17 Million-Year-Old Primate Fossils Could Be Link Between Man and Ape

– Janak Lal Sharma

Some days before i.e. on 15 December 1983, Rt. Honourable Chancellor of Royal Nepal Academy Mr. Lain Singh Bangdel giving me a news cutting published on 27 November 1983 in "Daily Telegraph" of London, said, "You please write something about it." Perhaps he could have thought that the news was concerned with the subject of Archaeology. These days as I am holding the post of Director General of Archaeology Department, he requested me to write about this. But, in fact, it was the subject concerning Paleontology not the Archaeology. Ofcourse, while working in the field of Pre-historic Archaeolgy should take the help of human paleontology. Though these two subjects are related to each other, both belong to different desipline. Even then as my friend requsted me to write, I dare to float my few opinion about this subject. The head line of the news was the same which we have captioned here and news was like this—

By Bayard Webster

New York Times Service

NEW YORK- Scientists esploring in northern Kenya have found the 17-million-year-old remains of an apelike creature formerly thought to have existed only in Asia. The researchers theorize that the primate may prove to be one of the common ancestors of humans and the great apes.

Examinations of bone fragments of the chimpanzee-size primate, which weighed 120 to 150 pounds (54 to 68 kilograms), indicate that it was similar in appearance to an ape, with a short face like that of an orangutan.

Because the remnants were discovered only a few months ago, confirmation that the new specimen is an ancestor of apes and humans awaits the discovery of more specimens "and a lot of work in studying them," said Alan Walker, a Johns Hopkins University paleontologist who is a co-leader of the expedition.

The discovery was made by a team headed by Mr. Walker and Richard E. Leakey, director of the National museums of Kenya.

Mr. Walker, in a telephone interview, said the newly discovered specimen was

believed to be *Sivapithecus*, one of a group of apelike creatures that had previously been found only in Asia. But the Asian specimens, which share a number of characteristics with contemporary orangutans and had been thought to probably be their ancestors, are much younger, dating to as recently as about eight million years ago.

As a result, the new African findings indicate that orangutans, now found only in Asia, probably originated in Africa. The disovery also suggests that Sivapithecus may not have been merely a specialized Asian ape related closely to orangutans, but may have been a more generalized ancestral form that gave rise to all the apes and humans that evolved later.

Mr. Walker said a part of the Kenya specimen's lower jaw was first found by Meave Leakey, Richard Leakey's wife, in a preliminary survey of the site, called Buluk, in July. The full research team later found many more bones of the apelike creature.

Preliminary dating of the fossils was done by the potassium-argon process, in which the rate of decay of potassium in the bone indicated the age of the specimen as being 16 million to 18 million years. The dating was supported by the finding of other fossils nearby whose age had already been determined.

The discovery of the primate places a possible common ancestor of apes and humans a little higher on the tree of lineage of great apes and Homo sapiens than had been previously reported.

Three years ago a team of scientists found fossils of a monkeylike primate that inhabited Africa 30 million years ago. This primate was named *Aegyptopithecus*. It is believed to be the oldest primate-ape-human evolutionary link that has so far been found.

The question of what the earliest human ancestor was, and accompanying questions of when the great apes and humans split apart in the evolutionary process, have been among the most puzzling problems in paleontology.

The line of descent of apes and man is believed by most paleontologists to have split some time between 20 million and five million years ago At that point, the primitive ancestral line for the apes-gorillas, chimpanzees, and orangutans- branched off and orangutanlike primates appeared. Later, other primate species formed separate lineage. And about five million years after that *Austrnalopithecus*, found in eastern and southern Africa, emerged as the earliest true hominid.

The Earth History

The news says, "New African findings indicate that orangutan, now found only in Asia, probably originated in Africa. The discovery also suggest that Sivapithecus may not have been merely a specialized Asian Ape related closely to orangutans, but may have been more - generalized ancestral form that gave rise to all the Apes and humans that evolved later."

Today Africa and Asia are not one but to different continents. It should be kept in mind that how it is possible to get a species of one continent in another continent. Most probably, the geological history will give the answer to us.

Where the mountains reach the Bay of Bengal or the Arabian Sea is the terminus

of the orogenic divide that defines the Pakistan, India, Nepal and Bangladesh region as subcontinental. If the theory of the movement of the inner Asian land mass against the crystalline heart of the subcontinent is indeed correct, it is apparent that much of Asia's topography owes its origin to the interplay of the mass of the main continent with its southern fringe. A similar situation may be found in the relation of Africa to Europe. The heart of Africa, like the Deccan, is made up of ancient crystalline rocks that also fault rather than bend under stress. It may well be that the Alps are the result of a continental tidal flow brought up against the unyielding bulk of the archaic African land mass.

Africa and the subcontinent were connected by land during the Mesozoic era, or Age of Reptiles. The deposits that represent this age were laid down as the result of the erosions of mountains or other high areas like those of the Aravalli. In compensation for the uplift of these ranges it would appear that some portions of the Deccan subsided. Into the basins thus fomred flowed streams and rivers carrying their burden of erosional products. The rivers, of course, tended to follow fault-line depressions, and they thus have a linear aspect. Today these old basins and river systems are traced by the presence of sediments in which are found the fossil remains of a terrestrial and fresh-water founa and flora. These paleontological remains are to a large extent duplicated in Central Africa and Madagascar and even resemble material from South America. Thus some authorities have envisioned a vast southern continent which eventually became divided up into its present existing segments of Africa, India, Madagascar, etc. by the subsidence or floating off of those areas now covered by the Arabian Sea and the Bay of Bengal. This "lost" continent is referred to in the literature as Gondwanaland, after the Gonds of the Narbada River region, where the formation was initially identified. There are living animal and plant forms which appear to confirm by their existence what the paleontological record indicates.

More recent studies of the Indian Ocean underline the possibility that though a land area continental in size was unlikely to have existed, it is very likely that faulted blocks were uplifted to form land bridges from time to time. Gondwanaland formations are Mesozoic or perhaps early Tertiary. However the possibility that a land bridge existed until the Pleistocene between Africa and India has to be considered in view of human artifactual parallels in the Paleolithic period.

The over-all evidence derived from studies of the Indian Ocean and itsenvirons in Africa, Arabia, Iran, Pakistan, India, Nepal, Bangladesh, Burma and Australasia is summarized by Pepper and Everhart:

Vertical movements occurred throughout the shield areas from time to time but were of different intensity and magnitude. In consequence, the borders of the shields contain sags which in some places are the marginal edges of basins that now lie mainly beneath the continental shelves. Coastal basins and embayments bordering the basement complex have been the sites of deposition of marine and sub-continental sediments of widely different kinds and amounts at times from the Cambrian on. Volcanic extrusions of different ages have been spread widely in some areas. To a large extent, tectonic movements have controlled the distribution of the continental and marinesediments. During the Paleozoic, in Africa, India and Australia the shields were elevated, and large

areas of continental sediments, varying from lacustrine to aeolian, were deposited. Near the end of the Paleozoic the shield margins were downwarped, and widespread flooding occurred. During the Mesozoic Era a thick sequence of limestone and intercalated sands and muds was deposited. Near the end of the Mesozoic, marked uplift of the continents began, and a long period of erosion followed from Tertiary time to the present. Although many uplifts and downwarps of regions have taken place within the periods in the eras, in general they have been of much smaller regional extent than the movements that marked the end of each era.

