5 African cradle

There is always something new coming out of Africa.

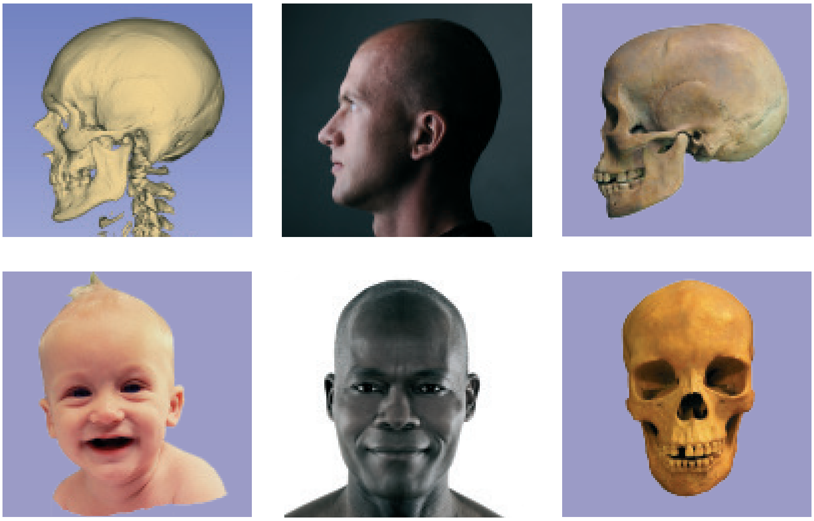
Ancient Greek proverb

A second great fact which strikes us in our general review is, that barriers of any kind, or obstacles to free migration, are related in a close and important manner to the differences between the productions [species] of various regions.

Charles Darwin, *Origin of Species*

Africa is where we evolved: it is the 'cradle of humankind'. This is true both leading up to the appearance of *H. erectus* and after *H. erectus* had dispersed beyond Africa into Eurasia. We *H. sapiens* did not appear out of nowhere but descended by way of modification from earlier species in our lineage. Through both gradual and punctuated processes we evolved from our predecessor species, who had evolved from *H. heidelbergensis*, who had evolved from *H. erectus*, and so on. Many physical features about us and, most markedly, our culture (behaviour) set us apart from our earlier ancestral species. The evolution of our species *H. sapiens* is revealed in the fossil record when bones and teeth first appear that have features and dimensions that fall within the range observed among living, anatomically modern humans (AMHs).

A key defining feature of our species is the size and shape of our skull. It is our big, complex brain housed within our skull that most clearly separates us from our past, extinct ancestors and from all other creatures alive today. The paramount importance of our big and clever brain is reflected in our species name: *Homo sapiens*, 'wise human'. The peculiarities of our big brain are reflected in the ballooned, bulbous appearance of our head, so well displayed by babies and bald adults. Our highly vaulted skull is most apparent in our large, expansive forehead as it rises back into the high, rounded top



Our species is largely defined by our distinctly bulbous skull

and back of the skull. Below our prominent forehead is our small, divided brow ridge, accentuated by our eyebrows. Tucked under our brow ridge is our small, flattened face with projecting cartilaginous nose and bony chin. Our big skull sits atop a gracile body, one that is less robust and muscular and more lithe and lean than that of our forebears. All of these bony features and our teeth can fossilise, and among them it is our highly vaulted, bulbous skull and bony chin that are most diagnostic of our species.

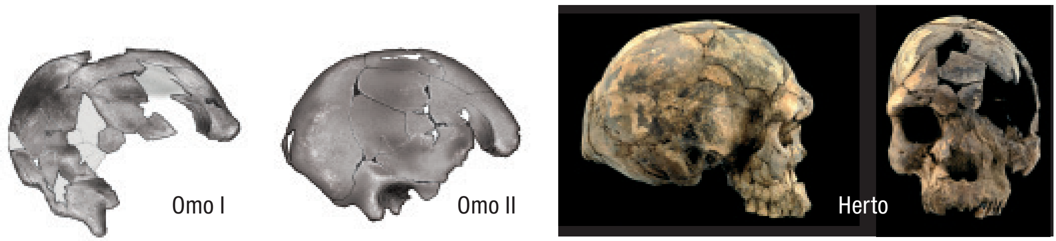
It is not just that our brain is bigger; our brain relative to our total body size is larger than that of our ancestors. This implies we have more brain power to devote to other tasks besides the essential everyday operation of our bodies, tasks like thinking. But did the earliest anatomically modern members of our species think like us? Our brain remains the most complex and least understood part of us. A fossil skull may have the same shape and volume as ours, but whether the brain it once contained was functionally the same as ours is difficult to assess. One approach is to look at human-made artefacts for clues about what the brain was capable of making and doing in the past. Despite all the discovered artefacts available, when our ancestors not only looked like us but also thought and behaved like us remains a contentious issue, which is addressed in the next chapter. For now, let's try to start by answering the seemingly more straightforward question: When did our species first appear?

