

VOLUME  
**35**  
NUMBER  
**1**

# explore



*nature*

COLLECTING SHELL STORIES

*culture*

PAINTINGS FROM WEST PAPUA

*discover*

WILDLIFE PHOTOGRAPHER OF THE YEAR

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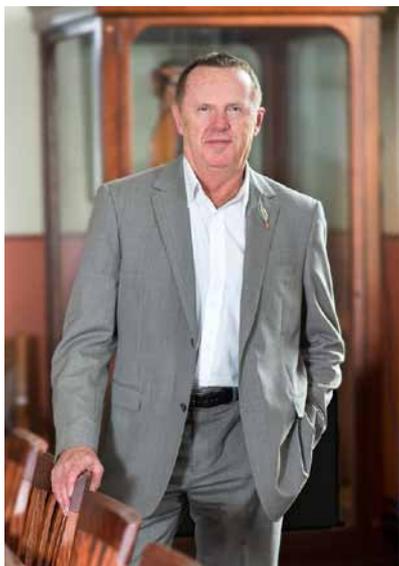
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# telling **STORIES**



People usually assume that museums are primarily collections of objects, but they are not.

Science specimens or cultural artefacts are of no use to anyone if they are kept locked away and preserved safely for 'the future' and never used. Museums are about stories and knowledge, with people using the collections as catalysts and information carriers for those conversations. Museum philosopher Stephen Weil put it simply when he said that museums would re-invent themselves when they realise that they are not about things, but are for people.

## **VISITORS**

We had a telling example of this philosophy recently when four groups of visitors came to the Museum to access the cultural collections – all in one day. First was a delegation from the Northern Territory's Northern Land Council, who wanted to know what objects, stories and knowledge the Museum holds about their heritage and how we might work with them to learn more about their stories and knowledge. The second were visiting artists Barayuwa Mununggurr and Geoffrey Ngurruwuthun from Arnhem Land, who came here to connect Museum visitors with Aboriginal art from their Country, to learn from our collections and add to our stories and knowledge. Next was a wonderful Australian band called the Stiff Gins, also artists-in-residence, who are exploring stories and songs retained in Aboriginal cultural material to develop material for a new CD. Finally, there was Eric Bridgeman, a contemporary artist of Papua New Guinea and Australian heritage whose work explores the rapidly changing culture of that vibrant and sometimes troubled country on Australia's doorstep.

Each of these visitors interacted with the collections in their own way to tell stories and, ultimately, leave the collections all the richer for it.

## **STORYTELLING**

Another group of storytellers in the Museum is our own staff who have learned a thing or two about the collections over the years. To hear Geoscience Collection Manager Ross Pogson bring a meteorite to life (so to speak) or Archives Manager Vanessa Finney speak passionately about Frank Hurley's photographs is one of the great delights of working here.

The value of the Museum's collections resides in these stories that tell how the objects came to be here, how they help us make sense of this world and how they help shape our futures. With this in mind, we are publishing a book later this year that aims to capture some of these stories, people and objects. Project leader Kate Murray talks about the challenges of bringing such a book together in this edition of *Explore* (see page 4). This new publication is just one of several initiatives that continue to bring the Museum's collections to life. Stay tuned for more information about the book closer to the publication date.

## **FRANK HOWARTH**

Director of the Australian Museum

# JANIE'S *legacy*

DO WE ACQUIRE OUR PASSIONS AND INTERESTS FROM OUR PARENTS?

**MICHAEL WATERHOUSE** TRACES HIS FAMILY'S ACHIEVEMENTS IN SCIENCE  
BACK TO HIS GREAT-GRANDMOTHER, JANIE.

On a cool July morning in 1895, an observer would have noted a curious group at Little Manly Cove, peering into pools and turning over rocks on tidal flats. The group – Janie (Mary Jane) Waterhouse and her three sons Athol, Gowrie and Leslie – was making another of its frequent visits to Little Manly to collect cowry shells.

Janie Waterhouse (1853–1935) had been collecting shells for some years. Though lacking formal scientific training, she attached great importance to taxonomy – the classification of species – and meticulously recorded all discoveries in her diary.

In August 1895, exactly one hundred of Janie's specimens, belonging to 17 species of cowry, were displayed at the Linnean Society of NSW, including 11 species not previously recorded from Sydney Harbour.

Over many years, Janie assembled a shell collection remarkable for its size and diversity. It included spectacular specimens acquired from all over the world, with many brought back by her husband, Gus, from his frequent trading trips to the Pacific.

In 1930, she donated her collection to the Australian Museum. But however valuable her donation, Janie left another legacy to future generations. Her innate curiosity about the natural world instilled in her children a strong spirit of inquiry and love of natural history.

## BUTTERFLIES AND BEETLES

Janie's eldest son Athol (1877–1950) attended Sydney Grammar and reportedly spent much time with his brothers browsing in the adjacent Australian Museum. Though he worked at the Royal Mint as assistant assayer from 1900, his real love was butterflies. He'd begun collecting them as a boy and over many years undertook extensive taxonomic research, resulting in more than 50 scientific papers.

He co-authored the groundbreaking book *Butterflies of Australia* with George Lyell in 1914 and in 1932 wrote a further volume, *What Butterfly is That?*, with illustrations by Neville Cayley. Among his many scientific affiliations, Athol was an honorary entomologist at the Museum and became a Trustee in 1927,

even serving briefly as President in 1930. He donated much of his butterfly collection and library to the Museum.

As Janie had taken her children cowry collecting, so years later Athol took his nephew Douglas on butterfly collecting trips around Sydney, stimulating his interest in these and other insects.

Douglas went on to become Chief of the Division of Entomology at CSIRO in Canberra where he did much to promote the importance of collecting and studying insects. He is remembered among many achievements for his role in introducing dung beetles to Australia and inventing *Aerogard* insect repellent. Doug was elected a Fellow of the Royal Society in 1967 for his contribution to science.

## CAMELLIAS

Janie's second son Gowrie (1881–1977) was to become a professor of German at the University of Sydney. Also fluent in French and Italian, he did much to promote the literature and culture of all three countries. His other love was horticulture, and he became a leading authority on camellias. His home, Eryldene, in Gordon is now an historic house and garden attracting thousands of visitors annually.

Leslie (1886–1945), a mining engineer, made his name in New Guinea overseeing one of the largest gold mining operations in Australasia. Like his brothers, Leslie had a private passion: photography, in which he took an active interest from an early age. The photos and film footage he took in New Guinea are today in public collections.

Janie's legacy is thus a remarkable one, with her three sons and grandson Douglas in particular making their mark in several fields of natural history. The circle that began with the donation of Janie's shells to the Museum has closed with one of Janie's great-grandchildren – Doug Waterhouse's niece Janet – working in the Museum as a Technical Officer. Her field of interest? Malacology, the study of molluscs, the phylum which includes cowries.

**MICHAEL WATERHOUSE** HISTORIAN

## WEBLINK >

Identify any NSW seashell online at [seashellsofnsw.org.au](http://seashellsofnsw.org.au)



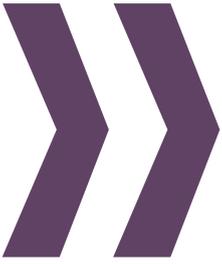
**Left**  
Janie Waterhouse with her shell collection in 1895. Photo courtesy Michael Waterhouse.

**Below**  
The Museum's Janet Waterhouse with Sydney Harbour cowries and a diary holding collection data, donated by her great-grandmother. Photo by Carl Bento.



# *double* DELIVERY





THE MUSEUM'S LATEST BOOK IS SO MUCH MORE THAN A CATALOGUE OF TREASURES, SAYS PROJECT MANAGER **KATE MURRAY**.

For the last 12 months I've been working on a very special project. It's a book about the Australian Museum and, like the Museum itself, the book is unique.

With the working title *Feathers of the Gods*, it's not so much an 'icons' book about the most beautiful or the smallest or the biggest things in the Museum collection, it's a book of stories.

Some objects have incredible stories behind them: who collected them, how they were collected, what difference they made and the trials and tribulations of getting them. In some cases, these stories have never been told before.

#### **WHO IS IT FOR?**

It's a book for Museum lovers: Members, supporters, volunteers and sponsors as well as the many local and international visitors who come through the doors each year.

In fact, Members are supporting the production of the book in a financial sense because income from Member events such as Night Talks has been put towards this project. It's another in a long line of projects that Members have supported, such as funding for dinosaur specimens, research expeditions, *Search & Discover* and so on.

#### **WHAT'S DIFFERENT ABOUT THIS BOOK?**

A lot of cultural institutions are creating this style of book. Some of them – and they're all great books in their own ways – are written by one person. Ours is really different in the people aspect.

#### **Opposite**

Project manager Kate Murray (right), designer Amanda Teer and photographer Stuart Humphreys discuss a shoot in the Museum photography studio. Photo by Carl Bento.

The stories have been selected and written by many different people from across the entire Museum: collections, research, archives, library, conservation and so on.

It's illustrated with lots of photographs. A lot of them have been taken *in situ*, behind the scenes at the Museum – in collection storage areas, the heritage boardroom, the Director's office, the research building and so on. So we're actually showcasing the Museum itself in the images, instead of just the object in isolation. And the photos usually include the people with the objects that are part of their everyday work. In many cases the author of the story will be photographed with an object behind the scenes.

#### **WHAT WERE SOME OF THE CHALLENGES?**

A project of this scale presents many challenges. One of them was choosing what to include. With more than 18 million objects we have a near-unlimited resource to draw from, but knowing what stories can be told takes a lot more work than just knowing the objects.

And because some of the stories are social history, they aren't necessarily noted anywhere but are more anecdotal, just in people's minds. Trying to capture those stories meant bringing together scientific and archival information and asking people to fit the story-writing into their work programs.

We're very happy and grateful for all the people who've contributed to the book and done such a great job.

One of the better known objects in the book is the Hawaiian cloak given to Captain Cook. It's a beautiful cloak made of bird feathers (which is where the idea for

#### **BOOK AVAILABLE LATE 2013**

Check the next edition of *Explore* for updates.

the current working title came from), but photographing this object, like most of the objects in the book, was actually quite complicated. It involved negotiating and discussing what was needed with a whole range of people: conservators, collection managers, authors, designers and photographers.

