

Fig. 1. The Location of Langhnaj in Northern Gujarat.

PRELIMINARY REPORT ON LANGHNAJ

THE PRELIMINARY REPORT OF THE 1963 ARCHAEOLOGICAL EXPEDITION TO
LANGHNAJ, NORTHERN GUJARAT.

by

G. KARVE-CORVINUS & K. A. R. KENNEDY

This is a preliminary report of the archaeological excavation at Langhnaj which was directed by the authors in November and December of 1963. The expedition was made possible through the cooperation of the Departments of Archaeology of the Deccan College Postgraduate and Research Institute, Poona, the University of Baroda, and the Government of Gujarat, Rajkot. Confirmation or modification of the interpretation of the recent data from Langhnaj is dependent upon a thorough examination of the artifacts and osseous remains. Until this laboratory study has been completed, the impressions of the officers-in-charge stand on the basis of their field observations. The importance of Langhnaj to the prehistoric archaeology of Western India is emphasized by the fresh evidence now made available to scholars concerned with the development of early cultures in the Sub-continent.

The first discoveries of prehistoric stone tools in Gujarat were made by Robert Bruce FOOTE.¹ In 1893 he found a flake tool and two handaxes in the bed of the Sabarmati River near the villages of Sadolia and Pedhamli. Although these tools were the centre of interest to prehistorians gathered at the Geological Section of the British Association at Oxford, some fifty years elapsed before the artifacts were figured and described in a published account by Dr. H. D. SANKALIA². This scholar again drew attention to the prehistory of this portion of India in his report of a programme of archaeological research in Gujarat initiated in 1941—the First Gujarat Prehistoric Expedition.³ It was during the investigation of the sandy deposits in the vicinity of Vijapur that SANKALIA and his colleagues made their headquarters at the village of Langhnaj in the District of Mehsana, for this place offered them the convenience of a Government Rest House. Before the termination of the 1941 season of site surveying, it was observed that the mound upon which the Rest House stood, and which was cut by the road leading to the village, was microliferous and a repository of splintered bones. Further searching in the neighbourhood revealed that the mound which promised the greatest archa-

¹ FOOTE, R. B., *The Foote Collection of Indian Prehistoric and Protohistoric Antiquities in the Government Museum Madras : Notes on Their Ages and Distribution*, 15, Madras, 1916.

² SANKALIA, H.D. Pre- and Proto-History of Gujarat, *The Glory that was Gujaradesa*, 1.13-26, 34-40, 1943.

³ SANKALIA, H. D., In Search of Early Man Along the Sabarmati, *JGRS* 75-8, 1942; *Investigations into the Prehistoric Archaeology, Being the Official Report of the First Gujarat Prehistoric Expedition 1941-42*, Baroda, 1946.

