BULLETIN
OF THE
GOVERNMENT MUSEUM, CHENNAI

Prof. T. BALAKRISHNAN NAYAR Endowment Lectures 1992.

BIO CULTURAL EVIDENCES FOR HUMAN EVOLUTION

by
Dr. ASOK. K. GHOSH

New Series – General Section Vol. XV No. 4
1996

Published by the
COMMISSIONER OF MUSEUMS,
GOVERNMENT MUSEUM, CHENNAI-600 008.

BIO-CULTURAL EVIDENCES FOR HUMAN EVOLUTION

Asok. K. Ghosh
Department of Anthropology
Calcutta University
35, B.C. Road, Calcutta-700019.

PREFACE

Professor T. Balakrishnan Nayar was a distinguished historion and Numismatist who had been for sometime curator for Numismatics in the Government Museum, Chennai. His work on "Dowaleswaran Hoard of Coins in the Government Museum, Madras" was published as a bulletin of this Museum. It was in appreciation of his services to Numismatics and Archaeology and history a Committee was set up by his students and well-wishers and they established an endowment in 1982 in his name in the Government Museum, Chennai. A corpus fund was made available for this purpose which wasinvested and from the interest from it is to be utilised for endowing an annual lecture in one of the following topics: Arcaeology, Anthropology, Numismatics and Museology. A distinguished scholar in any one of these disciplines is invited to give a series of the lectures on any aspect of his specialisation

In these series of lectures, Dr. Asok. K. Ghosh, Prof. of Anthropology University of Calcutta, a distinguished scholar delivered two lectures on 'Bio-Cultural evidences for human evolution' (1992 series) in this series in 1994. His lectures are being published now as a bulletin of the Chennai Government Museum, and made available to the researchers and scholars.

We would like to place on record the help received from Dr.(Mrs.) Matangi Ramakrishnan, daughter of Professor,T.B. Nayar in augmenting the investment in 1995.

26. 11. 1996.

Chennai - 8.

K. DHEENADHAYALAN, I.A.S.,
Commissioner of Museums
Government Museum, Chennai.

THE BACKDROP

The idea of organic evolution did not come into existence before the time of Darwin, and prior to that human beings were thought to be products of special creation by 'God Almighty'. It was Darwin who shattered all these notions of supremacy of human beings and stated that the so called supremacy of humans lay not in being a special creation of God, but in the fact that human beings represent the highest degree of biological complexities in the ladder of evolution, with the position of man at the peak.

In connection with human evolution, different theories have been forwarded at different times, and over the ages progressive development of the evolutionary theory has taken place. Previously, it was thought that the apes are the direct ancestors of human beings. But this is not the case in reality, and any relation that human beings have with them is only that at some point of time, both the modern apes and modern man had a common ancestral stalk from which the two lineages diverged.

Once this was believed. Afterwards another concept came into being, and that was the concept of the missing link - a creature that occupied the intermediate position between man and ape. This concept has led to a lot of search which led to consequent discoveries. Dubois, in 1891 discovered a fossil at Trinil in Java, which he named as 'Pithecanthropus' or ape-man. However, later on, the discovery of a number of fossils, that could be classified as being intermediate between man and ape, but bearing different amounts of resemblances to each led scholars to question the validity of such a form as the missing link. So, at present the idea of a 'missing link' has almost turned obsolete. At times, very infrequently the same phrase reappears.

The present generic and specific status of human beings is *Homo* and *sapiens* respectively, falling within the family *Hominidae*. However , to reach the *Homo* stage from the hominid or even prehominid (i.e. *Hominoid*) stage there was a very long march with elapse of immense time period passing through long drawn biological stages. It is to be mentioned in the context of human evolution that prior to the stage Homo, there was no culture. It is supposed that in the preceding stage the nascent form of culture came into being which is termed as "proto-culture" Potentialities of culture are laid on specific biological aspects which were netting in slowly and instead of the appearance of culture all on a sudden, there was a wide time spectrum within which gradually but continuously culture appeared through development. Once this stage was

reached which may be identified as culture, at least in the form of standardizaion, there was the advent of culture in furtherance. Thus human evolution implies both biological as well as cultural evolution, especially marked from the stage of *Homo erectus* onwards.

