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YOUR SOCIETY

Read all about our 2015 AGS award winners. p117

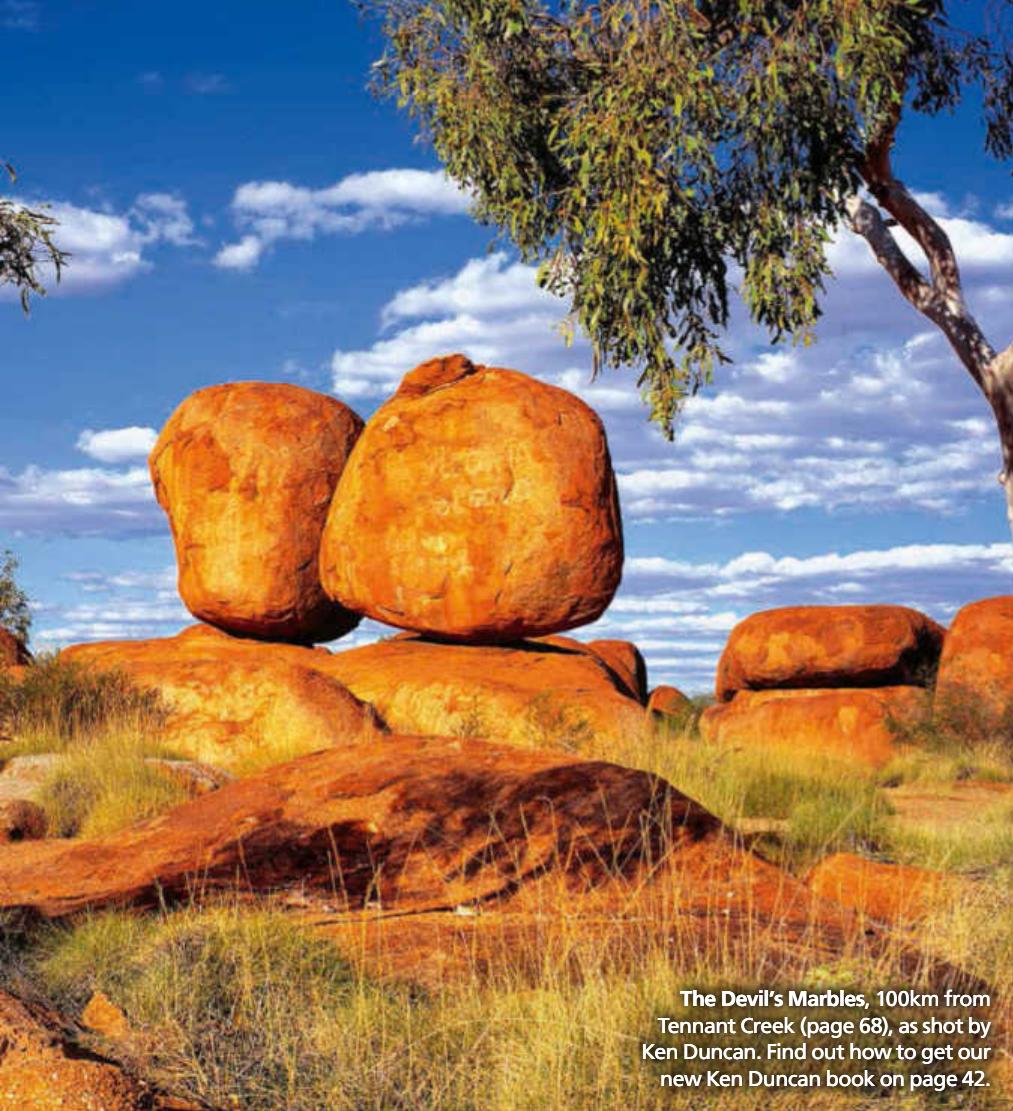


Jon Muir, who's completed a series of outback crossings, is a top Aussie explorer (page 54).



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PAGE 56: HEAR adventurer Tim Jarvis talk about the perils of Antarctic exploration.

PAGE 71: SEE a short film about the characters of Tennant Creek, NT.

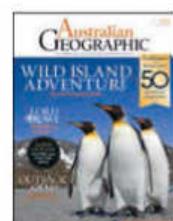
PAGE 85: EXPLORE the coast of South Georgia with our Adventurers of the Year.

PAGE 119: DONATE to our snubfin dolphin fundraising appeal.

PAGE 125: ENTER our competition to win a BBC natural history DVD.



Kingfishers come in a dazzling array of colours (page 24).



ON THE COVER

A group of king penguins (*Aptenodytes patagonicus*) on the beach at St Andrews Bay, on the subantarctic island of South Georgia. Captured by Ingo Arndt (Minden Pictures).

ONLINE

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EDITOR John Pickrell

ART DIRECTOR Mike Elliott

CHIEF SUB-EDITOR Amy Russell

SUB-EDITOR Karen McGhee

STAFF WRITER Natsumi Penberthy

DESIGNER Katharine McKinnon

PRODUCTION EDITOR Jess Teideman

CARTOGRAPHY Will Pringle

AG SOCIETY ADMINISTRATOR Nicolia Conti

EDUCATION EDITOR Lauren Smith

ONLINE ASSOCIATE PRODUCER Carolyn Barry

COPY EDITOR Frank Povah

PROOFREADER Susan McCreery

EDITORIAL INTERNS

Naomi Russo, Madeleine van der Linden, Anthea Batsakis

AG SOCIETY EXPERT ADVISORY PANEL

Chris Bray, Tim Flannery, Tim Jarvis AM, Anna Rose

ADVERTISING

BRAND AND ADVERTISING MANAGER Eleanor Rattray

02 9282 8483, erattray@bauer-media.com.au

QLD Rebecca Lawrie 07 3101 6630

WA Vicki Stacy 08 9207 1500

SA Nabula El Mourid 08 8267 5032

SUBSCRIPTIONS AND SALES

SUBSCRIPTIONS MARKETING MANAGER Michelle Willis

GPO Box 5252, Sydney NSW 2001, Phone: 1300 555 176

(in Australia), +61 2 8667 5295 (from overseas)

Email: magshop@magshop.com.au

EDITORIAL CORRESPONDENCE TO

Australian Geographic, GPO Box 4088, Sydney NSW 2001, Australia

Phone: 02 9263 9813 Fax: 02 9126 3731

Email: editorial@bauer-media.com.au

CEO David Goodchild

PUBLISHER, SPECIALIST DIVISION Cornelia Schulze

PUBLISHER Jo Runciman

HEAD OF SPECIALIST ADVERTISING Julie Hancock

DIRECTOR OF SALES Tony Kendall

DIRECTOR OF MEDIA SOLUTIONS Simon Davies

GENERAL MANAGER, MARKETING Natalie Bettini

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CLOCKWISE FROM TOP LEFT: GARY CRANICH / BARYCHELIDAE SP.; HELMUT FOHRINGER/AAP; CARCHARODON CARCHARIAS; LAURIE BOYLE / EPIHANURA TRICOLOR; WARREN KELAN



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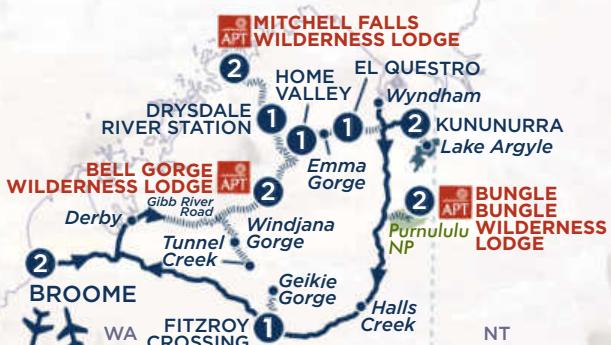
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The Whitsundays

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The Whitsundays
Queensland 74 Island Wonders

Let the adventures begin



OUR ANNUAL celebration of adventure and conservation – the 2015 Australian Geographic Society Awards – took place in Sydney on 28 October, and once more we hosted the year's brightest and best in adventure and conservation (page 117). The audience at the sellout event was treated to inspiring tales of courage, perseverance and a dogged determination to make a difference from amazing Aussies of all ages and from all walks of life – as well as an inspirational presentation from wonderful guest speaker Jessica Watson. The party atmosphere was heightened by the exciting prospect of AG's impending 30th birthday next year.

As we look to that milestone – to be

celebrated in the next issue (Jan/Feb 2016) – the founding editor of this journal, Howard Whelan, reveals Australia's 50 greatest adventurers and explorers from the time of European settlement to the present day (page 54). Like all lists of this type, it's sure to raise some eyebrows and ruffle a few feathers.

The 50 greatest adventurers is the basis of a thrilling new exhibition called *Trailblazers*, at the Australian Museum in Sydney, which opens in late November and runs until July 2016. The AG Society's crucial role in promoting modern-day adventure is reflected in many of the displays, and we are delighted to be able to announce our role as sponsors of a series of adventure-related events and talks that will take place at the museum over 21 weeks, from March to July 2016.

We will publish the full schedule on our website (www.australiangeographic.com.au/issue129) and in coming issues of the

journal. AG subscribers will receive a 20 per cent discount on adult and family ticket prices to the *Trailblazers* exhibition – you must present the latest issue of AG at the admission desk to redeem this special offer (see page 67). If you can't get to the museum in person, we will also post videos of the talks online.

And remember that it's only through your subscription that we are able to support this spirit of adventure, which contributes in so many ways to a strong and confident national identity. A subscription makes a valued and lasting Christmas gift for friends and family, and it's easy to organise – go to page 42 to subscribe now.

Chrissie Goldrick

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Contributors



Kevin Stead

began his working life as a high school art teacher, a role he continued for 15 years before leaving to focus on his own creativity.

Never tempted to cross the digital divide, Kevin sticks resolutely to his favourite traditional mediums of watercolour and gouache on paper, or acrylic on canvas, working from photographic references and live specimens. Kevin has been working with AUSTRALIAN GEOGRAPHIC since AG 15, which featured his magnificent tree frog on the cover.

NATURE WATCH, PAGE 24



Heath Holden

started photographing BMX and mountain-bike riding events, which opened a path for him to explore the world. Since then he has lived and worked in Canada and Singapore, and is currently working as a photojournalist based in Tasmania. With a combined passion for natural history and outdoor adventures, he's a natural fit for AG – and this issue's feature about the Northern Territory's Tennant Creek is his first commission for us.

RED DUST, GOLD HEART, PAGE 68



Mandy McKeesick

is a freelance writer from north-western New South Wales, who has a passion for sharing the stories of rural Australia. With a career spanning the deserts (as a geologist), the oceans (as a diver) and the grasslands (as a farmer), her collection of yarns is long and varied. She lives on an 800ha cattle property with her husband and many dogs in her home town of Coolatai, the story of which she shares with us in this issue's Lat/Long.

LAT/LONG, PAGE 110

Contributing editors: Joanna Hartmann, Karen McGhee and Josephine Sargent **More contributors:** Ralph Alphonso, Ingo Arndt, Nathan Barden, Paul Brown, Elspeth Callender, Henry Cook, Julius Csotonyi, Ken Duncan, Pam Duncan, Ken Eastwood, Richard Flesfadar, Luke Hanson, Kiernan Ironfield, Zoe Lawrence, Bianca Nogradi, Andrew Maffett, Eric Philips, Alex Ries, Ethan Rohloff, Ben Sanders, Fred Watson, Howard Whelan.

BIG PICTURE CITY IN THE SKY

BY ETHAN ROHLOFF

On 11 July this year, Sydneysiders awoke to a blanket of all-encompassing fog smothering the city's CBD. Captured here from the air by photographer Ethan Rohloff, it was enough to completely obscure the Sydney Opera House and much of the Harbour Bridge. The city sees 5–6 fog days each year; the Bureau of Meteorology says light winds, calm conditions and moisture from rain in the preceding days all added up to the unusual conditions on this date.





BIG PICTURE SLIPPERY CUSTOMER

BY HENRY COOK

This Murray Darling carpet python was rescued from 8m up on the roof of a smash repairs workshop in Longreach, Queensland. Resident snake-lover and keen bird photographer Henry Cook reached it using a scissor-lift; he then relocated it to this enormous coolibah tree, full of large python-friendly hollows, on the banks of the nearby Thomson River. The species is non-venomous and can grow to a length of almost 3m.





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ANT143



Accounting for taste

“I SN’T SHE SWEET”, “bitter old man”, “He’s a good salt.” English is littered with sayings relating to our sense of taste. It’s one of the earliest senses, developing 21 weeks after conception, and is also one of the most powerful. There are five basic tastes: sweet; sour; salty; bitter; and savoury, or umami (and perhaps now a sixth – fat). The historic diagram that shows the tongue divided into different regions responsible for each taste is in fact a myth. All tastebuds detect all flavours, but the concentrations of cells able to detect different chemicals (sodium chloride for salty, sucrose for sweet, for example) varies across the tongue, meaning that some flavours appear to be detected in different regions first.

SUPERTASTERS?

Some people have a greater concentration of tastebuds, making them ‘supertasters’. They are sensitive to bitter flavours from foods such as coffee or broccoli and are more likely to be fussy eaters – although some scientists have now contested the supertaster theory.

NEW FLAVOURS

There are still many chemical receptors on taste cells that scientists don’t understand. We may soon find taste receptors for substances such as fat, carbohydrate, phosphorus and calcium, says Professor Russell Keast at Deakin University in Melbourne.

TASTEBUD

Tastebuds each contain separate cells that pick out the five different flavours and their levels of intensity as they wash over the tongue in saliva. Each individual tastebud only lives for about 10 days.

SPICY

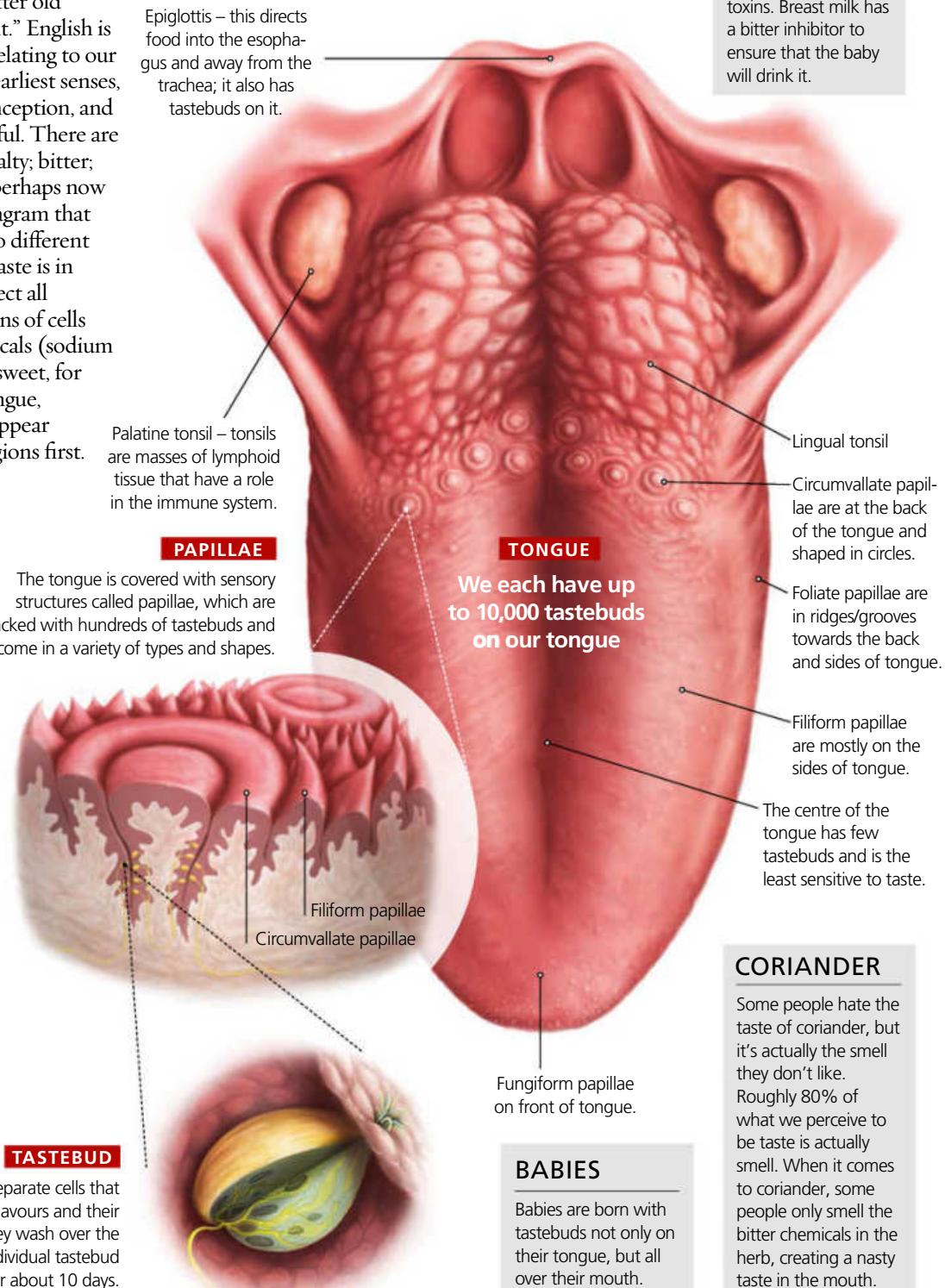
The ‘flavours’ of hot and spicy in chilli and pepper are sensations, not tastes. The chemical capsaicin stimulates pain receptors, producing the impression of heat.

UMAMI

Umami – also known as ‘savoury’ – is the flavour of MSG, glutamic acid or aspartic acid and is thought to be linked to the overall protein content of food.

BITTER

Our dislike of bitter tastes was developed to stop us eating poisons. Pregnant women have a heightened ability to taste bitter things in order to protect them and the baby from toxins. Breast milk has a bitter inhibitor to ensure that the baby will drink it.



CORIANDER

Some people hate the taste of coriander, but it’s actually the smell they don’t like. Roughly 80% of what we perceive to be taste is actually smell. When it comes to coriander, some people only smell the bitter chemicals in the herb, creating a nasty taste in the mouth.

BABIES

Babies are born with tastebuds not only on their tongue, but all over their mouth.

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AGS-supported research

All hail 'Lightning Claw'

A new dinosaur is the biggest carnivore ever found Down Under.

IN AUGUST I LED an AG Society Scientific Expedition to Lightning Ridge. It was the first fossil dig we have hosted, and one of the most exciting specimens we helped study was a new meat-eating dinosaur, the largest ever discovered in Australia.

Originally found by opal miners in the 1990s, the fossil has only recently been studied by Dr Phil Bell, palaeontologist at the University of New England in Armidale, NSW. The fossil was discovered underground at the Carters Rush opal field, and consists of a giant claw from the hand; parts of the arm, hip and foot; pieces of ribs; and a whole bunch of other fragments.

"When I started looking at this fossil last year, I immediately recognised it was something new and important. Comparing it with other Australian and South American dinosaurs it became clear this was a megaraptorid – a relatively rare group mostly known from Argentina," says Phil, who has published a study on the find in the journal *Gondwana Research*. Calculations suggested that the animal would have been about 7m in length, making it Australia's biggest known carnivorous dinosaur – bigger than previous record-holder *Australovenator*, described in 2009 from a fossil found at Winton in Queensland.

There were just enough clues in the new bones to identify the dinosaur – dubbed 'Lightning Claw' – as a megaraptorid. It would have been a large and slender predator that prowled the waterways and flood-plains of this region of the supercontinent of Gondwana 110 million years ago, during the Cretaceous period. One unique feature of Lightning Claw is its massive claws, which may have been used like grappling hooks to ensnare prey – it lacked the powerful jaws of other carnivores, such as *T. rex*.

The fossil, mostly formed of blue-grey 'potch', or common opal, also displays flashes of precious opal when moved in the light. In 2005 Lightning Ridge locals Rob and Debbie Brogan, who had acquired the dinosaur, donated it to the Australian Opal Centre (AOC), which has the world's largest public collection of opalised fossils (see AG 124). The original specimen was almost certainly more complete, but wasn't immediately recognised as a fossil, and parts were destroyed or lost in the mining process. Phil – who has been working for several years alongside Jenni Brammall and Dr Elizabeth Smith of the AOC – has chosen not to officially name the animal as a new species until more complete fossils are found.

"It's another little piece of the puzzle for Australian dinosaurs," says Dr Steve Salisbury, from the University of Queensland. It also cements the idea that megaraptorids were the dominant carnivores here in the Cretaceous. Megaraptorids are medium-sized meat-eaters – including *Megaraptor* and *Australovenator* – that lived on Gondwana at this time.

Australian dinosaurs have often been thought of as aberrant or relict species, living on the periphery of the regions that produced new groups of dinosaur, but Phil argues the new find contests that notion. "Lightning Claw... is the oldest member of this group of megaraptorid dinosaurs," he says. "The evidence now points to an Australian origin for this group – so they first appeared here and branched out, colonising other parts of the supercontinent, such as South America."

Several other dinosaurs have been described from Lightning Ridge fossils, but each consists of just a single bone. Lightning Claw is the most complete Australian carnivore known after *Australovenator*.

► **JOHN PICKRELL** is the editor of AUSTRALIAN GEOGRAPHIC. AGS-supported research will continue on our 2016 Lightning Ridge fossil dig: www.australiageographic.com.au/issue129



Cretaceous carnivore.
This 7m killer once prowled along Lightning Ridge's swamps, lakes and rivers.

Turn to page
99 to participate
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Inside outside

X-ray images from a new CSIRO book provide an unexpected view of a series of Australian native animals.

1 AERIAL ADAPTATIONS

The shadow of a gliding membrane – a skin fold known as the patagium – can be seen in this image of a squirrel glider (*Petaurus norfolcensis*). Elongated vertebrae are a less obvious adaptation for gliding. Similar to other possums and gliders, the limb and tail structure reflects this species' tree-dwelling lifestyle.

2 DEVIL'S DETAIL

Combine this fearsome tooth display with the extraordinary bite strength of the Tasmanian devil (*Sarcophilus harrisii*) – which is the same as that of a dog four times its size – and it's clear why this endangered carnivore has such a savage reputation.

3 ANCIENT ANCESTRY

Unique pelvic bones reveal a link between the short-beaked echidna (*Tachyglossus aculeatus*), extinct mammalian ancestors and living crocodiles. Note the sharp protective spines covering the echidna's body – like our fingernails, they are made of the hard protein keratin.

4 INJURY EXPOSURE

The unmistakeable shape of the bill makes it impossible to confuse the platypus (*Ornithorhynchus anatinus*) with any other mammal. This individual appears to have had an accident-prone life – note the fractured ribs on its right side and a healed fracture on its left leg.

5 FLIGHT POWER

The bones of the pelvis and front limbs have been highly modified to create a supportive framework for the wings of the grey-headed flying-fox (*Pteropus poliocephalus*).

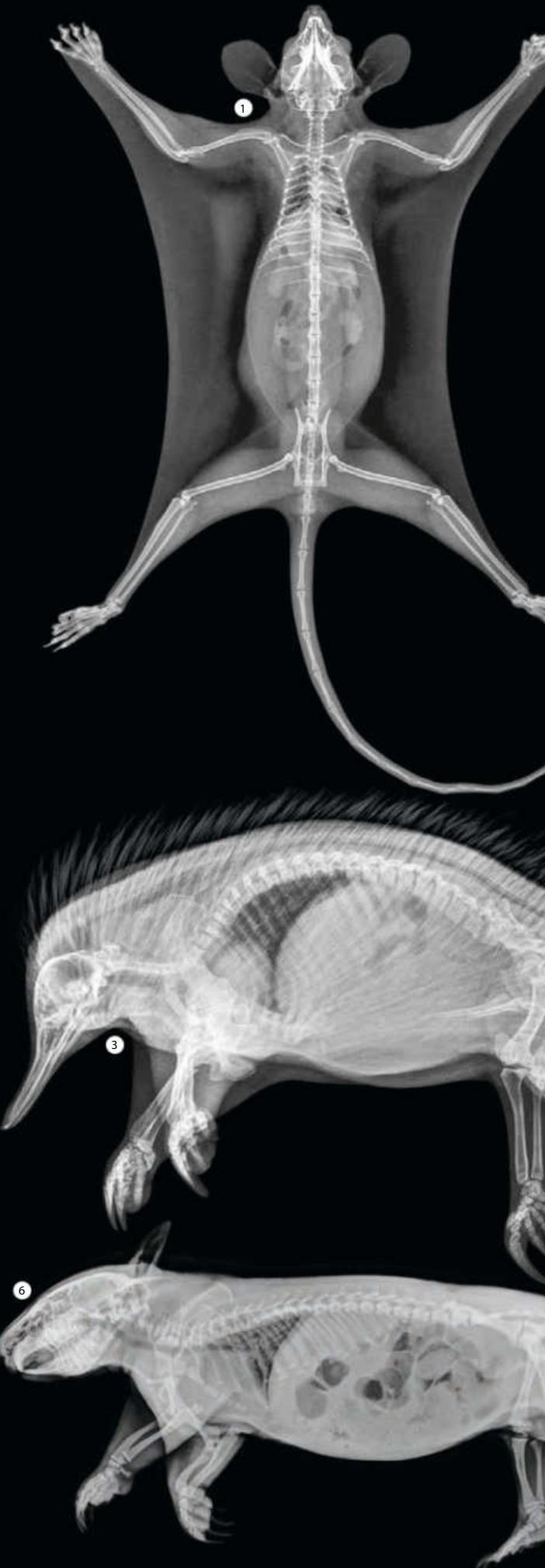
6 TUNNELLING SIGNS

Strong stout limbs are telltale signs of a common wombat's (*Vombatus ursinus*) burrowing lifestyle. The contents of its digestive tract are also clearly visible here.

7 BABIES ABOARD

Three joeys are tucked away in the pouch of this common ring-tailed possum (*Pseudochirus peregrinus*). It looks like a tight squeeze, but there's room in there and enough teats for up to four babies.

Images reproduced from *Radiology of Australian Mammals* (CSIRO Publishing, 2015). Find it online at: www.publish.csiro.au





VOYAGE: 2609 - WEST PAPUA >
LOCATION: BANDA NEIRA > DATE: SEPTEMBER 2013

Kora Kora war canoes similar to the ones welcoming the
Coral Discoverer defended the Spice Islands of Indonesia
from the Dutch fleet during the 'Spice Wars' of the 1660s.



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Sowing the seed

Amelia Telford, our 2015 Young Conservationist of the Year, has created an environmental network that has given a voice to Aboriginal youth.

AMELIA 'MILLIE' Telford is no ordinary 21-year-old. Instead of spending her days with her nose buried in university textbooks, she works in a busy Melbourne office, giving advice to young Aboriginal people all over the country.

In 2013, while working with the Australian Youth Climate Coalition (AYCC), Amelia raised funds to create the Seed Indigenous Youth Climate Network, an organisation that supports Aboriginal people aged under 30 who want to participate in environmental debates. It was an effort that saw the young Bundjalung woman become the joint NAIDOC Youth of the Year in 2014. She is talking to an increasingly important demographic; more than half of all

Aboriginal and Torres Strait Islander people are under 25, and world governments are recognising that remote and rural indigenous communities are among those most affected by climate change (see AG 103).

"We're filling a gap that no-one has really been working on," Amelia says. "The way that we're doing it alongside the AYCC, a non-indigenous organisation, is unique because we're seeing indigenous and non-indigenous young people working together; we're so much more powerful...because of that."

Anna Rose, co-founder of the AYCC, and the AG Society's 2014 Conservationist of the Year, heard of Amelia's campaigning power before the Lismore-based high school captain

had even graduated. When Amelia put off taking up a place as a medical student at the University of New South Wales to volunteer in the environmental sector, the AYCC offered her a role as its indigenous and diversity coordinator.

The 120,000-member-strong AYCC is one of Australia's largest youth-run organisations, but Amelia quickly realised that the key to increasing Aboriginal participation was to create an independent body. "At the time, we weren't working particularly closely with indigenous young people," she explains.

However, since its launch in 2014, Seed has rapidly taken root. "There's been an incredible response from our elders and community members," Amelia says. "They realise that we need young people who have the privilege of being more open-minded and positive, and can learn from the struggles [of]... generations before us."

Seed has trained 50 youth representatives in public speaking and media and project management. They are now participating in important debates concerning the effects of sea-level rise on the Torres Strait, and in negotiations with Aboriginal landholders in Queensland regarding what could become the country's largest coal mine.

Indeed, Amelia will soon be taking a road trip from Townsville to Brisbane to visit communities and "amplify their voice" in the run-up to the UN climate change negotiations in France in December 2015. Although climate change is a major focus, other youth advocates are raising awareness around local environmental issues, she says.

According to Anna, Amelia has played a groundbreaking role in building a movement of young campaigners. "They are effective in their own right, but are also challenging the rest of the environmental movement to be more so," she says. "What Millie has done is really reinforce that environmentalism is about people and culture, and our connection to the land. That's been a huge gift to the whole movement."

NATSUMI PENBERTHY

AUSTRALIAN KINGFISHERS

Fabulous fishers

These shy, yet glamorous, birds can be found around our rivers, coasts and forests, and indicate a healthy ecosystem.

KINGFISHERS LIVE all over Australia, but predominantly in coastal regions. We have 10 native species, including the kookaburra, which is the largest. Kingfishers nest in tree hollows, in burrows in riverbanks and in termite nests. They feed on small animals, including fish, frogs, yabbies, snakes, insects and nestlings of other birds. Cloaked in stunning green, blue, turquoise and orange plumage, some kingfishers were once in danger of being hunted to extinction for their feathers. Despite their elaborate garb, these stocky birds are tough, and hunt by darting upon prey in a flash of colour from branches above the river or forest floor. The kingfisher's heavy beak is the perfect tool for despatching victims quickly – they smack their hapless prey against tree branches before swallowing them whole.

TEXT BY MADELEINE VAN DER LINDEN
ILLUSTRATIONS BY KEVIN STEAD

SACRED KINGFISHER

Todiramphus sanctus

Length: 20–23cm **Wingspan:** 29–33cm

This turquoise-green kingfisher is found in open forests and on the edges of lakes, mudflats and streams, as well as in parks, golf courses and near garden ponds. Although it feeds mainly on insects and small reptiles, it isn't above pillaging goldfish from unguarded ponds.



BUFF-BREASTED PARADISE KINGFISHER

Tanysiptera sylvia

Length: 29–35cm **Wingspan:** 34–35cm

Despite its striking red bill and long white tail feathers (which make up half its body length), this species is difficult to spot in the rainforests and gullies where it lives, but is occasionally seen in thickly vegetated gardens. It breeds in Australia and nests in active termite mounds – flying beak-first into the mound until it has dug a hole. Once the young are fledged, they fly with their parents to New Guinea for the winter.



COLLARED KINGFISHER

Todiramphus chloris

Length: 24–29cm **Wingspan:** 42–52cm

Also known as the mangrove kingfisher, it lives only along northern coastlines, from Shark Bay, WA, to the lower Clarence River, NSW. It prefers to eat crabs and fish, but will eat insects, small reptiles and nestlings of other birds if the seafood pickings are slim.



LITTLE KINGFISHER

Alcedo pusilla

Length: 11.5–13cm **Wingspan:** 20–26cm

The little kingfisher is the smallest of our native species. Its glossy, dark-blue plumage flashes as it darts across the water, hunting for small fish and crustaceans, which are its main prey. It lives along thickly vegetated coastal creeks, mangroves, swamps and rainforest streams.



