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nature culture discover

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life IN THE DEEP

The deep ocean has been in the news quite a bit recently, with film director James Cameron making the first solo descent to Challenger Deep and the centenary of the sinking of the *Titanic*.

At the Museum, life in the oceans is an important part of our research effort and a natural focus for engaging visitors. The weird and wonderful creatures that survive in the deep oceans, and how we know about them, form the subject of the Museum's latest exhibition, *Deep Oceans*. In this edition of *Explore*, you can meet Em Blamey, who as project coordinator has brought this exhibition to fruition.

Just how we go about researching marine life, and some of the higher thinking behind it, can be seen in another story in this edition, as scientist Nerida Wilson talks about her research voyage to the Scotia Arc in Antarctica.

Another key area of marine research for the Museum is of course coral reefs, and in particular the Great Barrier Reef, where the Australian Museum Lizard Island Research Station, located some 240 kilometres north of Cairns, has operated for the last 30 years.

The knowledge gained through research can often inform and influence policy decisions by governments. We have recently made submissions to the Australian Government on marine reserves proposed for the Coral Sea and Southern Ocean. Our knowledge of fish ecology and behaviour, for example, can help ensure that governments make informed decisions that balance conservation with economic outcomes.

SUPPORTING REEF RESEARCH

Lizard Island Research Station is used by senior scientists and research students from institutions worldwide. In 2011, they produced around 130 research papers based on their work at the station, greatly adding to our knowledge of coral reef biology and ecology.

We are very fortunate to have the Lizard Island Reef Research Foundation as the station's major supporter. I'd like to pay tribute to some very special people associated with this effort. First, Ken Coles AM, who has chaired the Foundation over the last 18 years, has decided to retire following the successful conclusion of a $6-million fundraising program that has allowed the station to be considerably overhauled.

Also choosing to depart Lizard Island at this time are Lance and Marianne Pearce, who have lived and worked at the research station for six months each year since 1988, maintaining equipment and facilities, and Andrew Green, resigning from the Foundation after 34 years as Trustee, Secretary, Treasurer and Public Officer.

I am sure you will want to join me in wishing them well for the future.

FRANK HOWARTH
Director of the Australian Museum

THE *queerest* SHOP IN AUSTRALIA

WITH A RESURGENT INTEREST IN TAXIDERMY (THE ART OF PREPARING NATURAL HISTORY SPECIMENS FOR DISPLAY), IT'S TIMELY TO MEET ONE OF THE TOP TAXIDERMISTS IN SYDNEY – ALSO THE MUSEUM'S FIRST FEMALE EMPLOYEE, EXPLAINS MUSEUM ARCHIVIST **ROSE DOCKER**.

Headed by the inspirational German scientist Gerard Krefft, the Australian Museum in 1863 employed its first professional female employee: taxidermist and businesswoman extraordinaire, Jane Tost.

Jane and her daughter Ada would go on to develop a flourishing family curios business and become leading lights in a remarkable nineteenth-century Sydney sorority of award-winning taxidermists.

WIFE AND HUSBAND

Probably the first woman in the Australian colonies to be employed professionally in a museum, Tost had migrated from the UK to Hobart in 1856 at the age of 39. The daughter of a prominent English family of naturalists and taxidermists, she'd honed her skills while working at the British and Hobart Town museums. When her application to the more conservative Victorian Museum was rejected, she instead moved her growing family of six children to Sydney and began working at the Australian Museum.

When her husband, Charles, also a taxidermist, applied for a position at the Museum the following year, the services of 'Mrs Tost' were already highly regarded by the Museum Trustees. Unhappy with the badly mounted and insect-infested specimens produced by her colleague Adam Becker, they obviously considered Jane's work to be superior: 'The specimens thus repaired or newly mounted by Mrs Tost during the last ten months had never suffered in the least'. Becker was promptly dismissed and Charles joined his wife on an equal salary of ten pounds a month.

In 1869, a falling out between Charles and Director Krefft resulted in the Tosts leaving the employ of the Australian Museum but beginning a commercial association that would keep the institution well supplied with collection items for the next 50 years.

AWARD WINNERS

When the Chicago World Fair Committee reported in 1891 that 'a good deal of bird and animal stuffing, done in Sydney, is performed by females', it was definitely including the dynamic mother and daughter team of Jane Tost and Ada Rohu.

Husband Charles had apparently disappeared back to England, and Jane's daughter (and former actress) Ada Coates was widowed with three children when the taxidermy firm Tost & Coates was born in 1872. By the time Ada married Henry Rohu in 1878, the growing middle-class taste for fancy work and stuffed animals in the home meant that Jane and Ada's enterprise was set to expand.

Opposite
Rose Docker examines correspondence to piece together the Museum's relationship with Jane Tost. Photo by Stuart Humphreys.

Above
These Irrawaddy Squirrels, *Sciurus pygerythrus*, purchased from Tost & Rohu in 1878, are currently displayed in the National Museum of Australia's *Australian Journeys* exhibition, Canberra. Photo by Jason McCarthy © NMA

The firm of Tost & Rohu supplied more than 130 'curios' to the Museum over a 50-year period.

"Jane Tost blazed a path for many working women to come."

Tost & Rohu – taxidermists, tanners, furriers and curio dealers – was widely advertised. Visitors to Sydney were enticed to visit the shop boasting 'the largest stock in Australia of genuine Native Implements and Curiosities … Carved Emu Eggs and other beautiful souvenirs … Skins of Foreign and Australasian Birds, Beasts and Reptiles … Live Snakes (non-venomous), Entomological specimens & requisites.'

'Birds and Animals mounted in life-like style by Mrs Tost', fancywork goods and glass domes – there was something there for everyone. The two women were so industrious that while running and marketing the family business and bringing up Ada's children (nine in total), they also won at least 20 medals between them for their meticulous craftsmanship at international trade exhibitions.

THE QUEEREST SHOP IN AUSTRALIA

Between the 1870s and 1920s the Museum kept a watchful eye on goods being offered at 'the queerest shop in Australia', as it came to be known, acquiring about 130 ethnographic items from them as well as other, natural history specimens.

When Jane Tost died in 1889, Ada and family carried on her mother's life work until the bookseller James Tyrell bought out the business in 1923. With news of a 'sale' in that year of 'many desirable pieces' from the collection, the Australian Museum quickly sent buyers to acquire what they could of the remaining pieces before competitors arriving in Sydney for the Pan-Pacific Science Congress swooped on the stock.

In addition to the many ethnographic pieces acquired from Tost & Rohu, the Museum holds a number of stuffed mammals, including the Irrawaddy Squirrels (page 3), perhaps stuffed by 'Mrs Tost' herself – an enduring link with our first female employee. Remarkable for her taxidermy skills, industry and business acumen, Jane Tost blazed a path for many working women to come.

