

Being Human, Again: Stories of Evolution Part 1

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REGULAR readers of this journal will remember the beginning of a journey I started in volume 2, issue 3 (pp. 67-73) of this journal in 2016, titled 'Being Human: The Introduction'. That journey, collectively called "Peopling of the Northeast of India", was spread over 5 issues of this popular journal talking about the arrival of not only the Tibeto-Burman speaking group of people but also the Austroasiatic tribes through the northeast corridor of India and their encounter with the Dravidians at the edges of eastern India. The peopling journey produced evidence from language, archaeology, and genetics to show that our histories need to be understood in more complex and subtle ways than simple, broad strokes that emphasise only one, central mega-story of migration into and peopling of India.

The journey that I am now about to start is in many ways going back to the beginning of the earlier journey, and therefore, appropriately titled as 'Being Human, *Again*'. The phrase 'being human', here and in the earlier series, connotes the unique attribute of being human, namely, the human being's ability to use language – an ability that is not shared with any other related or unrelated species, that is, language is uniquely human and therefore species specific. Or so it seems. For example, the common understanding of the term 'language' means

speech, that is, language is equated with speech. However, that equation is beset with problems right from the outset: do humans who cannot speak (for example, the Deaf) not have language? All of us know by now that that is blatantly false, Signed languages are languages by any standard of measurement. In fact, the idea that language is neither speech, nor is it uniquely human will be among many of the themes explored in this series.

The broader meaning of 'being human' therefore takes into its semantic ambit the term evolution as well. As it will become clearer as we proceed through this journey, the subtitle of this series is carefully constructed to mean that what will follow will be a discussion of themes related to human evolution, not just language evolution. In fact, with regards to the latter, I will introduce a controversial concept that is perhaps novel to most readers, namely, that language never really 'evolved', that is, the term 'language evolution' is an oxymoron; rather, language *happened*, almost, one fine day, perhaps around 100,000 years ago and it has been there ever since. That is, 'something' happened, literally, 'one fine day', may be to a person or to a small group of persons, somewhere in eastern or southern Africa, that eventually, after a few generations, gave rise to what we know today as language. We can call this the suddenness thesis, which will be technically adorned later as the exaptation thesis. Speech however is a different matter, and we shall see how.



Richard Dawkins, one of the most celebrated Revolution biologists, in his famous book from 2004, titled *The Ancestor's Tale* had a subtitle, *A Pilgrimage to the Dawn of Life*; note the word 'pilgrimage' in the subtitle, evolution for Dawkins is a pilgrimage from present to past zero. The metaphor of pilgrimage is compared to no less than a tale as Chaucer's *Canterbury Tales*. Note further that any such metaphor necessarily has the intention of producing the effect of not only a journey, but also a linear journey. However, as hinted already as above, as far as language is concerned, there was no journey to begin with but only an instance. In fact, an instantaneous moment or event, perhaps in as short a period as 50,000 years or so, is literally in the blink of an eye in evolutionary terms.

To close this introductory section, let me briefly mention a puzzle that was raised in the Introduction of the earlier series, a puzzle that was left as such, to which, my illustrious ex-teacher and colleague, Prof. Rama Kant Agnihotri, had reacted by seeking an answer after he read the manuscript; unfortunately, I could never go back to that puzzle again. It was pointed out that a simple, 'Yes-No' question in English like *Can the eagles that fly swim?* has the helping verb *can*, although associated with the verb *swim*, appearing for some reason at the initial position of the question (compare the non-question counterpart: *Eagles that fly can swim* where *can* is in its rightful place). Why should this be so?

Well, the answer to that question will be revealed not in one go but episodically throughout this series, because in answering that innocuous question, we shall have arrived at a clue to the nature of that instantaneous event, that 'something', that happened

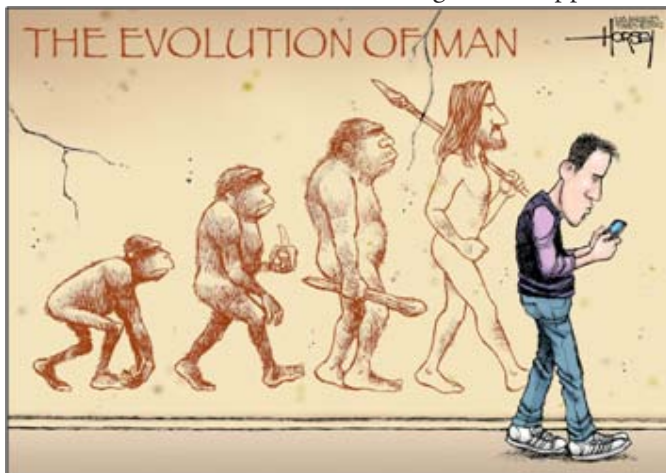


Fig. 1: Popular notion of evolution of 'man'
(<https://www.uv.es/jgpauas/he.htm>)

