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Subject: Anthropology

Production of Courseware
-Content for Post Graduate Courses

Paper No. : 01 Physical/Biological Anthropology
Module : 06 Hominization Process

ज्ञान-विज्ञान विमुक्तये

athshala पाठशाला

MHRD Govt. of India

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Description Of Module	
Subject Name	Anthropology
Paper Name	**01 Physical/Biological Anthropology**
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7. Summary

Learning objectives:

- This module would help the students to understand the concept of Hominization process.
- This module explains the type of anatomical changes that have occurred in human beings during the course of evolution
- This module explains the type of physiological changes that have occurred in human beings during the course of evolution
- This module explains the type of behavioural changes that have occurred in human beings during the course of evolution

Introduction

Homanization Process

The homanization process may be viewed as the evolutionary transformation from prehomind to hominid status in the course of human evolution. It is also referred to as ñaromophasis" by Severtson (1939) and "anagenis" by Hur Oley (1942) and Rensch (1960). The original meaning of the word ôhominizationô was the emergence of human among other living things. It means the threshold which prehumans had to cross before becoming human. This process concerns the nature and adaptive significance of major anatomical and physiological transformation in the evolution of the body from an ape like higher primate to the single variable species, Homo sapiens.

The changes that have occurred in the evolutionary development of mankind since its divergence from the last common ancestor and are shared with any living ape can be categorized into two groups.

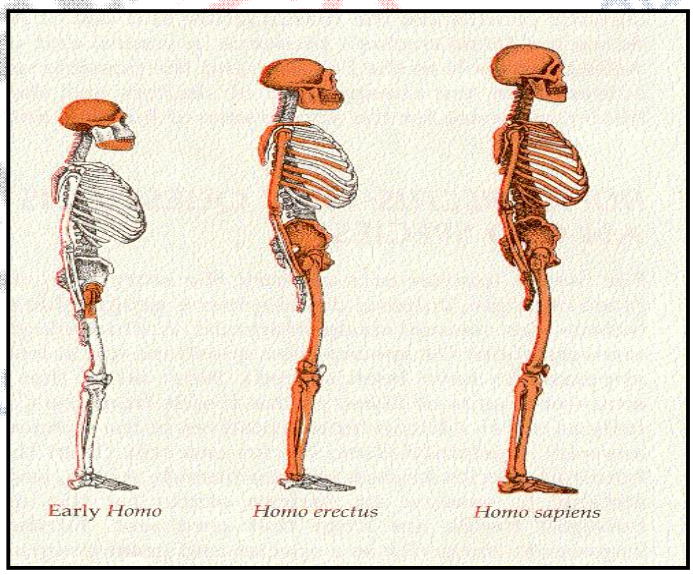


Fig. 1 Hominization Process of Homo sapiens

1.1 Anatomical and physiological changes.
1.2 Behavioural changes

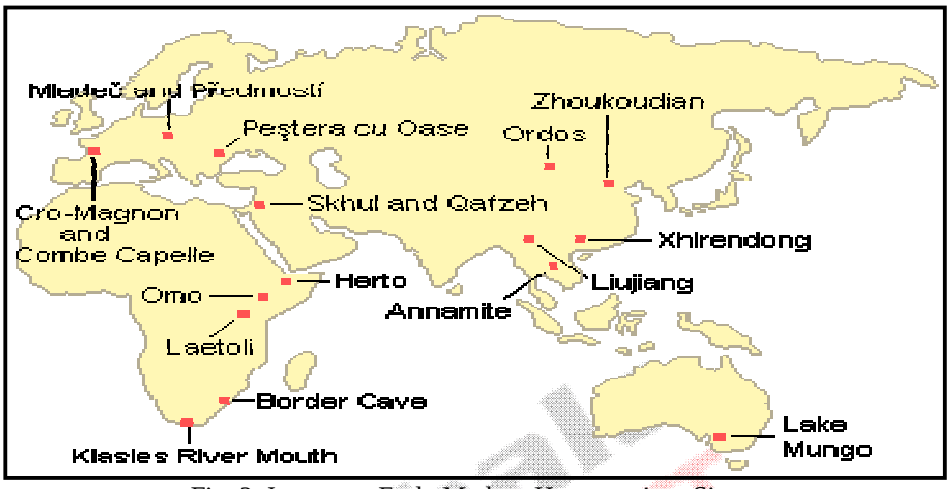


Fig. 2: Important Early Modern Homo sapiens Sites.

I. Anatomical and physiological changes

A. Visible in fossils

B. Not readily visible in fossils

- Modification of hands and arms for more effective carrying and tool use.
- Changes in skin and skin glands.
- Reduction in body hair.
- Enlargement of the brain.
- Continuous sexual receptivity of female.
- Reduction and remodeling of the jaws.
- Partial reorganisation of the brain.
- Modification of the vocal tract.

II. Behavioural changes

A. Directly detectable by archaeology

B. Not directly detectable by archaeology

- Increasing dependence on manufactured equipment and tools
- Language
- Suitable control on display of emotions
- Great increase in expressing ideas.

