

“Australian Rock Art links into a culture that is ongoing and represents one of the longest cultural traditions on the planet. It is amazing to be able to contribute to a research project of this stature” DR HELEN GREEN

“Helen is a worthy recipient of the KFA Fellowship. She’s such an exciting scientist for KFA supporters to follow.”

MARIA MYERS AC,
KFA CHAIRMAN

A ‘career scientist of exceptional merit, 29 year old Dr Helen Green is the recipient of a major 5-year Research Fellowship.

A new *Fellowship in Rock Art Dating* has been awarded to the Kimberley Foundation Australia who has bestowed it on Dr Helen Green, a post-doctoral scientist at The University of Melbourne and a member of the *Rock Art Dating* research team. KFA Director Professor Andy Gleadow has described Dr Green as ‘a career scientist of exceptional merit and an emerging research leader.’

The \$740,000 *Kimberley Foundation Australia Fellowship in Rock Art Dating* is funded \$600k by The Ian Potter Foundation and \$140k by KFA. Helen will examine mineral coatings that have developed over time on rock art surfaces in the Kimberley, and identify which coatings might be dated using the uranium series dating method. The study will contribute to a multi-disciplinary project investigating the history of human origins in Australia and indigenous cultures in the Kimberley. Known as the *Rock Art Dating project #2*, it commenced its 2nd phase last month following a successful 3-year funded research period where technical firepower was

the focus. It too is funded by KFA (\$400k over four years) and the Australian Research Council also re-committed to the innovative project with an additional \$880k to be spent over four years.

Helen will work closely with the Traditional Land Owners, the Balangarra Aboriginal Corporation and the *Rock Art Dating* team at The University of Melbourne, led by Prof Andrew Gleadow, as well as colleagues including ARC Laureate Prof Jon Woodhead and Prof Janet Hergt as well as Dr John Hellstrom, Dr John Moreau and others.

Born and bred in Manchester, Helen has had a life-long interest in Australia. Her great-grandmother was a ten-pound pom, arriving in South Australia in 1961. With her great-grandparents, uncles and first cousins living in Adelaide, Helen, her two sisters and parents regularly travelled to Australia during her teenage years. It was always on the horizon that her family would join the Green clan in Australia.

In 2008, she and her partner, now fiancé, Matthew Felgate, who also trained as a geochemist, opted to complete their independent mapping projects in New Zealand. On the way home the pair made

a quick trip to Melbourne to investigate the opportunities for postgraduate research in Australia. Both knew of the University of Melbourne’s School of Earth Sciences, which has a reputation for innovative research and teaching in the geological, climate and weather sciences. They met with Professor Janet Hergt, a geochemist and then Head of School of Earth Sciences and Jon Woodhead who cemented their desire to continue their research in Australia.

Science is part of the Green family DNA. Helen’s father, Tim Green, now a research and development Director with Commonwealth Serum Laboratories, Parkville, inspired Helen to pursue a career in science. When Helen graduated from school, where she studied biology, geography, chemistry and physics, she was certain her career would involve science, but also wanted to work outdoors. Little did she expect that her Geology degree at the University of Durham in north east England, would lead her to fieldwork in the remote landscape of the Kimberley in north western Australia, and that she would be contributing to a multidisciplinary research project investigating the story of Australia’s first people.

Images (L-R):
Gwion Gwion
NW Kimberley

Dr Helen Green
Drysdale River
National Park
Photo: Andy Gleadow



With each subsequent visit Helen has fine-tuned the processes both on site and back in the laboratory, and also developed an eye for the mineral accretions that might yield the best results. Working in a team of three, an archaeologist, indigenous representative/ traditional owner and a scientist, the sites are carefully recorded and documented. Each sample taken is recorded with meticulous care into the project database with a detailed set of photos and information regarding the motifs.

In the first three years of the project, Helen, new to Rock Art, and the history and culture of Aboriginal Australia, established a rapport and trust with project partners, in particular with Dunkeld Pastoral's Cecilia Myers and the Balangarra Aboriginal Corporation's Ian Waina. The threesome travel to the sites together, each playing a fundamental and important role in identifying, recording and retrieving specimens. Over the next five years the slow and painstaking work of collecting and analysing data collected from field trips will bring new cultural knowledge. As part of this research Helen will continue to develop and adapt dating techniques for mineral coatings on rock art styles found in the Kimberley.

