Unit II: Theories of Evolution and Human Origin

Module No.6: Ramapithecus (Ramapithecus bevirostris)

OBJECTIVES:

The main objectives of this lecture are to make the students understand

- the historical background of the genus Ramapithecus and its importance in the study of human evolution,
- the salient anatomical and morphological features of the genus Ramapithecus and
- the phylogenetic status of the genus Ramapithecus on the basis of comparative anatomy with other genus.

SUMMARY

The fossil remains of Ramapithecus have been found in Africa and India. It may live about 9-14 million years ago (i.e. Miocene Pliocene border). The oldest of these remains called Ramapithecus wickeri was found in Kenya. The species found in the Siwalik hills of north western by G.E. Lewis has been called as Ramapithecus punjabicus.

Like the Dryopithecus, this genus is also represented mainly by teeth and jaw bones. The teeth display a number of features like parabolic dental arcade, small canines, small incisors and molars with flat, broad and thickly enameled chewing surface similar to that of the hominids. The reasons suggested for this change in dentition are based on the change in the environmental conditions. The regions where the Ramapithecus lived were not merely forests, but open grasslands. Exploiting this area for country food like seeds might have led to these dental modifications. These anatomical features lead to the conclusion that this genus, Ramapithecus, must have been the ancestral hominid form. It is here that we find the clear cut distinction in features between the pongids and the hominids. Ramapithecus is, therefore, the crucial find that contributes to the solution of pin-pointing the earliest ancestor of man in the evolutionary line.

TEXT

INTRODUCTION

The earliest fossils bearing the traits of the hominid are those belonging to genus Ramapithecus. Ramapithecus is the most important hominid from Miocene period. In recent years Ramapithecus has been accepted by many scholars as the first true hominid. There are at least two dozen fossils specimens that have been identified as belong to Ramapithecus. Most of these specimens consist of teeth and jaws and they principally come from two areas – the Siwalik Hills in India and Fort Ternan in Kenya.

DISCOVERY AND DISTRIBUTION OF RAMAPITHECUS

The first discovery of Ramapithecus fossils was made by G.E. Lewis in 1932 in the Siwalik hills regions of India. He assigned one of the fossils, an upper jaw, to a new genus and species he named Ramapithecus brevirostris. The generic name simply means Rama's ape' Rama being the mythical prince who is the hero of Indian epic poem. The species name that Lewis chose was more meaningful for it is the Latin word for 'short snouted'. Next Ramapithecus fossil find was

made by L.S.B. Leakey near Fort Ternan in south western Kenya in 1961. The specimen included parts of both sides of an upper jaw. Leakey gave it the name Kenyapithecus wickeri, which is synonymous with Ramapithecus brevirostris, after his friend Fred Wicker, on whose farm the fossil was found. which is synonymous with Ramapithecus brevirostris.

The next Ramapithecus specimen was excavated by Von Freyburg, a german geologist, in Greece during World War II. The specimen was assigned to another new genus and species: Graicopithecus freyburgi. Freyburg's find was the complete tooth bearing part of lower jaw and at the time of its discovery it contained all the teeth.

Next to the growing inventory of Ramapithecus fossil was a lower jaw unearthed from a Miocene deposit near Candir, some 40 miles north east of Ankara in Turkey in 1973. The specimen was named as Sivapithecus alpani. The species name of the Candir jaw honors the director of the Turkish Geological Survey. A major group of Ramapithecus like fossils has also been discovered in coal deposits of Miocene age in the Rudabanya Mountains of north eastern Hungary. They have been assigned to still another new genus and species Rudapithecus hungaricus.