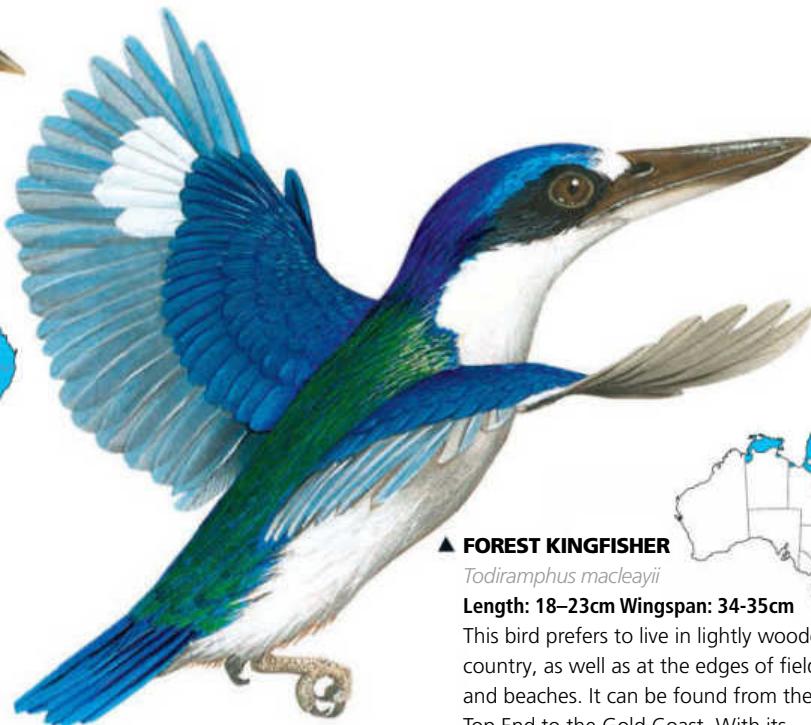


▲ AZURE KINGFISHER

Alcedo azurea

Length: 17–19cm **Wingspan:** 25–29cm

Similar to the little kingfisher, the azure makes its home along the banks of coastal and inland rivers, swamps and mangroves. During breeding season, it lines its nest with fish bones and scales. Found along much of our northern and eastern seaboards, as well as Tasmania, this species hunts for small mammals, reptiles, fish and frogs.



▲ FOREST KINGFISHER

Todiramphus macleayii

Length: 18–23cm **Wingspan:** 34–35cm

This bird prefers to live in lightly wooded country, as well as at the edges of fields and beaches. It can be found from the Top End to the Gold Coast. With its deep-blue and pale-turquoise colouring, it is a beautiful bird, often seen perched on powerlines, as it watches for insects and small lizards.

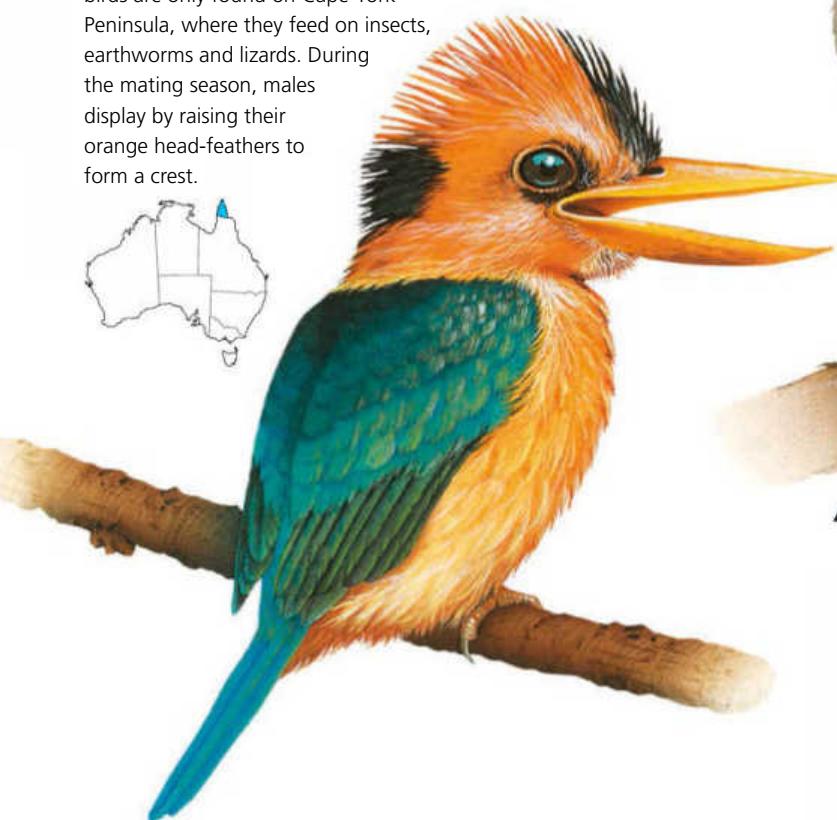


▼ YELLOW-BILLED KINGFISHER

Syma torotoro

Length: 18–21cm **Wingspan:** 34–35cm

Bright orange and olive green sounds gaudy, but the yellow-billed kingfisher manages to pull it off. In Australia these birds are only found on Cape York Peninsula, where they feed on insects, earthworms and lizards. During the mating season, males display by raising their orange head-feathers to form a crest.



▲ RED-BACKED KINGFISHER

Todiramphus pyrrhopygius

Length: 20–24cm **Wingspan:** 40–50cm

Unlike many birds in this group, the red-backed kingfisher is often found far from water, in dry, open woodland where it preys upon mice and large insects. This medium-sized bird is found across Australia, but not in Tasmania, southern parts of Victoria or in the southwest of WA.



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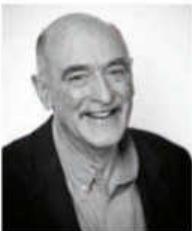
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Puzzles in space. Shapes spotted on Mars include: a crab, a face, a lady and a pyramid.



Born to be deceived

Mysterious figures, faces and creatures photographed by space probes are probably not what they seem, says Fred Watson.

DID YOU SEE news about a crab spotted on Mars? Oh yes, it was definitely a crab-like creature, as you could see from images circulating on social media. To be exact – as reported more hysterical accounts – it was a “Martian space crab” or “alien facehugger”. Or, at the least, a space spider.

Oddly, the story was trumped days later by reports of a 10cm-tall dark lady on Mars – also spotted by NASA’s Curiosity rover, as it began its fourth year on the planet’s surface. Like the crab, she was standing against a rocky background. And she was hailed as proof there is life out there.

You don’t have to look far to see similar accounts of ‘incontrovertible’ evidence of lifelike activity on Mars. Skeletons, pyramids, jelly doughnuts – you name it. Perhaps best known is the Face on Mars, spotted by NASA’s Viking 1 orbiter in 1976 as it passed over a region known as Cydonia. Almost 3km in length, the face had humanoid features, and at the low resolution of Viking’s cameras,

it looked like an alien artefact. Conspiracy theories abounded, so when the Mars Global Surveyor satellite entered orbit around the planet in September 1997, NASA countered them by prioritising Cydonia in its mapping program.

The feature was then revealed as a rocky mesa, its surface gouged by erosion, which looked nothing like a face in the higher resolution images. Like other Cydonia mesas, it is probably an ancient lava dome.

This human tendency to perceive patterns where none exist (such as Jesus on a piece of toast) is called ‘pareidolia’, and applies both to visual and auditory stimuli. There may be some evolutionary value in recognising a face or an animal when detail is minimal. The look-alike rock features have a name, too – mimetoliths. Try that out on conspiracy theorists next time they see life forms in Mars’ rocks.

FRED WATSON is astronomer-in-charge of the Australian Astronomical Observatory.

Fred answers your questions

Are there five ways in which the Earth moves as it travels through space?

Bob Owen, Yarrawarrah, NSW

The Earth is moving in its orbit around the Sun, which itself is revolving around the centre of the Milky Way. The Sun also has an up-and-down motion. The Galaxy has a motion of its own through space, and also participates in the ‘Hubble flow’, which results from the expansion of the universe. So that’s five – except the last one is technically a motion of space.

If you have a space question for Fred, email it to editorial@ausgeo.com.au

Glenn Dawes looking up

x1 NAKED EYE Watch the two brightest planets drift apart in the eastern predawn sky. November begins with Jupiter to the upper left of brilliant Venus. Jupiter rises rapidly and by December’s end has entered the evening sky, rising about 11pm.

x10 BINOCULARS Comet C/2013 US10 (Catalina) is low in the morning sky, rising out of the Sun’s glare in late November. On 8 December the comet is directly below Venus and the crescent Moon.

x100 SMALL TELESCOPE The constellation of Sculptor has some impressive galaxies, but its flagship is NGC 253, the Silver Dollar Galaxy. This edge-on spiral extends across a medium power eyepiece view. Also worth a visit is globular star cluster NGC 288.

Glenn Dawes is a co-author of *Astronomy 2015 Australia* (Quasar Publishing).



WALK A WHILE FOUNDATION

Talent show

Renowned photographer Ken Duncan aims to impart the secrets of his art to the Aboriginal children of Haasts Bluff, in Central Australia.

AS ONE OF AUSTRALIA'S greatest landscape photographers, Ken Duncan has an incredible ability to 'see' – while observing the chaos and disorder of our world, he can distinguish perfectly framed images, glorious symmetry and simple patterns.

But when Ken looks at the rugged terracotta hills and jagged peaks of Haasts Bluff, and its 200-strong community of Ikuntji, he sees a vision of its future – one in which its isolated residents are given every opportunity to use modern technology to develop skills and employment in music,

photography and cinematography.

In his vision, a thriving creative arts and technology centre will be established at Ikuntji, 230km west of Alice Springs. It will become a cross-cultural hub where Aboriginal and non-Aboriginal people alike will exchange creative ideas and 'walk a while' with each other.

In 2012 Ken set up a charitable foundation called Walk a While, which has been working to bring this vision to fruition. "I've been involved with the community at Haasts Bluff for about 14 years," Ken says. "My mum and dad were missionaries up in

the Kimberley and I grew up with a lot of indigenous people. When I became a landscape photographer, they really helped me learn how to 'see' and to feel the land."

After working with other charities, Ken felt the need to contribute something positive to an Aboriginal community. "I was doing work for World Vision and I kept saying to them, 'Listen, our Australian indigenous people need as much help as people overseas.'"

Ken began doing photographic and cinematic workshops at Ikuntji, giving young people access to camera equipment and computer technology, and found many had abundant natural talent. Although he visited year after year, he became aware that the community didn't have ongoing access to such equipment, which meant the sessions had little lasting impact.

"These kids do not have access to the technology we take for granted," he says. "It needs to be ongoing. We want to set up a permanent presence out there – set up a building."

Technology companies would loan or donate gear, and through such a centre, jobs would be created.



"Photography, cinematography and the arts are areas where people can do something they really love and still remain connected to their land. Hopefully, we can help raise up some of these up-and-coming artists to give them a real income stream."

In Ken's vision, the centre would create employment not just in the arts, but in tourism. Locals would be employed as guides to show visitors their land. "We go out there and work

with them and we learn from them, then they come and walk a while with us, and learn from us. That's how we'll get true reconciliation."

Ken acknowledges that Ikuntji already has an excellent arts centre and school, and that the new centre would complement them. "It's something special for the community and the kids to share. Especially for our kids to learn new technology," says resident Gordon Butcher Tjapanangka.

Not bluffing. For 14 years Ken Duncan (left) has taught photography to the children of the NT community of Ikuntji, in the shadow of Haasts Bluff (above) – a rock feature he has shot many times. Through the Walk a While Foundation he is building an arts and technology centre that will foster an interest in music, photography and film among local kids.

Cinematographer Wayne Osborne, from the Central Coast of NSW, has been involved in the workshops. He says it doesn't take long before the young photographers are asking people to stand beside particular geographical features or to pose in a particular way. "The nature of Walk a While is to work a long time with them – getting beyond just the novelty of it to a real skill level."

Country gospel singer Steve Grace has also been involved with the foundation, setting up and running music workshops every year and writing songs with members of the community. "Ken Duncan contacted me and encouraged me to go out in the western deserts because they were playing my music out there," he says. "And I very quickly fell in love with the...communities."

Steve and his crew set up proper



Quiet reflection. After lessons with Ken, 18-year-old Claudia Marshall from Ikuntji took this picture of her friend Denise Pareroultja at Ormiston Gorge.

“There are lots of people who want to help... We’ve got technology companies coming on board.”

sound and musical equipment and encourage people to participate. “Everyone gets up and has a go,” Steve says. “Every kid in the community can play the guitar. Sometimes these events can go for eight hours.”

Ken says that the Walk a While centre will hopefully have recording equipment so that musicians can record the local talent and songs. “There’s not much point bringing out artists to entertain them. We need to create a base and a long-term strategy. It needs to be something that they want... It’d be great to record their music – there’s some legendary stuff going on out there.”

A disused building at Ikuntji has been selected for the project, and the Walk a While Foundation – which has four directors including Ken and his wife Pam – has been steadily collecting funds and dealing with governments and other bodies to

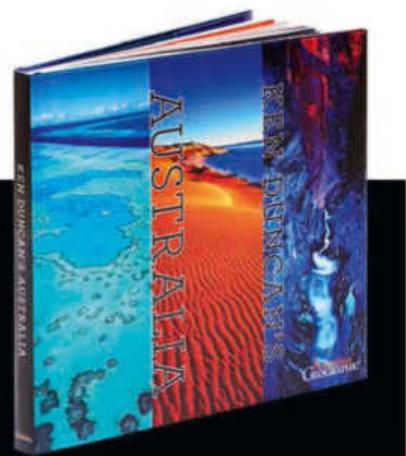
make the project happen. “There are lots of people who want to help – all sorts of creative artists,” he says. “We’ve got technology companies coming on board such as Epson and Panasonic. Multinational companies need to give something back.”

Another aspect of the project is an unusual request by the community elders. A 20m-tall cross is to be built on a nearby mountain to reflect their Christian beliefs. It will be lit up at night with special solar panels and will hopefully act as a tourist icon and attract people to Ikuntji.

Ken has spent four years building up the foundation, fundraising and dealing with logistics, and says, “It’s taken up a hunk of my time, but I’m not going to give up up.”

KEN EASTWOOD

TO LEARN MORE about the foundation, go to: www.walkawhile.org.au



KEN DUNCAN'S AUSTRALIA

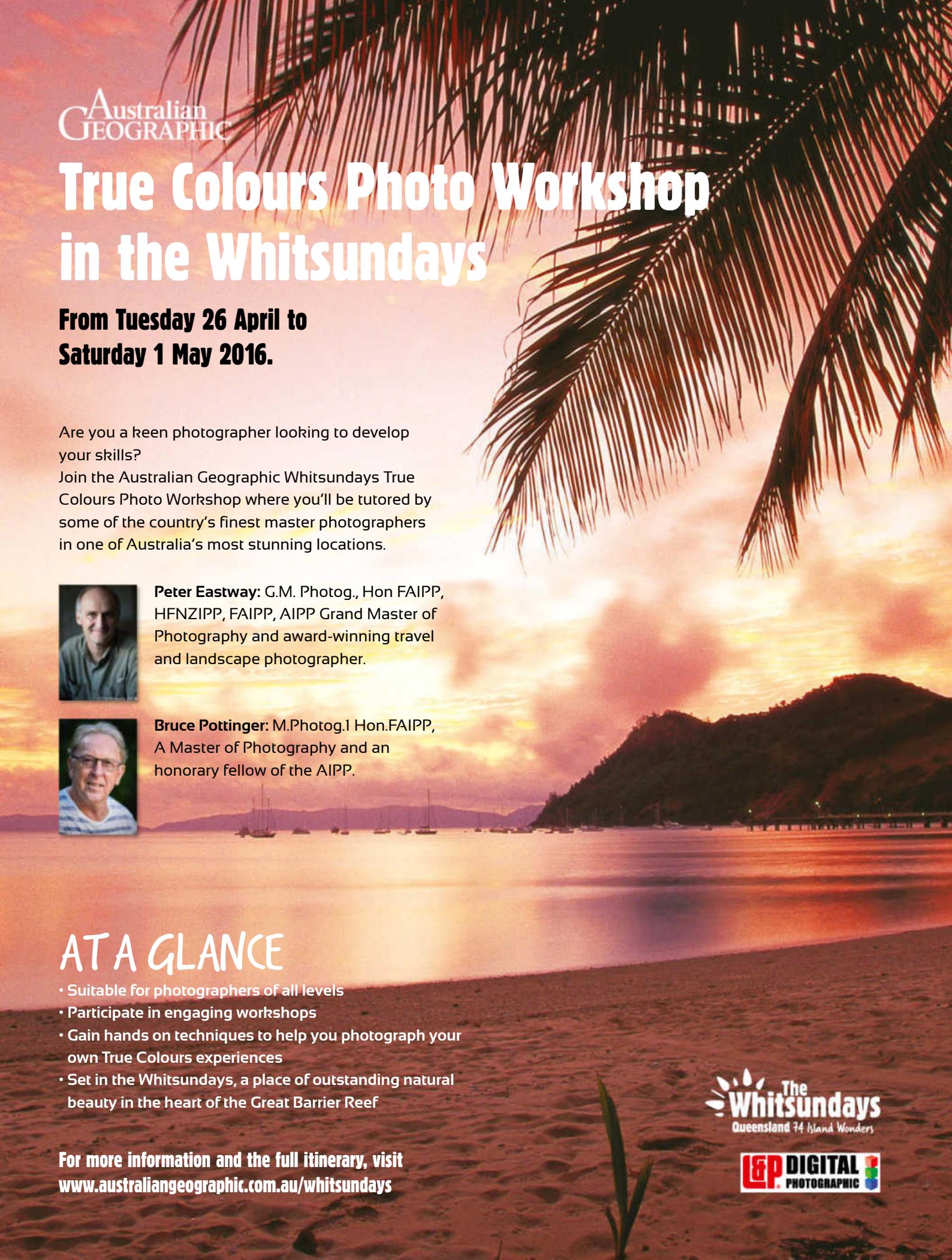
KEN DUNCAN'S AUSTRALIA is a landmark collection of more than 130 beautiful images taken by the undisputed master of the panoramic format in Australia. Ken has focused his lens on every corner of this continent and captured the very essence of our classic national landscapes. His eye for the perfect composition and instinct for the right light are legendary. Unsurpassed in technical quality, his limited edition prints are now reaching record prices in Australia and abroad.

In this book, AUSTRALIAN GEOGRAPHIC presents the very best of Ken's Australian work, drawn from every stage of a photographic journey that began in the early 1980s in the remote Kimberley region of Western Australia and continues today. The book is divided into broad geographical regions: North, South, East, West and Centre – and each chapter features an introduction and regional highlights by regular AG contributor and author Quentin Chester.

The picture captions have been written by Ken, and this expert yarn spinner shares the entertaining stories, backgrounds and insights to his most significant images. The photos have been selected by AG's picture editor of 14 years and now editor-in-chief, Chrissie Goldrick.

The result is a gorgeous visual journey around Australia that is sure to inspire the traveller in us all.

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HIGH-FLYING HISTORY

Men of steel

The construction of the Story Bridge called for bold labourers to work in trying conditions above and below the Brisbane River.

THIS YEAR the city of Brisbane celebrated the 75th anniversary of the Story Bridge, which opened on 6 July 1940. Although the crowd on opening day was large, it was nothing compared with the 74,000-strong group that gathered there in honour of this birthday.

Construction on the bridge began in 1935, during the Great Depression. The aim was to create jobs and help alleviate traffic congestion at the Victoria Bridge, the only inner-city crossing at the time.

Brisbane-born Dr John Jacob Crew Bradfield had been the chief engineer on the Sydney Harbour Bridge, which opened in 1932. He was commissioned as designer and consulting engineer for the Story and recommended a steel-cantilever construction (above), a design requiring more than 12,000 tonnes of locally manufactured steel.

The dangerous, backbreaking labour – as seen in this 1937 photograph (right) from the State Library of Queensland's George Jackman Collection – was carried out by 400 men. They worked inwards from opposite banks of the Brisbane River and eventually met in the middle.

At the time, George was a correspondent for *The Courier-Mail* and *Daily Mail*. His image depicts men standing

precariously on a single girder high above the Brisbane River, while manoeuvring the beam with rudimentary block and tackle pulleys. Heavy cables run along each side of the girder and are threaded through the pulley system.

Not only did the workers face dizzying heights, they also laboured in what was, at that time, Australia's deepest airlock. The southern pier had been sunk some 30m into the river bed and the crews used compressed air as they toiled below the surface.

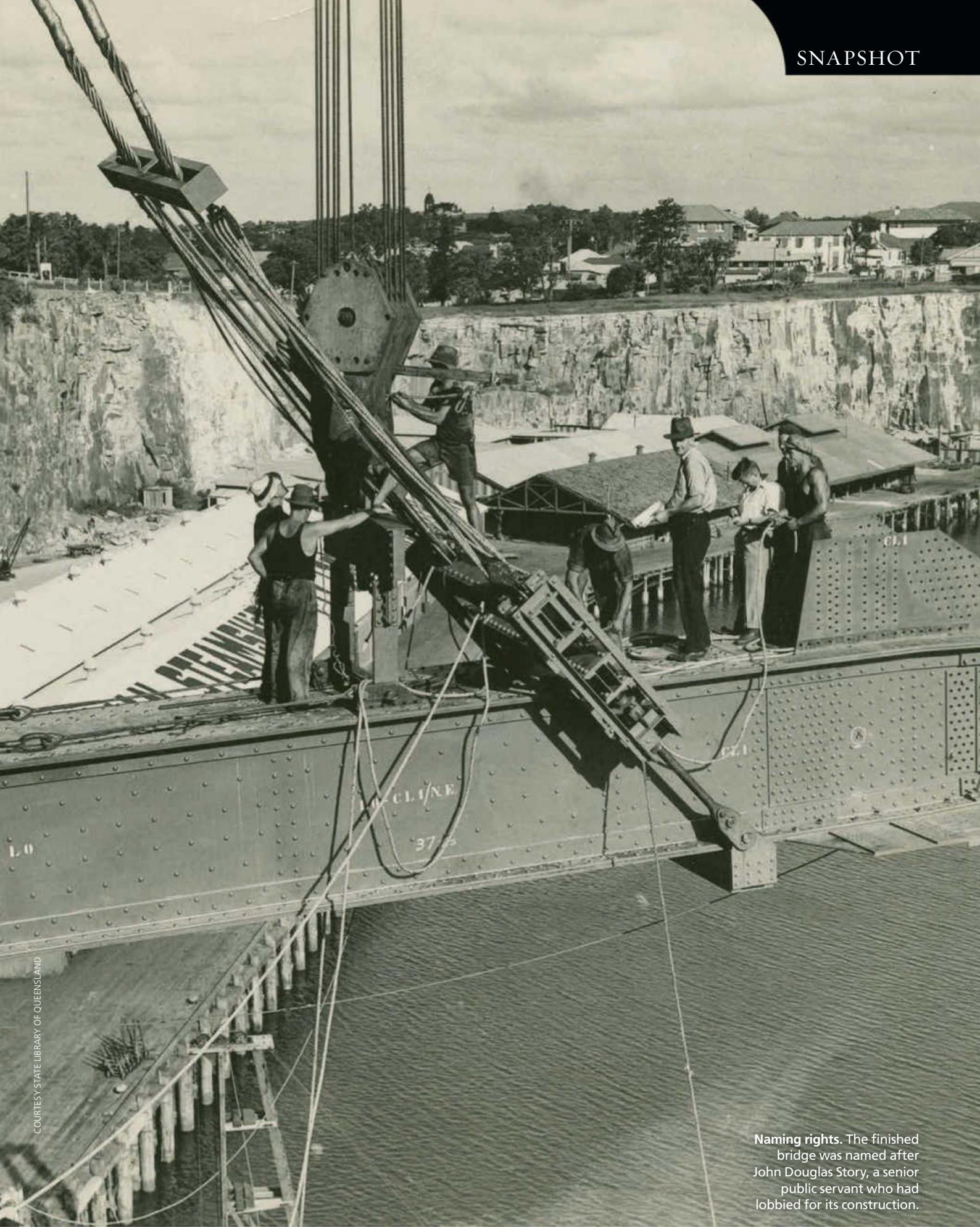
The work was not for the faint-hearted and this photograph is a testament to the tenacity of the hardy men who overcame great adversity to complete the bridge. Many suffered the bends and, sadly, four were killed during the construction period.

At a total length of 777m, the Story Bridge remains the longest span metal truss bridge in Australia. And it's still a "much loved Brisbane landmark", says Graham Quirk, current mayor of Brisbane. "It's a wonderful, iconic piece in the city...[and] was a bridge built for Queenslanders, by Queenslanders."

Today it's a vital city thoroughfare that carries more than 70,000 vehicles each day.

PAUL BROWN





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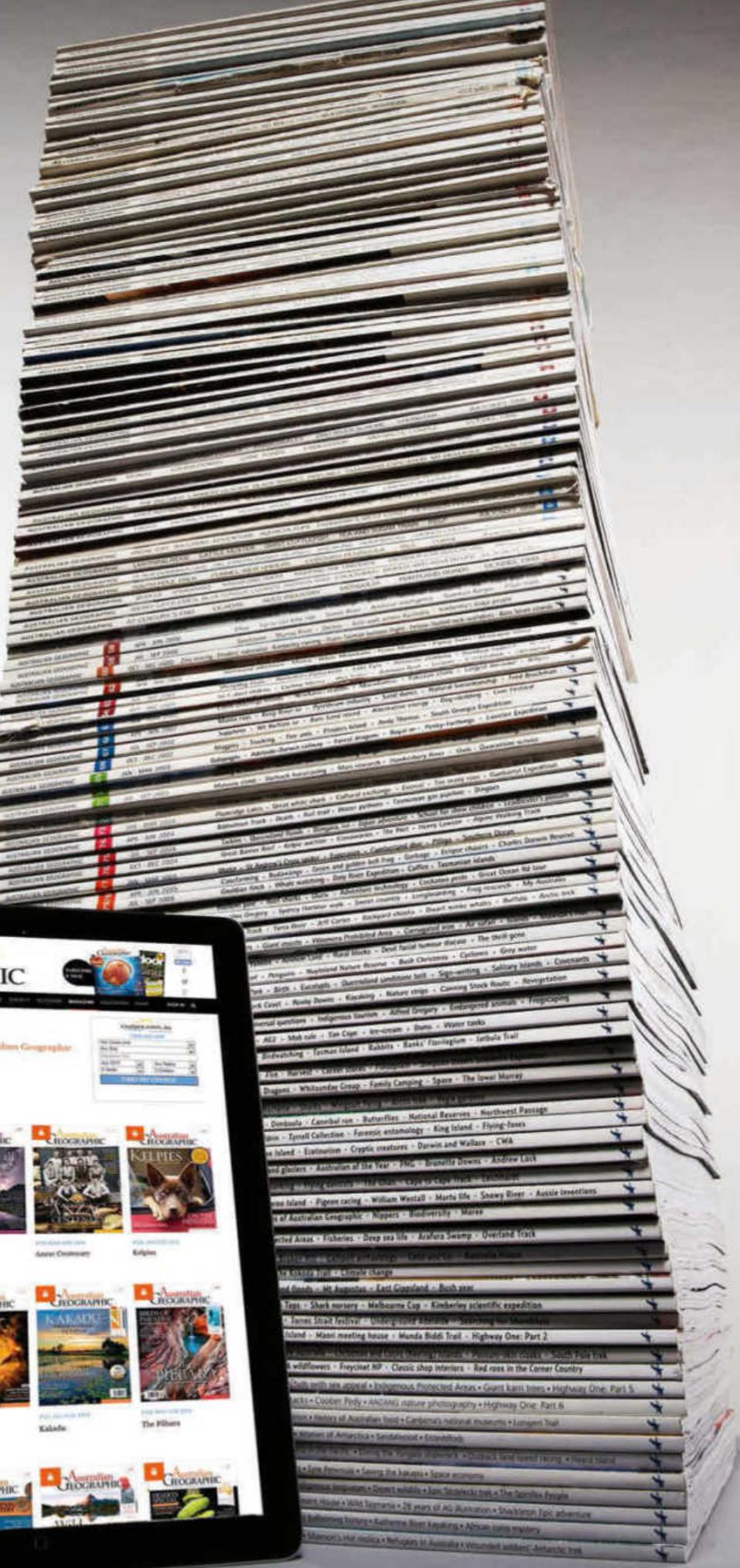
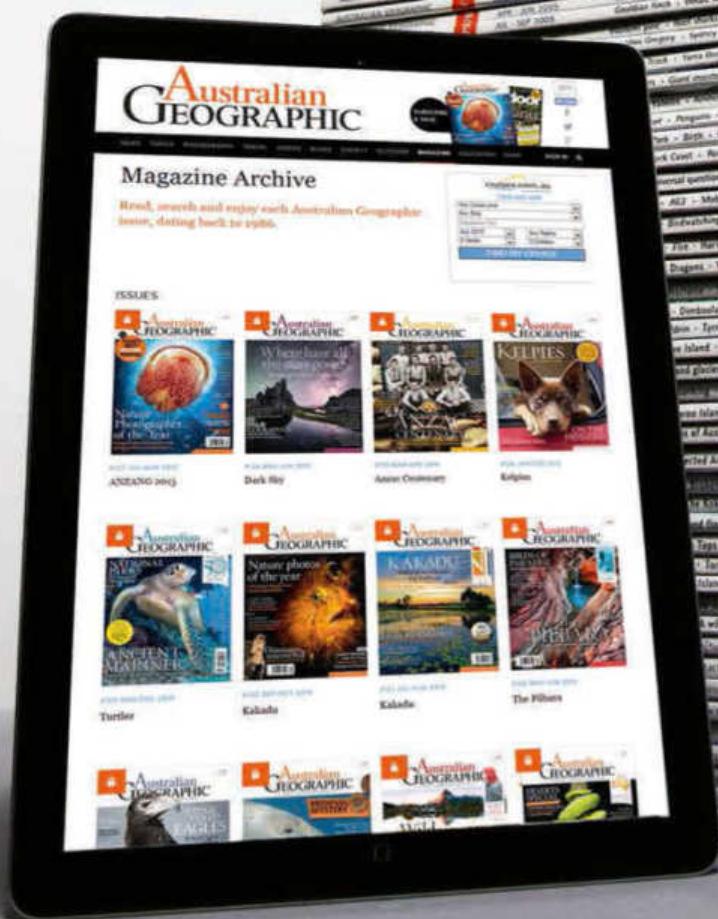
Naming rights. The finished bridge was named after John Douglas Story, a senior public servant who had lobbied for its construction.

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Sharks rock out

Chum has long been used to entice sharks, but it seems they have slightly more eclectic tastes when it comes to music.

SMALL WAVES MAKE fin-like peaks near South Australia's rocky Neptune Islands, a popular hangout for great white sharks. Standing on the deck of his boat *Shark Warrior*, Matt Waller – fourth-generation fisherman turned tour operator – is trying to lure the apex predators towards us using bobbing waterproof speakers. Flicking through songs on his iPod, he stops on an old faithful by grizzled Aussie rock legends AC/DC.

Since the 1960s, the waters of the Neptune Islands Group (Ron and Valerie Taylor) Marine Park, 60km south-east of Port Lincoln in SA, have hosted the Australian shark-diving industry – and for 13 years have been the only place in the country where you can cage-dive with sharks. Despite fears about the increasing frequency of shark attacks, and controversies around responses to them, great whites are listed as vulnerable and receive some degree of protection. Tour operators and researchers working out of Port Lincoln believe that the more safe and controlled encounters people have with the fearsome fish, the more likely they are to join the call for even greater levels of protection.