As Andy Gleadow has observed 'What is exciting about this phase of the project is the new uranium series dating method will not just assist in bracketing the ages of rock art in the Kimberley, but also rock art more widely around the world where limestones do not exist.'

KFA acknowledges Ann Carew who spoke to Helen Green for this story; and the generous support of The Ian Potter Foundation for the KFA Fellowship in Rock Art Dating.



Images (L-R):
Dr Helen Green
Drysdale River
National Park
Photo: Andy Gleadow

Dr Helen Green
at University of
Melbourne's
science lab
Photo: Cas Bennetto

Helen Green with
Cecilia Myers,
Drysdale River
National Park
Photo: Cas Bennetto

With up to 20 sites and 100 to 150 samples collected each field trip, the accurate recording of data is essential.

In July 2009, just two days after graduating from the University of Durham with a (first class) Bachelor of Science (Geology) honours degree, Helen and her family left for Australia. At this point in her career Helen was most interested in the study of past climates (paleoclimates), and what better place for fieldwork than in the caves of Southern Australia. For anyone who has visited the caves at Naracoorte, a world heritage site, you will be familiar with its spectacular array of stalagmites, stalactites, straws, and flowstones. For her PhD, Helen used the uranium-thorium dating technique to measure the age of the cave rocks, collectively known as speleothems, to better understand past climates. She has also worked on samples from caves in Dominican Republic and South Africa.

It was the application of chemistry to develop a scientific dating method for the speleothems that led her into her involvement with the Australian *Rock Art Dating Project*. As a post-doctoral research fellow, Helen spent three years developing, in partnership with Andrew Gleadow, an innovative way to marry the dating techniques explored in caves with a new methodology for the rock shelters in the Kimberley. As Helen has observed the dating technique was tried and tested in calcium carbonate formations found in limestone

regions, but in the Kimberley the landscape is dominated by sandstone.

Helen's first expedition to the Kimberley in 2015 was her first experience of camping and the Australian outback. Accompanied by a cook and other support staff, the scientists pitch their own tents and help to prepare the camp site. The expeditions are demanding, with each day beginning early with the scientists, investigators and indigenous partners travelling long distances to reach remote sites with the assistance of a helicopter. Helen relished the challenges. In one blog post she described her work:

My research focuses on characterising and dating the mineral accretions or 'crusts' we see fringing the rock art panels, varying in colour and texture from site to site.

Uranium series dating works on the principle that the element Uranium, deposited within these crusts as they formed, decays to the element Thorium over a known amount of time. Using a mass spectrometer we can measure the amount of Thorium accumulated in the samples we collect and use this to calculate the age of the mineral deposit. Occasionally, these crusts are found under and/or over pigment allowing us to provide maximum and minimum bracketing ages for the associated paintings.

Unlocking the past environments of the Kimberley

For the past several years the Foundation has sponsored an environmental change project including an understanding of the Australian monsoon. Emily Field, a PhD student at the University of Queensland, shares with us the research she has undertaken and the progress made on samples taken from springs in the region in 2005 and 2015.

“It seems to have been particularly wet across the region between 11,000–7500 years before present but the monsoon then appeared to weaken after 7,500 years.”

EMILY FIELD

Image:
Emily Field taking
water quality
measurements in the
Kimberley
Photo: Sam Marx

Across much of tropical Australia the monsoonal climate affects sediments which we might typically use to investigate past environmental change. Monsoonal rains might scour away the sediment, and the wind may remove it during dry periods. Fossils within the sediments can also get affected by this seasonality as they can become weathered. However, as Emily explains, “in some locations across the Kimberley, springs containing deep peaty sediment deposits have been found which provide an exciting avenue for palaeoenvironmental research.”

In 2005 Dr Andy Hammond and the late Grahame Walsh collected sediments from a number of sites, including Black Springs, which were donated to the University of Queensland. Initial analysis showed that these springs contained fossils and information for palaeoenvironmental research, including pollen and dust. As a result, a record of environmental change thought to be up to 15,000 years long could be developed from Black Springs. Based on this

success, a team of researchers from the University of Queensland (UQ) and University of Wollongong (UoW) took samples from a number of springs across the Kimberley in the 2015 dry season.

