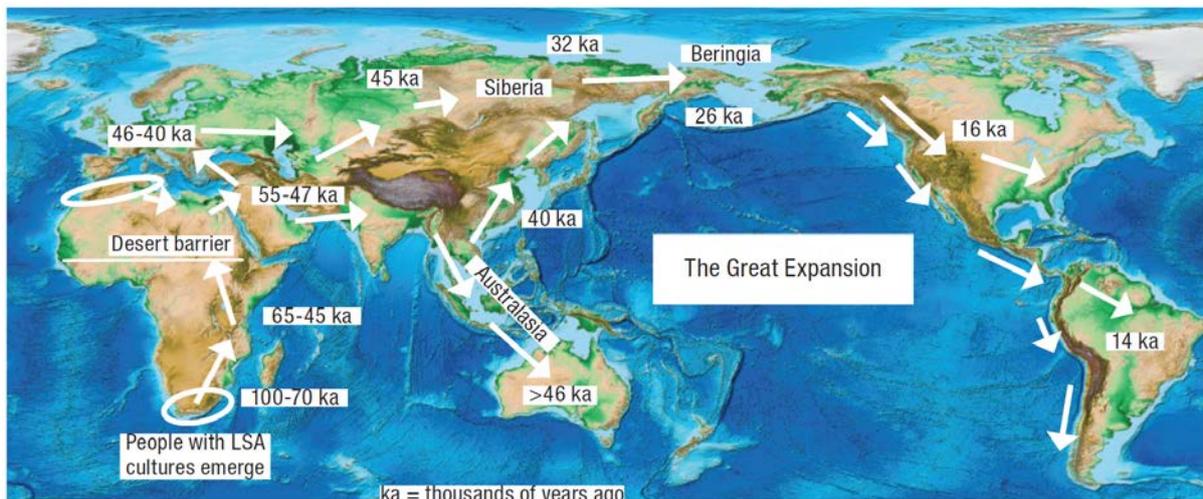


The first Australians

Update #4 to *Human Origins: How diet, climate and landscape shaped us*

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Australia is home to some of our species' most ancient roots outside of Africa. When the first of our human (*Homo*) lineage arrived in Australia has long been debated. Although early members of our lineage (*Homo erectus*, for example) were living nearby on the island of Java as early as 1.7 million years ago, it was only much later that humans entered Australia. Dated archaeological sites suggest that our species, *Homo sapiens* was the first to arrive by around 50 thousand years ago (50 ka) and that we had become widespread throughout the continent by 45 ka (Hamm and others, 2016). This chronology generally fits with the proposed timing of the 'Great Expansion,' when our species rapidly spread out of Africa around 60 to 50 ka and effectively conquered the world. Our species had earlier forays out of Africa prior to the Great Expansion, but these never appear to have amounted to much. In my book *Human Origins* I refer to those who left Africa prior to the Great Expansion as anatomically modern humans (AMHs) and those that left as part of the Great Expansion as people having cultures on a par with modern hunter-gatherers. Our species evolved in Africa 200 to 160 ka, but appears to have only slowly acquired cultures equivalent to modern hunter-gatherers between 100 and 70 ka while in Africa. This may explain, in part, why earlier exits were relatively unsuccessful: the Great Expansion had to wait until modern hunter-gatherers had emerged in Africa and their movement beyond Africa, in turn, had to wait until the Sahara-Arabian Desert became sufficiently green to let them out 60 to 50 ka. However, a recent study by Clarkson and others (2017) proposes that modern people had arrived in Australia by at least 59.3 ka and possibly as early as 70 ka. Such an early arrival of people in Australia would be at odds with the Great Expansion scenario.



Going global: possible pathways and timing of the Great Expansion, when modern people conquered the world.

The study by Clarkson and others revisited and expanded upon earlier work carried out at the Madjedbebe rock shelter located in northern Australia. From the lowest and oldest layers of human

occupation they recovered over 10,000 artefacts that, in addition to an in place hearth, included many stone flakes, ground ochre (associated with mica), edge-ground hatchets and a grinding stone. The age of the deposit was determined by optically stimulated luminescence (OSL), a method by which the measured luminescence of many individual sand grains is related to the time it took for them to accumulate their luminescence from exposure to radioactivity in the surrounding sediment. The artefacts and their associated OSL ages establish that the sequence of layers at the site has not been significantly disturbed or mixed and indicate, quite convincingly, that our species was in Australia as early as 65 ± 5 ka. Such an early arrival of modern hunter-gatherers is inconsistent with all other archaeological evidence indicating that the peopling of the Eurasian continent occurred between 55 and 45 ka.

