

## Report on the Work Done in the Project of Quaternary and Prehistoric Studies in Nepal

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The project, headed by Prof. Dr. Freund Institute for prehistory, Erlangen University, Germany, and executed by me, Dr. Gudrun Corvinus from the same university, has been going now very successfully for 2 years. The first 2 years were mainly exploratory work to determine the extent of work of the project and above all to make the basic studies in the projected field of investigations. The study concentrated on two themes:

- 1) the Miocene-Pliocene stratigraphy and geology of parts of the Siwaliks and its palaeontological potentials in order to (a) determine the age and palaeoenvironment of the Siwalik group sediments and (b) to be able to compare the Nepal Siwaliks sediments with those known from the Indian Subcontinent and Pakistan.
- 2) the study of the Pleistocene and early Holocene period in Nepal and the search for possible prehistoric settlements of palaeolithic (old stone age) and neolithic (young stone age) man in Nepal during these periods, in order to find out whether Nepal was in fact occupied by stone age man or not.

It was a two-fold aim; one more geologically orientated and the other more prehistorically orientated, yet connected with each other by the fact, that the period of the Siwaliks precede the period of the prehistoric investigations and that during the early Siwalik period the earliest possible ancestors of man, Ramapithecus, lived.

The investigations were in both topics extremely fruitful so far.

1) The work in the Siwaliks concentrated in two areas. The first area is in West Nepal, where a new road was constructed through the Siwaliks from the Terai into the Rapti Deokhuri Valley, and where the exposures were extremely well exposed during the cutting and blasting of the road.

Here a number of vertebrate fossils were found *in situ* in the rocks, mainly in the compact sandstones which seem to constitute the middle part of the Siwaliks. Also a very great amount of plant fossils, of leaf impressions and of fossilized, carbonized wood was found, the wood mainly in association with the vertebrate fossils in the sandstones, and the plant and leafmaterial

throughout the succession, but more commonly found in the fine clastic deposits of claystones and mudstones in the older period.

Besides these fossils a number of horizons full of molluscs could be recorded, which yielded plenty of gastropods and lamellibranchs, sometimes so rich that they form lumachelle horizons in the clays.

A very unique find was made during the cutting of the road at the Surai Khola near the Chor Khola bridge, where a large bedding plane of a mudstone got exposed which carried a really lovely set of animal footprints of some smaller artiodactyl animals. This has been recorded and photographed, but the bedding plane is slowly disintegrating.

After the deposits were found to be full of interesting data, the whole succession was measured and analysed and samples taken. A profile column of 5500 m. of Siwalik deposits was measured with all details of palaeontological and sedimentological data.

The data so far obtained show a coarsening up of the clastics, from fine clastics in form of alternations of colourful grey, black, brown to purple clays and banked fine sandstones and mudstones with shale intercalations for the lower part, and a thick succession of very micaceous, crossbedded, jointed sandstones which become coarser in the higher upper sections. They begin with multistoried sandstones and later form very thick, compact, coarse sandstones with little stratification. These compact sandstones contain much fossil wood, often in the form of small coalseams, and whole carbonized tree trunks. These sandstones are also the most fossiliferous deposits of the succession.

They later begin to alternate with beds of gravels, and finely thick deposits of hard conglomerates from the main ridge and watershed between the Terai and the Deokhuri. The

succession of the Siwalik deposits show altogether a coarsening up of the alluvial sediments from finer clastics in the lower part to coarse clastics in the upper part.

The palaeoenvironment of the earlier period seems to have been a quiet period with deposition of clays, silts and muds in quiet waters of small backwaters and marshy terrain with small ponds and occasional fluvial intercalations, and with a great wealth of plant life. The identification of the plant material will eventually tell us a great deal more about the environment and climate of that period.

The coarsening of the deposits in the middle part of the succession indicate a wide, flat riverine environment with a broad net of widely meandering and braiding streams and broad flood beds with ever changing point and traverse bars. The deposits indicate active fluvial sedimentation with lateral accretions in the stream beds and fine overbank deposits in the form of vertical accretions. Together with the coarser material of sands brought down from the Himalayas, great amounts of wood as well as fossil animal bones were swept into the sand bars and were well preserved in the rather calcareous environment of the sands.

Toward the end of the Siwalik succession the pronounced coarsening of the deposits in the form of thick conglomerate banks shows us a scenery which is characterized by large fans and sheets of boulder/cobble gravels at the foot of the mountains. A strong, last phase of uplift of the Himalayan orogene caused the rivers to transport large amounts of very coarse debris from the rising mountains.

Several other areas were investigated in Western Nepal, in comparison to the Surai Khola succession: the Arjun Khola deposits between the Deokhuri and Dang valley and the Siwaliks to the west of Deokhuri near Tapt Kund. Here quite a number of vertebrate

fossils could be found *in situ* in a thick sandstone succession and these deposits, too were measured and recorded in detail.

Further to the west the Siwaliks were investigated at its broadest belt between the Terai north of Nepalganj to Surkhet. These successions show several thrusts and are interesting from the lithological point of view. Plant fossils have been found plentifully, but vertebrates have yet not been found.