ROSE DOCKER ARCHIVIST

yourSAY

ON THE AIR

The TAMS volunteer-run radio show *Talking Science* [*Explore* 34(1), p14] was produced weekly at Eastside Radio in Paddington until 2004, not 1999.

JL via email

ANTS ARE VITAL

It is important not to demonise insects [*Explore* 34(1), Xplorer]. Ants are vital to healthy ecosystems, harmless to humans and fascinating creatures with many endemic species. They play a tremendously important role in the Earth's natural ecosystems.

MF via email

reVIEW

FROZEN IN TIME: PREHISTORIC LIFE IN ANTARCTICA

by JD Stilwell & JA Long
CSIRO Publishing, 2012

Antarctica has not always been a frozen land of snow and ice. Fossils prove that the continent was once inhabited by a thriving diversity of plants and animals from warmer climes. *Frozen in Time* documents the story of these fossils, from first discovery to the present day. It also reveals how recent research is unravelling past climates in order to predict the future.

The book is mostly easy to read, though some prior knowledge, and use of the glossary and bibliography, will help overcome the more technical bits. It is well produced and superbly illustrated with many of the authors' own photographs – a comprehensive account of the fossils of the Antarctic, their discovery, diversity and significance.

ROBERT JONES SENIOR FELLOW, PALAEONTOLOGY

diving into DEEP OCEANS

BRINGING THE MUSEUM'S *DEEP OCEANS* EXHIBITION TO LIFE HAS BEEN AN 18-MONTH VOYAGE OF DISCOVERY FOR PROJECT COORDINATOR **EM BLAMEY**.

If someone asks 'what lives in the deep?', we'd have to answer with a shrug. Although we've already found countless creatures there, less than 10 per cent of the deep ocean has been explored, and new species are discovered every time we take a look. Or, as a favourite quote puts it, 'We know more about the Moon's behind than the Earth's bottom!'

The deep oceans make up more than 95 per cent of the living space on this planet, and its biodiversity is thought to be on a par with rainforests or coral reefs. There's lots of room for things to live – but we know hardly any of them. Only three people have ever been to the deepest point in the oceans (nearly 11 kilometres deep): two in the 1960s and film director James Cameron in March this year – so it's quite correct to say more people have been to the Moon.

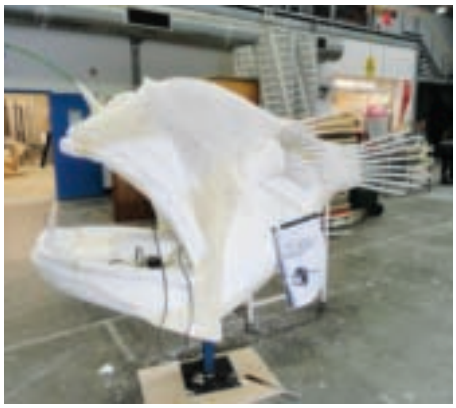
GLOBSTERS

Far from 'out of sight, out of mind', the unknown is hugely attractive; people have always been fascinated by what lies beneath, from ancient mariners returning with tales of sea serpents and mermaids, to unfathomable 'globsters' (mysterious gelatinous beasts) found washed up on beaches.

Our imaginations have been filling in the blanks. Deadly denizens of the depths star in our monster movies, books and comics. We've yet to find Godzilla down there, but we've found the massive (500-kilogram) Colossal Squid, its tentacles full of vicious hooks – and it may well have friends we don't know about yet.

ROBOTS

New technologies are gradually opening up this mysterious realm. Over 3000 autonomous submersible robots are currently adrift worldwide, transmitting invaluable data on ocean temperature, salinity and currents whenever they surface.



"certain deep-sea sponges contain compounds that may help patients fight breast cancer"

Underwater cameras enable us to see the creatures alive and at home in the depths, rather than dead and distorted after being collected in nets; animals adapted to deep-ocean pressures of 400 atmospheres tend to explode long before they reach the surface. We add to our knowledge every day, but there's still much more to be discovered.

DAMAGE

What we do know is that deep-ocean environments are already under threat. Pollution, ocean acidification, trawling and mining are all damaging the deep, though we don't know enough to fully appreciate their impacts.

What do we stand to lose? As just one example, certain deep-sea sponges contain compounds that may help patients fight breast cancer; one drug made from them, Halaven, is just going on the market overseas. There may be other beneficial compounds yet to be discovered – but they could be wiped out by a trawl net before we get the chance.

The deep oceans are a varied, fascinating and vital part of our world – one we need to understand, appreciate and protect before it's too late.

The *Deep Oceans* exhibition showing at the Museum from 16 June allows visitors to get a taste of this enthralling world. We've worked with our partners at Questacon to make it exciting and innovative, combining interactive exhibits, multimedia and real specimens. We hope the result will give visitors a unique experience of what we know and what we don't, how we're discovering more and why we should care.

EM BLAMEY EXHIBITION PROJECT COORDINATOR

Deep Oceans *is a new exhibition developed by the Australian Museum and Questacon, the national science and technology centre.*

WEBLINK ›

Dive into *Deep Oceans* at www.deepoceans.com.au.

Above
Evolution of an anglerfish from concept (by 3D designer Aaron Maestri) to construction. Photos by Stuart Humphreys.

Page 6, from top left Humpback anglerfish, *Melanocetus johnsonii*, photo © Norbert Wu/Minden Pictures/National Geographic Stock; brittle star, *Opheiolepis* elegans, photo © Aquapix and Expedition to the Deep Slope 2007, NOAA-OE; deep-sea jellyfish, *Peraphilla* sp., photo by Justin Marshall © Harbour Branch Oceanographic Institute; volute snail, *Provocator corderoi*, and anemone, *Isosicyonis striata*, photo © Greg Rouse; solitary coral, *Flabellum impensum*, photo © Greg Rouse; spider crab, *Lithodes confundens*, photo © Greg Rouse; serolid isopod, *Ceratoserolis* sp., photo © Greg Rouse; dragonfish, *Chauliodus sloanii*, photo by Justin Marshall © Harbour Branch Oceanographic Institute; deep-sea strider, a munnopsid isopod, photo by Justin Marshall © Harbour Branch Oceanographic Institute; tube worm, *Lamellibrachia barhami*, photo © Greg Rouse.

alexander AND ACHILLES

ANTIQUITIES COME ALIVE AS THEIR STORIES ARE REVEALED. HERE THE MUSEUM'S **LIZ COWELL** TAKES A BREAK FROM ORGANISING THE BLOCKBUSTER *ALEXANDER THE GREAT: 2000 YEARS OF TREASURES* EXHIBITION TO PROVIDE A GLIMPSE OF WHAT'S TO COME.

Gold overlay for a gorytos (bowcase) showing scenes from the life of Achilles, 350–325 BCE. 47 x 27 cm. It was found on the northern Black Sea coast and is now part of The State Hermitage collection. Photo © The State Hermitage, St Petersburg.

When the editor asked me to choose just one object to write about from the upcoming exhibition *Alexander the Great*, my eye fell on this exquisite piece which highlights a fascinating civilisation and some superb craftsmanship.

