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**eG Pathshala**  
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### Learning objectives

- Who is *Homo*?
- What was the climatic condition when the first *Homo* appeared?
- Where did the first *Homo* appear?
- How do they look like?
- The stone tool industry of the earliest *Homo*
- The food habit of the earliest *Homo*

## 1. Introduction

We the *Homo sapiens*, dominated the earth by modifying the environment and controlling over other species. But how do we come into existence? Who is our nearest ancestor? Do we emerge in the present form in a particular place? If so, when did it happen and where? How did our early ancestor disperse? These are some of the basic questions that surface during the second half of the 19<sup>th</sup> century. These issues drove many scholars and thinkers to find out hypothesis on human origin, may be far from reality.

Charles Darwin was one of the pioneers in the field of evolution. Amazed by the great anatomical similarity between living human and African apes, he proclaimed that Africa must be the birth place for modern human. However, Ernst Haeckel (1834-1919), a German anatomist and evolutionary biologist of the late nineteenth century held a completely different view about human origin. He was of the opinion that Asia and not Africa must have been the birth place for modern humans. His view was supported by claiming that Asian great ape; the orangutan is more anatomically similar to human than that of African great apes as Darwin claimed.

Eugene Dubois, a young Dutch anatomist and anthropologist was fascinated by Haeckel ideas of human evolution. One common drawback of both Darwin and Haeckel is that none of them have seen or analyzed any human fossil but simply developed their hypothesis based on comparative human anatomy with that of great apes. Dubois thinks a little farther from both these two evolutionists and convinced that study of human origin needs to analyze its fossil records for better understanding. So, he came to Sumatra in 1887 in search of human remains in the island. After not able to find any trace of human fossil from Sumatra Island, he shifted his excavation to nearby Java. In 1891, Dubois and his team discovered a human molar; few months later a partial skull and a year later discovered a complete femur from the banks of Solo River, near the village of Trinil.

The skull found was clearly not that of human being. It is neither of a modern human nor of any ape, but something in between ape and modern human. The cranial capacity is estimated to be about 1,000cc which is too big for an ape (average cranial capacity of a chimpanzee is 400 cc) and too small for a human (average cranial capacity of modern human is 1450 cc). The femur was identical to human's indicating fully biped. Dubois was convinced that he had found what he was looking for, what Haeckel had predicted, the ancestor of humans from Asia. He even used the term 'Pithecanthropus' as proposed by Haeckel and named the fossil as *Pithecanthropus erectus* or 'upright walking ape-man' which was later came to be known as *Homo erectus*.

However, question arises. Did Dubois fossil from Java belong to the earliest species of *Homo*? No, Dubois and Haeckel were wrong in thinking that earliest human would be found in Asia. Then who

were the first members of the genus *Homo*? When did they appear and where? How they adapted to the environment? These are some of the questions that we would try to discuss in this module.

## 2. Defining *Homo*

It will be very easy for us to recognize a *Homo sapien* in living form. But will you be able to recognize an earliest *Homo* if you ever find a fossil? What type of characteristic feature you will be looking for in order to called it *Homo*? So, let's define the genus *Homo* before going further.

We all belong to the genus *Homo*. Genus *Homo* is characterized by having enlarged brain case compared to *Australopithecine* group. Further, the members of this group had a less projecting and flat face with reduced teeth and jaw size. Their body size was large and they were perfectly biped, meaning striding bipedalism. These characteristics found among the members of this group may be related to various adaptive strategies including a shift to a more animal based diet, dependence on manufacturing and use of stone tools and technology for gathering and processing food instead. In other word, they depended more on cultural practices as adaptive strategy. With this culture they increasingly controlled and influenced the environment and started exploring new habitat. However, earlier members of *Homo* were less different from the *Australopithecines* as compared to later members, making it difficult to distinguish between them. Hence, the first *Homo* is not much different from some of the *Australopithecines* at all.

## 3. Plio-Pleistocene climatic condition and evolution of *Homo*

Shifting from *Australopithecine* to *Homo* implies some set of adaptive strategy which was compelled by the changing climatic condition. So, we need to have some idea about the climatic condition during the time when the first *Homo* appeared. The first species of *Homo* appeared around 2.5 million year ago, say in late Pliocene and early Pleistocene. This period coincided with greatest climatic variability. Ice sheets became permanent features at North and South Pole during the early Pliocene. Cyclic glaciations began about 3 million year ago and became increasingly intensified throughout the Pleistocene. The glaciations became so severe that it lowered the sea levels enough to connect Islands of Southeast Asia to mainland Asia for the first time. This phenomenon is important because *Homo* started to move out of Africa. This severity in climate may also be the reason for enlargement in brain size and increased intelligence among *Homo*. Adapting to such hazardous environment may have honed human intelligence (Potts, 1996).