Obtaining reliable dates for the sediments is essential. “We would normally expect older dates at the bottom of the spring sediments. As the sediment gets shallower the dates become younger, representing the process of deposition through time” Emily says.

Unfortunately the initial radiocarbon dates didn’t follow this pattern and a series of challenges frustrated the talented and committed researcher.

A team of researchers from UQ, UoW, James Cook University, the University of Freiburg and ANSTO were called in to assist. They found that the application of standard radiocarbon dating methods to the springs was problematic due to groundwater fluctuations and biological processes such as root growth down through the sediments.

“We needed to isolate carbon from the sediments created at the time of past burning events” explains Emily. The team found that a relatively new radiocarbon pre-treatment technique, called hydrogen pyrolysis (HyPy) allowed that process to take place and removed most other contaminants. Emily finally obtained a logical sequence of radiocarbon dates for the springs using this technique.

Next, the team worked out whether the past environmental changes seen at Black Springs reflected broader scale climatic change across the Kimberley, or whether they were a response to local spring dynamics. “We analysed three springs spread across a distance of 100km, and looked at the microfossils and geochemistry of their sediments. Interestingly, each of the springs started to

accumulate sediment at roughly the same time – during the deglacial around 14,500 years ago. This suggested that we were seeing a response to a regional scale change in climate at this time” Emily says.

With the help of Dr Jon Tyler from the University of Adelaide, statistical techniques showed that there were indeed synchronous changes at the three springs in the geochemistry and non-pollen palynomorphs (ecological microfossils which are preserved alongside pollen but which are derived from other sources such as algae and fungi). “This showed us that these indicators were responding to regional scale changes, and that the springs were recording climatic changes across northwest Australia.

“What we now know from the palaeoenvironmental records developed from the three springs is that monsoonal precipitation increased in the deglacial from around 14,500 years and remained relatively high until about 7,500 years ago. We see a short return to increased rainfall at about 4,200 years ago.”

This coincides with the global ‘4.2 ka event’ which was one of the most severe climatic events of the last 12,000 years. “It’s intriguing that we’re picking this up in the northwest,” says Emily. The records also show that the monsoon weakened 2,600 years ago, with a period of particularly low rainfall between 2,000 and 1,000 years, before becoming more active again in the last millennium.

“What we hope now is that our records of environmental change can be useful to all the other researchers working in the Kimberley and that our work will go on to help others interpret their records” Emily says.



Images (L-R):
Assoc. Prof Bruno
David – *Kimberley
Visions* project,
Drysdale River
National Park
Photo: Mark Jones

Prof Jean-Jacques
Delannoy – *Kimberley
Visions* project,
Drysdale River
National Park
Photo: Pauline Heaney

(Below Right):
Image from the
Hall of the Bulls,
Lascaux, France
Photo: Cas Bennetto

To date the
project has
recorded 583
sites and
amassed a
database of
44,000 photos
in addition
to 583 GIS
and FileMaker
records.

**Kimberley
Visions: rock art
dynamics
of northern
Australia**
is a major
scientific push to
connect different
art periods and
map Australia's
earliest human
footfall across
the northern
landscape. It
focuses on the
emergence of
rock art styles in
northern Australia
and how the art
bodies we describe
as Kimberley and
Arnhem Land
came to exist
through time.
Led by Chief
Investigator Prof
Peter Veth.



New discoveries show that the Aboriginal ancestors created their own architectural places

There is an aspect of Kimberley rock art that is easily overlooked: how the sites themselves have been created as architectural places often richly endowed with stone furnishings, evidence of how people arranged their living spaces, and the areas they painted.

In a rich site complex along the Drysdale River, a team of archaeologists, geomorphologists, cartographers and rock art specialists from the *Kimberley Visions project* have combined their efforts to study not only the art, but also how and when the sites were shaped by people to create new spaces and rock surfaces for painting.

