MAURICIO ANTON/SPL

An early human relative, *Homo antecessor*, takes advantage of game animals' attraction to water (artist's impression).

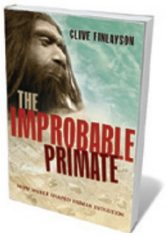
HUMAN EVOLUTION

Just add water

Richard G. Roberts is intrigued by the idea that early humans gained an edge by 'hunting' for lakes and rivers.

We humans are a thirsty lot. Our bodies are between 55% and 60% water, and we need to drink 2 to 3 litres of fluids per day to remain healthily hydrated. In the prehistoric past, our ancestors sourced their supplies from lakes, wetlands and rivers, but these amount to just 0.01% of all water on Earth today. Fresh water has always been scarce. In *The Improbable Primate*, Clive Finlayson argues that the progressive desiccation of the planet over the past few million years — especially three shifts around 2.8 million, 1.8 million and 0.8 million years ago — was the driving force behind our emergence. And, he posits, it triggered the extinction of our closest evolutionary cousins, the Neanderthals, about 30,000 years ago.

The field of human evolution abounds with schemes for how we came to be the dominant primate. When and why did we leave tropical rainforests and take our first steps onto the savannah? How did we acquire our competitive edge over other apes and hominins (primates more closely related to humans than to chimpanzees), enabling us to disperse around the globe and occupy almost every conceivable habitat? The evolution of our large brains, bipedal gait and dexterity with tools have been attributed to all manner of causes — most often some change in the external environment, but also transformations in cultural practices, such as increased meat consumption or cooking, and population dynamics.



The Improbable Primate: How Water Shaped Human Evolution
CLIVE FINLAYSON
Oxford University Press: 2014.

With his "Water Optimization Hypothesis", Finlayson — a zoologist by training — pins his flag securely to the environmental mast. He blazes a trail through the past 16 million years of human ancestry, from fruit-eating apes roaming the rainforest canopy to Australia's desert-dwellers, exemplars of human survival on the driest inhabited continent and "the crowning achievement of almost 2 million years of evolution". Primates are experts at locating key resources in patchy environments, from ripe fruit in the rainforest to freshwater oases on the open landscape. Natural selection rewards those that can exploit these patches most efficiently. Thus were born the "rain chasers": humans built for endurance running and long-distance walking, equipped with portable and perishable objects to suit their nomadic lifestyle. The resulting increased mobility and large-scale consumption of meat by our ancestors — perhaps due to animal-hunting or scavenging of carcasses concentrated around watering holes — are unrivalled among primates. Hence the tag 'improbable'.

Was water the evolutionary driver or is it merely one of the key habitat components that we require to survive? Answers cannot be sought solely in hominin fossils, which are exceptionally rare. So Finlayson scours the archaeological and palaeontological literature for common features of what our ancient forebears called home: some combination of woody cover, open spaces and fresh water. In 1925, the pioneering palaeoanthropologist Raymond Dart proposed that these habitat elements were essential to early human evolution in southern Africa. Finlayson extends this list to the needs of later hominin lineages, adding rocky outcrops, which proved particularly ▶

popular with cool-climate Neanderthals occupying the mountain ranges of Eurasia.

Certain regions loom large in *The Improbable Primate* as launch pads for nature's experiments in human evolution: northeast Africa and Arabia (dubbed "Middle Earth", but free of Hobbits), the mountain chains of mainland Asia and the continental shelves of southeast Asia, exposed when sea levels fell during each ice age. In this largely descriptive account of human biogeography, Finlayson paints with a broad brush. Defying convention, he lumps all hominins in the past 1.8 million years into a single species, *Homo sapiens*. This will be too large a lump for most palaeoanthropologists (and me) to swallow. But his focus on hominin lineages — rather than individual species — has some merit, given that genetic evidence has arisen in recent years of ancient admixture between early modern humans, Neanderthals and Denisovans, and of gene flow into Denisovans from an unknown archaic hominin.

An admirable feature of Finlayson's hypothesis is its amenability to scientific testing. Further empirical data from fossils, artefacts and environmental records will certainly be valuable, as might a more nuanced treatment of individual sites. I would have welcomed more information about the chronology of these sites (which number more than 400), and the processes of burial, weathering and preservation that affected them over time. Sites close to water and in caves can be overrepresented in surveys, because their preservation potential is often higher than that of desert sites.