In India the end of Mesozoic and the beginning of the Tertiary was dramatically marked by the outpourings of igneous material from fissures in the crystalline shield of the Deccan. In the Bombay region these outpourings may have reached a thickness of ten thousand feet. The flows reached as far north as Sind, where a thin layer there of less than two hundred feet is in marked contrast to the mighty lava sheets that lie one on the other in the western Deccan. Though much of this material has been eroded away, it is still a dominant land feature of the northwest of peninsular India. Study of the flows, which are principally basaltic, proves that in general they accumulated as the result of steady, rather slow outpourings rather than in an explosive manner, because of their remarkable horizontality. There are examples of tuff and ash which indicate explosive vulcanism, however but in general these flows, which are collectively known as the Deccan trap, are almost exactly like those of the Columbia lava plateau in the northwestern United States, massive in their bulk and homogeneity, and majestic in their vastness. It is of great economic importance to India that the regur soils resulting from the erosion of the Deccan trap are among the most agriculturally productive in the subcontinent.

The close of the Mesozoic was marked by great crustal movements. It was presumably then that the upwarping of the Himalayan chain began, with a consequent downwarping of the area between the Aravalli-Vindhyan-Rajmahal hill boundary of the Deccan and the foothills of the new ranges. This effectively cut off peninsular India, Pakistan, Nepal and Bangladesh from inner Asia and left two great gulfs, one on the north and east, and one on the west. At first these gulfs were filled with marine water, but by a combination of increased deposition from Himalayan rivers and a general land uplift, the seas eventually retreated, to be replaced by the Indus, Ganges, and Brahmaputra river systems familiar today. These rivers now flow on accumulation of sediment thousands of feet in thickness, and which span in time in an almost uninterrupted fashion from the Eocene period at the beginning of the Tertiary until today. Interestingly, the Eocene is marked by marine fossils which are also found high up on the slopes of Sagarmatha or Mount Everest- ample demonstration of the magnitude of the changes which so characterize the Tertiary.

The Tertiary witnessed the creation of what is essentially the modern situation, modified somewhat by the geological events of the Pleistocene. The riverine systems are probably the best indication of the differences between the three classic divisions of geologic India, Pakistan, Nepal and Bangladesh. The rivers of the peninsula meander over Deccan trap deposits or on broad crystalline peneplains, carrying silts and

gravels which are deposited along the valleys in such quantity that a comparatively small percentage of the total depositional load reaches the sea. The general direction of these rivers is east to the Bay of Bengal. This is because during the Tertiary it would appear that the whole of the peninsula was uplifted on its western side and sunk on its eastern as a result of crustal movement. The sharp walls of the Western Ghats suggest a massive faulting along the side probably matched by the subsidence of blocks now under the Arabian Sea. Of interest are the rivers Tapti and Narbada on the northwest, which flow apparently along fault lines from east to west in counterdistinction to the usual Deccan riverine situation.

In contrast to these Deccan streams are the rivers of the mountain massif of Himalaya- Karakorum. Here the rivers Indus, Brahmaputra, and Ganges and their eventual tributaries begin amid glaciers and snow fields and roar through enormous gorges, moving immense quantities of detritus to the foothills. Monsoonal rains augment the flow of these rivers so that the seasonal volume of water is immense. In the case of the Indus, for example, it is ten times that the Colorado River and twice that of the Nile.

Now we had read the earth history which has proved the famous quotation of natural history as given below:

"Many hundreds of thousands of years ago, during an epoch, not yet definitely determinable, of that period of the earth's history known to geologists as the Tertiary period, most likely towards the end of it, particularly highly developed race of anthropoid apes lived somewhere in the tropical zone – probably on a great continent that has now sunk to the bottom of the Indian Ocean" *

The Transition from Ape to Man

Our concerning subject is 17 million–year-old Primate fossil could be linked between man and the apes.

Let us think here that who had first classified as primates. In 18th century Swedish Botanist Carolus Linnaeus (1707–1778) has classified the old and new world monkeys and the apes (Family - Pongidae) and man (Family - Hominidae) as Primates. Therefore, in the history of human evolution the name 'Primate' will be mentioned.

The great naturalist Frederick Engels (1820–1895) held "Darwin has given us an approximate description of these ancestors of ours. They were completely covered with hair, they had beards and pointed ears, and they lived in bands in the trees.

Climbing assigns different functions to the hands and the feet, and when their mode of life involved locomotion on level ground, these apes gradually got out of the habit of using their hands [in walking– *Tr.*] and adopted a more and more erect posture. This was *the decisive step in the transition from ape to man.*"

Frederick Engels has quoted the name Darwin. The name Darwin and his evolutionary theory is well-known to all readers, but it is not relevant to say that all are familiar with the subject that how his theory has developed. Therefore, it will be better to describe here about Darwin and his evolutionary theory in short.

* Frederick Engels – Dialectics of Nature– Progress Publishers, Moscow–Seventh Printing– 1976- page- 170.

Darwin and the theory of evolution

Charles Darwin (1809-1882 A. D.) is generally credited with the theories of evolution which are now widely accepted, but during the first half of the 19th century accumulating fossil evidence led many naturalists to speculate along evolutionary lines, including Darwin's own grandfather. If man himself had not been swept into the evolutionary net such ideas would have caused less excitement than they did, and much of the excitement would have been centered on the mechanics of evolution rather than the principle of evolution itself.

Many of the older scientists objected to early ideas of evolution on the grounds that this naturally implied the mutability of species, whereas the inability of species to change was one of the cornerstones of the Catastrophic Theory as well as biblical orthodoxy. Further, it is possible that the supporters of older ideas were already beginning to suspect that these new fangled views were bound to lead to the questioning of man's place in nature. Had the early evolutionists harbored such views, they prudently kept them to themselves.

The dissension aroused by these conflicting views was muted compared with the explosion which was to follow the publication of Darwin's *On the Origin of Species by means of Natural Selection* in 1859. Prior to this event disagreements took place among scientists and a small educated elite, and although such differences of opinion were often expressed in somewhat acrimonious terms, they were limited to a comparatively small section of the population. The attack on the special creation of man which Darwin's book implied reached into every home in Britain, and it was largely the outraged middle class, whose fundamentalist approach to the biblical narrative was challenged, who formed the vanguard of the assault on the concept of human evolution.