Recently, Professor Jean-Jacques Delannoy and Kim Genuite (Université Savoie Mont Blanc, France) undertook detailed geomorphological and three-dimensional (3-D) laser mapping of Wanjina Rock and nearby art sites; Dr Robert 'Ben' Gunn (Monash University) and Leigh Douglas recorded the rock art and performed digital enhancements to better visualise the images, while Associate Professor Bruno David and Dr Robert Skelly, also of Monash, directed two archaeological excavations. Each aspect of the work was closely supervised by Balanggarra representatives who advised the researchers on cultural matters. The results are being cross-correlated for a richer understanding of the art in its landscape setting.

The findings significantly change how we view rock art sites in the Kimberley. The team discovered that rock layers were thickly carved out of the sandstone massifs by Aboriginal ancestors, one layer at a time, to create cavernous recesses into the rock. In many cases the newly hollowed-out recesses created fresh rock surfaces that were subsequently decorated with rock art. The team also discovered large blocks of rock (one weighing more than 500kg) moved by the ancestors to carefully reconfigure the sites and their landscape so as to create a separate wall to demarcate a large cavity under the Wanjina Rock quartzite stack. The art was shaped by a broader and crucial reworking of its landscape context.

Kimberley Visions researchers are gaining unprecedented insight into how Aboriginal ancestors engaged with the materiality of the rock art sites themselves, slowly, painstakingly uncovering the long cultural history of the region.

Fieldwork in 2018 will involve a combination of rock art survey work and excavation. The research team will again include world leading French geomorphologist Prof Jean-Jacques Delannoy. Delannoy is a director of the research laboratory EDYTEM (Environment, Dynamic and Mountain Areas). He led the scientific committee which advised the French government on the famous Chauvet-Pont d'Arc facsimile.

Renowned archaeologist, Prof Jean-Michel Geneste is also attached to the *Kimberley Visions* project. Both Frenchmen have previously worked with Bruno David on the rock art cave at Nawarla Gabarnmang (Northern Territory). Geneste was the general curator of heritage and director of the Centre National de la Préhistoire, the only laboratory in France devoted exclusively to the scientific study of rock art sites. Formerly the conservation director and then research director of the cave of Lascaux, he has been attached to the archaeological study of ornate caves for more than two decades. **He directs the multidisciplinary study program of the Chauvet-Pont d'Arc cave which brings together some fifty researchers from different countries. Jean-Michel Geneste will visit Australia in October. Visit the KFA website for details.**

Highest academic honour bestowed on KFA researcher for best doctoral thesis

Dr Ben Gunn is the recipient of a medal for best doctoral thesis completed in the Faculty of Arts at Monash University. The Mollie Holman Doctoral Medal is named after the late Emeritus Professor Mollie Holman AO in honour of her significant contribution to science and education.

This medal acknowledges and rewards Ben Gunn for both the quality of his thesis and the quality of his research. It is one of the highest academic honours the University bestows and marks the recipient as a researcher of the highest order.

KFA is the fortunate beneficiary of the method developed in Ben's award-winning thesis. Ben is currently in the Kimberley to apply the method in a pilot study *Clarifying Kimberley rock art sequences: presenting the evidence*.

The aim of the pilot project is to systematically document, publish and make available to research teams the patterns of superimposition for Kimberley rock art based on image enhancement and Harris Matrices at 3-4 key sites; and by doing so, demonstrate the value of the methods used in the analysis of current questions about existing style-sequences.

This evidence will allow all researchers to assess for themselves sequence trends in the Kimberley rock art record.



Q&A

WITH
PROFESSOR
PETER VETH



Prof Peter Veth, a leading expert in Indigenous archaeology was appointed as the inaugural Kimberley Foundation Ian Potter Chair in Rock Art at The University of Western Australia in November 2012. Since taking up the position in 2013 he has contributed significantly to research, teaching and public outreach initiatives. He has established collaborative partnerships between industry, Aboriginal communities and academia including securing major ARC Linkage projects. In this Q&A Peter reflects on the challenges and achievements in archaeology and rock art over the 5-year period.

How and when did you first get interested in Archaeology?

I was fascinated by the study of cultures as a child. I originally studied archaeology and anthropology with the foundational scholars Ronald and Catherine Berndt. My passion for archaeology was fuelled as a student doing remote fieldwork with researchers during the late 1970s and 1980s in the Kimberley, Pilbara and Western Desert including a year with the African rock art specialist Patricia Vinnicombe on the rock art of the Burrup (*Murujuga*). I completed my Honours project there in 1982 and my PhD in 1990 on the archaeology of the Martu peoples of the Canning Stock Route. These trajectories have now led back to a focus on the Kimberley and the privilege of working on one of the greatest rock art estates.

