

Emergence of *Homo erectus*

The appearance of *Homo erectus* in the domain of hominid development put a new turn in the history of human evolution. No other hominids found in the earlier period were so widespread as *Homo erectus*. *Homo erectus* with a larger brain capacity than *Homo habilis* came to the scene about 1.6 million years ago. They not only developed a new concept of life intermingled with cultural traditions but also they explored, through their continuous efforts, the unknown horizon of life and activities which made valuable contributions to the existing knowledge and understanding of that remote past period. With *Homo erectus* we meet with a broad-based manifestation of the interplay among the biological, cultural and environmental factors than ever before.

The early hominids gradually became specified through time and space. Some of the Australopithecines and *habilis* evolved into a conspicuous big-brained genus of hominids—*Homo erectus*. The evolution of this genus occurred through a gradual process of development. It effected at different rates in different countries. The *Homo erectus* had been differentiated by their possession of increased cranial volume as compared to the earlier hominids. The average cranial capacity of *Homo erectus* is 800 c.c., whereas the cranial capacity of the *habilis* is 650 c.c. in the average. The Australopithecines have considerable less cranial capacity.

The first appearance of *Homo erectus* is dated to the Middle Pleistocene epoch which falls between 2,500,000 and 750,000 B.P. But so far as the African *Homo erectus* are concerned we get the evidence of their more earlier appearance. The earliest African *Homo erectus* finds are from East Africa where they emerged about 1.6 million years ago. *Homo erectus* date back about 1 million years in Asia and more recent in European countries. The discoveries of *Homo erectus* have been conducted throughout the different parts of the world. The first of the *Homo erectus* group of fossils was found from the Djetis Bed in Java in 1891. The fossils were full of primitive features, but in some, there were categorical humanoid characteristics. It was for that

blending of characters the fossils concerned became a subject of depth-oriented discussion amongst the physical anthropologists.

