Human evolution and migrations

Taking stock of hominid evolution (*February 2002*)

The dearth of fossils along humanity's early evolutionary path inevitably results in even a single find forcing a rethink of the whole story. Sometimes it exposes a novel characteristic, or a new date of occurrence, and quite minor deviations in relative durations of different species or minuscule differences in dentition or foot bones assume an importance that would be disproportionate in any other vertebrate group. The last 2 to 3 years have unearthed evidence for the presence of bipedalism as early as 6 Ma ago, and three new primate divisions that seem on the line to humans rather than other living apes. The 15 February issue of *Science* devotes 8 pages of *News Focus* to reviewing hominid evolution (Gibbons, A. 2002. In search of the first hominids. *Science*, v. **295**, p. 1214-1219; DOI: 10.1126/science.295.5558.1214. Gibbons, A. 2002. New fossils raise molecular questions. *Science*, v. **295**, p. 1217; DOI: 10.1126/science.295.5558.1217. Balter, M. 2002. What made humans modern? *Science*, v. **295**, p. 1219-1225; DOI: 10.1126/science.295.5558.1219).

One picture that emerged more than a decade ago is that the richest pickings occur along the line of the East African Rift system, where continued extension since Miocene times has created room for the deposition of terrestrial sediments and thus chances of preservation. Moreover, its continual volcanic activity has interleaved sedimentary strata with lava flows and ash beds that present ample opportunities for precise dating. It is in the Rift that the onset of human-like traits has been pushed further and further back in time. The discovery of *Ardepithecus ramidus* ("root Earth-ape) at Aramis in the Afar province of Ethiopia by The Middle Awash Research Team in 1992 (dated at around 4.4 Ma) pushed "Lucy" and the earlier, but fragmentary 4 Ma *Australopithecus anamensis* out of specialists' ranking as the first in our line. Last year Yohannes Haile Selassie published details of an earlier *Ardepthicus* subspecies from Afar, whose age is between 5.2 to 5.8 Ma. In both, the central evidence for being hominid rests on foot bones, for the teeth bear a mixture of chimp- and human-like features. Ardepithecines possibly could walk bipedally, but probably ate soft fruit and leaves in forested hills. And then there is *Orrorin tugenensis* ("original man") from the Tugen Hills in the Kenyan Rift, coming in at 5.72 to 5.88 Ma. This so-called "Millennium Man", found by a joint French-Kenyan team. Its gait has still to rest on what to most of us might seem like flimsy evidence, modelled from three thighbones. *Orrorin*'s teeth have mixed human- and chimp-like characters. Unsurprisingly, *Orrorin*'s finders claim primacy as well as a nice new name, while those responsible for slightly younger *Ardepithecus* argue that both are the same genus. The most important point, assuming that bipedality can be convincingly demonstrated for both, is that neither dwelt in grasslands, but in forests. Bipedality might not have evolved through pressures that emerged with the spread of African savannah. Although yet to be published, and dated only by stratigraphic means, an early forest dwelling hominid fossil, found last year in northern Chad by the French-Chadian Palaeoanthropological Mission breaks the stranglehold of the Rift on exploration for early hominids. Two thousand kilometres from the Rift, the Chadian find implies that hominids roamed over a vast tract of a largely flat continental surface.

As well as a flurry of revisions to the human evolutionary "bush" (and each anthro to their own!), the oldest date comes dangerously close to the 5 to 7 Ma date of last common ancestor between the chimp and the human lines, as estimated from the difference between modern DNA sequences. One among several possibilities is that the chimp human

separation involved acceleration of evolution in our line; something often attributed to a "bottleneck" when numbers of individuals dropped to such a low level that mutations spread rapidly, instead of being "ironed out" in a larger gene pool. There is one worrying aspect of the hunt for human ancestral fossils - there seems to be little parallel effort to seek early chimp fossils, or at least they are exceedingly rare. That may be because true tropical rain forest with its highly oxidizing soils destroys the evidence. Whatever, there is a possibility that among the increasing number of supposedly hominid fossils could be some ancestral chimpanzees! All that would be required is a reversion to knuckle walking in forest environments. Bone and tooth enamel cannot resolve that possibility. The only possible way forward is more finds in a wider geographic diversity of sites, which the finds in Chad suggest is achievable, given Miocene to Pleistocene successions.