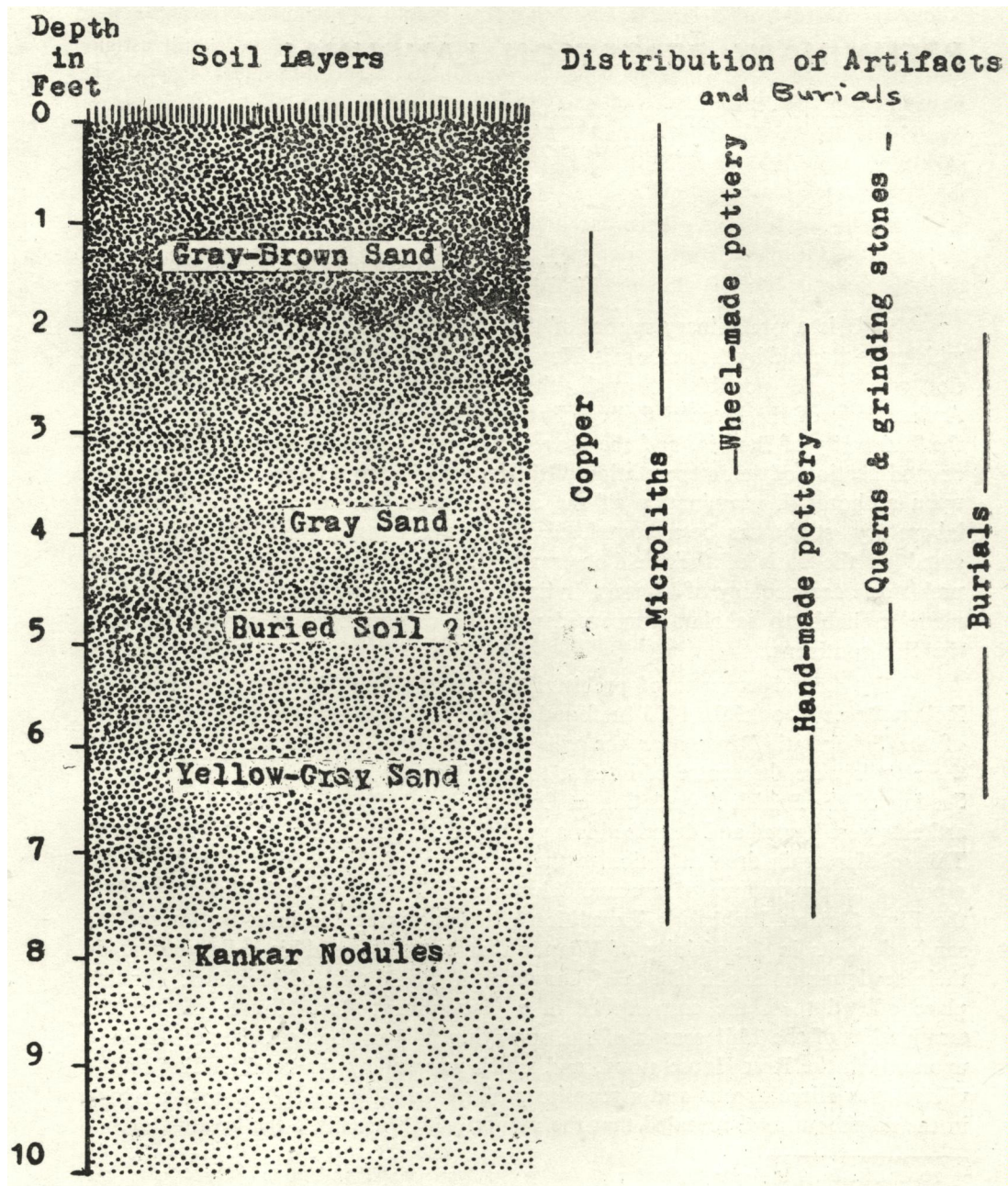


Fig. 2. Schematic Representation of Sectional Trenches at Anghario Timbo.

eological rewards was a large *timbo* rising to a height of some sixty-seven meters to the East of the Rest House-the *Andhario Timbo* (Fig. 1). Since the investigations of 1941, SANKALIA and his colleagues conducted a Second Gujarat Prehistoric Expedition in 1944⁴, and a Third one in the year following⁵. Subsequent work was conducted in this region in 1947 and 1949⁶. Dr. B. SUBBARAO continued excavations from 1952 to 1954⁷. The last expedition before the one described in this report took place in 1959⁸.

Archaeologists have been faced with three major problems in their interpretation of the data from Langhnaj: (1) the identification of geological and palaeontological deposits in the sandy soils, as revealed along the walls of excavated sections and in eroded nalas; (2) the identification of cultural horizons with possible stratigraphic layers, i.e. the correlation of cultures with soils and fauna for different depths; (3) the absolute and relative dating of the site itself.

The problem of geological stratigraphy at Langhnaj was investigated by Dr. F. ZEUNER⁹ who came to Gujarat in 1949. After examining the areas around the Sabarmati and Langhnaj, he defined a number of climatic periods with which he correlated specific kinds of soil deposits in this region. A humid phase (T), during which time the " red soil " which can be seen along the cliffs of the Sabarmati was formed, was followed by a main dry phase (U). In this latter period thick deposits of windborne sands were laid over great parts of Gujarat. These sands were ultimately transported by the rivers as an erosional material acting upon the granites and quartzites of the highlands to the North. ZEUNER assumed that at the termination of this dry phase a flat land surface was derived from subarial forces. Upon this ancient plain (V) another dry phase was active. Winds blowing from the southwest in the region of the Bay of Cambay led to the formation of the dunes. *Andhario Timbo* is one such dune (Plate I). These dunes were accompanied by blow-outs which became filled with water. The waterpan to the southwest of *Andhario Timbo* today serves as a village tank. From these depressions the materials which constitute the mounds were removed, and ZEUNER identified this dune phase (W) with the light yellow-grey, calcarious sand filled with kunkar nodules to be found at depths below five feet in sections of the site. The dune phase was followed by more humid conditions during which time vegetation gained a hold on the surfaces of the dunes and formed a soil cover (X). It was at this level of the " buried soil " that ZEUNER associated the cultural and osteological

⁴ SANKALIA, H. D., KARVE, I., The Second Gujarat Prehistoric Expedition : a Preliminary Account of the Search for; ' Microlithic Man ' in Gujarat, *NIA* 7·1·1-6, 1944.