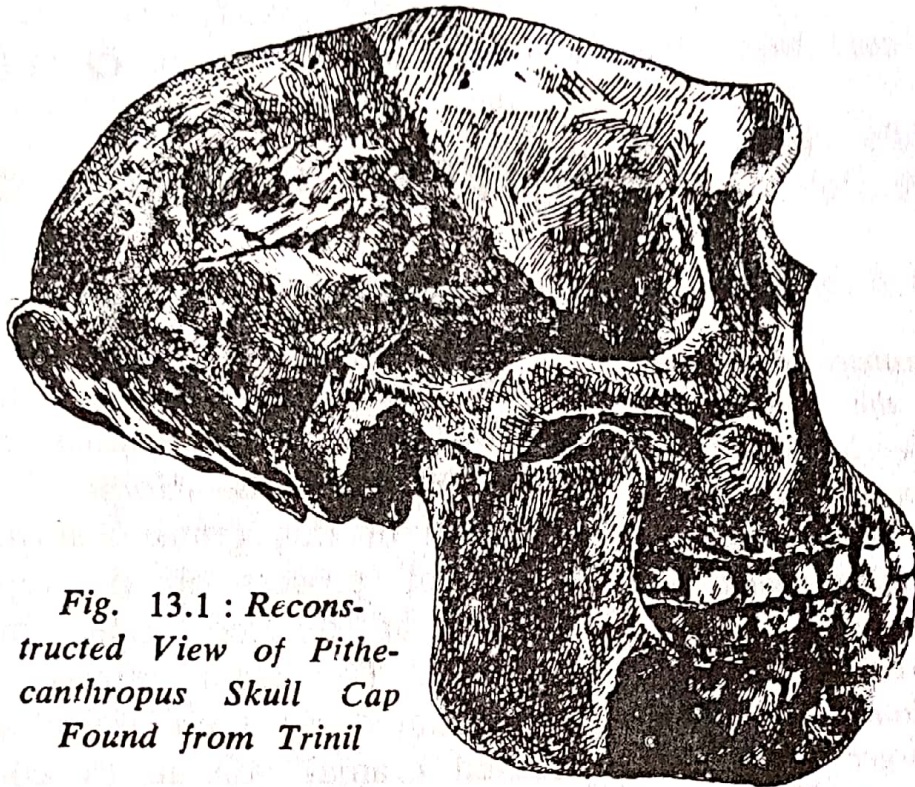


Fig. 13.1 : Reconstructed View of Pithecanthropus Skull Cap Found from Trinil

The fossil find concerned has been named as Pithecanthropus IV. In course of time Pithecanthropus I, II, III, V, VI, VII and VIII have been discovered from Java region. From Pithecanthropus I to VIII there is a gradual and significant change leading to the expansion of cranial volume as well as in the development of other bodily features. The Pithecanthropus finds and other related groups of fossils found from different countries are grouped together to be called as *Pithecanthropines*.

The next significant group of *Homo erectus* came from China. The first of the group was discovered in 1927 at Choukoutien (presently, Zhoukoudien), near Peking (now Beijing), in China. During different times about fifty individuals represented by dental and cranial fragments have been brought to light. All these were originally known as *Sinanthropus pekinensis*. They possessed higher cranial volumes than the specimens from Java. The cranial vault bones are, to some extent, thinner than those of Java fossils. The brow ridges of the Peking fossils are somewhat reduced. But in other features these fossils show similarities with the *Homo erectus* from Java. In 1963, Woo Ju-Kang of the Chinese Academy of Sciences discovered a lower jaw bone of an individual at Gangwangling near the town of Lantian in north-east China. The remain was seen under a 100-foot deposit of red clay. It was named as Lantian man. In the next year Woo and his associates brought to light another

primitive skull very similar to that of Lantian individual. Some teeth relating to *Homo erectus* were discovered at Jian Shi.

✓ The *Homo erectus* find from the Narmada Valley of India also deserves mention in this connection. It was de Chardin who specified the potentiality of getting the evidence of early man from this region of India because of diversified geological, ecological and circumstantial factors. In 1982, a few fossilised cranial fragments were discovered from the Middle to Upper Pleistocene deposits of the Narmada Valley (Please see Chapter 10). It has been specifically identified as an advanced form of *Homo erectus*



Fig. 13.2 : *Homo erectus* Skull Cap from Narmada Valley, India

though there are still a lot of controversies.

In Africa, *Homo erectus* remains are very conspicuous, specifically diversified and more earlier in development than their counterparts in Asia. The *Homo erectus* in Africa communicate many significant information in relation to human evolution. At Ternefine, Algeria, in North Africa, jaws and part of a skull were discovered in a sand pit which were assigned to *Homo erectus*. These were found out in 1955. Further discoveries relating to *Homo erectus* were made in North Africa in 1971. From Sale, in Morocco, a frontal bone was found which possessed striking similarities with the Peking fossils.

South Africa presents an important *Homo erectus* site at Swartkrans. In 1949, a strange jaw was discovered by Broom and Robinson which differed largely from *Australopithecus* specimens. Thus the skull was named as *Telanthropus capensis*. At present this skull is being identified as the South African variety of *Homo erectus*. The date is uncertain but there is a possibility that it belongs to the age of *Homo erectus* of Java.

Olduvai Gorge in East Africa is the worth mentioning site for the fossil finds relating to *Homo erectus*. In 1960, Leakey discovered from Bed II at Olduvai a calvarium with thick vault bones, sloping forehead and massive supra-orbital region. Then,

from Bed IV, several skull fragments have been discovered which are assigned to *Homo erectus*. In 1970, the recovery of Olduvai Hominid-28 femur and pelvic remains became very much illustrative to this sphere. The stone tools found in association with these bone fragments resemble very early Acheulean industry. A femur found from Bed IV closely resembles Asian *Homo erectus* femur. In the beginning of the seventies Richard Leakey discovered at Koobi Fora, in East Africa, a considerable number of skulls and bone fragments of very ancient hominids. His study team discovered, on the west shore of Lake Turkana, a more or less complete skeleton of *Homo erectus* dated to 1.6 million years B.P. This skeleton has striking similarities with the Peking finds. The Koobi Fora sites also presented us two almost complete femora belonging to ER 1472 and ER 1481. These were found from the deposits not less than 1.9 m.y. old. Kennedy (1983) attributed these femora to *Homo erectus*. If this attribution is taken to be a fully correct, then it should be noted that these are the earliest evidence of *Homo erectus* from Africa and also from other places of the world.