Ecological models are another avenue worth exploring. Mathematical models that examine foraging patterns and responses to habitat fragmentation in space and time, and simulations of alternative hypothetical scenarios, can help to illuminate what may have happened in the past. Such models could indicate which combinations of factors were likely to have had the greatest effect on hominin evolution. Multiple selective pressures have been in play over the past 7 million years and across the six inhabited continents, so untangling these interactions will be no easy task. *The Improbable Primate* provides a useful starting point for this next great challenge. ■

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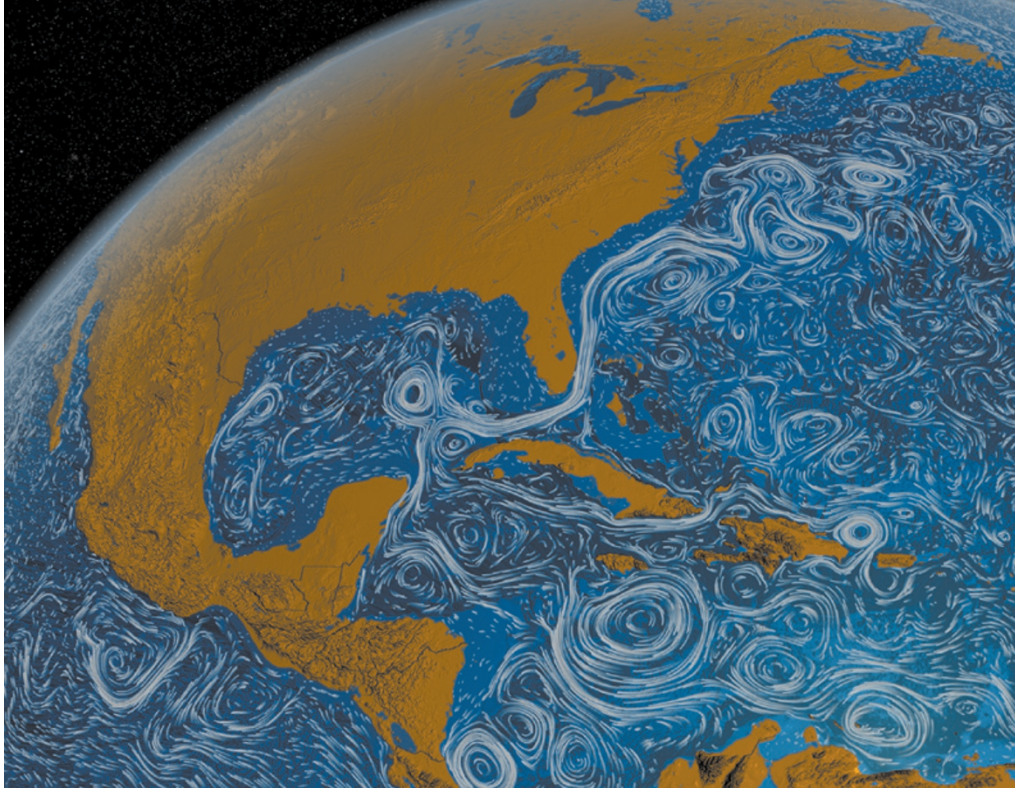

Ocean currents swirl and eddy in a visualization of NASA satellite data, on show at the British Library.

INFOGRAPHICS

Truth is beauty

Daniel Cressey views the British Library's first science exhibition — a celebration of scientific illustration.

Isaac Newton may have long presided over the British Library in the form of Eduardo Palaozzi's vast sculpture at the library's entrance, but only now is the London institution hosting its first science exhibition. *Beautiful Science* catalogues attempts to make sense of the world through visualizations from the seventeenth century to today, drawing on the vast archives of the United Kingdom's national library. On show are graphics from alchemist Robert Fludd's 1617 work *Great Chain of Being* — which attempts to explain the Universe from stars to animals, vegetables and minerals — to a huge collection of modern Circos diagrams used to visualize genetic information and highlight relationships between species.

"Infographics are now a staple of every newspaper in the country. In many ways this seems like a new phenomenon," says curator Johanna Kieniewicz. "What I was really keen to show is that it actually has a very interesting and rich history."

The graphics have a many-layered power. "The visual representation of science can increase both the engagement of fellow researchers [and] the public," says Kieniewicz.

NATURE.COM
For a video about the exhibition, see:
go.nature.com/cvy8r9

Perhaps the exhibition's most famous expression of this is *Nightingale's Rose*, from the 1850s. A pioneer of modern medicine, Florence Nightingale demonstrated the value of improved hospital hygiene by showing that during the Crimean War, more British soldiers died as a result of poor sanitation in hospital than from enemy action. The image she drew to illustrate this point, says Kieniewicz, has "changed science, changed the way in which things are done".

Beautiful Science: Picturing Data, Inspiring Insight
British Library, London. Until 26 May 2014.

Less transformative but no less impressive is William Farr's failed 1848–49 attempt to determine the cause of a cholera epidemic. His huge *Temperature and Mortality of London* plots these two variables in circular graphs. Farr's contemporary, John Snow, was more successful in using epidemiological mapping to pin cholera down as a waterborne disease; yet Farr's diagram stands as a monument to the difficulties of trying to tease causation out of huge data sets. Farr eventually came around to Snow's views, in part thanks to Snow's data presentation.

Beautiful Science shows that good data presentation is timeless. Witness Luke Howard, the meteorologist who named the