⁵ SANKALIA, H. D., KARVE, I., *Preliminary Report on the Third Gujarat Prehistoric Expedition*, Poona, 1945; Early Primitive Microlithic Culture and People of Gujarat, *AA* 51·1·28-34, 1949.

⁶ SANKALIA, H. D., Stone Age Cultures and Climatic Phases in Northern Gujarat, *PISC* 3. Abstracts. 212, 1950.

⁷ SANKALIA, H. D., Excavations at Langhnaj, Gujarat, *Man* 55.33.26, 1955; The Microlithic Industry, of Langhnaj, *JGRS* 18-4-275-84, 1956; SUBBARAO, B, *The Personality of India*,² 69-75 Baroda, 1958.

⁸ REPORT Unpublished

⁹ ZEUNER, F., *Stone Age and Pleistocene Chronology in Gujarat*, 23, Poona, 1950.

remains of the prehistoric people of Langhnaj. During this occupation phase, the climate became drier and windborne sands were again deposited (Y). This was a brief period and the modern brown calcareous sands which constitute the upper three feet of the site (Z) cap this grey-brown layer. Today the region is again lightly wooded.

The mammal bones collected at Langhnaj prior to 1963 have been described by Dr. J. CLUTTON-BROCK¹⁰. She writes that it has not been possible to gain any information about the stratification of the faunal remains because the depths of the bones were measured from the uneven surface of the mound and not from the level of the "buried soil". No single species appears to be correlated exclusively with either the upper or the lower layers. The precise faunal pattern during the period of prehistoric human occupation remains unclear. CLUTTON-BROCK has identified ten mammalian species among those specimens sent to London for palaeontological study :

" *Order Carnivora*

Canis cf. lupus pallipes Sykes 1831, the Indian wolf.

The left maxilla and mandible of one individual.

Herpestes edwardsi cf. ferrugineus Blanford, 1874, the Indian grey mongoose.

One almost complete skull and skeleton.

Order Perissodactyla

Rhinoceros unicornus L., the great one-horned rhinoceros.

Two scapulae, one humerus, one talus, and a molar tooth.

Order Artiodactyla

Sus scrofa cristatus Wagner, 1839, the Indian wild boar.

One talus and teeth.

Axis axis Erxleben, 1777, the spotted deer.

Four tali, teeth and antler fragments.

Cervus duvauceli Cuvier, 1823, the barasingha or swamp deer.

Five tali and teeth.

Boselaphus tragocamelus Pallus, 1766, the nilgai.

Five tail, four metapodial bones, two horn cores and teeth.

Bovini of Simpson, 1945.

Forty teeth and a large number of bone fragments.

Antilope cervicapra L., the blackbuck.

One talus, teeth and mandibular fragments."

These faunal species can be found today in the savannah areas of the Indian Peninsula, although *Rhinoceros unicornis* is no longer in Western India and certain other forms are nearly extinct or of a very limited distribution. *Rhinoceros unicornis*, *Sus scrofa cristatus* and *Cervus duvauceli* and *Axis axis* are swamp-living

¹⁰ CLUTTON-BROCK, J., *Faunal Remains from the Microlithic Site of Langhnaj, Gujarat*, Unpublished MSS. The authors are indebted to Dr. CLUTTON-BROCK for permission to cite this report.



Plate I. The Crest of Andhario Timbo, seen from the West.

Plate II. The main Trench (Trench I)
on the Crest of the Hill.