Historically, sharks have been lured towards tour boats by a trail of chum (or berley), a smelly mix of tuna oil and minced fish, which they can detect from several kilometres away. However, in recent times, recorded music has been found to exercise a



Shark bait. Underwater speakers playing a variety of tunes (left) are used to entice great white sharks (above) closer to divers in the waters off SA's Neptune Islands, where the live shark footage was filmed for *Jaws* in 1974.

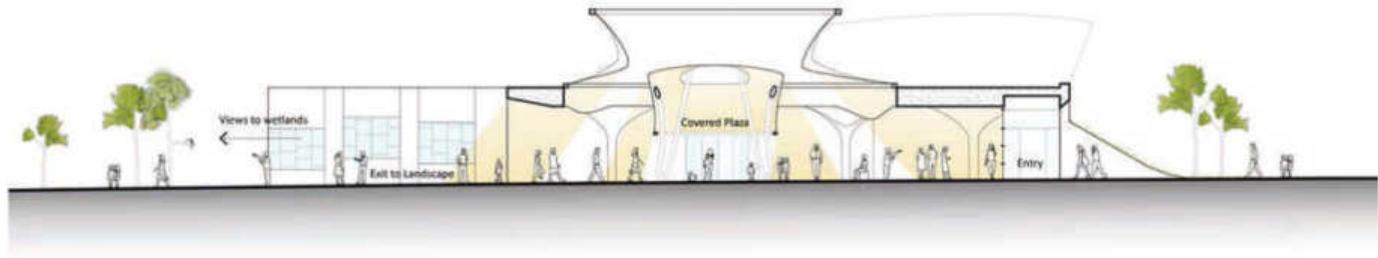
attracted to irregular, pulsed sounds of frequencies at less than 375Hz.

Their so-called yummy sound theory suggests that this mimics the sounds of struggling, injured fish, and acts like a dinner bell. It's a technique that Adventure Bay Charters have had to adopt since a 2011 CSIRO study recommended a reduction in chumming. Scientists had reported that a boom in cage-diving at the Neptune Islands had seen the population grow and sharks hang around for longer, signalling a change in their natural behaviour. Matt's business, one of the youngest, lost out on a chumming licence soon after. Having heard that operators were successfully using music off the Mexican island of Guadalupe, he gave it a go, and now takes out 2500 passengers annually, using tunes as bait to draw in the sharks. Music also seems less disruptive to the sharks, Matt says. "They're more curious and a lot less aggressive."

While I'm out with Matt, death metal act Darkest Hour is the musical drawcard. A 5m great white rises from below and heads straight to the speaker, nuzzling it before sinking again, sending shivers of excitement through everyone in the cage.

NATSUMI PENBERTHY

Elevated vision. An architect's drawing of WAMA's \$22 million facility, which will have 100sq.m of exhibition space, a library of rare books, an external theatrette and an interpretive education centre.



Wild inspiration

An ambitious vision for a unique museum will see the Grampians region of Victoria become a centre of natural history art.

WHEN IT COMES to art museums, four-letter acronyms abound. Think MOMA in New York, or closer to home the phenomenal MONA in Hobart, or Brisbane's popular GOMA. Now a group of passionate wildlife-art lovers in western Victoria is hoping to add WAMA to that roll call of globally significant cultural institutions.

According to the project's patron, Glenda Lewin, a Wildlife Art Museum of Australia (WAMA) is critical in our increasingly urbanised and technologically dependent era. "The timing is perfect for a museum that will focus on a rediscovery of the relationship between humans and their natural physical surroundings, raising awareness of our environment and how it has inspired artists from cave-dwellers to the present day," she says.

The proposed museum aims to celebrate the relationship between art, science and nature, and will explore art's role in awakening us to the world



Leading light. Peter Voice is a renowned wildlife artist and co-founder of the Wildlife Art Museum of Australia, along with Glenda Lewin.

in which we live. The idea was born out of an encounter between Glenda and wildlife artist Peter Voice in 2010 after art enthusiast Glenda returned to her native home town of Stawell after 30 years overseas. While living in the UK she had become involved with the Artists for Nature Foundation, which focuses attention on

fragile habitats and endangered flora and fauna through the creative output of renowned artists.

Glenda identified an opportunity to harness the creativity of the numerous artists living around the Grampians for the benefit of the environment. Together, Peter and Glenda established the Grampians Wildlife Art Society (GWAS) with a view to holding an annual exhibition and occasional workshops, but it quickly escalated to embrace a much more ambitious vision. They used the art society to measure the interest in a bigger concept, says Peter, who believes Australia is the rightful place for such a museum.

"It became clear that there's a huge gap in the way the history of our relationship with our environment is represented," he says. "There's a chronological parallel between the European discovery of Australia and humanity's exploration of the environment. The strange and



Bird artistry. *Emus* (top) by Steve Morvell (left, at his Halls Gap studio) is one of the artworks featured in the 2016 Australian Geographic Society Art Calendar, which has been produced in association with WAMA and contains works by many of Australia's leading wildlife artists. Adam Doumouras (above, at left) and Jacqueline Ridler pitch in to help at the WAMA working bee in May this year.



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exotic species Joseph Banks brought home [from Cook's first voyage to the Pacific in 1768–1771] helped promote the theory of evolution... and the subsequent published illustrations caused a sensation and awakened people's interest in the natural environment."

The museum will be surrounded by botanic gardens, a wetlands and a wildlife sanctuary. The 16ha site – the gift of a benefactor – borders the Grampians (Gariwerd) National Park, and is located 6km from Halls Gap.

I joined a group of hardy volunteers there in May this year to participate in a working bee to clear non-native vegetation and plant indigenous Grampians flora seedlings. It's clear WAMA enjoys broad community support with more than 40 locals turning up armed with chainsaws and gardening gear ready to roll up their sleeves, despite an unseasonably inclement day. As the wind howled and the rain beat down relentlessly, they laboured cheerfully from early morning till well after dark.

Mike Stevens from The Grampians Wildlife Trust joined the party. The trust is working on reintroducing species that have become endangered here and he's thrilled with the opportunity that WAMA offers for a sanctuary for some of the region's smaller mammals.

"Our initial aim is for long-nosed potoroos and southern brown bandicoots, which have been hammered in the Grampians landscape. We want to get them back into this site and...get an insurance population established," he says. "We can use WAMA as a launch pad to get some larger fenced-off areas underway through agreements with local landowners...it's a match made in heaven and we're very lucky to have this opportunity."

When complete, the museum will house a permanent collection of natural history art and host travelling exhibitions, art workshops and artists-in-residence. There'll be a strong focus on education and understanding of the natural



It's clear WAMA enjoys broad community support with more than 40 locals turning up.

Wheel of fire.

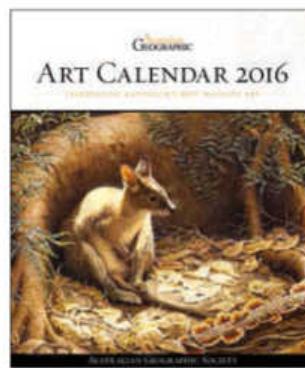
The weather was wet and windy as more than 40 volunteers of all ages (above), including Glenda Lewin (right), descended on the working bee at the WAMA site in May this year. But the atmosphere was warm and inviting.



environment, and the facility will provide more than 100 jobs and draw visitors to the region.

Australian Geographic has played a key role in the creation and promotion of Australian natural history and wildlife art and we are keen to support the successful completion of the WAMA project. In 2016 our long-established *Australian Geographic Society Art Calendar* will showcase the work of several of the talented wildlife artists involved with WAMA and help raise awareness of the museum and its foundation's fundraising efforts.

CHRRISSIE GOLDRICK



For more information on getting involved with WAMA, visit www.wama.net.au. To purchase the AG Society Art Calendar, visit: www.magshop.com.au/2016-art-calendar

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BIANCA NOGRADY

Dead and gone?

Defining death requires more than simply doctors and advanced medical technology.

IN THIS WORLD nothing can be said to be certain, except death and taxes," mused Benjamin Franklin in 1789. The US scientist, author and politician may have been right about many things, but on this occasion he wasn't entirely correct.

Countless people have disproven the second part of this assertion and medical technology is challenging the first. It's not that we won't die. But the concept of death – what differentiates being 'dead' from being 'alive' – is subject to ongoing debate.

One of the earliest attempts to define death was made by English anatomist Jacques-Bénigne Winslow, who wrote a 1740 treatise entitled *The Uncertainty of the Signs of Death and the Danger of Precipitate Interments and Dissections Demonstrated*. He'd twice been mistakenly declared dead as a child, so had a vested interest in preventing that fate being bestowed on anyone else.

Winslow concluded pin-pricks or incisions didn't help, and his student later declared that putrefaction was about the only foolproof method of diagnosing or defining death.

Today we can detect even the faintest glimmer of brain activity and restart or replace a heart that has been inactive or damaged. And we can defend the body against assaults that, in Winslow's day, would have meant a swift passage into the unknown.

But we still struggle to define death. Australian state and territory legislation says death is an "irreversible cessation of all function of the brain of the person, or irreversible cessation of circulation of blood in the body". The issue, however, is not purely medical. It is a legal, ethical, spiritual, philosophical and social question for which we are yet to find a universally accepted answer.



Currently, there's much debate in the medical arena, particularly regarding the definition of brain death in the context of organ donation. US paediatric neurologist Dr Alan Shewmon, for example, has had much to say on the potential for orchestrating transplants prematurely. "It's an ongoing debate because at the time that these patients are declared dead for purposes of organ procurement, in principle, they could be resuscitated...they're actually still alive," he comments.

The heart of a person declared brain dead beats independently. They can blush, sweat, maintain a normal blood pressure and may even exhibit reflexes. In rare cases, a woman in late pregnancy can gestate a foetus to term. So, what is meant by "all function of the brain", and why does this equate with death?

The diagnostic criteria for brain death involve testing for brain activity, breathing responses, blood flow to the brain and reflexes. No-one meeting the criteria has 'come back', so there's no question this is an extremely dire neurological state. But what's gone from a person that therefore makes them 'dead'? Alan Shewmon argues

'personhood' is both physical and psychological, so both must end for a person to have died. He says that, although brain death is a grim neurological prognosis, by itself it doesn't mean you're deceased.

Take the example of Nebraskan boy Jamie*, who, in 1984, aged four, was stricken with bacterial meningitis. He became comatose and was placed on a ventilator, but the damage had already been done to his brain. There were no signs of electrical activity, but his heart beat and his lungs filled and emptied with air.

Jamie remained like this for 20 years, fed through a tube and with his bladder emptied regularly through massage. His body even went through puberty. Finally, after yet another bout of pneumonia, his family decided he should not be resuscitated if he took a turn for the worse.

In 2004, aged 24, Jamie had a fatal heart attack. An autopsy revealed his brain had calcified into a hard soft-ball-sized sphere. But exactly when had he died? At four when his brain stopped or at 24 when his body did?

Dr Ray Raper, head of intensive care at Sydney's Royal North Shore Hospital, says 'life' may be a nebulous concept, but we know when it is gone. "We talk about the 'spirit,'" he says. "Even if you're not terribly religious, there's this sense of the spirit leaving the body...that's the real time of death. But we can't identify that, we can't see that, we can't measure it."

Until we can, it seems the incontrovertible definition of death will likely remain beyond our grasp – at least until we experience it for ourselves.

BIANCA NOGRADY is a journalist living in NSW and the author of *The End: The Human Experience of Death* (Random House, 2013).

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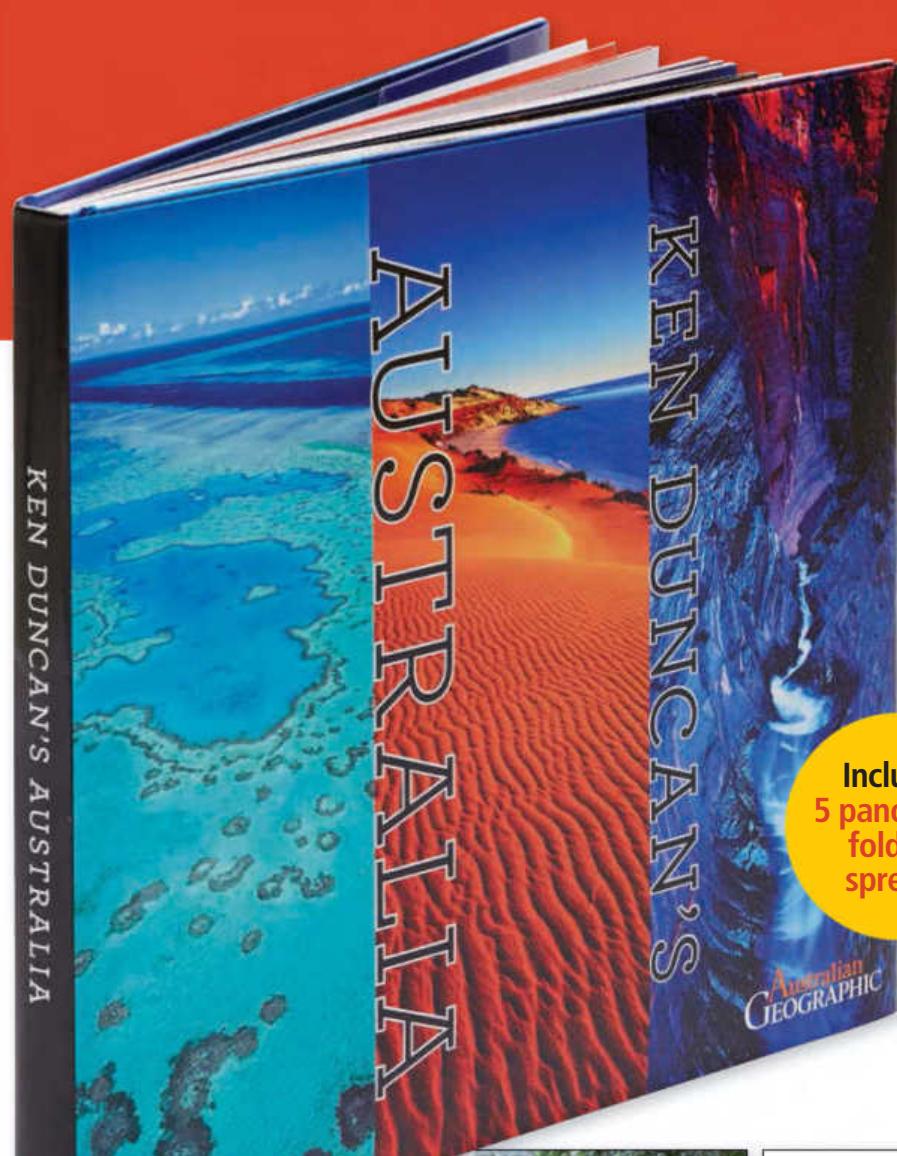
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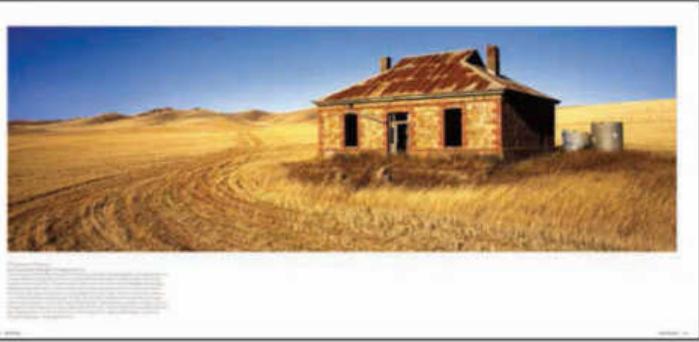
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The photos have been selected and edited by Australian Geographic's picture editor of 14 years and current editor-in-chief, Chrissie Goldrick. The result is a wonderful pictorial celebration of Australia that's sure to inspire the traveller in us all.



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ALIEN OCEANS



Over the past 50 years space exploration has revealed that oceans exist on the moons of other planets in our Solar System. But what exactly – if anything – lives beneath the surface of these otherworldly seas?

STORY BY FRED WATSON ILLUSTRATIONS BY ALEX RIES

Waterworld. Could there be alien life in the vast subsurface oceans of Jupiter's moon Europa? Nobody knows for sure, but there's already talk of sending robotic submarine probes that could be delivered via holes drilled through the icy crust. This technology may be ready within the next half century.

HIDDEN SEAS

HERE'S SOMETHING TO think about the next time you're on the water. It doesn't matter whether you're on a lake or the ocean; or whether you're floating on a yacht, an ocean liner, or even just on your back. Take a look at that animated, sparkling surface that surrounds you. It's the exquisite boundary between our planet's liquid shroud and its gaseous envelope, and it stays there because the water and the atmosphere are in a state of perfect equilibrium.

In the grand scheme of things, that's a very special circumstance – so rare that, at present, we know of only two places in the universe where it is found. One is here on Earth and the other is...well, we'll get to that.

It's not so long ago that our forebears took seas and oceans completely for granted, assuming they would be commonplace on other worlds. The darker regions of our own Moon – easily visible to the unaided eye – have long been known as 'maria', Latin for seas. Some later sky-gazers were so fixated on the immutable perfection of the cosmos that they rationalised the Moon into having a mirror-like surface that reflected an image of our oceans back to us. But the invention of the telescope in the early 1600s quickly demonstrated that the lunar maria were quite unlike anything on Earth. We now know they are frozen lava flows – seas of a very different kind.

With the dawn of the space age, our horizons broadened to include not just the planets of the Solar System, but also their moons. Fly-bys of Jupiter and Saturn by the Pioneer and Voyager spacecraft in the 1970s allowed accurate estimates of the densities of their larger moons, suggesting a high proportion of ice in their make-up.

Speculation quickly arose about the possibility of oceans existing beneath their icy surfaces – something that would have seemed like pure science fiction a decade earlier. Today's investigations extend even further into the realm of science fiction, with some querying whether living organisms might have developed within these subsurface oceans – a question we are yet to answer.

THE PLANET JUPITER boasts more than 60 moons, and the four largest are significant worlds in their own right. Three – Europa, Ganymede and Callisto – may have a thick surface layer of ice overlaying a liquid-water ocean, all overlaying a rocky core.

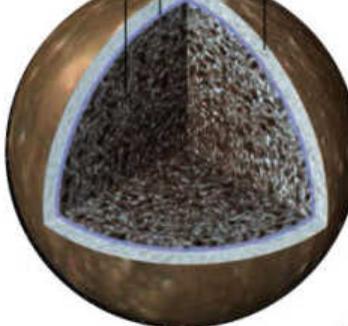
How do we know they have oceans under their surfaces? The major evidence comes from their magnetic properties, since their water generates a weak magnetic field in response to Jupiter's extreme magnetism. That, together with the detection of hydrogen atoms by NASA's Galileo spacecraft (in orbit at Jupiter from 1995 to 2003), suggests large bodies of liquid water. It is the gravitational pummelling of the ice-moons by massive Jupiter's tidal forces, pulling and pushing on their rocky cores, that creates frictional heat and keeps the oceans liquid.

The demonstrated existence of large bodies of liquid water within the Solar System's ice-moons excites astrobiologists looking for proof of living organisms,

EUROPA

This large Jovian moon may have a salty ocean, holding twice as much water as Earth's, beneath its kilometres-thick icy exterior.

CORE OF ROCK AND ICE LIQUID OCEAN LAYER DIRTY ICE CRUST



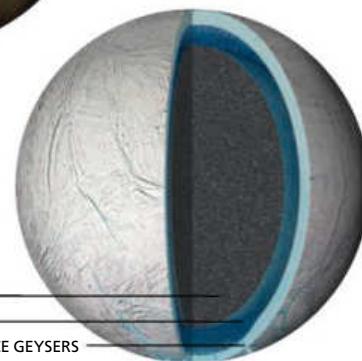
CALLISTO

Once thought of as a massive lump of rock and ice, Jupiter's Callisto may have a subterranean ocean layer – a feature suggested by its low density.

ENCELADUS

Saturn's Enceladus is mostly rock and ice, but appears to have an internal ocean encircling it.

ROCKY INTERIOR LIQUID OCEAN LAYER CRACKS CAUSE SURFACE GEYSERS



because water is essential for life on Earth. It is indeed possible that life may, for example, have evolved in Europa's mineral-rich ocean nurtured by the tidal heating that keeps it liquid.

A first step in finding out whether any of Jupiter's moons offer a habitat suitable for life is already on the drawing board. The European Space Agency's (ESA) JUICE (JUpiter ICy moons Explorer) mission is slated for launch in 2022 to visit Ganymede, Europa and Callisto. The spacecraft won't land, but the exploration of their subsurface oceans is high on the list of mission objectives. This will be achieved by imagery, laser altimetry and ice-penetrating radar, together with spectrum analysis of the surface to determine composition.

Beyond that, a NASA concept study has considered a robotic lander to investigate the rusty brown cracks that criss-cross Europa's surface. This is to see what has been dredged up from the depths below, and how it has survived Jupiter's harsh radiation environment.

It has even been suggested that a small nuclear heat source, like those used for power-generation on deep

FRED WATSON is our regular astronomy columnist and the astronomer-in-charge of the Australian Astronomical Observatory.



Geyser moon. This illustration of jets of water vapour and ice spewing from Saturn's moon Enceladus was inspired by images taken by Cassini in 2011; experts now believe there are up to 100 such geysers.

space missions – such as New Horizons to Pluto – could power an ice-penetrating robot. By melting the ice below it, the robot would slowly descend through Europa's thick ice crust, reporting back on what it finds – perhaps emerging into the ocean beneath. Such heat-drilling is already a proven technology on Earth – although without the need for a nuclear heat source. That's how dozens of 2.4km-deep holes were drilled into Antarctic ice for a neutrino particle observatory at the South Pole.

MORE EVIDENCE FOR a subsurface ocean comes from Saturn's moon Enceladus. This has an icy surface like Europa, but with bluish-green linear features dubbed 'tiger stripes' in the region around its south pole. Erupting from these are geysers of ice that were discovered in recent years by the international Cassini probe, which has since flown through the ice-plumes and detected mineral salts. This hints that a moon-wide liquid reservoir from which the geysers emerge is in contact with a rocky surface and not totally encased in ice.

The warmth that keeps Enceladus's ocean liquid has yet to be fully explained. Cassini observations show surface 'hot spots' in its south polar region, with temperatures up to -116°C , some 65°C above the ambient temperature. Saturn's tidal influence is part of the story, but Enceladus seems warmer than can be explained by this alone.

The warmth that keeps Enceladus's ocean liquid has yet to be fully explained.

OF ALL THE ICE-WORLDS of our Solar System, none is more bizarre than Saturn's biggest moon, Titan (see page 51). It is the only known moon with a thick, hazy atmosphere, which stabilises its surface temperature at about -180°C and gives it some extraordinary attributes. Most notable is that Titan is the only place in the universe known to have seas both above and below the surface.

A long-held suspicion that Titan might have pools of liquid on its icy surface was confirmed by Cassini's smog-penetrating radar. By 2007 this had provided definitive evidence of methane-filled lakes. Further verification came from clever observations of sunlight glints. Located mostly near Titan's poles, the lakes pool in basins in the ice 'bedrock'. They are the only stable bodies of surface liquid known anywhere in the universe beyond Earth.

Three of the lakes are particularly large – comparable in area with North America's Great Lakes – and ➤

Jovian Satellites. The 'Galilean moons', discovered in 1610, were the first objects found orbiting other worlds; they are among the biggest objects in the Solar System after the planets. Io in contrast to the other three, which have abundant water-ice, is one of the driest objects in the Solar System.

THE ICE-MOONS OF JUPITER

CALLISTO

Diameter 4806km

Orbits Jupiter in 16.7 days

- Has the most heavily cratered surface in the Solar System.
- Indicates great age, and no surface regeneration since the 'late heavy bombardment' period 3.8 billion years ago.
- Low density suggests the presence of an ocean beneath the icy surface.

GANYMEDE

Diameter 5268km

Orbits Jupiter in 7.15 days

- Largest of all the moons in the Solar System (400km wider than the planet Mercury).
- Unique in having a magnetic field, which gives rise to auroral displays.
- Shift in latitude of auroras suggests existence of a saline ocean under the surface.

EUROPA

Diameter 3130km

Orbits Jupiter in 3.55 days

- Relatively young surface criss-crossed by linear cracks, marked by rust-coloured deposits.
- The cracks have recently been shown to be consistent with deposits of salt, coloured by the intense radiation generated by Jupiter's enormous magnetic field.
- This suggests a briny subsurface ocean leaking through surface cracks and leaving behind the coloured residues after evaporation.



echo ancient terminology by being described as maria. Some 30 smaller lakes, ranging in length from a few kilometres up to 200km, have also been identified. Most are thought to be fed by methane rain draining into river-like features. But a few in Titan's equatorial region – in places where the ice bedrock is porous – could be fed by springs from a hydrocarbon 'water table'. Depths vary from 2–3m for the smallest lakes, to 10s of metres for the polar seas, with a maximum depth of more than 200m for Ligeia Mare, Titan's second-biggest sea.

The hydrocarbon seas hold many mysteries. What are the temporary surface features that have been observed in the three largest? Some scientists believe they are the surface ripples reflecting Cassini's radar signals. But methane icebergs, which form on or near the surface and then sink as the conditions change, might also be responsible. It is thought cyclones may occur during Titan's frigid summer. And strong currents in the so-called Throat of Kraken (a narrow neck of liquid in Kraken Mare, Titan's largest sea) may even generate spectacular whirlpools.

Because observations have suggested a rich chemistry of 'organic' (carbon-containing) compounds on Titan's surface, some scientists believe this distant moon is an analogue for the early Earth – with an atmosphere similar to that here before life evolved. Others go further, proposing there could already be life forms thriving in the hydrocarbon lakes. These would be quite different

from the water-based life we see on Earth and use liquid methane as their working fluid, breathing hydrogen and feeding on acetylene. Tantalisingly, both chemicals are depleted to low levels in Titan's atmosphere.

How could we explore the potentially rich submarine environment of a world that is 1.4 billion kilometres from Earth? The answer could be close. We already have much experience using unmanned underwater vehicles (UUVs) in our own planet's oceans – for scientific exploration, military purposes, resource surveys and, most recently, searching for the wreckage of downed flight MH370. UUVs provide a sound basis for further development.

A UUV for exploring Kraken Mare, for example, would be feasible, although it would need an onboard nuclear generator for power. Its sleek form would hide an array of specially developed sensors (see opposite), including chemical and biological samplers, imagers and sonar. To relay data to and from such a submersible would require it to work, as the Mars rovers have done, in conjunction with an orbiting spacecraft.

A Kraken Mare submersible has already been the subject of a detailed NASA study, with thought given to such subtleties as dumping excess heat from the craft into its liquid methane-ethane surroundings. But there are still open questions. How, for example, would you deliver it from Titan's orbit to sea level without damaging delicate equipment? The moon's murky atmosphere might help. A winged atmospheric entry vehicle, not unlike the US ▶

Strange activity. The surface of Titan has rivers, lakes and seas of liquid methane, and hydrocarbon compounds rain from the sky. It also has dramatic mountains, which are made from ice.



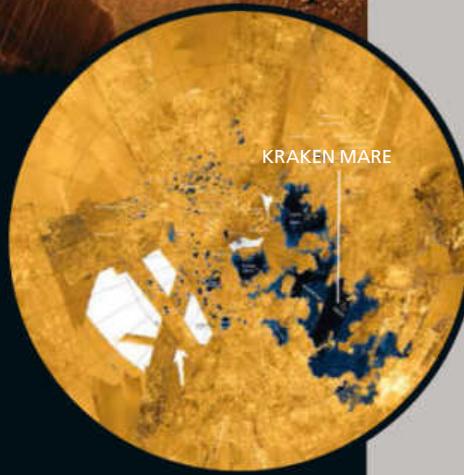
TITAN: A WEIRD WORLD

Diameter 5152km Orbits Saturn in 15.9 days

- 'Bedrock' of water-ice under 'soil' of water-ice powder and solid hydrocarbons, which form wind-blown dunes.
- Possible cryovolcanoes – fissures spewing a 'lava' of ice slush and other compounds.
- The icy bedrock is underlain by a global ocean of water and ammonia, over which this ice-shell floats.

- The ice-shell flexes under Saturn's tidal pull, and rotates independently to the core.
- Atmosphere has similar composition to Earth: mostly nitrogen, but with methane and other hydrocarbons.
- Atmosphere forms an opaque orange haze, similar to the hydrocarbon smogs of our cities here on Earth.

- Weather cycle of evaporation/rainfall, similar to Earth.
- Atmospheric moisture is not water – resembles liquid natural gas, with hydrocarbons such as ethane and methane.
- Clouds of this ethane-methane mix usually cover a small percentage of Titan's surface. When conditions are right, rain falls from them.

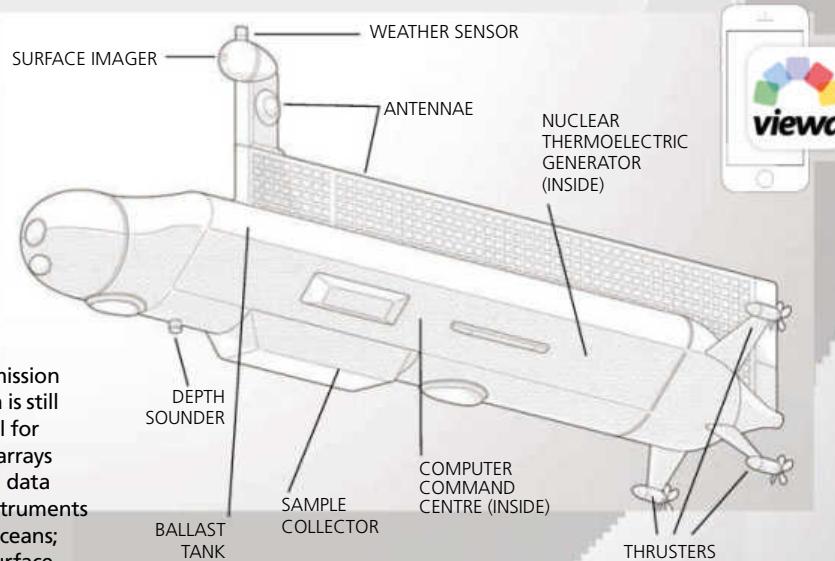


▲ Great lakes. A false colour image of the north pole region shows hydrocarbon lakes and seas.



Exploring Kraken Mare: NASA concept submarine

Earlier this year NASA released a video about a conceptual mission to send a nuclear-power submarine probe to Titan. The idea is still at a very early stage, but envisages a device that could travel for approximately 2000km on a primary 90-day mission. Large arrays of antennae would allow it to return to the surface to beam data back to Earth, while also taking weather measurements. Instruments would measure tides, currents and the composition of the oceans; and cameras would also image the moon's shorelines and surface landscape. Use the **viewa** app to scan this page and see the film.



Air Force's 'secret' X-37B mini-shuttle (AG 128), could bring the sub close to the surface before deploying the craft on a parachute. The prospect of a torpedo-shaped submarine floating down onto the waves of an alien sea is fantastic beyond belief. But there is a good chance this will become reality before the middle of the century.

IF THERE IS ONE thing we have learnt from the robotic exploration of the Solar System, it is that water and ice have played a fundamental role in its history. The Earth's oceans, for example, are thought to have arrived, at least partly, during impacts by icy comets from the Solar System's fringes. They, in turn, are composed of the debris of the giant gas cloud that gave birth to our star and its planets, assembled by gravity. Even the bone-dry landscape of Mars shows clear evidence of having been shaped by water. Most planetary scientists agree Mars's northern hemisphere has every sign of having once harboured an ocean; its low elevation and paucity of impact craters suggesting a regenerated surface contrasting strongly with the rugged terrain to its south.