The theories outlined in Darwin's book were not the result of any particular epoch-making discovery, but were based on data available to everyone. Darwin's contribution was the patience and observation of a brilliant naturalist who not only was able to marshal a mass of facts into an intelligible pattern but had the courage to publish the inevitable conclusions, though even he was not wholly prepared for the resultant storm. Darwin himself did not invent the theory of evolution, but demonstrated the mechanics by which it could have operated, his theory of natural selection seemingly fitting the known facts.

It was the anatomist Thomas Huxley, Darwin's great champion, rather than Darwin himself who ignited the fuse which set off the great evolutionary explosion. One of Huxley's contentions was that physical differences between some apes and men were smaller than those between apes. This comparison of man and ape was taken by the public to imply that man was descended from the apes - a theory which was never claimed by the evolutionists of the time. This widely held misconception outraged Victorian Britain and provided ample ammunition for the cartoonists of the day. Had we been descended from a more noble animal, society might have been less affronted – a horse or a dog (preferably of sporting breed) possibly, but an ape ? Never ! One cannot say for certain whether the attack on their religion or their pride hurt the Victorians most.

While Huxley stood champion to Darwin, there was one ready and as suitably

equipped to take up the gauntlet on behalf of all good churchmen: Samuel Wilberforce, Bishop of Oxford – an eloquent if somewhat untuous orator with the nickname "Soapy Sam." The two met to defend their different points of view at the famous Oxford meeting of the British Association in 1860. There can be no doubt that both were perfectly sincere in their conviction, but in the ensuing debate the authority of Genesis proved inadequate against the mass of irrefutable evidence produced by the scientific opposition.

There are still many, particularly in parts of America, to whom the rejection of a special creation of man is anathema, but the battle of the fundamentalists was lost at the British Association meeting which saw the last serious assault on the theory of human evolution.

While evidence was marshaled in support of the general principles of evolution, Huxley was in no better position than Wilberforce when it came to producing proof of the descent of man. Huxley's arguments were largely based on comparative anatomy, which so strongly underlined the similarity between man and the apes, implying that they were in some way related. If one had been subjected to a long process of development there was no good zoological reason for the other to be the only member of an entirely different scheme. One factor which might have weakened the scientific case was that man appeared to have no demonstrable ancestors – simpler and less specialized creatures comparable to proto-dogs, proto-horses or proto-cats. Plenty of human remains representing the Ancient Britons were available, all of modern type, but where were the makers of the primitive tools found in the Somme gravels ? Where were the hunters of the mammoth ? There was no archaeological evidence to show that these early inhabitants of the earth were in any way physically different from the members of Wilberforce's Oxford congregation. The reasonable inference was that man had been created earlier and under different circumstances from the individuals recorded in Genesis, but his apparent antiquity was no reason for denying him his special creation.

If no new evidence of early man had come to light, the controversy might well have remained at stalemate, but it soon came in abundance. The first find was a well-preserved skull unearthed in a quarry in Gibraltar in 1848. It aroused no interest and remained in the Garrison Library, unrecognized, until the end of the century. The next find fared rather better: it came from a quarry at Neanderthal in Germany in 1856, three years before the publication of Darwin's book. The Neanderthal skull was far less complete than that from Gibraltar, consisting only of the skull cap; nevertheless it became the type specimen for the Neanderthals.

Huxley was one of the first to accept this specimen as representing ancestral man, since its clearly primitive characteristics were what he would have expected to find. His opinion was expressed in *Evidence as to Man's Place in Nature,* published in 1863, but played no part in the arguments at Oxford in 1860. Not all of Huxley's colleagues were prepared to support his views, and some considered the primitive features of the skull to be of pathological origin.

As in the case of the association of man with extinct animals, a problem which was eventually resolved by a steady accumulation of solid evidence, Neanderthal

Man stood alone for only a very short time. His position was soon strengthened by further finds of a similar type, some from cave deposits associated with archaeological material of which he was clearly the maker.

By 1890 not only had finds of Neanderthal remains increased in number, establishing a creature related to but distinct from modern man, but finds in Java were demonstrating the existence of older and even more primitive human. By the turn of the century a steady stream of human fossils had been uncovered, together showing an enormously complex ancestral pattern whose details are still being argued about by human paleontologists. This phenomenal progress was not without setbacks, some the result of genuine mistakes and others not.

How the scientists followed Darwin's evolutionary theory ?

We should think over it that how this theory of Darwin move further after him. Another champion of Darwin, German Biologist Ernst Heinrich Haeckel (1834-1919) has imagined in 1868 A. D, such a creature which was neither man nor anthropoid nor gorilla nor orangutan. It was in between Man (hominid) and Anthropoid Ape to whom we can call missing-link. Haeckel named this imaginary creature as Pithecanthropus Alalus. The meaning of this word Pithecanthropus Alalus was speechless ape like Hominid Ape.

This theory of Haeckel has influenced many of the scholors. Prof. Eugene Dubois, anatomist of Amstardom Univesrity of Netherland is one of them. That is why Dubois resigning from his lectureship determined to go to East Indies as a surgion in Dutch Military Hospital, because he was in hope that the creature imagined by Haeckel could be found there.

In anthropology, it is not at all strange to have people coming out stubbornly against new concepts and discoveries. But those people are standpatters and are, more often than not, proved wrong eventually.

When the young Dutch anatomist, Eugene Dubois, began his search for hominid fossils in Java in 1887, he ran into trouble with the standpatters. On November 24, 1890, Dubois discovered a badly preserved hominid mandible at Kedang Brebus. Then between 1891-92, not far from this site, a skullcap turned up showing great ambiguity in characters, together with a fragmentary mandible, three teeth and a thighbone, in alluvial deposits on the north bank of the Solo River, some metres from the water margin. This was in Trinil, about 9.5 kilometres east of Ngawi at the foot of the Lawu volcano. Although they were not found in one heap, the *in situ* positions of these specimens were not far from each other, with the exception of the thighbone, which was 15 metres away.

Dubois' study led him in 1894 to name his find *Pithecanthropus erectus*, or Erect Apeman, popularly called Java Man. The announcement caused a tremendous furore, and when he returned to Europe in 1895 he became the centre of a heated controversy. Dubois then put away all his specimens, and it was not until 28 years later, in 1923, that the American anthropologist H. F. Osborn secured access to them through the good offices of the Dutch Academy of Sciences.

The problem of what species did the

owner of the remains belong to had not been settled. Sceptics asserted that they might belong to a deformed ape, or an abnormally developed animal which had no relation to man whatsoever. The most vociferous critics were from the religious community, who held that man's ancestor was Adam, and that man's history dates back only 4,004 years before Christ. Anyone who held that those specimens were related to man was accused of being a heretic. In the end, because of the pressure or some other reason, even Dubois himself gave in and stated that what he had discovered were the remains of a "giant gibbon." It was not until 1929 after Professor Pei Wenzhong discovered the Peking Man skullcap and later, stone artifacts and traces of the use of fire in association with it that the absurd clamour gradually died down.