IMPORTANT SITES, YEAR OF DICOVERY AND DISCOVERERS OF RAMAPITHECUS

Sl.No.	Sites	Year and Discoverers	Genus and species
1	Siwalik hills, Haritalyangar (India)	1932 & 1934,G.E. Lewis	*Ramapithecus punjabicus, Ramapithecus brevirostris*
2	Fort Ternan(Kenya)	1961 &1962, L.S.B. Leakey	*Kenyapithecus wickeri*
3	Athens (Greece)	1972 Bruno Von Freyburg	*Graicopithecus freyburg*
4	Candir (Turkey)	1973,1974 Ibrahim Tekkaya	*Sivapithecus alpani*
5	Rudabanya(Hungary)	Miklos, Kretzoi1977,1979	*Rudapithecus hungaricus*
6	Pakistan	D. Pilbeam and co-worker	*Ramapithecus*

ANATOMICAL CHARACTERISTICS OF RAMAPITHECUS

1. Incisors and canine are inserted vertically and not in slight procumbent position as in apes.
2. Little or no canine diastema.
3. The canines of the Ramapithecus are not projected and they possess narrow faces.
4. The dental arcade is rounded.
5. The palate of the Ramapithecus is arched as in man.
6. Flattened and thick enameled premolars and molars that appear to be adapted for heavy chewing and processing of hard food stuffs.
7. Ramapithecus has a canine fossa (Kenyapithecus).
8. The molars possess the Dryopithecus Y-5 cusps pattern.
9. Slightly divergent tooth rows. The tooth rows have been identified as parabolic by some and V-shape by some others.
10. Reduction of size of third molar as compared to first and second molar.

11. The ratio between the sizes of front tooth (incisors and canine) and those of cheek teeth (premolars and molars) is roughly the same which indicates the human position.
12. Shelf-like ridges are present inside the lower jaw of Ramapithecus.
13. Large inferior torus on mandible.
14. Short maxilla that would indicate a placement of the chewing muscles that increase the chewing pressure brought to bear on the food being eaten.
15. Facial profile is orthognathus.

PHYLOGENETIC POSITION OF RAMAPITECUS

The Dryopithecinae primates made their appearance in Europe, Asia and Africa during Miocene and Pliocene epochs. Their size range from gibbon like body form to the body structure of modern gorilla. Most of the remains belong to Dryopithecinae are jaws and teeth; therefore, the charactors distinguishing Dryopithecinae from Hominidae are restricted to dentition. Gregory and Hellman, after conducting their dental characters, came to the conclusion that Dryopithecinae were the common ancestor of the anthropoid apes and man.

In the year 1856, Lartet discovered from Miocene deposits, in south france, a lower jaw bone which was assigned to the genus Dryopithecus. The place of Dryopithecus in the evolutionary stem has been found out by studying the peculiar dentition – "the Dryopithecus pattern" which is characterized by five cusped lower molars. After carefull study of the different species of Dryopithecus, it has been decided by many scientists that Dryopithecus fontani, Dryopithecus rheuanus and Dryopithecus darwini, were probably the ancestors of gorilla, chimpanzee and humanoid forms respectively.

Fossils found in Europe and asia since 1970 suggests that between 10 and 15 million years ago dryopithecus gave rise to at least three other genera. Two of them Sivapithecus and Giogantopithecus were primates with a face as large as that of a modern chimpanzee or gorilla. The third genus, Ramapithecus had a small face. Of the three genera, Ramapithecus clearly shows the greatest similarity to later hominids.

Ramapithecuis has been the center of a great deal of debate concerning its possible hominid status. Pilbeam has proposed alternatively that a number of the middle and late Miocene genera to be classified together in Ramapithecinae, in an attempt to both to draw attention to morphological feature shared by the group which differentiate it from others and to focus discussion on adaptation and biology rather than phylogeny. The most widely distributed Ramapithecid genera are Ramapithecus and Sivapithecus. The taxonomy of this group is in a rather confused state, which newer materials from Pakistan will hopefully help clarify. Isolated teeth of Ramapithecusnand Sivapithecus are very difficult to distinguish except on the basis of size; Ramapithecus teeth are smaller. What seems more probable is that both Ramapithecus and Sivapithecus are quite dimorphic dentally and that the size ranges of the two forms overlap, perhaps substantially Ramapithecus may show less canine dimorphism than Sivapithecus though more than the Pliocene hominid Australopithecus afarensis.