The thrust of research shifts from bones to artefacts in the case of *Homo* species, and how they might be interpreted in terms of cognitive ability. Most important are signs of abstraction from the natural world; in a word, art. There has long been a Eurocentric bias, largely because of the wealth of exquisite objects that explode into the archaeological record there after 40 thousand years ago. Art is a sure sign of fully human cognitive abilities, no matter how much physical anthropologists might ponder over this or that feature of skulls from the late-Pleistocene, and its role in shaping brain architecture and function. Sudden European appearance of artistic expression has long spurred the view that its evolution was explosive and unique, probably as a result of some mutation. That view needed revision as soon as Christopher Hinshilwood of the South African Museum reported his find in January this year of geometrically carved ochre objects close to Cape Town. They are 77 thousand years old, but are not exactly prancing horses. More common are tools, and major advances seem to have taken place in Africa, long before they appear in Europe at around the same time as artistic impressions. Photographs of the engraved ochre objects bear strong resemblance to recent "doodles" by hunter gatherers and even runestones or tally sticks. It is certainly a case of "Who knows?", until more finds come to light.

***Homo erectus* unification? (*March 2002*)**

It is difficult to resolve the "multiregional" versus "out-of-Africa" debate about the origin of modern humans on the basis of fossil evidence alone. For some time, it has seemed that there were fundamental anatomical differences between earliest members of the genus *Homo* in Africa and those found in Asia. The 19th century discovery by Dubois of what he called *Pithecanthropus erectus* (now Asian *H. erectus*) in Indonesia, set the taxonomic framework for recognising this species before early-human remains of similar antiquity (dating from about 1.8 Ma) were found in Africa. At first regarded as *H. erectus*, the anatomical peculiarities of the early African remains eventually forced their reclassification as a different, perhaps ancestral species to "true erects" - *H. ergaster* ("Action Man"). The fragmentary remains of the earliest Asian hominids do seem to be of this species, as do those dating to 1.6 Ma from Dmanisi in Georgia. The lack of African fossils from the period up to about 600 ka permitted the view that *H. erectus* was an exclusively Asian descendant from early migrants; i.e. that there was a species divergence between Africa and Asia. Two recent finds have cast doubt on that.

The first was of a well-preserved cranium, with associated tools and abundant mammalian remains, from the Danakil area of Eritrea (Abbate *et al*. 1998. A one-million-year-old *Homo*

cranium from the Danakil (Afar) Depression of Eritrea. *Nature*, v. **393**, p. 458-460; doi 10.1038/30954), which seems to blend features of both *H. erectus* and *H. sapiens*. The latest is claimed to be indisputably an *H. erectus*, and comes from the highly productive Middle Awash sediments of southern Afar in Ethiopia (Asfaw, B. *et al*. 2002. Remains of *Homo erectus* from Bouri, Middle Awash, Ethiopia. *Nature*, v. **416**, p. 317-320; DOI: 10.1038/416317a). The last also comes from the period around 1 Ma ago. Such is its resemblance to Asian fossils, that there seems little point in considering any minor differences as being other than the results of the polymorphism which is so characteristic of modern humans (a view long held by the palaeoecologist, Jonathan Kingdon). The authors also suggest that assigning earlier fossils to *H. ergaster* is neither necessary nor useful, for the African record now suggests that they are the early members of a lineage towards later "erects". The close resemblance between African and Asian "erects" does appear to indicate either repeated migration to Asia or continuous genetic contact between the two populations.

(**Note** Acrimony that has no bearing on scientific debate flared up around the potentially revealing Eritrean, middle-Pleistocene sites at the annual meeting of the Palaeoanthropological Society in Denver (March 2002). One of the members of the University of Florence team, who discovered the site at Buia in Danakil, reported that on a recent visit local people had begun offering tools and fossils for sale. Allegedly, the locals said they had been offered money by another team, possibly led by Randall Susman of the State University of New York. Susman and co-workers strenuously deny offering bounties, yet have had their permit for future work withdrawn by Eritrean authorities (Dalton, R. 2002. Hints of bone bounties rile fossil hunters. *Nature*, v. **416**, p. 356; doi: 10.1038/416356a). It seems hardly surprising that perceptive locals, who wrest a meagre living in one of the world's most inhospitable places, seek to make their lives a little easier by selling what is clearly valuable enough to attract well-heeled scientists to their homeland. Rather than allow innuendo to fog the scientific issues, it would seem wise to train people who know the area intimately to become skilled fossil hunters, and to pay them a decent wage, much as has happened in Kenya and Tanzania.)