Multiply that by many objects and it's a fantastic challenge. So there's a lot of work gone into each photograph.

And at the same time as delivering this book I'm pregnant with my second child so it's been interesting juggling this 'baby' at work, and also my baby who'll be born in April 2013!

#### **WHAT'S IN THE BOOK?**

I don't really have a single personal favourite story from the book, but I love the Hawaiian cloak – it's beautiful and very precious – but there are too many objects to say and each has their own essence. For example, there's a story by research scientist Jeff Leis about larval fish and their amazing swimming and navigation abilities ... so many things across so many areas of research.

One of the largest items in the book, if not in the entire Museum collection, is a war canoe from the Solomon Islands. It's so large we can't assemble it onsite for a photograph! We may have to use a heritage or historic image instead, but the big canoe has a great story to tell too.

There are just so many aspects to this book that when I read the stories I often go, 'I didn't know that – that's amazing!'

KATE MURRAY SPOKE TO BRENDAN ATKINS



**Left**

*Fly in amber* by Scott Ginn. This male dolichopodid fly is preserved in Baltic amber (fossilised tree resin) some 40 million years old. The amber preserves fine detail of the specimen such as complex genitalia at the end of its abdomen. Scott's was one of the top ten images in the 2012 *New Scientist* Eureka Prize for Science Photography.

# FLY IN *amber*

I love the detail and dynamic feel in this image, taken by Museum Technical Officer Scott Ginn.

It could almost be a behavioural shot of an insect flying into a headwind, its hairs flowing backwards, and not

trapped in amber at all. You might also think that Nature took the initiative and imaged itself millions of years before people came along and thought of illustrating the natural world.

CARL BENTO MANAGER PHOTOGRAPHY

## 2013 AUSTRALIAN MUSEUM EUREKA PRIZES

What does science mean to you? Capture your answer in a single photograph and you could win a share of \$10,000 in the *New Scientist* Eureka Prize for Science Photography. It's one of 17 prizes on offer in the 2013 Eureka Prizes program.

To see the complete line-up and conditions of entry go to [www.australianmuseum.net.au/eureka](http://www.australianmuseum.net.au/eureka). Entries close 7 pm AEST Friday 3 May 2013.

# musings



## OUR FIRST VOLUNTEER

National Volunteer Week (13–19 May) is a time to acknowledge and celebrate the contributions made by volunteers, especially at the Australian Museum where more than 250 people generously give their time to meet visitors or work behind the scenes.

Our first official volunteer was 20 year-old Hereward Leighton Kesteven, who was grudgingly permitted to assist the conchologist, Charles Hedley, as a volunteer in 1901. Hereward proved to be an invaluable asset and two years later the Museum was to employ him as a technical assistant.

Read more about Hereward Kesteven at [australianmuseum.net.au/BlogPost/Museullaneous/Our-First-Volunteer](http://australianmuseum.net.au/BlogPost/Museullaneous/Our-First-Volunteer)



## EXCELLENCE

The Australian Archaeological Association has awarded Dr Nina Kononenko the 2012 John Mulvaney Book Award for her work *Experimental and archaeological studies of use-wear and residues on obsidian artefacts from Papua New Guinea*. Archaeologists have heaped praise on the work for its practical and theoretical approaches that allow reconstructions of human behaviour over time to be substantiated or challenged.

You can find Nina's book at [australianmuseum.net.au/journal/Kononenko-2010-Tech-Rep-Aust-Mus-Online-21-1244](http://australianmuseum.net.au/journal/Kononenko-2010-Tech-Rep-Aust-Mus-Online-21-1244)



## MENAGERIE RETURNS

*Menagerie* features 68 contemporary animal sculptures by leading Indigenous artists alongside framed works by award-winning artist Danie Mellor and 14 traditional bark paintings from the Museum's collections. *Menagerie* is the first exhibition to feature in the Museum's newly redeveloped *Indigenous Australians* gallery.



## FAREWELL

The Australian Museum would like to acknowledge the passing of Patricia (Pat) Dent who generously entrusted a collection of artworks and objects from the Anindilyakwa people of Groote Eylandt to the Museum's collection in 2005. Our sympathy and thoughts are with her family, in particular Rod and Robyn Dent, at this sad time.

Pat received the objects – which included bark paintings, spearheads, a stone axe and wooden and bark containers – as a gift from the Anindilyakwa people while serving as a missionary on Groote Eylandt, Northern Territory. The Australian Museum gratefully acknowledges the generosity of Pat and her family.



**Above**  
*Butterfly* by Marina Murdilinga, 2009.  
 Twined pandanus fibre,  
 143 x 128 x 5 cm.  
 Courtesy of the artist  
 and Maningrida Arts  
 and Culture.



HERPETOLOGIST **DR JODI ROWLEY** HAS DISCOVERED AND NAMED 12 NEW SPECIES OF FROGS OVER THE LAST FOUR YEARS, BUT HER LATEST DISCOVERY HAS A VERY SPECIAL PERSONAL MEANING.

# *helen's* FLYING FROG



To discover previously unknown species of frogs in South-East Asia, my colleagues and I typically have to climb rugged mountains, scale waterfalls and push our way through dense and prickly rainforest vegetation.

Yet there we were in a patch of lowland forest less than 120 kilometres from Ho Chi Minh City, a city twice the size of Sydney and one of the largest in South-East Asia.

Unlike montane rainforest, this habitat was far from pristine: criss-crossed by a network of tracks made by people and water buffalo, and completely surrounded by a sea of rice-paddies.

## **PARACHUTE**

Initially, the survey was going just as expected. Most of the frogs we were seeing were well known and widely distributed – the kinds of frogs that don't mind living in a rice paddy.

That doesn't mean we were unhappy to see them, to document their abundance and habitat preferences or record their unique advertisement calls, but seeing them certainly didn't excite us as much as seeing a frog we'd never seen before.

But there it was: sitting on a fallen tree right next to a well-worn trail through the forest: a large, bright-green frog. Its enormous webbed hands and feet identified it immediately as a 'flying frog' – a group that spends most of its time in the trees and uses its webbed hands and feet like a parachute to glide from tree to tree or descend to the forest floor.

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## **WHY HELEN'S FLYING FROG?**

While we were still deciding what to name the new species, my mum, Helen Rowley, was diagnosed with ovarian cancer, and I thought it was about time that I showed her how much I appreciate everything she's done for me, supporting me, her daughter and only child, trekking through the forests of South-East Asia in search of frogs (including when I contracted scrub typhus during fieldwork and she almost had to get me evacuated from Vietnam).

So we chose to name it Helen's Tree Frog, *Rhacophorus helenae*, in her honour. We also thought that the name Helen, and its Latinised form *helenae* sounded regal enough for such an impressive frog.

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### **Opposite**

Jodi and Helen Rowley. 'Having a frog named after me was a lovely surprise!' Helen said. Photo by Carl Bento.

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### **Above**

Helen's Flying Frog, Photo by Jodi Rowley.



#### Left

Lowland forest habitat where Helen's Flying Frog was first discovered. Clearing and degradation of habitat is the greatest threat to amphibians throughout South-East Asia. Photo by Jodi Rowley

#### Right

Front view of Vampire Flying Frog tadpole's head showing fangs. Photo by Jodi Rowley

### CANOPY

At first I thought it was the Black-webbed Flying Frog, *Rhacophorus kio*, a species I'd never seen, which was exciting enough. But on closer inspection, it lacked the yellow belly and yellow 'whites' of the eyes (sclera) characteristic of this species. Instead, it had a creamy white belly and bright white sclera, along with other less obvious differences in colour, pattern and skin folds.

At almost 10 centimetres long, it was big. Yet in ten nights of surveying this forest patch, we found no other individuals of this new species. It was likely evading us, as it had evaded biologists until now, by spending most of its time out of sight in the canopy of large trees.

We'd just been lucky enough to stumble upon a single individual while it was on a rare trip to ground level, but with only one specimen we weren't sure we'd be able to prove it was a different species.

Fortunately, at around the same time, my Vietnamese colleague Dao Thi Anh Tran found a small group of similar frogs while surveying another isolated patch of forest even closer to Ho Chi Minh City, this time near a muddy puddle on a roadside.

Comparing all the newly found individuals (using a combination of morphology and genetics) with specimens of the Black-webbed Flying Frog and other flying frogs allowed us to confirm that this was indeed a new species.

### RHINOCEROS

To date, Helen's Tree Frog is known only from those two patches of lowland forest in the middle of agricultural land not that far from Ho Chi Minh City. But lowland forest is accessible and easily cleared, ranking among the most threatened of habitats, and so the new species is at great risk.

A slightly larger and more obvious species reliant on lowland forests, the Javan rhino, *Rhinoceros sondaicus*, was confirmed extinct in Vietnam in October 2011. We truly hope that we've discovered Helen's Tree Frog in time to help protect it and the forests it relies on.

DR JODI ROWLEY SCIENTIFIC OFFICER



### FANGS FUNCTION FOUND

Jodi Rowley's previous discoveries include the Vampire Flying Frog, *Rhacophorus vampyrus*, discovered in 2010 – the only species known to have fanged tadpoles.

'The tadpoles were so strange that in 2010 my colleagues and I decided to name the newly discovered species to which they belonged after them. And so the Vampire Flying Frog was named', she said.

'Known only from cloud-forests on the Lang Bian Plateau in southern Vietnam, the adults are "flying frogs". They don't even come down to the ground to breed in ponds or streams, but lay their eggs in tiny, water-filled tree-holes.

'We've now had a chance to examine their anatomy quite thoroughly to reveal that the fangs are another adaptation for arboreal life. They've had to adapt to living in tiny amounts of water and little food, crammed in with their siblings.

'Their strange fangs and weird appearance are likely adaptations for egg-eating (oophagy), with their mothers returning to feed them unfertilised eggs.

'So, despite the scary name, Vampire Flying Frogs actually make great mothers!'

#### Further reading

JJL Rowley, DTA Tran, HD Hoang & DTT Le, 2012. A new species of large flying frog (*Rhacophoridae: Rhacophorus*) from lowland forests in Southern Vietnam. *Journal of Herpetology* 46: 480-487.

JJL Rowley, DTA Tran, DTT Le, HD Hoang & R Altig, 2012. The strangest tadpole: the oophagous, tree-hole dwelling tadpole of *Rhacophorus vampyrus* (*Anura: Rhacophoridae*) from Vietnam. *Journal of Natural History* 46, 47-48.