A handful of ramapithecid postcranial remains have been recovered during recent work in Pakistan, attributable to Ramapithecus, Sivapithecus and to a third form gigantopithecus bilaspurensis. Though these remains are unfortunately fragmentary, they suggest that all the ramapithecids were smaller than previously expected: Ramapithecus ~20kg, Sivapithecus ~ 40kg and Gigantopithecus ~ 70kg.
Therefore, the fossil finds of Ramapithecus are regarded as the most important addition to the knowledge of relating to human evolution. Credit goes to G.E. Lewis to discover in the year 1934, the fossilized remain of Ramapithecus in the Siwalik hills of India. Dr. Simons has attributed

Ramapithecus a very significant position in the line of human evolution. Ramapithecus raised many important points which are highly effective in search of human ancestral pattern. On examining the nature and extent of teeth, some scholars described Ramapithecus as a weapon wielding terrestrial biped. Ramapithecus, according to the competent anthropologists, represents the oldest known ancestors of the human line. The scientists like Simon, Pilbeam and Tattersall are the proponent of Ramapithecus as a human ancestor. The materials so far excavated in relation to Ramapithecus suggest a line between Dryopithecus group belonging to early Miocene and later real hominids. In a review based study made by Conroy and Pilbeam a plausible interpretation of the Ramapithecus has been given as the late Cenozoic ancestor of Australopithecus.

In consequence of recent findings and interpretations Ramapithecus has been widely considered as a candidate for the first hominid. It splits up from the ape line 14 million years ago and marked the remarkable beginning of hominid line. The main reason for giving Ramapithecus a true hominid status is the similarity of its teeth with that of the later hominids. In discussing the status of Ramapithecus, Swartz and Jordan have remarked that when a creature is called hominid, it doesn't mean that it is a modern man, but this term is used for clearly human like forms. Ramapithecus was such a creature as understood by many authorities.

CONTROVERSY REGARDING THE TAXONOMY OF RAMAPITHECUS

The current view of the Ramapithecus depends upon little more than two dozen fragments, mainly of teeth and parts of jaws that have been discovered since the first find reported on by G. Edward Lewis in 1934. The initial discovery prompted Lewis to recognize a new form that he called Ramapithecus. This was followed in later years by a handful of fossils that were each recognized as new forms and they were given a series of separate names (Kenyapithecus, Graecopithecus, Rudapithecus, Sivapithecus) based upon the geographical localities at which they were found. But in 1965 Simons and Pilbeam reviewed the entire series and held the view that all these forms really comprised two species groups. One of these, Sivapithecus, was basically ape like and it was therefore put forward as an ape ancestor; the other, Rudapithecus, seemed to possess a number of hominid- like features was therefore entered as an early hominid ancestor. This view was still extent in 1977 but a series of more recent studies has cast doubt upon it.

Thus Andrews and Cronin (1982) and Lipson and Pilbeam (1982) have all suggested that the non Chinese ramapithecus are really only a single species or species group, that the two forms (Sivapithecus and Ramapithecus) are really only the males and females of sexually dimorphic species group.

One of the reasons for putting forward this new idea is an attempt to make these data conform to those suggested by the concept of molecular clock. The molecular clock, assessing the time from common ancestry of two species using the notion that molecular evolution has taken place in a linear manner, suggests that human and African apes had a common ancestor at five million years ago or even closer to the present time. If these were true, it would be logically impossible for there to have existed prior ancestors of humans (ramapithecines date from 8 to 14 million years ago) that were more like humans than apes. The new views of the fossils have therefore concentrated on the ape like features of Ramapithecines and of these, big sexual dimorphism is one of the most powerful, being found in every great ape known, but not markedly present in any species of the genus Homo so far identified.