Accumulative discoveries of Peking Man remains led to a collection of 6 complete, or nearly complete skullcaps, 8 skull fragments, 6 facial bones, 15 mandibles, 153 teeth (58 of them single ones), 7 fragmentary thighbones, 1 shin bone, 3 upper arm bones, 1 fairly well-preserved collar bone and 1 carpal bone, belonging to more than 40 individuals – male and female, adult and juvenile.

The discovery and subsequnt research work done on Peking Man fossils and his culture dispelled the myth surrounding Java Man. But of greater significance was the discovery of the genus Peking Man, or *Pithecanthropus pekinensis*, which thus filled in a missing link in the evolutionary ladder of man and gave a glimpse of the way he lived at that early period.

The above list of specimens may seem insufficient, even fragmentary, but it is remarkable for the number of individuals they represent and the completeness of some of the skulls when compared with *Pithecanthropus* remains found elsewhere in the world. It is unique also in the frequent occurrence of important parts. Human fossils of the Middle Pleistocene found in Germany, Algeria, Morocco and Tanzania consist of only fragmentary skullcaps and mandibles of less than 10 individuals, Java Man remains come to no more than 10 individuals.

Distinctions between the Peking Man skull and that of the modern ape and modern man are easily discernible. The Peking Man skull possesses features of both ape and man, indicating its owner was in the process of discarding its anthropoid ape characteristics and developing towards *Homo sapiens*.

In 1924 kiln workers in South Africa (Azania) found in a cave near the railway station at Taung, 80 kilometres north of Kimberley, the skull and a natural endocranial cast of an immature individual which show features of both the anthropoid ape and Hominidae. Except for the greater part of the skullcap, the upper and lower jawbones and dentition are well preserved. Simian in appearance, the specimen has a number of structural features approximating closely to the Hominidae. This specimen of an ape of great antiquity unknown until then was given the name *Australopithecus africanus* (African Southern Ape) by the Australian Professor R. A. Dart. It was reputed then to be the ape nearest to man.

Over the half century since this discovery, similar types of fossils have been found in Africa and elsewhere in the world. These include: Sterkfontein, Kromderaai,

Makapansgat and Swartkrans in South Africa, Olduvai Gorge in Tanzania, Kanam in Kenya, Chad and Tell Ubeidiya in Palestine. The most significant among these is the discovery made at the Olduvai Gorge site. It is a fairly complete skull imbedded in the first layer of the gorge bottom. The fossil shows a low vault, prominent brow ridge, large facial skeleton, relatively small incisors but robust cheek teeth and a well-developed sagittal crest. It was found by Mrs. Leakey and her husband, who first gave it the name *Zinjanthropus* (Eastern African Man). In the same stratum were tools fashioned from pebbles, from which comes the term "pebble culture" or "Olduvai culture." Along with these were remains of small amphibians, reptiles, rodents and fish.

In 1960, in deposits about 270m. away from the site and some 60 cm. lower than the stratum that yielded the *Zinjanthropus* skull, more Hominidae remains were found, consisting of immature and adult individuals. Judged from the much lighter and smaller skulls, the new hominid shows a closer approximation to man than *Zinjanthropus*. To it the Leakeys gave the name *Homo habilis* (Able Man). Found in association with these were stone tools, worked animal bones and fossils of tortoises, water birds and sabre-tooth tigers.

Though a variety of names have been given by authorities to the fossil material collected in Africa, they are now mainly defined under the subfamilial term australopithecinae and most of them are regarded as belonging to the genus *Australopithecus*. Some paleontologists have lumped *Homo habilis* of Olduvai Gorge and *Meganthropus paleojavanicus* (Giant Man) found in the Djetis stratum, Java, into the australopithecinae, but the majority holds that *Homo habilis* is taxonomically correct and recognizes it as the earliest representative of man's ancestor capable of making stone tools.

Over the years, more remains of the *Australopithecus* have been discovered. The collection consists of more than 90 individuals, ranging from nearly complete skulls to lower jawbones, teeth, broken shoulder-blades, arm bones, hand bones, pelvic bones, leg bones, and foot bones, of both sexes and all ages. The skulls are characterized by their protruding snout, absence of a chin eminence, and flat and low-vaulted skullcap and receding forehead, which give the owners an ape-like look, but they have a mean cranial capacity of 600 C.C., which is greater than that of any anthropoid ape, and in some individuals the brow ridges are not prominent. The dentition conforms to the hominid type, the big cavity at the cranial base (*Foramen magnum*) is positioned nearer to the forehead and much lower down than apes, indicating erect bipedalism. This is corroborated by pelvic features and strongly suggests that they are not really apes.

The australopithecinae survived for a very long period. The earliest ones appeared over three million years ago, while the most recent, one million years or less. A small number persisted into the time of Peking Man. Such overlapping of generic types is common in animal species, too.

Known hominid fossils of the Lower Pleistocene are so morphologically disparate that there is taxonomical confusion on the genus level. This is one major cause

of the controversy over naming them australopithecines. However, efforts in recent years have resulted in their recasting into two general morphological types, *Australopithecus africanus*, or Gracile African Southern Ape, and *Australopithecus robustus*, or Robust Southern Ape. Many authorities hold at present that the australopithecinae, which include *Homo habilis*, were the first tool-makers ancestral to man. But other assert that the line begins with *Hamo habilis* through *Homo erectus* (Erect Man) which includes *Pithecanthropus pekinensis* (Peking Man) and finally to *Homo sapiens*. And although *Australopithecus robustus* could indeed make crude stone implements, this genus was morphologically so specialized that it became extinct by the time *Homo erectus* appeared on the scene. The genus Eastern African Man is a case in point.

The Conception of Man's Family Tree

The geological age of this planet is estimated to be 4,500 million years, while the first appearance of man, according to available evidence, is believed to have occurred only two million years ago. There was no life on earth until one-cell organisms came into being 3,500,000,000 B. P. These living things were not identifiable as plant or animal. From then, fish developed 400,000,000 B. P which in turn, gave birth to amphibians 280 000,000 B. P. From the amphibians, reptiles evolved 250,000,000 B. P. and from the reptiles, mammals were differenciated 150,000,000 B. P. At a later stage, mammals branched off, one branch developed into apes which are ancestral to man.

While the 19th century saw the acceptance of the theory of the evolution of man, the 20th century drew aside the curtain a little to reveal not only the various stages involved but also a timescale far in excess of anything dreamed of by the early pioneers.