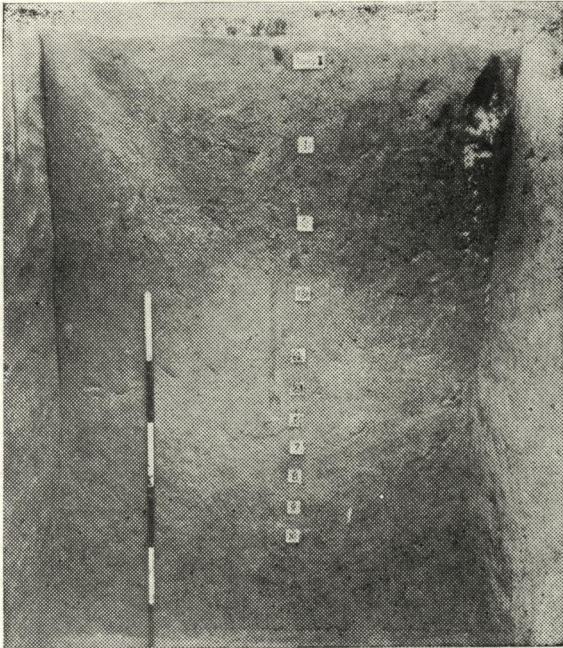
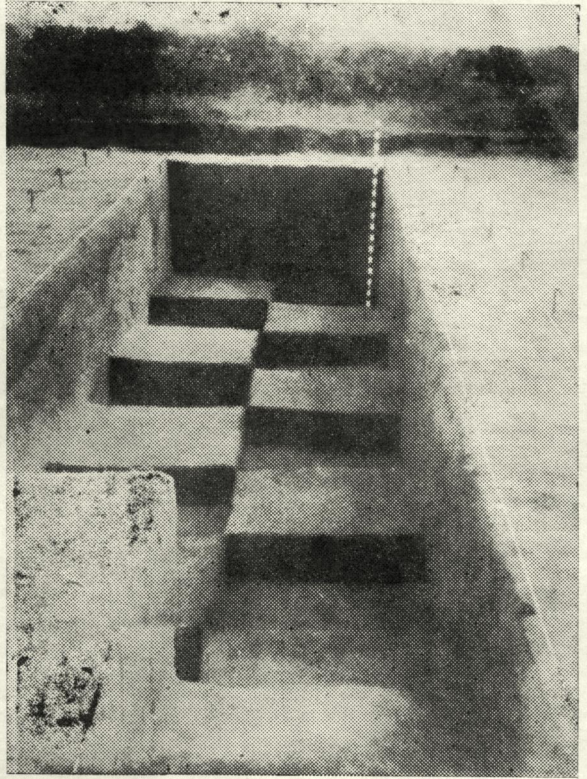


Plate III. Trench I, Section, facing East.

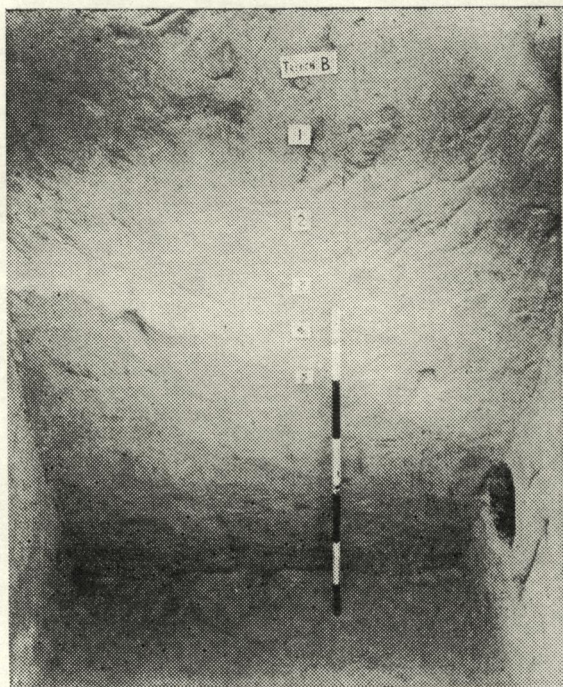


Plate IV. Trench B, Section, facing East.



Plate V. Trench IV, Section, facing East, with a pile of fractured bones.



Plate VI. Fractured Bones from one of the piles.

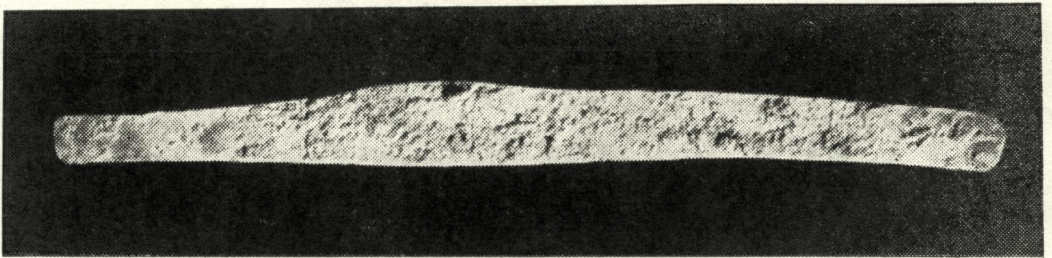


Plate VII. The Copper Knife of Trench I. (Reduction; Approx 2 times.)