#### 4. Fossil record of *Homo habilis*, the earliest *Homo*

Ever since the accidental discovery of Taung child (*Australopithecus africanus*) from South Africa in 1924, a number of Australopithecine fossil were excavated from East, West and South Africa. In 1960, almost seven decades after Dubois discovered *Homo erectus* from Java, Louis and Mary Leakey discovered an extraordinary partial skull from Olduvai Gorge in Tanzania, the same site from where Robust Australopithecus (also known as *Paranthropus* or *Zinjanthropus boisei*) was discovered. The skull belongs to a juvenile and it is dated to about 2 million year ago. It is derived from the Australopithecine by having relatively smaller face and larger cranial capacity. The estimated average cranial capacity of earlier *Homo* skull is 631cc, compared to 520 cc for all the measurable *Paranthropus* specimens and 442 cc for Australopithecus crania (McHanry, 1988). Recognizing the significance of these characteristics, Louis Leakey, Philip Tobias and John Napier convincingly gave a new genus “*Homo*” and named it as *Homo habilis*, meaning ‘handy – man or skilled – man’, referring to the use and manufacture of stone tools.



(Source: [http://commons.wikimedia.org/wiki/File:Homo\\_habilis\\_\(cast\),\\_Olduvai\\_Gorge\\_-\\_Springfield\\_Science\\_Museum\\_-\\_Springfield,\\_MA\\_-\\_DSC03370.JPG](http://commons.wikimedia.org/wiki/File:Homo_habilis_(cast),_Olduvai_Gorge_-_Springfield_Science_Museum_-_Springfield,_MA_-_DSC03370.JPG). Access on 21/03/2015)

Fig 1: *Homo habilis* (OH7) fossil from Olduvai Gorge

In addition to fossil bone and teeth, some stone tools were also discovered from Olduvai Gorge. Initially it was thought to be the remains of Australopithecus, but later they were convinced that the discovered materials were of *Homo habilis* who really manufactured and used it. Thus, most anthropologists agreed that *Homo habilis* might be the first maker of stone tools and this marked the beginning of a lineage leading to modern human. Initially, reorganization of *Homo habilis* was met

with skepticism. However, with additional finding from other parts of Africa, it confirms the presence of such early member of the genus. Now *Homo habilis* is found from Hadar and Omo in Ethiopia, Urcha in Malawi, Chemeron Formation and Koobi Fora in Kenya besides Oldovai Gorge in Tanzania.

About a decade after *Homo habilis* was discovered, in early 1970s, Richard Leakey and his team discovered a more intact skull of *Homo habilis* from Koobi Fora, Eastern shore of Lake Turkana. The skull was dated approximately 1.9 million year ago and known by the National Museums of Kenya catalog number KNM-ER 1470. This fossil greatly differed from the one discovered from Olduvai Gorge having a large cranial capacity of 775 cc. The difference between the largest specimen of *Homo habilis* or early *Homo* and the smallest specimen is too large to be grouped together under one single species. The cranial capacity of the largest specimen is almost one third larger than the smallest specimen (only 510 cc). Moreover, the smaller specimens have longer upper limbs compared to the larger specimen, which is a primitive feature. Hence, many scholars preferred to call the larger specimen with a new species name *Homo rudolfensis*. However, the two types of specimen have similar brain to body proportion. The specimen with large brain size has larger body and the one with small brain size has smaller body. So, many scholars claim that they were male and female individuals of the same species. Since both the fossils have same general body plan and overall morphology we can consider them as a single species – *Homo habilis* or early *Homo*. But not to have confusion between *Homo habilis* and *Homo rudolfensis* we will use the term ‘early *Homo*’ to mean both.