100,000 years ago somewhere in Africa. We shall see that the placement of the auxiliary *can* at the beginning of the sentence perhaps marks the sentence out as a question in the first place. However, this cannot by itself be an explanation as it gives rise to more questions than it answers. For example, one of the prominent questions that raises is: In the Yes-No question above, why is *can* associated with the verb *swim* which is 'farther' in linear distance from it than the verb *fly*? We shall see that the answer lies in showing that language operates with not linear but structural or hierarchical distance, a feature of language that happened as a result of that mysterious event.

At the Beginning

This is the most obvious problem to deal with in any account of human evolution – what is the start date? As if this by itself is not a difficult enough problem to solve, further related questions that the field of evolution has to deal with are questions that raised more specific who and where questions, namely, who came where first? This question, as we have painfully realised through our modern centuries, is not an innocuous question only about evolution but also about rights and entitlements; fates of nations and people have been decided as a reaction to raising this question.

In the case of language evolution – to be traced out throughout the series – this question has been to some extent subverted by showing, through indirect evidence, that the structure of language is not about linearity at all. But what about evolution in general? As we know, the evolution fable is heavily biased in favour of a linear account – the reason Dawkins chose the metaphor of a pilgrimage from present to time past zero. And the celebrated Palaeontologist Stephen Jay Gould has shown in his famous little book *Wonderful Life: The Burgess Shale and the Nature of History* (1989), how the traditional iconography of evolution invariably traces origins of complex forms in simple form in the form of the so-called ladder of linear progress, or what Gould calls the 'march of progress', which is made maximal use of in popular media as well as in textbooks in a form similar to the cartoon in Fig. 1.

The force behind this iconographic representation is our undeniable desire to linearise and to establish the superiority of the present. This desire gets mapped on to the so-called 'tree of life' model

as well, which in spite of representing the branching notion of evolution, is moulded into the conventional framework of progress. This is shown in Gould (1989: 39) in the traditional representation of the evolution of coelomates (see Fig. 2), or animals with a body cavity, which includes all vertebrates and all common invertebrates except sponges, corals, and related species.

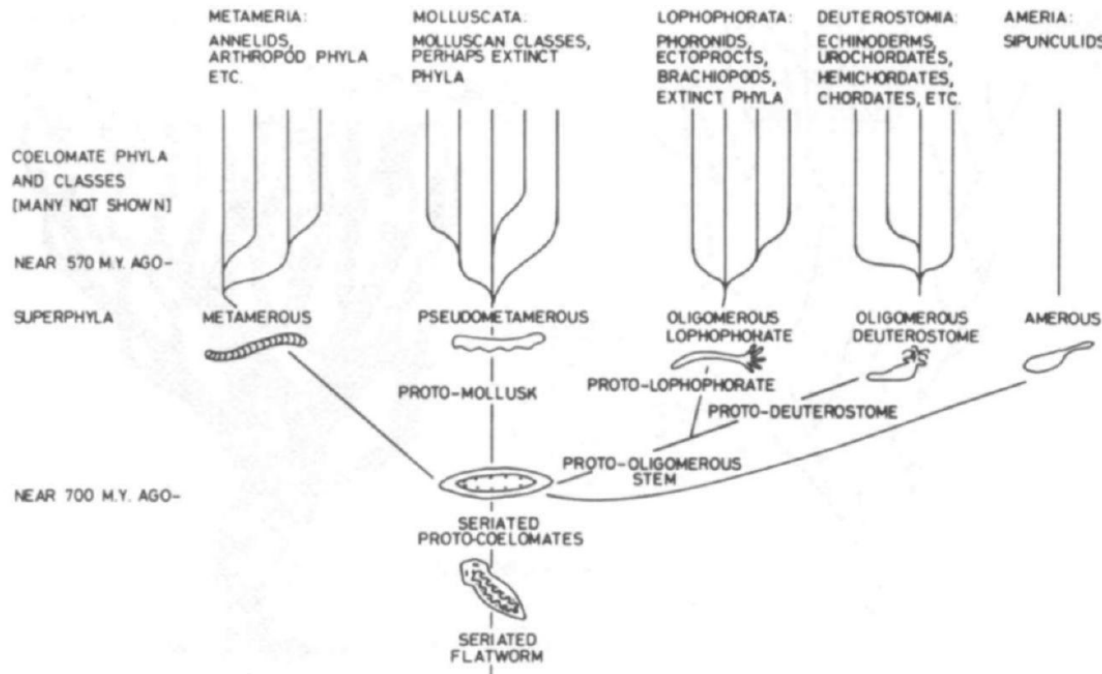


Fig. 2: Evolution of coelomates (from Valentine, 1977).