Phyllogeography and "Out of Africa" (*March 2002*)

While 2001 was becoming the "Year of the Genome", work continued unnoticed by the press on the growing amount of information about genetic differences between modern people in widely separated parts of the world. Moreover, computer software developed to give more meaning to that geographic variation; the science of phyllogeography emerged. Analysis of genetic data, using sophisticated statistics, potentially reveals the different mutations that have appeared in widely separated populations over time, and also the degree to which genetic information entered such populations as a result of movement into them by people from far-off places. It is a complex business, but may help resolve or reconcile the two main hypotheses about the origins of modern humans.

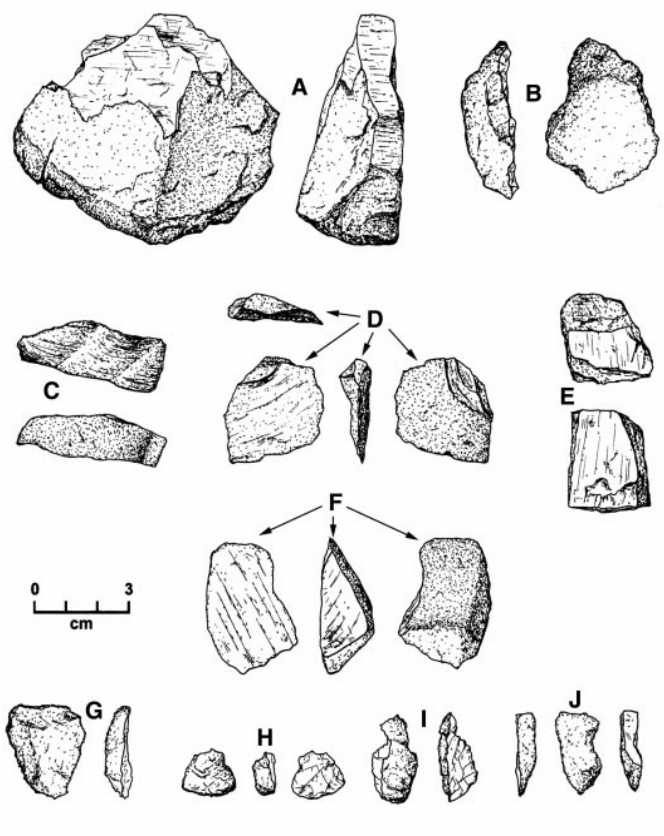
The "out-of-Africa" hypothesis - launched by early work on modern humans' genetic patterns - starts with the migration of *Homo erectus* from Africa to colonise Eurasia, perhaps as early as 1.8 Ma ago, thereafter to evolve separately in isolation from early Africans and perhaps one another. Fully modern humans evolved in Africa and expanded again since about 100 ka to replace and genetically extinguish those older, non-modern populations.

The alternative view of multiregional evolution also accepts an African origin for *H. erectus* and its early migration outwards, but that it was followed by many genetic contacts of regional populations with Africa through continued migrations over the last 1.8 Ma. That would allow local populations to differentiate because of the distances between them, yet gene flow between them and Africa would have maintained a single evolutionary lineage. The many shifts in climate and sea-levels through the Pleistocene would have posed repeated stresses and opportunities for the regular migrations that this multiregional trellis model demands, hence the tenacity with which its supporters hold that view. However, a notion of modern human populations having evolved in semi-isolation over such a long time carries inevitable connotations that many people find disagreeable. There are political undertones in the debate that do cloud the scientific issues.

