

Footprints of the First Australians

BY MICHAEL WESTAWAY

Footprints left in the ancient Australian landscape reveal how the first Australians coped with the last ice age, while the fossil record continues to play a role in understanding the complexity of modern human origins.

One of the most fundamental questions in Australian archaeology concerns the origins of the first Australians. No cultural landscape stands out as more significant to addressing this question as the Willandra Lakes World Heritage Area, a landscape that continues to reveal an enormous amount of archaeological and environmental data regarding Australia's long and complex Aboriginal past.

Recent research here into the origins of the first Australians has put to rest the idea that Aboriginals are in part related to archaic populations of *Homo erectus* from Java, Indonesia. Further research has also revealed one of the world's largest human fossil trackways dating to the peak of the last ice age.

The Beginning of Research

In 1969 the discovery of the fossil remains of a young woman cremated on the ancient shores of a great inland lake in south-western NSW created excitement in both archaeological and popular circles across the world. Palaeoanthropologists and archaeologists were surprised that

some of the most telling signatures of the last chapter in human evolution came from such a distant corner of the world.

The complex mortuary ritual associated with the lightly built human skull played a central role in our understandings of modern human dispersals from Africa. Here at Lake Mungo was the world's earliest cremation. Now dated to around 40,000 years ago, the site provided evidence of complex human behaviour and beliefs that predated what was known at the time in Africa, Europe and Asia.

The remains of Mungo woman, and more than another 100 modern human fossil remains from the Willandra Lakes system, continue to play a role in interpreting the successful dispersal of modern humans out of Africa sometime after 200,000 years ago. The discoveries acted as the catalyst for increased research into the archaeology of human origins in Australia, and saw the establishment of multidisciplinary research teams investigating the archaeology and palaeoenvironment of humankind in the continent.

While palaeoanthropological research continued largely uninterrupted in other

parts of the world, this was not to be the case in Australia. Arguments over ownership of the past and the repatriation of human remains forced archaeologists to address the importance of working more closely with the descendants of the first Australians. At the beginning of this century I was able to undertake research on the ancient people of the Willandra with the consent of the local Aboriginal custodians, and place this very important series of people into a broader human evolutionary context.

More than 40 years since the initial announcement of Mungo woman, it is





A child meanders along a clay track during the peak of the Last Glacial Maximum around 20,000 years ago. Photo: Michael Amendolia

western Victoria and Keilor from the outskirts of Melbourne – suggested a close genetic link with fossils from Trinil, Sangiran, Ngandong and Wadjak in Java. Excavations in the late 1960s by Alan Thorne at Kow Swamp, close to the original Cohuna fossil discovery site, seemed to complement the picture of a continuous regional sequence of human evolution.

The discovery of the fossil remains of a lightly built female fossil at Mungo Station in western NSW changed this picture dramatically. We have a much larger and well-dated fossil human sequence in the region now, and the evidence seems to clearly indicate that the archaic *Homo erectus* populations in Java were not ancestral to modern humans in the Australasian region. Instead they represent an earlier migration out of Africa that eventually led to an evolutionary dead-end.

The evidence from my research, published recently in *Archaeology in Oceania*, points quite clearly to the replacement of this population by modern humans moving through the region, similar to the situation that emerged in Europe when *Homo sapiens* (Cro-Magnon) eventually replaced *Homo neanderthalensis*. A similar fate seems to have befallen *Homo floresiensis* on the Indonesian island of Flores, although its extinction occurred as late as 18,000 years ago while *Homo erectus* seems to have been driven to extinction at least 40–50,000 years earlier.

The fossil remains of Mungo woman were initially dated to 26,000 years ago, and if she were alive today she would appear no different to women within contemporary Aboriginal Australian populations. She was a truly modern human. At the turn of this century there was heated debated in palaeoanthropological circles whether she was buried as

timely to discuss the significance and ongoing educational value of Australia's answer to the Rift Valley and the importance of the ancient Willandra people for our understanding of the origins of modern humans.

The First Australians

Prior to the discoveries at Mungo, the modern human record in Australia was thought to be linked closely with the ancient fossil record of *Homo erectus* in Java. The limited series of Australian fossils – Talgai from south-eastern Queensland, Cohuna from north-



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A footprint from the one-legged man. Photo: Michael Amendolia

long ago as 60,000 years, but this debate now seems to have been settled through further stratigraphic and scientific dating of the burial to an age range around 40,000 years ago.