# on the RECORD

## STREAMWATCH AT THE MUSEUM

Streamwatch arrives at the Australian Museum! Sydney Water's Streamwatch, which for 20 years has played an important role in investigating and caring for the local environment, has now joined the Museum's science outreach program. Streamwatch groups of community volunteers test and monitor the water quality of our local waterways and collect the data. The information provides an early warning system for pollution events and a record of environmental changes. Groups are active across Sydney and in the Blue Mountains, Illawarra and Southern Highlands.

Find out how to get involved at

[www.australianmuseum.net.au/Streamwatch](http://www.australianmuseum.net.au/Streamwatch)

## SNAILS BY HELICOPTER

Museum scientists have completed a comprehensive survey of land snails inhabiting arid limestone outcrops in the Northern Territory – by helicopter. Museum Research Associate Vince Kessner and Dr Michael Braby from the NT Museum and Art Gallery, Darwin, visited more than 100 sites to collect the snails – a trip that would have been impossible by land. Examination of the samples revealed 13 new species with restricted ranges. 'We understand very little about the fragility of Australia's more arid habitats', said co-author Dr Frank Köhler. 'There are lots of potential threats – fires, pastoralism, feral animals, weeds, climate change – and we now know that even local disturbances may have detrimental impacts on some wildlife. This study indicates just how incomplete our knowledge of Australian invertebrates still is.'

**Further reading** F Criscione, ML Law and F Köhler, 2012. Land snail diversity in the monsoon tropics of Northern Australia. *Zoological Journal of the Linnean Society*, 2012, 166, 689–722.

## MARINE WORM INVADERS

Australia's marine environment is under constant siege from marine pests. Transported in bilge water and on the hulls of cargo ships, these bio-invasers can displace native species from their habitats and damage our fishing, aquaculture and tourism industries. There are over 100 known invasive marine worms (polychaetes), and early detection is paramount. To counter this threat, the Museum is producing a digital guide for use by non-specialists – environmental consultants, fisheries staff, quarantine officers and port authorities. The guide, partly funded by the Australian Museum Foundation, will be presented at a pre-conference workshop of the 13th International Polychaete Conference being hosted by the Australian Museum this August.

Find further information on the polychaete conference at [www.ipc2013.com.au](http://www.ipc2013.com.au).



### Above

*Exiligidada rivifontis*, one of 13 new species of land snail discovered in the remote Victoria River region of the Northern Territory by Australian Museum scientists. Photo © Vince Kessner.

### MEMBERS

Members can meet polychaete scientists at a special Night Talk on Thursday 8 August. Bookings, phone 02 9320 6225.

# DISTURBING *the peace*

MARINE BIOLOGIST DR **VANESSA MESSMER** HAS FOUND THAT THE ICONIC CORAL TROUT MAY BE REACHING THE LIMITS OF ITS TOLERANCE TO THE WARMING OCEANS.



To the well-heeled gourmet traveller, Lizard Island Resort is a luxury oasis, its wooded slopes gently descending to the white sandy beaches and waters of the Great Barrier Reef.

‘It’s easy to be lulled into the deep peace that comes with being in your own beautiful world’, claims the resort’s website. The resort is one of only two developments on this remote island, a national park situated 270 kilometres north of Cairns.

A three-kilometre stroll from the resort lies a very different development: the recently refurbished Australian Museum Lizard Island Research Station. Since 1973, many hundreds of barefoot scientists have made their way to the research station from all over the world to conduct research on the reef ecosystem.

And for these visitors, there is trouble in paradise.

## LIVING CORAL

‘Climate change is increasingly a threat to coral-reef ecosystems and their associated reef-dwelling animals’, said Dr Vanessa Messmer, a marine biologist from the ARC Centre of Excellence for Coral Reef Studies at James Cook University in Townsville.

Research on the Great Barrier Reef by Eureka prize-winner Professor Ove Hoegh-Guldberg from the University of Queensland has already shown that rising sea surface temperatures lead to the loss of living coral.

‘Coral bleaching is affecting coral reefs worldwide, with obvious consequences for reef-dwelling organisms’, Vanessa said. ‘As the oceans continue to warm, it’s only going to get worse.’

Vanessa is part of a larger research team looking at the effects of climate change on Common Coral Trout, *Plectropomus leopardus*.

‘Climate change is affecting coral reefs in many ways. We want to know how it affects this species both indirectly – by bleaching and degrading the reef habitat – and directly by increasing water temperatures.’

## FISHERY

Little is known about the habitat preferences of coral trout at the crucial settlement stage. This large predatory fish grows to 75 centimetres and sustains the largest finfish fishery on the Great Barrier Reef, yielding an annual catch of around 1000 tonnes.

‘We know that the coral trout spawns into the water column and its buoyant eggs then drift with ocean currents, hatching and

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**Right**

Dr Vanessa Messmer with a coral trout at Lizard Island. Photo © Andrew Tobin.

**Far right**

The Common Coral Trout, *Plectropomus leopardus*, struggles to survive as temperatures increase. Photo © Vanessa Messmer.

**Opposite**

Australian Museum Lizard Island Research Station. Photo © Charlie Shuetrim.



developing into larval fish (which by the way are active swimmers). After around 30 days, the fish larvae locate and swim towards nearby reefs where they can settle and grow', said Vanessa.

'But we don't know what kind of habitat these larvae need to settle on and to what degree they depend on live coral. We also want to know how the fish is directly affected by temperature increases at different stages during its life.'

**WARMING**

Vanessa and colleagues visited the research station throughout 2012 to capture juvenile and adult fish and keep them in temperature-controlled tanks.

'People have studied smaller reef fish but each species will respond differently to ocean warming. Basically, we were able to measure the metabolic rate of larger coral trout at different temperatures. We are still analysing the data, but the main result seems to be that the coral trout is already beginning to struggle at 30 degrees', she said.

'Its resting metabolic rate increases at higher water temperatures, which means it needs more energy just to stay alive and maintain basic body functions, such as respiration. This can leave less energy available for other activities, such as feeding, avoiding predators and reproduction.

'This may already be a challenge in the northern part of the fish's range where water temperatures can exceed 30 degrees and it becomes a problem if these higher temperatures are experienced over longer periods.

'We are concerned that coral trout may not be able to adapt to the kinds of increases being predicted for the Great Barrier Reef – up to 3 degrees this century.'

**RESEARCH FELLOWSHIP**

Vanessa's work at Lizard Island is supported by the Isobel Bennett Marine Biology Fellowship, one of several research fellowships offered each year by the Australian Museum and funded by the Lizard Island Reef Research Foundation.

'The fellowship has allowed me to explore some of these questions further especially the habitat component, to see whether they settle on living or dead coral. We'll be going back to the island in March to look at this question more closely.

'I'm curious and in awe about the natural world', said Vanessa, 'and am interested in applying knowledge towards a sustainable world.

'Our work shows how climate change will likely affect this iconic reef fish. Any action to slow the rate of global warming can't come soon enough for this and probably many other species.'

Now there's a message to disturb the deep peace of any gourmet traveller.

**BRENDAN ATKINS** EDITOR

Applications for fellowships to conduct research at Lizard Island close in August or September each year. Find out more at [australianmuseum.net.au/Lizard-Island-Fellows](http://australianmuseum.net.au/Lizard-Island-Fellows).

**WEBLINK >**

Donations to the Lizard Island Reef Research Foundation are tax deductible. Visit [australianmuseum.net.au/The-Lizard-Island-Reef-Research-Foundation](http://australianmuseum.net.au/The-Lizard-Island-Reef-Research-Foundation) for further information.

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**MEMBERS EXCLUSIVE!**

Visit the Australian Museum Lizard Island Research Station – details, page 36.

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# ouch!

## AN ISOPOD GRABBED MY TONGUE!

BITING YOUR TONGUE TAKES ON A WHOLE NEW MEANING WHEN IT COMES TO THESE PARASITES, SAYS MARINE BIOLOGIST **MELISSA BEATA MARTIN**.



*“Some species have lost functional eyes, since there’s no need to ‘look around’ once they are attached”*

### Above

This tongue biter in the genus *Ceratothoa* is around 15 mm long. Photo © Niel Bruce and Melissa Martin.

### Opposite

*Ceratothoa* sp. from the mouth of a Yellowtail Scad, *Trachurus novaezelandiae*. Photo © Megan Stride and Barbara Nowak.

Imagine yourself as a Common Jack Mackerel, swimming peacefully along the coast of New South Wales. Then, out of nowhere, an alien-looking crustacean enters your mouth through your gills, gets hold of your tongue and won't let go. Slowly it sucks away the blood until it eventually *becomes* your tongue. You can't remove it so you're stuck with it – forever!

For some fish, this is a nightmare that just got real. Those alien creatures exist, and they're called tongue biters – parasites that live in the mouths of fishes.

### TONGUE BITERS IN AUSTRALIA

I first became interested in tongue biters in my early years as a marine biologist when I took a course in marine parasitology. It was in this class that I saw my first tongue biter, and it was love at first sight.

I was lucky enough to be awarded a scholarship from the Malaysian government to do a four-year research degree at the National Centre for Marine Conservation and Resource Sustainability and Museum of Tropical Queensland. My research aims to review the taxonomy (classification, or defining organisms according to shared characteristics) of tongue biters in Australia.



Tongue biters are isopods (a type of crustacean) belonging to the family Cymothoidae. This whole family consists of fish parasites, some of which attach to the fish's mouth, others to the gills and fins, while others burrow into the flesh. They're found on hundreds of species of marine and freshwater fishes throughout the world's tropical and temperate regions.

Two of the more common mouth-attaching genera are *Ceratothoa* and *Cymothoa*. According to the Zoological Catalogue of Australia, six out of 29 *Ceratothoa* species and 13 out of 47 *Cymothoa* species are known from Australian waters on a wide range of fish hosts.

During my recent Geddes Postgraduate Award working with the Australian Museum's collections I've discovered four *Ceratothoa* species and probably five *Cymothoa* species new to Australia. This increases the known diversity of the Australian region and gives us a better resolution of host-preference and distribution patterns. So my time here has certainly been worthwhile.