The stage of *Homo habilis* has been set aside because the controversies on this issue have turned quite conapicuous in recent times. A very interesting feature is that from *Homo erectus erectus* (as holotype) to *Homo sapiens sapiens*, the biological steps transversed are relatively few, but the cultural realm is of much larger spectrum. On the other hand, from the *Hominod* stage (as *Dryopithecus*) to *Homo*, the biological stages indicating progressive change for hominization, are more in number, but there is no evidence of any cultural stage whatsoever. This backdrop may also be accounted for bringing out capabilities for possession of culture. Thus on the basis of this nature (i.e. human evolution without culture and human evolution with parallel cultural evolution) the evolutionary history of mankind can be divided into two phases, one after the other, both separately only of biology and in conjointed form of biology and culture.

Human evolution is a very complicated process and the total scheme in the global context is still far from clear primarily due to scanty and incomplete nature of data. Anomalies also lie regarding the phylogenetic positions of the various fossil remains. While lumpers try to place a number of fossil remains bearing close similarities into a single group, i. e. family or genus. The splitters create a new family or genus for every newly discovered fossil with slight dissimilarities with the proceeding ones. Such apparent differences may even be due to age and distinctions.

FROM *DRYOPITHECUS* TO *HOMO ERECTUS*

The present course may be initiated from a basal stalk and continued in furtherance through time. In such scheme, the chronological framework is found to be substantiated with fossils of different genera and species, showing a trend of evolution.

Dryopithecus

The first ancestral form that can be traced back in the hominoid line of evolution is perhaps the species within the genus *Dryopithecus*, better be said as *Dryopithecinae* a Miocene ape, belonging to super family *hominoidea* and family either *Pongidae* or *Dryopithecidae*. From its cranial and dental characters, it can be shown that it is related to, or in the direct ancestry of modern chimpanzee. Though it is essentially an ape, however, the importance of *Dryopithecus* lies

in the fact that somewhere along a line of ancestry in or near this one, the first hominids branched off. Different species of *Dryopithecus* have shown characteristics that are ancestral to both apes and man. Therefore, *Dryopithecinae* is thought to be ancestral to both apes and humans. The fossils of this group have been recovered from Europe, Asia and Africa. In situ occurence of these materials in specific geological condition in India, rather in South Asia, presents convincing hypothesis for consideration of India as one of the main locales where man evolved.

The first European *Dryopithecus* find, D. fontani, as it was named by Lartet, comprises two horizontal branches of a mandible, with some teeth and an associated piece of symphysis. From a study of these and some other mandibles found at the same site, it was established that the face consisted of a deep but narrow snout, in which the incisors were neither as large or procumbent relatively as those of present day great apes. The teeth pattern showed an increase in size from M1 to M3 and the typical (pentacuspid) cusp pattern of the molars.

The Asian regions where *Dryopithecus* fossils have been found are North India and West Pakistan. However, to these specimens numerous (unnecessary) names have been attributed, and this has led to a lot of confusion with regard to their phylogenetic affinities. Simons and Pilbeam (1965) have, however, classed all the hominoid fossils, discovered from this place, into two *Dryopithecus* species (*D. indicus and D. sivalensis*) and one Ramapithecus species (*R.punjabicus*). To these must be added the relatively new species of *Gigantopithecus bilaspurensis* discovered in 1968 near Haritalyanagar, India.

In general, the Indian species resemble closely to those of Europe and East Africa. In size, the *D.indicus* are mostly equal to the low land gorillas. Some *D. indicus* specimens have even larger body size. Because of this large body size which occured in time even before *Gigantopithecus*, it is thought of that the former is ancestral to the latter.