But the later evidences regarding Ramapithecus strongly suggests that two species are present there in Yunnan. One of these, the larger creature, (Sivapithecus), with larger dental sexual dimorphism, larger canine dimorphism, larger canine heights and areas, more herbivorous dentition, considerably smaller number of males than females has attributes that are matched by many of the apes. In contrast, the smaller creature, (Ramapithecus) possess smaller dental sexual dimorphism, smaller canine dimorphism, smaller canine heights and areas, more omnivorous

dentition and equal numbers of males and females, and thus has attributed that would not deny it a place in a radiation of prehuman form.

FAQs

Q1. Write a short note on Ramapithecus. (5 marks)

Answer: The fossil finds of Ramapithecus are regarded as the most important addition to the knowledge relating to human evolutionary development. It is the most important fossil hominid from Miocene period. In recent years, Ramapithecus has been accepted by many scholars as the first true hominid. Most of the Ramapithecus fossil specimen consists of teeth and jaws and they principally come from two areas – the Siwalik hills in India and Fort Ternan in Kennya. A mandible is also found from Pakistan and this may be the most complete fossil yet found known as Ramapithecus. Other specimens have been found from Turkey, Hungary and Greece. The Fort Ternan fossil have been absolutely dated to 14 million years ago, while the Siwalik hill specimens are younger being dated to about 10-12 million years ago. The striking feature of this Miocene fossil is that the dental arcade was rounded, the canines small and, probably, the incisors small and spatulate. It can be deduced from these features that the front teeth were no longer used for tearing the food and that this was a function of the hands freed by bipedalism for the task. Ramapithecus certainly provides a possible link between the definitely ape like Dyopithecus and the later Pliocene and Pleistocene hominids. The molar teeth of the Ramapithecus are relatively much larger than those of Homo, but are smaller than those of Dryopithecus. The whole animal was gibbon size. Ramapithecus thus occurs in the proper time and place to represent a forerunner of the Pleistocene Hominidae.

Q2. Write a short note on Ramapithecus brevirostris. (5marks)

Answer: In the year 1934, G.E. Lewis discovered the fossilized remains of Ramapithecus in the Siwalik hills of India. Later in 1930s, Lewis assigned an upper jaw from Haritalyangar (Siwalik hills, India) to a new genus Ramapithecus brevirostris i.e. Lord Rama's ape. The specimen includes first two molars, both premolars and the root of the lateral incisor. The socket of the canine is totally preserved as well as the lateral wall of the socket of the median incisor. From the size of the tooth sockets, and the space available to each in the tooth row, Simons has estimated the size of the missing teeth. According to him, the palate of Ramapithecus brevirostris is arched as in man, the canine is not longer in comparison to the first premolar. The ratio between the sizes of the front teeth (canine and incisor) and cheek teeth (molars and premolars) is roughly the same which indicates human position. From the intact preservation of the maxilla it is understood that the upper jaw is more human like than ape like in its depth and prognathism.

Q3. Discuss the geographical distribution of Ramapithecus in detail. (7marks)

Answer : The first discovery of Ramapithecus fossils was made by G.E. Lewis in 1932 in the Siwalik hills regions of India. He assigned one of the fossils, an upper jaw, to a new genus and species he named Ramapithecus brevirostris. The generic name simply means Rama's ape' Rama being the mythical prince who is the hero of Indian epic poem. The species name that Lewis chose was more meaningful for it is the Latin word for 'short snouted'. Next Ramapithecus fossil find was made by L.S.B. Leakey near Fort Ternan in south western Kenya in 1961. The specimen included parts of both sides of an upper jaw. Leakey gave it the name Kenyapithecus wickeri after his friend Fred Wicker, on whose farm the fossil was found. The next Ramapithecus specimen was excavated by Von Freyburg, a german geologist, in Greece during World War II. The specimen was assigned to another new genus and species: Graicopithecus freyburgi. Freyburg's

find was the complete tooth bearing part of lower jaw and at the time of its discovery it contained all the teeth.