In the second year of the investigations in winter 84/85, apart from continuing at the Surai Khola succession several traverses through the Siwaliks have been carried out in the central part of the Siwaliks and in the eastern part.

Here I will only mention the Kamla Nadi area, in which a more concentrated survey has been carried out. In this area quite a great amount of vertebrate fossils could be recorded in the deposits mainly in the middle part of the succession in the sandstones. Apart from the vertebrate fossils there are, as usual, many plant fossils, leaf impressions and very much carbonized wood, as well as molluscs in some very concentrated horizons. But above all, this area is interesting due to the large animal fossils which could be found here in the succession. Of particular interest here are some partly fragmented, partly well preserved skulls of crocodile, large pig, antelope and elephant. One large elephant skull could be extracted from the sandstones and was quite complete, and we took great pain in preserving it, as it was quite brittle, hardening it with chemicals, and transporting it with bandages of plaster of Paris for protection. This, as well as another upper part of an elephant skull seems to belong to a *Stegodon* and is probably of an Upper Siwalik age, comparable to the Pinjores in India.

These are very interesting first results

and the project promises to clarify the stratigraphy, palaeoenvironment and the palaeontology of the Siwaliks in these areas in Nepal and will establish a sequence of events in Nepal to form a base for the comparison with the Indian Siwaliks and the Potwar area in Pakistan, from which areas there are already detailed studies available.

The immediate future plans in the connection with the palaeontological findings is to get all the fossils identified. For the plant fossils I am in contact with the Birbal Sahni Institute of Palaeobotany in Lucknow. The vertebrate fossils will be studied and identified partly in India with Dr. Nanda in Dehra Dun and partly in Munich University in Germany.

In the following winter season further field work is planned in the above mentioned areas, especially in the eastern Siwaliks in the Kamla Nadi area, as well as in the Deokhuri area.

2) The prehistoric investigations went alongside the geological studies. While in the field and while doing the geological survey I had always an open eye for possible prehistoric sites.

No such sites of prehistoric man had yet been found in Nepal, and it was not known, whether palaeolithic or neolithic man was occupying Nepal in prehistoric times. Several attempts had been made and some investigations had been carried out previously, but without any definite evidences.

In the Kathmandu valley neolithic settlements should be expected, as in the valley of Kashmir in India. A few polished stone celts have been found in the valley and elsewhere, but all of them in no stratigraphic nor archaeological context and most of them seem to have been brought in by migrants from Tibet, mainly as "shaligrams".

Neolithic man, however, must have occu-

pied some of the valleys in Nepal. In the Kathmandu valley so far nothing has been found in spite of the search, probably due to the fact, that the entire valley surface has been tilled into a dense terrace system for agricultural use for many centuries, so that no original surface soil has been preserved.

The search for palaeolithic and neolithic settlements have also been carried out, as I just said, in the area of my geological investigations, in the Deokhuri and Dang valleys and along the river terraces of the Kamla Nadi area, in the foothills of the Siwaliks.

And here my search has been extremely fruitful, and unexpectedly rich.

Altogether I found 29 sites and localities where stone artefacts have been recorded by me. Only sample collections have been made in order not to disturb the findspots for future detailed work and analysis of the environmental setting and the determination of the stratigraphical position.

The sites were found during systematic survey work in the Dun valleys of the Deokhuri and Dang as well as on river terraces at the foot of the Siwalik mountains towards the Terai.

The stone age material consists of artefacts and tools, made of a variety of raw material: mainly quartzite, but also quartz, various kinds of chert and silica, and a fine, curious tuffaceous material.

The artefacts are unretouched flakes, cores and corescrapers and much manufacturing debris of macrolithic and microlithic nature. They seem to belong to several cultural periods, not only to one. And this is really an interesting fact.

The macrolithic flakes are associated with larger cores and with a very typical, (i. e. very typical for the newly discovered cultural material in Nepal, as it seems) new tool type, a type of corescraper. This macrolithic material is all

made from quartzite and sometimes of the tuffaceous rock type. The flakes have a very characteristic stepflaking at the margin of the platforms towards the dorsal (upper) surface of the flake; and the platform consists mainly of cortex. They have been detached from cobble cores which had been "prepared" and retouched by stepflaking along one or to flat cortex platform prior to the detachment of the flake.

The most interesting tool of this period is the above mentioned corescraper which seems to be the typical tooltype within this unit. It is made from quartzite cobbles and worked in such a way that one or two vertical working edges were produced, which show a characteristic steep stepretouch. The sites containing such macrolithic artefact material must belong to a palaeolithic period of a yet unknown age.

Other sites are younger and have a pronounced microlithic element. They contain small flakes and microlithic debris as well as small microlithic cores and small discoidal cores, all made of varied types of raw material, but mainly of various colourful kinds of chert and silica, and quartz as well as of quartzite.

Small retouched tools are few amongst this material, but a few "thumbnailscraper" like tools, endscrapers and a backed lunate show the affinity to a microlithic cultural period of yet unknown provenance and age.