What do you see as the big challenges to be tackled in the next few years?

Dating art both on and off the rocks represents a major task over the next decade. A big challenge is systematically mapping rock art at the larger regional level to understand how style phases are both shared and differentiated through time as part of the identity making. A range of

dating techniques being used such as OSL (Optically Stimulate Luminescence and the Uranium-series dating) will likely push back the known time of occupation in the Kimberley to greater than 50,000 years ago.

Other significant challenges are how to meaningfully link social, symbolic and subsistence behaviours with Quaternary records of changes in climate, environment and landscape; and documenting lifeways through deep time to the present.

Since you've been in the Chair, what strikes you as the most remarkable advances in knowledge?

- The oldest dates from North-west Australia are now in the 50,000 year range at the sites of Carpenter's Gap and Riwi (in the Devonian reefs), *Parnkupirti* (at Lake Gregory) and *Minjiwarra* on the Drysdale River;
- The oldest edge-ground axe technology in the world has been documented to 49-46,000 years ago;
- The ongoing dating of earlier rock art style phases, including Naturalistic and Gwion figures, now plausibly extends into the Pleistocene era (older than

10,000 years ago);

- Modelling shows that the extended banks of the Kimberley coastline, which were exposed during lower sea levels, could be seen from parts of West Timor and Roti and boated to;
- Ornamental and ceremonial objects such as the ground nose peg and shell beads date from 46,000 to 30,000 years ago; and
- The evidence for continuity of groups persisting through the aridity of the Last Glacial period is growing.

Can you yet explain the radically different types of art found in the Kimberley, the Pilbara and Arnhem Land?

These areas have people who have exercised different ways of marking country, expressing their world views and signaling identity. In rock art these may be identified as Style Provinces.

There are regional differences also with engravings on dark volcanic rocks in the Pilbara in contrast to pigments applied to the sandstones of the north-west. Kimberley and Arnhem Land people share the same 'Tropical' language family and some art

forms; Pilbara people belong to a different language family and have cultural connections to the desert. All three areas show significant changes in the styles of art production through time.

Early styles of engraving in the Pilbara include very complex intaglio designs of humans, animals and mythological beings. These appear very different to later figures. Conventions and styles change through the millennia where art has preserved and this is a common pattern from all three Style Provinces.

How has the Kimberley Foundation Ian Potter Chair provided new platforms to promote studies of rock art and engage with the public and the Academy?

The research, promotional and advocacy work I am able to undertake in the role of Chair is considerable. The ARC Linkage projects which have been seed funded and supported by KFA are yielding mutually beneficial collaborations, partnerships

and opportunities which see diverse groups working together for shared interests like land management, research outputs, education, tourism, conservation, and indigenous capacity building. The combination of all of these is promoting a greater appreciation of Kimberley Rock Art at regional, national and international levels. A Kimberley rock art research hub has been created at UWA that is building alliances nationally and internationally. Research training is significant with four PhD and Honours candidates currently working on Kimberley topics.

Over the last five years I have had the opportunity to make presentations to the public through films, television and news media reports and to large public festivals such as Woodford. I've worked with a wide range of people based at universities, museums and Aboriginal communities and been invited to make presentations at hunter-gatherer and rock art conferences in Glasgow, Mendoza, Taos, Vienna and Salzburg and

World Heritage meetings in Africa, Scandinavia, USA and Europe and throughout Australia.