In spite of multiple possibilities where branches may die or develop rapidly or disproportionately, a “cone of increasing diversity” (Gould 1989:38) becomes the only model; Fig. 2, for example, shows no branch perishing and each branch diversifying further in a well-behaved manner. Abstractly, the cone of increasing diversity, shown in Fig. 3, becomes the model for all representations of evolution, where the horizontal dimension maps morphological diversity, but the vertical dimension maps not only progression of time but also complexity. It is in this direct and sometimes subtle implication of the present being more complex than the past, unknowingly, an apparently innocuous seed is sown in our minds, which derives our morality and our behaviour for the rest of our lives.

Gould in fact, presents his model of evolution, which he calls the model of decimation and diversification. I will however leave the Gouldian world and its implications for deriving the normative in our education and morality for now, with the

promise that I will come back to it in the next episode. I will instead draw the lesson that one can learn from viewing evolution not as linear progression but more as diverse forms coexisting, namely, that evolution involves significant turns across time in multiple animal (and plant) species at varying points; and that there is no better way to understand evolution and our place in it than figuring out this network of turns

and jumps. This is exactly what I wish to do in the rest of the series.

Terrestrial bipedalism

Since we are here interested in human evolution, one of the most significant turns in the passage of evolution to the genus *Homo* is the ability of several human-like apes to be able

to walk on two limbs. The importance of bipedalism is manifested in several functionalities to do with mobility and survival in general (including foraging,

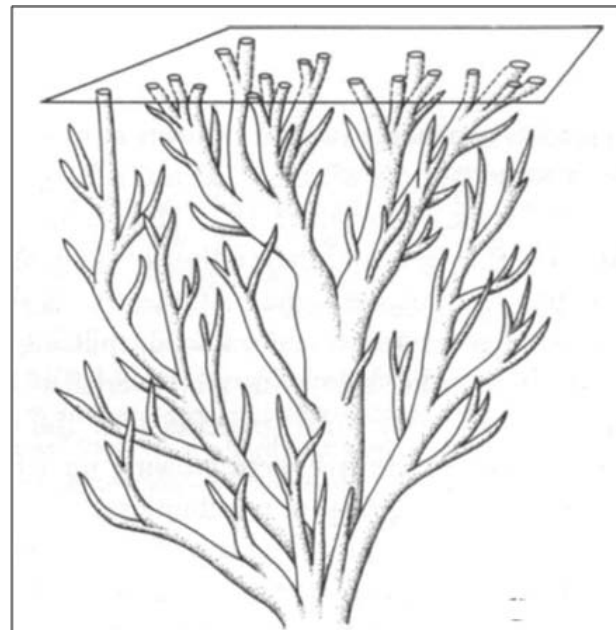


Fig. 3: Abstract cone of increasing diversity (Gould 1989:40)

carrying, vision, etc.); that is, there are distinct selectional advantages of adapting to bipedalism from quadrupedal knuckle-walking associated with gorillas and chimpanzees. In fact, being bipedal is closely related to being vocal, a connection with language evolution that I will postpone for now.

The most famous of the early hominids which was definitely a committed biped was the genus *Australopithecus*. After Raymond Dart discovered and described the first *Australopithecus* fossil species, found in Taung, South Africa, in 1924-25, there

was a lot of enthusiasm among anthropologists and paleoanthropologists, naturally, due to its link to bipedalism and therefore its possible ancestral connection to *Homo*. Since then many other species of this genus have been discovered in east, north-central, and south Africa. This excitement is reflected in workshops such as the one organised by Stony Brook University entitled *Diversity in Australopithecus: Tracking the First Biped*, in 2007. The “Taung child” was named by Dart as *Australopithecus africanus* and dated to about 2.8 Million Years Ago (Ma, henceforth) (a 3D reconstruction of the same is shown in Fig. 4)



Fig. 4: Taung child – Facial forensic reconstruction
(By Cicero Moraes - Own work, CC BY-SA 3.0,
<https://commons.wikimedia.org/w/index.php?curid=22547427>)

The placement of the foramen magnum (shown in Fig. 5), an oval opening in the occipital bone of cranium of humans and other animals, through which the spinal cord passes from the brain to the vertebral column, is under the cranium for the Taung child indicating an upright posture.