Hunting- Meat eating:

- Co-operation and division of labour

- Increasing interdependence through food-sharing
- Greater increase in social bonding mechanism- marriage and Marriage kinship reciprocation.
- Re-organization of behaviour around a 'Camp' or Home-Base.
- Great increase in symbolism.

The Hominization process consists of evolutionary transformation of hominoids into hominids. It is a process that has occurred in the hominoid-line since its divergence from the last common hominoid ancestor shared with any living ape. Initially the term has a restricted meaning and implied emergence of modern man, different from all other forms. Currently, however, the term is broadened and includes all those aspects of structural and behavioral changes that occurred in the Hominid line, finally leading to the emergence of modern human group.

Over a century, the prevailing view among evolutionists has been that Bipedalism preceded encephalization. The last decade of hominid fossil discoveries has made some surprising refinements in this view. The most dramatic discovery is the pattern revealed by the 3.7 to 3.0 mya old Australopithecus africanus. The members of this group were bipedal, yet their absolute brain size was about one third that of modern Homo sapiens and teeth were intermediate between pongid and hominid. These bodily transformations during the process of hominization were affected at quite unequal rate (differential rate of somatic evolution) implying that human evolution came about in mosaic from bearing on a certain number characteristics.

Important Early Modern Homo sapiens Sites		
East Africa	Herto, Middle Awash [1]	160,000-154,000
	Omo	130,000
	Laetoli	120,000
South Africa:	Border Cave	115,000-90,000
	Klasies River Mouth	90,000
Israel:	Skhul and Qafzeh	92,000
Australia:	Lake Mungo	60,000-46,000
Europe: [2]	Peкtera cu Oase (Romania)	36,000-34,000
	Mladeļ and PŚedmostí (Czech Republic)	35,000-25,000
	Cro-Magnon (France)	30,000-23,000

All such changes can be broadly grouped into following heads.

1. Bipedalism
2. Hand manipulation and tool use (manual dexterity)
3. Modification of jaw and teeth.
4. Enlargement of brain
5. Changes in vocal tracts, language and speech

1. Bipedalism

Analysis of postcranial elements of A. Africanus, A. Afarensis, A. Ramidus (Tim et al. 1994) and A. Anamensis (Leakey et al. 1995) clearly establishes Bipedalism to be one of the oldest of all hominid characteristics. The age of the earliest variant of australopithecines, A.Ramidus is estimated to be 4.4 mya. The appearance of this group took place perhaps one million years after the separation of ancestral lines leading to great apes and human. The branching out point between ape and human ancestors is estimated to be 5-6 mya. According to Stanford (1995), A. ramidus was a biped; its lower body was clearly adapted for walking on the ground, though they may have continued to use trees for gathering fruits and for shelter at night. Postcranial elements especially limb and pelvis anatomy of A. *afarensis* shows characteristics of bipedal adaptations. For example, iliac blades were short and broad, ischium was short, anatomy of hand and ankle joints were favorable, big toe was parallel. In all such features afarensis was more human like than ape.

In addition to post cranial elements, the Laetoli (Tanzania) foot prints of A. afarensis, proved that *Australopithecine* have existed around 3.77 mya, which is another proof of Bipedalism. It shows a convergent big toe, heel strikes, arches, etc. similar to humans in many aspects.

There are, however, certain features possessed by afarensis such as shorter hind limbs, longer foot, longer toes, etc. that suggest that australopithecine Bipedalism was different from, human Bipedalism. Such differences in the locomotory behaviour can be explained due to the habitat supposed to have existed in eastern African-woodland, bushland and dry savannah with patches of forest along rivers and lakes. Thus, they had to live somewhat less on the tree and more on the ground.