One of the supporters of the multi-regional model, Alan Templeton of Washington University, Missouri USA, has applied new statistical analyses to genetic data from mitochondrial DNA - first claimed as support for the "out-of-Africa" hypothesis - Y-chromosomes and 8 other sources of genetic information (Templeton, A.R. 2002. Out of Africa again and again. *Nature*, v. **416**, p. 45-51; doi: 10.1038/416045a). His work confirms the ultimate African origin of all of us, but raises the possibility of at least two expansions out of Africa, at 600 ka and 95 ka. Now that may seem to bring much needed support to multi-regionalism, but "again and again" is not the same as the many connections required by the hypothesis. It is a powerful demonstration of how much remains to be done, put in context by one reviewer's comment that genetic information from 35 individuals on a Pacific island, colonised in only the last 1000 years, is inadequate to say where all the genes came from (Cann, R.L. 2002. Tangled genetic routes. *Nature*, v. **416**, p. 32-33; DOI: 10.1038/416032a). In the global data used by Templeton to examine more than a million years of evolution, the groupings rely on samples from as few as 35 living individuals.

Nut-cracking chimps provide clues to the origin of tools (*May 2002*)

Ethoarchaeology attempts to use observation or experimental approaches to animal behaviour to shed light on features of fossil occurrences that relate to human origin. One example is examining the gnaw marks on bones in the dens of predators to check if they match similar signs on the bones of early hominids. Another is knapping flints to see if the flakes or debris produced match finds of broken fragments at sites with no clear sign of early-human involvement. Chimps use lumps of stone to break nuts on wooden anvils, and so provide natural subjects to probe what early hominids may have been up to. Anthropologists from George Washington University in the USA and the Max Planck Institute for Evolutionary Anthropology in Germany have painstakingly excavated the debris from a nut-cracking site beneath a large tree "traditionally" used as a source of nut protein by Ivory Coast chimps (Mercader, J. *et al*. 2002. Excavation of a chimpanzee stone tool site in the African rainforest. *Science*, v. **296**, p. 1542-1455; DOI: 10.1126/science.1070268).

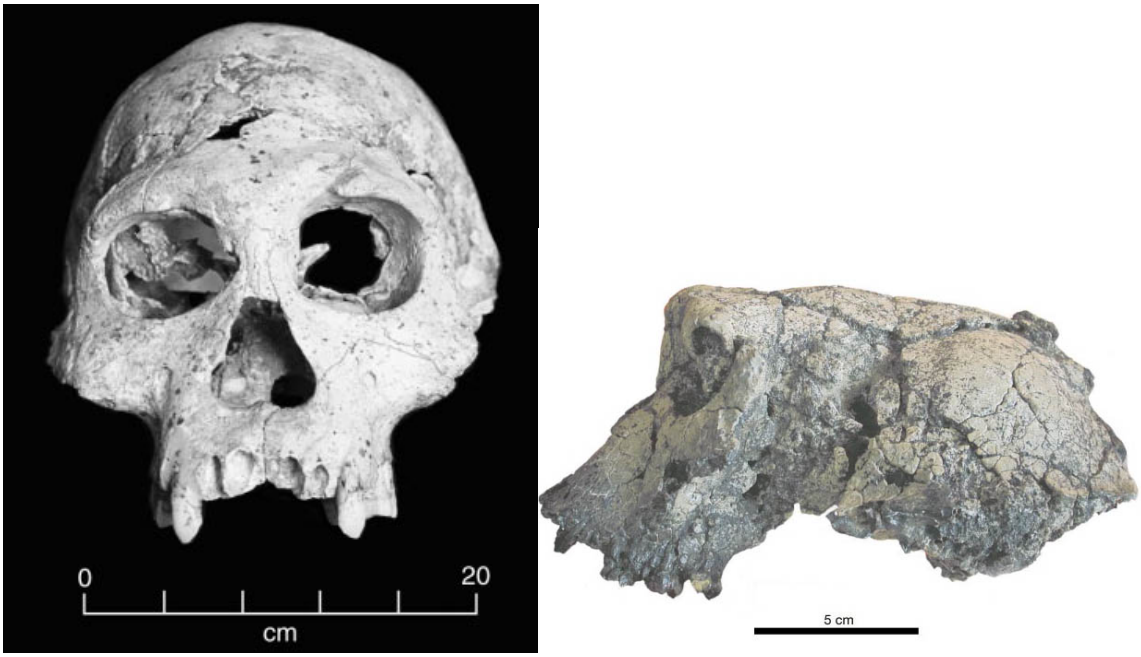


Broken fragments at a chimpanzee hammering site (Credit: Mercader, *et al*. 2002; Fig. 2)