Fig. 5: The foramen magnum

By Didier Descouens - File:Crane4.png, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=21748074>

Later on other *Australopithecus* fossils were discovered, especially of the species *Australopithecus afarensis*. The most famous (and complete) *Australopithecus afarensis* fossils assembled is that of *Lucy*, discovered in Ethiopia in 1974, representing 40% of the skeleton. *Lucy*, shown in Fig. 6, was an early species of the genus *Australopithecus* and was dated to 3.2 Ma.

Thus, particularly by analysing the morphology of the species *Australopithecus afarensis*, a species for whom most skeletal elements are known, terrestrial bipedality (that is, bipedal when terrestrial) of the the genus *Australopithecus* can be proven beyond doubt.

In 1978, the archaeologist Mary Leaky excavated (though known from 1935) the famous “Laetoli footprints” in Tanzania (shown in Fig. 7), 45 km from the site Olduvai George, which attained great significance in reconstructing the history of human evolution as a



Fig. 6: The cast of Lucy, skeleton (AL 288-1)
Australopithecus afarensis

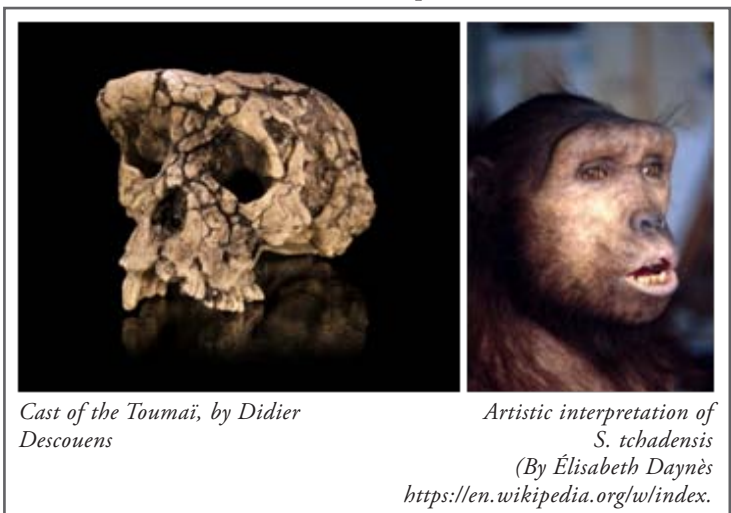
(By 120 - own picture worked with Photoshop, CC BY 2.5, <https://commons.wikimedia.org/w/index.php?curid=1818607>)



Fig. 7: Replica of Laetoli footprints
 By Momotarou2012 - Own work, CC BY-SA 3.0,
<https://commons.wikimedia.org/w/index.php?curid=24988811>

long line of hominid fossils from *Homo habilis* to *H. erectus* to *H. sapiens* have been found there, indicating a continuous community of hominid species living at the same place. Dated to 3.7 Ma, Laetoli footprints are the oldest hard evidence of bipedalism, as there are no knuckle-impresions. The species most commonly associated with the Laetoli footprints is *Australopithecus afarensis*. From most fossil records, it has been determined that Australopithecids were gracile (slender bodied) and diminutive, reaching a maximum height of 4.7 feet.

Although the evidence in favour of the genus *Australopithecus* being bipedal is quite strong, there is some evidence to suggest that some species prior to *Australopithecus* had also achieved bipedalism, if not committed bipedalism, but at least facultative (optional and limited) or arboreal – that is, some kind of primitive bipedalism. One of the species associated with early possible bipedalism is debated to be *Sahelanthropus tchadensis*, belonging to a genus named *Sahelanthropus*, which is contemporaneous to *Panina* (Chimpanzees) and *Hominina*, in other words, existing around the time of the Chimpanzee-human split around 6.3 Ma. A small cranium nicknamed Toumaï, was discovered in 2001 in Chad, central Africa. It was claimed that *S. tchadensis* is the oldest known human ancestor after the Human-Chimpanzee split. *S. tchadensis* is dated to ~7 Ma; the fact that the fossils were found far from the so-called cradle of humanity, that is, east Africa (and to some extent, south Africa), already indicates that these early ‘humans’ were travelling long distances. Fig. 8 shows the Toumaï skull and a reconstructed form of the species.



Cast of the Toumaï, by Didier Descouens
 Artistic interpretation of *S. tchadensis*
 (By Élisabeth Daynès
<https://en.wikipedia.org/w/index>.

Fig. 8: The Toumaï cranium and its reconstruction

Between the so-called first human ancestor just described, and the *Australopithecus*, the committed bipedal, there is yet another stop around 4.4-5.6 Ma. Two fossils named *Ardipithecus ramidus* and *Ardipithecus*

kadabba, were discovered in Ethiopia between 1992-2001, and were dated to 4.4 and 5.6 Ma, respectively. At least for *A. ramidus* it has been determined that it had a grasping big toe adapted for quadrupedal movement while on the trees but bipedal when on the ground, in other words, a typical facultative bipedal. The *Ardipithecus* fossil finds from Ethiopia are shown in Fig. 9.