Two ape fossils have also been disvovered from China, comprising a number of teeth. One of them resembles *D.indicus* and the other *R. punjabicus*. In addition, the presence of *G. blacki* in China somewhat corresponding to *G. bilaspurensis* of India requires further study.

It is more difficult to analyse the fossil apes of Miocene East Africa, as a large and varied quantity of them have been found. The first findings were made from Miocene deposits at Kenya, the best of which contained a left maxilla, which at present has been designated to *Ramapithecus*. However, as at the time it was thought to belong to *Dryopithecus*. Naturally a

new genus Proconsul came into vogue. Recent geo-chemical dating, now in application, date the African fossilized apes between 16 - 20 m.y.B.p. In features, the African *Dryopithecus* bears great similarities with the Eurasian counterpart.

Ramapithecus

The *Ramapithecus*, which has been attributed the Pliocene times, was not recognized initially as that of a new genus, but was described as belonging to the then new species., *D.punjabicus* (Pilgrim, 1910,1915). In 1932, Lewis found a left maxilla, which he recognized as being a new and more manlike genus of primate. So, he coined the name *Ramapithecus brevirostis*. Later, in 1962, Leakey gave the name *Kenyapithecus wickeri* to an East African primate maxilla, but his disagnosis and description of it showed that it was similar to the maxilla of *Ramapithecus brevirostris*. Meanwhile, further work on the various specimens showed that Ramapithecus brevirostis was a synonym of the much earlier described species *D.punjabicus*. Thus, the correct name for all these species became *R.punjabicus*.

The anatomical features indicate increased power of the grinding cheek teeth, and decrease in the size of front teeth. The mechanical efficiency of the chewing muscles was increased by a shifting forward of their location. 'Interstitial' wear on tooth is greater than ' abrasive' wear. Regarding the phylogenetic position, *Ramapithecus* is classed by most scholars as a member of *Hominidae*, though previously they were placed under a new family *Ramapithecidae*. Albeit, disagreement is still retained.

Australopithecus

Australopithecus, also for the group named as *Australopithecine*, a definite member of the hominid family, is said to have made its presence on earth in the Plio-pleistocene border or even little earlier. In recent times, *Australopithecus* fossils have been dated as 3.5 m.y. old and existed well into the pleistocene and was also for some time contemporary with Homo. The first *Australopithecus* disvcovery was made at Taung, in South Africa, and consisted of a juvenile skull. At present there are three species attributed to this genus: *A.africanus, A. robustus and A.boisei*. It had a very small brain, but in other features (dentition, jaws etc.,) were close to Homo, and were capable of bipedal locomotion. Regarding its origin and phylogenetic affinities, a number of theoretical models have been proposed, in which it has been placed either in the direct line of human ancestry, or side branch. However, most scholars like Leakey and others do not agree to the

view that *Australopithecus* can be a direct ancestor of humans as *Australopithecus* and *Homo* fossils have been discovered in contemporaneous fossil deposits. Very recently, late 1993, the discovery of *A. ramidus* from Aramis, Ethiopia presents the suggestion that this species of about 4.4 m.y. old is one of the two major branches from an earlier stalk. The other branch is chimpanzee. The branching off took place about 5 or 6 m.y. back according to the latest molecular research.

So far, no cultural assemblage is accorded to Australopithecine but analyses of their fingers show that they were in a position to make tools if they wanted. Previously, the 'osteo-donto-keratic' culture was attributed to them, but now it is said that was not a culture at all and *Australopithecus* had seldom any contribution on the fragments of bones, horns and teeth chewed and broken by predators.