Turning to European countries we find a few important sites for materials relating to *Homo erectus*. The most remarkable specimen of European *Homo erectus* comes from Mauer village in Heidelberg, Germany. The fossil find is represented by a single piece of well-preserved lower jaw with complete dentition. It belonged to Middle Pleistocene and dated from 700,000—600,000 years B.P. In 1960, a superb well-preserved skull was discovered from a cave at Petralona in Greece. The Petralona skull is the most complete of all the early fossils found in Europe. It is probably of about 300,000 years old. These arose, to some extent, later than African and Asian *Homo erectus*. It has been subject to varied interpretations. In 1965, the occipital bone of a skull pertaining to *Homo erectus* was found from a quarry in Vertesszöllos, Hungary. It had a comparatively larger brain. From the study of the entire backside of the skull differing views have been noted. According to Wolpoff, the relatively high position of the attachment area for the neck muscles on the bone gives us the idea to believe that it is *Homo erectus*. But Andor Thoma, a Hungarian Scientist, is of opinion that the bones belong to the early *Homo sapiens* group. *Homo erectus* specimen has also been uncovered from Bilzingsleben, East Germany. The fossil finds comprised of fragmentary skull. These are morphologically very close to *Homo erectus* though somewhat later type. All the European fossils of this series pose problems relating to their exact interpretation.

The Java Man (Homo erectus erectus)

The discovery of the remarkable Java man was made through a firm determination of a Dutch Doctor, Eugene Dubois. He was

an anatomist in the University of Amsterdam. Dubois, in course of his work, developed an inherent interest in searching out man's forefathers. He made up his mind to have a tour through some regions of South East Asia and discover the "missing link" connecting the two phases of ape and human development.

Dr. Dubois gave reality to his thinking and, in the year 1887, he reached Sumatra with his wife and a newborn child. But nobody attached any seriousness to that endeavour. At that time everybody's eyes were stuck to the soil of Europe because of the fact that the leading scientists of those days put considerable stress on that part of the universe in exploring man's ancient remains. Dubois did not support that concept and he left Europe to prove his prediction correct. After close-set observations on some of the sites Dubois chose a particular place on 15-metre high embankment along the Solo river near Trinil village. His workmen started the work of digging of the site characterized by river deposits, volcanic debris and sandstone. Within a month the workers unearthed a curious ape-like tooth. It was followed by the discovery of the skull cap and a fossilized thigh bone. The thigh bone supplied him the particular information that its possessor walked upright, and Dubois named the creature *Pithecanthropus erectus*—the erect walking ape-man. It was 1891. The term *Pithecanthropus* was proposed earlier by the renowned German Scientist, Ernst Haeckel. He drew up a chart of human ancestry where he showed the hypothetical predecessor of modern man. He named it *Pithecanthropus alalus*. The genus *Pithecanthropus* is now obsolete since Java man belong to the same genus to which modern man belongs. This discovery was most sensational and brought revolution in the domain of natural science, and it was regarded as the long-sought transitional stage from ape to man. The deposits of these bone fragments occurred at a village named Trinil, situated on the bank of the river Solo. The layers from where the bone fragments of *Pithecanthropus erectus* were found, contained many fossilized plants and animals of different types. The fauna included two species of rhinoceros, hippopotamus, stegodon and carnivores, cat-type and monkey-type.