GORYTOS

This gold overlay is part of a gorytos (a case for a bow and arrows) of the type used by the Persians and Scythians. They favoured a small, recurved type of bow which was housed within a leather case with a metal plate, such as this, attached outside for decoration.

The gorytos was slung over the back when a soldier was on the march or using a weapon other than his bow. When shooting, however, it would be slung at the side of the body to allow the archer to draw the arrows over his shoulder with one hand while holding the bow in the other.

It is thought this work was created by a Greek artist and it shows scenes from the life of Achilles. Alexander revered Achilles and considered himself to be in many respects Achilles reborn. He even slept with a copy of Homer's *Iliad* under his pillow.

ACHILLES

The story goes that Achilles' mother, Thetis, received a prophecy that Troy would not fall unless Achilles died during the war to secure its capture. To protect her son, and Troy, Thetis sent Achilles to hide, disguised as a girl, in the palace of Lycomedes, King of Scyros. Achilles was eventually discovered by the Greek heroes Odysseus, Nestor and Ajax and persuaded to join the Greek forces. At the beginning of Alexander's invasion of the Persian Empire he stopped at Troy to pay homage at the tomb of Achilles.

The gorytos is more than simply a beautiful, decorated artefact of ancient warfare, for it reveals a precious insight into the character of one of the greatest military leaders the world has ever known. You'll be able to see this piece along with many others at the exhibition *Alexander the Great: 2000 years of treasures*, when it opens later this year.

ELIZABETH COWELL EXHIBITION PROJECT MANAGER

The exhibition *Alexander the Great: 2000 years of treasures*, from The State Hermitage, St Petersburg, will be shown exclusively at the Australian Museum from 24 November 2012 to 28 April 2013. For details, visit www.alexandersydney.com.au.

WHAT ATTRACTS MUSEUM RESEARCH SCIENTIST **DR NERIDA WILSON** TO THE SCOTIA ARC, A SERIES OF ISLANDS LINKING THE TIP OF SOUTH AMERICA TO ANTARCTICA?

MAKING CONNECTIONS *in Antarctica*

Opposite
Hauling trawl nets aboard research vessel *Nathaniel B Palmer*.

Far left
Nerida Wilson (left) and colleagues with king crabs captured in Antarctic waters.

Photos by Dave Munroe © National Science Foundation

Left
The Scotia Arc is a chain of islands and seamounts connecting South America to Antarctica. Map by Amanda Teer.

Ever since Charles Darwin noted differences in the bills of finches living on adjacent islands in the Galapagos, scientists have been intrigued with the effects of geographical isolation – and its opposite, connectivity – on populations and species.

Darwin reasoned that two populations of a single species living on adjacent islands would eventually become two species if isolated for long enough and subjected to different selective pressures, such as food availability.

But barriers between populations are not always so obvious. When is an island an island, and what are the subtle connections between adjacent populations that help to maintain a species? The answers to such questions are vital for understanding the living world and informing the management of natural resources.

When the islands in question link two continents, they become a living laboratory of enormous interest to scientists like the Australian Museum's Dr Nerida Wilson.

STEPPING STONES

Nerida is conducting studies on the marine biota of the Scotia Arc, a narrow chain of islands linking South America and Antarctica.

'The geological history of this area has created perfect field conditions for testing theories about connectivity, speciation and the effects of climate change', said Nerida.

'Most of the Scotia Arc is volcanic in origin and parts resemble a mountain range with some peaks emerging from the ocean as islands and others submerged as sea mounts, while deep trenches separate some peaks from others.

'In this study, we're asking whether the Arc acts as a series of stepping stones for the distribution of organisms, allowing gene flow between populations, and whether barriers might lead to the formation of new species.'

GRANTED

Thanks to a grant by the US National Science Foundation (NSF), Nerida and her colleagues from the Scripps Institution of Oceanography have already conducted the first of two five-week research expeditions to collect animals from different habitats, with the next planned for early 2013.

But getting to the remote, inhospitable area and undertaking field work both present major logistical challenges. Fortunately, Nerida has an $80,000-per-day research vessel at her disposal (funded by the NSF) to collect biological samples from different underwater habitats.

The vessel is fully crewed, allowing the onboard research team of around ten scientists and technical staff to focus on their all-consuming research – sorting and identifying samples in preparation for detailed genetic analysis.

'With this vessel we can trawl depths greater than 200 metres and collect the particular types of marine invertebrates we're after – primarily snails, sea stars, sea spiders, crabs and polychaetes.

'We're also using multi-beam sonar to map the ocean floor so we can take scale and depth into account.'

OUTCOMES

Despite the depth and conditions in the bleak Southern Ocean, many species seem to be quite widespread and there's plenty of diversity to be found.

Like most scientists Nerida believes that global warming is changing the underlying marine food webs that lead eventually to economically important species.

'Besides being a hypothesis-driven scientific study and boosting museum collections, this research will be useful for monitoring and understanding the ecological effects of climate change', Nerida said.

'We can predict that species adapted to living within a narrow temperature range will become extinct with warmer conditions, and we can also assume that mobile species from neighbouring areas will start to move into new areas as conditions change to suit them.

'So what happens to those organisms that can't readily disperse? We believe that genetic connectivity can provide early warning signs of changes and local extinction.

'There has never been a better time or place to study these processes. And there's a sense of urgency about it – the rate of change is on the increase.'

BRENDAN ATKINS EDITOR

Hear Dr Wilson discuss her work with deep oceans. Details, page 27.

Opposite
Laura Williams with Collections Officer Yvonne Carrillo-Huffman documenting the Mr & Mrs Oakes Collection. Photo by Stuart Humphreys.

Below
Mrs Edna Oakes was born into a New Britain missionary family in 1933. Photo by Laura Williams.

A SIMPLE BASKET CAN HOLD MANY THINGS, INCLUDING MEMORIES AND KNOWLEDGE, WRITES THE MUSEUM'S **LAURA WILLIAMS**.

CONTAINERS *of memories*

When asked to choose a favoured object from her donation of superbly decorated New Britain artefacts, Edna Oakes pulled out a small, oval food basket. For Edna, the basket represents a story of survival.

NEW BRITAIN

In September 2011, Edna and her husband, George, kindly donated two collections of over 100 objects and 150 photographs from the island of New Britain, Papua New Guinea. The first of their donations belonged to Edna's parents and is known as the Rev. Arthur & Mrs Jean Brawn Collection (1932–51). It consists of shell money, shields, clubs, baskets and decorated arm bands, which are significantly contextualised by accompanying photographic slides and books written by Mrs Brawn for deputation (fundraising) use during the 1950s.

The collection in its entirety documents the Nakanai area of New Britain before and after World War II and is witness to both traditional culture and the destruction caused by war. A donation documented in such detail is hard to find.