HOMO - HABILIS

Homo-habilis the first member of this genus was first seen during the Plio-Pleistocene boundary, when the hominid lineage split up into two: *Australopithecus* and *Homo*, and the two groups continued to flourish side by side for some time, until the *Australopithecine* became extinct during middle Pleistocene times, and the *Homo* group continued with new species, *Homo erectus*. No definite cultural assemblage is associated with the *habilis* species. Previously it was said that they were the makers of 'Kafuan' culture, but this veiw no longer holds true. Definite cultural assemblages begin with the coming of the *Homo erectus*. The *Homo habilis* are also termed as *A. habilis* by some scholars (Simons, Pilbeam and others). Whatever their nomenclature may be, in the hominid phylogeny this group has dual positions - one, they are placed in the direct line of human ancestry and two, they are placed as a side branch which became extinct with time. On the basis of personal discussion with Professor T.Jacob of Indonesia, I find more confident to put *Habilis* away from *Homo* line. It is closer to *Australopithec*

NEW APPROACH

It may be noted that the concept and the model concerned with evolution of man ere relatively simple earlier when the data were insufficient. Lesser amount of data do not indicate greater variation, rather the distinction are found to be conspicuous. In such cases, neither the overlapping nor the interphases are observed. On the contrary new evidences, specially of fossils which are corroborated with chronological and environmental data are giving rise to further complications. In fact instead of a single attribute, a number of attributes are working together. This

led to greater ambiguity for the identification of the factor or factors responsible for progressive change. In very recent times more sophisticated techniques have come into existence and many of them are associated with molecular biology. This technique at times giving a different kind of result and the traditional scholars are not in a position to accept the same. At the same time the molecular biologists of course know the technical know how but they are nbot connversant with the total scheme and the details of data. It is only hoped that such problems will not exist in near future and the amalgam of diverse disciplines will certainly point to the correct answer on the problems.

HOMO ERECTUS

The *Homo erectus* group, whose presence is very well documented in the middle Pleistocene deposits of Asia, Africa and Europe, was the first member of the genus. *Homo* who were capable of walking with a perfect erect posture and bipedal gait, as is suggested by their anatomical features. Not only that they were also the first group of people with whom the term true "culture' is associated.

The first specimen of this group was discovered by E.Dubois in Java, in the Trinil beds. At that time it was thought to be the 'missing linlk', and so the name 'Pithecanthropus' was given to it. Later on similar discoveries were ade in Africa and Europe and also in other parts of Asia. From an overall analysis of middle Pleistocene hominids all over the world, it was suggested by eminent scholars that all of them should be grouped under one genus *Homo* and one species *erectus*. The anatomical differences prevalent among them are basiocally geographic, and of sub-species level. Thus, they were given different specific sub-species names as *Homo erectus* of Java, *Homo erectus pekinensis* of China, *Homo erectus heidelbergensis* of Europe and so on. In this cluster, the solitary find from India *Homo erectus narmadensis* discovered by Sonakia is also included. However, such placement is not yet full proof.

With regard to the anatomical features, the *Homo erectus* bore great resemblances with the present day *Homo sapiens sapiens*. However, they had a smaller brain volume, ranging from 750 cc. to 1300 cc. The skull vault was low, with a supra-orbital torus and receding forehead. The face was very much reduced and regarding dentition, it is seen that the occlusal surface lie on the same plan; but total as well as alveolar prognathism are very much evident.

Together with the anatomical characters, another aspect that has to be taken into accounbt is culture. Wherever fossil evidences of this group have been disvovered, usually, cultutral

evidence have also been associated with them. Two distinct cultural have been seen to be associated with the *Homo erectus*. One is the handaxe or biface culture and the other is the chopper-chopping culture. The former assemblage is also termed as the Acheulian culture. Movius line, separating two geo-cultural areas has been found to be nascent. First, in biface area choppers are to be found and in chopper-chopping area handxes are not totally devoid of. In addition to the same, the attribute of fabrication technology is to be given proper importance. Tool making technology is one of the components of culture and in this regard considerable resemblances are met with.