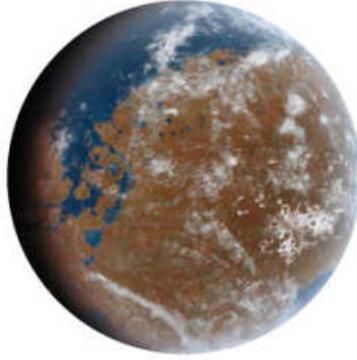
That is not to say Mars is now devoid of water. Much of it is still there, locked up as ice in the polar caps, or beneath the surface soil as permafrost at lower latitudes. Ground-penetrating radar aboard orbiting spacecraft has revealed glaciers overlain by a thin layer of soil, even at temperate latitudes. And the overall quantity of ice on

Future robotic exploration of Mars could find evidence of past or present biological activity.

Mars is far from limited. Data from the ESA's Mars Express orbiter have revealed that if just the southern polar cap melted, it would produce enough water to flood the entire planet to an average depth of 11m.

It is believed that wet conditions on Mars lasted well into the planet's so-called Hesperian era, which occurred between 3.7 and 2.9 billion years ago. This is the period during which we know life was beginning on Earth. The oldest undisputed fossilised terrestrial bacteria date from 3 billion years ago, with speculative evidence of micro-organisms existing another half a billion years earlier.

Perhaps further robotic exploration of Mars will find evidence of past, or even present, biological activity. That is exactly what ESA's two-stage ExoMars mission, scheduled for launch in 2016 and 2018, will be looking for. It will include a rover capable of drilling 2m into the soil of Mars, where microbes could be producing the mysterious methane emissions that have been detected in the planet's atmosphere.



MARS

Red water. Mars as it may have looked with oceans, 3 billion years ago. If its south polar cap melted today, water would cover its surface to 11m in depth.

THERE IS STILL much to learn about the Solar System's oceans. The dramatic New Horizons fly-by of Pluto in July (AG 126) raised questions about the dwarf planet's internal heat source – questions that might also have a bearing on our understanding of the warmth of Saturn's moon Enceladus. Being an isolated world, Pluto is devoid of any tidal heating. Yet data from New Horizons astonished scientists by revealing a surface that has been geologically renewed relatively recently.

That suggests an unknown heat source – such as a radioactive core, or perhaps even the heat given up by a subsurface ocean as it slowly freezes. An ocean under the ice of Pluto would be a discovery indeed, and the still-incoming New Horizons data will be intensely scrutinised for any evidence of this.

Beyond the Solar System is our wider Milky Way galaxy, in which we now know planetary systems are commonplace. Of the 2000 or so 'exoplanets' currently catalogued, only a handful are Earth-like, and none are proved to have oceans – although several, including a planet orbiting a red dwarf star, Gliese 581, are within the 'habitable zone' where the temperature is right for liquid water. Our capability to discover such worlds is currently limited by technology that is still in its infancy. But within the next decade or so, it is likely there will be evidence of liquid surfaces on some exoplanets, and a better understanding of the occurrence of ice-moons throughout the galaxy. If our Solar System is anything to go by, they could number in the hundreds of billions.

Proof of oceans on exoplanets will not come from their exploration in the near future because the distances are simply too great. A recently discovered Earth-like planet in the habitable zone of its parent star – known as Kepler 452b – is relatively close at 1400 light-years away, but even the fastest spacecraft ever launched would take 30 million years to reach it. So for now – until we've found a way to travel faster than light – we'll need to rely on the next generation of large telescopes to look for spectral signatures of water in light reflected by these worlds.

With such a wealth of proposals aimed at investigating the Solar System's seas and oceans, the future for this kind of research is bright. Meanwhile, Cassini remains operational and will return more data about the strange ice-moons of Saturn before its mission ends in 2017.

There's much to be excited about in our exploration of waterworlds. And that is certainly quite something to reflect on, when you next find yourself floating over the limpid, life-filled waters of our own blue planet. **AG**



Sailing an alien sea. The planet Gliese 581c is the right distance from its red dwarf star to have liquid water, and, at just 20.5 light-years away, is relatively close to Earth. If we develop technology to travel that far, then it may be a candidate for exploration with a solar-powered robotic sail-probe.



Douglas Mawson



Bennelong



Charles Kingsford Smith

Nancy Bird Walton



Jessica Watson

"In response to the challenges... an empowering resourcefulness can emerge – one I'm drawn to reacquaint myself with at every opportunity."

TIM JARVIS



Trailblazers

Australia's 50 greatest explorers

Each of us has a desire to explore. It was this that first drew humans out of Africa 100,000 years ago, and eventually to Australia's shores. Since then, our arid land has forged the character of all who explored it. More recently, trailblazers have sought out the world's poles and peaks. Curated by founding editor Howard Whelan, a new AG-supported Australian Museum exhibition nominates our greatest adventurers.



Jon Muir

JAMES COOK grew up a humble farm boy, left school at 16, signed on as an apprentice sailor and proved to become one of history's greatest navigators and explorers.

Syd Kirkby overcame childhood polio to map more of Antarctica than anyone else, often travelling by dog sled in temperatures as low as -70°C. Gaby Kennard was a single mum with two children when she chased her dream of becoming the first Australian woman to fly solo around the world.

Why does the instinct to explore lie dormant in some, yet drive others to confront discomfort, even mortal danger, in pursuit of the unknown?

Just one question examined by *TrailBlazers: Australia's 50 greatest explorers*, an Australian Geographic-supported exhibition opening at Sydney's Australian Museum in November. It's the brainchild of Kim McKay, the dynamic new director and CEO of Australia's oldest and most revered museum.

As founding editor of the journal and long-time councillor of the AG Society, I'd met Kim decades ago as she encouraged us to Clean Up Australia. More recently, we'd worked together helping Tim Jarvis organise his Shackleton Epic.

"How about an exhibition about Australian exploration and adventure," she asked just over a year ago. "You know, like the top 50 of all time." It's been a wild ride ever since. What defines exploration? Or adventure? How would we choose between one person and another? Cavers vs mountaineers, sailors vs surveyors?

"It will be controversial," Kim noted.

And comprehensive. From our first explorers, Aboriginals arriving from the north some 60,000 years ago on log rafts, to Macassans and Dutch driven by trade, the British expanding empire and 'settler explorers' opening up Australia's interior in search of greener pastures.

Victoria's Burke and Wills vied with South Australia's Stuart to be the first expedition to cross the continent. Two decades later, George 'Chinese' Morrison, a cub reporter for Melbourne's *The Age*, crossed from north to south alone, describing it as a "stroll".

In time, Frank Hurley's Antarctic imagery would surpass Douglas Mawson's extraordinary scientific discoveries in the public consciousness. And one of our greatest ever adventurers, Hubert Wilkins, went largely unheralded, because he made the USA his base.

Most explorers shared personal qualities. Often they had been challenged, either by social circumstance, illness or injury, and all showed an insatiable curiosity. They set goals, were willing to take risks to achieve them, yet maintained the necessary discipline to survive. Putting up with great physical discomfort was a given.

As we approached the present time, the names became people that are part of the Australian Geographic family – such as Dick Smith, who continued his aviation adventures as we developed his 'Journal of Adventure and Discovery'. I'd shared expeditions with Greg Mortimer, Ron and Valerie Taylor, Syd Kirkby and Tim Cope. Many others I'd been fortunate to meet, thanks to the crucial role the AG Society and its journal has played in sponsoring science and adventure.

Curating this exhibition taught me that Australians, like all humans, set out to explore and to push the boundaries, because it's in our nature. Like seeds that drift onto a newly formed island, take hold and generate fresh life, we too are designed to go forth and colonise. And not everywhere we land is sympathetic to human life.

So perhaps adventures to the most hostile environments on Earth, from the 'death zone' above 8000m, to the ocean's greatest depths, are vital exercises to prepare us for challenges ahead.

As for those among us who cry "there's nothing left to discover", I disagree. We've only just begun. If you'd like proof, make time to visit *TrailBlazers: Australia's 50 greatest explorers*, which will be at the Australian Museum from 28 November 2015 to 18 July 2016.

Howard Whelan



WATCH

Use the free **viewa** app to scan this page and watch a film about Tim Jarvis, 2013 AGS Adventurer of the Year.



“Very, very few, even among
Antarcticans – probably
only a couple of score – ever
know the reality of high
plateau sledgeing. It’s a
disgusting, brutal thing,
but magnificent.”

**SYD KIRKBY, ANTARCTIC
SURVEYOR AND EXPLORER**

TIM JARVIS, left, on his April 2007
Antarctic expedition. This
recreated Sir Douglas Mawson’s
1912–13 survival journey, during
which both his colleagues died.

Trekking the wilds: Inland, deserts and jungles

AUSTRALIA'S interior is a formidable foe. It demands an unbreakable spirit and knowledge of the intricacies of life in the outback. However, the first European explorers came with preconceived ideas: mountains are crossed by valleys and passes, rivers led to the sea and empty landscapes must be devoid of life. They faced a steep learning curve and their best tutors were Aboriginal guides.



Wylie (1824–1850)

A RESOURCEFUL EXPLORER and Aboriginal guide, Wylie was a friend to Edward John Eyre, joining him on the east–west Nullarbor crossing in 1841. Wylie was born in about 1824 on the West Australian coast, and was 16 when Eyre asked him to accompany him from Adelaide to Albany. They had 1300km of rough desert to cross, and Eyre took only overseer John Baxter, Wylie, and two other Aboriginal men, Joey and Yarry. The Nullarbor sorely tested them, providing little shade or water. Midway through, tempers frayed as meagre supplies and extreme conditions took their toll. Joey and Yarry killed Baxter, raided the stores and fled, leaving Wylie and Eyre with few supplies. Wylie remained loyal to Eyre, helping to find the horses, shooting kangaroos and birds for food, and collecting yams to keep them alive. He was commended for remaining faithful and was awarded a medal, some money and weekly rations.

WYLIE: STATE LIBRARY OF VICTORIA; MUIR: IAN DARLING; BURKE & WILLS: NATIONAL LIBRARY OF AUSTRALIA;
MITCHELL: COURTESY AM; CREAGHE: STATE LIBRARY OF NSW; HARPER: COURTESY ANDREW HARPER



JON MUIR (1961–)

Jon Muir and expedition partner Eric Philips were the first Australians to trek to both poles (AG 72). Jon has also climbed Mt Everest and kayaked for thousands of kilometres along coastlines and across Lake Eyre. But perhaps his greatest challenges have involved crossing Australia's deserts, without external support.



ROBERT O'HARA BURKE, WILLIAM WILLS (1821–1861; 1834–1861)

Burke and Wills are two of our most famous, and tragic, explorers. The first to cross Australia south–north in 1860–61, they died at Cooper Creek in north-east SA on the return journey. Australia's most expensive expedition ever mounted included two dozen camels, two years of rations and six tonnes of firewood.



THOMAS MITCHELL (1792–1855)

Mitchell was an eminent surveyor and explorer; he laid out towns, roads and reserves, filled gaps in maps, and found much of the best farmland in inland Victoria and Queensland.



EMILY CAROLINE CREAGHE (1860–1944)

Among the first female outback explorers, Creaghe (AG 88) was a member of an 1882 expedition across the Gulf of Carpentaria. Her diary shows remarkable tenacity and fortitude in trying circumstances.



ANDREW HARPER (1963–)

Andrew's passion for sand dunes and saltbush has driven him to explore more of the arid zone than any modern desert traveller. Since 1995, he's led camels over 15,000km of Australia (AG 125), including an east–west crossing along the Tropic of Capricorn.



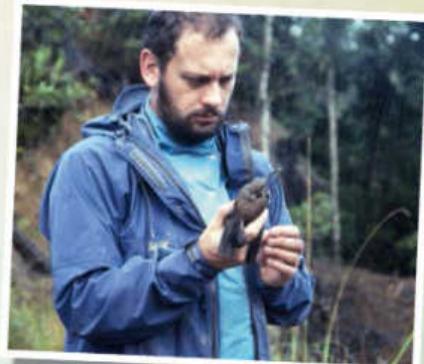
Tim Cope (1978-)

TIM COPE IS A 'long-rider', a special breed of explorer who travels to discover something of both the cultures they encounter and themselves. In 2004 Tim took equestrian long-riding to the extreme. He spent three years and four months covering 10,000km to become the first person in modern times to follow Genghis Khan's march from Mongolia to Hungary (AG 89). Keen to better understand nomadic life, he rode horses the length of the Eurasian Steppe, from Karakorum in Mongolia, through Kazakhstan, Russia, Crimea and the Ukraine to Hungary. Six months into the trip, a Kazakh nomad, concerned that Tim was travelling alone, gave him a dog named Tigon. Cope's new companion would share challenges from wolves and horse thieves, to the extreme temperatures of scorching deserts and sub-zero plateaus, and offer comfort as Tim grieved the loss of his father. Tim, whose other adventures include cycling from Moscow to Beijing and rowing across Siberia, has previously been named both the AG Society's Young Adventurer of the Year and Adventurer of the Year.



CHARLES STURT
(1795–1869)

Driven by the dream of an inland sea, Sturt charted the Macquarie, Bogan and Castlereagh rivers, found the Darling River and followed the Murray to Lake Alexandrina on the SA coast.



TIM FLANNERY (1956–)

Explorer, scientist, climate change advocate and former Australian of the Year, Tim has made remarkable discoveries in palaeontology and mammalogy. Remote expeditions to New Guinea (AG 113) and work in Australia resulted in the description of more than 40 new species.

"Let any man lay the map of Australia before him, and regard the blank upon its surface, and then let me ask him if it would not be an honourable achievement to be the first to place foot in its centre." **CHARLES STURT, 1844**

Trekking the wilds: Inland, deserts and jungles

WILLIAM SHERIDAN WALL (1815–1876)

There are explorers who thrive in extreme conditions, who persevere, uncomplaining, no matter what is thrown at them. William Sheridan Wall wasn't one of them. His journals reveal a reluctant and petulant traveller, yet the specimens he collected and preserved for the Australian Museum – such as a *Diprotodon* fossil in 1847 – contributed much to the early study of Australian plants and animals.

JOHN McDOWALL STUART (1815–1866)

The first known explorer to have successfully crossed the continent from south to north and back again, John McDouall Stuart is appropriately memorialised in the name of the main highway from Port Augusta to Darwin. The crossing didn't come easily though – he had several failed attempts before finally completing the journey in 1862, nearly blind and very sick. He died less than four years later.

JACKY JACKY (?–1854)

Showing grit, resourcefulness and incredible devotion to his employer Edmund Kennedy, this heroic Aboriginal man is not usually remembered by his own name, Galmarra, but by the name given to him by the European colonisers – Jacky Jacky. He joined Kennedy's ill-fated 1848 expedition to map the far north Queensland coast and travel to Cape York Peninsula.

LUDWIG LEICHHARDT (1813–1848)

Friedrich Wilhelm 'Ludwig' Leichhardt was an accomplished scientist and explorer. He completed one of the longest inland expeditions and opened up much of the country to pastoralism. He also left us with a fantastic unsolved mystery when he and his party of five white men, two Aboriginal guides, seven horses, 20 mules and 50 bullocks disappeared in 1848, never to be seen again (AG 98).



▲ **LEAVING FROM**
Alice Springs, Robyn Davidson walked 2700km with camels to the WA coast in 1977.

Robyn Davidson (1950–)

THE 'CAMEL LADY', Robyn Davidson, with her beloved dog, Diggity, and four camels, trekked 2700km across some of Australia's most remote and inhospitable deserts, from Alice Springs to the Indian Ocean, in 1977. The idea of a long camel trek across the desert was triggered by her desire to challenge her contrasting personal traits of vulnerability and steely determination. A chance meeting with photographer Rick Smolan led to National Geographic sponsorship. Davidson relied on good maps and knowledge of the constellations to navigate. A Pitjantjatjara man, Eddie, shared her journey from Docker River to Warburton (WA) to guide her to water (AG 2). *Tracks*, Davidson's best-selling book about her Australian journey, was made into an internationally released film in 2013.



GEORGE 'CHINESE' MORRISON (1862–1920)

His eclectic adventures include a solo 3200km summer trek from the Gulf of Carpentaria to Melbourne – on the route that killed Burke and Wills. He arrived in 123 days, calling it "a pleasant excursion".



LADY JANE FRANKLIN (1791–1875)

In an age when many women were limited to needlework or domestic duties, Franklin broke the mould. A keen traveller, she sailed, climbed, led expeditions and created social change in Tasmania.



HAROLD FLETCHER (1903–1996)

Harold Oswald Fletcher was curator of fossils at the Australian Museum from 1941, and its deputy director from 1957 to 1967. Determined not to be deskbound, he became a keen expeditioner, travelling to the top of Mount Kosciuszko, across the Simpson Desert and to Antarctica.

Frank Hurley

(1885–1962)

ONE OF AUSTRALIA'S most remarkable photographers, James Francis 'Frank' Hurley brought back early images and movies of far-flung places – Antarctica, New Guinea and the battlefields of Europe. Truly a photographer in the thick of the action, his images show a daring spirit and love of adventure. In 1911 Hurley became official photographer to Douglas Mawson's first Australasian Antarctic Expedition (AG 119). At the windiest place on Earth, he worked enthusiastically taking stills and moving images, and took part in a record-breaking sledging journey to the South Magnetic Pole. Back home he filmed an expedition through northern Australia before joining Sir Ernest Shackleton's famous Trans-Antarctic expedition of 1914–17. Hurley was forced to leave behind many of the glass plates, but kept 120 precious images. He then became official war photographer for the Australian Imperial Force from 1917 to 1918, producing the only colour-plate photographs of World War I.

"I have lived a life that suited me best. I took risks and never regretted them. If I could start again, I would do everything in the same way."

FRANK HURLEY, 1949



◀ **DURING THE 1920S**, Hurley took the first images and film, including aerial views, of remote parts of New Guinea, especially its tribal people. He also undertook expeditions in the Torres Strait.

▼ **HURLEY USED** this movie camera for 30 years; it accompanied him from Antarctica to the Middle East, and recorded important events at home, such as the building of the Sydney Harbour Bridge.



On thin ice: North and South poles

Encircled by savage seas and capped by thick ice, Antarctica was the last continent discovered; in contrast, the Arctic is an ocean of jumbled sea ice. Twice Australia's size, our frozen neighbour's proximity, minerals and Gondwanan history drew explorers and scientists. Some of our strongest and brightest have been seduced by its deadly and alluring landscape.



SIR GEORGE HUBERT WILKINS (1888–1958)

In a life filled with extraordinary adventures, George 'Hubert' Wilkins (at right) is noted for many firsts, including flights across the Arctic and Antarctic, and taking a submarine beneath the frozen Arctic Ocean. He was also a war correspondent, cinematographer, naturalist, geographer and pioneering climatologist.



JAMES CASTRISSION AND JUSTIN JONES (1982–1983–)

These young adventurers were the first Aussies to kayak unsupported from Australia to New Zealand; then they finished the first unsupported walk to the South Pole and back (AG 108). Adventures haven't stopped for them, and in 2013 they completed the first crossing of Okefenokee Swamp, the largest blackwater swamp in North America.



► **THE EARLIEST COMPASS** in the National Maritime Museum collection dates from the 16th century. The case is made of turned ivory, suggesting the owner was wealthy. The compass is mounted in a brass gimbal ring, which reduces the effects of a ship's motion at sea.

Tim Jarvis (1966–)

AN ADVENTURER WHO never chooses the easy road, Tim has undertaken two extreme Antarctic adventures. In 2007 he used 1913 clothing, equipment and rations to mimic Douglas Mawson's journey, hauling a sled hundreds of kilometres across the crevassed landscape. After being made a Member of the Order of Australia, Tim re-created Ernest Shackleton's incredible journey in 2013. In a open boat, using only a chronometer for navigation and barely adequate clothing, Tim and five others sailed 1200km across the Southern Ocean (AG 117). Then Tim and two others crossed precipitous mountains, mostly using historic 1916 gear. This re-enactment earned him the AGS Adventurer of the Year award in 2013.



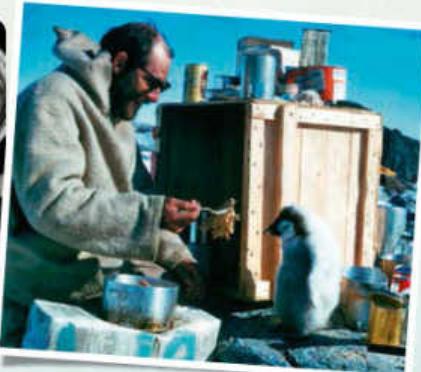
LINDA BEILHARZ (1960–)

The 'Icy Pole Lady', Linda was the first Australian woman to successfully ski to both the North and South poles as part of a bigger goal to ski over four icecaps – including Greenland and Patagonia.



DOUGLAS MAWSON (1882–1958)

Mawson led the tragic 1911–1914 Australasian Antarctic Expedition, during which the ship was trapped in ice and a number of the party perished. A scientist before all, he sought knowledge rather than fame.

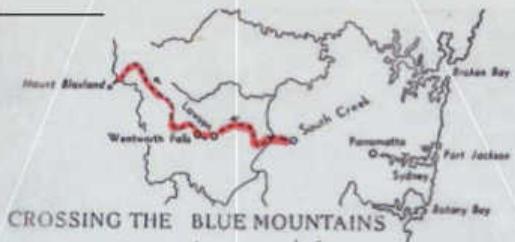


SYDNEY KIRKBY (1933–)

A leader and surveyor at Mawson Station, Sydney mapped the Australian Antarctic Territory by dog sled and theodolite. His crew was the first to view the world's largest glacier and explore the Prince Charles Mountains.

Going over and under: Mountains and caves

From the Great Dividing Range to red desert outcrops, and from limestone chambers to fossil caverns and lava tubes, it's taken a special calibre of explorer to unlock the secrets of Australia's mountains. Over time, our pioneering spirit has also urged mountaineers to explore remote and punishing ranges from Antarctica to the Himalaya.



**GREGORY BLAXLAND,
WILLIAM CHARLES WENT-
WORTH, WILLIAM LAWSON**
**(1778–1853; 1790–1872;
1774–1850)**

As livestock holdings outgrew pastoral lands around Sydney, Blaxland pushed to find a route over the Blue Mountains to new pastures. On 11 May 1813 the trio commenced their attempt, and 21 days later became the first known Europeans to escape Sydney's coastal confines.



ANDREW LOCK (1961–)

Andrew Lock was the first Australian to reach all 14 of the world's 8000m-plus peaks, including four – such as Mt Everest – that he has summited twice (AG 97). He says that, for him, adventure is about taking on challenges where the outcome isn't guaranteed. He was awarded the Medal of the Order of Australia in 2011 for services to mountaineering.

**PAUL EDMUND DE
STRZELECKI (1797–1873)**

Polish nobleman, scientist and explorer, Strzelecki named Australia's tallest mountain – 2228m Mt Kosciuszko. He was intrepid, well liked, an excellent administrator and a thorough scientist.



Greg Mortimer (1952–)

GREG MORTIMER was the first Australian to summit Mt Everest (AG 114), K2, Annapurna II and Chongtar in the Himalaya, without supplementary oxygen, as well as climbing two Antarctic peaks. In 1983 he was invited on an Aussie ascent of Annapurna II's south face, and reached the summit. The next year he climbed Everest by a new north face route, leading the crux pitch now called 'Greg's Gully'. In 1988 he sailed to Antarctica on a small boat to climb Mt Minto, the highest unclimbed Admiralty Mountains peak, and returned later in the year to climb Mt Vinson, Antarctica's highest peak. Greg has received the Medal of the Order of Australia for services to mountaineering, as well as three AG Society medals.



ALAN WARILD (1955–)

Explorer, writer and pioneer, Alan Warild is one of the world's finest cavers (AG 10). He's set many records while solo exploring deep caves, and has written the definitive book on caving and underground rescue.



**JOHAN GERARD KREFFT
(1830–1881)**

A prolific collector and extraordinary scientist, Johann Ludwig Gerard 'Louis' Krefft is renowned as one of the best early zoologists. He built up the Australian Museum's collections and recorded thorough sketches and descriptions of species now extinct.

Riding the waves: Travelling the oceans

Salt water is in our blood – we are an island continent, and, until recently, the only way here was by sea. First came Aboriginal people – more than 50,000 years ago – then Torres Strait Islanders, Macassan traders and European seafarers in pursuit of spice and empire. Here are those who mapped, studied and settled Australia and today's explorers probing the ocean depths.

WOOLLARAWARRE BENNELONG (1764–1813)

Bennelong was the first Aboriginal man to visit Europe and return to Australia. In late November 1789, governor Arthur Phillip had orders to use "every possible means" to open dialogue with the natives. Since none had ventured into Sydney Cove, he resorted to abduction, taking 25-year-old Bennelong from Manly Cove. In December 1792 Bennelong sailed with governor Phillip for England, where he met King George III.

ABEL TASMAN (1603–1659)

Dutchman, explorer and merchant Abel Janszoon Tasman was the first European to see Tasmania, and also confirm that Australia was an island. As a skipper for the Dutch East India Company, he was sent to search for the unexplored south and east lands (Australia and South America), discovering Tasmania and sailing along its south coast in 1642. In 1644 he sailed to Australia's northern coast, which his crew mapped from Torres Strait to Port Hedland.

WILLIAM BLIGH (1754–1817)

William Bligh was an outstanding sailor, and an accomplished navigator and cartographer. But because of an uncompromising attitude, bad temper and tyrannical leadership style, he is most often remembered as the captain of the *Bounty* when its crew mutinied, and as the failed governor of New South Wales, who was overthrown by the military (AG 101).



◀ **SEXTANTS** use a series of mirrors to determine the angle between an astronomical object, such as the sun or a star, and the horizon. This one was used by Captain James Cook, who made three major voyages to the Pacific from 1768 to 1779.

Ron and Val Taylor (1934–2012; 1935–)

PIONEERS OF SKINDIVING, underwater photography and cinematography, Ron and Valerie Taylor opened our eyes to the wonders of marine life and sharks (AG 93). In the early 1970s, they were approached by Steven Spielberg to work on *Jaws*. They continued shooting underwater films, including *Blue Lagoon*, *The Last Wave* and *The Island of Dr. Moreau*. For *Operation Shark Bite*, Valerie donned a chain-mail suit to see if it could protect against bites. It did. In the 1980s and '90s, Ron and Valerie continued to research shark deterrents and promoted marine conservation. In 1992 they were awarded the AGS Adventurers of the Year, and in 2003 were made Members of the Order of Australia for their conservation efforts.



KAY COTTEE (1954–)

Kay was the first woman to sail solo, unassisted and non-stop around the world, on a journey of 22,100 nautical miles in 1987–1988. Over 189 days, she experienced the beauty and terror of solo sailing the Southern Ocean.

BUNGAREE (1775–1830)

Born among the heathland and rainforest of Broken Bay on the NSW Central Coast, Bungaree became the first known Aboriginal person to circumnavigate Australia and contribute to the mapping of our coastline.

RON ALLUM (1949–)

Cave-diver, engineer and deep-sea explorer Ron Allum has played a key role in some of the most audacious explorations of our time (AG 110). His Deepsea Challenger submarine carried Hollywood filmmaker James Cameron 11km down to the bottom of the Marianas Trench in March 2012.

Jessica Watson (1993–)

WHEN 16-YEAR-OLD Jessica Watson sailed into Sydney Harbour on 15 May 2010 – becoming the youngest person to sail solo and unassisted around the world – she inspired a nation. Whether it was her youth, or that many had doubted her ability to succeed, more than 75,000 people, including the prime minister, and a vast flotilla, turned out to welcome her home. Her departure in 2009 had generated much controversy. Perhaps it was because someone so young was setting off alone on what many considered to be the Everest of sailing. Watson sailed out of Sydney on 18 October 2009, five months after her 16th birthday. Over the next 210 days, her boat rolled four times in an Atlantic storm, while the Pacific offered her glorious days surfing waves and enjoying the flight of albatross. Homework, maintenance and blogging filled her spare time. In 2010 Jessica became the AGS Young Adventurer of the Year, and in 2012 was awarded the Medal of the Order of Australia for services to sailing.



“You are only as big as the dreams you dare to live.” JESSICA WATSON



JOSEPH BANKS (1743–1820)

In 1768 naturalist Joseph Banks joined Cook's expedition to observe the transit of Venus. He gathered not just plants in Australia, but birds, reptiles, fish, molluscs and insects. He also took notes on Aboriginal customs. Back in England, he catalogued his vast set of specimens, notes and drawings, many of which remain in London's Natural History Museum (AG 90).



JAMES COOK (1728–1779)

Cook was a great navigator, explorer and cartographer. In 1768 he led an expedition on the *Endeavour* (AG 44) to the 'South Seas'. In the process he charted the east coast of Australia and claimed it for England.



MATTHEW FLINDERS (1774–1814)

Flinders charted much of Australia's coastline despite many trials. An outstanding sailor, surveyor, navigator and scientist, he was a considerate leader who looked after all under his command.



JESSE MARTIN (1981–)

When Jesse Martin sailed from Melbourne in December 1998, he hoped to become the youngest person to circumnavigate the globe solo, non-stop and unassisted (AG 96). Over 11 months aboard his yacht *Lionheart*, the 18-year-old completed a 50,000km rite of passage, earning a world record.

Taking to the skies: Aviation and space

In 1894 the first Australian took flight. Lifted by kites, Lawrence Hargrave reached a height of just 5m, yet he ushered in an era of exploration that would take us to the stars. From Charles Kingsford Smith's trans-Pacific flight to Andy Thomas's space walks and Dick Smith's adventures, the story is as much about evolving technology as pioneering spirit.

Nancy Bird Walton (1915–2009)

WALTON TOOK flying lessons from Charles Kingsford Smith, launched outback ambulance services and founded the Australian Women's Pilots Association (AG 80). She got her flying licence at 17 in 1933 and two years later bought a Gipsy Moth. With that, she took off on a tour of Australia, giving joyrides at country fairs. During WWII, Walton was commandant of an Australian Women's Air Training Corps. She was made an Officer of the Order of Australia in 1990. Her achievements were remarkable in an era when women were discouraged from wearing pants, let alone flying planes.



ANDY THOMAS (1951–)

An Adelaide-born boy who grew up playing with rockets and dreamt of becoming an astronaut, Andy Thomas became Australia's first member of NASA's elite astronaut corps. He flew four missions over nine years, spending a total of six months in space.



BILL BRADFIELD (1927–2014)

A backyard astronomer in SA, Bill is proof you don't need high-tech gear to achieve extraordinary things. A prolific hunter of space objects, he has found 18 new comets.



GABY KENNARD (1944–)

Inspired by childhood hero Amelia Earhart, Gaby became the first Aussie woman to fly solo around the world. In doing so, she proved that it's possible for an 'ordinary' single mother of two to fulfil her dream.



CHARLES KINGSFORD SMITH (1897–1935)

'Smithy' was renowned as our boldest pilot, pioneering trans-Australian, trans-Tasman and trans-Pacific routes. As well as setting other records (AG 44), he helped usher in commercial aviation.



Dick Smith (1944–)

IN 1982–83 AG's founder, Dick Smith, became the first person to fly a helicopter solo around the world – a 55,000km flight that would require him to overcome loneliness, storms, bullets and his first-ever shipboard landing. In late 1985 Dick launched AUSTRALIAN GEOGRAPHIC. Two years later, after three attempts, he reached the North Pole, solo, by helicopter. In 1988–89 Dick and co-pilot Giles Kershaw flew a de Havilland Twin Otter aircraft around the world via both poles. In 1993 Dick and co-pilot John Wallington completed the first balloon flight across Australia, and in 2000 the first flight from New Zealand to Australia. Dick Smith was named Australian of the Year in 1986 and was made an Officer of the Order of Australia in 1999. In 2000 he was named AGS Adventurer of the Year for his trans-Tasman balloon flight (AG 60), and in 2014 received an AGS Award for 50 years of adventure (AG 123).