The second of their donations is known to the Museum as the Mr & Mrs Oakes Collection (1959–63). Both George and Edna grew up and met in New Britain as children of Methodist missionaries. During their married life they returned to Papua New Guinea while George worked as a patrol officer in Pomio. This collection consists largely of objects given to them during that time.

SECRECY

Seventy-nine years ago, in September 1933, in the village of Malalia, Edna Brawn was born into secrecy. To this day, a small woven basket made by the people of Nakani remains a potent reminder of the fragility of her early life. Arriving three months prematurely, Edna and her twin sister Nancy began life hidden from a society which held traditional beliefs that did not favour multiple births. For months, the twins lay wrapped in cotton wool, warmed with hot water bottles and concealed in the very same food basket Edna has now donated to the Museum. It was only when the twins appeared strong enough to survive that their father revealed their identity to the surrounding village. His 'confession' was received with great joy and laughter from the villagers who responded with: 'We know – we saw two of everything go into the house and two of everything go out!'

ENDURING RELATIONSHIPS

On returning to Malalia in 1964, Edna was greeted fondly by people she had known since her childhood. She remembers that while the eldest woman of her village warmly stroked her arm others ran out to witness her arrival shouting, 'O misis, before you lik lik pikaniny, now you big mary misis!'. Old friends recognised her as the little Edna Brawn who had been nurtured into this world in a small Nakanai food basket.

Understandably, Edna sees the donated basket not just as an example of traditional Nakanai material utilitarian culture. She describes it as a 'container of memories' – of her parents, childhood and dearest friends in Malalia. And in this regard, her basket symbolises a more general truth about cultural objects held in museum collections: through personal stories they take us beyond formal documentation and into another world where each object has a unique and powerful identity.

LAURA WILLIAMS TECHNICAL OFFICER

WEBLINK ›

Hear Edna and George Oakes discuss their donation at www.australianmuseum.net.au/Explore-magazine.

mystery CORAL FIGURINE

This figurine carved from coral was brought to the Museum for identification recently by a member of the public. It clearly represents a human-like form, with a head, torso and folded arms, and is unlike any object in the Museum's collection.

Around 25 centimetres high, the figurine has been carved from the scleractinian coral *Platygyra sinensis*. The origin of the carving is not known for sure, but a similar figurine in the collection of the British Museum originating on Mer (Murray) Island was collected in 1889 by Professor Alfred Haddon during the Cambridge Anthropological Expedition to Torres Strait.

According to Haddon, the figurine is a *bager* (fire charm). It was placed close to the fire when people would leave the house so that its *lamar* (spirit) would magically keep the fire burning.

Figurines carved from natural products such as wood or pumice are relatively common across South-east Asia and Melanesia; however, coral figurines appear to be quite rare. It is possible that the coral – collected as rubble and resembling a human figure in its natural shape – was further shaped by the craftsperson using metal tools to its present form.

It has undoubted cultural significance and we recommended that its owner contact the Murray Island community council for further information.

ZOE RICHARDS RESEARCH ASSOCIATE AND **STAN FLOREK** DATABASE MANAGER, CULTURAL COLLECTIONS

Further reading

AC Haddon (ed), 1908. *Reports of the Cambridge Anthropological Expedition to Torres Straits. Vol. 6: Sociology, magic and religion of the Eastern Islanders*, Cambridge University Press: Cambridge.

Coral fire charm, Mer (Murray Island), Torres Strait. Photo by Carl Bento.

Send your query to the *Search & Discover* team, email **sand@austmus.gov.au**

search › DISCOVER

Q. *I live at South West Rocks (NSW) and noticed this rat . . . but what species is it?*

It is nice to see a native rat species for a change. Yours is the Southern Bush Rat, *Rattus fuscipes*. Most of the rat photos we get are of introduced pest species like the Brown Rat, *Rattus norvegicus*, and Black Rat, *Rattus rattus*. Your native rodent is a harmless species found mostly in forested areas and not generally considered a problem as they are rather solitary and most adults die off each autumn. They are threatened by land clearing, introduced foxes and feral and domesticated cats.

STEVE VOGEL

WEBLINKS ›

Bush rats: www.australianmuseum.net.au/Bush-Rat
Identifying rats: www.australianmuseum.net.au/Is-it-a-Rat/

Southern Bush Rat, *Rattus fuscipes*. Photo by GA Hoyes.

Q. *We photographed this huntsman spider wrestling with a skink in our garden. Do spiders normally eat vertebrates?*

What a great photograph! You have seen a species of tropical huntsman (either *Heteropoda jugulans* or *H. cervin*) capturing and feeding on a Weasel Skink, *Saproscincus mustelinus*! As their name suggests, tropical huntsmen are found in warmer, wetter regions such as Queensland but in recent years they have become more common in Sydney. Last summer in particular we saw an increase in enquiries about them as they flourished in Sydney's unusually tropical weather. It is not common for invertebrates to prey on vertebrates but this picture shows that if necessary a spider the size of a huntsman can overpower a skink for its dinner!

ELLA MINTON

A tropical huntsman, *Heteropoda* sp., devours a Weasel Skink, *Saproscincus mustelinus*. Photo © Kea Lambert & John Bishton.

Q. *I thought this bird might be a kingfisher, but the colours seem odd.*

At this time of the year, we often receive queries about stocky, oddly coloured birds with a kingfisher-like head and beak and a pale collar similar to a Sacred Kingfisher's. But the birds in question are usually young Grey Butcherbirds, *Cracticus torquatus*. In their first year, butcherbirds are often spotted in people's yards feeding on small birds, lizards and insects. It takes several moults before the distinctive black, grey and white markings of the adult replace the olive-brown and washed-out buff feathers of the youngster.

During its breeding season, which begins in late autumn, the adults display typical territorial behaviour by singing their distinctive songs and chasing off competitors. They allow immature offspring to remain within their territory for about a year, and these may assist with rearing the next season's clutch.

KELLIE HARRIS

A juvenile Grey Butcherbird, *Cracticus torquatus*. Photo © Graham Richardson.

MARTYN ROBINSON
IS THE MUSEUM'S
RESIDENT NATURALIST

WINTER STRATEGIES

As the weather cools down, so does the metabolism of cold-blooded animals. But, like everything in the natural world, there are always exceptions to the rules. Just take a look at these three examples.

WHERE HAVE ALL THE SPIDERS GONE?

You may be wondering what's happened to that big fat spider whose web you used to walk into around the back of the clothes line. Well, I hate to come over all Charlotte's Web on you, but I'm afraid she's probably dead.

Most araneomorph spiders (the typical web-building spiders and huntsmen) 'live fast and die young'. Many breed towards the end of their first year and then never get to see their offspring (which is probably a good thing, as some mothers would probably eat them otherwise).