STONE TOOLS CULTURAL ATTRIBUTES

With the attainment of the stage of *Homo erectus*, a good deal of biological changes came into being which may be attributed to the process of hominization. As a result the most significant character of hominid, i.e. culture, emerged. It was only possible due to setting in of a dual condition of inclusion or possession and exclusion or devoidance. The latter part is represented by the diminishing of size, primarily of canine which gave rise to a kind of crisis. The possession part includes many components, a development of brain, erect posture, bipedal locamotion, freeness of forelimbs, precision and power grips, acuity of vision, articulated speech etc. As a consequence, the lack in offensive and defensive mechanics and more so for survival - the perception faculty worked on the encountering actions of nature. This led to formulate the concept of creating extrasomatic manipulators from nature, as rocks or stones, floral and faunal parts, like branches of trees, shell of mollusks and bones of other animals respectively. These objects served the purpose of raw materials. Those materials were fabricated into different tool types in accordance with specific function, single or multiple. The ralationship between raw materials and fabrication technology gave rise to the formulation of selection criteria. In the same vista there was the divlsion of labour,categorization of band members based on skill etc.

To begin with, naturally, the tool types were relatively crude and comparatively of lesser number. In coping with the existing need conceived through experiences, fabrication technology followed the course of development and the tool typology was ramified with betterment of functional implications in specific terms. These cohesive factors and the integrated products there of are evident from tool kits. It is not unlikely that prior to a minimum standardised form of tools with technology as trick, some objects were used as tools without or with the application of technology. However, the more or less standardised tool kits reveal the choppers at the initial stage, unifacial first and bifacial thereafter. Almost the same of uncontrolled or free flaking technology with

little modification brought out a new taxon of tool types, viz. handaxes. This type continued for long with continuous development, indicating its usefulness and efficiencies which were advanced through improved technology, giving rise to betterment of tools both in the aspects of morpho-technology and function. In course of time, a little deviation was made without appreciable change of raw material - both nature and form, and technology and instead of pointed wedged tools, termed as cleaver appeared. Both the types are found to be associated in most of the places. All the above nboted tools are primarily made on cobble (mostly described as pebble which is a smaller variety), at times on cones. At a later stage when technology was controlled in full fledged form - both handaxes and cleavers were mapped on big flakes. i t is not unlikely that the flakes struck off during preparation of cobble/cone tools constitute the debitages and the suitable ones were used as tools, may be as adhoc forms. Some such pieces were used for scraping. In view of the need of such functions, scraper as a distinct tool type came into existence. Earlier scrapers not properly fashioned responsible for the presence of sub-types in case of scrapers when these were intentionally made.

HOMO ERECTUS NEANDERTHALENSIS

The next step towards humanity after the *Homo erectus* group is the *Homo sapiens neanderthalensis* or simply *Neanderthal* population. The first fossil member of this gouup was discovered at Neander valley near Dusseldorf in Germany in 1856. But at that time the concept of missing link was very much in vogue, and so, the fossil form the Neander valley was thought to be a freakish variant of modern man and definitely no ancestral form.

However, later on, with the change in the concept of evolution and with subsequent disvoveries of similar types from Asia and Africa, it was established that the Neanderthal was definitely an ancestral form to modern humans. Their physical features (large brain, flat skull vault, reduced nuchal ridge, less prognathous face than previous forms, etc.) suggest that they belong to the same genus and same species as that of modern man (i.e. *Homo sapiens sapiens*), and the differences between the two groups are purely of sub-species level.

Thecultural assemblage with which the Neanderthals are associated is called the Mousterian culture, after the type site, Le Moustier. The main types comprise handaxes and scrapers of different types, which may be considered as the continuity of earlier tradition, and also denticulates, points etc. which are the new emergent types.

The Neanderthals are an enigma in the evolutionary history of man as much is not yet known clearly about their origin and disapperance. Again, two distinct types of Neanderthals are seen in the Upper Pleistocene times - the "classic Neanderthals" (La-Chapelle Aux Saints, La Quina, La Ferrasie) and the "progressive Neanderthals" (Tabun, Skull). No suitable explanation can be set out for this aspect also, though a number of theories have been put forward to clarify this dilemma.