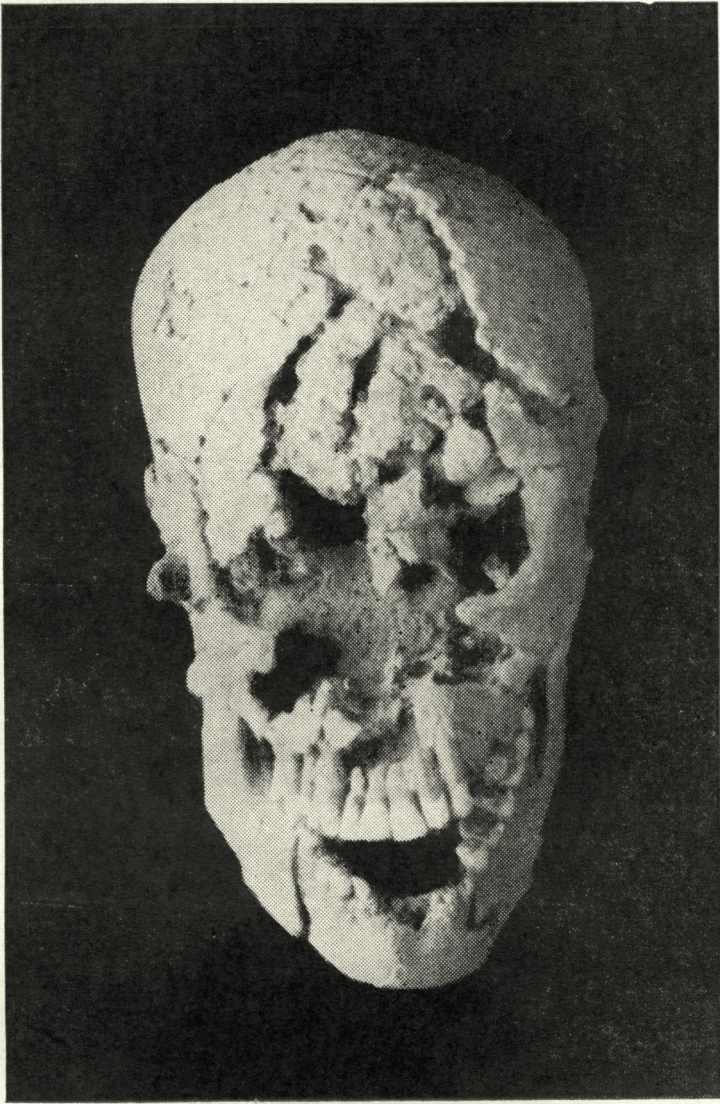


Plate VIII. Frontal View of the Skull.



Plate IX. Lateral view of the Skull

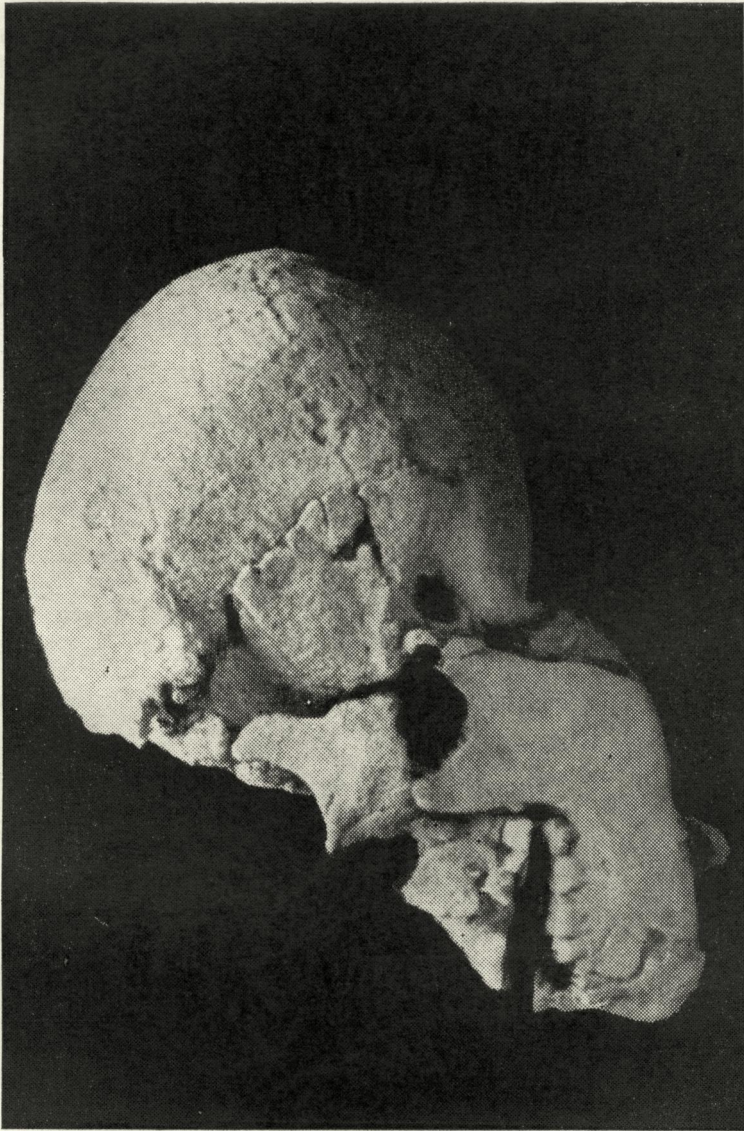


Plate X. Lateral View of the Skull

animals, and their presence at Langhnaj suggests that perennial water was available in Northern Gujarat during this period.