Broken fragments inadvertently created by the chimpanzee troupe do resemble the earliest Oldowan tools, which appear in the fossil record at around 2.5 Ma. The chimps can be shown to have brought hammer stones from several rock outcrops. However, any old rock serves their purpose and there is no sign of deliberate selection, unlike the makers of Oldowan tools, who clearly selected rocks that break to give sharp edges from outcrops up to several kilometres from the fossil sites. The first Oldowan tools demonstrate that they are the end product of what was probably a progression from accidental stone breakage. The way in which broken fragments from patterns around chimps favourite anvils for nut cracking should help identify earlier assemblages in the steps towards proper tool making. With luck, they may relate to fossils of the actual beings who were involved. The 2.5 Ma Oldowan tools from Ethiopia have yet to be linked to a hominid species. The earliest direct link between tools and their makers is the association of Oldowan artefacts with remains of *Homo habilis* about 2 Ma ago.

Bonanza time for Bonzo (*July 2002*)

The big news of July was without doubt from the palaeoanthropologists; a report on finds at the 1.75 Ma Dmanisi site in Georgia (Vekua, A. and 11 others 2002. A new skull from Dmanisi, Georgia. *Science*, v. **297**, p. 85-89; DOI: 10.1126/science.1072953), and the unveiling of a hominid-like skull from Chad dated at 7 Ma (Brunet, M. and 37 others 2002. A new hominid from the Upper Miocene of Chad, central Africa. *Nature*, v. **4418**, p. 145-151; DOI: 10.1038/nature00879). Both threw the issues of human origins, evolution and migration back into the arena of debate.



Crania of *Homo erectus* from Georgia (left), *Sahelanthropus tchadensis* (right)

Time and *Newsweek*, and once upon a time *Life* magazine often figure celebrities of the week or month on their covers. *Nature* entered the celebrity cult on 11 July with a front-page photo of the magnificent cranium of *Sahelanthropus tchadensis'* holotype found and analysed by a vast team from France, Chad, USA, Switzerland and Spain. The skull is from Upper Miocene sediments around Lake Chad, dated from their varied fauna which is very like that of similar sediments in Kenya. Its hominid credentials stem from the skull's face, jaw and teeth, but it is odd. From the back, it resembles a chimp, and so does the capacity of its brain case. From the front, it bears close resemblance to an advanced Australopithecine. Yet no limb bones have been recovered so far, and the attachment point of the skull to its backbone is not mentioned. Both features would be needed to prove upright gait. Undeterred, the authors and many commentators are convinced that it is the oldest human ancestor, from the very limit in time at which modern genetic analyses suggest that the human "bush" of descent parted from that which led to modern chimpanzees. Bernard Wood of George Washington University (Wood, B. 2002. Hominid revelations from Chad. *Nature*, v. **418**, p. 133-135; doi: 10.1038/418133a) discusses *Sahelanthropus'* significance to human evolution, implying that it poses problems for both the linear model of descent from a single emergence of basic human anatomy and the "untidy" model, to which he subscribes - adaptive radiation to changed circumstances that occurred more than once. In the "untidy" model, even an excellent-looking candidate for the first in the line may not have been ancestral to us.

Palaeoanthropologists have never been as well-endowed with bones as they are with funds, and one detects hints of the protectiveness that has long plagued the discipline. The finders of the previous candidate for the first hominid - Brigite Senut and Michael Pickford of the Natural History Museum in Paris (*Taking stock of hominid evolution* above) who found *Orrorin tugenensis*, in 5.72 to 5.88 Ma sediments of the Tugen Hills in the Kenyan Rift - claim that *Sahelanthropus* is merely an ancestral gorilla, citing the creature's large canines. Without a pelvis or footbones to back up the hominid claim, they could well be right. However, the good news is that East Africa has lost its primacy as the source of fossils

bearing on human evolution. Being 1500 km west of the nearest previous site, and unrelated to the East African Rift system. The new sites in Chad open up a vast area for future searches of potentially fruitful Miocene sediments, that are neither abundant nor complete in the Rift (its formation is post-Miocene).