At a time when the Neanderthals still dominated much of Europe, in Australia flourished a sophisticated hunter-gatherer society that held complex belief systems, practiced long distance trade, and around 40,000 years ago had managed to successfully colonise all of Australia's unique and diverse ecological habitats, from the deserts to the coasts, the fringes of rainforests and offshore islands to the Australian Alps. It is also likely that over this period they played a significant role in modifying the ecology of their island home.

Fifty thousand years ago Aboriginal groups had most likely travelled the northern route into Australia via the Bird's Head Peninsula of West Papua, conquering deep sea crossings that during the Pleistocene would have been 120 km wide. They most likely crafted vessels from bamboo, and followed the movements of migratory birds and signs of smoke over the horizon to reach the ancient landmass of Sahul, which today encompasses New Guinea and Australia.

But by 25,000 years ago Australia had well and truly commenced its descent into one of the driest phases in the past two million years. The Last Glacial Maximum (LGM) reached its peak around 18,000 years ago when, according to geomorphologist Jim Bowler, conditions at the Willandra Lakes were more similar to those of Outer Mongolia and Tierra de Fuego than those of contemporary Australia. Glaciers covered the Snowy Mountains and fed cold waters into the western-draining Murrumbidgee River that flowed into the Willandra system via the Willandra Billabong Creek.

The southernmost lakes in the system were drying up and became highly saline during the LGM, and would have provided limited opportunities for hunter-gatherers compared with the lake 40,000 years ago, although the age of shell middens in the north of the system indicates that people still used the northernmost lakes during the LGM. A lack of precipitation reduced the amount of standing vegetation, with highly mobile desert sands culminating in the longitudinal dunes that today stretch for hundreds of kilometres from Australia's centre into western NSW and Queensland.

An intriguing aspect of the human fossil record during the LGM is the appearance of a more robust cranial morphology in the Willandra Lakes fossils. Furthermore, robusticity is not restricted to males. The sex of a fossil can be established by the shape of the pelvic bones, and some of the robust fossils were female.

Fossil sequences around the world have generally revealed that more robust cranial forms predated more lightly built individuals. This is not the case in Willandra.

By undertaking further field surveys and using the field notes of the original archaeologists who recorded the position of the burials, the stratigraphy and available dates indicate that none of the robust crania found at Willandra are more than 25,000 years old. This is a very interesting discovery.

We know that the LGM was a period of intense environmental stress. It is possible that a combination of environmental stresses and sexual dimorphism (differences between males and females) may be responsible for the correlation of robusticity with the LGM, although restricted gene flow and isolation of the population may also be part of the equation, as has been proposed for the Kow Swamp fossil series (*AS*, March 2004, p.18–20). An understanding of the actual biological mechanism for the selection of robust crania is still far from understood.

Even during the bleakest phase of the Willandra's 50,000-year-old Aboriginal past, family groups continued to use the Willandra Lakes during the LGM. Perhaps the most humanised glimpse of this occupation, even more touching than the carefully interred burials adorned in ochre, comes from the most ephemeral of human signatures – a human footprint.



The fossils of Mungo Man (WLH 3), dated to around 40,000 years ago, and WLH 50, dated to around 18,000 years ago. Mungo Man lived soon after the original colonisation by the first Australians, while WLH 50 lived at a time when the Willandra system was experiencing significant climatic stress during the last glacial maximum. Photos: Dragi Markovic

Footprints Through Time

In 2006 I coordinated a large-scale excavation with Aboriginal tribal groups and colleagues from the National Parks and Wildlife Service and Bond University in order to expose a larger area of the Willandra fossil trackway. Previous work had revealed that between 21,000 and 19,000 years ago some adults and a few children of different ages, perhaps representing a family group, wandered across a wet pavement containing magnesite-enriched clay.

Following the more recent excavations, National Parks archaeologist Harvey Johnston noticed that one of the children, with a young foot around 15 cm in length, started to meander back in the opposite direction to the eastward-moving group. The footprints show how the child was perhaps called back by an adult or older sibling, arced around and scurried after the main group. So seldom in open-site archaeology do we see such a personal and familiar signature.

A day or two after this group, another group of individuals, most likely men, crossed the pavement in pursuit of prey. Pintubi trackers not only identified that they were hunters running together in pursuit, but they also detected a skid from a spear that missed its mark.