According to CLUTTON-BROCK the bovines from Langhnaj are difficult to identify. They do not seem to belong to *Bos gaurus* and *Bos indicus*. The latter was known at Mohenjo-daro, but not as a wild form. There is not enough comparative material to assert that the Langhnaj bones are *Bubalus bubalis*, although CLUTTON-BROCK thinks that *Bubalus bubalis* specimens in her collection come nearest to resembling them.

The second problem that Langhnaj presents—the relationship of one or more cultural horizons to the so-called stratigraphy—is a more complex one. There can be no doubt that the upper three feet of the site-ZUNER's Layer Z—contain the cultural remains of Neolithic and Iron Age occupations. These are recognized by the presence of pieces of iron slag and fragments of modern wheel-made pottery which has been well fired. Presumably the associated mammal bones are of domesticated species. As in the sands of Layer Z, the layer underlying it contains great numbers of microliths. But when the excavator descends to depths greater than three feet, the microliths are found associated with hand-made pottery of a cruder type. These lower sherds are dull brown in color with rough and poorly fired cores. Such coarse ware is no longer made in Western India.

Penetration into the deeper layer of the so-called "buried soil", some four to five feet from the surface, revealed to the former investigators of the site a situation in which the microliths continued into a layer devoid of pottery. SUBBARAO¹¹ later pointed out that at this position some crude pottery could be associated with the stone tools, but SANKALIA and KARVE¹² had earlier suggested that only stray sherds from upper levels could be found in the pure microlithic layer under these circumstances. Here is a crucial problem, for upon the tenet that pottery is not an intrinsic feature of the "buried soil" has rested the assumption that Layer X contains the vestiges of a Late Stone Age culture over which had been superimposed a later pottery-using Neolithic and Iron Age cultural sequence.

Little help in the resolution of this difficulty can be sought in the examination of the other specimens of material culture found within the mound. Immediately below the layer containing wheel-made pottery and iron a quartzite mace-head, or possibly a weight for a digging-stick, had been discovered along with two pieces of chlorite shist in the form of Neolithic celts, and some *Dentalium* shell beads. Layers below four feet have yielded a small number of sandstone querns and abrasive tools of the same material, implements used perhaps in the grinding of wild seeds and grains. Splinters of mammal bones which appear to have been used as tools were also recovered from these lower layers. But there is no distinctive feature of this artifact assemblage collected prior to 1963 to justify the theory that the lower deposits of the site contained the vestiges of a Late Stone Age culture. The absence of any stone tool larger than microliths and rubbing

¹¹ SUBBARAO, B., *The Personality of India*², 73-74, Baroda, 1958.

¹² SANKALIA, H. D., KARVE, I., *Preliminary Report on the Third Gujarat Prehistoric Expedition*, 2, Poona, 1945.

stones as well as the abundance of microliths does require the archaeologist to set a lower limit on the cultural period, however: the occupation must be post-Middle Stone Age.

SUBBARAO¹³ claims that 87·4 per cent of the total number of microliths in the excavated sections lie below the level of the "buried soil". However he marks the depth of this humid horizon within a range of from two feet ten inches to four feet two inches. Since microliths are found as deep as nine feet, this would mean that the lower two-thirds of an excavated section contain the majority of these tools, a situation that is not unexpected. The microliths that have been found at Langhnaj belong to a crude geometric industry represented by a high frequency of lunates and crescents and fewer numbers of triangles, trapezes, side and end scrapers and core scrapers. Some asymmetrical points may have been hafted to arrow shafts or used as barbs. A *Rhinoceros* scapula found by SANKALIA exhibits a series of cuts and abraded grooves which ZEUNER¹⁴ interpreted as scars placed on the bone as a result of its use as an anvil in the manufacturing of microliths.