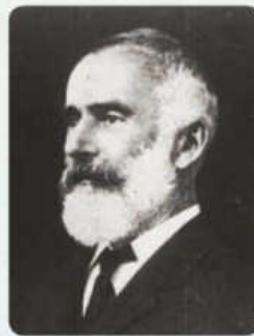
"In my mind, the flying machine will tend to bring peace and goodwill to all; it will throw light on the few unexplored corners of the Earth."

LAWRENCE HARGRAVE



RYAN CAMPBELL (1994–)

In 2013, at the age of 19, Ryan became the first teenager and youngest pilot to fly solo around the world. He hoped to demonstrate the accessibility of flying and prove it's possible to achieve your dreams. Departing from Wollongong in the single-engine *Spirit of the Sapphire Coast*, he returned 70 days later having covered 24,000 nautical miles and logging 180 hours in flight.



LAWRENCE HARGRAVE (1850–1915)

In 1894 Hargrave attached himself to a train of box kites and became the first Aussie to fly. His work in aerodynamics and engineering also helped pave the way for aviation.

Trailblazers: Australia's 50 Greatest Explorers is showing at Sydney's Australian Museum, 28 November 2015–18 July 2016.

AG subscribers will receive a 20 per cent discount on adult and family ticket prices – you must present the latest issue of AG at the admission desk to redeem this offer.

ALSO complementing the exhibit, and beginning in March, will be the AUSTRALIAN GEOGRAPHIC Festival of Adventure, featuring 21 weeks of events, films and lectures. For the full schedule, visit www.australiangeographic.com.au/issue129 and www.australianmuseum.net.au.

**Australian
GEOGRAPHIC**

THIS ARTICLE WAS researched and written by Lesley Cadzow, Fran Dorey, Ken Eastwood and Howard Whelan. AUSTRALIAN GEOGRAPHIC thanks the curators and staff of the Australian Museum for their assistance with this story.





Close call. Tennant Creek's famous rodeo draws spectators and competitors from all over Australia, such as this bull rider taking time out after a bad ride.

Red dust, gold heart

Tennant Creek in the Northern Territory is as gritty as it is charming. And with its swag of multicultural locals and zealous community spirit, it's a town now luring newcomers with more than just its precious metal.

STORY BY KEN EASTWOOD PHOTOGRAPHY BY HEATH HOLDEN

STIRRED UP BY WILLY-WILLIES

and horses' hooves, the red dust around Tennant Creek swirls over spinifex and snappy gum. Since 1934, this paydirt – the source of Australia's last major gold rush – has settled on cars, pubs and houses out here. It's been breathed into the lungs of locals, becoming part of their very being.

To live in one of Australia's most isolated towns, 1000km south of Darwin and 500km north of Alice Springs, they become as hard as its haematite, and yet as warm as the earth itself. And they absorb its hidden heart of gold.

With a fearsome reputation, Tennant Creek is a town of wild stories, past and present. Tales of alcohol-fuelled violence range from a copper who shot someone over 12 bottles of whisky in the town's early days, to stabbings, murders and lighthearted banter about a bloke in the pub yesterday swinging punches.

It's a town that proudly boasts it was founded when a truck carrying beer broke down and people set up camp around it; where police now man the drive-in bottle shops, confiscating alcohol or refusing to let some residents buy any (credited with reducing annual alcohol-related assaults from 460 to 192). It once had a mountain of longnecks higher than the Dolly Pot Inn, and coffins were made from beer crates.

It's a town where the instruction "turn left at the two dead donkeys" doesn't sound out of place; where one of the richest goldfields was found by two blokes with one eye between them. Nobles Nob yielded 34 tonnes over the next 45 years, and, altogether, the Tennant Creek area produced 210t of gold, making it one of Australia's richest fields.

It's a town with no real reason for being any more. There's no major industry and the last big mine closed a decade ago, although exploration continues. Mount Isa, more than 600km away, over the Queensland border, long ago took over as the major hub for Barkly pastoralists. Tennant Creek is chock-full of services, though – the shire council, land councils, Aboriginal services – here mainly to serve the 3000 townspeople.

Ask what locals think of the place and you're as likely to cop an explosion of expletives as people telling you they love it. The latter have moved here from all over the world and talk of how friendly the place is and the willingness of locals to dive in and help. "There's a great community spirit in town," says Catholic priest Father John Kennedy, who moved here three years ago. "For example, at Christmas, all the kids in town under 10 or 12 get a present, and that's been going for 81 years."

It's a town that offers a fresh start, and opportunities, with jobs galore for those who want them. However, this also creates a transient town, with many people coming for six months or a couple of years, gaining experience and savings before moving on. One in three locals lived somewhere else five years ago. And Tennant Creek will welcome anyone – famous visitors have included Mother Teresa, Lady Diana and even the Queen, who ate at the Goldfields Hotel in 1963.

TWELVE YEARS AGO, a pale Irishman named Bill O'Shea left Ireland mid-winter for this cauldron of central Australia. "It was like stepping off the plane into a blast furnace," he remembers. "I'd seen photos and that, but I wasn't prepared for what it was. I loved it."

Soon after arriving, Bill was taken bush to prospect for gold with Jimmy Hooker, who can't read or write but can read the country and recite his own poetry. Bill became hooked and now takes others on free prospecting tours. He calls it "scrub therapy" and still works with Jimmy sifting the mullock from old mines, rejoicing in glistening remnants in each pan.

"With the price so good at the moment, you only need 2g a day and you're making wages," says Jimmy, who came here for a week in 1968 and has been here ever since. "You could be looking at \$30 in that pan there. So if you throw that away each time, it's a waste. I call it tucker money."

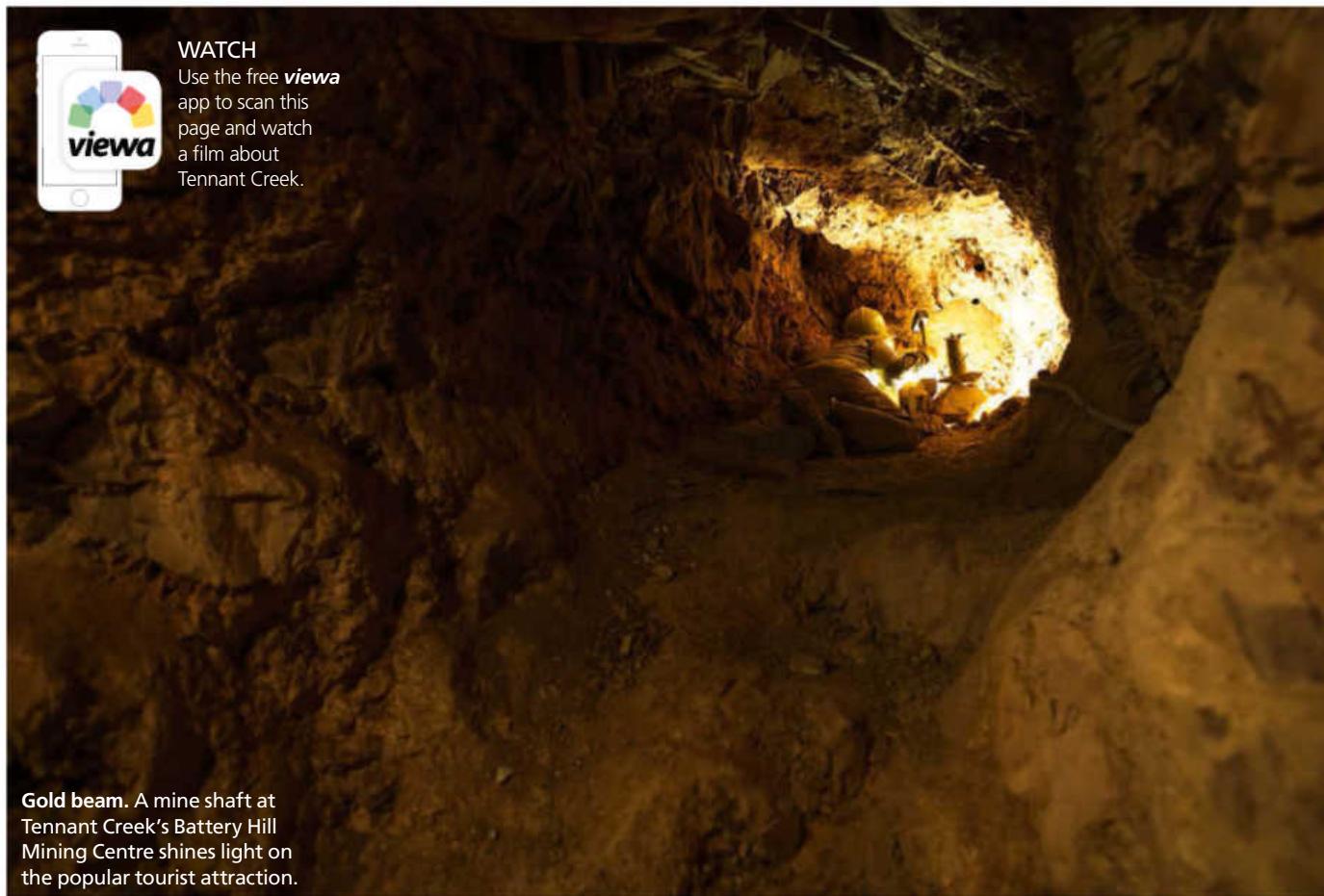
Jimmy bought his first metal detector in 1977 – a plastic \$600 job that was pretty useless. Similar to almost everyone ▶

Ken Eastwood is an award-winning Sydney-based journalist who has travelled the world, from the Arctic to Antarctica, collecting and writing stories. A former associate editor of AG, he has been writing for the journal for more than two decades. His last story for us was about national parks (AG 123).

Heath Holden is a photographer who has lived and worked in Canada and Singapore, travelled widely in the USA and is now based in Tasmania. His photographic career began shooting BMX and mountain-bike events. This is his first major assignment for AG.



WATCH
Use the free **viewa** app to scan this page and watch a film about Tennant Creek.



Gold beam. A mine shaft at Tennant Creek's Battery Hill Mining Centre shines light on the popular tourist attraction.

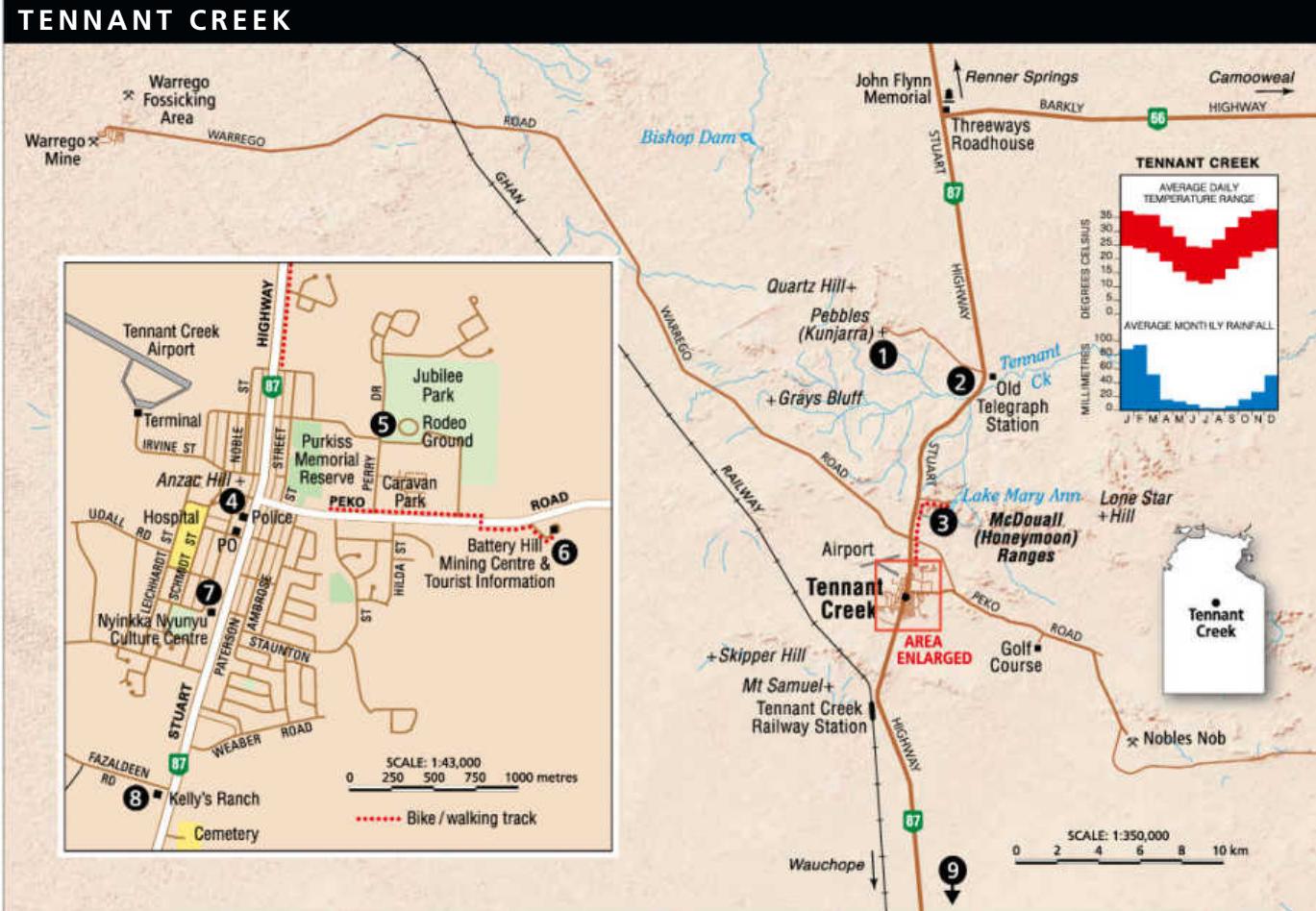


The chase. Local Aboriginal entertainer and prospector Jimmy Hooker has been chasing gold for 30 years.



The reward. Jimmy holds a collection of nuggets – a small haul, but, at more than US\$35 per gram, worth the effort.

TENNANT CREEK



Outback dreaming. Karlu Karlu / Devils Marbles Conservation Reserve (top) is a sacred site for Aboriginal people. The view from Anzac Hill (above) reveals Tennant Creek's straight streets.

WHEN TO GO

With average daytime maximum temperatures around 25°C, winter is the best time to visit. But be prepared for night-time temperatures that fall to as low as 6°C. December–January can be unbearably hot, with daytime temperatures climbing to higher than 40°C.

GETTING THERE

Tennant Creek is an 11 hour-drive from Darwin along the Stuart Highway. The drive from Alice Springs follows the Adelaide–Darwin route of explorer John McDouall Stuart. Most roads between major towns are sealed, but conditions can deteriorate quickly – particularly during summer-time flooding. Petrol stations can be great distances apart, so travel with extra provisions. Check regularly with the road report website. Chart Air operates two return services a week from Alice Springs to Tennant Creek Airport – on Monday mornings and Wednesday afternoons. Air North plans to begin flights between Darwin and Tennant Creek in the near future.

WHERE TO STAY

There is a range of motels, motor inns and roadhouses available in and around the town. Several caravan parks offer cabins, campsites and dorm accommodation. A youth hostel also offers a range of budget options.

USEFUL LINKS

Tennant Creek and Barkly Tourism

www.barklytourism.com.au

Barkly Regional Council

www.barkly.nt.gov.au

NT Road Report

www.ntlis.nt.gov.au/roadreport

Discover caravan parks and campsites at www.turu.com.au

POINTS OF INTEREST

- 1 Pebbles (Kunjarra)
- 2 Old Telegraph Station
- 3 Lake Mary Ann
- 4 Anzac Hill
- 5 Rodeo, Jubilee Park, in October
- 6 Battery Hill Mining Centre
- 7 Nyinkka Nyunyu Art and Culture Centre
- 8 Kelly's Ranch
- 9 Karlu Karlu / Devils Marbles (105km)

By 1934 the area had a full-blown gold rush – one of Australia's last.

in Tennant Creek back then, he worked at one of the goldmines, and the queue to get these first detectors flowed out the door of the town supplier. "No-one found any gold with them," Jimmy says, "but there were a few divorces – some of the women couldn't handle their men being off chasing gold all the time."

Equipment has improved and Jimmy and Bill now get enough yellow stuff to make it worthwhile. In one recent week they found two ounces, worth more than \$2000, although that was unusual. Bill, who speaks with a Cockney accent from his years in London, smiles ruefully. "If you told me 20 years ago that I'd be a gold prospector in the Australian outback..." he begins, then shakes his head and laughs.

AMONG DRY, STRAW-COLOURED spinifex, purple mulla mulla and scattered termite mounds 10km north of town stands a sturdy reminder of early European settlement. The glorious old telegraph station was built in 1872 as part of a vital communication system. The 'broadband' of its day, the telegraph line could get a message from Adelaide to London in seven hours.

The station's thick stone walls and wide verandahs, with roofs painted in government green, offer respite from the merciless sun. Out here six blokes grew vegies in the dirt and kept livestock, provided rations to the Warumungu people, and relayed morse code messages to the next stations 300km away. Anthropologist Baldwin Spencer, who visited in 1901, was, however, unimpressed, describing it as "the most forlorn and hopeless-looking place imaginable".

Adventurer Francis Birtles, who cycled from Sydney to Darwin and then down through the Centre along the telegraph line in 1908, was more appreciative: "At Tennant Creek I was most hospitably received... The vegetables were growing as well as I have seen them anywhere."

According to librarian and local historian Pamela Hodges, the Tennant Creek story could have ended not long after, if it wasn't for a postmaster at the station. "It wasn't until 1925, when the postmaster at the telegraph station, William Rabbit, was out shooting euros in behind the Three Sisters, when he came across an outcrop on flat ground, and found gold in the ironstone." Leases were taken out, and, although the gold wasn't easy to find in the bullet-hard ironstone, by 1934 the area had a full-blown gold rush – one of Australia's last.

Pam says the story about the beer truck breakdown becoming the site for the new town appears to be a myth. Instead, she says, the telegraph station was built on an Aboriginal Reserve, so a pub couldn't be built within 11km of it, leading to the town's site today.



Sound bite. Guide Bill Mitchell stands by the battery at Battery Hill, which thumps away at an ear-splitting 105 decibels as it crushes the hard ironstone – that's louder than a jet taking off a few hundred metres away.

Like a lot of gold-rush towns, it was wild, with fights over gold fuelled by alcohol. "It was portrayed as the wild west," Pam says. But at the same time, its heart of gold was shining through, says Roddy Calvert, long-time (but now-retired) Tennant Creek Visitor Information Centre manager, who has lived here since 1981. She says that during World War II, the women in town began to look after army convoys travelling up the Stuart Highway.

"They'd see the great big dust clouds coming, and that would give them time to put the kettles on and bake some scones." Some of the women then seized the opportunity to flee while their husbands were out looking for gold. "Some of them wanted a lift – they wanted to get out of Tennant Creek. So the husbands didn't want the convoys stopping and put a stop to it." Eventually an army camp was set up outside town.

MEANWHILE, THE TELEGRAPH station itself had closed. It was used for a while as the homestead for the vast Tennant Creek Station. Ken Ford, its current manager and owner, runs about 6000 Brahman and Droughtmaster-cross cows across his "million acres" (4000sq.km). "It's a bit smaller than most properties around here," he says.

Ken has lived here for 12 years and loves it. "We've got good access and bitumen in every direction so you can get freight from anywhere within a day and a half. We're only 6km out of town and we have town power, town water and we can even get pizza delivered." ▶



Creek goddesses. Samantha Konidaris, left, who moved here in 1969 from Greece, shares a walk in her tropical garden with daughter Efsta.



Weekly ritual. Anu Shaji holds baby Tessa for Sunday morning worship in Tennant Creek's historic Catholic Church, visited by Mother Teresa in 1985.

“You don’t have to be here for three generations before you are a local...it’s very embracing.”

Making a living on this spinifex, buffel grass and floodout country can be tough at the best of times, let alone when it regularly doesn't receive the 370mm average, but Ken currently has a spring in his step. "This year we've had one of the best seasons...not a lot of rain, but it rained over a few months, so the grass grew, then it grew again and again," he says. "The global demand for beef is really good at the moment."

Sitting 376m above sea level, Tennant Creek is pretty flat, with the worn-down jump-ups on the horizon around town looking like a blunted saw blade. A headframe on Battery Hill, on the town's eastern horizon, is testament to the golden years when pretty much everybody was after the lucrative metal. The battery there was recently renovated, and once again is pulverising the ironstone, at a thunderous volume of 105 decibels, partly for tourists and partly to once more make some money from the paydirt.

THE TOWN ITSELF is surprisingly clean and green, benefiting from thousands of trees planted in the 1980s. A grid-like pattern of roads spreads out neatly from the wide main street, the Stuart Highway. There is a smattering of churches among the mainly single-storey houses, and on a Sunday morn you're just as likely to hear the twitters of birds and the occasional fiery conversation packed with expletives, among the drone of lawnmowers, dogs barking and the bell-call to worship.

One of the greenest spaces is the garden of Sam Konidaris. Born and raised in Greece, she moved here in 1969 after marrying Jimmy, a Greek who'd become a successful businessman in Tennant Creek. Back then the town had little greenery, and Sam couldn't speak English, was pregnant and appalled by the heat of summer. She couldn't even get relief under the shower, because the calcium-rich water came out warm. "I always felt sick," she says. "Coming here, winter there, summer here – no air conditioning and all around very dry."

Virtually a recluse for 30 years, Sam was eventually encouraged by her children to start a garden when her husband died in 2003. "When I arrive here, nothing – only a couple of oleanders," she says. Gardening for hours each day, Sam has created a tropical paradise that has won local awards. Butterflies float among the lady palms, eggflowers, bougainvillea, marigolds, hibiscus, pencil trees, banana plants, vines and creepers. "Every time I go outside into the garden I'm very happy," she says.

Tennant Creek has a diverse bunch of residents – 50 per cent are Aboriginal and 20 per cent were born overseas, including Indians, Kenyans, Zimbabweans, Malays and Filipinos. The small population with Greek ancestry was boosted two years ago when Nick and Katerina Roditis, formerly of Darwin, set



Painting treasures. Phyllis Walden, originally from Doomadgee in Queensland's Gulf of Carpentaria, produces bright artworks at Nyinkka Nyunyu Art and Culture Centre, which showcases local indigenous art.

up their Greek cafe because they thought this would be a good place to raise children. "It's been one of the best moves," Nick says, between cooking yeros. "The people, the way the community has taken to us, I've never felt it anywhere that we've lived."

Katerina, her Santorini-blue eyeshadow and jewellery nicely offsetting sky-blue walls adorned with a Greek flag and pictures of home, agrees. "It's like a family," she says. "Even from the first day we opened the shop. All the people came to buy, but also to say, 'Thank you for opening the shop and for giving us something new.'"

THIS SENSE OF INSTANT belonging is echoed by many. "Those of us who live here absolutely love it," says Kate Foran, manager of the Nyinkka Nyunyu Aboriginal Art and Culture Centre. "You don't have to be here for three generations before you are a local...it's very embracing and very welcoming to new people. And also very tolerant."

At the Culture Centre, which opened in 2003, the ancient art and traditions of the Warumungu and other Aboriginal people are cherished and revered, and women are employed to paint for four hours a day. In broad canvases of gold and orange, red and blue and white, they record inspired works of their people, the land and its rich larder – bush berries, bananas, mangoes, bush apples and oranges.

Warumungu woman Heather Anderson pats her tummy and says she's hoping for some other tucker *Continued page 79*



Music makers. After a night of calling on the mic at the rodeo, Steve Goddard, left, joins Don Coleman to play at church.





Past insight. Historians Roddy Calvert, left, and Pamela Hodges take a look inside the old Tennant Creek Telegraph Station.



Mining waste. Relics, such as this old machinery along Peko Road, are commonplace around Tennant Creek.



Ring leader. Cultural officer Jerry Kelly teaches local Aboriginal kids horsemanship skills to help them find work on cattle stations.



Balancing act. A ringer riding bareback struggles in spectacular style to stay on his bucking ride in the arena at the Tennant Creek Rodeo.



Stock take. Some of the Barkly's meanest bulls wait their turn in the main ring at Tennant Creek's rodeo, an annual event that attracts stockmen and ringers from across the NT.

soon. "I'm sick of eating kangaroos. I'm sick of eating turkey. I really want emu. They're hard to get. They run really fast."

Kate says that, because the area was settled by Europeans only 80 years ago, the ancient cultures here have remained more intact, and most Aboriginal people will primarily speak their own language. But, like so much Aboriginal culture elsewhere in Australia, there's a blend of the old and new. Now, when local Aboriginal people paint themselves for ceremonies, the traditional ochres are mixed with canola oil, rather than the marrow from emu bones.

Jerry Kelly, the cultural officer at the centre, who grew up on nearby Banka Banka station, shows me the men's tall headdresses used in dances and ceremonies. "They used to make them out of paperbark. Now they used beer cartons turned inside out," he says. Once they were decorated with cockatoo feathers stuck on with blood. Now they use cotton wool and glue.

Five years ago, Jerry set up a horseriding school where he teaches locals and takes tourists on trail rides into the scrub around Tennant. "I was born in the saddle," he says. "I used to ride with the stockmen when I was four or five."

During his rides he educates about bush tucker and traditional ways of life – giving guests the taste of bush coconut, or washing their hands with soap bush. He ignores old 'keep out' and 'no trespassing' signs blocking the way to old mine sites. "We can't read," he says with a laugh. Dad to a stable of adopted kids, Jerry takes pride in mentoring and teaching Aboriginal youths

how to ride and care for horses, so they can get jobs on pastoral properties. "Anyone can ride a motorbike, but this...you can't teach anyone this in five minutes," he says.

And the mentoring often goes beyond the horse yard. "I used to train some of them to use fork and knife, too. And just getting up early," he says. "I also work with Corrections – the kids who are in trouble."

JERRY WAS A PROFESSIONAL rodeo rider for a while, until a buckjumper in Camooweal reared in the chute and broke his leg in two places. He was out for six months, but now teaches those same rodeo and campdraft skills to his young charges – some of whom get to prove themselves at the once-a-year Tennant Creek Rodeo.

In the built arena, the dust smothers checked shirts, shiny belt buckles and broad-brimmed hats. Beer cans dot the ground like confetti, while the crowd sings along to Lee Kernaghan's "The Outback Club".

In the chutes, where there's a heady smell of sweat, adrenaline and livestock, one of Jerry's former students – 25-year-old nephew Mitchell Albert – puts on some borrowed spurs and chaps with blue metallic trim before climbing astride a ferocious-looking bull. This is only the second time he's done this. The last time was two years ago, and he hasn't been on a horse this year, let alone a bucking bull weighing half a tonne.

The whites in his eyes clearly visible through the caged helmet, he gives the nod and the chute opens. It's wild and crazy, with bull spittle and dirt flying, and then – like most riders – he's bucked off awkwardly in a few seconds, landing heavily in the dust. But then the bull turns, and, seeing the figure on the ground, bucks and stomps on him. Somewhere in the crowd Mitchell's mother screams. As he tries to stand and get away, the bull turns and hammers him again, like a rag doll.

Finally, the rodeo clowns distract the bull, and Mitchell somehow flees, climbing over the high fence before collapsing on the ground. He lies motionless. His crew attends in a panic and helps him up when his eyes finally open. He's smiling now and yells a tirade of expletives, then whoops and hollers.

But later, in front of his mother, all he would say was, "I was a bit too slow. I've got a sore leg now." Just like Tennant Creek, he's as hard as haematite, with a heart of gold. **AG**

AUSTRALIAN GEOGRAPHIC and Ken Eastwood thank Travel NT for their assistance with this feature story.

▶ FIND more of Heath Holden's images of Tennant Creek online at: www.australiageographic.com.au/issue129



Safe harbour. With muscles aching from three days of hard paddling and tough conditions on South Georgia's wild south coast, (L-R) Chris Porter, John Jacoby and Jim Bucirde felt relief to reach the calm conditions of Larsen Harbour.



THE RIGHT STUFF

A group of record-breaking Aussie mates achieves a 30-year dream of circumnavigating South Georgia Island – a journey that saw them named the 2015 AG Society Adventurers of the Year.

STORY AND PHOTOGRAPHY BY ANDREW MAFFETT



AN AUDIENCE OF curious wildlife greeted us and our kayaks in Cooper Sound on the north-eastern tip of South Georgia Island. Fur seals in their thousands surfing offshore reefs like crowded point breaks poked their heads up to peer at us as we passed.

Further along the coast in Gold Harbour, we paddled past a beach packed with noisy penguins. Their raucous cries were bouncing off the dramatically serrated glacier behind them, and, for us, this tuneless wall of sound meant another night of wearing ear plugs as we tried to sleep in our tent.

We were deep in the South Atlantic, on day 10 of our circumnavigation of the island by sea kayak. We had already survived furious winds and wild seas, passed surf crashing onto stranded icebergs, and found gaps in reefs where the smallest mistake could mean a possibly deadly capsize. For us this was a cold and stormy world with treacherous potential everywhere – but for a menagerie of perfectly adapted wildlife it is an oasis.

While searching for somewhere to land, we found ourselves among a group of elephant seal bulls, puffing and sighing in annoyance at the disturbance. These massive beasts weigh up to 3 tonnes and are capable of carelessly crushing a kayak. While sheer size makes them worthy of much respect, their movements and behaviour also make them extraordinarily fascinating creatures.

We continued past rocky capes and sandy beaches, looking for some vacant real estate where we could camp between the steep green tussock slopes and beaches thick with wildlife.

Crowd control. King penguins (above) return each year to breed in the subantarctic colony where they were born, the biggest of which is on South Georgia. John Jacoby (opposite) came face to face with a male southern elephant seal – the world's largest carnivore – in Gold Harbour.

Each penguin species has its niche here. The gentoos were found in the hills, climbing to where their chicks waited to be fed. Macaroni penguins played in the shallows, getting tumbled about in the waves before hopping up the beach in gangs. And the kings stood together appearing regal – except for those that were moulting, which looked dishevelled while waiting for their feathers to be renewed.

IHAD WANTED TO visit South Georgia since I first found out about it three decades ago, in my early 20s. The island is located 1800km east of Cape Horn, at the southern end of South America, and 1500km north-east of the tip of the Antarctic Peninsula. Mountain ranges drip with glaciers along the island's entire 170km length.

Lashed by storms and pounded by ocean swells rolling unhindered from the frozen continent to the south, it is certainly a wild and remote place. But it's also enticing and exciting for anyone with a thirst for adventure.

I had attempted to organise numerous expeditions to this enigmatic island in the past, but the costs and logistics had always defeated me. In 2013, with the prospect of our 50th birthdays before us, my friend John Jacoby and I decided to make it



happen. We wanted to celebrate this milestone in 2015 with the ultimate adventure and prove that, as John put it: "Old blokes can still do good stuff."

Since our university days we'd taken many kayaking and mountaineering trips together and both felt that paddling around South Georgia would be a fitting way to celebrate our coming of age. If successful, we would be only the fourth team, and the first Australian one to complete the trip. As we launched into the epic task of planning the expedition we were joined by two mates, Chris Porter and Jim Bucirde. Even after a lifetime of tackling outdoor challenges, we knew this would test us at a whole new level.