Georgia in the former Soviet Union has grown in significance since the first reports of very old human remains near Dmanisi, a decade ago. The site is well preserved, contains abundant mammalian remains, and the containing strata overlie a 1.85 Ma basalt. With supplementary palaeomagnetic stratigraphy, Abesalom Vekua and his colleagues from several Georgian institutions, the USA, Spain and Switzerland have narrowed the age of the site to 1.75 Ma. Their new find is a superbly preserved skull, together with a lower jaw, following earlier discoveries of two other cranial fossils. The site is well endowed with stone artefacts, similar to those of the Oldowan culture of East Africa.

The new skull has a smaller brain capacity than co-eval *H. ergaster* or *H. erectus* in Africa, and bears some resemblance to the earliest species of human, *H. habilis*, although the authors prefer not to muddy the waters with yet another species of *Homo*. However, had this skull been found first, they might well have gone for *H. habilis*, and in the paper suggest that it and the others may have descended from habilines that left Africa some time before they were preserved. As with *Sahelanthropus*, no limb bones have been found at Dmansi so far. The three fossils are not identical, and another important possibility is that these humans, like us, were polymorphic, though this needs to be tempered with the possibility of differences between males and females, or that the smallest may have been adolescent. Others have jumped on the differences to suggest that more than one species are represented. Here we see the problem of meagre evidence, so that anatomy alone permits either “lumping” or “splitting”. Jonathan Kingdon, in his book *Self made man and his undoing* (1993, Simon and Schuster) raised the issue of polymorphism, so characteristic of modern humans, to the consternation of most palaeoanthropologists, who remain largely silent on its implications for the whole issue of human classification.

There is no doubt that early humans with primitive tools were able to expand out of Africa as early as 1.75 Ma ago. They were not well-endowed with brain power, and they were little people - they did not stride purposefully into the wide, blue yonder. That they reached Georgia, of all places, is extremely odd, because a direct route from Africa is barred by the Caucasus mountain range, and the deserts of Syria and Iraq. They might have tramped around the coast of Asia Minor, following the Dardanelles to the Black Sea coast and then into the Georgian plains. A more extreme possibility is that first they crossed the Straits of Bab el Mandab (closed at the time) and, in Kingdon’s words, “standloped” to east Asia and the backtracked along the northern flanks of the great mountains of Asia to reach the steppes. Finds of Oldowan artefacts and meagre human remains in China also provide ages around 1.8 Ma.

Protocol wars (*August 2002*)

Finding a new species of fossil organism is not usually a big deal. There are lots out there, and palaeontological journals publish formal descriptions regularly. The finder moves on, and as often as not allows other scientists in the field free access to the original specimens. Free exchange of published data, allowing colleagues to add to knowledge of materials by direct study, and, in most branches of science, verification by inter-laboratory analysis of

material is part and parcel of research. The priceless Apollo lunar samples and many meteorites move freely because of these informal protocols. Things are different when the materials are "hot news", none more so than remains from the human bush of evolution (Gibbons, A. 2002. Glasnost for hominids: seeking access to fossils. *Science*, v. **297**, p.1464-1468; doi: science.297.5586.1464).

Protocols for hominid specimens often allow access only to the finders, their colleagues and trusted friends, until they have performed the most minute investigation and written detailed monographs. The rules are sometimes laid down legally at governmental level. This can extend even to casts and CT-scan facsimiles. There are often delays of a decade between first publication of a new species and basic information, and the fossils' entering the public domain. Unsurprisingly, this frustrates palaeoanthropologists who do not have the luck to make a major discovery - useful hominid material is exceptionally rare, despite the fanfares which greet its first publication. Consequently, eager students of human origins try various ploys to get in on the act, such as detailed photography of specimens in museums, and furtive digs for new material at the original sites. Sometimes they are thwarted, sometimes not (See *Homo erectus unification*? above). Berhane Asfaw, of the Middle Awash Research Team that has done so much to advance knowledge of our early ancestors, commented, "You don't know how we suffered in the field to get these fossils", when putting a halt to such a disingenuous attempt to snaffle pictures.