The acceptance of man as part of the animal kingdom, subject to the same evolutionary laws, necessitated his scientific classification with other animals in the system originally conceived by Linnaeus in the 18th century. Within this classification man clearly belongs in the group containing the great apes and the monkeys of both the Old and New World. Among these are a group of creatures whose relationship to the others is not very apparent. This large group is the otder Primate, in which are included the prosimians, lemurs, pottos, bush babies and the like, the Old and New World monkeys, and the apes (family Pongidae) and man (family Hominidae). The obvious similarity between man and great apes led the early evolutionists to examine in particular the relationship between these two, but evidence obtained over the last hundred years has provided a great deal of information regarding the development of the other Primate as a whole.

As with all living creatures the geneaological tree of man resembles a family pedigree, with a line stretching from the first discernible ancestor of the group to the present representatives of the family. Between the two extremes is a structure with many side-branches, whose only connection with each other is via the ancestor on the trunk at the point from which they branched. As a result, the further one goes down the trunk, the more branches a single ancestor is seen to be responsible for. The two branches which led to the anthropoid apes and man thus had their last common ancestor at the point at which they parted company. The pro-

blem facing the Human paleontologist is the placing of each piece of fossil evidence in its correct position on the family tree. Does it precede the divergence of man and ape, thus being ancestral to both, or does it come after the divergence, being ancestral only to one ?

The real problem is that both modern man and apes are end products of specialisation. The further one goes back towards their common ancestor the more alike they tend to become, and there is some excuse for anatomists often appearing very uncertain as to where a particular fossil should be placed.

The early ancestors of the primates are discernible as far back as the first stage of the Tertiary (the Eocene) some 70 million years ago, and certainly the ancestral forms of the prosimians were in existence at that time, having been found in both the Old and New Worlds. In the succeeding Oligocene the Old and New World monkeys are distinguishable, and they probably divided out in the early Oligocene. It is not clear whether their common ancestor was a monkey or some form of prosimian.

The next major landmark in the ancestral tree is the point of separation of man and the apes, but before entering this rather confused area of relationship it is necessary to consider the various traits which separate man from his nearest relative.

It would be an oversimplification to say that man differed from the apes in only three characteristics - his brain, his manual dexterity and his upright posture. There are other traits which distinguish him, but it is the exploitation and development of the above three in particular which has given rise to man in his present form.

During Human evolution the brain has developed in overall size and in complexity, and it is particularly the increase in the latter that has given man his present superiority. Perhaps the most productive of man's acquisitions are memory and ability to communicate.

The need to accommodate areas of the brain containing the higher centres led to alteration of the skull's basic shape and to an enlargement of the particular area where these accomplishment were developing. For instance as the frontal lobe developed the frontal bone became progressively more upright, resulting in a backward movement of the face, further modified by a decrease in the size of the jaw and teeth as the diet became more varied. The other two factors distinguishing man, upright posture and manual dexterity, are of course closely related. Man's present method of locomotion seems to have developed from the knuckle walking of the great apes. A change of stance to the upright position freed the hands from their walking role and allowed them to become more sensitive and flexible, giving rise to the precision grip as opposed to the power grip only. It also had considerable effect on the skeleton, particularly the pelvis and the position of the skull in relation to the rest of the body.

It is not possible to say how each of the three developments outlined above affected man's evolution, since they are so intertwined, nor do we know for certain whether or not the acquistion of these traits accelerated man's evolution.

Over the last seventy years an increasing number of human fossils have been found, particularly during the last twenty.

Not only has greatly added to our store of material, it has also led to much of the older material being reexamined.

We have already referred to the breakaway of the Old and New World monkeys in the Oligocene. In the succeeding Miocene, beginning about 35 million years ago,there was a group of small primates, lightly built and intermediate in size between a chimpanzee and a gibbon. To this group the name Dryopithecus has been given, bringing together several forms occurring in Africa, the East and Europe, which has been classified under several different names. The Dryopithecines' relation to man and the apes is not yet clear as they have a number of characteristics which could place them in either branch, although most anatomists suggest that they may be considered as proto-anthropoids rather than protohominids.

One group originally classed with the Dryopithecine but now treated separately is Ramapithecus. The original specimen from India was considered to belong to the pongid rather than the hominid line.

In 1930-34, G. E. Lewis of the Yale University while digging in the Siwalik Hills of India, found one wide-curving jaw with an arched palate - the roof of the mouth - typical of man. He named his find Ramapithecus and announced that in the tangle of all the Miocene ape - forebears, this one not only belonged to a different genus but was also the most man-like of the lot. Lewis's specimen, however, consisted of only part of an upper jaw with a few teeth attached. One swallow does not necessarily make a summer ! To confuse the issue, there was another wild-jawed type, Bramapithecus, known only by a lower jaw.

Twenty-five years later, Prof. L. S. B. Leakey was lucky to find a fossil upper jaw that closely matched that of Ramapithecus - not in India but in Africa. This, too, is now called Ramapithecus, and potassium-argon dating has confirmed that it was contemporaneous with the Ramapithecus of India - 14 milion years ago. From these two finds, a prettygood upper jaw with all its teeth could be reconstructed. Not only did the upper teeth have an unmistakably man-like sweep, but they were also all about the same size. (Among the apes, the front teeth, the incisors and canines tend to be conspicuously longer.) What is more, Elwyn Simons of Yale University was able to show that Bramapithecus and Ramapithecus were the same.

Fossils of Leakey's *Ramapithecus* have been found in Upper Miocene or Lower Pliocene deposits in Kenya, East Africa and were given the generic name *Kenyapithecus* (Kenya Ape) in 1962. The evidence consists of only upper and lower jawbones and teeth.

In 1957 and 1958, at Xiaolongtan, Kaiyuan County, Yunnan Province, five fossil teeth were unearthed successively in Lower Pliocene coal seams. To these Professor Wu Rukang gave the name *Dryopithecus kaiyuanensis* (Kaiyuan Oak Ape), but further studies resulted in grouping the 1957 Kaiyuan finds with the fossils collected in Kenya and India under one generic name, *Ramapithecus punjabicus* (Punjab Rama Ape). Although the diversity of views on the taxonomical classification of *Kenyapithecus* is not yet resolved, this grouping has provided a more creditable outline of the evolutionary lineage from ape to man.

It is generally believed that *Ramapi-*

thecus lived in tropical or semi-tropical forest and savanna areas. Members of this genus are in general 1.1 to 1.2 metres in height, with a short face, vaulted palate bone, and teeth and upper and lower jawbones similar to that of *Australopithecus* (Southern Ape). As the dentition shows many characters like that of *Homo sapiens* in its rudimentary form, the genus can nearly be identified as the precursor of *Homo sapiens* who lived 15-10 million years before the present. There is no evidence on hand to show whether *Ramapithecus* walked with an erect gait, as no cranial and pelvic fossils have been found. Nevertheless, since *Australopithecus* has been shown capable of doing so, his lineal precursor *Ramapithecus* may be inferred as being able to walk in a transitional semierect gait. No sites have yet yielded any artifacts to show that this genus could make tools.