#### THE MODIFIED ALIEN

These alien-looking parasites are adapted to a life of what an Australian might call bludging. After entering through the gills, the tongue biter hooks onto the fish's tongue. Its seven pairs of strongly hooked legs cut off the blood supply, causing the tongue to degenerate, while anchoring the parasite against the currents. A thickened, calcified cuticle protects its slender, tapered (streamlined) body from abrasion. And there it stays, serving as a mechanical replacement for the tongue. Some species in genus *Cymothoa* have lost functional eyes, since there's no need to 'look around' once they are attached.

#### IT'S COMPLICATED

If their appearance seems strange, their life history is downright complicated. Cymothoids are protandrous hermaphrodites; in other words, all juveniles are males before developing into adult females.

The female releases up to a hundred eggs at a time into a brood pouch on the underside of its abdomen. The eggs hatch and undergo two or more moults to form juveniles which are released into the water to seek out a suitable host. The first male

to parasitise a fish will change into a female whereas subsequent males attaching to the same fish remain male, possibly from a pheromone released by the female.

Depending on where you live, you might never come across a cymothoid parasite, though they can be a nuisance in some fish farms and often turn up in recreational catches. And while a parasitised fish mouth may not look very appetising, the fish is safe to eat. Just remove the parasite before cooking and try not to think about it.

MELISSA BEATA MARTIN GEDDES POSTGRADUATE FELLOW

Melissa is enrolled at the National Centre for Marine Conservation and Resource Sustainability, University of Tasmania and is based at the Museum of Tropical Queensland, Townsville. She is supervised by Dr Niel Bruce and Prof Barbara Nowak.

#### WEBLINK >

Applications for the Museum's visiting fellowships are now open, closing 31 May 2013. Details: [australianmuseum.net.au/Awards-Fellowships](http://australianmuseum.net.au/Awards-Fellowships)

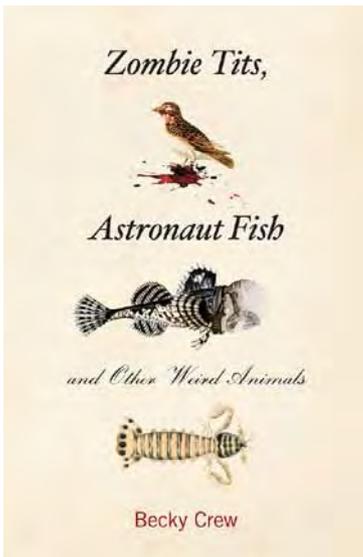
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#### Further reading

Brusca, RC & Gilligan, MR, 1983. Tongue replacement in a marine fish (*Lutjanus guttatus*) by a parasitic isopod (Crustacea: Isopoda). *Copeia*, 3, 813–16.

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# reVIEW



## THE BEST AUSTRALIAN SCIENCE WRITING 2012

edited by Elizabeth Finkel  
NewSouth, 2012

How does science impact your day? Astrophysics? Climate change? Killer viruses? Whatever strain of research you find Quite Interesting, there's something for you in *The Best Australian Science Writing 2012*. Shortlisted from entries to the inaugural Bragg UNSW Press Prize for Science Writing, this anthology showcases the science of today.

Journalist Jo Chandler is this year's Bragg Prize winner with *Storm front*, which examines our collective inability to respond meaningfully to climate change. But not all contributors are professional writers. Epidemiologist Frank Bowden reveals just how close we came to a pandemic meltdown during the swine 'flu epidemic of 2009, while oncologist Ranjana Srivastava writes about maintaining balance in her emotionally demanding job.

All of these articles have appeared in print or online, but if you missed them first time around, here is your chance to digest the latest from Australia's leading research communicators.

BRENDAN ATKINS

### WEBLINK >

Look out for the 2013 anthology – entries close 31 March.  
Details [newsouthpublishing.com/scienceprize](http://newsouthpublishing.com/scienceprize)

*“you're sure to find plenty to intrigue you in this book”*

## ZOMBIE TITS, ASTRONAUT FISH AND OTHER WEIRD ANIMALS

by Becky Crew  
NewSouth, 2012

This is an excellent book for getting people interested in the quirkiest side of nature. Each chapter is a short, stand-alone story about an animal, or group of animals, with odd or unusual biology or behaviour. Some include a sketch of the animal and many have a short, humorous paragraph or two about what the animal's life would be like if their world was like ours.

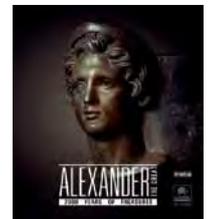
The style is informative, lively and entertaining, and it all seems well researched (there's even a bibliography), but there's an occasional lapse. For example, 'Battle of the genitals' starts: 'Most birds, amphibians, reptiles and monotremes don't have one [a penis]'. Well, yes, most lizards and snakes have two, and of the other reptiles only New Zealand's Tuatara lack penises, while monotremes notoriously have very strange multi-headed penises.

Yep, it's a strange world, and you're sure to find plenty to intrigue you in this book.

MARTYN ROBINSON

## MUSEUM SHOP

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*Alexander the Great:  
2000 Years of Treasures.*  
RRP \$29.95



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Send your query to the Search & Discover team, email [sand@austmus.gov.au](mailto:sand@austmus.gov.au)

# search > DISCOVER



**Q.** *That is the biggest caterpillar I have ever seen! What is it?*

The caterpillar of the White-stemmed Gum Moth, *Chelepteryx collesi*, can reach 12 centimetres in length, one of the largest in the world. Banded in grey and black with yellow spots, it is covered with tufts of reddish-brown spiky bristles.

Also known as the Prickly Gum Moth, its bristles are easily dislodged, yet are strong enough to penetrate human skin and cause painful irritations. It's a good idea not to handle the caterpillar or their shed skins. The camouflaged cocoon is hazardous too, with bristles in the tough silk walls able to cause irritation years after the caterpillar has pupated.

The adult moths are sometimes mistaken for bats, with the female wingspan reaching 16 centimetres and the male only slightly smaller. But, lacking functional mouthparts, they live for just two or three days after emerging around May each year – just enough time to mate and lay their eggs.

LAUREN MCDONALD

The caterpillar of the White-stemmed Gum Moth is one very prickly customer. Photo by Melissa Murray.



**Q.** *What are these insects doing swarming in my garden?*

Many people contact us at this time of year about beetles swarming in gardens and around houses. The colourful, soft-bodied culprit is known as the Plague Soldier Beetle, *Chauliognathus lugubris* (family Cantharidae). The Plague Soldier Beetle earned its common name not because it brings or spreads dangerous plagues, but because it forms huge swarms during mating season when vast numbers of beetles can appear on plants.

The larval beetles live on the ground where they prey on other insects. The adults are omnivorous, feeding on both other insects and plants, and can release poisonous chemicals to deter predators when handled or threatened. But don't be too concerned if you have a swarm in your garden: the beetles are more interested in mating than eating plants and will tend to disperse afterwards.

JAYME-ANN DEMENY

Plague Soldier Beetles form huge swarms. Photo by Dave Britton.



**Q.** *I have found a lizard in my backyard that appears injured. Can I take care of it and keep it as a pet?*

Many native animals (including all reptiles) are protected in New South Wales, so it is illegal to remove a wild lizard from its habitat, even if the habitat is your backyard!

You should contact a wildlife rescue group if the animal is injured or sick. Most wild animals do not adjust to captivity as well as captive-bred animals and so taking the animal out of the wild can often stress the injury further.

Most vets will not charge you to treat wildlife in need and they can pass the injured animal on to a licensed carer. You can legally keep reptiles such as lizards by first obtaining a wildlife keeper's licence and researching what the species needs.

CHRIS HOSKING

WEBLINK >

Find out more about keeping reptiles as pets at [australianmuseum.net.au/Reptiles-as-Pets](http://australianmuseum.net.au/Reptiles-as-Pets)

Eastern Water Dragon, *Intellagama lesueurii lesueurii*. Photo by Steve Vogel.

**MARTYN ROBINSON**  
IS THE MUSEUM'S  
RESIDENT NATURALIST

# BROKEN SLEEP

When I was a child in suburban Sydney there were a number of insects which you only ever saw in summer if the summer was very hot and the winds were from the north or north-east.

Now many of these insects are to be found every summer and sometimes at other times of the year too. One of these is the Common Crow butterfly, *Euploea core corinna*.

It's the caterpillar and – even more so – the pupa (chrysalis) of this species that usually attracts everyone's attention. The caterpillar is stripy with six tendrils rising from its body, and the chrysalis is an almost unphotographable blob of mercury silver or shining gold. To top it off, the caterpillars are often found feasting on highly poisonous Oleander shrubs.

The adult butterfly by contrast is a dingy dark colour with white spots – not a showy insect in comparison with its earlier life stages. This doesn't mean, however, that it isn't interesting. For a butterfly, it is very interesting! It is one of the butterflies that 'hibernates' through the winter months.

Butterfly hibernation isn't quite the still, cryptic state of torpor found in other animals. Most hibernating butterfly species hang in clusters exposed among the foliage of selected trees, and on warm winter days they will fly about for short distances, perhaps visiting a nearby creek bank to drink before returning to their roost.

The Common Crow is one of these and has long been known to form clusters numbering from about a dozen to a hundred or more around Brisbane and further north. Nowadays these



**Left**

Common Crow butterflies clustering in winter along a dry creek bed near Charters Towers, 100 km southeast of Townsville, Qld. Photo © Elly Scheermeyer.

**Opposite**

A male peacock spider, *Maratus volans*, displaying his finery to a potential mate. Photo © Jürgen Otto.

clusters, though smaller than in the north, can be found as far south as Sydney.

They are an annual occurrence in certain areas and are most common near wet, rocky overhangs. When springtime comes around, the clusters disperse and the butterflies are off to an early start, ready to find food and breed while the eggs of other butterfly species are still hatching.

It is tempting to regard these overwintering clusters as yet another sign of climate change – and they may well be – but a simpler explanation is that urban areas tend to be warmer during winter because of heat stored in concrete and radiation

from homes such that quite a few suburban areas no longer experience winter frosts (deadly to butterflies).

It is from these frost-free areas that the butterflies find their overwintering spots and they are still absent from frost-affected areas. Mind you, it could be just a matter of time before frost itself becomes a distant memory.