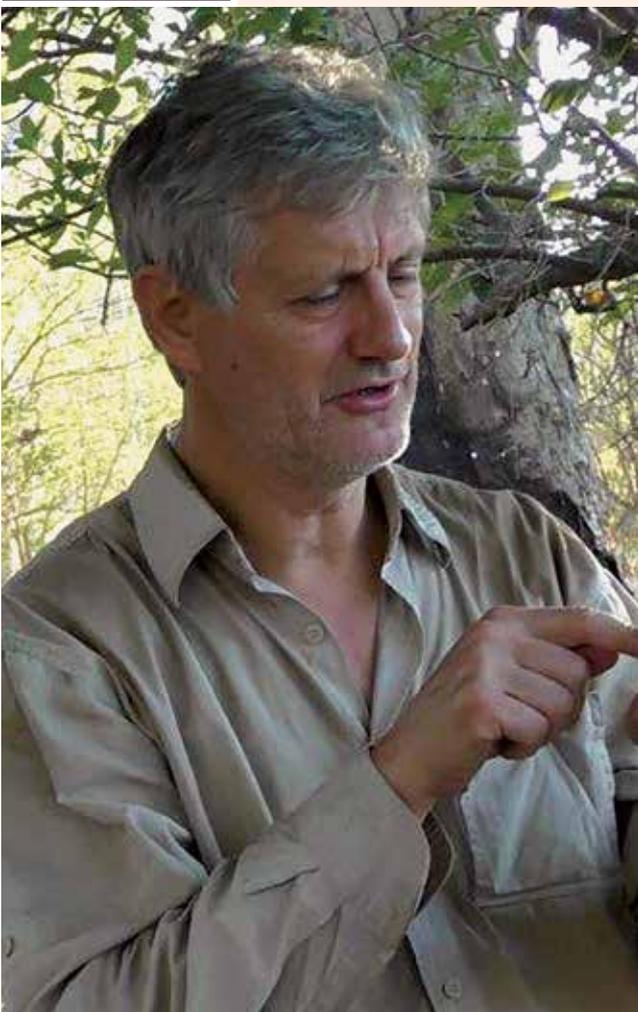
The Chair established by KFA, The Ian Potter Foundation, INPEX and the University enables us to promote a widespread understanding of our past which will in turn help shape Australia's future.



Images (Right):
Prof Peter Veth,
King River Road public
rock art site
Photo: Sven Ouzman

Prof Peter Veth at a
fundraising lunch held
in Perth, May 2018

Image (Below):
Prof Bert Roberts -
Drysdale River
National Park
Photo: Cas Bennetto



Distinguished Professor Richard 'Bert' Roberts joins KFA Science Advisory Council

Prof Richard 'Bert' Roberts is an Australian Research Council (ARC) Australian Laureate Fellow, Director of the ARC Centre of Excellence for Australian Biodiversity and Heritage (CABAHA) and Director of the Centre for Archaeological Science at the University of Wollongong. He has been appointed to the KFA's Science Advisory Council (SAC) as an ex officio member representing the CABAHA Centre of Excellence of which he is CEO. The Kimberley Foundation Australia is an Associate Organisation in CABAHA.

The Foundation's SAC is made up of a diverse group of eminent scientists from tertiary institutions across Australia who guide and shape KFA's long term research program.

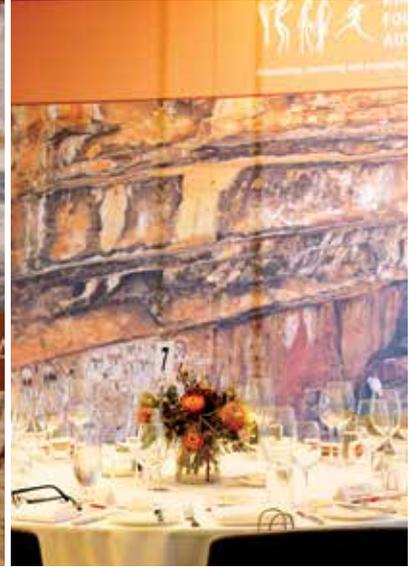
Prof Roberts will deliver the 2018 KFA annual public lecture on Tue 13 November at UWA, Perth and in subsequent cities in 2019.

Bert was trained in the Earth Sciences and is interested in past interactions between hunter-gatherers and their environments in Africa, Asia and Australia. Much of his career has been spent investigating turning points in human evolution and dispersal, publishing across the fields of geochronology, palaeoecology, archaeological science and human evolution.

Bert leads a team dedicated to archaeological dating and to reconstructing the timing, causes and ecological consequences of human migrations around the planet, and the interactions between archaic and modern humans.