The 'elderly decline' of these spiders is perhaps most noticeable in the orb-weaving species. Garden orb-weavers such as *Eriophora transmarina* normally build, tear down and eat their webs each night, but around this time of year they will start leaving them up permanently. Golden-orb weavers (*Nephila* spp.), which always leave their webs up, will be getting less fussy about repairing any holes. And the webs of St Andrew's Cross Spiders, *Argiope keyserlingi*, normally so taut and symmetrical, will begin to sag.

Left
Golden-orb weavers spend less time on web maintenance at this time of the year. Photo by Stuart Humphreys.

Opposite
The Common Eastern Froglet, *Crinia signifera*, is one of the few winter-active frogs. Photo © Jodi Rowley.

These are all signs that winter is upon us and the spiders will soon disappear (though perhaps not as quickly as they once did, thanks to global warming). They no longer seem to have the energy or the silk to make repairs, but may well be trying to catch a few of the dwindling insects still about to provide enough energy for a last egg sac.

In contrast, the more 'primitive' spider forms – the mygalomorphs such as funnel webs – live for many years and simply become less active in winter, many waiting out the cold weather, safe in their burrows.

ECHIDNAS GONE TO GROUND

Winter isn't a very good time to see echidnas as many enter torpor during the colder months. Dropping their body temperature below 10°C and breathing just once every three minutes – and consequently greatly reducing their metabolic rate – they survive on their body fat, which can make up as much as 40 per cent of their total body weight.

Every few weeks, their temperature slowly rises to normal (32°C) as they stir to eliminate wastes and perhaps have a drink before returning to torpor. As the warmer weather returns, so does the echidna's food supply of ants and termites, with tasty winged queens and fat grubs, and the sleepy monotremes fully awaken to set about replenishing their fat stores.

AS COLD AS A FROG

Winter isn't usually thought of as a time when you'd find frogs, let alone find them breeding – surely most frogs would be hunched up asleep somewhere safe? Well, it's that very point that has allowed some species to specialise as winter breeders. Braving the elements allows these hardy amphibians to avoid competition with all the frogs that prefer the warmer weather.

Along Australia's east coast, the frog most commonly heard during winter is the Common Eastern Froglet, *Crinia signifera*. This small brown frog is variably patterned – some individuals are striped, while others have spots or blotches on their backs.

Although winter is when it comes into its own, this diminutive croaker – it grows to a mere three centimetres in total length – actually calls throughout the year, often forming large choruses in temporary ditches, ponds, soaks and shallow creeks.

It can even be heard calling from freshwater soaks less than a metre above the high-tide mark along some Sydney beaches. The choruses are interesting in that roughly half of the frogs call together, immediately followed by the other half, producing a see-sawing 'creeeek creeeek' effect.

FROGS ONLINE

Identify frogs from their calls anywhere in Australia using your iPhone and the Museum's latest app, *Frogs Field Guide*. Now available from the Apple Store.

HOW ARE DIFFERENT ANIMAL SPECIES ADAPTING TO A WARMER FUTURE? NEW RESEARCH BY THE MUSEUM'S **JOHN GOLLAN** AND **MICK ASHCROFT** HAS COME UP WITH A TECHNIQUE FOR IDENTIFYING AREAS WHERE SOME SPECIES AT LEAST CAN FIND REFUGE.

HIDE AND SEEK

in a warming climate

Much of the world's biodiversity faces an uncertain future as global warming continues across the Earth's surface. The scale and pace of the threat posed by a warming climate has alarmed many scientists, leading them to search for areas that may be least affected by having unusual or stable climates.

Scientists reason that such areas could provide somewhere for species to expand and contract their populations over long periods or offer shelter from more extreme conditions. Such areas have been termed 'microrefugia' but are also known as 'cryptic refugia' because of the difficulty in observing them within a landscape.

DEFINING

Before we can identify refugia, we first need to define them in an ecologically meaningful way. Scientists have known for years that refugia exist as patches in variable (heterogeneous) landscapes, but until recently our definitions of microrefugia have lacked precision or were poorly characterised.

To address these shortcomings, we have been conducting detailed and intensive field studies over the last three years monitoring the microclimate at a range of sites in the greater Hunter region west of Newcastle.

MEASURING

Every six months, we set off from Sydney to collect data from a total of 150 climate loggers that automatically record hourly temperature and humidity readings. Each field trip takes around a week.

The small, button-sized climate loggers have been placed in a variety of sites including rainforest gullies; steep slopes having different aspects; exposed rocky escarpments and even sand dunes.

So far, we've amassed over six million observations. Combining these data with detailed information about elevation and the local topographic features that influence temperature has produced a technique that can be widely used to quantify and locate potential microrefugia in a landscape.

In short, the technique captures extreme conditions (either very hot or very cool), the degree of stability in these conditions, and how distinct these conditions are from the climatic conditions in the surrounding landscape.

To test and validate the technique, we successfully used it to predict the location of known communities considered to occupy refugia, such as rainforests that have progressively contracted in distribution over the last 2.5 million years, and alpine grasslands that have contracted over the last 15,000 years.

So we know the technique works, but can it be applied more widely?

SCALE

The vast scale of Australian landscapes complicates the incorporation of microrefugia into adaptation plans for future climate change. Indeed, some Australian land management agencies are responsible for land areas larger than certain European countries.

This is where computer modelling plays a valuable role. In the past, complex global climate models (GCMs) have been used to identify refugia. A limitation is that many GCMs are based on cells measuring tens to hundreds of kilometres. We now know that temperatures vary at scales of less than one kilometre.

In effect, these coarse-scale models can define features that are more correctly

termed 'macrorefugia', and they certainly have a role in planning for climate change effects.

But another shortcoming is that GCMs fail to accurately estimate surface climate conditions because they are too coarse to take into account the very terrain features that help to decouple upper atmospheric conditions from boundary layer effects.

This is a significant weakness because it is the surface climate that most organisms experience and that directly affects their survival: germinating seeds, tender saplings and the majority of terrestrial invertebrates and ground-dwelling vertebrates – all are at the mercy of near-surface temperatures.

Further, GCMs are based on temperature, more specifically 'average temperature'. This measure has long been held to be important in understanding the distributions of species and in turn their responses to future changes in climate. Our studies, however, show that it is the extremes and the intervening periods of stability that are more significant in a biologically or ecological sense.

We hope that our work will lead to a paradigm shift in which the roles of temperature stability and isolation, rather than long-term averages, are properly considered in understanding ecological communities.

TO THE FUTURE

To test our hypotheses about the roles of temperature extremes and stability, our work at the Museum continues under an ARC-funded project partnered with the University of Technology, Sydney, University of NSW, NSW Office of Water and the Central West Catchment Management Authority.

With PhD students, we are planning to conduct intensive biodiversity surveys across the full range of conditions found in the NSW Central West and supplement it with data from collections databases held in museums.

The study will include surveys of deep rainforest gullies, exposed mountain ridges and steep rocky slopes.

Some of the questions to be answered include: are microrefugia adequately represented in our reserve network? does climate stability act to stabilise a community? and, are microrefugia more likely to support endemic species?