**WEBLINK >**

Explore Common Crow biology at [abc.net.au/science/articles/2000/07/20/2689015.htm](http://abc.net.au/science/articles/2000/07/20/2689015.htm)

# MY 2013 CALENDAR

Most years I have a calendar on my wall with nice monthly photographs of natural history subjects. This year's is particularly spectacular – and unusual – for all the images are of spiders.

Not just any spiders either, but members of a single genus of native Australian spiders which combine brilliant gaudy colour, unusual flamboyant behavior, extreme sexual dimorphism and tiny size. They are known as peacock spiders and are now placed in the genus *Maratus*.

When they were first described, it was noted that the male spider possessed tiny flaps that folded around the sides of his colourful abdomen. What could these flaps be for? Well, they resembled the gliding membranes of gliding possums and 'flying' squirrels, and one early anecdotal report claimed they'd been seen to help the spider glide. In fact, an earlier name for the species was *Attus volans* – the Flying Spider.

The puzzle didn't end there – every single specimen found was a male. Obviously the female must look different to the male, as there were no obvious female specimens with such flaps and colours, despite searches in areas where males had been found. Even the males, at around 4–5 mm, were not easy to find.

It was not until recently that Jürgen Otto was to identify and photograph the female of the species and prove that the male's flaps are not for gliding but a colourful courtship display. When unfurled the flaps form a fan like a peacock's tail and are similarly brandished in courtship display, leading to the whole genus now being called peacock spiders. This behaviour was described – and ignored – way back



in 1957 by RA Dunn for a related species, and it was Dunn who coined the term 'peacock spiders'.

Initially there were very few species named but recent research by Jürgen Otto, David Hill, Julianne Waldock and some enthusiastic amateur photographers has revealed more than 22 species so far. Many have spectacular displays, abdominal flaps and different patterns in the males as well as drab-coloured females.

The reason for these patterns becomes obvious when you consider that in one small area there may be several species of these tiny brightly coloured spiders.

The males will display to females of other species, and so presumably it is up to the female to determine which male is the correct species for her to mate with. And what better way to do this than check out his colour patterns and distinctive courtship dance?

The males on the other hand must get things right – even if he is courting the correct female of his species, he could still end up as dinner!

#### WEBLINK >

Find more of Jürgen Otto's photographs on flickr.com

# SHELL *surprise*

ARCHAEOLOGISTS AND ANTHROPOLOGISTS ARE ALWAYS ON THE LOOKOUT FOR NEW WAYS TO UNLOCK THE HIDDEN SECRETS OF CULTURAL COLLECTIONS, WRITES **SCOTT MITCHELL**.

**Opposite**  
Robin Torrence and Scott Mitchell with Massim artefacts. The carved cone shell is in the foreground. Photo by Carl Bento.

Over recent years the application of new technologies to Museum objects has yielded surprising clues on topics as diverse as climate change, prehistoric trade and even species extinction. One such surprise has recently emerged from research into the Australian Museum's collection of carved Massim objects from eastern New Guinea.

## CONE SHELLS

The Massim art style, one of the major art regions of New Guinea, came to the world's attention in Alfred Haddon's 1894 book *The Decorative Art of British New Guinea*. Despite the book's dry, detached prose, it is easy to detect Haddon's enthusiasm as he writes about the technique, precision and symmetry of this distinctive art.

The origins of the Massim style intrigued but eluded Haddon, who concluded that '... its unravelment would be an exceedingly difficult, and perhaps impossible, task.' Ironically, part of the answer was close to hand.

Just after Haddon led an expedition to Torres Strait in 1898, missionaries at nearby Collingwood Bay in Papua New Guinea found a series of carved cone (*Conus*) shells in an ancient midden site. Scholars immediately recognised the highly stylised spiral, concentric circle and scroll motifs on the shells for their artistic value and similarity to modern Massim woodcarvings. Six of the shells were donated to the Australian Museum to be safely stored for more than a century.

## DATING

Then in 2009 a team of scientists led by Dr Pamela Swadling from the Australian National University, hoping to shed light on the antiquity and origins of Massim art, approached the Museum with a request to use radiocarbon dating on the carved cone shells.

For the Museum this posed a serious dilemma. We were excited at the potential to explore an important and long-standing research question. We also knew, however, that radiocarbon dating would destroy a piece of the shell as the technique involves bathing samples in acid, grinding them up and burning them in a furnace.

Museum archaeologist Dr Robin Torrence helped to broker a compromise. One of the shells had been broken in the prehistoric past exposing part of its undecorated central spire. It would be possible, Robin argued, to remove a small sample of the central spire (modern dating techniques require just 80 milligrams of sample) without disfiguring the artwork.

With the assistance of ANU's Dr Wallace Ambrose, the research team then applied recently available 3D scanning and casting technology to create and replace an exact replica of the sampled piece. The Museum Trustees agreed with this proposal and granted permission for the sampling and reconstruction to proceed.

## ORIGINS

'We had no idea how old the engravings might be', said Robin, 'so we were both surprised and excited when radiocarbon dating showed the shell to be between 500 and 600 years old.'

Three carved shell fragments from other collections returned dates in the range of 600–800 years, making these carved shells the earliest radiocarbon-dated examples of Massim art. Taken together, the results indicate that the Massim art tradition, still alive today, has a long history indeed.

Still to be explained however, is the timing of the art style's appearance, which coincides with changes in long-distance trade and cultural links between island and mainland communities in the region. Were the engraved designs influenced by contact with new and distant communities?

Alfred Haddon's question more than a century ago is still only partly answered. Like him, we can only guess what answers museum collections will make possible in the future.

**DR SCOTT MITCHELL** HEAD OF CULTURE CONSERVATION AND BUSINESS SERVICES

## Further reading

W Ambrose, F Petchley, P Swadling, H Beran, E Bonshek, K Szabo, S Bickler & G Summerhayes, 2012. Engraved prehistoric *Conus* shell valuables from southeastern Papua New Guinea: their antiquity, motifs and distribution. *Archaeology in Oceania*, 47, 113–32



# CONTESTING IDENTITY

## *paintings from Lake Sentani*

BARKCLOTH PAINTINGS FROM THE MUSEUM'S COLLECTIONS HIGHLIGHT CULTURAL TENSIONS IN WEST PAPUA, SAYS **YVONNE CARRILLO-HUFFMAN**.

The paintings known as *maro* are among the most striking to be found in Melanesia, and some of the finest designs come from Sentani, a freshwater lake district in the vicinity of Jayapura, the provincial capital of West Papua.

Sentani maro has been interpreted by Europeans since the 1920s as an 'art form', and the beautiful and intricate designs certainly give the viewer an impression

of fluidity and movement. But to Papuans the designs have both a functional and spiritual role associated with their cosmology, animals, spirits and environment.

### SENTANI MARO PAINTINGS

Traditional maro (painted barkcloth) was produced by women from the beaten bark of fig trees. Decorated maro was worn by initiated girls, while married women wore maro waistcloths. Maro was also worn by men in ceremonial dances, hanging from the waist-belt.

The arrival of European colonial administrators and missionaries in the nineteenth century dislocated the production and use of barkcloth and it was gradually replaced with cotton. Knowledge of barkcloth production has been revived at different times in Sentani history (such as in the 1930s, 1970s and 1990s) and today the Hamadi markets of Jayapura offer both traditional, hand-painted examples created by Papuans and cheaper, stencilled versions painted by non-indigenous migrants.

Papuans and a growing migrant population from across the Indonesian archipelago live in the Sentani area but only Papuans live on the islands in the lake, the main one being Asei, where the paintings are known as *malo*.

### DESIGNS, COSMOLOGY AND LANDSCAPE

During a personal visit to the region in 2009, I was able to collect examples of *malo* and *maro* and meet with the artists



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**Opposite**

*Jarapo, protector of the sea* by Mbra Mbra, Tobati, Humboldt Bay, Jayapura, West Papua, 2009. Mbra's paintings are simplistic in their composition and stylistic designs, and they feature locally known spirit figures. Photo by Carl Bento. E93830

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**Top**

Detail of an Ondoafi (village chief) daughter's large wooden women's kaji (canoe) and decorated carved paddle covered with spiral-form motifs and fish designs from Ayapo island, Lake Sentani. Photo by Yvonne Carrillo-Huffman, 2009.

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**Centre**

Untitled painting (detail) by John Ohee, Asei, Lake Sentani, West Papua, 2009. The *fouw* is one of the most important motifs in Asei and is found in many carved objects such as bowls and gourds from the area. Australian Museum collection. Photo by Carl Bento. E93823

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**Bottom**

Schoolgirl Ruth Pow decorating her father's malo designs to sell to tourists. Asei Island, Lake Sentani, West Papua, 2009. Photo by Yvonne Carrillo-Huffman.



to learn about the cultural significance of their paintings and hear about the social and cultural constraints that form part of their daily lives.

Certain designs are associated with ancestors and cosmic symbols which represent life, balance and fertility in Lake Sentani. Some of these designs are associated with the powerful village chief or *ondoafi* and are therefore regarded as a guarantee for plentiful fishing, hunting and harvesting of crops and wellbeing for the community.

The main traditional stylistic design from this area is the Sentani form *fouw*, which is represented on maro paintings and many carved objects such as bowls, paddles, gourds and knives. Earlier Museum collections from the Sentani area illustrate the *fouw* motif on wooden plates, bowls, paddles and model canoes.

The *fouw* holds profound spiritual significance associated with the sky and land, the surrounding Cyclops mountains, the waters of the lake and the relationship with animals, ancestors and spirits. The designs are, ultimately, important symbols of cultural identity, ancestry and wellbeing.

From the Humboldt Bay area, closer to the capital, the Museum holds maro paintings decorated with the *nafri* design, a distinctive stylistic variation. The *nafri* style in particular captured the imagination of European artists and collectors in the early twentieth century.

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**PAPUAN PERSPECTIVE**

West Papuans have become a minority in their traditional lands as new economic prospects including mining attract migrants to the area, bringing conflict and competition over land, barkcloth and other natural resources. Such competition has depleted the available trees in some areas and people now have to travel to other locations to buy bark for maro painting.

Sentani people recognise few individuals to be 'true' maro artists, the status being reserved for indigenous Papuans from Sentani who paint their designs mainly by hand (though some also use stencils) and who, most importantly, have the rights to represent specific clan designs.