CULTURAL PERSPECTIVES REVEALED FROM TOOLS

Neanderthals (*Homo sapiens neanderthalensis*) are biologically different from their predecessor, *Homo erectus*. And the distinctiveness are observed with development of varietal nature, as increase of brain volume - the most significant character. Such advanced biological traits of possession also played crucial role in the quasi-biological aspect, i.e., cultural. The salient observations include; change of raw materials from coarse grained to cryptocrystalline variety of rocks (quartzite and quartz to gasper, chalcedony, agate, porcelanite), utilization of flakes as blanks for making tool, smaller size of tools better fabrication technology, multiplicity of tool types. At the same time some of the earlier types are found to be continued. Above all the distribution of sites was enlarged - pointing to increase in population.

Greater distribution of Neanderthals, probable population explosion, multiplicity of tool types and betterment of function in specific terms are indicative of higher and intense exploitation of natural resources. In such condition, the band organization must have been developed. In addition, the ideological concept made its emergence in the non-materialistic part which is connected with belief. This is observed from special graves with the painting of skull of the deceased with red ochre and also presentation of heaps of flowers during burial. Such evidences are connected with development of society, in the level of band or lineage or even family.

HOMO SAPIENS SAPIENS

The final stage of human evolution was reached in the late Upper Pleistocene time, with the coming of the modern man or *homo sapiens sapiens*, represented by Cromagnon, Grimaldi, Chancelade and other fossils. Anatomically they are similar to modern man.

The associated cultural assemblages concern Aurignacian, Solutrean, Magdalenian cultures, named after the type sites, together with some localised like Gravetian, Chattelperronianetc.

ONSET OF FULL-FLEDGED CULTURE

Biologically modern man and *Homo sapiens sapiens* are the same. The difference is primarily set in the scale of chronology. The tradition which was carried out by *Neanderthals,* was further extended to early *Homo sapiens sapiens.* Compared to changes in the biological characters between *Homo erectus* and *Homo sapiens neanderthalensis,* the transmutations of much attributes is less from *Homo sapiens neandethals* to *Homo sapiens sapiens.* This may lead to think that the optimum expressions of activities of brain of *Neanderthals* were not made. As a result those actions were carried over to *Homo sapiens sapiens* and the latter in their turn were equipped with further developmental potentialities.

In dealing with the above view point, evidences may be presented from cultural manifestations. During this stage further break-through was made with the tool kit. Highly uncontrolled fabrication technology came into and gave rise to production of blade the blank for making tools. Finer retouches were possible to add fro the higher status of technological skill. Tools are diminutive in form and of varied types. Some such tools were of composite nature. Besides stones, bones and antlers were used as other basic materials for making tools of highly specialised functions. Band organizations and activities made enhanced development and measures of security were enlarged.

The ideological manifestations expressed with the Neanderthals were further modified to a great extent. The concrete evidences of the same are observed from art objects. These materials indicate higher development of ideological traits in the forms of beliefs and their communicatioin on the one hand and perfection in technological manaifestations on the other.

EPILOGUE

From the above discussion, it is clear that human evolution is a very complicated process and such factors as time, space and environment have to be taken into account. It cannot be denied that environmental pressure played a curcial role both in biological as well as cultural developments and modern man is the total product of the cumulative changes. Some broad and generalised information on envirnment and the change thereof are known from elastic sediments in geological strata. Albeit the tools have hardly been applied for a synthetic approch. This area is to be covered with both extensive and intensive studies in different geo-environmental-ecological areas.

Another fact that comes to light from ananalysis of the fossil hominids is that none of them can be called with conviction the direct ancestor of another form. This has brought into existence the idea of mosaic pattern of evolution.

In general, organic evolution does not include the episodes connected with behavioueal expression. With the emergence of modern man, there are ample evidences connected with his acti vities related to brain for ideas and physique for manipulation. The perception and conception finally gave rise to the change over from hunting-gathering to food production and so also from nomadic to settled stage.

.....