Our starting point was the abandoned whaling station of Grytviken, on South Georgia's north coast and just getting there was a massive effort. Our kayaks were shipped six months ahead of us, on a 40,000km roundabout route via Poland, and in January 2015 we sailed 1400km on the expedition vessel *Pelagic* from the Falkland Islands to South Georgia. It was a rough voyage and when we finally sighted land, clouds hid the mountain peaks and big seas lashed the coast – but nothing could dampen our excitement upon reaching this wilderness paradise.



Happy campers. Jim, Andrew and John take advantage of some mild weather at their camp at Wirik Bay to rest, eat and organise their gear.

AT OUR FIRST campsite, wind blasted across the bay, sending smoking clouds of spray that threatened to demolish the tent. It had already been flattened once, when the kayak we tethered it to landed on top of us.

We scrambled to secure it with large rocks and retreated inside, hoping for better weather. Later, conditions changed from sleet to sunshine and back to snow as we made slow progress battling into 30-knot headwinds. We paddled into a sea of fog and mist past a southern right whale and calf, and found a gloomy campsite at Right Whale Bay.

We were immersed in wildlife and the clouds parted occasionally, revealing jagged peaks towering above. It felt like a lost world. *Pelagic* shadowed us throughout the journey, and the following day, with conditions still dismal, we accepted a lift in its Zodiac to wait out the storm on board. There aren't many vessels suitable for this kind of support mission, but the 17m steel-hulled *Pelagic* was purpose-built for polar exploration. ▶

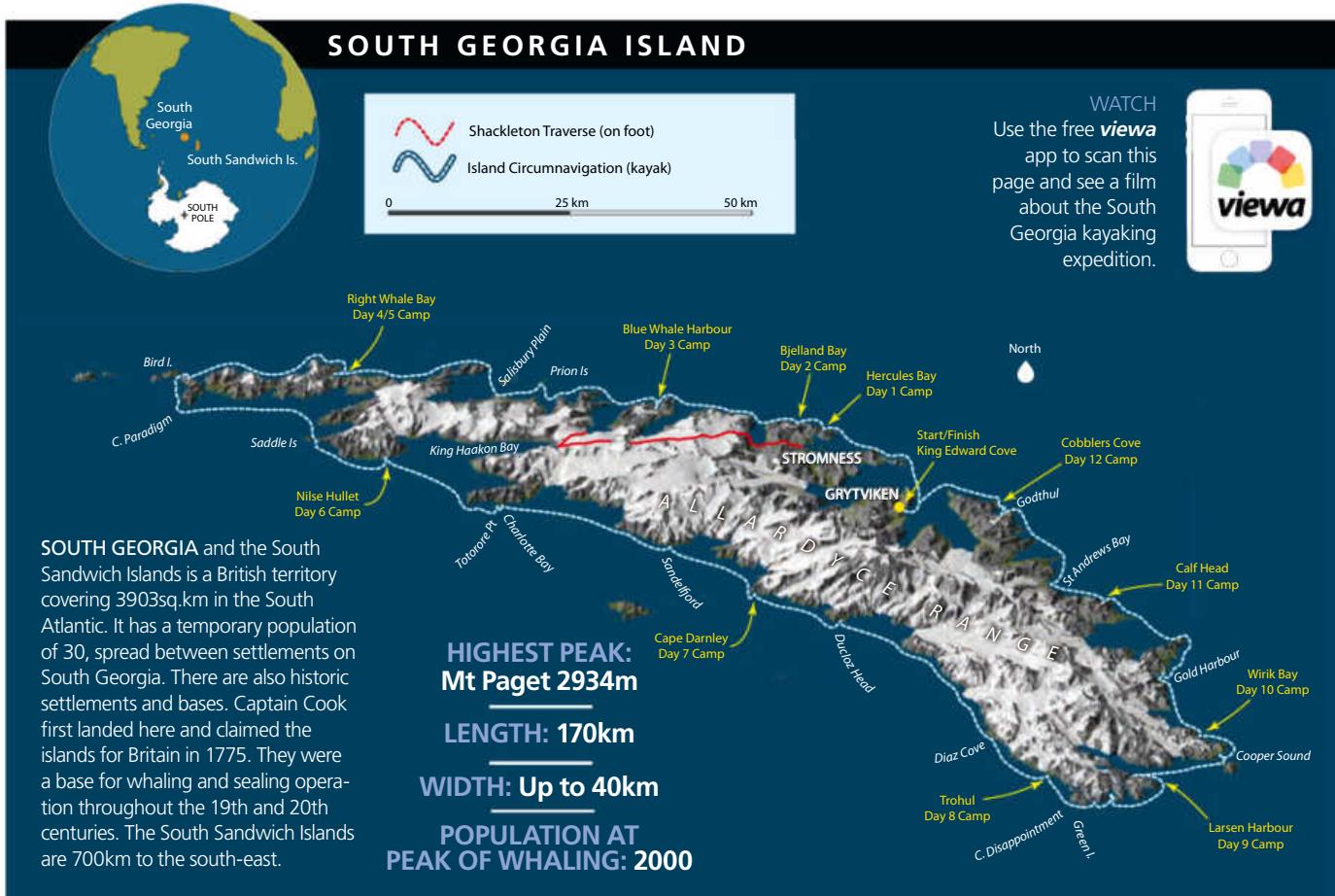


The sun came out...and the majesty of the south coast opened before us in myriad crystal colours.



Tough life. This chinstrap penguin parent (above) can travel up to 200km every day from its Bjelland Bay colony on fishing trips to bring krill home for its chick. About 95 per cent of the world's Antarctic fur seals (top) are found on and around South Georgia, and Jim met some frolicking in the waves at Cooper Bay. For the expedition team, paddling through brash ice (right) on the island's exposed south coast was a challenge.





We sheltered inside, listening to the storm as it escalated. By the afternoon the wind gauge was consistently registering above 50 knots and during dinner there was a loud crash. The 3cm-thick anchor snubbing had snapped and the squall had lifted the Zodiac out of the water and flipped it over. Another gust threw crew member Kirsten Neuschafer into the air as we struggled to right the Zodiac. Luckily, Chris grabbed her just in time and she escaped an icy swim.

ON DAY SIX the grey conditions reflected our thoughts as we approached the turning point south at Cape Paradigm, imagining the worst about the treacherous south coast around the corner. It was famed for its sheer cliffs and massive swells; my mind flashed images of kayaks dashed onto rocks and of paddling through the night to avoid treacherous big-surf landings.

The world, however, didn't end as we rounded the corner. We could almost touch the rocks of the cape as we were joined by a flying escort of hundreds of Antarctic prions, small southern latitude seabirds on a feeding sortie from their onshore



Home alone. A giant petrel chick waits at Right Whale Bay for its parents, likely to be out fishing. These birds also take the chicks and eggs of other seabirds.

breeding sites. Almost immediately the sun came out, and, instead of the menacing environment we had feared, the majesty of the south coast opened before us in myriad crystal colours.

We set off towards an iceberg that lay ahead like a jewel, but hours later we were still paddling. We completely misjudged this

lump of ice. Up close we could see its full grandeur, almost the size of a container ship, with 50m-high ice walls.

Idyllic conditions continued as we paddled past sea cliffs and threaded our way through anvil-like sea stacks until we reached the mouth of the massive King Haakon Bay. To our left was the landing point for famed polar explorer Ernest Shackleton and five of his men, but I doubt they appreciated the same grandeur in the glaciers that tumbled down its sides. After their ship *Endurance* became trapped in Antarctic pack ice (AG 117) in 1916, they trekked across the island to reach Stromness whaling station on the north coast. Here they raised the alarm to rescue the remainder of their stranded crew.



White wilderness. Huge icebergs are a hazard in Drygalski Fjord, which reaches 15km into the island's interior. It is a narrow passage cutting a spectacular swathe through the mountains, with steep walls of glacial ice and tumbling waterfalls.

We paddled on and tempted fate by manoeuvring under the towering faces of ice cliffs at the base of the glistening Allardyce Range, which is studded with glaciers and snowy plateaus. The constant flow from the glaciers creates swathes of brash ice, a gently moving carpet that pops and crackles as it releases air bubbles trapped for thousands of years.

In three 13-hour paddling days we covered 200km and had a dream run along one of the world's most dramatic coastlines.

But then with just 30km to go, our good luck broke and conditions turned rugged. Wind magnified the ocean's movements and we were soon flying down large waves, playing Russian roulette with shallow reefs and creamy-topped swells.

Exhilaration turned to concern as waves bounced back at us from Cape Disappointment's imposing cliffs, and, on the edge of control, I back-paddled to stop my kayak burying its nose and wrestled my sail down. I steered towards a narrow gap that satellite images had shown was between the cape and Green Island, but for now all I could see was a wave-lashed rock wall.

Icebergs loomed nearby and the wind increased, whipping



Extreme dimorphism. Female southern elephant seals can weigh as little as 300kg, just a tenth of the size of their largest 3t male counterparts.

up confused seas that drove me towards the surf zone. Then, just in time, the gap in the cliffs appeared and I crossed into a sheltered sanctum. Relief washed over me as I glided to John and the others. Sea kayaking doesn't get much more exciting but we had completed the crux of our trip down the forbidding south coast.

BY THE TIME WE returned to King Edward Cove we had been on the water for 13 days, and had completed our circumnavigation six days faster than anyone before us. It meant we had time to retrace Shackleton's land traverse of South Georgia to complete a unique double achieved by none of our predecessors.

Equipped with maps, GPS and the latest camping gear, we felt for Shackleton and his team as we followed the path they took during their desperate march 100 years previously. They were lucky to have clear conditions and a full moon, but



Climbing bonus. Scaling 862m-high Snow Peak on the island's north-west made a nice break from paddling for John (above, at left) and Andrew. Chris, Andrew, Jim and John complete the circumnavigation of South Georgia at Grytviken, where they celebrate in style.



It's impossible not to be inspired by the miraculous scope for existence on our planet.

had to push on non-stop for 36 hours to make the crossing.

It took us three days to reach Stromness, now a whale graveyard that has become the dominion of fur seals and penguins. It was where we ended our South Georgia odyssey. As we waited to be collected by *Pelagic*, I felt a weight lift from my shoulders and euphoria rose in me. After years of dreaming and planning, we'd completed both of our objectives. But my sense of achievement ran much deeper.

South Georgia is a wild and beautiful place where life is marginal but remarkably abundant, and it's impossible not to be inspired by the miraculous scope for existence on our planet. Away from home comforts and pleasures, the important things in life had become clearer and we realised that what truly keeps us alive is our strength of spirit. We had shared an extraordinary adventure and shown that old blokes really can do great stuff. **AG**

FIND a video of the record-breaking circumnavigation online at: www.australiangeographic.com.au/issue129



AUSTRALIAN GEOGRAPHIC SOCIETY UPCOMING EXPEDITION



IN SHACKLETON'S FOOTSTEPS

In MARCH 2017 the AG Society will partner with Aurora Expeditions for a special voyage to South Georgia and the Antarctic to mark 100 years since the conclusion of Sir Ernest Shackleton's epic adventure in 1917. This will commemorate his famous journey across South Georgia to rescue crew stranded on Elephant Island. We'll follow his route, offering a small group the chance to walk in his footsteps. You will be led by a team of expert guides, naturalists and historians, who will interpret the wildlife and history of this remarkable destination.

DETAILS

DATES: 8-25 March 2017 (18 days)

VESSEL: The 54-passenger *Polar Pioneer*

COST: From US\$14,300 pp

ROUTE: Ushuaia, Argentina-Santiago, Chile

BOOKINGS: Call 02 9252 1033 or 1800 637 688, or visit: www.auroraexpeditions.com.au/expeditions/expedition/in-shackletons-footsteps

HIGHLIGHTS

- Visit penguin rookeries.
- Pay your respects at the explorer's Grytviken grave.
- Trace Shackleton's journey from Fortuna Bay-Stromness.
- Sail the Weddell Sea past vast icebergs and in search of geological wonders.
- Land at Elephant Island.



EXPEDITION ROUTE

aurora
expeditions





Paradise found. Lord Howe Island, as viewed from 875m Mt Gower, features lush rainforest, rugged terrain, subtropical beaches, and an idyllic coral-filled lagoon. The Admiralty Islands can be seen to the north.

A NATURAL BEAUTY

Lord Howe Island is a bushwalkers paradise. Its small size means rewarding hikes through mossy forests, close encounters with nesting seabirds and snorkelling in a coral lagoon are all easily achievable in a single day.

STORY BY JOHN PICKRELL PHOTOGRAPHY BY LUKE HANSON AND JOHN PICKRELL

THE SUPERLATIVES TRIP off the tongue with ease when talking about Lord Howe Island. Within a few hours of arriving at the airstrip I had already climbed through a forest of black-butt, greybark, curly palms and elkhorn ferns to the lookout high on Malabar Hill. Here is one of the most spectacular views in the South Pacific. Splayed out to the south in front of me lay the misshapen crescent of the island, dominated at the far end by the rugged peaks of Mt Lidgbird and Mt Gower, and filled in the middle with meadows, forests, beaches and bays. Protected within the crescent was a shallow lagoon – a line of breakers on its right delineated the boundary of the world's southernmost coral reef.

As if that wasn't enough to take in, there I stood amid the world's largest nesting ground for red-tailed tropicbirds, their nests found in pockets of the cliffs beneath my feet. Turning 180° to the north – to take in the view away from Lord Howe and towards the Admiralty Islands – the graceful white forms and screeching calls of these aerobatic seabirds filled the sky as they weaved back and forth above the waves and the mosaic of coral reefs 208m below me.

Just 90 minutes later I'd climbed down to the lagoon and was bobbing in the warm waters and dipping below to snorkel alongside double-headed wrasse, spangled emperors, reef sharks and turtles. Here I made my way through thick gardens of coral, found further from the tropics than any others on Earth. At Erscharts Hole, near the south of the lagoon, I looked up to find myself almost in the shadow of 875m Mt Gower.

"Lord Howe represents the southern extremity to where the East Australian Current drives warm tropical water, 12 months of the year – although in summer it will extend right down into Bass Strait," says Cameron Lay, manager of Lord Howe Island Marine Park. "It means we can maintain a truly tropical ecosystem, and the island's waters are characterised by both tropical and temperate species – one of its defining features. It's got a real mix of climatic zones... The current brings larvae, eggs and spawn down from the Great Barrier Reef to settle around Lord Howe. So we've got more than 500 species of fish, 98 known corals and possibly thousands of invertebrates."

LORD HOWE IS A SPECTACULAR speck in the Pacific; 780km north-east of Sydney, it is just 11km long, and it is this compactness that makes it a brilliant destination for enjoying a wide variety of nature-based activities all within a few days – including bushwalking, kayaking, birding and snorkelling. Hiking along beaches, cliff ledges and forest trails is a fantastic way to encounter some of the 200 species of bird that live or pass through here (including 14 nesting seabirds) and 300 plants (such as 11 orchids, 56 ferns and 105 mosses, which are abundant in the cloud-capped forests atop Mt Gower and Mt Lidgbird).

"One of the great things about Lord Howe Island is that it's an incredibly diverse environment, but it's also very accessible," says Dean Hiscox, who was the island's park ranger for 16 years, and who now runs Lord Howe Environmental Tours with his family. "You can be on the reef in less than 10 minutes, or a mountain in a very short amount of time, and really get an appreciation for the diversity the island has to offer."



Lay of the land. John Pickrell stands on Malabar Hill from where walkers can take in the whole island, all the way to distant Mt Lidgbird and Mt Gower.

Crew members of the First Fleet ship HMS *Supply* caught glimpses of Lord Howe in 1788 while they were en route from Sydney Cove to establish a second colony on Norfolk Island. Merchant vessels plied this route and whaling ships stopped here in the intervening years, but the first settlers didn't arrive until 1834. They made a living trading with passing ships until whaling began to decline, and then developed a trade in the seeds of native thatch or kentia palms, which became enormously popular in the parlours of Victorian Europe. The island's governing body, the Lord Howe Island Board (LHIB), still earns revenue from the cultivation and export of seedlings by a contractor.

It is the island's remoteness and the rugged nature of its 1455ha of land that have kept it in relatively pristine condition compared with other Pacific islands. Today, Lord Howe has just 350 permanent residents, and up to another 400 tourists in peak season. Numbers are controlled by an LHIB restriction on guest beds, limiting development. The island group has been a World Heritage Area since 1982 and a marine park since 1999.

Ecologist-turned-hotelier Luke Hanson and his wife, Dani Rourke, own Pinetrees Lodge, an island institution; with 75 beds, it is the largest provider of accommodation. Dani is the sixth generation of a family who first began taking paying guests on Lord Howe in the 1890s. Luke says the island has a series of delightful bushwalking spots, including the northern hills we'd ventured into earlier that day.

"Without too much effort you can get up to Malabar and Kims Lookout. It's not too steep. There's a nice track up to the ridgeline. And, when you get there, you realise you've climbed up the back of this sea cliff that drops 200m down to the ocean. And it's kind of staggering," he says. "You can walk along that ridgeline for about a kilometre and you get these little viewpoints where you pop through the forest. And this time of year you're surrounded by all the red-tailed tropicbirds and chicks squawking. It's a great wildlife experience."

The red-tailed tropicbirds are all along the island's northern cliffs from November to May, but if you're there over the period from September to January, there will be sooty terns in their tens of thousands instead.

Also worth exploring at that end of the island is Mt Eliza, slightly lower than Malabar at 147m. *Continued page 95*

Wanderers return. Sooty terns return to Blinky Beach for the spring breeding season after their annual migration to the Sea of Japan.



Birding wonderland. Nesting seabirds are abundant on Lord Howe Island, such as this providence petrel scooped up by Dean Hiscox (far left); the large dappled chick of a red-tailed tropicbird (above) tucked in its nest under a bush on Malabar Hill; and the tiny, fluffy nestling of a white tern (left). White terns lay eggs in depressions on bare branches, and here chicks remain, somewhat precariously, until fully fledged.

LORD HOWE ISLAND

A series of great walking tracks allows visitors to explore the island's full range of environments. Most are open year-round, but some are closed in September–December, when seabirds are found nesting along the tracks.

WALKS

TRANSIT HILL

2KM, 2 HOURS RETURN

This easy walk takes you through dry rainforest before emerging into the paddock above Pinetrees; this is the oldest lodge on the island, and dates back to 1842 when the Andrews family arrived. The first paying guests came in the 1890s. The walk ends at a summit viewing platform with 360° views. From here you can return the same way or head down to Blinky Beach.

Access: Starts from the LHIB administration building and goes up Bowker Avenue.

MALABAR HILL AND KIMS LOOKOUT

1.5KM, 2 HOURS RETURN/7KM, 6 HOURS RETURN

The entire loop walk that goes through both Malabar Hill and Kims Lookout takes half a day, but the return walk to Malabar Hill can be done in two hours. This is a popular trek, with a mixture of forest types and great views, and it takes you through nesting grounds of the red-tailed tropicbird. A rocky clearing marks the crash of an RAAF Catalina in 1948; from here you can see Old Settlement Beach and Sylph's Hole, named after a trading vessel that anchored there in the 1860s.

Access: Starts near Neds Beach.

GOAT HOUSE CAVE

6KM, 5 HOURS RETURN

This steep and rocky climb is demanding, but rewards walkers with spectacular views from Goat House Cave, 400m up on Mt Lidgbird. It is a good test track to attempt before the more difficult Mt Gower. It was named for the goats released onto the island by early settlers, and eradicated in 2001. As you ascend you move through lush rainforest and more open patches of dry forest before emerging into a rocky overhang with the help of rope pulls.

Access: Starts from Lagoon Road, just past Capella Lodge.

INTERMEDIATE HILL

1KM, 45 MINUTES RETURN

This is a shorter version of the Goat House track, but is still a challenging climb up to 250m Intermediate Hill, the island's third-highest peak. A great view of the island and Smoking Tree Ridge can now be enjoyed from a new viewing platform, funded by Dick and Pip Smith.

Access: Branches off 200m along from the start of the Coastal Track.

COASTAL TRACK TO ROCKY RUN AND BOAT HARBOUR

3.5KM, 3 HOURS RETURN

This track has several small paths leading off it; you can stop at Mutton Bird Point lookout or follow Rocky Run Creek to the ocean. If you stick to the main track you'll arrive at beautiful Boat Harbour with stunning sea vistas. The walk takes you through verdant forests of giant pandanus trees. In spring and summer trees such as mountain rose and green plum are in flower.

Access: Starts from Lagoon Road near the turn-off for the airport.

MT GOWER

10KM, 9 HOURS RETURN

This strenuous walk along often unmarked tracks requires an expert guide. For those who make it, the climb ends at the 875m summit of Mt Gower, with breathtaking views and a colony of providence petrels from March to October. The walk passes through constantly changing scenery, and is the best way to enjoy the range of island flora.

Access: Guided treks offered by Lord Howe Environmental Tours (02 6563 2214); Sea to Summit Expeditions (02 6563 2218).

MT ELIZA

0.6KM, 30 MINUTES RETURN

This short but steep track ends at the top of 147m Mt Eliza, which has fantastic views over North Bay. It is closed in September–February to protect sooty terns, which nest along the path.

Access: Starts from the picnic area at North Bay.



NORTH HEAD



GOAT HOUSE



NEDS BEACH

CLEAR PLACE

1.2KM, 1.5 HOURS RETURN

Kentia palm groves offer cool respite in the heat and host a colony of flesh-footed shearwaters. This easy walk is also a good way to spot muttonbirds, sooty terns, woodhens and masked boobies. Banyan trees and roots form tunnels around the track.

Access: Starts at the southern end of Anderson Road.

MAX NICHOLLS TRACK TO NORTH BAY

4KM, 4 HOURS RETURN

This is a demanding track, but rewards walkers with great views. Old Settlement Beach is where

the island's first families set up home in 1834. From here you can see wrecks of ships sunk here in 1965 and 1954. This walk ends at North Bay, which has toilets and barbecue facilities; from here you can walk back or head to Malabar and Neds Beach.

Access: Starts from Old Settlement Beach.

LITTLE ISLAND

3KM, 1 HOUR RETURN

This easy track follows a disused road through palm groves with an abundance of birdlife, including rare Lord Howe Island woodhens.

Access: Starts from the southern end of Lagoon Road.

GETTING THERE

Lord Howe Island, officially part of NSW, is 780km north-east of Sydney and 740km south-east of Brisbane. It is a short flight (under 2 hours) on QantasLink from either city and 15 flights (in peak season) are offered per week.

CLIMATE

Temperatures are mild and comfortable, with an average maximum of 19°C in winter and 25°C in summer.

WHERE TO STAY

Accommodation options on Lord Howe can be found at: www.lordhoweisland.info/accommodation-and-dining. Popular places to stay include Somerset Apartments (02 6563 2061), Pinetrees Lodge (02 9262 6585) and the Ocean View Apartments (02 6563 2041). There are no options for camping.

POINTS OF INTEREST

- 1 Mt Eliza
- 2 Malabar Hill
- 3 Neds Beach
- 4 Lord Howe Island Museum
- 5 Lord Howe Island Board
- 6 Transit Hill
- 7 Erscoths Hole
- 8 Goat House Cave
- 9 Mt Lidgbird
- 10 Mt Gower

WALKS

- - - Transit Hill
- - - Malabar Hill & Kims Lookout
- - - Goat House Cave
- - - Intermediate Hill
- - - Coastal Track
- - - Mount Gower
- - - Mount Eliza
- - - Clear Place
- - - Max Nicholls Track
- - - Little Island

LORD HOWE ISLAND

AVERAGE DAILY TEMPERATURE RANGE	
DEGREES CELSIUS	25 20 15 10 5 0
J F M A M J J A S O N D	25 20 15 10 5 0

AVERAGE MONTHLY RAINFALL	
MM	250 200 150 100 50 0
J F M A M J J A S O N D	250 200 150 100 50 0

BALLS PYRAMID

(24km south-east of Lord Howe Island)

SAME SCALE AS MAIN MAP

NOVEMBER – DECEMBER 2015 93

Hidden heights. Mt Lidgbird cloaked in cloud. Lidgbird is rugged and inaccessible, with no marked track to the summit, although islanders know of some routes.



From turf to surf. Bushwalkers and birders can easily find time out for a dip in Lord Howe's superb lagoon, much of which is 1–3m in depth. Ercott's Hole (far right), 800m from shore, is easily reached in a glass-bottomed boat and is a favoured spot for snorkelling. Kayaks (right) are a great way to explore, and reach other snorkelling spots, such as Comets Hole. Surge wrasse (above) come in for a feed at Neds Beach.



"In the '50s and '60s it became a fashionable honeymoon destination... Lord Howe was seen as incredibly exotic."

Getting there involves a climb up a ridge to a spot where you view the island as an amphitheatre below you. "It's where you get that postcard view of Lord Howe – and the mountains and the curved beach of North Bay," Luke says. "The lagoon is this beautiful turquoise/aqua colour and the ocean on the other side of the island is a cobalt blue, and it's just a beautiful place."

A 45-MINUTE WALK down from Malabar Hill is Neds Beach on the island's east. Here you can feed the fish, another iconic Lord Howe experience. Visitors get a thrill from standing amid a writhing vortex of neon-coloured moon wrasse and parrot fish, trevally, garfish, silver drummer, spangled emperors and huge green-backed kingfish. Even little reef sharks occasionally cruise through at sunrise and sunset.

The tradition dates back to the 1920s or '30s, when islanders were already protecting some of the special places and had prohibited fishing on Neds Beach. "They'd throw food scraps and bread in the water and subtropical reef fish would come in to feed," Luke says. "As time went by, a lot of the fish bred and stayed, so there's a whole population there because of feeding."

Feeding with bread was stopped by the LHIB several years ago, after some kingfish developed growths on their heads, and fish pellets are now provided instead. "People come and put a dollar in the old bubble gum vending machine and get their cup of fish food. They go down [into the surf] and throw it out and get absolutely surrounded by hundreds of fish. Some people lie in the water and...have fish jumping all over them."

Of course, many visitors here are avid birders and come to have close-up encounters – like few other on Earth – with birds. And it is these remarkable experiences that make a visit to Lord Howe unique. It is an important rookery for 14 seabirds – including several petrels, shearwaters, boobies and terns. The forest behind Neds Beach is a good spot to see flesh-footed shearwaters returning to their burrows at sunset in September–April, but an encounter with the providence petrel is perhaps the island's biggest drawcard.

Late afternoon one day, as the sun dipped low in the sky, I climbed with Dean and Luke from the black boulder beach at Little Island up the flanks of Mt Lidgbird. On the walk down to the beach from the road we'd passed through groves of kentia palms and seen endangered Lord Howe Island woodhens. As we reached the beach, the skies were already thick with wheeling providence petrels returning after a day foraging at sea. Here it is possible to attract petrels to perform the trick for which they are famous, but Dean told me we'd have more luck if we climbed up to the Lower Road, a grassy ledge part of the way up the track to Mt Gower.

Forty minutes and a vigorous scramble later, we reached our destination and Dean began to clap and loudly imitate the



A tradition begins. Following the arrival of flying boats, honeymooners – such as these, pictured at Pinetrees in the 1950s – flocked to Lord Howe.



EARLY AVIATION GLAMOUR

THE FIRST PLANE at Lord Howe was the gypsy moth *Madame Elijah*, piloted by Francis Chichester on his 1931 crossing of the Tasman from New Zealand to Australia. It flipped on the lagoon in a storm and he stayed on for nine weeks to repair it. Later, during World War II, RAAF Catalina flying boats visited to service meteorological and radio bases.

From 1947 to 1974, Catalina and Sandringham flying boats – run by Qantas and then Ansett and Trans Oceanic Airways – served the island, landing on the lagoon at high tide. They would take off from Rose Bay in Sydney Harbour in the very early morning carrying up to 46 passengers, many of them honeymooners. "In the '50s and '60s it became a fashionable honeymoon destination in the Sydney scene. Lord Howe was seen as incredibly exotic," says Luke Hanson, co-owner of the Pinetrees Lodge. "In early photos everyone is travelling in their very best. All the men are wearing suits; all the women are wearing lovely dresses and heels."

It was a four-hour flight and the planes weren't pressurised, so they flew below 10,000 feet. "Some were two-storey, so people moved around on board. Parts of the plane were like a bar and there was a fully-decked kitchen, where they cooked with an open flame. It was classy travel for its time." A lot of those honeymooners fell in love with Lord Howe and they've come back every few years or for a significant anniversary, Luke adds. "There's this great lineage of people who came a long time ago and are now bringing their kids and grandkids."

It wasn't until 1974 that the 886m airstrip opened. Qantas now operates up to 15 flights a week from Sydney and Brisbane aboard 36-seater Dash 8-200 turboprops. In part it was the lack of an airstrip and limited access that protected the island from overdevelopment.



Critically endangered. At up to 15cm and 25g, Lord Howe Island phasmids – also known as tree lobsters – are among Australia's heaviest insects. Following their rediscovery on Balls Pyramid, four were collected by a team in 2002, including LHIB ranger Chris Haselden (below) and brought into captivity at Melbourne Zoo. From those four, the zoo has now bred more than 11,000 offspring, some of which are kept by the board on the island.



Balls Pyramid has the only wild population of one of the world's largest invertebrates – the Lord Howe Island stick insect or phasmid.

chattering, squeaky calls of the petrels. Within moments there was a “THUD, THUD, THUD” and curious birds crashed to the ground all around us. They are clumsy and useless on land and have absolutely no fear of people; several fought among themselves, flapping their wings, while another nonchalantly pecked at my shoelaces. Dean scooped one up and noted that its heart rate was languid – it was utterly nonplussed by the experience. I had never seen anything like it in my life.

“To climb up the mountain, call these birds and have them land all around you – and gently pick one up – is incredible and surreal,” Luke says. “These birds nest nowhere else on the planet, so to experience that – especially in the mist on the summit – is really amazing and a great thing to introduce people to.”

If you continue from the Lower Road up to the summit of Mt Gower, you experience a rapid drop in temperature and a change in environment. Finally, you emerge into a cloud forest filled with ferns, mosses and *Fitzgeraldii* trees, which would look more at home in temperate Tasmania. The ground there feels spongy, because it is honeycombed by the burrows of providence petrels. Lord Howe is now the only place where they breed. The rugged habitat protected them better than at Norfolk Island, 900km to the north-east. There colonists and convicts survived by harvesting the birds in huge numbers, hence the species’ common name. In April–July 1790 alone, 171,362 were slaughtered. Within 10 years the petrel was locally extinct.

ANOTHER GREAT WALK at the south of the island is the Goat House hike, which takes you to a 400m-high overhang on the north-eastern side of Mt Lidgbird. This is a great climb if you don’t have the time to make the challenging nine-hour trek up Mt Gower. If you make it far enough around the corner at Goat House, you can enjoy the view of Lidgbird’s wild south-eastern flank, and see out to Balls Pyramid, 23km away. This 551m rocky outcrop was once part of the Lord Howe volcano and its summit was reached – following other ascents – by AG’s founder, Dick Smith, in 1980 (see AG 123).

Balls Pyramid is home to the only wild population of one of the world’s largest invertebrates – the Lord Howe Island stick insect or phasmid. These, fat, black, waxy-looking creatures are flightless and up to 15cm long. At the turn of the 20th century, they were so abundant that South Australian Museum entomologist Arthur Mills Lea described finding 68 in one tree hollow. “Phasmids were once incredibly common over the whole of Lord Howe,” Dean says. “They were a pest and would get into ceilings of the early homes. If you were walking through the bush and picked up a hollow log there would be dozens crammed into it.”

But in 1918 the *Makambo* ran aground off Neds Beach. In its hold were black rats, which soon made themselves at home on Lord Howe – an event naturalist Ian Hutton describes as the “greatest single disaster” to befall the island. With few predators, they ate their way through the stick insects and the eggs of



LORD HOWE ISLAND SCIENTIFIC EXPEDITION

Come with the Australian Geographic Society to the South Pacific in 2016.