But these rights are being ignored in the rush for tourist dollars, with non-indigenous migrants misappropriating traditional designs to create inferior versions of maro paintings for the Hamadi markets, which undermines the opportunity for Papuan artists to generate a small income.

This was firmly stated during my visit to Asei when a woman displayed her barkcloth on the ground and said emphatically, 'This is Sentani malo, not Hamadi!'

Today, the barkcloths are 'holding onto the thread of culture' for Papuan artists and the local communities who produce them. Accordingly, I dedicate this article to all Sentani artists and other Papuans in their determination to survive and hold on to their rich cultural identity.

**YVONNE CARRILLO-HUFFMAN** COLLECTION OFFICER, PACIFIC



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**Further reading**

Y Carrillo-Huffman, 2011. Indigenous perspectives on Maro paintings from West Papua (Irian Jaya), Indonesia, and Nemas, Erromango, Vanuatu in C Mondragon (ed), *Moana: las culturas de las islas del Pacifico sur*, Instituto Nacional de Antropologia e Historia, Ciudad de Mexico, pp 73-90.

MC Howard, 1998. Maro paintings of Irian Jaya, *Art AsiaPacific*, 18: 54-61.

R Simon & D Dippo, 1986. On critical ethnographic work. *Anthropology and Education Quarterly* 17: 195-202.

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**PENNY BERENTS** REFLECTS ON HER 40 YEARS OF SERVICE AT THE MUSEUM AND TALKS ABOUT FUTURE CHALLENGES WITH **MAXINE KAUTER**.

# EXIT STRATEGY

Dr Penny Berents, now a Senior Fellow. Photo by Carl Bento.



When Dr Penny Berents retired as Head of Natural Sciences in December, she simply took her name plate from her office on the third floor of the Collections & Research Building and placed it outside the marine invertebrate laboratory, two doors away.

‘I’m looking forward to continuing to make a contribution as a Senior Fellow’, she said. ‘I’ll be continuing my research into amphipods and working on some of the collections from the Museum’s recent expedition to Timor-Leste.’

## BEGINNINGS

When Penny first started work at the Australian Museum in 1971, she was a first-year Zoology student at the University of NSW.

‘I saw an ad on a notice board for a part-time research assistant. I applied for the job and so began a long association with the Australian Museum’, she said.

She worked in the Marine Invertebrates section studying cryptofauna, amphipods and echinoderms. Her Master’s degree and PhD were both supervised by (now) Principal Research Scientist Dr Jim Lowry.

In 1988 she became the Collection Manager of Marine Invertebrates and then moved to more senior roles as Head of Collections, then Head of Natural Science Collections and finally Head of Natural Sciences.

## ACCESS

‘I really enjoyed the hands-on work in collection management – storage, procedures and access to the collection. As a collection manager you are “host” to research scientists from around the world who come to work on the collections and it is very satisfying to see the results of their work.’

Penny likens the Museum collections to a giant ‘library’ of specimens that can be accessed by researchers to ‘answer all kinds of questions’. Such access is vital for many research projects, and the current level of accessibility owes a great deal to her long and focused service.

A particular highlight for Penny was implementing the Museum’s digital collection database, EMu. ‘That was one of the most satisfying achievements in my management roles ... and overseeing the release of Museum data to a range of web portals like the Atlas of Living Australia.’

## PARTING WISDOM

Much of the Museum’s scientific research is largely invisible, yet the collections are regularly plumbed by curious minds and the research is vital for our understanding of the natural world.

‘For my entire career ... I have heard the cry that people don’t know that we do science at the Museum. The range of topics being investigated at the Museum never ceases to amaze me. I don’t think it matters that not everybody knows we do science. But there are some groups for whom we should put effort into raising awareness that our science makes a difference.’

Other scientists, government agencies and those who fund research projects top the list for her. ‘We can’t afford to sit back and lament that they don’t understand what we do.’

Her passion is inspiring and we are lucky indeed that she will remain closely involved with Museum research in her retirement.

**MAXINE KAUTER** PROJECT COORDINATOR

PHOTOGRAPHY MANAGER **CARL BENTO** SELECTED THESE PHOTOS FROM THE 2012 *WILDLIFE PHOTOGRAPHER OF THE YEAR* EXHIBITION AS HIS PERSONAL FAVOURITES.

# *flight* PATHS

‘There’s a lot to like in this selection of images’, Carl said. ‘The subject, colour, sense of movement and composition in each image combine to tell a good story. All of these images grabbed my attention and made me feel good.’





**Previous page**

*Bubble-jetting emperors* by Paul Nicklen (Canada). This was the image Paul had been so hoping to get: a sunlit mass of emperor penguins charging upwards, leaving in their wake a crisscross of bubble trails. Photo © Paul Nicklen/ Wildlife Photographer of the Year 2012.

**Above**

*Flight paths* by Owen Hearn (UK). This photo was taken at photographer Owen Hearn's grandparents' farm, which was formerly at the centre of the Bedfordshire site chosen for London's third airport back in the late 1960s. 'Opposition to the planned airport stopped it going ahead, which is why I can photograph the wildlife on the farm today', Owen said. Photo © Owen Hearn/ Wildlife Photographer of the Year 2012.

**Opposite**

*Turtle gem* by Jordi Chias (Spain). Armeñime, a small cove off the south coast of Tenerife, is a hotspot for green sea turtles. They forage there on the plentiful seagrass and are familiar with divers. Jordi cruised with this one in the shallow, gin-clear water over black volcanic sand. Photo © Jordi Chias/ Wildlife Photographer of the Year 2012.

**2012 WILDLIFE PHOTOGRAPHER OF THE YEAR EXHIBITION**

The 2012 *Wildlife Photographer of the Year* exhibition opens at the Australian Museum on 8 June with 100 awe-inspiring images.

*Wildlife Photographer of the Year* is co-owned by the Natural History Museum and BBC Worldwide.

**MEMBERS**

Preview the 2012 *Wildlife Photographer of the Year* exhibition – for free! Details, page 35.



# ALEXANDER'S *nearest*



**Left**  
Dr Elizabeth Baynham with the tapestry *Alexander the Great and the family of Darius*. In the tapestry, Alexander (in red) stands second from the right with Hephaestion (blue). Elizabeth says 'The story is significant because when Alexander took Hephaestion to visit Darius' captive mother and family, the Persian queen mother bowed to Hephaestion by mistake. She was horrified when the frightened eunuchs (background) pointed out her error, but Alexander reportedly said 'Never mind, Mother, you weren't far out – this man (Hephaestion) is Alexander too!' Photo by Carl Bento.

# and dearest

WHO CAN A KING TRUST?

**ELIZABETH BAYNHAM** REVEALS WHO WAS CLOSEST TO ALEXANDER THE GREAT.

Some 50 years ago, the late Ernst Badian, Professor of History at Harvard University, published a classic essay entitled 'Alexander the Great and the loneliness of power'. It portrayed a calculating and paranoid king who was not only ruthlessly efficient at putting down conspiracies, but also capable of manufacturing them in order to remove those whom he considered a threat.

Such political intrigue meant there was no one whom Alexander could completely trust. So for Badian's Alexander, supreme power also ultimately meant psychological isolation and solitude.

## ASSASSINATION

Yet, while Alexander undoubtedly did survive – and exploit – assassination attempts, it would be going too far to say that he was the proverbial island. If anything, sexual or emotional intimacy with others offered both liability and protection.

There is a wealth of evidence about people who, at one time or other, were very close to the king and who were probably privy to sensitive information and confidences: his mother, Olympias; possibly some of his tutors, like the great Aristotle; generals like Craterus and Ptolemy, and staffers like his secretary, Eumenes. I could also highlight the king's boyhood friends and lovers.

Throughout his reign, like any Macedonian king, Alexander entrusted his life to a complex, tiered structure of guards. There were the elite Somatophylakes (personal bodyguards) but also crack troops known as Hypaspists (Shield Bearers), and a group of teenagers called the Paides Basilikoi, or 'Royal Youths', who were

aristocratic boys attending the king. Their duties included menial tasks like cleaning the king's boots, but they also guarded the king's bedroom of a night, and probably often shared his bed.

In such an environment, rejected jealous lovers could nurse resentment into murderous anger. The evidence suggests that at least two Macedonian kings, Archelaus and Alexander's own father, Philip II, were assassinated as a result of a former lover's rage. It is not surprising then that one of the most dangerous assassination attempts on Alexander's life originated from this group of Royal Youths. The conspiracy would have succeeded – the boys had carefully worked their shifts so that they were all on guard duty on the same night. But, either through prior knowledge or sheer good fortune (indeed, the type of luck that made Alexander's contemporaries think he had divine protection), Alexander stayed at a party to drink until dawn, rather than retiring to his bed chamber where his young would-be assassins were waiting. His prolonged celebration left the boys with an appalling sense of anti-climax and the belief that the gods were against them, so it was only a matter of time before one betrayed the rest.

## WOMEN

Alexander's attitude to women was complex. The historian William Tarn famously said that Alexander never loved any woman apart from 'his terrible mother', yet it is also true that after 334 BC, when Alexander was 21, he never saw his mother again. Alexander seems to have had a sexual relationship with Barsine, a Persian woman from a powerful family, and he enjoyed the friendship of several

mature royal women: Ada of Caria, who adopted Alexander as her son; Sisygambis, the mother of Darius, the Persian great king; and Cleophris, the mother of one of the Indian rulers.

Although political objectives were very much to the fore in each of these relationships, our sources also speak of mutual respect and admiration, and there is no reason to doubt this. Alexander married three wives: Roxane, the daughter of a powerful Bactrian chieftain; Statira, the daughter of Darius; and Parysatis, the daughter of a previous great king. It is hard to know to what extent these women shared Alexander's intimacy, even though his marriage to Roxane is explicitly described as a 'love match', but Alexander's marriage policy was like his father's: to consolidate alliances and frontiers.

However, Alexander's marriages to the Persian princesses had a deeper purpose. Alexander did not marry his royal brides in isolation; he took part in a mass marriage ceremony with his nobility and 10,000 Macedonian soldiers in which his close friend Hephaestion was chosen to marry Stateira's full sister, Drypetis.