The fossil finds of the Trinil river bed show a striking resemblance to that of the Siwalik Hills of India. Therefore, it is said that, at that time, there was a land connection between this island and the Asiatic continent. The geological age of *Pithecanthropus* finds are certainly Early Pleistocene, but some are of opinion that these belong to the Late Pliocene. According to Dr. Dubois, the *Pithecanthropus* layer undoubtedly correlates with that of the early Pleistocene. Recently a number of K-Ar absolute dates

have been conducted on the Trinil finds and the Djetis Beds. The earliest date has been estimated at 1.9 million years, whereas dates of later Trinil Beds extend over the period from 900,000 to 600,000 years B.P. It indicates a range from Early to the Middle Pleistocene.

Several discoveries have been made regarding the Pithecanthropus and its allied humanoid forms by different scientists in different times. The list of the various discoveries is given in the next page.

Now we shall study the Pithecanthropus finds in detail. In doing this, first of all, we should concentrate our attention to the Trinil remains because much work has been done with these. Besides the skull cap, two molar teeth and a femur were found in Trinil. Dr. Dubois found a fragment of lower jaw, in the year 1890, at Kedung Brubus, thirty-five miles from Trinil.

THE SKULL-CAP

The maximum length of the skull-cap is 185 mm. and maximum breadth is 130 mm. The cranial index is 70, and, therefore, the skull is dolichocranial. The skull-cap shows simian characteristics in many respects.

The cranial capacity of the skull is 850 c.c. In man, it ranges from 1,000 c.c. to 1,600 c.c. and in apes, it generally does not exceed 600 c.c. Therefore, regarding the cranial capacity of the skull, the Pithecanthropus falls between apes and man.



Fig. 13.4: Skull-Cap of Java Man Discovered by Dubois

The vault of the skull is low and almost like those of the apes. The bones of the skull are found to be fused and the sutures can not be distinguished. The supra-orbital ridges are continuous and fuse across the middle line forming a torus. This is found in gorilla and chimpanzee. The forehead is narrow and slanting. The frontal bone presents a slightly marked median keel. But the skull, as a whole, lacks any trace of sagittal crest as found among the anthropoids, such as, the orang-utan and the gorilla. The temporal region of the skull is not very prominent and the temporal lines are widely separated, as in gibbons, chimpanzee and man. The malar plane is more inclined than in apes, and less inclined than in man. The outline of the skull shows a very flat contour

Table No. 13 : 2

DIFFERENT DISCOVERIES RELATING TO THE JAVA MAN

<i>Different Forms</i>	<i>Fragments Obtained</i>	<i>Discoverer</i>	<i>Place and Time</i>
(1) Pithecanthropus I	Skull cap and thigh bone, and two molar teeth	Dr. Dubois	Trinil (1891)
(2) Pithecanthropus Mandible-A	Fragments of lower jaw	Dr. Dubois	Kedung Brubus (1891)
(3) Homo Modjokertensis	Juvenile skull cup and some facial parts.	Geological Survey	Near Modjokerto (East Java) 1936
(4) Pithecanthropus Mandible-B	Lower jaw	von Koenigswald	Sangiran (1936)
(5) Pithecanthropus II	Skull and some parts of Lower jaw	von Koenigswald	Sangiran (1937)
(6) Pithecanthropus III	Juvenile skull fragments	von Koenigswald	Sangiran (1938)
(7) Pithecanthropus IV	Skull fragments and maxilla	von Koenigswald and Weidenreich	Sangiran (1939)
(8) Meganthropus Palaeojavanicus (Female)	Mandible	von Koenigswald	Sangiran (1939)
(9) Meganthropus Palaeojavanicus (Male)	Mandible	von Koenigswald	Sangiran (1941)

as is found in the case of apes. Several anatomists have laid stress on the presence of an occipital crest which is always widely interrupted in men, even in primitive types. Taken as a whole, Dubois has said that the skull of *Pithecanthropus* may be compared to that of a gibbon, but much enlarged. The main characteristics of the Trinil skull place this in an intermediate stage between chimpanzee and man of low status, such as Neanderthal man.