Among all known ape fossils, *Ramapithecus* is the closest to man, possessing more human characteristics than any other genera. Judging by this fact and the period in which he lived, he may be considered as man's simian ancestor who had inherent qualities enabling him to evolve into man. He had crossed the threshold into the stage of hominids.

Increasingly more evidence has been unearthed to show that man's birth place is Asia. Recently, fossils of *Ramapithecus* have been discovered at sites in Pakistan and in Lufeng County (25.7N, 102.7E), Yunnan Province, China.

Finding on oldest human ancestor in Asia

A tooth of the "first possible ancestor of man in Nepal and oldest in Asia" has been found near Tinau Khola, a couple of miles from Butwal, by Dr. J. H. Hutchison, 40, of the Joint Nepal-USA Scientific Expedition. The upper left molar of the hominoid (the super-family of man) *Ramapithecus* was recovered from rocks dated as approximately eleven million years old.

The discovery made in December 1980s helps to fill the geographic gap in the record of early hominoids between India and southern China. The age of the *Butwal Ramapithecus* is very important. Its preliminary age determination of eleven million years, based on a study known as paleomagnetic analysis, is over one million years earlier than the next oldest dates for Asian specimens.

Ramapithecus is the earliest fossil primate which many anthropologists believe to be a direct ancestor of man. Rare specimens have previously been found in Kenya, Pakistan, India and China.

Where will be the earliest ancestor of man ?

Fortunately, in the last 60 years or so, investigators of various countries have collected a fairly substantial amount of specimens which adds immensely to the credibility of paleontological propositions. But the interpretations based on the evidence available so far are not incontrovertible. They are unavoidably inferences. Perhaps in another generation or so sufficient material will have been amassed to upgrade the inferences to firmly grounded concepts.

What answers do we have at present on the question of man's place of origin ? Paleontologists still differ. Some hold that it is Africa, others Europe, and many believe it is Asia. For many years contention has been centred on these three con-

tinents, while Antarctica, Oceania and the Americas have not been considered at all. Discounting the Antarctica, the earliest reliable evidence unearthed in North America merely goes back less than 30,000 years and in South America, the sites in Venezuela have yielded specimens of no more than 14,000 years in antiquity. The further down the south of that continent, the shorter the history of the evidence. Human fossil remains at the southern tip is only some 10,000 years old. In Oceania, no cultural objects older than 20,000 years have yet been found.

Europe was once claimed to be the place of man's origin when the first discovery of Paleolithic industry was made there in the 1830s, and a chronology of the Paleolithic Age of Europe was compiled by the end of the 1860s. But, up to now, taking the world as a whole, Europe has yielded much less human fossils and artifacts of great antiquity than Asia and Africa.

Africa is the home of the gorrilla and chimpanzee which are close to the human species. Since the 1920s, more anthropoid ape and early man fossils have been found on that continent, giving rise to high popularity of the thesis that man had fiirst evolved in Africa. But Asia is the place which has yielded the greatest number of fossils of simian species that had not known tool making but are most akin to man.

The thesis that Southern Asia is man's birthplace seems more tenable. As Frederick Engels held: "Many hundreds of thousands of years ago, during an epoch not yet definitely determinable of that period of the earth's history which geologists call the Tertiary, and most likely towards the end of it, a particularly highly-developed species of anthropoid apes lived somewhere in the tropical zone – probably on a great continent that has now sunk to the bottom of the Indian Ocean." This assertion on the location as well as geological age has been corroborated by later finds consisting of fossil remains of *Ramapithecus* (Rama Ape) of Upper Miocene and Lower Pliocene, the human fossils of the Lower Pleistocene, and the geographical distribution of cultural sites contemporaneous, we have already discussed.

The Siwalik and the Himalayan Regions

The Siwalik Group, a thick fluvial sedimentary sequence derived from the Himalayan uplift, was deposited across the northern edge of the South Asian subcontinent from middle Miocene to middle Pleistocene time. It can be traced, under various names, from Baluchistan and Iran in the west to Burma in the east (A. Gansser, 1964).

The orogeny which created the Himalayas acted throughout the Tertiary and is in effect today. Many of the later Tertiary deposits were raised as foothills, and often fluvial erosion creates outcrops of underlying strata among these deposits. In Punjab one of the more significant type series of Tertiary formations has been worked out in the so-called Salt Range. The sequence is relatively dated by paleontological evidence, in which the mammals are of greatest importance. It was here in the Siwalik strata that the extraordinarily interesting primates. Sivapithecus (Upper Miocene) and Palaeosimia (Middle Miocene), were discovered. The latter would appear to be in the line toward the orangutan, while the former suggests some relationship to the fossil primates generally grouped in the family Dryopithecidae. This

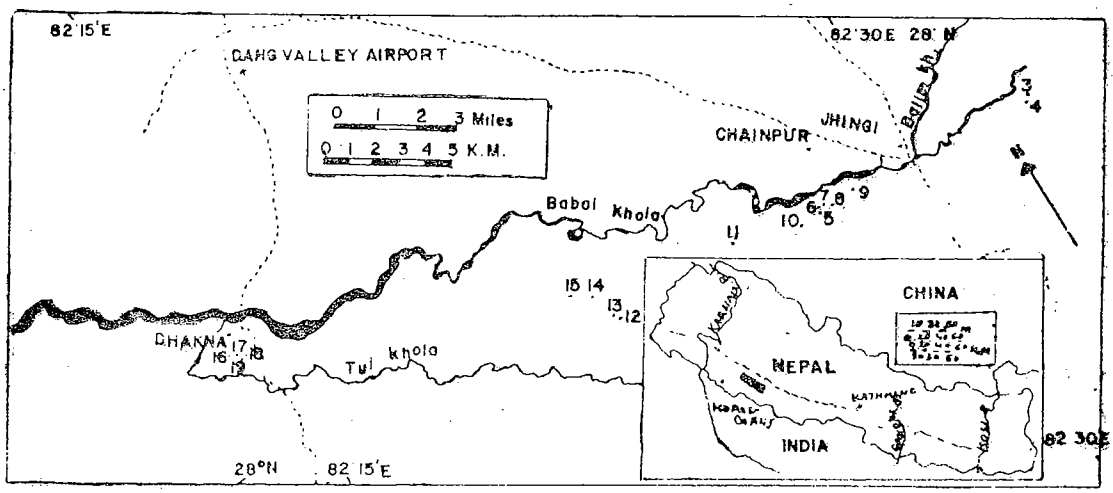
family is famous for its particularly hominid-like teeth, suggesting that it bears a definite relationship to human evolution.