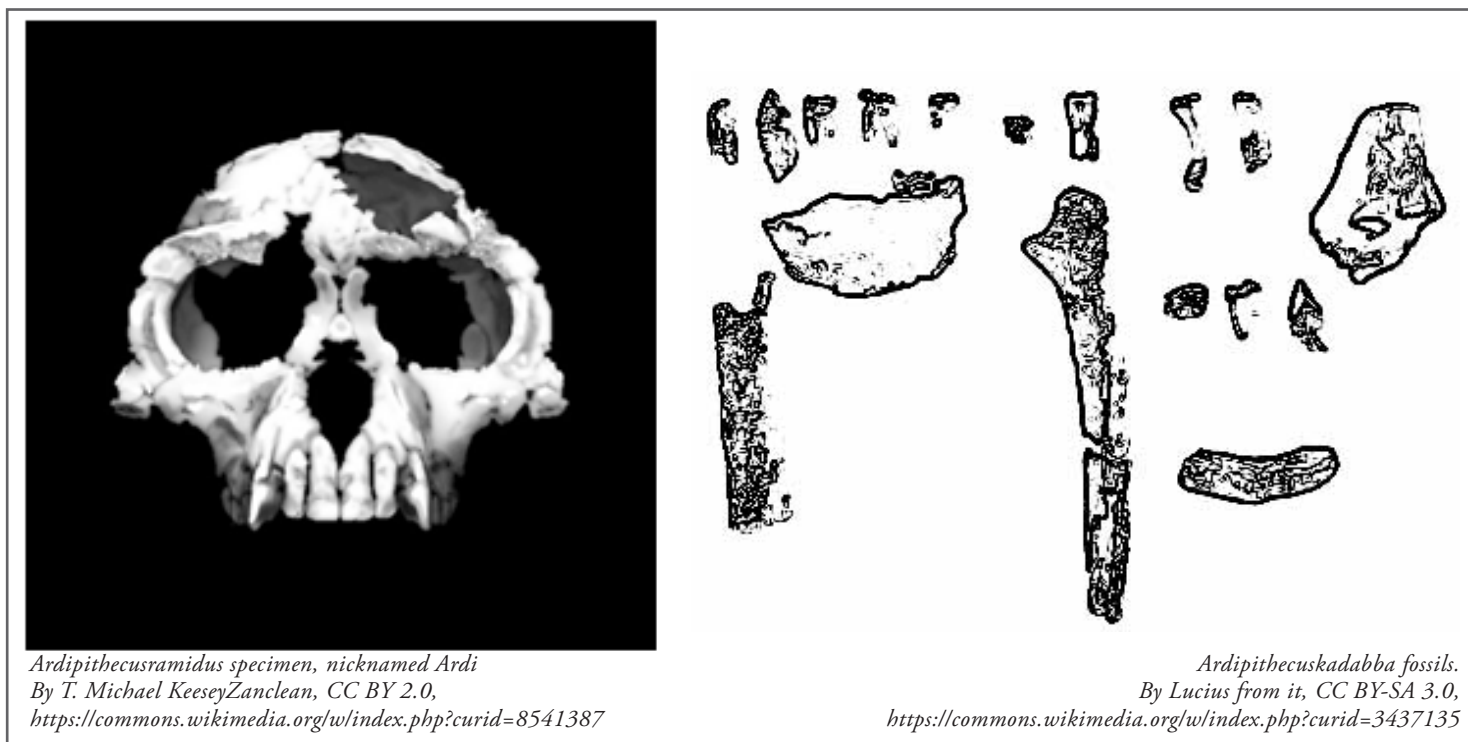


Fig. 9: Fossil remains from 2 species of genus *Ardipithecus*

Brain Size and the Out of Africa Thesis

Paleoneurology is a branch of study that involves studying the endocrania of fossils to determine anatomical brain asymmetries. Fossil endocrasts (impression the brain makes on the inside of the cranium) are sometimes formed when sediments fill the inside of the skull before it decays. From the few specimen available, the endocranial capacity of available *Australopithecus* fossil hominid species can be determined (this is shown in Table 1).