THE BRAIN

From the endocranial cast of the brain, it is evident that the frontal lobes of the brain are far smaller than those of modern man, though larger than those of modern apes. From the development of the certain parts of the brain, it is clear that *Pithecanthropus erectus* most probably had the power of speech. The parietal and post-parietal regions are more or less developed and this indicates the power of formation of thoughts and ideas. The interior frontal convolution is double than that of a chimpanzee and only half than that of a modern man. Thus regarding the brain it is clear that *Pithecanthropus* falls between the great apes and man.

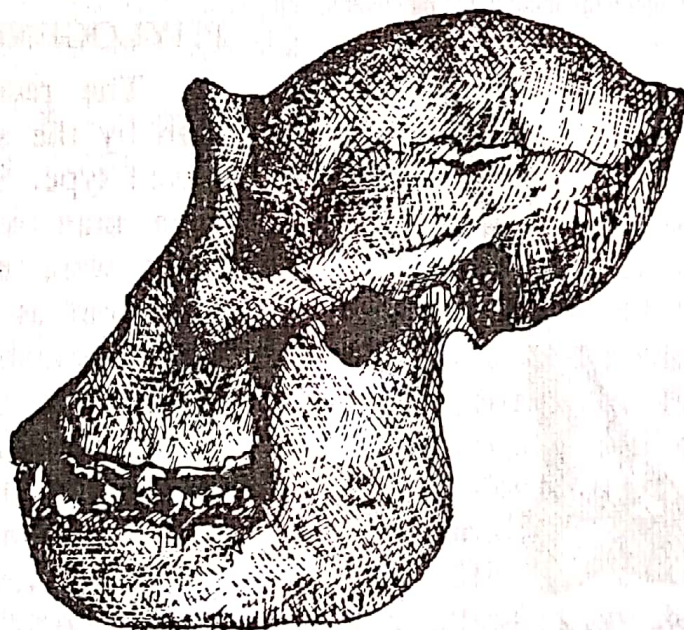
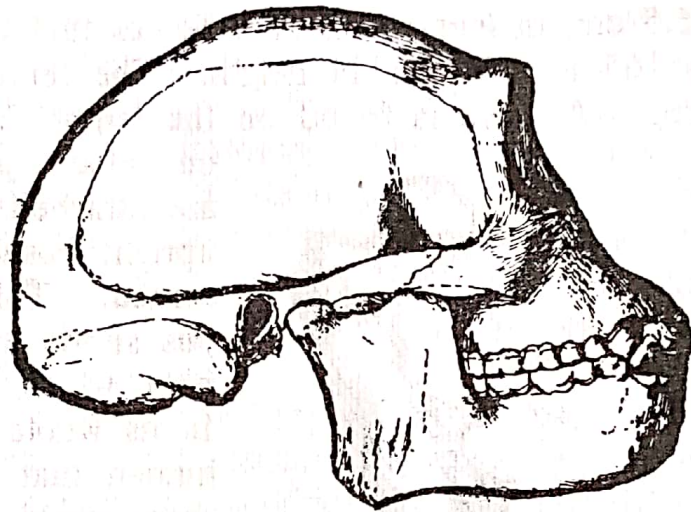


Fig. 13.5

THE TEETH

The teeth found are three in number—

a second upper left

molar, a third upper right molar, and a second right lower pre-

Upper : Dubois' First Reconstruction of Java Man

Lower : A Skull of Modern Gorilla

molar. These teeth are of enormous size. The roots of the teeth are widely separated as in apes. The crowns are more akin to human types. However, these teeth differ markedly both from those of man and from those of apes. Gregory is of opinion that these teeth resemble those of the orang and of *Dryopithecus*. On the whole, it seems that the teeth of *Pithecanthropus* are more simian than human.

THE FEMUR

The femur of *Pithecanthropus erectus* is far more modern than his skull and teeth. The femur found is a complete one and measures 45.5 cm. in length, which indicates that the possessor of this femur is 165 to 170 cm. in height. The femur is straight, slender and long. A ridge is found on the femur, known as the *linea aspera*, on which powerful extensor muscles are attached which is essential for the upright posture of the individual concerned. The femur of *Pithecanthropus* shows a well-developed *linea aspera*, which suggests the erect posture. In its whole structure, the femur is so human that had it been found alone, there would have been no hesitation in attributing it to a Pliocene man.