It has been assumed that all the human skeletons recovered from Langhnaj are from the same temporal period. This contemporaneity was suggested by the similarity of mode of burial, the concentration of the burials within an area of some sixty-five by thirty-five meters, the common association of skeletons with faunal remains of a similar degree of mineralization as well as their association with microliths, and finally the existence of anthropometric and morphological affinities between different individuals of the human skeletal series. Pottery was not reported from the layers in which the burials occur. Hence these skeletons came to be regarded as the vestiges of the manufacturers of the microlithic and pre-pottery culture which was called Late Stone Age.

If there were supportive evidence to show that the pre-ceramic layer was Late Stone Age, and if the burials could be intimately associated with this culture, then the Langhnaj skeletal series is the most ancient collection of human remains yet found in the Indian Sub-continent. There is only one other site in this part of Asia where human skeletal material has been found in association with a pre-agricultural and pre-metal using culture. These burials are found at Bellan Bandi Palassa¹⁵ in the jungle of southcentral Ceylon. But radiocarbon dates for the culture of the Balangodese indicate that their Late Stone Age culture was quite recent, a survival of a microlithic culture well within the Historic period on the Island, i.e. within a few centuries before and after the birth of Christ. Was their culture contemporary with that found at Langhnaj ?

Opinions have differed widely concerning the relative and absolute chrono-

¹³ SUBBARAO, B., *The Personality of India*², 78, Baroda, 1958.

¹⁴ ZEUNER, F., The Microlithic Industry of Langhnaj, Gujarat, *Man* 52.182.129-31, 1952; *Environment of Early Man with Special Reference to the Tropical Regions*, Maharaja Sayajirao Memorial Lectures 1960-61 3-21-22, Baroda, 1963.

¹⁵ The anthropometric and biochemical report of the prehistoric skeletons from Bellan Bandi Palassa has been prepared by one of the authors and (K.A.R.K.) is now in process of publication.

logies of Langhnaj. SUBBARAO¹⁶ turned to the evidence from other sites when he was unable to admit the presence of a true stratigraphic superimposition in his excavated sections. He noted that at Ranganathao there is a microlithic horizon which underlies an Harappan occupation. This site became the lower limit of his relative chronology. A second limit was found at Baroda where a clean and barren horizon intervenes between a microlithic and Early Historic layer. The upper limit was found at Timbarva where an Early Historic culture phase follows without hiatus an earlier occupation marked by the presence of Northern Black Polished Pottery (NBP ware). Since microliths are ubiquitous in the vicinity of Timbarva, SUBBARAO concluded that the microlithic phase could not be later than 400 B.C., the date assigned to the dawn of the Early Historic phase at Timbarva. SANKALIA¹⁷ has looked to Rangpur and Rojadi for a correlation of their microlithic techniques with those practised at Langhnaj, evidence which has led him to favour a date of about 2500 B. C. as a lower temporal limit for the site. For ZEUNER¹⁸, who does discern a distinction between the earlier pre-pottery microlithic users and their Iron Age successors who also manufactured microliths, the lower cultural horizon should be assigned a comparatively early date, but the Iron Age phase is given an antiquity not exceeding 2000 years B. P. Other dates which have been suggested for Langhnaj are 12,000 years B.P.¹⁹ and one millennium prior to the Harappan Civilization, i.e. about 3500 B.C.²⁰ Such are the problems and theories that the present investigators have inherited from earlier workers at Langhnaj.

The expedition of 1963 was motivated by three objectives. The first was an effort to amplify the data already collected during previous excavations in order that the problems of stratigraphy, cultural horizon and chronology might be reassessed. This question of dating prompted the collection of bone samples from each of the levels of the sections excavated to a depth of ten feet from the surface. This was the second goal of the investigation. Finally, the party was interested in recovering additional human skeletal material which might assist in a reevaluation of the thesis that the burials are Late Stone Age in date and contemporary with the artifacts associated with them and this cultural period. The remainder of this report is concerned with the results obtained from the pursuit of these aims.

Eight trenches were excavated, four on the crest of the mound and four on the slope to the North-West and the South-West. This is the area of the mound to the East of the trenches which had been dug during previous seasons. The main trench on the crest was two by eight meters in size (Plate II). The other trenches had dimensions of two meters square, save for one on the northwestern slope which

16 SUBBARAO, B., *The Personality of India*², 74-75, Baroda, 1958.

17 SANKALIA, H. D., *Prehistory and Protohistory in India and Pakistan*, 146, Bombay, 1962.

18 ZEUNER, F., *Prehistory in India : Four Broadcast Talks on Early Man*, Deccan College Handbook Series 1. i-ii, 1-7, Poona, 1951.

19 NAUDOU, J., *Le Neolithique de L'Asie Meridionale, L'Homme avant L'Ecriture*, edited by A. Veragnac, 11.315-39, Orleans, 1959.