A considered view (*October 2002*)

Find after find of hominid remains (*Bonanza time for Bonzo* above) undoubtedly forces physical anthropologists to reflect on what their still tiny collections of fossils might signify about the descent of humans. There are two ways of looking at that; as a "tidy" tree and one that is essentially "untidy". The first seeks a means of connecting the earliest remains to later ones by the simplest possible connections – a touch of Occam's Razor. However, more diversity and ever increasing ranges of ages and localities for the remains inevitably challenges this kind of palaeontological "good housekeeping". Bernard Wood of George Washington University has long regarded evolution as untidy, and the finds of *Sahelanthropus tchadensis* and *Orrorin tugenensis*, around 6 to 7 Ma old, reinforce his trenchant views (Wood, B. 2002. Who are we? *New Scientist*, 26 October 2002, p. 44-47).

Because the genetic similarity between humans and their nearest relatives, chimpanzees, seems to suggest that the two clades diverged between 5 and 10 Ma ago, *Sahelanthropus* and *Orrorin* may be pretty close in age to that division. But what were they? Wood's view is interesting, and a worry to the advocates of a parsimonious set of connections. Connectivity in proposed clades rests, for obvious reasons, on purely physical characteristics. There are many examples from the fossil record of animals whose outwardly similar characters, for example those shared by sharks and dolphins, do not signify inheritance from common ancestry. This is homoplasy, and raises the awkward possibility that special characters, regarded as essentially human, need not have arisen only the once and been carried by linear descendants. The often quoted "golden characters" of big brains and upright gait, that confer an opportunity to develop consciousness through freeing of the hands, may well have arisen more than once. The truly odd thing about *Sahelanthropus* is just how "modern" its face looks. Beetling brows, thick jaw and un-apelike canine teeth would put it on a sort of par with fossils of species of *Homo* that arose

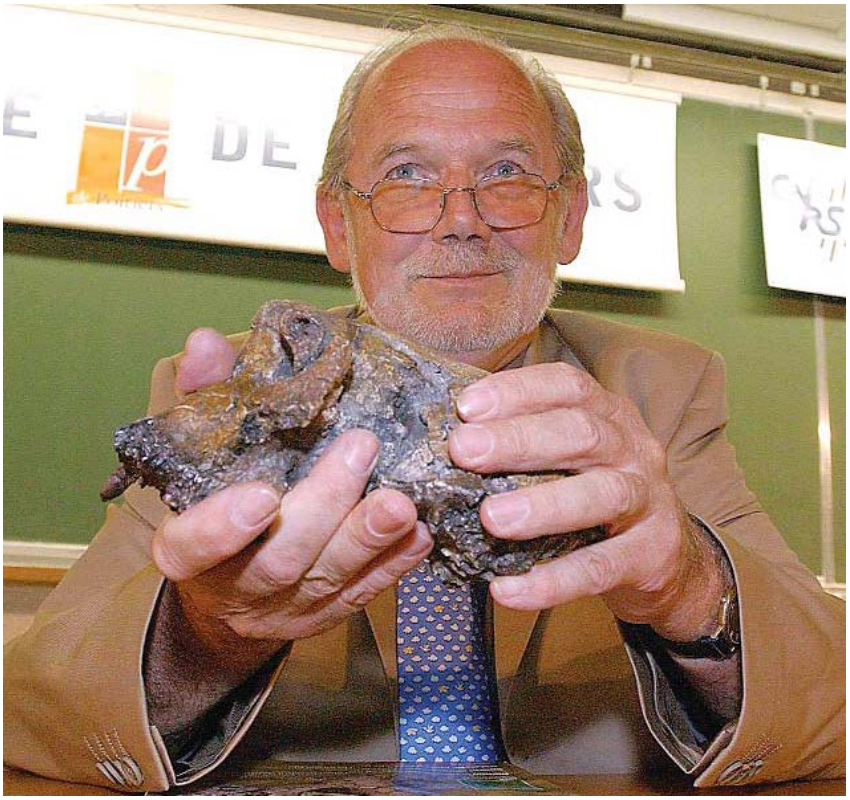
4 to 5 million years later. Yet none of the fossils in between have this combination.; in the "tidy" scheme of things they are more "primitive", and "therefore" cannot be our ancestors. Quite a muddle! Faces, the most sought after bits of bone, isolated in time and place could well have led many up the proverbial garden path. Why, suggests Wood, shouldn't early hominids have been dead ends morphologically, with "primitive" characters making repeated comebacks? Why, too, shouldn't they have been ancestral chimps, or even neither chimp nor human? The dearth of late-Miocene and Pliocene non-hominid fossils of primates leaves all this as possible. He reckons the search for "missing links" has always been a non-starter. Whatever, by expanding enormously the area of potentially fruitful ground from the narrow confines of the East African Rift, the *Sahelanthropus* find in Chad may yet lead to a big increase in the number of hominid and other primate fossils over which physical anthropologists can ponder.