Taxon	N	Mean	Average
<i>A. afarensis</i>	3	413.5	482.82
<i>A. africanus</i>	6	441.2	
<i>A. robustus</i>	1	530.0	
<i>A. boisei</i>	4	513.0	
<i>A. robustus/A. boisei</i>	5	516.4	

Table 1: Endocranial capacity values for various *Australopithecus* fossils in cm³

(based on Tobias, Phillip. V. 1987. The brain of *Homo habilis*: A new level of organisation in cerebral evolution. *Journal of Human Evolution* 16, 741-761)

Compared to this average of 482.82 cm³, the ‘brain’ size of the earlier species described above, *Ardipithecus ramidus* dated 4.4 Ma, is only 300-350 cm³, smaller than that of modern Chimpanzees and Bonobos. This points to the observation made as early as 1925 by Raymond Dart (who first discovered the *Australopithecus* fossil in south Africa), which ensued a debate lasting for the next 50 years, that bipedalism predated brain enlargement.

Apart from brain size, Paleoneurological studies also throw light on brain asymmetries, that is, brain functional specialisation or lateralisation such handedness, language, etc. Endocrania of even early hominid fossils (like *Australopithecus africanus*, dated 3 Ma) show hemispheric asymmetries (that is, one brain hemisphere is larger/ smaller

than the other). However, a measure of brain size as the basis for behaviour is no longer considered the right methodology, and instead relative brain size along with body size and dentition, that is, a combined analysis based on cranial, dental, postcranial remains, is considered the right approach. If we compare the relative endocranial capacity of the *Australopithecus* with other hominid fossils, we obtain an interesting difference from *Australopithecus* to *Homo habilis* to *H. erectus* to *H. Sapiens*; this is shown in Table 2 (based on Tobias, 1987).

Given that various scientists conclude that at least the *H. habilis*, and according to some, even the *Australopithecus*, possess the anatomy for brain specialisation, it is possible that Out of Africa 1, exactly like Out of Africa 2, almost 2 million years later, must be thought to have been co-extensive with emergence of some brain functions. Given that the endocranial volume of *H. erectus* was a bigger jump, it is not a surprise that the first hominin fossil found outside Africa was that of *H. erectus*. Thus it may be conjectured that the spread of the *H. erectus* throughout Asia (as well as some evidence of early species in Europe) is a result of increased abilities in other cognitive abilities as well.

The Out of Africa thesis of human origin is based on archaeological evidence and evidence from skeletal fossil morphology. Archaeological or lithic evidence implies looking for evidence of possible distance between the sites where tools are found and the location of the source of the material from which those tools are made, that is, rock transport distance in case of early hominins. This kind of evidence may also involve studying the spread of lithic tools across different stratigraphic zones. Potts & Teague (2010) demonstrate that stone tools belonging to Oldowan technology, dated ~2.6 to 1.7 Ma of the lower Palaeolithic period, originally discovered in Ethiopia and near the famous Olduvai George site in Tanzania, east Africa (see Fig. 10), were spread to new Palaeogeographic zones.



Fig. 10: Oldowan stone tool By José-Manuel Benito Álvarez Locutus Borg (Locutus Borg <https://commons.wikimedia.org/w/index.php?curid=1892114>)

Morphologically, at least some *Homo habilis* fossils dated ~2.5 Ma from Ethiopia indicate commitment to terrestrial bipedality as well. For example, an analysis of the limb bones of these fossils shows that the femur bone elongation occurred prior to shortening of the forearm. Thus *H. habilis* shows more relative elongation of hind limbs compared to earlier species like *A. afarensis* and *A. africanus*. That is, it was more likely for the Homo to be ready to travel long distances than the *Australopithecus*.

Still staying within eastern Africa, Potts & Teague also show that as we proceed toward later times, rock source-to-site distance seems to increase, again indicating increased ability of later species to travel longer distances. For example, the oldest archaeological site of Ethiopia and Kenya, dated ~2.6 to 2.3 Ma, were situated only 32-330 ft. away from the rock source. As we proceed towards the Olduvai assemblages of ~1.85-1.77 Ma, the rock sites were 10 km away. This increased distance between source and site indicates decoupling of activities from localised landscape features.

Taxon	N	Mean	Average
<i>H. habilis</i>	6	640.2	640.2
<i>H. erectus erectus</i>	7	895.6	951.4
<i>H. erectus erectus</i>	6	929.8	
<i>H. erectus pekinensis</i>	5	1043.0	
<i>H. erectus</i> (Asia & Africa)	15	937.2	1121.1
<i>H. sapiens soloensis</i>	6	1090.8	
<i>H. sapiens soloensis</i>	5	1151.4	

Table 2: Endocranial capacity values for various hominid fossils in cm³

This section very briefly has shown that the early hominins were now ready to travel long distances, setting the scene for the the first Out of Africa migration to take place. The question is, where did they travel to?