RUN IN PARTNERSHIP with Pinetrees Lodge and the Lord Howe Island Board, this scientific expedition is an opportunity for 20 readers to enjoy the bushwalks and nature experiences, while also helping scientists from the Australian Museum to survey endemic snails, beetles and other insects that are thought to be close to extinction. Many species remain undescribed or unrecorded, so the expedition stands to make a significant contribution to conservation. Opportunities for coral and bird surveys will be available and evening lectures provided. A proportion of the fees will go towards supporting the important work of the AGS and the museum scientists.

DATES: 16–23 October 2016

COST: From \$4250 per person, twin share

INCLUSIONS: Return airfares from Sydney; local transfers; seven nights accommodation and breakfasts, lunches and dinners at Pinetrees Lodge; sunset drinks and afternoon teas; bushwalking activities

BOOKINGS: Contact Pinetrees on 02 9262 6585 or info@pinetrees.com.au



ground-nesting birds. Within decades the phasmids were extinct.

That was thought to be the case until 2001, when the island board and the NSW National Parks and Wildlife Service (NPWS) arranged for a team of entomologists led by Dean to make an exploratory expedition to Balls Pyramid. Climbers had reported finding pieces of insect exoskeleton there in the 1960s. “There was always a question about what was actually going on, on Balls Pyramid. Was this a small extant population of phasmids? Or another insect that was similar? Either way it was worth exploring,” says Dean, who was then the LHIB ranger.

Several days of searching resulted in the discovery of heavily grazed melaleuca bushes on a high ledge, which had lots of insect droppings under them. But several visits during daylight hours had not turned up anything more. On the last evening, Dean and Nick Carlyle, also of the NPWS, decided that, seeing as they had nothing else to do, they’d climb up to the ledge at night.

“We made our way along the sea cliffs and climbed up to this ledge where a couple of large melaleucas were growing in fractures of the basalt that had water seeping through,” Dean says. “We tentatively peeked across, and in the torchlight I saw a large insect. A closer look revealed it was indeed a phasmid. It was absolutely mind blowing. We didn’t really have any expectation that we’d find them at all. It was a moment that I’ll never forget.”

The wild population on Balls Pyramid is estimated to number fewer than 50, but a breeding program at Melbourne Zoo

has been a great success. There’s now a captive insurance population kept by the board on Lord Howe itself, and there’s talk of reintroducing them to neighbouring islands free of rats.

“The zoo found that they were prolific breeders and after a few years had a surplus,” says Chris Haselden, current LHIB ranger. “They sent back the descendants from the original four that Dean and I collected [from Balls Pyramid]...and now we’re housing a population estimated at up to 200 individuals.”

ASOUTH PACIFIC squall sets in on the afternoon before I’m meant to depart. Fat droplets of rain and powerful gusts of wind pound the kentia palms and Norfolk Island pines, littering the roads with debris. Because landing on the tiny airstrip is a precarious activity at the best of times, all flights in and out are cancelled when the weather turns bad, and I was stuck on Lord Howe for 24 hours longer than I’d planned.

But on my last morning, I awake to glorious sunshine and – walking barefoot in the surf of the lagoon with Mt Lidgbird and Mt Gower towering over me – I decide this isn’t really such a bad place to be stranded. From its southernmost coral reefs to its unrivalled birding opportunities and peerless bushwalks, my visit to Lord Howe has been a superlative experience. 

 **FIND** more stories and galleries about Lord Howe Island online at: www.australiageographic.com.au/issue129



Cavern fever. Katie Keophilaphet explores caves under the SA stretch of the Nullarbor Plain, one of the world's largest limestone karst landscapes.

Join us next issue

We celebrate the **30th birthday** of AUSTRALIAN GEOGRAPHIC – and launch a fresh new look for the journal. Also this issue, we nominate our **30 conservation heroes** of the past 30 years; revisit some of the **favourite images** of our veteran photographers and the stories behind them; follow the **trail of brumbies** across the nation; and explore the **caverns of the Nullarbor**. Our valued subscribers will also receive a **FREE** fully updated **Adventurers and Dreamers** map of Australia. Out early January.

While you're waiting for your next issue, get your daily hit of fascinating AG stories and stunning photography at www.australiangeographic.com.au

AUSTRALIAN GEOGRAPHIC SOCIETY SCIENTIFIC EXPEDITION 2016



GOBI DESERT FOSSIL DIG

Join us on a thrilling adventure in remote Mongolia to hunt for dinosaurs!

SOME OF the world's most spectacular fossils come from the Gobi Desert, but few people will ever have the opportunity to go there with professional palaeontologists to hunt for these treasures. Join the AG Society on this special scientific expedition, run in collaboration with the Mongolian Academy of Sciences (MAS) and Odyssey Travel. Your hosts include John Pickrell, editor of AUSTRALIAN GEOGRAPHIC,

dinosaur enthusiast and author of *Flying Dinosaurs*; and Dr Tsogtbaatar Khishigjav, renowned dinosaur hunter and head of the Mongolian Palaeontology Centre. We will take a group of up to 15 volunteers into the heart of the eastern Gobi, where rocks are exposed from the early Cretaceous, a key period of dinosaur evolution. We'll travel in a convoy of 4WDs to a series of sites to discover and excavate fossils. Evenings will be spent

enjoying meals cooked by the field chef around the ger (yurt) at the centre of camp. Prior to eight nights spent camping in the desert, the expedition begins in the Mongolian capital, Ulaanbaatar, where we'll visit museums, the Gandan Monastery and the fossil preparation laboratory of the Mongolian Palaeontology Centre. Find more details and a story on the 2015 Gobi expedition in an upcoming issue of the journal.

DETAILS:

DATES: 7–22 September 2016 (16 nights)
COST: From \$11,995pp – a proportion of which supports the work of the MAS and AGS
BOOKINGS: Call 1300 888 225, email info@odysseytravel.com.au or visit www.odysseytraveller.com
INCLUSIONS: Accommodation in lodges, gers and camp, all meals, internal flights

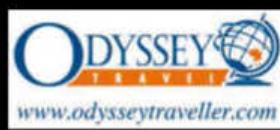
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We head to Coolatiai in northern NSW for an unusual vintage tractor pull event.

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REWIND
In 2002 Eric Philips and Jon Muir skied their way to the North Pole.

OUT BACK

TRAVEL & DESTINATIONS, YOUR SOCIETY, YOUR AG



Volcanic crater lake.
Mt Pinatubo on Luzon, the largest island of the Philippines.

DESTINATION HIGHLIGHT: PHILIPPINE ISLANDS

A world of islands

A dramatic volcanic landscape of bountiful biodiversity makes for an island hop experience like no other.

MORE THAN 7000 islands, making up the Republic of the Philippines lie between the South China Sea and Philippine Sea, arranged in a shape that resembles a baby sun bear with its head thrown back, sneezing at Taiwan, its outstretched claws nearly touching Borneo.

This archipelago is a series of island arcs formed by various incidents of subduction, when the Earth's tectonic plates collide and one slides under another into the mantle. The mythical explanation is a foot-stomping fight over pearls between a couple of ancient giants, Angalo and Angarab.

The Philippine Islands' collective coastline of 36,289km is virtually the same as that of mainland Australia and

Tasmania, with the exception of a few hundred kilometres, yet their total land area is just 3.9 per cent of Australia's.

Due to the extent of its tropical rainforests, rich volcanic soil, physically isolated ecosystems, and the fact that only about 2000 islands are inhabited, the Philippines is one of the world's top 10 most biologically megadiverse countries, with more than 270 endemic species of birds and mammals.

Its 2.2 million square kilometres of maritime waters are part of the Coral Triangle, and in 1993 marine and bird sanctuary Tubbataha Reefs Natural Park was declared a World Heritage Site.

S OF THE BEST PHILIPPINE ISLAND WONDERS

1 KAYANGAN LAKE
Coron Island lies 310km south-west of Manila. The dramatic vertical crags of its limestone karst are visible below the surface of this crystal clear freshwater swimming lake.



2 MAQUINIT HOT SPRINGS
Soaking is encouraged in the 41°C mineral-rich waters of the nation's only known saltwater hot springs. Also on Coron, the springs flow into seaside pools bounded by mangroves.

3 PUERTO PRINCESA RIVER
Palawan has one of the world's longest underground rivers. A section of the Cabayugan River stretches for 8.2km in the St Pauls Underground River Cave. From the cavern's mouth, visitors are paddled upstream in canoes.



4 CHOCOLATE HILLS
Spread mainly over 5000ha of Bohol Island are 30–120m tall mounds, the result of eroded coral deposits. The vegetation browns in the dry season, hence the name.

5 MOUNT APO
The country's tallest peak is a 2954m-high volcano on Mindanao Island. A summit hike exposes walkers to a diversity of forest types and a chance of sighting the endangered Philippine eagle.





Ocean escape. Beautiful Coron Island in the northern part of the Philippines' Palawan province is managed by the Tagbanua tribe.

SOUTH-EAST ASIA ADVENTURE

Odyssey of the Seven Seas

Experience the little-explored island archipelagos of the East Indies on this special AG Society and APT expedition cruise.

STORY BY ELSPETH CALLENDER

TAWAU'S fishmongers now have our faces on their phones. A sea of heads had already turned before we reached the shade of the wet market and – with the smell of fresh seafood in my nose and a few Bahasa Malaysia phrases to exchange – the next hour was spent posing and holding prize catches.

The 25,000-island region of the Malay Archipelago, also known as Maritime South-East Asia (or, to European colonials, the East Indies), has been explored, exploited, travelled and traded with by outsiders for centuries. So when I began my cruise aboard MS *Caledonian Sky* from the Philippine port of Manila – a capital region with a greater population of 12 million – I didn't expect anyone to be surprised to see us.

Days of pinballing through the islands of the Philippines, Malaysia and Indonesia, however, has spawned experiences to rival those of British naturalist Alfred Russel Wallace during his 1854–62 research for his book *The Malay Archipelago* (see AG 96).

And actually, formal meals, elegant service and plush cabins aside, we're technically on an expedition too.

At only 90.6m long and 15.3m wide with a draft of 4.2m, MS *Caledonian Sky* can sail minor channels and pull up alongside small ports. Its fleet of Zodiacs allows easy access to beaches and to the small jetties that jut out over shallow reefs surrounding the region's many coral islands.

The ship's passenger capacity is 114 and our crew of about 75 includes a team of ecologists, naturalists, an ornithologist, an archaeologist and expedition leaders. Daily onboard lectures range from an introduction to sea life we might encounter while snorkelling to the more weighty migratory history of the Malayo-Polynesian peoples over the past 5000 years and the unique burial practices of Indonesia's Tana Toraja (just before we overnight there).

After a few days of bustling ports, central city markets, popular tourist sights and animal sanctuaries in the Philippines and Malaysian Borneo, the Zodiac ties are loosened and the



itinerary becomes flexible. Being a novelty to the people of Tawau – a town of more than 100,000 people and the third-largest in Sabah, the eastern-most state of Malaysian Borneo – marks, for me, the true start of our expedition experience.

The following day the ship slips into Indonesian waters, assumes a drifting position off Kakaban Island and we Zodiac ashore to snorkel in its brackish lake among jellyfish that have evolved to be stingless.

The mangrove-fringed circumference of the 22ha nature reserve of Birah Birahan Island is ripe for exploration the next day, and the ornithologist has to be practically dragged away from it. We then have the 2000ha Samboja Lestari wildlife sanctuary near Balikpapan almost to ourselves, and, across a narrow moat, watch a magnificent male orangutan observe us as he audibly destroys an enormous coconut.

Our course criss-crosses the Wallace Line – a hypothetical faunal boundary Wallace drew in 1859 distinguishing Asiatic species from those of Australian origin. He and Charles Darwin co-discovered the theory of evolution by natural selection, but Darwin was the first to present supporting evidence. Wallace's book on the Malay Archipelago, still in print, was originally subtitled *The land of the orang-utan, and the bird of paradise. A narrative of travel, with studies of man and nature.*

But our journey feels far more conducive to interaction than study. We're welcomed to Pare Pare, in Sulawesi, by energetic dancers in shiny red and yellow suits who brighten up the concrete dock like spilt lollies.

On Balobaloang-besar, in the Sabalana Islands, someone invites me to look inside their house and somebody else gets annoyed when I don't give them my scarf. Lamalera whalers on Lembata Island help land our Zodiacs onto their beach in a heavy swell, before the villagers share food, dance with us, make rope and harpoons, and demonstrate age-old and still sustainably practised



Seven Seas sights. Clockwise, from top left: Orangutans steal the show at the Samboja Lestari wildlife sanctuary in Balikpapan, Indonesia; local fishers simulate the traditional practice of whale harpooning at Lembata Island, Indonesia; vibrant rice paddies and rural dwellings on Flores Island; a welcome dance at the dock in Pare Pare, Sulawesi; traditional houses in Ke'te Kesu, Sulawesi; expedition vessel, MS Caledonian Sky.



Snorkelling off Kepa Island, I watch a sea turtle pass in the calm silence of submersion.

whale-hunting methods. People are constantly surprised at being greeted in their own language.

In the town of Kalabahi, on Alor Island, women with betel nut red lips laugh openly at my height. When I straighten up so my head and shoulders are above the market's tarps, one of them nearly chokes. That afternoon it's like a time warp, arriving at Latifui Village to find people in traditional costume already dancing the lego-lego in a circle, muscular arms around each other, with the metal rings on the women's ankles crashing on the beat like waves on a rocky beach.

Snorkelling off Kepa Island later

that day, I watch a green sea turtle pass in the calm silence of submersion then surface to an amplified call to prayer. Local kids have paused their beach soccer game for the spectacle of many floating bodies draped across colourful pool noodles; something they don't see every day. Someone from the ship strikes up a conversation with the kids. I buy a piece of fruit.

This constant exchange continues until we arrive in Darwin, and I'm left thinking about the countless conversations I've had with the many different peoples of these varied islands – experiences that will stay with me long after my bags are unpacked. **AG**



SOUTHEAST ASIA EXPEDITION

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- Day 4. Puerto Princesa, Palawan
- Day 5. Sandakan
- Day 6. Semporna, Pom Pom Island
- Day 7. Kakaban
- Day 8. Birah Birahan, Sangatta River
- Day 9. Balikpapan
- Day 10. Pare Pare, Torajaland
- Day 11. Torajaland
- Day 12. Sabalana Islands
- Day 13. Rinca Island
- Day 14. Ende, Flores Island
- Day 15. Lamalera, Lembata
- Day 16. At sea
- Day 17. Depart at Darwin



Timor-Leste You are welcome!

Timor-Leste is a must-visit destination
for all discoverers, adventurers
and intrepid travellers.





JUST ONE HOUR NORTH of Darwin by air, Timor-Leste (East Timor) is blessed with natural scenic beauty, colourful events, a unique culture and friendly people.

Dili, the capital, is the entry point and home to about 20 per cent of the country's one million people.

Nestled into the base of the surrounding hills and looking out to the sparkling waters of the Wetar Strait, this little city shows all the signs of a bustling and dynamic centre and yet manages to retain a laid back atmosphere where people still have time to savour life and smile. Dili's youthful energy is contrasted with Portuguese features harking back to colonial times, like the villa-lined beach roads, the former colonial garrison and the waterfront Motael church.

New resorts and tourism facilities are being developed all the time and you will find myriad accommodation options, a wide range of restaurants, both modern and traditional, shopping, bars and entertainment. There are plenty of attractions to visit close by. A white sandy beach in Area Branca is a perfect location for those who like to spend a day relaxing by the water. World class diving and snorkeling opportunities await offshore with the ever-visible Atauro Island a favourite spot for visitors.

For a perfect weekend brunch you can drive up into the hills to enjoy stunning views of Dili and savour some delicious Timorese coffee at the Dare Memorial Museum and Café. Here there is a monument commemorating the Australian soldiers who fought in Timor-Leste during World War Two and their Timorese 'kriados' or 'helpers/friends'.

Timor-Leste has a strong and unique cultural heritage reflecting many influences: traditional beliefs inherited from ancient times; five hundred years as a Portuguese colony; the impact of World War Two; the more recent Indonesian invasion and Timorese resistance; the role of the Catholic Church and the impact of other minority groups such as Chinese traders.

Beyond Dili there are many special places to see. On the eastern tip is the Nino Konis Santana National Park with its offshore jewel, Jaco Island. This area's pristine terrain with white sand and crystal clear water has been described by visitors as "a true tropical paradise".

The island is open to visitors in the →



Advertising Promotion

daylight hours and can be reached by small local boats at a cost of US\$10 for the round trip.

Here, and in many other locations around the country, there is kilometre after kilometre of untouched coral reefs, offering some of the most intensely beautiful diving in the world.

In the western part of the country, for those who like to soak in natural hot springs, Bobonaro offers the perfect European style pool for a sauna and bath.

Also located in the west is the village of Balibo, familiar to many Australians because of the movie of the same name, which documented the lives of five Australian-based journalists who died during the Indonesian invasion sixteen years ago.

Here, within the grounds of a 350 year-old Portuguese fort complex, is the recently opened Balibo Fort Hotel and Cultural and Heritage Centre. Sitting high in the hills overlooking the village of Batugade and offering a spectacular view of the Banda Sea, this new accommodation with a modern restaurant is at the heartland of colourful local attractions and set to be a popular tourist destination for years to come.

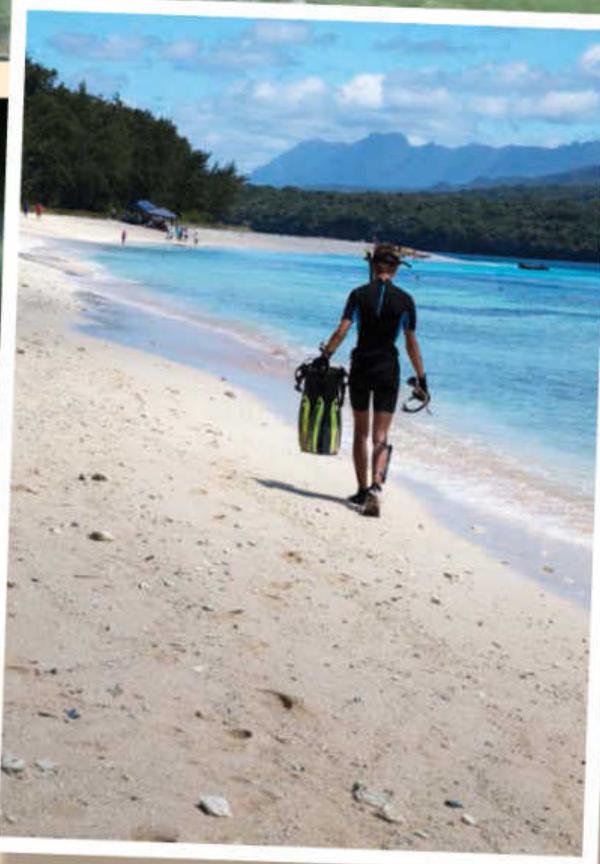
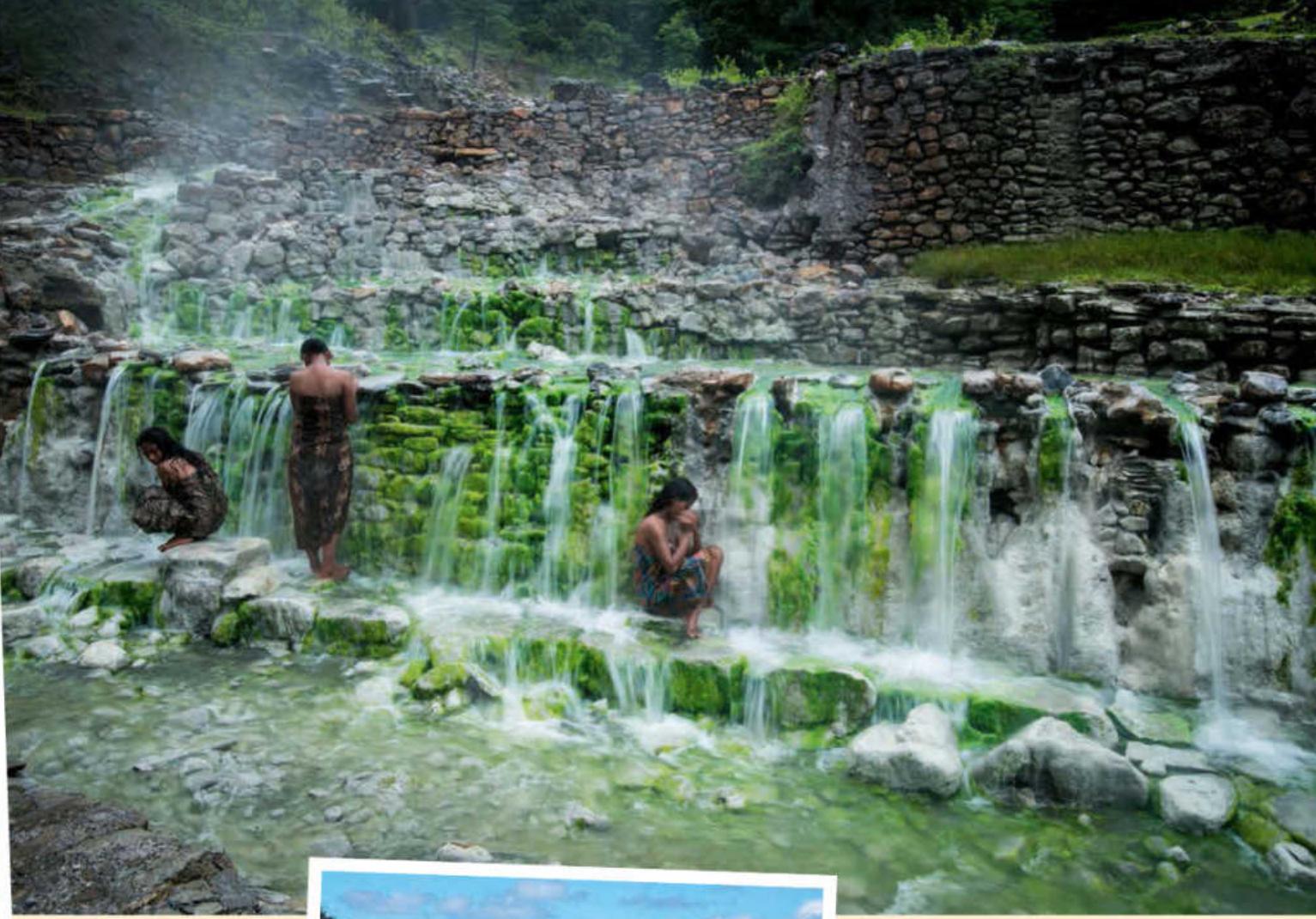
Tourism is fast becoming an important pillar of Timor-Leste's growing economy and through the Ministry of Tourism, Art and Culture [MTAC] the Government is investing in improving services and upgrading infrastructure.

AS A PART OF the Ministry's program to encourage visitors, Timor-Leste hosts a range of international events throughout the year including the Dili Peace Marathon, the Tour de Timor (a very challenging bike race) and a variety of international cultural events.

This year Tour de Timor was held in September. Famed for its smooth seaside rides, gruelling climbs, spectacular mountain views and unprecedented crowd support, riders were treated to a rare and special insight into Timor's unique geography, environment, people and culture. Why not plan to ride in 2016!

With the use of English growing [around 25 per cent] and a currency based on the US Dollar, Timor-Leste is not a difficult place to navigate for Australians. There are also many excellent operators conducting tours and offering services as drivers and guides. Beautiful crafts, artworks and hand woven tais are souvenirs to remind you of your unforgettable experience and they make perfect gifts. Timor-Leste has much to offer with its white sandy beaches, beautiful mountains, hot springs, fascinating culture and welcoming people.





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COOLATAI

A mysterious feline and a vintage tractor pull attracts the curious to the small village of Coolatai in northern NSW.

STORY AND PHOTOGRAPHY BY MANDY MCKEESICK



ENTER ANY SMALL town in Australia and you will feel eyes upon you. Usually it will be the patrons at the local pub who may make you feel akin to a penguin in a polar bear colony, but drive through Coolatai after dark and you may catch a mysterious red-eye glow from an entirely different creature.

If local legend is to be believed, that creature could be a black panther. Although big black cats have long been part of Australian folklore, panther-mania first took hold in Coolatai in 1958 after 13-year-old David Wheatley was thrown from his horse when it spooked at a "large black-furred, panther-like beast".

The incident made national headlines. Another local claimed he was "trapped" in his caravan as the animal prowled the perimeter, and over the years irregular sightings persisted. In 1995 a local 'expert' declared the panther lived around Coolatai and made an annual migratory pattern around the north-west of the state.

Today, panthers adorn the entrance signs to the village, and at the only commercial outlet, the Wallaroo Hotel, you can see a depiction of the feline locked in mortal combat with one of the area's feral pigs. But with the panther only providing sporadic distractions, the residents of Coolatai turned their attentions to another form of entertainment – a vintage tractor pull.

"When I first proposed the idea of holding a tractor pull I had two main problems," organiser Chris Gooda says, laughing. "The competitors wanted to know 'Where the hell is Coolatai?' and the locals wanted to know 'What the hell is a tractor pull?'" For the competitors it was a fair question. Situated among rich cropping and grazing land on the north-western slopes of NSW, Coolatai is 640km north-west of Sydney and 380km south-west of Brisbane. You might say the middle of nowhere; to the residents it is the centre of everything.

Coolatai's population is 38, if everybody is at home, and from the surrounding district comes a dedicated group of people who contribute to a thriving community. The fact that they didn't know what a tractor ▶

Case in point. Enthusiasts (right) and a selection of vintage agricultural machinery.



Generation game. Father-and-daughter team Rick and Lucy Nelson (above top) prepare for the competition on their Case LA. Vintage goods (above) are displayed at the tractor pull.





Coolatai cats.
Black panthers adorn the entrance sign to the township (left). Bonnie the dog (below) competes in the Trixie Durkin Memorial High Jump event.



Grind and wind.
A collection of axes (left) forms part of displays around the sidelines. Jeff Gooda (centre left) with his rabbit trapper display. Tim Scanlon (above centre) winds the wheel as Mick Graham shears using the antique hand-powered shearing plant.



Harvest history. An 1860s Meadowbank stripper owned by Peter Venables is another machine on display – draught horses once pulled it to harvest crops.

BEARINGS: COOLATAI

Population: 38

Major industries: livestock, cropping

Closest large town: Warialda, 40km south

Panther population (in art form): 7

Number of tractors at pull week: 50+

Oldest tractor: 1914 International Mogul

For more information: 'Coolatai Vintage Tractor Pull' on Facebook

pull was did not deter them from holding one, and, in 2010, despite the torment of a lingering drought, the inaugural Coolatai Vintage Tractor Pull attracted more than 40 tractors and bulldozers and their committed owners. From there the event has grown, and each May competitors and spectators from across Australia descend for a weekend of genuine country hospitality. "Essentially a pull sees tractors of similar horsepower compete to pull a concrete-laden sled," Chris explains, "and for vintage machinery enthusiasts, this is great sport."

Gavin Walker, who grew up on a neighbouring station, returns each year to compete. Spend some time with him and his tractors and you will soon see why. "This little darling is my Dexta," he says as he guides you past a 1959 27HP Fordson Dexta. "And this is my diesel mobility scooter, a 1966 57HP Chamberlain 306, and this is Mrs Mack, my ol' 1988 Valueliner truck – the last of the good ones." Passion rings rich in his booming voice.

As Gavin lines up to have the Dexta chained to the sled, another character loud of voice and colour hops along on his wooden leg, twirls his handlebar moustache and impresses the crowd with his encyclopaedic knowledge of all things tractor. This is Ian Haycock, aka the 'Sergeant Major'. "This is how life should be," he enthuses. "Look at the family spirit of this community, everyone is involved whether they like pulling or not. The local Red Cross branch is here providing lunch; the crafty ladies are selling their handiwork and just wait till the Sportsground Committee lights up that big bonfire tonight."

Family is a big part of any rural community, and Chris regularly invites his brother and fellow machinery devotee, Jeff Gooda, to the show. Jeff hails from

the Riverina, and, as well as dragging tractors halfway across the state, he also comes with an authentic rabbit trapper's truck, which he parks among displays of yesteryear. Next to the rabbit skins a sheep is shorn using a hand-powered plant, a lovingly restored 1937 Dodge shines brilliant blue in the afternoon sun, a team of Clydesdales hauls a plough, and a blacksmith demonstrates how a cart wheel was fitted to its wooden spokes. Through it all, a border collie works half-a-dozen ducks and a four-year-old boy.

"Not everyone gets excited about tractors," Chris admits, "and so we make sure we have something for all the family. There is a jumping castle and an animal nursery for the kids, a blind lawnmower obstacle course, boot throwing and a multitude of market stalls."

Deanne Skinner has been attending the tractor pull for years as she helps her mother on a popular fruit-and-vegetable stall. But, much to her mother's frustration, she spends a great deal of the time socialising and enjoying the carnival atmosphere. "Last year I got to polish the big John Deere, and this year my dog came third in the fancy dress, and we won the mini-dog jumping competition," she says with a bubbly laugh. The fact that she won the mini-dog jump with a koolie says more about the Sergeant Major's rubbery judging methods than the skill of the dogs involved.