If we are to meet the very real threat to biodiversity posed by climate change, we must work closely with land management authorities to identify microrefugia – not all of which will be represented within existing conservation reserves.

We might not be able to stop the inexorable creep of global warming, but perhaps we can help slow the loss of species through better management of refugia.

DR JOHN GOLLAN RESEARCH ASSOCIATE AND
DR MICK ASHCROFT SPATIAL ANALYST

Further reading

MB Ashcroft, JR Gollan, DI Warton & D Ramp, 2012. A novel approach to quantify and locate potential microrefugia using topoclimate, climate stability, and isolation from the matrix. *Global Change Biology*, online 2 March 2012. doi: 10.1111/j.1365-2486.2012.02661.x

Left
Localised variations in climate, such as this cold air pool in a valley, may offer opportunities for species to escape the effects of a warming climate. Photo by Carl Bento.

Right
Dr Mick Ashcroft at one of 150 locations in the Hunter Valley downloads temperature and humidity data from a climate logger. Photo by John Gollan.

where DO YOU BEGIN?

I asked Stuart Humphreys, from the Museum's Photography Department, to make a selection of his favourite images for *Photofeast*.

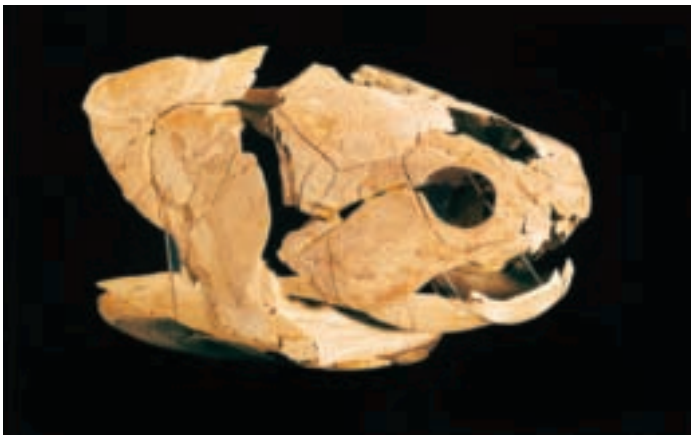
He replied, with some exasperation, 'How do you choose just four images from 17 years of photography?'

Well he did, and here they are.

CATE LOWE PHOTO EDITOR

WEBLINK ›

See more of Stuart's favourite photographs at www.australianmuseum.net.au/Explore-magazine.



Above

Dunkleosteus

This was the first photo I took for the Museum. I was a freelance photographer in my final year of college when the opportunity arose. I didn't know what to expect – certainly not a 350-million-year-old fossil fish. Imagine taking photographs of whitegoods one week and rare and beautiful fossils the next. From then on I knew where I wanted to be.

Above right

Crested Katydid, *Alectoria superba*

We are often asked to photograph non-living specimens, though personally I always enjoy the opportunity and challenges of working with living subjects. This katydid is particularly fascinating. Its ears are on its front legs near the 'knees'. If you look closely you should be able to see them.

Right

Ancient footprint

In my time at the Museum I've been lucky enough to be involved in some incredible projects, but I cannot think of a more moving or fascinating assignment than the ancient footprints in south-western New South Wales. Staring at a human footprint in what looks like freshly dried mud and to be told it's possibly 23,000 years old is something I'll never forget.

Left

Sascha Smith

This image was taken in 2007 during the creation of the Museum's *Surviving Australia* exhibition. Sascha's place was wall-to-wall full of taxidermy specimens. What struck me most that day was how well the work had been executed. She'd won awards in international shows, and some of her pieces are still on display in the Museum. It's not really what you expect to find in a suburban house behind a frangipani tree on Sydney's northern beaches is it?

BE PREPARED!
Timor-Leste on the horizon

MAKING A DIFFERENCE

The Australian Museum Expedition to Timor-Leste has been made possible by a generous private donation to the Australian Museum Foundation. Find out how your support can make a difference to the important work of the Museum – see back cover for details.

THE MUSEUM IS PLANNING A MAJOR BIOLOGICAL EXPEDITION TO TIMOR-LESTE IN 2012, THANKS TO FUNDING FROM THE AUSTRALIAN MUSEUM FOUNDATION.

Australia's near neighbour Timor-Leste (also known as East Timor) is an emerging nation of biological mystery that excites the minds of many Museum scientists.

'Timor-Leste is a fascinating and unique place', said entomologist Chris Reid, who recently returned from a scouting survey of Timor-Leste with malacologist Frank Köhler.

'Timor's mountains reach almost 3000 metres, the climate is monsoonal and the main natural vegetation is dry woodland – including three native species of *Eucalyptus* – but there are also some areas of rainforest', Chris said.

In a two-week whirlwind trip, Chris and Frank identified areas for further sampling and began the important process of engaging with local people and authorities.

HABITATS

Natural habitats across the country are patchy and isolated as a result of human land uses, the rugged terrain and a varied climate.

'Just as patchy is our knowledge of the fauna', Chris said.

'A few groups, like the reptiles and amphibians, have recently been studied, but there has never been a systematic biological survey of Timor-Leste.'

All that is about to change with two major biological surveys – one terrestrial, the other marine – scheduled for 2012 and funded by the Australian Museum Foundation.

QUESTIONS

'Timor-Leste is evaluating its system of protected areas for biodiversity', Frank said.

'Both the terrestrial and marine surveys will answer questions about biodiversity and provide crucial data for identifying new areas that may need to be conserved.'

The Museum's Dr Lauren Hughes agrees and will travel to the island later this year as one of ten Museum scientists for the marine survey.

'The seas surrounding Timor are part of a mega-diverse coral triangle, with deep onshore coral reefs teeming with unexplored sea life', Lauren said.

'While the survey team expects to find many specimens – and new species – for the Museum's collection, the results will also help answer important scientific questions.

'We want to know the origins of Timor-Leste's fauna, Asian, Australian or other, and whether it's old or new compared to other islands in the archipelago', Lauren said.

BUZZING

The first survey is scheduled for May and excitement is buzzing in the corridors and laboratories of the Museum's Collections & Research Building.

'We've been planning this survey for months now and can't wait to see what's out there', Lauren said.

'Let the Australian Museum Expedition to Timor-Leste begin!'

BRENDAN ATKINS EDITOR

WEBLINK ›

Follow the Australian Museum Expedition to Timor-Leste at www.australianmusuem.net.au/Explore-magazine.

Opposite
Dr Chris Reid examines a sweep net sample during the scouting survey in November 2011. Photo by Frank Köhler.

Above
Dr Frank Köhler scans the Timor-Leste landscape. Photo by Chris Reid.

returning TO THE RED CENTRE

AUSTRALIA HAS TURNED A CORNER IN REPATRIATING CULTURAL OBJECTS TO THEIR OWNERS, SAYS THE MUSEUM'S **SCOTT MITCHELL**.