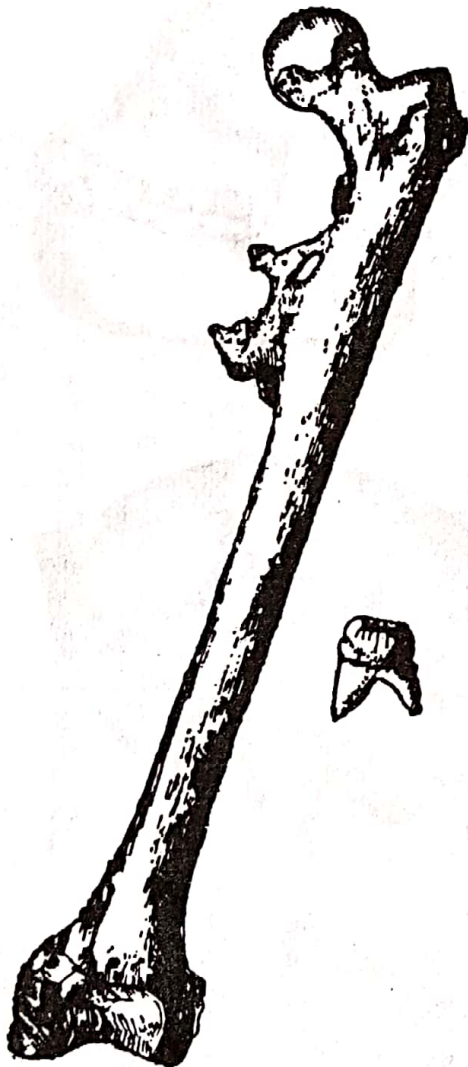


Fig. 13.6 : Femur and Third Upper Right Molar of *Pithecanthropus*

PHYLOGENETIC POSITION

The reception given to the Java man by the scientific personnel was of mixed type. Some were of opinion that Java man was out and out an ape, there were many anthropologists who took him as an intermediate type between apes and man. But many others nurtured an idea to focus Java man as an ancestor of man. There were some arguments at the beginning regarding the fact whether the skull, jaw bone, teeth and femur belonged to a single species. At that time it was difficult to prove it in spite of the fact that the materials were discovered from the same bed and in the same state of geographical preservation. But with the introduction of fluorine test the riddle was solved. It was accepted by all concerned that

the remains belonged to the same geological age—the creature developed a man-like posture more rapidly than a man-like skull.

Pithecanthropus bone remains have been discussed by different scientists in different times. This ape-like and, at the same time, humanoid primate has created a storm of controversy in the scientific world. According to many scientists including Dubois, Pithecanthropus represents an intermediate form between the anthropoid apes and man. But when von Koenigswald, after studying the remains, disclosed that Pithecanthropus belonged to a very lower status, Dr. Dubois changed his opinion and began to think that the Pithecanthropus was nothing but a gigantic ape related closely to the gibbon group. In the late 1930s a good many discoveries were made in Java. von Koenigswald unearthed some jaw fragments and skulls at Sangiran. This was followed by a multitude of discoveries relating to Pithecanthropus. These put forward the evidence that Java man did not stand alone—it rested on multiple individuals. From the collected data on the group of fossils relating to Java man it can easily be conferred that this man-like animal surpassed all the anthropoid apes in its brain formation, erect gait and other humanoid characters. In its various bodily developments, Java man comes very close to man. The Java fossils, that were identified as Pithecanthropus for long, have now been reevaluated in the modern scientific methodology. Most anthropologists take it for granted that they are more similar to modern *Homo sapiens* to be labelled as *Homo erectus* pointing out their direct relationship to modern man.

Reference: R. M. Sankar