australian Museum)

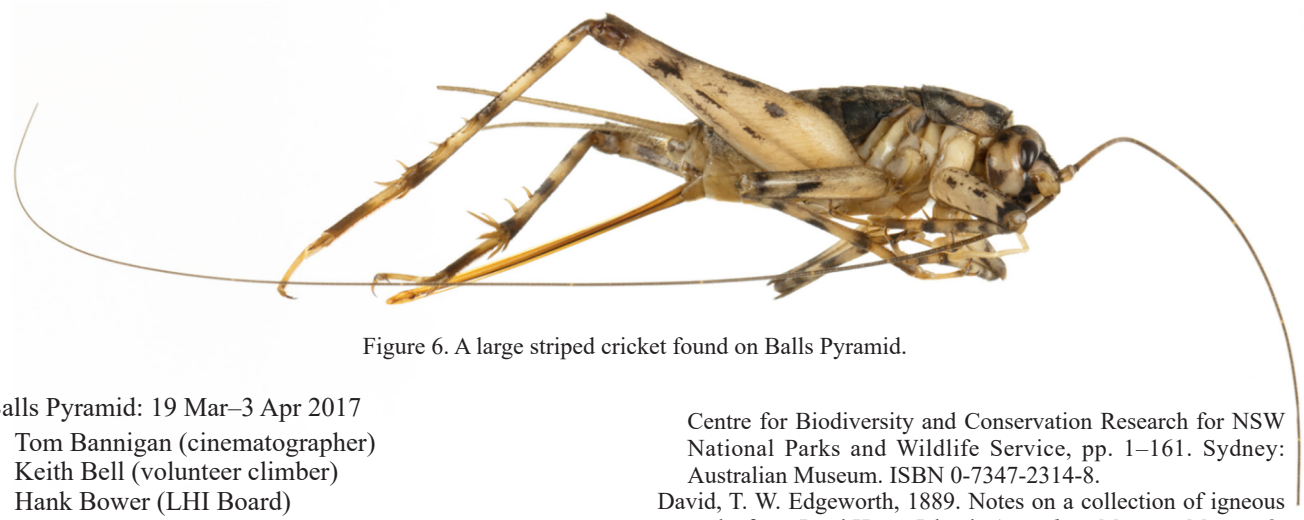

Figure 6. A large striped cricket found on Balls Pyramid.

Balls Pyramid: 19 Mar–3 Apr 2017

Tom Bannigan (cinematographer)
Keith Bell (volunteer climber)
Hank Bower (LHI Board)
Paul Flemons (Australian Museum)
David Gray (volunteer climber)
Frank Köhler (Australian Museum)
Brian Mattick (volunteer climber)
Kate Pearce (volunteer climber)
Paul Priebbenow (volunteer climber)
Zane Priebbenow (volunteer climber)
Vanessa Wills (volunteer climber)

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Scientific research on Lord Howe Island published by the Australian Museum since 1889

More than a century of scientific research on Lord Howe Island by staff of the Australian Museum is digitized and freely available online. Use the Australian Museum scientific publications search engine to locate any work by author, year, title, or keyword. The following works have Lord Howe Island in the title:

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Figure 7. “Vanessa” in her night box.