One of my fondest memories of living in Central Australia was driving into an Aboriginal outstation near Hermannsburg to be greeted by a gaggle of smiling young boys. I can still see them running towards the car, beating their chests and shouting 'I'm a tjilpa man! I'm a tjilpa man'. *Tjilpa* is the Arrernte word for the Western Native Cat or Quoll, and it's a very important ancestral totem for certain Aboriginal people.

Now there is nothing unusual, in my experience, about boys wanting to be men, or in Aboriginal people identifying closely with the natural world. What I found striking was that the tjilpa has been extinct in that part of Central Australia for nearly a hundred years. Whether it's rock art near the Sydney Harbour Bridge or a child's playful boasting in the desert, Aboriginal culture continues to endure in surprising ways.

STREHLOW

Between 2004 and 2008 I was Director of the Strehlow Research Centre, a museum in Alice Springs which houses the Strehlow collection of secret/sacred Aboriginal objects. TGH Strehlow was an anthropologist who spent 40 years working in Central Australia, recording Aboriginal ceremonies and sacred sites, and collecting the tjurunga, or sacred objects, at the heart of men's ceremonial life.

From the 1960s onwards, senior Aboriginal men from Central Australia began to ask for their sacred objects back. Strehlow refused, a position he held until his death in 1978. Subsequently, family members who inherited the collection, and the Northern Territory Government, which ultimately purchased it, similarly did not return the objects. The decades-long attempt by the Aboriginal community to have their cultural property returned was marked by legal battles, national and international media attention, and even a protest march when the Strehlow Research Centre opened in 1991.

Like the tjilpa, the sacred objects were taken away but never forgotten by the Aboriginal people of Central Australia.

BITTER DEBATE

When I was starting my career, as an archaeology undergraduate in the 1980s, the hottest topic of debate was the repatriation of Aboriginal cultural property. On the one hand, some museum curators and archaeologists argued that Aboriginal cultural materials, including skeletal remains, held universal scientific and cultural values. Such objects, they suggested, should be held in museum collections in trust for future generations who could gain priceless scientific and cultural knowledge of value to all people.

On the other hand, many Aboriginal people believed that museums had a moral right to return their ancestors' remains and any other cultural objects that were still important as part of their living culture.

It is striking, looking back, how bitter that debate was at the time and how it raged well outside the boundaries of polite academic discourse (I'm thinking of a prominent archaeologist who lost his front teeth in a late-night conference fist-fight).

Today the need for the repatriation of human remains and culturally significant Aboriginal objects is widely accepted by the Australian museum community, and is beginning to be recognised by overseas institutions. Professional bodies such as Museums Australia and ICOM (International Committee of Museums) have built into their code of ethics a respect for the moral ownership rights of indigenous communities. All major State and Territory museums, including the Australian Museum, participate in the Commonwealth-funded Repatriation of Indigenous Property program, which is actively returning ancestral remains and secret/sacred objects from museum collections to Aboriginal communities.

LEGISLATION

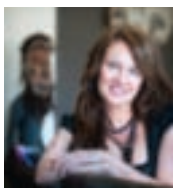
One my proudest career moments was facilitating the passage, in 2005, of a new piece of NT Government legislation allowing – for the first time – objects from the Strehlow Collection to be returned to Aboriginal custodians. Living in Central Australia, I was privileged to see firsthand the difference that repatriation can make in people's lives.

I have seen the pride and dignity with which men carry out their role as custodians of their family's sacred objects. I have witnessed old men greeting objects coming back to their Country from museums far away, singing songs that had been remembered, but not performed, for decades. I have been told of whole cycles of ceremonies being held again in Central Australia now that the sacred objects are home. And I know of families still hoping to find their objects somewhere in a museum, often with the most incredibly detailed memories of their physical characteristics and the stories associated with them.

The tjilpa boys near Hermannsburg may never get to see a native cat in the wild. Hopefully they will have the chance to hold their ancestors' sacred objects when it is their turn to grow up and become men.

DR SCOTT MITCHELL HEAD, CULTURE, CONSERVATION AND BUSINESS SERVICES

Opposite
Scott Mitchell played a key role in changing legislation so that the Strehlow Collection could be repatriated to Indigenous custodians. Photo Stuart Humphreys.



It was nice to see so many Members at our 40th anniversary celebration in March. We're looking forward to at least another 40 inspiring and engaging years.

THE CASE OF THE CASES

Have you noticed our new display area – it's outside the *Skeletons* gallery and is currently home to *Spirit Faces*, a display of some 20 amazing Melanesian masks. This new display area will allow us to bring more collections out of storage for short periods, particularly from our cultural collections.

The Italian glass showcases were made by the same company responsible for the display area now protecting da Vinci's *Mona Lisa*, and a team of Italian experts travelled to Sydney for the installation.

The first display in the cases, *Big Cats*, was a big hit with visitors. Look out for new displays coming up. With over 18 million objects in the collection, the possibilities are endless.

YOUR IDEAS WELCOME!

If you have ideas for displays you would like to see, we would love to hear from you. Just call in to the Members office and leave a suggestion.

It's a busy time here and we're especially excited about *Deep Oceans*, opening on 16 June. Turn to page 6 to find out more.

Enjoy the winter season at your Museum.

SERENA TODD
Executive Officer,
Australian Museum Members

Photo Carl Bento.

TRAVEL *with members*

NEW!

Papua New Guinea September 2013

Raw, largely untamed, with massive mountain ranges, mighty rivers and a spectacular diversity of fauna and flora, PNG has over five million people living much as they have for thousands of years.

Journey to our culturally diverse neighbour with Members and explore the richness and complexity of the Highlands (including the annual Goroka Show), the Sepik and much more. Few Australians have immersed themselves as deeply here as our program leader, Helen Dennett, who brings a lifetime of experience and involvement in PNG to our special small-group travel program. Register your interest in this tour with Australian Museum Members today, telephone 02 9320 6225.

More upcoming tours

Details Visit www.australianmuseum.net.au/Travel-Program

Modern Mongolia Explore unique and untouched places amid vast wilderness. 29 June to 16 July 2012

Wild Africa! Join Nat Geo Wild presenter Ben Britton on the safari of a lifetime. 26 August to 4 September 2012

Rock Art Research Experience the rock art of Western Arnhem Land with Prof Paul Tacon. September 2013

NEW! Tracing the footsteps of Alexander the Great Explore the ancient and modern worlds of Greece and Turkey following Alexander's trail. September–October 2013

Above Waghi man wearing a decorated plumed headdress, Jiwaka Province, Papua New Guinea. Photo by Yvonne Carrillo-Huffman.

night talks

ALL NIGHT TALKS

TIME 6.30 pm

COST Members $20, non-Members $30

BOOKING phone 9320 6225 or www.australianmuseum.net.au/Members

Ancient astronomies, ancient worlds

Prof Clive Ruggles, University of Leicester

WHEN Monday 4 June

Archaeo-astronomy is the study of beliefs, practices and knowledge concerning the sky. Often, the main evidence comes from the orientation of ancient architecture and the disposition of human activity in the landscape, but such evidence has to be interpreted with considerable caution – says Clive Ruggles. In this talk, hear Prof Ruggles describe some major new discoveries from his work in Peru, Polynesia, and prehistoric Europe.