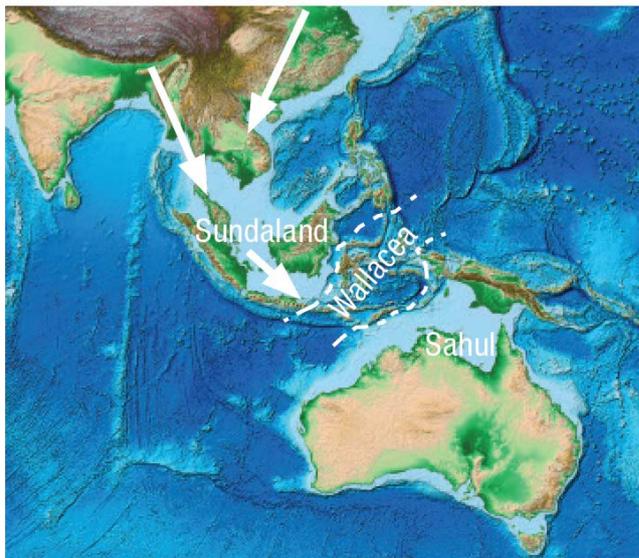
A critical question is who were these first Australians? If they were part of one of the earlier waves of our species (AMHs) that expanded out of Africa between 130 and 80 ka, then there is no problem with the timing of their arrival. Instead, the potential problem is with their cultural artefacts, which appear to be inconsistent with those associated with earlier waves of our species out of Africa. On the other hand, if they were part of the exodus from Africa of modern hunter-gatherers that successfully filled the world, then the problem lies not with their artefacts but with the time of their arrival, which would appear too early relative to other sites. At this stage, the best explanation appears to be that the first to arrive were AMHs from an earlier exodus out of Africa that had developed some cultural artefacts similar to modern hunter-gatherers. Despite their cultural artefacts, these early arrivals in Australia, as elsewhere, appear to have had a limited presence in the archaeological record and were largely replaced by the later arrival of modern hunter-gatherers by around 50 ka as part of the Great Expansion.

The authors of the paper argue that those living at the Madjedbebe rock shelter were behaviourally modern people based on the presence of an edge-ground hatchet, a grinding stone and ochre (a red coloured pigment) mixed with highly reflective mica flakes. The use of ochre dates back to our predecessor species, already widespread in Africa by 230 ka. However, these earlier ochre occurrences are not associated with highly reflective mica flakes, for which the Madjedbebe site is the earliest known example. Ground hatchets and a grinding stone at the site may also be the earliest occurrences known, but the lack of fine stone tools (such as backed microlithic stone tools for spear or bow and arrow), along with art or jewellery (micaceous ochre aside) suggest that these earliest arrivals were perhaps not yet in possession of a complete modern hunter-gatherer culture.

Interpreting the significance of these artefacts is difficult because cultures evolve over time and can be lost. Loss of cultures may result if specific cultural items are no longer needed or if groups are too small to sustain them. There is evidence that humans living in Southeast Asia developed different cultures to those elsewhere in Eurasia, with a lack of stone tools in particular. The lack of stone tools may reflect their use of wood (bamboo), which is much less likely to be preserved than stone tools. There is evidence that those associated with the Great Expansion were innovative, using fire ash to detoxify yams and tree nuts by 46 ka in Borneo, as well as artistic, making some of the earliest cave paintings 40 ka on Sulawesi (Aubert and others, 2014). What the archaeological record suggests in Australia is that the first to cross over did not arrive with the typical modern hunter-gatherer toolkit but managed to reinvent it over time, with bone points appearing by 40 ka and backed microliths by 30 to 20 ka (Hamm and others, 2016).

If *Homo erectus* was already in Java by 1.7 Ma, why did it take so long for humans to cross over to Australia? The difficulty in reaching Australia is that it requires crossing over water to get there. This is true today as well as in the past when many of the islands were joined into one large landmass during periods of lowered sea level when ice sheets built up in the Northern Hemisphere. *Homo*

erectus survived in Southeast Asia until around 300 ka. Some among them managed to cross narrow, calm seaways to reach the island of Flores, where they underwent island dwarfism to become the one-metre tall 'hobbit' (*Homo floresiensis*) who lived there until around 50 ka. But crossing the larger seaways required to reach New Guinea – Australia (collectively called Sahul) was apparently too great for earlier members of our lineage to manage. There is evidence that our species was living in Sumatra sometime between 78 and 58 ka, but unfortunately no cultural items were found associated with the fossil evidence (Westaway and others, 2017). Perhaps these were AMHs for an earlier exit and among those who the first to successfully navigate their way as far as Australia.



Humans could expand into Southeast Asia when sea level was lower (pale blue areas of Sunda) but had to island-hop their way through Wallacea to reach the connected landmasses of New Guinea and Australia (Sahul).

Therefore, it would appear that the first arrivals in Australia were AMHs from an earlier exit out of Africa. As elsewhere in Eurasia, the AMHs who arrived in Australia had a relatively subdued impact and were largely displaced by the later arrival of modern hunter-gatherers as part of the Great Expansion who reached Australia by around 50 ka. This Great Expansion scenario is supported by genetic studies which indicate that all people today outside of Africa descend from a single

population that exited out of Africa and that they acquired DNA from intermingling with Denisovans and Neanderthals along the way between 53 to 45 ka. DNA studies of indigenous Australians (aborigines) indicate that those who arrived with the Great Expansion rapidly colonized the continent by 45 ka (Tobler and others, 2017). To whatever extent earlier expansions of our species may have taken place prior to the Great Expansion, none feature strongly in either the archaeological or genetic evidence, their existence appears to have been swamped out by the rapid peopling of the world during the Great Expansion. However, the earlier forays of our species out of Africa were perhaps not completely erased, with some genetic studies suggesting that a few percent of the DNA from these earlier expansions survives in modern populations (Pagani and others, 2016).

Further reading

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