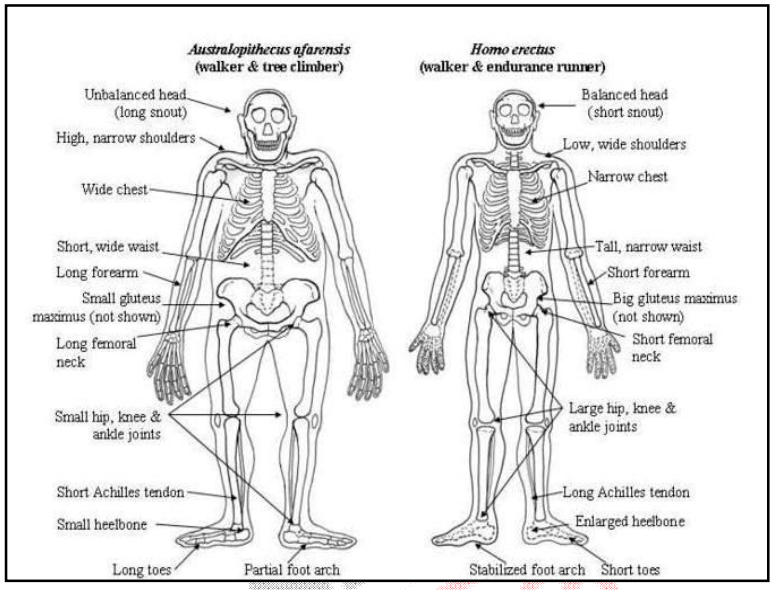
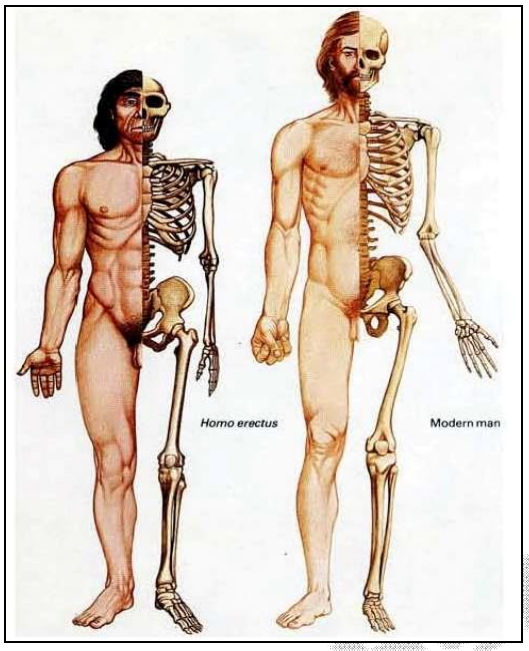


Fig 3. Bipedalism

2. Hand anatomy and Tool use

The earliest evidences of hand manipulations that are different from apes and similar to Homo can be found in A. Afarensis. The hand proportion of the members of this group is approximately similar to human proportions but differ from those of humans in having fingers more curved suggesting greater power grip. The hand anatomy of *afarensis* also reveals that the precision grip was greater among them compared to that of the chimpanzee, but lesser than that of the Homo. A. *afarensis* spent more time on the land than on the trees hence the hand-anatomy had started overshadowing the characteristics of hands of Homo and different from those of apes. Hominids with their manipulative hands, precision grip and contemplating brains, had been able to expand their ecological niche so far beyond the physical capabilities inherent in their makeup, one that no other animal has ever had the potential to achieve.

The classical view of anthropologists has been that the use of tools led to the distinction between human and ape that the split between the pongidae and the hominidae resulted from the acquisition of tool-use by one of the ancestral hominoid populations. Others now feel that environmental influence and adaptation to nonarboreal ecological niches were more important for early hominid evolution. However these divergent views are ultimately resolved, it is interesting to learn how far human technology and culture can be traced.



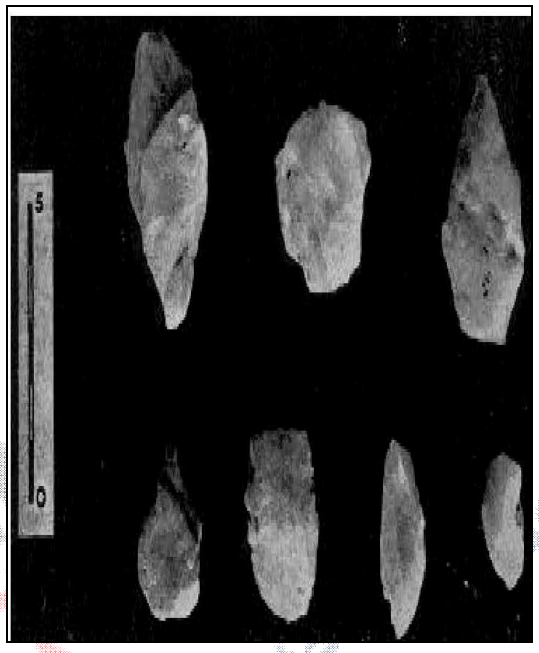


Fig . 4: Hand anatomy and Tool use

Recent palaeo-anthropological findings reflect the use of tools, antedates the origin of the big-brained *Homo sapiens* by at least a million and a half year. There is now indisputable evidence of the occurrence of modified stone tools that is 2 million years old found in association with the bones of *Homo habilis*. In other words, tool-use and tool-making developed before hominid brain capacity had undergone remarkable increase. The old idea that a large brain and associated high intelligence were prerequisites for tool use is no longer tenable. The use of tools by primitive hominids may, in fact, have been a major factor in the evolution of the cerebral cortex and higher intelligence, for once the use and making of tools began to favour survival, there would be high selection pressure for neural mechanism promoting improved crafting and use of tools. The elaborate brain of *Homo sapiens* may be a consequence of culture as much as its cause. Hominization process, with respect to cultural attainments, had set in much before the modern man appeared on the earth. Oldowan industry of earliest *Homo habilis* clearly proves the point.

Homo erectus had not only perfected stone tools considerably but had also learned how to control and use fire, as revealed by radio isotope dated hearths in caves. With fire humans could cook their food they could keep themselves warm in cold weather; they could ward off predators and they could light up the dark to see. The hearth no doubt promoted the development of social organization and allowed an opportunity for the beginning of communication through spoken language.