ETA

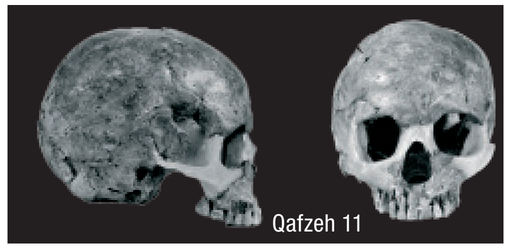
The estimated time of arrival (ETA) of our species should correspond to the oldest fossil bone and teeth that look like ours. However, establishing this correspondence is not as simple a task as it may at first appear. The specific features of our bones and teeth vary naturally to some extent among us, as they did among our most immediate predecessor species. Because our evolution occurred via relatively minor modifications of what already existed, the extent to which our bones differ from those of other members of our lineage depends in large part on how distantly related they are to us. The bones of *H. erectus* differ from ours in many respects, but the differences separating us from our predecessor species are less well defined. We can statistically evaluate the variations among people living today because there are so many of us to compare. But such an approach cannot be applied to our ancestors because of the limited number of fossils available. For example, the braincase volume of adult skulls today varies anywhere from 1100 to 1800 cc. This large range in size reflects primarily overall body size and does not correlate to intelligence. But the age and size of the individual to which a particular fossil skull once belonged are rarely known because the other bones needed to estimate them are lacking. These sorts of issues complicate the assignment of any given fossil to a species, however defined, to which it belongs.

Bearing these complications in mind, the oldest fossils yet found interpreted to belong to our species include Omo I and II, Jebel Irhoud and Herto. The 200- to 190-thousand-year-old Omo II skull from Ethiopia and the 176- to 144-thousand-year-old Jebel Irhoud fossils from Morocco have features shared by the Florisbad skull representative of our predecessor species and us (Chapter 4). These shared features make it difficult to know to which species the skulls belong. The 187- to 155-thousand-year-old Omo I skull, although maybe not convincingly modern in all respects, does have a chin and highly vaulted skull, and overall is considered to be more typical of AMHs than Omo II. The 165- to 155-thousand-year-old Herto skull from Ethiopia is interpreted to have features that fall just outside the range observed among AMHs. The skulls considered by most to be 'fully modern' are from 115- to 90-thousand-year-old cave deposits in Israel. But even the skulls from Israel display features such as heavy brow ridges and slightly projecting faces. The available fossil skulls would therefore suggest that our species had broadly emerged sometime between 200 and 100 thousand years ago. And considering the general morphological plasticity shown by the available fossils, many would conclude that our species evolved by at least 170 to 160 thousand years ago, based on the Omo I and Herto skulls.

Another approach for estimating the age of our species – and one that is independent of fossils – is to compare the DNA of people living today. The DNA in our mitochondria (mtDNA), the 'energy' organelles within each of our cells, is inherited intact from only our mothers, and long stretches of DNA in the Y chromosome are



Omo I and II, Herto and Israeli skulls (Qafzeh 9 and 11) are considered among the first to be anatomically modern



inherited intact from only our fathers. By sequencing the mtDNA and Y chromosome of people from globally diverse populations, it is possible to construct maternal and paternal lineages based on the accumulation of random mutations through time. It is also possible to estimate the time to the most recent common maternal and paternal ancestors. However, owing to assumptions and uncertainties in the calculation methods, the age of the most recent woman or man from which all of us descended ranges broadly among different studies. In addition, the relationship of our maternal and paternal lineages to when we evolved as a species remains unclear. Therefore, DNA studies have thus far been unable to refine the estimates available from the fossil record of when our species evolved.

Is there any other evidence to indicate when our species evolved? One possibility is to look for when any new, innovative stone tool or other artefact first appears that can be uniquely linked to our species. The stone tools of the Middle Stone Age (MSA) do change regionally throughout Africa between 250 and 150 thousand years ago, but surprisingly, the archaeological record has yet to reveal anything strikingly new in the toolkit that might account for how our species managed to grow the biggest, cleverest brain yet in our lineage. This is puzzling when we recall that many previous brain-size increases in our lineage appear to be linked with certain cultural advances. To briefly recap: the appearance of *H. erectus* was perhaps linked to increasing control of fire; the appearance of *H. heidelbergensis* with the first composite tools including the thrusting spear; and the appearance of our predecessor species with regionally diverse early MSA stone tools, the javelin and the symbolic use of ochre. Why is there