India and Out of Africa: A Puzzle

I end this episode of human evolution with a puzzle, and will take up the rest of the story in the next part. This puzzle has to do with a missing link as far as the connection between hominin fossils and the Indian subcontinent is concerned. Although, very definite hominin fossil finds have been reported from both north and south China, as well as, very famously, from Java in southeast Asia, all dated within the range of ~1.43 to ~1.7 Ma, nothing remotely comparable has been found in the Indian subcontinent. That is, we find hominin fossils within 7°S to 40°N latitude but nothing in the comparable geographic zone in India.

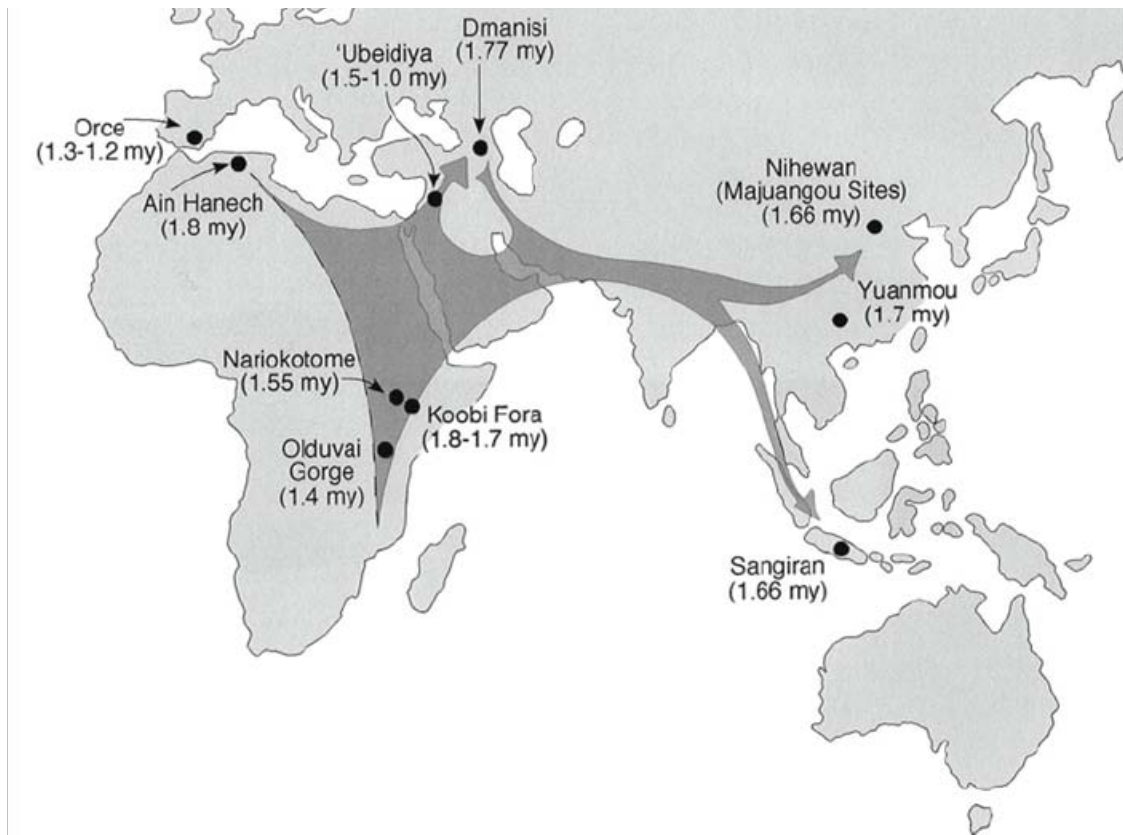


Fig. 11: *H. erectus* fossil sites possible routes and dates

Similarly, there have been definitive hominin fossils found in Europe and Eurasia (*H. heidelbergensis*, *H. antecessor*, *H. Neanderthal*, *Denisovan*, etc.), all dated about 700,000 years ago and less. Since a possible Indian corridor for the early hominin migration presents excellent sources for rocks for making tools and perennial fresh water springs and rivers in the north-central India,

early hominins would have been expected to pass through the subcontinent. Fig. 11 shows the sites where hominin fossils have been found and possible routes of movement out of Africa along with their first appearance dates (from Rightmire & Lordkipanidze, 2010:240).

However, and this is where it becomes really puzzling, there have been a plethora of very rich collection of hominin ecology reported from various sites in India. For example, Early and Late Acheulean tools, stone age oval and pea-shaped tools (see Fig. 12), associated with *H. erectus* and dated from roughly 1.76 Ma to 100,000 years ago, have been found at such sites as Morgaon, Pilikarar, Singi Talav, and Satpati Hill (for Early Ach.), and at Attirampakkam, Bhimbetka, Raisen District, Hunsgi-Baichbal Valleys, the Kaldgi Basin, and Gadari (for Late Ach.). Fig. 13 shows various Palaeolithic sites in India (from Petragalia, 2010: 166).