Fig 1: Frontal and lateral view of KNM-ER 1470 also known as *Homo rudolfensis*. (Photographs © 1985 David L. Brill)  
(Source: Larsen, CS. 2010. Essentials of Physical Anthropology, Discovering Our Origins. W. W. Norton & Company, p 255)

East Africa have yielded a wide variety of fossil remains predominantly Australopithecine along with early *Homo* and *Homo erectus*. Early *Homo* roamed in East Africa from about 2.0 to 1.4 million year

ago (mya). The latest Australopithecine was seen in East Africa in about 1.5 mya and the earliest *Homo erectus* appeared in East Africa in 1.8 – 1.9 million year ago. By putting all these evidence together, it can be reasonably presumed that at least one species of early *Homo* evolved in East Africa about 2 million year ago, along with an Australopithecine species, coexisting contemporaneously for atleast a million year after which Australopithecines apparently disappeared forever. One lineage of this early *Homo* might have evolved into *Homo erectus* about 1.8 million year ago and all other species of early *Homo* became extinct sometime about 1.4 million year ago.

## 5. Physical Feature

### a. Skull and teeth

The skull of early *Homo* became more rounded with extension of brain size. Forehead became slightly visible. The face is less projecting and reduced in size with smaller and arched brow ridge compared to Australopithecines (earlier ancestors). The foramen magnum, the hole for attachment of the vertebral column was located in the centre of the skull base indicating bipedalism. The average cranial capacity is estimated to be about 630 cc which is significantly larger than that of Australopithecines. The jaw of early *Homo* became smaller with more rounded dental arcade than those of Australopithecines. The teeth became smaller but the incisors were still relatively large. The feature of teeth suggest that they were depending more on stone tools and technologies for getting food or else they may have very limited food resource.

### b. Post Cranial

The size of the body is relatively small and similar to that of Australopithecines with about four feet height. The leg and foot bones indicate that they were definitely bipedal. But bones of upper limbs show some primitive characteristic. The arms were relatively long suggesting that they retained some climbing ability (Wood, 1996). Fingers have slightly curved bones, intermediate between curved finger bones of quadrupedal apes and straight fingers of modern human. The proportion of finger bones suggests that they have the ability for precision grip. This might help them in manufacturing and using stone tools.

## 6. 'Homo habilis' Culture

### a. Early stone tools

- b. The earliest stone tools were discovered from Olduvai Gorge in 1959 when the *Australopithecus bosei* was excavated and it is estimated to be 2.5 million year old. The same site also yielded another hominine – *Homo habilis*. At first it was thought that *A. bosei* manufactured and used those tools. But, later it was realized that *A. bosei* will be too primitive to have made something so



sophisticated. Therefore, these tools were used and manufactured by *H habilis*. Whoever have manufactured and used it, the earliest stone tools were available from 2.5 million year ago.

These tools from Olduvai Gorge are so named as Oldowan tool industry, taking the name of the site from where it was first found. Most of the tools were **core**, water-smoothed cobbles 3-4 inches across, modified by knocking off a few chips from one or two face to make a sharp edge and **flakes**, small fragments removed from the core. Other tools found from Oldowan industry was **hammer stone**. It was used to break open the bones of large animals to get marrow and also to manufacture flakes from the core. Authorities initially thought that the Oldowan tools were all core tools and that flakes were the waste products of their manufacture. However, experiments have suggested that majority of core were the raw materials for the manufacture of flake tools which were used as cutting and scraping tools. Cores were used to produce flakes multiple times until it become too small to produce flakes and were discarded.

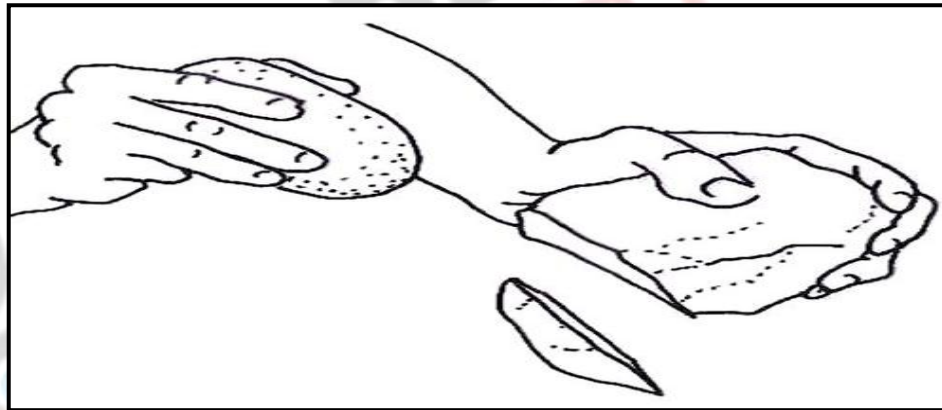


Fig 3: Technique of removing flakes from core (Source: <http://australianmuseum.net.au/image/stone-tools-initial-reduction-flaking>, creator Helen Beare, © Australian Museum)

Sometime, flakes can be very sharp and are effectively used to cut through tough animal hides to remove meat from bones or dig out roots and tubers. Early *Homo* seems to have travelled some distance in search of superior raw material to produce sharp and durable flakes. They may also probably carried those cores with them in order to remove flakes whenever required (Schick and Toth, 1993). So, if early *Homo* carried their tools around it must be because those tools were an important part of their daily life like cell phone and wallet in the present day life.

