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Opinion Box 11: When did modern humans first colonize Southeast Asia and Australia?

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Abstract

When modern humans first left Africa and entered Eurasia, they spread eastward, along the rim of the Indian Ocean. Australia lies at the end of this arc of dispersal, and our ancestors needed advanced planning capabilities and watercraft to safely island-hop through Southeast Asia and make landfall in northern Australia. Knowing when Homo sapiens first colonized this island continent has long been viewed, therefore, as providing a minimum date for the emergence of the cognitive skills and behaviors usually associated with our species.

Keywords

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Opinion: When did modern humans first colonize Southeast Asia and Australia?

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When modern humans first left Africa and entered Eurasia, they spread eastwards, along the rim of the Indian Ocean. Australia lies at the end of this arc of dispersal, and our ancestors needed advanced planning capabilities and watercraft to safely island-hop through Southeast Asia and make landfall in northern Australia. Knowing when *Homo sapiens* first colonized this island continent has long been viewed, therefore, as providing a minimum date for the emergence of the cognitive skills and behaviors usually associated with our species.

Dating the time of human arrival has, however, not been straightforward. Radiocarbon dating has traditionally been the method of choice for the last 40 KY or so of human history. But radiocarbon dating cannot reliably extend back much further—at least not with the techniques available in the late 1980s, when I began working in northern Australia with Rhys Jones and Mike Smith. The 40 KY ceiling posed a conundrum for Australian archaeologists, because it was becoming clear that the continent had already been colonized by that time. So we took a different approach and used **thermoluminescence** (TL) to date the time of deposition of sediments at Malakunanja II rockshelter. The ages of 50 to 60 KY for the sediment layers containing the oldest stone tools, ochres, and ground hematite proved controversial. They extended the accepted time of human occupation of Australia by 10–20 KY, conflicting with the expectations of some archaeologists that modern human behavior emerged much later, along with the initial wave of migration of *Homo sapiens* out of Africa.

Optically stimulated luminescence (OSL) dating has since helped to largely resolve this controversy. OSL is better suited than TL for dating sediments exposed to sunlight before deposition, and analysis of individual grains of sand allows issues of post-depositional mixing and other site-formation processes to be investigated (Jacobs and Roberts, 2007). I first used this method to date the sediments surrounding the oldest stone tools and ground hematite at Nauwalabila I—a rockshelter located close to Malakunanja II—and obtained similar ages of 53–60 KY. Single-grain OSL dating of Malakunanja II subsequently confirmed that it was first occupied more than 50 KY ago, and that sediment mixing was not a significant problem. But the benefits of single-grain dating came to the fore at another site in northern Australia—Jinmium rockshelter—where claims had been made for human colonization by 120 KYA. By dating individual grains of quartz sand, I showed that the archaeological deposit had been contaminated by decomposed rubble and that the artefacts were an order-of-magnitude younger than proposed originally.

OSL dating studies at Devil's Lair and Lake Mungo in southern Australia have also added weight to the case for continental colonization before 50 KYA, and advances in methods of charcoal preparation for radiocarbon dating have resulted in ages of between 45 and 50 KY for several sites in Australia, neighbouring Papua New Guinea, and at Niah Cave in Borneo. A date of 50 KYA is now widely accepted as the latest possible time for human arrival in Australia (Hiscock, 2008), but some tantalizing questions remain. The oldest reliably dated skeletal remains of anatomically modern humans in Australia (Lake Mungo) and Southeast Asia (Niah Cave) are only 40 KY in age, and both sites also have stone tools at least 5 KY older. Is it safe to assume that *Homo sapiens* made

these tools, given the evidence of genetic admixture between modern humans and the enigmatic Denisovans in Southeast Asia? Similarly, given the presence of Denisovan DNA in Aboriginal Australians, perhaps it is timely to ask which hominin group made the 50–60 KY artefacts at the northern Australian sites, where skeletal remains are absent and the earliest stone tools are several millennia older than any found further south? Also, the diminutive 'Hobbits' (*Homo floresiensis*) survived until at least 60 KYA on the Indonesian island of Flores, while the human metatarsal found at Callao Cave in the Philippines—and dated to 67 KY—raises further questions about the diversity and distribution of hominin populations in Southeast Asia during the period in which pioneering modern humans were dispersing through the region. There are several intriguing possibilities, therefore, of interactions between different hominin groups that are ripe for enquiry and that may radically revise our views of which group was the first to reach Australia's shores.

References cited:

Hiscock, P. (2008) *Archaeology of Ancient Australia*. Routledge: New York.