In fact, finds tentatively dated to ~2.0 Ma from Riwat and to 2.0 – 1.0 Ma from the Pabbi Hills (both in northern Pakistan) indicate *Homo* presence much earlier (Pappu 2001; Petraglia 2006). Large quantities of lithics (more than 1500 artefacts) were also reported by Paddy et al. (2001) from Isampur in north Karnataka, where 10 sites were found within 5-6 km. Two fossil herbivore teeth were also found at one of the sites and were dated ~1.27 Ma, which makes Isampur the oldest known site in India.

Finally, in 1982, a partial hominin cranium was discovered and assigned first to *Homo erectus* and later to early *H. sapiens*, in Hathnora, at the northern bank of Narmada river in Sehore district, 22 km east of Hoshangabad, Madhya Pradesh (Sonakia 1984, 1985, and others). This fossil is currently dated to ~236,000 years ago (Patnaik et al., 2009), which puts it in early middle

Pleistocene. A view of Hathnora besides Narmada and hominin cranium is shown in Fig. 14.

End this part of the human evolution story with a question in connection with the hominin fossils in India, why so little and why so late? I will come back to this in the next part of story.

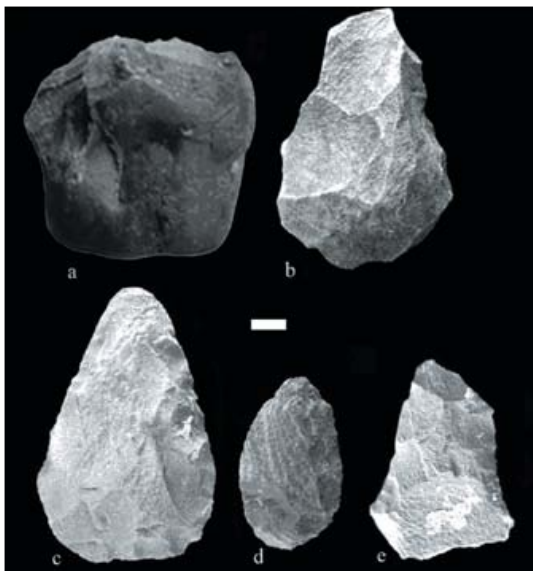


Fig. 12: Acheulean tools from Narmada valley (from Patnaik *et al.*, 2009)

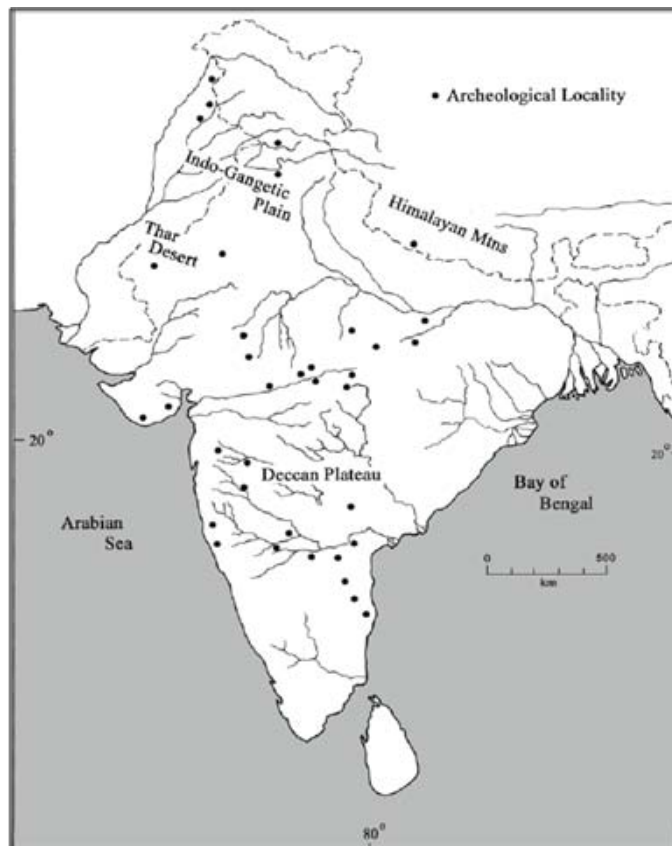


Fig. 13: Early Palaeolithic localities and sites



Fig. 14: Narmada hominin locality (Hathnora) and the hominin cranium (inset) (from Patnaik & Chauhan, 2009)