Siwalik Group rocks have been best studied in the markedly fossiliferous areas in the Siwalik Hills of India, and in the extensive open syncline of the Potwar Plateau, Pakistan. On the basis of lithic nature and fossil content, the Siwalik Group of India and Pakistan has been divided informally into lower, middle and upper units (G. E. Pilgrim, 1910). The Lower Siwaliks includes the Chinji Formation, the Middle Siwaliks the Nagri and Dhok Pathan formations, and the Upper Siwaliks the Soan Formation in Pakistan or the *Tatrot and Pinjor formations in India* (A. N. Fatmi, 1973; Colbert, 1935; and references cited therein). In the very broadest sense, the rocks become coarser grained upwards through, the Group being dominated by claystones and siltstones in the Chinji Formation and terminating with conglomeratic beds in the uppermost units. The entire sequence in Pakistan and India is estimated to be from about 4,865 m. thick (E. H. Colbert, 1935) to 6,080 m thick (D. N. Wadia, 1975).

Ongoing remapping and intensive paleontologic and magnetostratigraphic studies of the Pakistan Siwaliks are resulting in revision of the traditional concepts of the Siwalik formations and their fossil. One of the more important aspects of this work is the confirmation of marked lateral lithologic change within the Siwalik Group, as originally suggested by W. D. Gill (1952) for the western end of the Potwar Plateau. The resultant diminution in importance of the lithologies for correlation purposes has placed more emphasis on paleontologic correlations, especially those using fossil mammals.

Previous Studies of Nepal Siwaliks

Nepal was essentially closed to Westerners until the middle 1950's, so the Siwaliks (Text fig. 1) of the sub-Himalayas in this country were not studied along with the Indo-Pakistan beds. Lateral correlations of the Nepal Siwaliks with those of India and Pakistan have been further ha-



TEXT-FIG 1 — Dang Valley Siwalik Group fossil vertebrate localities. Insert shows mapped area and distribution of Siwalik Group in Nepal (adapted from C.K. Sharma, 1973)

mpered by the relatively poor exposures and virtual absence of paleontologic data.

Auden (1935), the first to describe eastern Nepal Siwaliks, noted the three Siwaliks units, as to the west, with the same general upward increase in average grain size. A. Lombard (1958) and P. Bordet (1961) briefly discussed the Siwaliks of eastern Nepal. T. Hagen (1959) published a series of cross sections through the Siwaliks at numerous localities the length of Nepal, indicated the three-fold stratigraphic division, and suggested that most of the exposed Nepal Siwaliks are "Middle Siwaliks." None of these earlier workers reported fossil materials in the Nepal Siwaliks.

More recently, K. W. Glennie and Ziegler (1964) made seven traverses through the Nepal Siwaliks. They defined a lower sandstone facies and an upper conglomeratic facies. They also noted lateral facies variations, although the conglomeratic facies tended to be higher in the section than the sandstone facies. No fossil materials were found during their survey. In conjunction with United Nations groundwater studies, M. T. Ithihara et al. (1972) studies the Siwaliks of eastern Nepal. They recognized three units and found occasional plant fossils in the middle unit. K. Mathur (1972) reported on pollen from presumed lower Siwaliks rocks near Nepalganj in western Nepal.

The first primarily paleontologic field work in the Nepal Siwaliks was reported by R. M. West et al. (1975) who prospected part of the area mapped by M. T. Ithihara et al.Only poorly preserved molluscs were found. These were in the unit considered Middle Siwaliks by Ithihara et al., but were inadequate for paleontologic correlation with the western Siwaliks of India and Pakistan.

The Nepal Geological Survey has mapped numerous areas within the Siwaliks but the individual reports are not published. Some of that information is included in C. K. Sharma (1973). Nepal Geological Survey mappers utilize the three-fold subdivision of the Siwaliks, but for mapping purposes they recognize four to six lithic units which they do not correlate explicitly with the formations of Pakistan and India. They estimate the entire Siwalik Group to have a thickness of 4,250 to 8,200 m. within Nepal. Several reports mention plant, mollusc and vertebrate remains, especially in the lower and middle Siwaliks. This material was not collected, and locality data is not available.

The Present Study

In March 1976, Robert M. West and others collected fossil vertebrates in rocks mapped by the Nepal Geological Survey as Lower Siwaliks in the range of low hills immediately south of Babai Khola in western Nepal. This area of the Dang Valley was selected from aerial photographs studied at the Forest Resources Service, Kathmandu, and from the comments on fossil occurrences in several unpublished Nepal Geological Survey reports.

Vertebrate-producing sites were found in a region about 34 km long and 3.25 km wide. The localities are scattered through about 500 meters of steeply dipping finegrained rocks on the north slope of the first line of hills south of the Main Boundary Fault. Recent deforestation by local residents has resulted in rapid erosion of the steep hill sides, exposing the steeply dipping

Siwaliks.

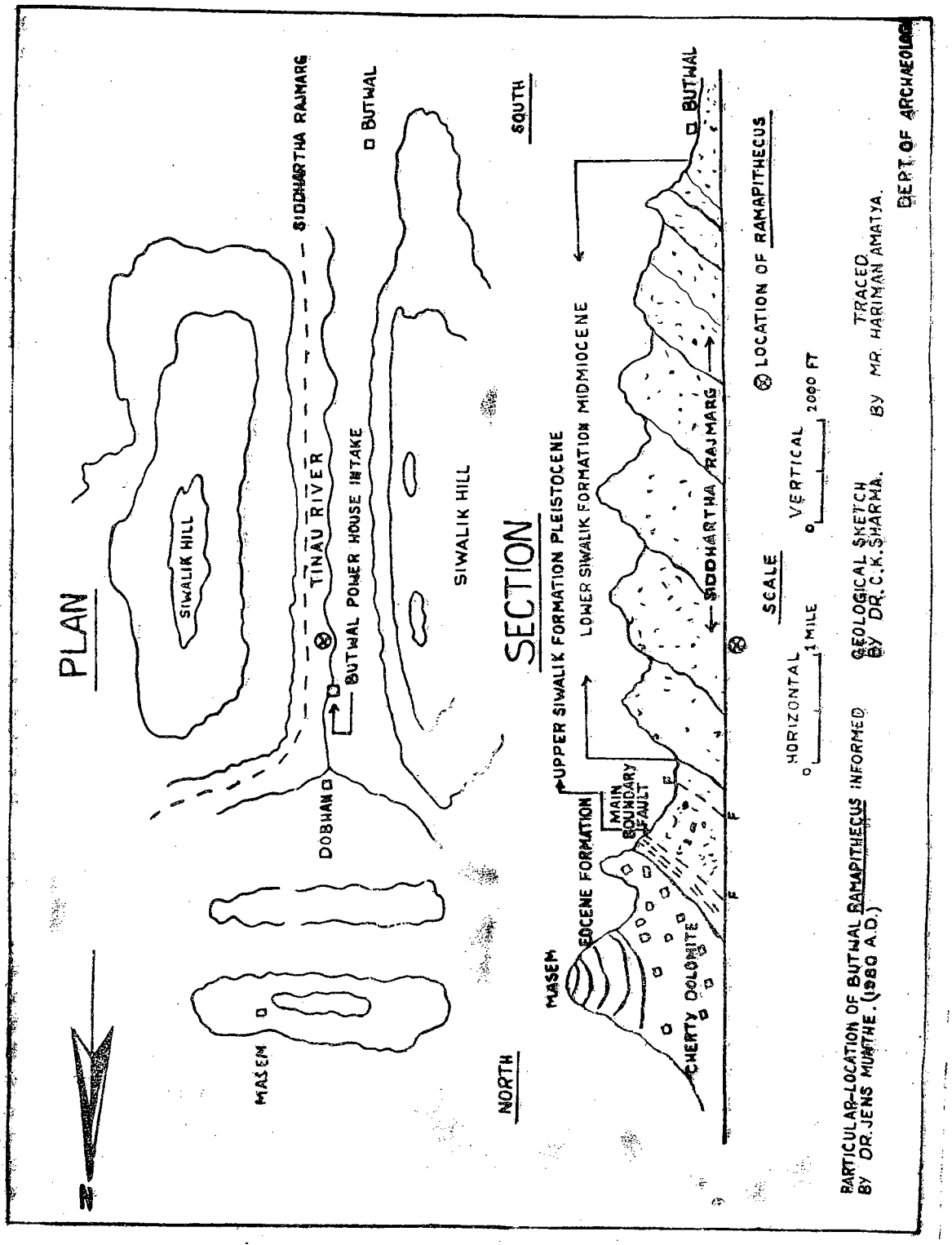
The Dang Valley Siwalik Group dips generally southward, so the oldest rocks are low on the northernmost hills. These sub-Himalayan hills are faulted synclines reflecting structural proximity to the Main Boundary Fault. Younger beds of the Siwalik Group overlie the 1976 localities, to the south of Tui Khola, so the present study sampled only a small part of the available Siwalik sequence.