Next to the growing inventory of Ramapithecus fossil was a lower jaw unearthed from a Miocene deposit near Candir, some 40 miles north east of Ankara in Turkey in 1973. The specimen was named as Sivapithecus alpani. The species name of the Candir jaw honors the director of the Turkish Geological Survey. A major group of Ramapithecus like fossils has also been discovered in coal deposits of Miocene age in the Rudabanya Mountains of north eastern Hungary. They have been assigned to still another new genus and species Rudapithecus hungaricus. All these are the important geographical distribution of Ramapithecus.

Q4. Write some important anatomical features of Ramapithecus.

Answer : Important anatomical features of Ramapithecus can be summarized as follows :

1. Incisors and canine are inserted vertically and not in slight procumbent position as in apes.
2. Little or no canine diastema.
3. The canines of the Ramapithecus are not projected and they possess narrow faces.
4. The dental arcade was rounded.
5. The palate of the Ramapithecus is arched as in man.
6. Flattened and thick enameled premolars and molars that appear to be adapted for heavy chewing and processing of hard food stuffs.
7. The molars possess the Dryopithecus Y-5 cusps pattern.
8. The ratio between the sizes of front tooth (incisors and canine) and those of cheek teeth (premolars and molars) is roughly the same which indicates the human position.
9. Shelflike ridges are present inside the lower jaw of Ramapithecus.
10. Large inferior torus on mandiblde.
11. Facial profile is orthognathus.

Q5. Highlight some morphological features distinguishing Ramapithecus from Australopithecus.

Answer : Important morphological features distinguishing Ramapithecus from Australopithecus are :

1. The masticatory apparatus of Ramapithecus is absolutely smaller and mandible shallower than that of Austtralopithecus.
2. The Ramapithecus face is shorter than that of Australopithecus but of the same length as that of homo.
3. The incisors and canines are less reduced than the cheek teeth in Australopithecus.
4. and the incisors are considerably procumbent.

GLOSSARY

Bipedalism : The phenomenon of standing and walking on foot.
Canine : A strong pointed teeth situated between the incisors and molars.
Cusps : Conical projection on the occlusal or chewing surface of a tooth.
Diastema : A natural space between the teeth.
Fossa : A concavity in teeth or bones
Fossil : Remains or evidence of an animal or plant preserved in earth's crust.
Hominid : Primates of family Hominidae which include Homo sapiens, earlier human species, Ramapithecus and Australopithecus.
Incisors : The front tooth of the jaw which is flat in form and used for biting and scraping.
Mandible : Lower jaw
Maxilla : Upper jaw

Orthognathus : The jaws which do not protrude
Procumbent : Incline forward or protruding.
Torus : A raised mound of bone.
Y5 molar : 5 cusps of the lower molars are arranged in such a fashion that the grooves separating the inner cusps look like the letter Y.

READING LISTS:

Pilbeam,D. *The Ascent of man, An Introduction to Human Evolution*, Macmillan,1972.

Pilbeam, D.(1979). *Recent finds and interpretations of Miocene hominoids*. Ann. Rev. Anthropology.,8:333-352.

Sarkar R.M. : *Fundamentals of Physical Anthropology*. Vidyodalya Library Private Limited Calcutta,1997.

Seth P.K : *The Primates.* Northern Book Centre, New Delhi 1986.

Simons Elwyn L. *: Ramapithecus. In Human Ancestors*. Eds.G. Issac and R.E.F. Leakey, W.H. Freeman and Company (Scientific American), pp 35-42.

Simons, E.L. *Primate Evolution- An Introduction to Man's place in Nature*, Macmillon New York 1985.

Szalay, F.S. and Delson, E. (1979). *Ramapithecus. In Evolutionary History of Ramapithecus*. Academic Press, pp.498-502.