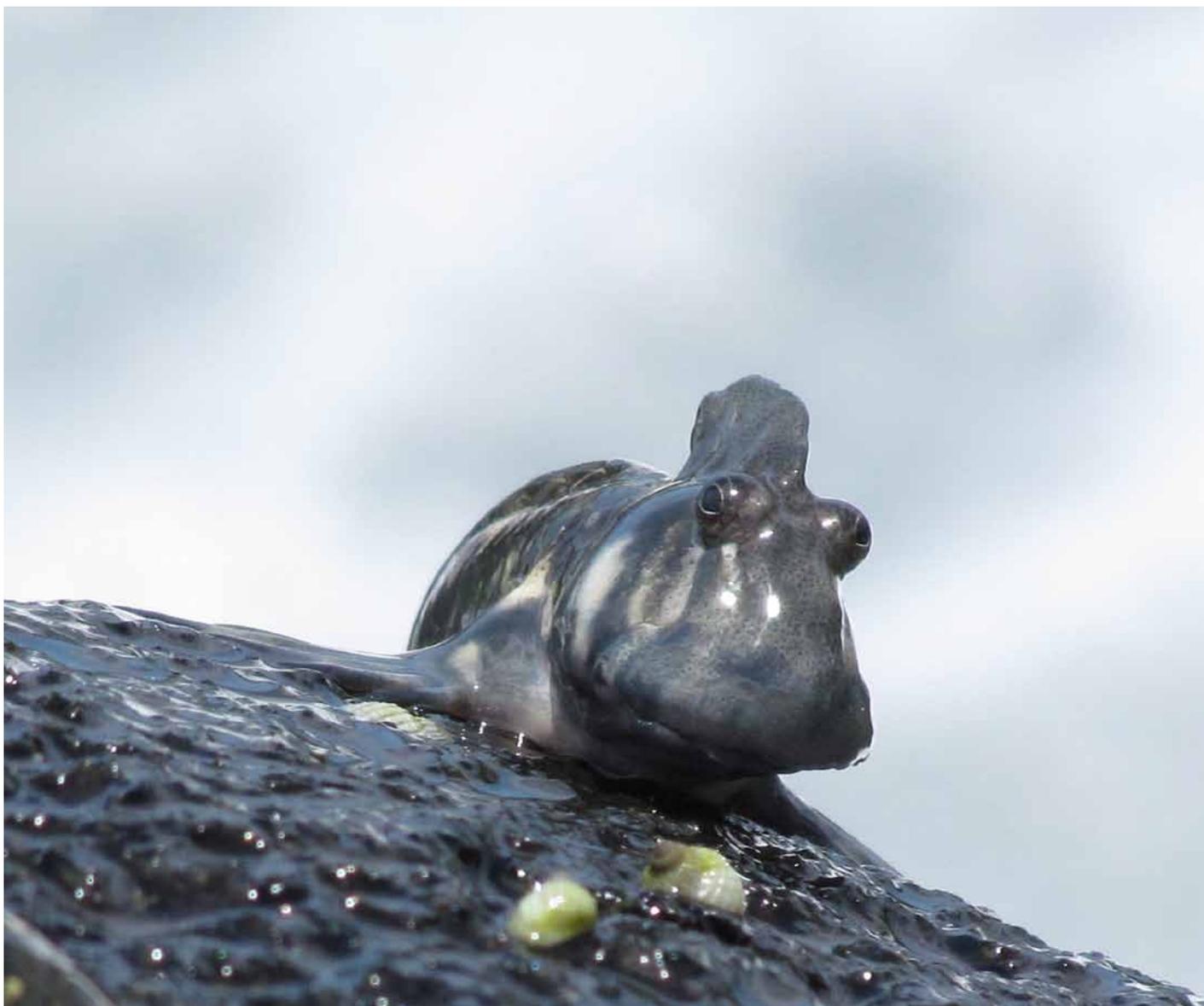
This ensured not only that Alexander and Hephaestion would have formal family ties, but also that their children would be blood relations. Alexander's love for his friend would extend beyond the grave. When Hephaestion died suddenly in 324 BC the king did everything he could to ensure that Hephaestion would share in godhead and a divine existence for eternity.

**DR ELIZABETH BAYNHAM** SENIOR LECTURER,  
UNIVERSITY OF NEWCASTLE

*Alexander the Great: 2000 years of treasures* is now showing at the Australian Museum. Hurry! Must close 28 April!

# A FISH OUT OF *water*

FROM AMAZONIAN FLOODPLAIN FORESTS TO REMOTE INDO-PACIFIC ISLANDS, **GEORGINA COOKE** SEARCHES FOR ANSWERS TO THE BIG QUESTIONS IN BIOLOGY.



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**Opposite**

*Alticus monochrus*, an 'amphibious' blenny found on rocky shores in the Indian Ocean. Photo by Georgina Cooke.

**Right**

Georgina Cooke catching blennies in Taiwan. Photo © Courtney Morgans.



**'Why there are so many species is one of the fundamental questions in biology ... and that's how I came to be working on blennies at the Museum!'**, laughs Dr Georgina Cooke, the Museum's latest Chadwick Biodiversity Fellow.

Blennies, she explains, are a group of fishes found all over the world, but there are some species found in the Indian and Pacific oceans and they're remarkable for their adaptations to living out of water.

'Different species of blenny can live out in the reef, in the intertidal zone, in tide pools or on the rock platform, but most excitingly some can live in the splash zone above high water.'

'They have all kinds of adaptations to life out of the water – sight, smell, osmoregulation and behaviour – but they're still gill-breathers, like other fish.'

'I'm catching fish that exhibit the entire range of terrestrial behaviour, from "normal" submerged fish, to intertidal "amphibious" species, to some that live exclusively out of water – they actively avoid submersion.'

'You can even find them all in one place – three or four species in and around one rock pool.'

**UNDERSTANDING**

To a biologist, such remarkable diversity and adaptation provides a living laboratory for understanding the processes of evolution.

'My role is to use genetic methods to understand the evolutionary relationships between the species on land and in the water, but I'm just one little cog in a big blenny machine', she says, beaming.

'I'm part of a research group [led by Dr Terry Ord, UNSW] looking at different aspects of blenny biology, behaviour and ecology.'

'By studying this "fish out of water" we hope to gain insights into one of the greatest events in vertebrate history, when fish made the transition onto land during the Devonian 350 million years ago.'

It's not the first time Georgina has worked on fish. For her PhD, she investigated fish diversity in the Amazon.

'I was interested in how ecological factors may have contributed to the enormous fish diversity in the Amazon – how speciation can happen when there are no physical barriers to the flow of genetic material between populations.'

**GENETICS**

Georgina became inspired to study science after hearing David Suzuki and Bob Brown speak at a lecture in her home town, Hobart, when she was about 13. She moved to Sydney to complete a degree in biodiversity conservation at Macquarie University, completing Honours in Genetics in 2007.

'I am deep down in my heart a geneticist', she says. 'Genetics is central for understanding speciation, evolution

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**MAKING A DIFFERENCE**

If you are thinking about making a bequest, or have already made one, please contact Kate Richardson on 02 9320 6456 or [kate.richardson@austmus.gov.au](mailto:kate.richardson@austmus.gov.au) for more information.

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and conservation. And I think genetics is the number one way to assess, understand and so conserve biodiversity.'

Her field research regularly takes her to Mauritius, Guam, Taiwan, Japan and the Cook Islands, where she collaborates with local researchers through the Marine Oceanography Institute (Mauritius), University of Guam and Taiwan National University.

'The relationships are not necessarily formal, but I really like my interactions with the various institutions. I've met lots of really great fish biologists and it facilitates the research.'

**CHADWICK FELLOWSHIP**

The Chadwick Biodiversity Fellowship supports recent PhD candidates to publish their research and apply for further grants.

'My goal for the Chadwick Fellowship is to understand the genetic relationships between land, amphibious and fully marine blennies and to apply for grants to look at which genes switch on when a blenny comes out of water. I think it would be very exciting!

'If it wasn't for the [Chadwick] Fellowship, we wouldn't be able to do the work we're doing now.'

DR GEORGINA COOKE SPOKE TO BRENDAN ATKINS

**WEBLINK >**

See video of amphibious blennies at [australianmuseum.net.au/Explore-magazine](http://australianmuseum.net.au/Explore-magazine)



We've had a very busy season with many new Members joining our community and a sold-out Alexander the Great lecture series.

Why not take one last opportunity to hear about Alexander (Night Talks, this page) and view the exhibition which must close on Sunday 28 April.

**FREE PREVIEW**

To thank all Members for their support, we invite you to a free preview of the 2012 Wildlife Photography of the Year exhibition (details page 28) on Friday 7 June from 5.15 pm. To RSVP, just call the Members office on 9320 6225.

**WINE TIME**

The Museum's wine partner, CSU Wines, has put together another special Members dozen. They're terrific wines and good value. See the enclosed brochure for details.

**CHARLES ADDAMS**

Don't miss a special display, *Charles Addams: American Gothic*, featuring 37 drawings by the creator of TV's *The Addams Family*. It's on until 25 August in the new Extinctions café on Level 2. Come along and sneak a peek!

However you choose to experience it, we hope you enjoy your Museum this autumn and winter!

**SERENA TODD**

Executive Officer,  
Australian Museum Members

Serena Todd's photo by Carl Bento.

**ALL NIGHT TALKS**

**TIME** 6.30–8 pm

**COST** Members \$20, non-Members \$30

**BOOKING** phone 9320 6225 or [www.australianmuseum.net.au/Autumn-events](http://www.australianmuseum.net.au/Autumn-events)

**Unexpected excavations –  
Ultimo, what lies beneath?**

Jennie Lindbergh, Australian Museum

**WHEN** Tuesday 21 May

In the summer of 2011 the Museum's Archaeology and Heritage unit undertook a historical archaeology project on behalf of UTS. Join us to celebrate National Archaeology Week and hear from excavation director Jennie Lindbergh as she recalls the amazing discoveries found beneath 14–28 Ultimo Road. Although the history of the site was known, the remains uncovered were entirely unexpected and more extensive than indicated by the historical records. After battling against the bad luck of a very wet summer, the team didn't expect to find much beneath the extensive remains of an 1874 terrace, but to their delight uncovered the remains of cottages built in the 1850s.

**Geology of Australia:  
how a continent shaped the nation**

Dr Richard Blewett, Geoscience Australia

**WHEN** Thursday 18 July

Australia's geography and geology have shaped the nation in many ways: through the climate, soils and landscapes, seascapes, water, minerals and energy; through our unique flora and fauna, and what the fossil record tells us about the evolution of life and the planet in general. Join Dr Richard Blewett from Geoscience Australia in exploring the challenges and opportunities presented by Australia's rich geological heritage.