Anyone is welcome at the Coolatai Tractor Pull. For the princely sum of a gold coin donation you too can join the fun, and camping on the hillside or by the creek is free. Full and happy after a night with the locals around the monster bonfire, you can wander off to bed at your leisure...but beware of red eyes watching from the undergrowth. You wouldn't want to spark another round of panther-mania. **AG**

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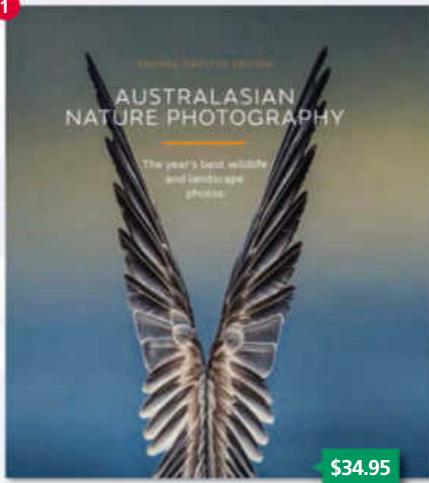
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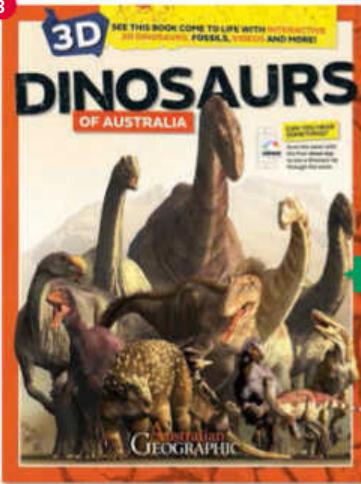
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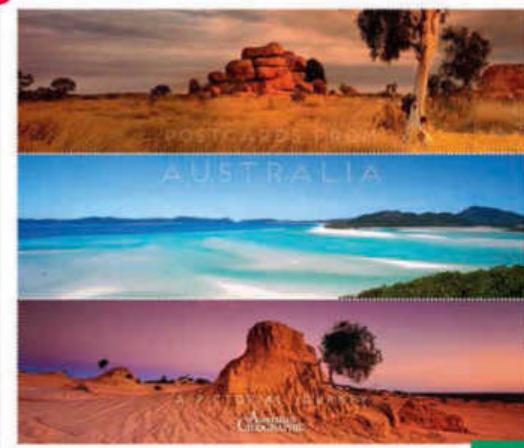
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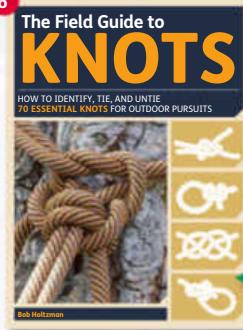
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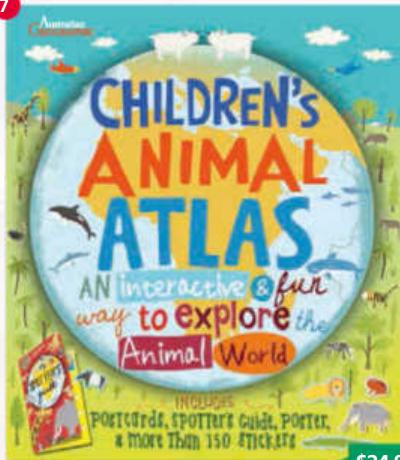
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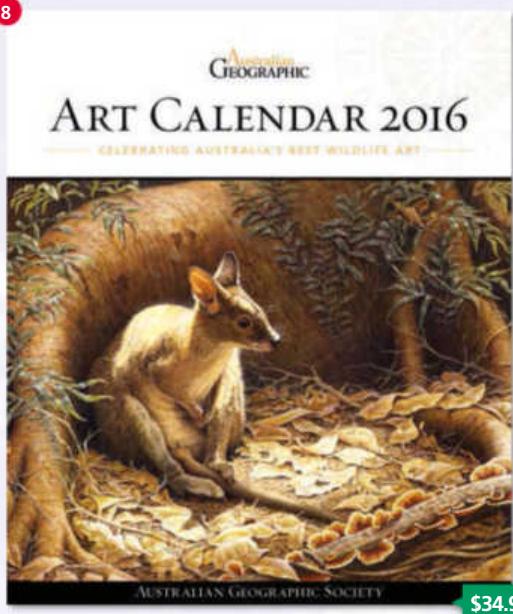


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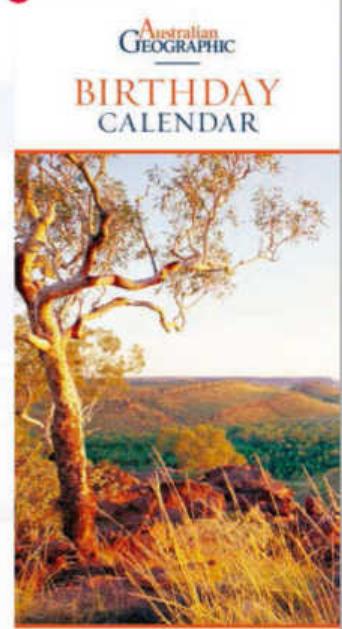
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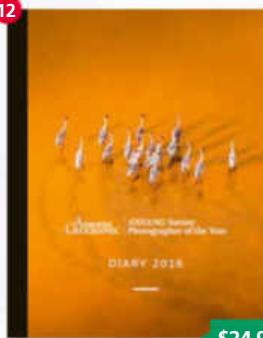


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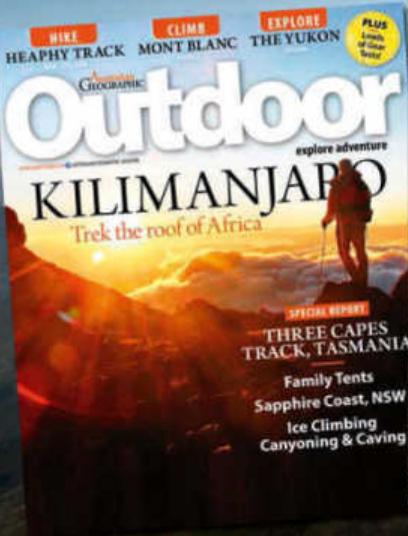
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THE AWARD GOES TO...
Meet this year's winners.

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SNUBFIN SUPPORT
Australian dolphin needs your help.

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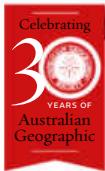
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YOUR SOCIETY



AUSTRALIAN GEOGRAPHIC SOCIETY NEWS & INITIATIVES

A
G
SOCIETY
2015
GALA
AWARDS



True spirit. Guest speaker Jessica Watson was Young Adventurer of the Year in 2010.

2015 AGS Gala Awards

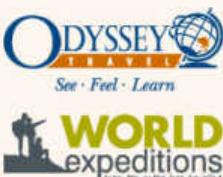


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THE ANNUAL AG Society Gala Awards took place on 28 October at Doltone House in Sydney, hosted by Catriona Rowntree. With an exuberant audience of more than 300 people, we kicked off AG's 30th birthday celebrations in style.

Throughout the evening, we honoured Australia's best in the fields of conservation and adventure; despite the fine threads on display, it was a night that celebrated giving things up – such as time, money and comfort. From a businessman who donated more than \$5 million to environmental causes, to the persuasive crusader who convinced his town to shun commercially bottled water, this year's awardees are all examples of how making a difference is a part-personal, part-public journey.

We were inspired by the achievements of all our worthy winners and continue to be awed by Jessica Watson, our special guest speaker on the night. Jessica's 2010 solo sail around the world at the age of 16 stands as one of the great feats of Australian adventure and we were thrilled that she was able to share her journey with us all so vividly.

FIND more information, film clips about the winners and photos from the night on our website: www.australiageographic.com.au/society

AGS GALA AWARDS

And the winners are...

CONSERVATIONIST OF THE YEAR: TIM FAULKNER



MANY WILL RECOGNISE this environmentalist from his TV show, *The Wild Life of Tim Faulkner*, which airs on Channel 9 and the National Geographic Channel, and has a global audience of 180 million people each series. But Tim has also led an initiative to reverse the extinction rate of small mammals on the Australian mainland, through the reintroduction of Tasmanian devils to NSW. As general manager of the Australian Reptile Park and Devil Ark, a large conservation breeding facility for Tasmanian devils in NSW's Barrington Tops, he has also played a pivotal role in efforts to curb the extinction of the Tasmanian devil itself (see AG 105).

SPIRIT OF ADVENTURE HUW KINGSTON



AVENTURER Huw Kingston undertook an AGS-sponsored 14,000km circumnavigation of the Mediterranean Sea by foot, kayak, ocean rowboat and bicycle in April 2015 (AG 125). Beginning and ending at Gallipoli in Turkey, the 12-month, 17-country journey was planned to mark the Anzac Centenary. Huw also used the trip as a fundraiser for Save the Children Australia. His efforts attracted so much attention that he became the charity's most successful individual campaigner ever.



YOUNG CONSERVATIONIST OF THE YEAR: AMELIA TELFORD

AMELIA TELFORD, a 21-year-old Bundjalung woman who grew up on the NSW north coast, had planned to study medicine after high school. Instead, she joined the Australian Youth Climate Coalition, and in July 2014 founded Seed (see page 33). This network of young Aboriginal people provides access to training and support for those keen to

make a difference in the areas of climate change, sustainability and conservation. In 2014 Amelia was named as the joint NAIDOC (National Aboriginal and Islander Day Observance Committee) 'youth of the year'. Many Aboriginal communities are facing the loss of sacred country and culture, says Amelia, and are feeling the effects of environmental degradation.

ADVENTURERS OF THE YEAR JOHN JACOBY, CHRIS PORTER, ANDREW MAFFETT AND JIM BUCIRDE



THESE MEN WERE all experienced sea kayakers, but their previous expeditions were nothing compared with their circumnavigation of the subantarctic island of South Georgia in January (see page 80). Their 500km paddle around this wilderness oasis, which lies 1500km north-east of the Antarctic peninsula, saw them encounter massive icebergs, powerful ocean swells and ferocious

storms. They were fortunate to experience some clear weather, however, and completed their journey faster than the three teams who had circled South Georgia previously. Having made such good time, they then traversed the island – following in the footsteps of Sir Ernest Shackleton, who'd landed there in 1916 – and are the first team to have completed both a crossing and circumnavigation of the island.




**LIFETIME OF ADVENTURE
ERIC PHILIPS OAM**


WHEN PRINCE HARRY began recruiting explorers for his 2013 Antarctic expedition Walking with the Wounded, Eric Philips was top of the list. Now Hobart-based, Eric is the only person to have skied across Earth's four largest icecaps – Antarctica to the South Pole, Greenland, the South Patagonian Icecap and Ellesmere Island. His 84-day journey to the South Pole pioneered a new route through the Transantarctic Mountains. His expeditions have featured in three internationally screened documentaries, most notably the Emmy Award-winning film on Greenland, *Chasing the Midnight Sun*. Along with adventurer Jon Muir, Eric was part of the first Australian team to reach the North Pole unsupported, and to ski to both the North and South poles.

**LIFETIME OF CONSERVATION
ROBERT PURVES AM**


MORE THAN A decade ago, Robert Purves AM sold his shares in a publicly listed radiology and aged-care company to raise \$10 million and establish the Purves Environmental Fund. The organisation now donates \$2 million annually to champion environmental sustainability and biodiversity. Robert has also personally donated more than \$5 million to environmental causes. Just as importantly, he gives up much of his time to make the planet more sustainable: he is the current president of WWF Australia, a founding member of The Wentworth Group of Concerned Scientists and a director of Earth Hour Global. He is also a director of the Climate Council of Australia, a patron of the Lizard Island Research Station and a governor of the Australian Youth Climate Coalition.

YOUNG ADVENTURER OF THE YEAR DANIELLE MURDOCH

IN 2010 DANIELLE Murdoch became the first recipient of the AGS Nancy Bird Walton grant for female adventurers (AG 101). With the support of the AGS, Danielle travelled by motorcycle from Brisbane to Darwin, before transporting her bike by ship up the Indonesian archipelago. After crossing Sri Lanka, India and Pakistan, she made her way across the Middle East attempting to avoid conflicts along the way. Starting in Egypt, she then motored down the east coast of Africa, where she broke down and had to be towed 760km by another motorcyclist to the nearest mechanic. In October 2014, four years after she'd left, Danielle completed her epic journey and surrendered her broken motorcycle to customs at Victoria Falls, Zimbabwe. Her journey spanned 24 countries and she weathered eight breakdowns along the way.


SOCIETY FUNDRAISER

Support our snubfin
Australia's own dolphin species needs help.



HELP US TO protect one of our rarest marine mammals – the Australian snubfin dolphin. It's thought there could be fewer than 10,000 adults of this highly sociable marine creature left, mostly in small populations along Australia's northern coastline. To ensure the future of this unique species, which was only identified in 2005, we need to understand more about its natural history and protect its habitat from increasing human impact. Your donation will provide much-needed funds for two crucial research and conservation projects: a study by Southern Cross University's Capricorn Cetaceans Project and the campaign by the Mackay Conservation Group to save snubfin and seagrass habitat along the central Great Barrier Reef.



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HERON ISLAND RESORT

DATE:
12–16
November
2015



SOUTHEAST ASIA ADVENTURE

DATE:
16 June
2016

WHO: Heron Island Resort **COST:** From \$2060pp
BOOKINGS: 1300 731 198 or go to www.heronisland.com

Join the AG Society expedition to Heron Island in November 2015 and witness the spectacle of nesting turtles. Heron Island is famous for its spectacular coral reef and you'll learn about the crucial conservation efforts being made to protect green and loggerhead turtles, and assist with monitoring the health of the surrounding reef. With plenty of tours and guided bird walks, nature is at your fingertips.

WHO: APT Small Ship Expedition Cruise
COST: From \$11,995pp **WHEN:** June 2016 (17 days)
BOOKINGS: 1300 278 278 or www.aptouring.com.au/southeastasia

A once-in-a-lifetime adventure awaits on this expedition from Manila to Darwin. Explore the Philippines, Indonesia and Borneo. Discover the unique ecosystem of Puerto Princesa, encounter Borneo orangutans and be intrigued by a fascinating overnight stay in Torajaland. On board, enjoy an all-inclusive lifestyle and the services of an expert expedition team.

AG SOCIETY SCIENTIFIC EXPEDITION

TASMANIAN DEVILS SURVEY

Join us in the Arthur River region of north-western Tasmania.



WE RETURN for a third season of field work with University of Tasmania scientists Dr Menna Jones (former AGS Conservationist of the Year) and Professor Chris Johnson. The Arthur River is one of the last areas still untouched by devil facial tumour disease (DFTD), and Menna's study aims to detail the changes that occur as the disease moves through. Volunteers will assist with field work including trapping, species counts and vegetation surveys, and enjoy visits to the nearby wild coastline.



WHEN: 5–12 March 2016 **WHO:** Curious Traveller
COST: \$3630pp (twin share); AGS members \$3300; return volunteers \$3080
BOOKINGS: For more info and to reserve a place call 03 6234 4918, visit www.curioustraveller.com.au or email: info@curioustraveller.com.au.

MAILBAG WELCOMES FEEDBACK

Send letters, including an address and phone number, to editorial@ausgeo.com.au or to Australian Geographic, GPO Box 4088, Sydney, NSW 2001. Letters will be edited for length and clarity.

Edited by Lauren Smith

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COMPETITION
Win a copy of the BBC's *Life Story*, one of David Attenborough's latest productions.

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TALKBACK
Your social media comments on our stories.

YOUR AG

FEEDBACK, READER PHOTOS, BOOK REVIEWS & ASK AN EXPERT

YOUR PHOTOS

Winged jewel

by Richard Flesdar

The sweet stuff euphorbia flowers contain must be pretty good because these little native bees just love them.

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FIRST TO FIND

My attention was caught by *Adventure in the Alps* (AG 126). It reminded me of the activities of my great uncle Stewart Ryrie, who journeyed in the Alps in 1840. Following discussions with Governor Gipps in 1839, he proposed to explore, map and report on an unknown area south of the Moruya River, NSW, and east of Port Phillip Road, Victoria. During nine months, he crossed nearly 2500km of unmapped territory in the colony's south-east before narrowly



missing an appointment with fame. At the time, nobody knew which Australian mountain was highest. Stewart strode to within 30 minutes

of the summit of a mountain that a month later was climbed by Polish explorer Paul Edmund Strzelecki and named Mount Kosciuszko.

Being a Scotsman, my great uncle might have called it Ben Nevis or Mount Durran.

JOHN S. RYRIE, VAUCLUSE, NSW

COUNTING UP

Hugh Mackay's commentary piece *Being a good neighbour* (AG 127) hit the nail on the head. It was as if he was reading my mind. Also in that issue, *A lofty retreat* mentioned that the Dandenongs are accessible to almost one-quarter of Australia's population. There is a later reference to 4.25 million people "camped on the doorstep of these ranges". Australia's population is 23 million, so 4.25 million is less than one-fifth. Were different figures used to determine the one-quarter?

KEN COWEN, BILOELA, QLD

Editor's note: The one-quarter refers to the population of Victoria, while the 4.25 figure refers specifically to Melbourne.

CAT CAUTION

I live in the UK and have begun a project to decrease the impact of cats on wildlife. It was refreshing to read your article *Natural born killers* (AG 113). Cat owners here don't want to hear the truth. Part of my plan is to highlight the dangers of *Toxoplasma gondii*, a parasite hosted by cats that can pass to people who come into contact with their faeces. The parasite can cause a range of conditions with long-lasting impacts. If enough people object to their gardens being used as toilets, owners would have to take responsibility – hopefully making owning a cat a less attractive proposition.

BARRY CUTHERBERT, UNITED KINGDOM

A QUESTION OF ACCESS

I have hiked and camped in Victoria and southern NSW for decades. You published a story in AG 127 (*Riding high*) that promoted horse treks in the High Country and Alpine National Park, and I found this disappointing. The AG Society supports national parks and ecological science projects. It equally supports just plain human adventure. On the surface this activity may appear to offer both, but I don't think it's an activity to be promoted.



NEED TO KNOW

WITH DR KARL KRUSZELNICKI

PENICILLIN

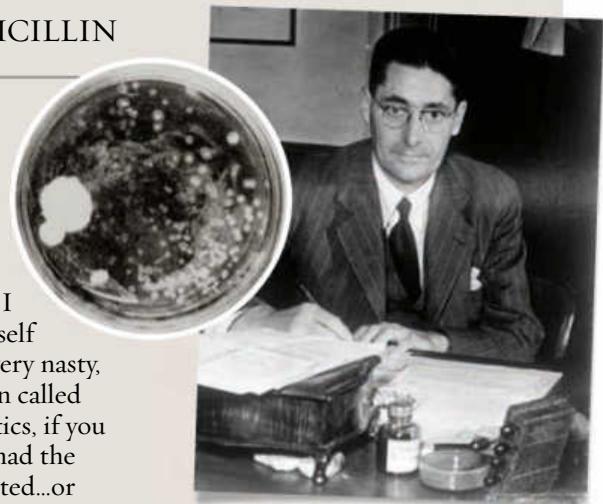
IF IT WASN'T for the antibiotic penicillin, I would have lost both hands and one foot. Working in various jobs over the years, on three separate occasions I have accidentally cut myself and suffered bouts of a very nasty, rapid-spreading infection called cellulitis. Before antibiotics, if you had cellulitis you either had the area of infection amputated...or you died. But penicillin meant I still have two arms and two legs.

Sulfonamides, the first antibiotics, became available in the early 1930s. Unfortunately, they worked only moderately well, and sometimes had nasty side effects.

Soon, an even better antibiotic appeared – penicillin, the 'Magic Bullet'. Back in 1928, British researcher Alexander Fleming had returned from a two-week holiday to find the now-famous "clear spot" on a dish of bacteria (an accidental fungal infection had killed the bacteria). But Fleming was notoriously poor as an author and communicator – and word of his discovery spread very slowly.

Enter Howard Florey. He was born in Adelaide in 1898 and excelled in his medical studies. By 1931 he was a pathology professor in the UK. In 1938 he and his colleagues read Fleming's paper about *Penicillium notatum* and how the mould could kill bacteria.

By 1941 Florey's team had made enough penicillin to treat their first human patient – Albert Alexander, a postmaster who had been scratched by a simple rose thorn. It carried a nasty bacterium that spread rapidly through the



Life-saver. Howard Florey shared the 1945 Nobel Prize in Physiology or Medicine for his role in developing penicillin.

superficial layers of his skin. By the time he was treated by Florey's team, his whole face was red, hot, swollen and tender. One eye had been removed and the other had been lanced to relieve the pain.

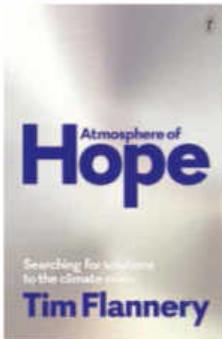
Alexander was given what was then the entire world supply of penicillin and began to recover. But when the penicillin ran out he relapsed.

Some of the drug was recovered from Alexander's urine, readministered to him and again his condition improved. But when the penicillin ran out a second time, he died.

Florey's team then concentrated on children, who needed smaller doses. And they learnt how to make huge quantities of penicillin. Since then, such antibiotics have saved more than 80 million lives – and three of my four limbs.

DR KARL is a prolific broadcaster, author and University of Sydney physicist. His new book, *House of Karls*, is published by Pan Macmillan. Follow him on Twitter at: twitter.com/DoctorKarl

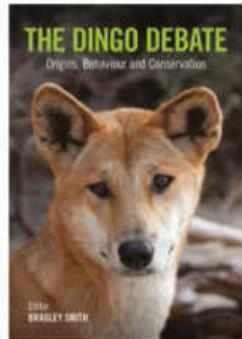
AG'S BOOKSHELF



Atmosphere of Hope

TIM FLANNERY, TEXT
PUBLISHING \$29.99

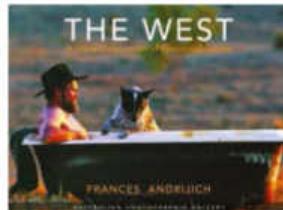
Tim Flannery, head of the Climate Council of Australia and an AG Society adviser, covers the progression of climate change, and, more importantly, some solutions to the problem. He discusses renewable energy schemes, differing opinions on nuclear, solar and wind power, and geo-engineering. In light of growing fears that climate change spells the end of humanity, Tim seeks to bring clarity and hope to the issue by turning the debate towards the ways that society can fix the problem.



The Dingo Debate: Origins, Behaviour and Conservation

BRADLEY SMITH, CSIRO
PUBLISHING \$39.95

Australia's most controversial animal, the dingo, has a somewhat unusual story. Its existence has been shaped by human interactions, from its origin as a semi-domesticated wild dog in South-East Asia, to its current status as an outcast under threat and nearing extinction. This book explains the dingo's plight – from its journey here and relationship with indigenous Australians, to its adaptations to the harsh environment and its survival against the rise of agriculture.



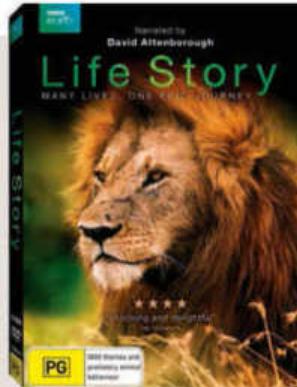
The West: A Visual Celebration of Western Australia

FRANCES ANDRIJICH, ECHO
PUBLISHING \$24.95

Award-winning AG photographer Frances Andrijich takes you on a journey through Western Australia in her photo book that celebrates the West's beauty and diversity. She explores outback, shoreline, urban and country themes, capturing depth and richness in each. From red dirt and pristine waters to remote communities and green Karri forests, this whimsical portrait of the West reminds us of the majesty of the Australian landscape.

Competition

We're giving away 10 copies of the BBC's *Life Story*, one of the grandest David Attenborough productions from recent years. Taking more than four years to produce, it follows the journey from birth to parenthood through the eyes of individual animals from 29 countries – such as a gosling that has to leap from a 120m-high cliff, and the orphan chimpanzee that makes its first friend.



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SYDNEY

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The world's largest short film festival showcases 16 films, each up to seven minutes long, all featuring the Tropfest Signature Item, which this year is 'Card'. More than 100,000 people are expected to watch at venues around the country.

When and where: 6 December, Centennial Park, Sydney

More info: www.tropfest.com



MELBOURNE

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Raising funds for seafarers' welfare services in Victoria, this is Australia's leading maritime art award. The prize draws attention to the lives and experiences of the world's 1.5 million merchant seafarers while showcasing maritime art.

When and where:

6–27 November, Mission to Seafarers Victoria, Docklands, Melbourne, VIC

More info: www.missiontoseafarers.com.au/anl-art-prize

AUGUSTA

AUGUSTA ADVENTURE FEST

The Act-Belong-Commit Augusta Adventure Fest is known as the world's biggest adventure race. It includes the Adventure Race, shorter MINI Adventure Race and a Junior Survivor challenge. For those who prefer spectating to cycling, swimming, running and paddling, there's also entertainment, a food market and bar.

When and where:

7–8 November, Augusta, WA

More info: www.rapidascent.com.au/augustaadventurefest/

HOBART

THE TASTE OF TASMANIA

There are cooking classes, sporting activities, children's rides, workshops and more at this celebration of Tassie produce.

When and where:

28 December–3 January, Hobart, TAS

More info:

www.thetasteoftasmania.com.au

YOUR PHOTOS

Flight of fancy
by Nathan Barden

I stumbled across nesting ospreys last winter in a Brisbane suburb. Being a photographer and keen ornithologist I later returned to investigate, and photographed one of them returning to the nest with a fish for lunch.



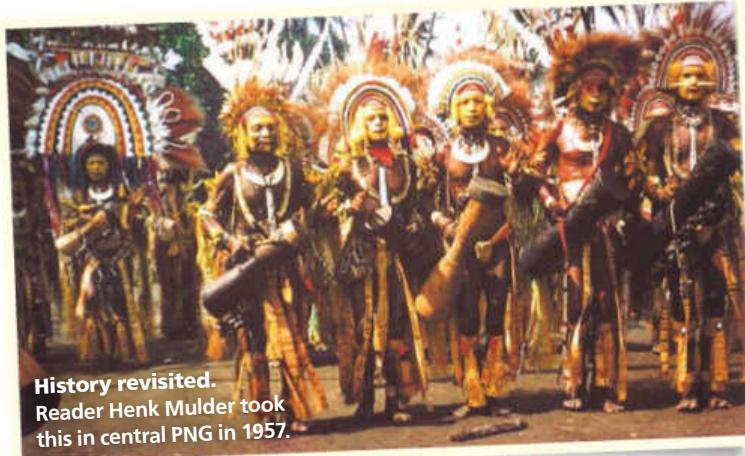
Defenders of national parks fought for many years to stop cattle grazing in these areas. A horse trek might have some claim to a macho historical charm, but it is hardly supporting the natural state of the environment. I cannot take a dog on a leash for a picnic, but a business can spend days damaging tracks and reintroducing feral weeds with many horses? There always needs to be a balance between protection and access. I don't believe there is a simple answer, or that one aspect naturally has priority, so we must keep discussing this dichotomy from time to time.

JEREMY WOOD, BONYTHON, ACT

SING-SING

I was going through old colour slides recently and found this one (below) of a sing-sing in Inauaia, in the Mekeo district of Papua New Guinea, in 1957, and it reminded me of your feature *Cultural conservation* (AG 120). I was posted in the district as an agricultural officer with my family, and lived in the community. This was my second job in PNG, having worked a few years on a rubber and cacao plantation in the northern district. I don't know why this sing-sing was held, but it's clearly an important event because six chiefs were there, watching on in regal outfits.

HENK MULDER, STANTHORPE, QLD



History revisited.
Reader Henk Mulder took
this in central PNG in 1957.

ESTUARY LIFE

I wanted to share these impressions from the boardwalk at Narooma, NSW.

*A toadfish flutters round the whelks
Hoping to find one on its back;*

*A heron peers and pecks, and daintily extracts
A baby soldier crab,
Carefully tossing to ensure the legs go rightways
down.*

*A four-leaf mangrove sprouts
Where none had grown before.*

*Somewhere up there the mountaintops are
crumbling –
Down here a slow accretion nurtures small
delights
And quiet satisfaction.*

LEITH DOUGLAS, DUFFY, ACT

POSTSCRIPT

In our Lat/Long on St Arnaud (AG 127), we said the 1611 King James Bible was the first to have numbered verses and be mass-produced. The Geneva Bible (published 1560) was in fact the first, and a 1608 edition is on display at St Arnaud's Bible museum.

ASK AN EXPERT

Show-off. Frill-necked lizards open their mouths to warn off predators, but do they yawn too?

GOT A
QUESTION FOR
AN EXPERT?

Email it to
editorial@ausgeo.com.au



Q I've seen birds yawn and wondered if reptiles yawn, or perform other bodily actions, such as sneezing or coughing?

MIKE ROBINSON, HELENSBURGH, NSW

A DR MARK HUTCHINSON, SOUTH AUSTRALIAN MUSEUM, SAYS:

Reptiles, like lizards and snakes, appear to yawn from time to time, opening their mouths widely for no obvious reason. Snakes often gape and work their jaws after feeding, but this seems to be more to do with getting all the moving parts within their very mobile skulls to settle back into place. When congested, or if the nose is stuffed up, they do make sneezing sounds that blow their nostrils free of congestion. And sometimes little spasms or twitches occur after feeding that might be hiccups (but I haven't seen a reptile experience the persistent hiccups that we sometimes do).

Some of these actions look similar to those that occur in people, but they are not necessarily the same physiological 'experiences'. I've not come across anything that suggests that when a lizard yawns or sneezes, it gives them the same feeling of relief (endorphins) that we experience. What another creature feels when they show a similar external symptom or behaviour to one of ours is always difficult to determine.

Q Why do cats rub against your legs?

GEMMA CALVERT, PERTH, WA

A DR GAILLE PERRY, VISITING LECTURER TO THE UNIVERSITY OF QUEENSLAND, SAYS:

Cats produce pheromones from glands around their mouth, chin, forehead and cheeks, as well as their flanks, tail and paws. They use these to mark their territory, and also to communicate friendly intentions, by headbutting and rubbing against one another. It is thought that, by rubbing on us, they are, in effect, 'marking' us as a member of their social group. This is instinctive behaviour, shown by both domestic and wild cats.



Talkb@ck



We shared stories about palm cockatoos on our website, Facebook and Twitter.

In Cape York, I spent time with one at camp while the boys were out fishing. They seem dominant in personality, but truly spectacular in colour, size and cleverness.

LEISA BUCKTON

I saw one on a trip to Cape York. I didn't know it was rare and the tour guide was really disappointed he missed it!

SUSAN PATTERSON

I saw many of these great-looking birds during my time as a ringer in the Gulf Country, back in the 1950s.

NEVILLE JEFFREYS

They bang the side of their hollow tree nest with a stick to announce their presence and communicate. Mad stuff.

TOM DAWSON

Black cockatoos are my favourite birds. I've planted some she-oaks and Daintree pines so that they might think of stopping over on their way past.

MICHELLE NIGHTINGALE

We were very lucky to see a couple on the dirt road in Cape York; so lucky to have had my camera ready, too!

JENINNE RIC JANSSEN



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Dust busters

RED DUST, GOLD HEART 68

SHOOTING SEVERAL features for us in the Northern Territory was a fantastic experience for new AG photographer Heath Holden. He snapped off this selfie, above, while writer Ken Eastwood concentrated on driving along the dusty, corrugated dirt roads on the way to Davenport Ranges National Park. "Shot opportunities at the Tennant Creek camp draft and rodeo were overwhelming – the mix of the dust, action and low lighting was difficult but made for beautiful shots," Heath says. "The challenge was not missing anything significant. But Ken [an AG veteran] communicated really well as to what he was focusing on, and the shots we needed to fit the story. Witnessing the diversity of locals out at Tennant Creek was also very interesting, Heath adds. "Spending time with them, hearing their stories and photographing them really was a dream. The Northern Territory is beautiful – you really don't know what is going to pop up until you go round the next bend."

ABOVE: HEATH HOLDEN; RIGHT: LUKE HANSON

Lord of the lens

A NATURAL BEAUTY 88

IF YOU'RE INTO bird photography then Lord Howe Island – a short flight from Sydney or Brisbane – is the perfect spot to get close to a wide range of different species, says AG's editor, John Pickrell, right. He had a series of close encounters with seabirds while he was covering our feature on the island's bushwalking and nature experiences. "I wasn't prepared for just how close we'd get to many species, such as red-tailed tropicbirds and masked boobies, which in some spots were nesting alongside or actually on the walking tracks." On one day, John went to the backyard of a local who was hand-rearing tiny white tern chicks that had been abandoned by their parents, or fallen from precarious nests on bare branches. "I was standing just a metre or so from these curious little chicks sitting on branches around the yard. It's rare that you get to enjoy being so close to wild animals, but the birds here seem to universally have very little fear of people."





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A frosty reception

PHOTOGRAPH BY ERIC PHILIPS AG 72, OCT–DEC 2003, PAGES 92–101

DURING A TWO-MONTH trek in 2002 across the frozen Arctic Ocean to the magnetic North Pole, Eric Philips had more to contend with than simply staying warm. He and fellow adventurer Jon Muir were equipped with the best insulating materials available, including face masks. But the air temperature was so cold – as low as -35°C – that their breath would form icicles at the ends of their noses and chins, and in their facial hair; personal de-icing became the first chore for the end of each day, once they were inside their tent. The journey saw Eric and Jon become the first Australians to ski to both the North and South poles. In the name of exploration, Eric has visited every continent on Earth, and his wanderlust has seen him decorated many times – in 1995 he won the AG Society Spirit of Adventure Award; he was presented the Medal of the Order of Australia for achievements in exploration in 2004; and, this year, the AGS honoured him with its 2015 Lifetime of Adventure medallion (see page 117).



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