The presumed Lower Siwalik rocks of the Dang Valley are fine-grained, buff, purple to gray sandstones, siltstones and marlstones. Little coarse sandstone or conglomerate is present, and channel deposits are not prominent. Marlstones make up many of the more resistant units; this facies is markedly different from presumably time-equivalent Lower Siwalik rocks of India and Pakistan and from lower Siwalik red and maroon clays near Nepalganj reported by K. Mathur (1972). Lower Siwalik rocks in western Nepal appear to have been deposited in poorly drained areas, characterized by ponds and sloughs, in contrast to the almost entirely fluvial depositional environment of Lower Siwalik rocks of the west in India and Pakistan. The abundance of fossil fish, crocodilians and turtles in the Nepal Siwaliks tends to substantiate this.

The fossils usually were found as surface lag fragments; no excavations were undertaken and only one specimen was found in situ. The fragmentary nature of the specimens coupled with the relative infrequency of fossils suggests that this particular area of Nepal Siwaliks is not nearly as productive as exposures of equivalent size farther west. Although fossil vertebrates previously had been found in Nepal (C. K. Sharma, 1973), and near Butwal in the Siwalik range has been found the upper left molar of *Ramapithecus* by Scientific-Expedition-Team in December 1980. (Text fig. 2)

Present Study of the Himalaya

Neither can the Qinghai-Tibet Plateau be ignored as a possible place of man's origin. In the Tertiary period, the geographical features of this region were quite different from today. Successive explorations in the Qomolangma (Jolmo Lungma) (or Mount Everest) area carried out under the auspices of the Chinese Academy of Sciences have produced abundant scientific data. We know from the flora here that in the Upper Pliocene, the ecological environment in the Mount Xixia Bangma region at that time was marked by sub-tropical climate with a yearly mean temperature of about 10 °C and precipitation around 2,000 mm. In 1975 at a site in the Jilong Basin, which is 4,100-4,300 m. above sea level, on the northern slope of Mt. Xixia Bangma in the middle section of the Himalayas, fossil remains of the Pliocene three-toed horse (*Hipparion*) were found. This species of forest-grassland dweller is at home in a temperate climate. Sporo-pollen analysis has also produced evidence of a flora that included *Loropetalum*, palm, quercitron, goosefoot, cedar, pea and other sub-tropical plants, which tallies with the climatic conditions shown in the composition of local clay minerals. A geological report made on April 16, 1977 by a Chinese geologist Chen Wanyong concluded : "In the Pliocene the Himalayas were about 1,000 metres above sea level and not as pronounced a barrier to the monsoon from the Indian Ocean as it is today, hence both the south and north slopes were benefited by that seasonal, wa-


PLAN
SIWALIK HILL
SIDDHARTHA RAJMARG
TINAU RIVER
BUTWAL POWER HOUSE INTAKE
BUTWAL
DOBHAN
MASEM
NORTH
SOUTH
SIWALIK HILL
SECTION
UPPER SIWALIK FORMATION PLEISTOCENE
LOWER SIWALIK FORMATION MIDMIOCENE
EOCENE FORMATION
MAIN BOUNDARY FAULT
CHERTY DOLOMITE
SIDDHARTHA RAJMARG
LOCATION OF RAMAPITHECUS
SCALE
HORIZONTAL 1 MILE
VERTICAL 2000 FT
PARTICULAR-LOCATION OF BUTWAL RAMAPITHECUS INFORMED BY DR. JENS MUNTHE. (1980 A.D.)
GEOLOGICAL SKETCH BY DR. C.K. SHARMA.
TRACED BY MR. HARIMAN AMATYA.
DEPT. OF ARCHAEOLOGY

Text Fig. 2

nm, moist wind. It can be safely said that the Himalayas and Qinghai–Tibet Plateau have since the Pliocene been rising at the rate of approximately 0.025–0.03 mm. per year, with an obvious higher rate of uplift after the Middle Pleistocene. The present-day elevation is at least 3,000 metres higher than in Pliocene times." This information is of great value. It suggests that during the transition from ape to man, the Qinghai–Tibet Plateau and himalayas in Nepal are the himalayan region still suitable for the evolution of higher Primates, which makes the regions a hopeful place for seeking missing links in the evolution of man.

For reasons stated above, for the assertion that man's place of origin is in the southern part of East Asia, particularly nothern and southern slope of Sagarmatha or the Mount Everest region.

The example, which is given here, shows the possibility that man's ancestor Hominidae could be found in the southern part of Nepal in Siwalik and in Himalaya in north. Therefore, work should be done in this field in Himalayan range also, as it has been done in Siwalik. Royal Nepal Academy of Science and Technology has already been established in Nepal. Every year foreigners are given permission for Himalayan expedition. With these expedition teams, if Royal Nepal Academy of Science and Technology would compulsorily participate by sending a paleontologist, then it might be a great achievement for Nepal, the country of Yeti-Man, in the field of paleontology. It may be possible that the origin of Man's first ancestor would have been started from the world's highest mountain Sagarmatha or the Mount Everest range.

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