Is evolution predisposed to intelligent beings? (*November 2002*)

Simon Conway Morris of Cambridge University is one of the younger pioneers of palaeobiology, beginning with his doctoral studies of the famous Cambrian creatures of the Burgess Shale. His discoveries and analyses of them have clearly set him on course for thoughts of a much broader kind, much as did the career of Stephen Jay Gould. By way of introduction to his forthcoming book (*Life's Solution: Inevitable Humans in a Lonely Universe*, Cambridge University Press, scheduled for 2003) a recent article by him (Conway Morris, S. 2002. We were meant to be…. *New Scientist*, 16 November 2002, p. 26-29) will cause a stir. At first sight it smacks of teleology, the predestination of biological processes to create the thinking mind. It is far from being teleological, because Conway Morris argues from sound evolutionary principles about the role of fitness. To him, there is evidence of evolutionary convergence towards smart creatures, such as dolphins and even octopuses and social insects; the outcome of gathering and processing information in some kind of integrated mental map. Unfortunately, detecting signs of such behaviour in the fossil record is not easy, unless advanced intelligence created recognisable artefacts. Such evidence spans only the last 2.5 Ma, and of course it originated with hominids, and with them alone; we find few signs of the dolphin's predilection for using snout guards while grubbing in the seabed - a likely tale!.

What he does not address is the difference between intelligence and the consciousness that turns environments into tools for our species, which in turn drive the generation of culture, economy and a free association of individuals. Much as we might wish to, we cannot converse with a dolphin, an advanced mollusc or an ant. Which is a shame, because a really smart cookie needs to work on the principle of, "It takes one to know one"! All manner of living animals use tools of a rudimentary kind, even the song thrush in my back yard, so Conway Morris is mainly restating a truism. But that is fine as a starting point for speculation, and what I take to be pure fun. But as a basis for some optimism that when we meet a truly alien intelligence it should be pretty easy to have a good old natter, is being silly. If he does hold that view, then I can recommend a few hours in the Aztec exhibition in London; as like as not we would be a menu item for any intelligent being which had crossed a thousand light years out of curiosity or for plunder! Life's history on Earth has not been simply one of evolution, but of awesome snuffings out, and many other chance combinations of circumstances outwith any kind of biological necessity. Being ever so clever is little help against a Chixculub or the Siberian Trap.

The man who found the oldest hominid (*December 2002*)



Michel Brunet with Toumai (Credit: Alain Jocard/AFP/Corbis)

I have a bias towards investigations of human origins, simply because it is that branch of the geosciences with the most immediate bearing on all of us. Much of the reported material has been technical. So, it is pleasing to direct readers to a profile of a palaeoanthropologist who is not a self-publicising diva (Gibbons, A. 2002. One scientist's quest for the origin of our species. *Science*, v. **298**, p. 1708-1711; DOI: 10.1126/science.298.5599.1708). Michel Brunet, of the University of Poitiers in France has spent his professional life researching Neogene mammals in as many likely sites to which he and his colleagues could gain access. It has been a risky business, and at least one of his close colleagues died in the field, and Brunet has had many close encounters with acute danger. Late in his career he hit the bonanza represented by *Sahelanthropus tchadensis* (see *Bonanza time for Bonzo* above). Not only did the find take his team far beyond the time frame of previous signs of hominid evolution, but completely outside the usual hunting grounds of eastern Africa to Chad. That hominids were not exclusive to the area of the East African Rifts had already been demonstrated by Brunet and David Pilbeam of Harvard by their find of 3.5 Ma australopithecine remains there in 1995. Time will tell if this seemingly quiet academic is turned into yet another diva by the media circus that inevitably scrums around palaeoanthropologists with big finds. I reckon he will remain as he is.