Most amazing of all is the trail of a one-legged man moving at considerable speed. The impression of his footprint is much deeper than the other footprints, which indicates that more weight was

placed on this one foot.

More than 800 footprints, representing more than 20 individual trackways, have been identified at the Willandra. The vast majority are human, but there are some marsupials and birds represented.

Ground-penetrating radar has revealed that less than 20% of the site has been uncovered so far. The magnesite clay pavement, which lies beneath a blanketing sand dune, has preserved the trackway as it continues to the north-east of the exposed site.

In 2007 palaeoanthropologist Steve Webb controversially reported that some of the trackways recorded Olympian sprint speeds of more than 36 km/h. However, there are problems with this estimate.

Sprinting leaves a distinct signature, with most of the weight placed on the front of the foot and the toes. But in all of the Willandra trackways we see a heel strike signature, which is indicative of walking or long distance running. The fact that the individuals were running in mud also indicates that the individuals were not sprinting at Olympic speeds.

There is no doubt that the people living in the landscape at this time were extremely fit and capable of considerable endurance in the harsh climatic conditions of the LGM. Our estimates of their running speeds are much closer to the original speed estimates published in the *Journal of Human Evolution* in 2006, and



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Dusk over one of the many residuals on the Walls of China at the Mungo lunette. The different coloured sediments provide a valuable indicator for the position of the original stratigraphic layers. Archaeological evidence and faunal remains from extinct mammals can often be seen in the section of these residuals. Photo Steve Bourne

we have submitted our reassessment to that journal for publication this year.

An enormous amount of research is currently focused on understanding the evolution of human locomotion. Recently discovered fossil trackways from Kenya have revealed that a foot morphology similar to modern humans was already present in *Homo ergaster* (which is known by some as African *Homo erectus*) some 1.5 million years ago.

The morphology of the foot bones of *Homo floresiensis* would seem to share a combination of Australopithecine and modern non-human ape characteristics, giving strength to the proposition that this newly discovered species is related to a hominin earlier than *Homo ergaster* or *Homo erectus*.

As more research is undertaken into the locomotion of hominins, the Willandra's vast and detailed record – which has been reburied for conservation purposes but documented

through high precision digital scans by the University of Melbourne – provides an unparalleled data set for comparing these Late Pleistocene *Homo sapiens* with earlier fossil trackways. With estimates that the size of modern humans has reduced by around 30% since the end of the Pleistocene, rare trace fossils of human locomotion such as the Willandra trackway represent a treasure trove of information for understanding the evolution of human movement.

Australia's Deep Human Past

It is important to note that the Aboriginal people of the Willandra did not disappear. Despite the deep antiquity of the archaeological signatures, the descendants of the first Australians still remain in settlements around the fossil system. The majority of the employees at Mungo National Park are members of the Aboriginal groups that live in the towns around the Willandra. The joint management of the National Park is coordinated by a universally respected Parkindji man, Warren Clark, an important ingredient to managing the internationally recognised heritage values of Mungo's fragile landscape.

Archaeologists from La Trobe University and geochronologists from the Australian National University are these days scouring the Walls of China – a lunette sand dune that stretches for 26 km on the eastern margin of Lake Mungo – with Aboriginal colleagues to look at the different stratigraphic layers named after the nearby pastoral stations of Mulurulu, Arumpo, Zanci and Mungo. One of the objectives is to see how technology and behaviour may have been modified as the great lake approached the LGM, when it became saline and eventually dried up. Will there be discernable signatures in the archaeological layers showing how Aboriginal people adapted to dramatic environmental change? Only further research will reveal if this is the case.

The educational importance of the Willandra cannot be underestimated, and over the past few years innovative educational programs have emerged from local educators funded by the governments of Victoria and NSW. Plans are afoot to develop an inspiring offsite interpretation of the fragile fossil trackway, which will play an important role in promoting the educational value of this iconic Australian landscape.

An equally important development will be the establishment of a keeping place managed by the traditional custodians, to ensure that the record representing one of the world's most significant human stories is conserved for many millennia to come.



The red sands of the lower Gol Gol units of the Walls of China (foreground) represent a time when people did not live in the landscape more than 100,000 years ago. Excavations I undertook in this unit with archaeologist Wilfred Shawcross helped demonstrate that there was no evidence of human occupation in these very ancient layers. Photo: Steve Bourne

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