Understanding the barbarian in antiquity

Prof Andrew Gillett, Macquarie University

WHEN Tuesday 26 June

The barbarian lurks constantly at the edge of our vision of the ancient world. Barbarians feature regularly in the art and writings from the classical Mediterranean societies of Greece and Rome; they get the blame for the end of the classical world; and many modern European nations have long traced their origins back to these same barbarians. Prof Gillett will look at how the idea of the barbarian has changed, from antiquity to early European states.

Dragonfish, spookfish and other unbelievable animals

Dr Bruce H Robison, Monterey Bay Aquarium Research Institute

WHEN Tuesday 10 July

Lurking in the dark waters of the deep sea are some of the strangest creatures known. Fishes with huge teeth and glowing lights cruise through the cold water that is studded with small blue sparks, spread like the galaxies. Bizarre gelatinous creatures without eyes or brains are dominant predators in much of this hidden world that also contains living fossils, giant squid, and, very rarely, an explorer.

ThinkUKnow: Cyber safety and your children

Reka O'Connell (Microsoft) and Angus Mclean (Australian Federal Police)

WHEN Tuesday 17 July

COST $5 Members, $10 non-Members, all children free

With today's youth spending a vast majority of their time online, it's important to know how to protect your children from the potential dangers that lurk on the world wide web. Come along to this special evening and learn how young people are using technology and how to keep them safe. Cyber bullying, online grooming, inappropriate content and online safety will be covered in this presentation by the Australian Federal Police and Microsoft. Bring your children to this special Night Talk so they too can learn how to stay safe on the internet.

Exploring the deep

Dr Nerida Wilson, Australian Museum

WHEN Tuesday 31 July

If you're keen to hear about the history of discovery of the deep ocean, and the technological advances that have allowed this exploration, don't miss this talk. Dr Wilson will explain the different habitats and weird and diverse animals that live in the deep oceans. Hear about her firsthand experience of diving on hydrothermal vents in the submarine DSV *Alvin*.

Life on Earth … are we a quirk in the laws of physics?

Dr John Webb, University of New South Wales

WHEN Thursday 16 August

Dramatic technological advances have had an enormous impact on our understanding of the universe. We can see further into the universe than ever before. In this lecture Dr Webb introduces current concepts in cosmology and shows how a new astronomical study provides the first clues that perhaps the universe extends far beyond the practical limits of observation. Intriguingly, the same data might also provide a simple solution to a long-standing problem: why is it that the laws of nature seem to be so finely tuned for the development of life on Earth?

WEBLINK ›

For a complete listing of Museum events this winter, visit www.australianmuseum.net.au/whatson.

Left See the Parthenon in a new light with Members as we trace the footsteps of Alexander the Great. Photo © World Expeditions.

special events

Sleepover: Sleep in the Deep

WHEN 22–23 June

COST Members: adults $140, children $110
non-Members: adults $170, children $130

Sleep on the ocean floor in Australia's oldest Museum! Come to the Museum for a special pizza dinner, join in a fun craft activity and tour the Museum by torchlight. Watch some DVDs with friends and then catch some ZZZs in our latest exhibition *Deep Oceans* beneath a giant squid! Make sure you bring your camera to capture every moment of this larger-than-life experience.

Film: *The Greenhorns*

WHEN Thursday 28 June, 6.30 pm

COST Members $15, non-Members $20

Come to the Australian Museum for a special screening of the documentary *The Greenhorns*. Three years in production, this film explores the lives of America's young farming community – its spirit, practices, and needs. By broadcasting the stories and voices of these young farmers, the film aims to build the case for those considering a career in agriculture – to embolden, entice and recruit them into farming. Presented jointly with the Friends of the Gardens.

Sleep in the Deep: Just for adults

WHEN 17–18 August

COST Members $145, non-Members $175

Why should the kids have all the fun? By popular demand, join our very first 'Big Kid' sleepover – an exclusive evening for adults. Starting with pizza, beer and wine you'll experience a night of fun activities including a hands-on squid dissection workshop! Bunk down in the *Deep Oceans* exhibition surrounded by giant squids, anglerfish and whales. Enjoy a breakfast of fresh pastries, fruit and the all-important espresso! Cost includes all food, drinks, torchlight tour, movie and the chance to sleep with creatures from the *Deep Oceans* exhibition – an experience you will never forget!

adventurous walks

ALL WALKS

COST Members $15, non-Members $20

BOOKING phone 9320 6225 or
www.australianmuseum.net.au/Members

Darlingtown to Darlington

Street names such as Ivy, Rose and Myrtle recall the nursery origins of this small suburb, now dwarfed by the adjoining Sydney University. Its Aboriginal and early colonial history can only be sketched, yet the suburb retains historic buildings and some charming tree-lined streets, says walk leader Keith Robinson.

Wednesday 20 June

Out and about in Oatley

Enjoy Oatley with Keith Robinson. Go on a guided tour of Oatley Senior Campus, Georges River College; visit Oatley's Point and Oatley's pleasure grounds; and enjoy a morning tea in the Avenue Café.

Wednesday 15 August

Springwood and surrounds

This easy 8-km walk takes in the beautiful Magdala, Glenbrook & Sassafras creeks in the lower Blue Mountains. Explore a picturesque network of creeks, waterfalls, weathered rock formations, mosses and gullies with Ross Pearson OAM.

Sunday 26 August

Above The Tube-eyed Spookfish, *Macropinna microstoma*, lives at depths of 600–800 metres in the Pacific Ocean. Its large, upward-facing eyes are protected within a transparent dome-shaped head. See Night Talk, page 27. Photo by Bruce Robison © MBARI.

SYDNEY ELDERS

Portraits of Aboriginal and Torres Strait Islander Elders by Mervyn Bishop

A series of photographic portraits celebrating the achievements of Indigenous elders. Exhibition now showing in the *Indigenous Australians* gallery, Australian Museum. Hurry! Closing soon.

Presented with the support of the City of Sydney
Joyce Ingram. Photo © Mervyn Bishop.

Exhibition preparator Angus Adameitis puts the finishing touches to a realistic Giant Sunfish for the *Deep Oceans* exhibition. Photo by Stuart Humphreys.

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Frank Howarth's photo by Carl Bento

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The Australian Museum strives to inspire the exploration of nature and cultures. We would like to acknowledge the benefactors and corporate partners who support us in achieving this vision.

Australian museum
nature culture **discover**

These generous individuals 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 on **02 9320 6216** or **development@austmus.gov.au.** Donations to the Australian Museum and its Foundation are tax deductible.

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