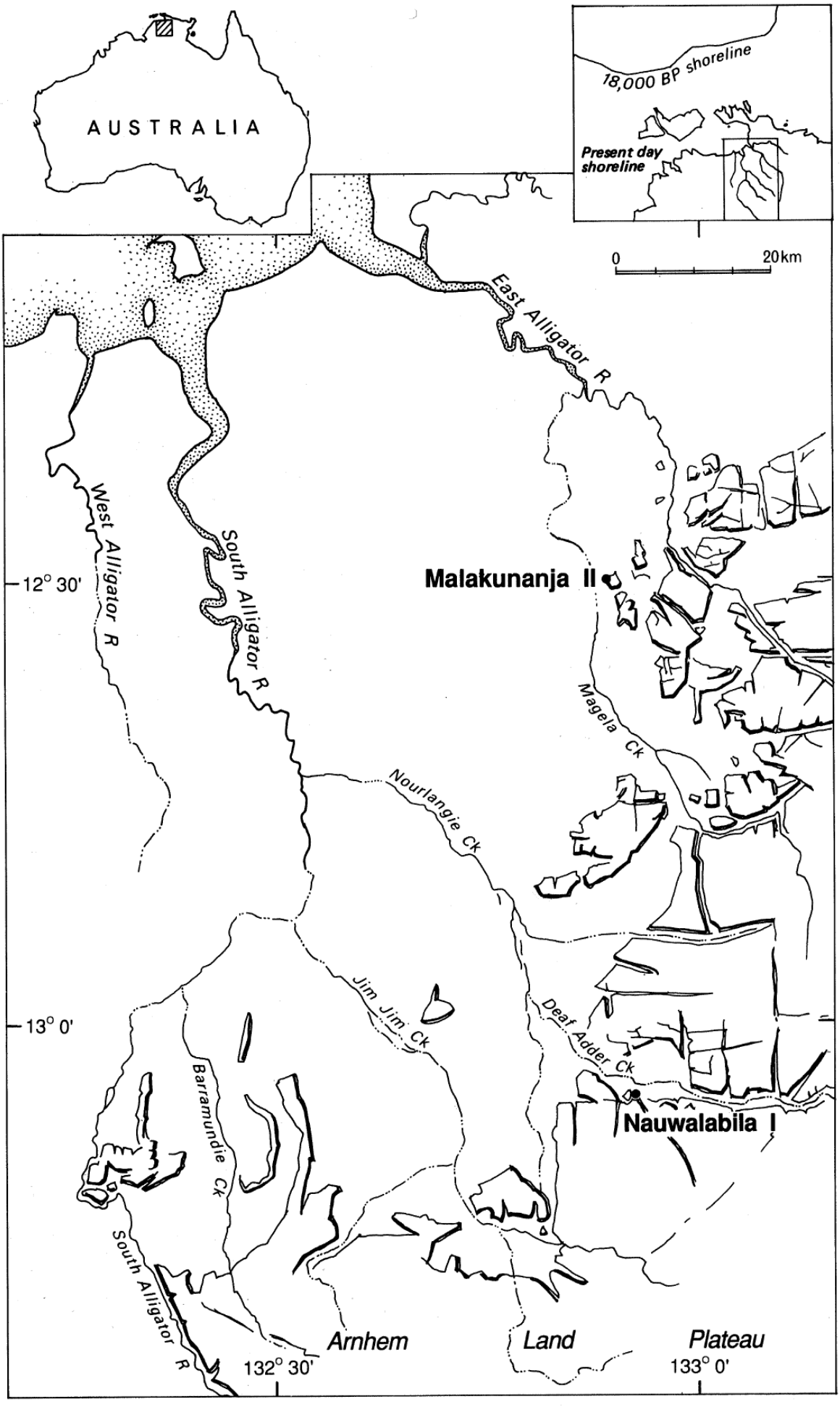
Jacobs, Z. and Roberts, R.G. (2007) Advances in optically stimulated luminescence dating of individual grains of quartz from archeological deposits. *Evolutionary Anthropology* **16**, 210–223.

Figures:

Map showing locations of some important sites in northern Australia;

Photograph of Nauwalabila I site.

Photograph of Malakunanja II site.


AUSTRALIA
18,000 BP shoreline
Present day shoreline
0
20km
East Alligator R
West Alligator R
South Alligator R
12° 30'
Malakunanja II
Magela Ck
Nourlangie Ck
Jim Jim Ck
Deaf Adder Ck
13° 0'
Nauwalabila I
Barramundie Ck
South Alligator R
Arnhem
Land
Plateau
132° 30'
133° 0'