Analyzing the pattern of tool used at various sites in East Africa, archaeologists categorized the sites into different types. In some sites stone tools are found in association with varieties of mammal bones some of which bears cut and percussion marks made by stone tools. So, such sites may be the **butchering sites**. Stone tools are also found in large number in some particular sites where the raw material are found to be abundant but not in association with bones. These sites may be **quarrying**

**sites** from where they get raw material for manufacturing stone tools. Glynn Isaac (1978) proposes a third type of site called **home base**, some more comfortable central place, perhaps near a shade of tree or a water hole, where early *Homo* repeatedly brought butchered carcasses. They manufactured or refined and stored tools in this site. They slept and ate in greater safety in this site than the place where animal was killed. But this hypothesis faces skepticism due to lack of proper evidences.

## **b. Food Habit**

With the availability of sharp stone tools, animal foods became an important adaptive strategy for early *Homo*. The first indisputable evidence of tool use for getting animal meat is from the cut marks on fossilized bones of antelope about 2.5 million year ago. However, despite the enormous amount of evidence of meat eating in the form of butchered bones, we don't know how often early *Homo* might have eaten meat or how important meat was in their diet. How they get those meats? Do they hunt or scavenged?

There are three probable models on how they acquired carcasses:

- Active hunting: group of early *Homo* might have courageously attacked and slaughtered large and dangerous game.
- Confrontational scavenging: Large and dangerous game may be hunted down by large predators such as saber-toothed cats. Early *Homo* might have bravely fought off these predators to gain access to significant amount of meat.
- Passive scavenging: early *Homo* might have patiently waited till the large predator who hunted down the big game left the carcasses after they finish eating to get a few scraps of meat and fat.

It is important to know whether early *homo* evolved as hunter or scavenger as these activities indicate a different set of behavioral adaptation. Analyzing some of the cut marks on fossilized carcasses it is evident that carnivores first chewed and butchered later. Bone from Olduvai site show cut marks by the gnawing of contemporaneous lion, hyena, etc. and on top of that early *Homo*'s cut marks were found. This inferred that early *Homo* eats flesh from the bone after it had already been chewed by predators. So, at least occasionally early *Homo* scavenge but not hunt. There are more evidences of scavenging by early *Homo*. Analyzing the animal bones found from early *Homo*'s sites, Lewis Binford (1985) found that most of the bones belongs to the lower legs of antelopes where little flesh/meat was attached. This may be the left over part of the carcass after carnivores have finished eating. So, they might have cut through the bone to get nutritious marrow inside.

The climatic condition may give the most unfavorable condition for survival to early *Homo* but they were successful to survive through it with adaptive strategies. These adaptive strategies include enlarged brain, manufacture and use of stone tool and technology. This led them to explore new and

nutritious animal based diet. The success of early *Homo* set the stage for the rest of the hominine evolution. So, the first early *Homo* appears in around 2 million year ago. Before they disappeared, a new hominine species – *Homo erectus* appeared, equipped with more enhanced adaptive strategy which soon spread all over the old world, out of Africa.

## 7. Summary

- Genus *Homo* is characterized by having enlarged brain case compared to *Australopithecine* group.
- Further, the members of this group had a less projecting and flat face with reduced teeth and jaw size. Their body size was large and they were perfectly biped, meaning striding bipedalism.
- Shifting from *Australopithecine* to *Homo* implies some set of adaptive strategy which was compelled by the changing climatic condition.
- The first species of *Homo* appeared around 2.5 million year ago, say in late Pliocene and early Pleistocene.
- Earlier member of *Homo* are less different from the *Australopithecines* as compared to latter members, making it difficult to distinguish between them.
- Louis Leakey, Philip Tobias and John Napier convincingly gave a new genus “*Homo*” and named it as *Homo habilis*, meaning ‘handy – man or skilled – man’, referring to the use and manufacture of stone tools.
- *Homo habilis* was found from Hadar and Omo in Ethiopia, Urcha in Malawi, Chemeron Formation and Koobi Fora in Kenya besides Olduvai Gorge in Tanzania.