**KFA 20TH
ANNIVERSARY
DINNER**

The new
Kimberley
**Foundation
Minderoo
Chair in
Archaeological
Science** at the
University
of Melbourne
was announced
at KFA's 20th
anniversary
dinner hosted
by Westpac
on 26 October
in Melbourne.



Anniversary Dinner
Photos: Emma Byrnes.

Images (L-R):
Andrew Forrest,
Maria Myers, Nicola
Forrest, Allan Myers.

Table at KFA 20th
Anniversary dinner.

John Barlow,
Charles Goode.

Anita & Luca
Belgiorno-Nettis,
Cas Bennetto.

Karen Inge, George
Janko, Deidre Willmott.

Fiona O'Donoghue,
Andy Gleadow,
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John Sharpe.

Andrew Forrest,
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Your support allows us to fund scientific research in the Kimberley. We support a broad range of scientists from the fields of archaeology, geology, palynology and related areas who work with Aboriginal communities to uncover Australia's earliest settlement history. Support KFA and ensure the rock art is recognised for its world-wide significance and protected accordingly. All amounts over \$2 are tax deductible. **Donate today: kimberleyfoundation.org.au**

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KFA acknowledges the support of The Ian Potter Foundation

KFA Research Project Distribution Map

- 1 Mitchell Plateau – 3 projects: *Change & Continuity; Messages in Paint; Developing Palaeoecological Science in the Kimberley*
- 2 Riwi and Carpenters Gap: *Lifeways of the First Australians*
- 3 Gregory-Mulan Lakes: *Human Occupancy of Mulan Lakes*
- 4 Fitzroy Basin and NW margins of the Great Sandy Desert: *20,000 Years of Climate & Weather*
- 5 Drysdale River, Charnley River and Mt Elizabeth Stations: *Unlocking Environmental Archives*
- 6 Balangarra Native Title – 3 projects: *Dating Aboriginal Rock Art; Past Indigenous Subsistence; Kimberley Visions*



The map above shows the distribution of ten projects funded by the Kimberley Foundation over the past ten years.

What we know

A number of studies from around the world have been published in the last few years reporting the great advances made on what was previously known about global human occupation and associated artistic expression. The following compiled with the assistance of Prof Peter Veth, is a summary of what we now know:

The earliest occupation from northern Australia now dates from 50 to 65,000 years ago and comes from the Kimberley and Arnhem Land. Evidence for use of ochres from some of the sites yielding the earliest dates suggests those people were engaged in artistic and symbolic practices such as creating rock art, making personal ornaments and adorning themselves.

We now know that people produced rock art from between 65,000 to 40,000 years ago in Europe and by at least 40,000 years ago in Indonesia.

- In Feb 2018 research was published relating to cave paintings found in Spain thought to be the first works of rock art dated to 65,000 years ago – a time when both homo neanderthalensis and homo sapiens lived in present day Spain. Which of them is responsible for the art is being debated in archaeological circles.

- A site in SE Spain yielded perforated marine shells with red and yellow colourants and these date to greater than 110,000 years ago. Cross-hatched

clam shell was recovered from Java and dates to c. 500,000 years ago – argued to be one of the oldest engravings found.

There are ochres, styled axes and fashioned bone and shell artefacts recovered from the Kimberley and Arnhem Land and now dated to between 50,000 to 30,000 years ago – so there is every probability that early rock art was produced there.

The oldest 'rock art' motif in Australia is about 26–28,000 years old. It is a small motif on a plaque from the Nawarla Gabarnmang site in the NT. The oldest pigmented slab plaque recovered from a rockshelter deposit, and which has been sprayed with ochre, is from Carpenter's Gap in the Kimberley at 40,000 years old. Other dates for early art are now coming in from the terminal Pleistocene (between c. 20–10,000 years old).

New genetic studies, palaeogeography, sea level modelling and voyaging success simulations indicate populations of up to 100–200 individuals arrived in the Kimberley/ North West by at least 50,000 years ago and developed regionally distinct populations throughout Australia by 30–25,000 years ago. Regional 'culture groups', economies and rock art Style Provinces may date from this time.

Deliberate sea crossings by people with advanced symbolic and organisational behaviours represents one of the most dramatic and early demonstrations of the advanced cognitive abilities and technological complexities of the First Australians.

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