The youngest cultural material, forming also the most interesting discoveries, are two small polished stone celts made of fine, light-coloured sandstone/siltstone, not of the black phyllitic type of rock material usually found with the polished celts, which are available sometimes as "shaligrams" in the bazaar.

One of the axes was found in the Dang valley within a silt, i. e. in stratigraphical context and in association with other archaeological findings at the same site. This is also the first time that a celt has been found *in situ* in stratigraphically determinable position

and with other archaeological material in Nepal and the intriguing question is now to what period and what age it belongs, and which of the archaeological material found also at this site is associated with the celt: there are postherds of a different type than the recently made pottery of Dang, and there is also other stone age material at the site, for example a fine blade. Only an excavation can clarify the situation.

Another small, but broken fine celt was found in the Tui valley, in context with a similar silt, but found on the surface in a small erosion gully in the silt, and the probability is that it has recently weathered out from this same silt.

All these above mentioned sites have been found in the Deokhuri and Dang Dun valleys and in association with a colluvial silt which form terraces in the Rapti and Babai valleys and interfinger with fluvial and probable lacustrine sediments. It is probable that prehistoric man lived here at the margin of the formerly existing lakes in the Duns which had formed when the rivers were blocked due to the continuation of orogenetic movements after the forming of the Dun valleys.

Some other prehistoric sites have been found far away from the Deokhuri Dang area in the Eastern part of Nepal in the Kamla Nadi area.

Here the environmental situation is quite different from Dang. While at Dang the sites are connected with the intermontane Dun Valleys, separated from the Terai flatlands by one or two (in the case of the Dang Dun) chains of Siwalik mountains, the situation in the Kamla Nadi area is not connected with Duns. The sites are positioned on the older river terraces of the streams which leave the Siwaliks and enter the plains. These streams

have formed, on reaching the flat Terai, a set of riverine terraces; and here, at the edge of the Himalayan mountains to the Terai, stone age men must have lived and have left the artefact remains of their camp sites on the terraces.

This situation is similar to the palaeolithic sites of the Soan culture recorded from Northwest India at the foothills of the Himalaya. And such type of sites I had expected to find while looking for prehistoric remains. And I was very happy that the search has been positive.

So, there is no question now, that during prehistoric times Nepal, too, was occupied by people who fashioned stone age tools and who were able to penetrate through the thick forests of the Terai into the foot hills or came from the North and East from Eastern Asia.

A whole set of very exciting and interesting questions has thus been raised by these discoveries, such as : to what cultural period belong the various artefact materials; they do seem to span the palaeolithic and neolithic time, but during what ? In what connection are the archaeological findings with the geological strata ? Can a chronology be established? And in what way does the prehistoric material from Nepal compare with the Northwest Indian Himalayan Soan culture on the one hand and with the other very different palaeolithic culture of peninsular India? Or does it compare with the prehistorical material from East and Northeast Asia ? What people were responsible for making these artefacts? And from where did they come ?

All these questions can only be solved by further work, which is planned in the coming future. The discoveries are made; the question whether prehistoric and palaeolithic man really did live in Nepal has been answered to the positive. But now the real, main work starts, that of excavating carefully and skillfully and analy-

sing the material and strata with all possible scientific methods, such as sedimentological analysis of the silt; of determining the geological and palaeoenvironmental context within the geomorphological frame; of using modern dating methods for determining the age of the cultural material; identifying the typology of the artefacts and comparing them with the prehistoric cultures of the neighbouring countries.

Only after such studies have been done the manifold questions will be solved. And this is what is planned in the coming years.

This report records in short form that the project of the last two years has been extremely fruitful and successful in all ways, palaeontologically as well as prehistorically, and that very interesting and partly unique discoveries have been made in both fields, obtaining much new data and raising many exciting questions about Nepal's earliest past, and that the work had been hard but very rewarding, and that future work is very promising and will reveal plenty of new evidences.

The German Research Council has granted the financing of the continuation of this work and thus, though the project is small and only me with four Nepali companions executing it, the work can continue, and I am very grateful for it.

I want to thank at this place the Research Division of Tribhuvan University for having granted the first two years research permission, and I hope that it will continue. I want also to thank the Rector of Tribhuvan University, Dr. Gorkhali, as well as the Head, Prof. Sharma, and the staff of the Geology Dept. at Trichandra College for help and assistance. Above all I thank my four companions in the field, specially Mr. Vishnu Dangol from the Geology Department of the University. My thanks go also to the H.M.G. Department of Mines and Geology, to Mr. Rana and Mr. Tater, for their encouragement and the facilities they gave me initially when I was new here. Very thankful I am specially to the H. M. G. Department of Archaeology, particularly to Mr. J. L. Sharma, the former acting Director, for his co-operation in my archaeological work. Last but not least I want to thank very much the German Research Council for granting me the project and financing everything in it, and particular thanks are extended to Professor Dr. Freund, Head of the Department of Prehistory of the University of Erlangen in Germany, due to her great help and promotion the project has only been made possible; to her, as head of the entire project, goes my deepest thanks.

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