**Space Junk!  
'Greening' the Universe**

Dr Fred Watson, Anglo-Australian Observatory

**WHEN** Tuesday 23 July

'Space junk reaches new levels'; 'Endangered squirrels under threat from observatory'; 'Nuclear reactor sent into space'; 'Toxic rocket fuel found down-range of launch site'. With headlines like these, you might

be forgiven for thinking astronomy and space exploration is pretty hard on the environment. Not so, argues astronomer Dr Fred Watson in this provocative and entertaining talk. When the big picture is taken into account, the credentials of these high-tech sciences are greener than you might imagine, at least so far as life on planet Earth is concerned.

**Alexander, Cleopatra and  
the coming of Rome**

Professor Tom Hillard, Macquarie University

**WHEN** Thursday 4 April, 5.30–8 pm

**COST** Members \$35, non-Members \$45 (includes exhibition viewing)

**BOOKING** phone 9320 6225 or [www.australianmuseum.net.au/Autumn-events](http://www.australianmuseum.net.au/Autumn-events)

Take this opportunity to revisit the *Alexander the Great: 2000 years of treasures* exhibition (closing 28 April) and discover the influence of Hellenic culture on Cleopatra VII, the last of the great successors to Alexander. Join Tom Hillard as he reveals Cleopatra's own contributions and the widespread cultural influences that shaped the city that was perhaps Alexander's most lasting monument, Alexandria itself. With Cleopatra's death the rule of the Macedonian Ptolemies came to an end in Egypt – one of the major historical landmarks of the ancient world.



**Right** Cleopatra VII, Egypt 51–30 BC, basalt. Photo © The State Hermitage, St Petersburg, 2012.

## ALL WALKS

**TIME** 9.30 am – 3.30 pm approximately

**COST** Members \$15, non-Members \$20

**BOOKING** phone 9320 6225 or  
[www.australianmuseum.net.au/Autumn-events](http://www.australianmuseum.net.au/Autumn-events)

## Historic Macquarie Street

**WHEN** Sunday 28 April

Join volunteer walk leader Ross Pearson OAM as he takes a trip down Macquarie Street stopping at the buildings that set the cornerstones and foundations of this great city.

## Conquering Concord

**WHEN** Wednesday 15 May

Sydney's Concord takes its name from Concord, Massachusetts, site of one of the first military engagements of the American War of Independence in 1775. Join walk leader Keith Robinson for a wonderful insight into the 'parkland suburb', stopping to see the historic house 'Ardill', the exclusive Concord Golf Club, a tour of Concord Heritage Museum and much more.

## Picturesque Paddington

**WHEN** Wednesday 26 June

Discover the beautiful highlights of this inner-city suburb with walk leader Keith Robinson. While stopping at places such as Paddington Town Hall, the Victoria Barracks, War Memorial and Margaret Olley's house, Keith will fill you in with historical facts and fascinating details of the area.

## Australian Museum Science Show and Tell Series

Join us for this special look into the Museum's research expeditions and collections.

**WHEN** Thursday 2 May, 6–8.30 pm

**COST** Members: adults \$20, children \$10; non-Members: adults \$30, children \$15

**BOOKING** phone 9320 6225 or  
[www.australianmuseum.net.au/Autumn-events](http://www.australianmuseum.net.au/Autumn-events)



## Meet the Timor-Leste marine expedition team

Meet the scientists from the Australian Museum Timor-Leste expedition, the biggest collecting expedition in the Museum's history. Join us to hear from the marine science team who embarked on this field trip. Following the lecture, enjoy light refreshments and see some of the amazing specimens brought back from Timor-Leste. This is a unique opportunity to speak one-on-one with some of Australia's leading researchers and learn about the importance of our Museum collections. Scientists include Dr Lauren Hughes, Mark McGrouther, Dr Mandy Reid and then some!

The Timor-Leste expedition was made possible thanks to a significant gift to the Australian Museum Foundation from a private donor.

## Dinosnore Sleepover – They're back!

**WHEN** Friday 24 May, 7 pm – 7.30 am

**COST** Members: child \$110, adult \$140 non-Members: child \$130, adult \$170

**BOOKING** phone 9320 6225 or  
[www.australianmuseum.net.au/Autumn-events](http://www.australianmuseum.net.au/Autumn-events)

Sleep in the *Dinosaurs* exhibition! Come to the Museum at night for a special pizza dinner, join in a fun craft activity, tour the Museum by torchlight, watch some DVDs with friends and then catch some ZZZs in the *Dinosaurs* exhibition surrounded by the dinosaurs and wake up to breakfast! Bring your camera to capture every moment of this larger-than-life experience. Cost includes dinner, activities and breakfast, but bring your own sleeping bag and airbed.

**NOTE** children must be accompanied by an adult; adults not permitted without a child.

## Preview: the 2012 Wildlife Photographer of the Year exhibition

**WHEN** Friday 7 June, 5.15–8 pm

**COST** FREE – Members only!

**BOOKING** online [www.australianmuseum.net.au/Autumn-events](http://www.australianmuseum.net.au/Autumn-events) or phone 9320 6225.

Enjoy a special Members-only preview of the latest *Wildlife Photographer of the Year* exhibition from the Natural History Museum, London. We open the doors at 5.15 pm to this beautiful exhibition as our way of saying thank you to you, our valued Museum Members.

The Museum Shop will be open late too so you can take advantage of your 10% Members discount. If you can't join us on the night, don't worry as the exhibition is running until 7 October and entry tickets can be purchased at the Members discounted rate. We hope to see you there. See Photofeast, page 27, for a selection of images from the exhibition.

**Above** Dr Penny Berents (left) and Amanda Hay preparing to dive in Timor-Leste. Photo by Mandy Reid.



Scan this code to your mobile device to find all Members events, or visit our website.



**Above** *Emu in the sky.*  
Details, see Night Sky Dreaming tour.  
Photo © Barnaby Norris.

### Wild Madagascar with Dr Steve Goodman

**WHEN** 23 May – 14 June 2013

Due to popular demand we are running the Wild Madagascar trip for a third time. Madagascar is a natural history wonderland unlike any other place on Earth. Formerly a landlocked plateau, it became marooned as the ancient landmass of Gondwanaland broke up. Madagascar's flora and fauna have evolved in splendid isolation, isolated from the African mainland by the Mozambique Channel. Chameleons, lemurs, rare and gorgeous birds and a thousand species of orchids are yours to discover in this unforgettable Members tour.

### Explore Lizard Island

**WHEN** 5–10 August 2013

Back by popular demand! Join this very special trip to the Australian Museum Lizard Island Research Station. Go behind the scenes at one of the world's foremost coral reef research facilities and enjoy walks, talks, swimming and snorkelling.

Numbers strictly limited.  
To express interest, phone Serena Todd  
on 02 9320 6123.

### Night Sky Dreaming with Dr Fred Watson

**WHEN** 11–19 August 2013  
(Note change of date due to January bushfires.)

Gazing up into a million-star sky in outback Australia is sure to take your breath away. Indigenous Australians created stories to make sense of the heavens above and the universe around them. Join Fred Watson on this ten-day, fully escorted tour through the most indigenously interesting corners of Victoria and New South Wales while unravelling the secrets of astronomy old and new.

### In the footsteps of Alexander the Great with Dr Chris Matthew

**WHEN** 29 September – 17 October 2013

For over 2000 years Alexander the Great has excited the imagination of people around the world. Join tour leader Dr Chris Matthew (ACU) for this cultural and archaeological tour as we follow in Alexander's footsteps, exploring the very best of ancient and modern Greece: archaeological sites, museums, mountain scenery and Mediterranean Sea views. In Turkey we'll visit the historic cities of Ephesus, Troy and Gallipoli and take time to explore the Grand Bazaar, Topkapi Palace and Blue Mosque in Istanbul.

### Chinese Dinosaur Odyssey with Dr Yong Yi Zhen

**WHEN** 15–28 October 2013

During our Chinese Dinosaur Odyssey study program, we'll visit two of the most exciting dinosaur sites in China: Zigong Dinosaur Museum, Sichuan Province, and Dinosaur Valley, Yunnan Province.

Tour leader, Yong Yi Zhen, an Australian Museum palaeontologist, will take you behind-the-scenes to hear lectures with researchers and see field studies at dig sites where you'll gain first-hand experience of an archaeological dinosaur dig.

This tour also explores several World Heritage sites including the Leshan Grand Buddha, one of the largest stone-cut Buddhas in the world; the Jinsha Museum site; the Stone Forest near Kunming, a geological phenomenon; the Old city of Dali; the beautiful old township of Lijiang; and of course, a visit to the Panda Sanctuary.

Join us for an information session about this exciting tour on Saturday 6 April at 2 pm in the Museum Theatre (RSVP phone 02 9320 6225).



Scan this code to your  
mobile device to find  
all Members travel,  
or visit our website.

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## SAVE THE DATE!

### The Second Annual Australian Museum Foundation Dinner

30 May 2013

The Australian Museum Foundation's annual fundraising dinner supports Australian Museum research to conserve Australia's endangered wildlife.

Tickets go on sale in April. To register your interest, email [development@austmus.gov.au](mailto:development@austmus.gov.au) or phone Anna Gauchat on 02 9320 6216 for further details.

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Memories, cultural artworks, scientific objects, biodiversity indicators – explore the many different meanings of shells. Styling by Gabrielle Tydd. Photo by Carl Bento.

## EXPLORE

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*Explore*, the news and events magazine of the Australian Museum and Australian Museum Members, is now published three times per year.

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We welcome your feedback, comments and enquiries. Email the Editor at [explore@austmus.gov.au](mailto:explore@austmus.gov.au)

Frank Howarth's photo by Carl Bento

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**These generous individuals and organisations contribute to scientific research, education and public programs, and assist in the acquisition of items that enrich the Museum's collections.**

We would especially like to acknowledge those who generously leave a gift to the Australian Museum in their will – a lasting way to benefit generations to come.

Find out how your support can make a difference to the important work of the Australian Museum. Contact the Development Branch, phone 02 9320 6216 or email [development@austrmus.gov.au](mailto:development@austrmus.gov.au).

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