20 GORDON, D. H. *The Prehistoric Background of Indian Culture*², 34, Bombay, 1960.

was two by four meters in size. Excavation proceeded by a system of "sub-squares" each one meter square for the levels of a given trench. Excavation terminated at the ten feet level for six of the eight trenches, but for two on the slope of the mound digging was continued only to depths of three and six feet respectively.

The distribution of these eight trenches at different loci on the mound afforded the researchers an opportunity to check the presence or absence of stratigraphy. Such very specific climatic fluctuations as ZEUNER has defined would suggest that traces of humid and dry phases might be clearly visible in the pit sections. Yet to the eyes of the present investigators only two, or at most three, soil layers are discernable (Plates III-IV). The geological stratigraphy as observed by us in the sections of the trenches is depicted schematically (Fig.2). There is a dark grey-brown topsoil which extends from the humus line to a depth of about three feet. Beneath this is a layer of lighter grey sand which merges at a depth of about five feet with a grey-yellow calcareous sand where one encounters kunkar nodules of various sizes. No traces of the so-called "buried soil" could be detected, although the presence of *Rhinoceros* bones and the remains of other swamp-living animals in the habitation layers of the site suggest a humid climate and a forested countryside during the time these fauna and their hunters were occupying the region.

Microliths are ubiquitous in the different layers of the mound. True microlithic tools with evidence of retouching constitute less than two to five per cent of the total number of microlithic flakes collected. Lunates, crescents, trapezes, triangles, points and "plunging flakes" are present. Nodules and cores range in size from minute pebbles to fist-size stones. Quartz and varieties of chalcedony are the common raw materials. Until the microlithic collection has been carefully studied in the archaeological laboratory, it is not possible to determine what the distribution of these types may be within the mound.

In all layers pottery is present. Where sherds are absent, microliths are also scarce or absent, as at depths under seven feet. Here faunal remains decrease in frequency as well. Therefore the present excavators cannot confirm the statements of earlier researchers that a pottery-free microliferous zone underlies a pottery-bearing layer, although this is not to question the existence of such a situation in the trenches previously excavated. As SUBBARAO²¹ has noted in the description of his work, the pottery of the lower levels is characterized by its coarseness and poorly-fired condition, while the wares of the upper level are better made as a result of superior techniques of firing and modelling. Sherds of the crude hand-made pottery are smaller than pieces of wheel-made manufacture, and no rim pieces of the former type are found at depths below three feet.

Ground stones of granite and sandstone have been collected from depths of two to six feet. These may be the parts of querns used for the grinding of grains and seeds. Although a complete quern has yet to be found, it may be possible to reconstruct the original form of one of these implements from recovered bits of rims and one saddle-shaped mid-section. Ground stone pebbles in the vicinity

21 SUBBARAO, B. *The Personality of India*², 74 Baroda, 1958.

of these larger fragments may be the pounders or rubbing stones held in the hand when materials were pulverized on the querns.

Two beads of *Dentalium* shell and one flat stone bead were found at two to three feet from the surface in a trench along the slope of the mound. These were in direct association with the human skeleton recovered from this zone.

In previous excavations the only metal objects found were bits of iron slag of obviously recent or Iron Age times. Iron was again found in the course of the present work at Langhnaj, but now for the first time copper has been discovered there. A knife of pure copper came from a depth of three feet two inches in the long trench at the crest of the mound (Plate. VII). The implement measures thirty centimeters in length and has a width of two and one half centimeters. Its blade has preserved a sharp edge, and the dull half of the implement strongly suggests that it had been hafted to a material which has now disintegrated. The stylistic comparison of this knife with similar tools in the Chalcolithic and Bronze Age sites of India and the Near East may provide additional clues to the antiquity of the culture of Langhnaj. Two other pieces of copper were found together at a depth of six inches from the surface in one of the trenches on the slope, but the affinities of these scraps with the copper knife may not be significant.

In contrast to the great number of microliths and potsherds found in the site, the frequency of faunal remains is low. All levels of the sections have rendered small splinters of bone, but the identification of these according to species is extremely difficult. Cranial portions and teeth are represented by only ten fragments. One molar tooth and the distal end of a femur appear to belong to *Rhinoceros*. Bovines are represented by the proximal end of a tibia, tarsal and carpal bones, a few pieces of the dentition, and two vertebrae. Tarsal and carpal bones of deer, the canine tooth of a dog or wolf, and some twenty-five pieces of tortoise carapace are in the series. Snail shells of conical and helix forms are encountered at all depths down to ten feet. The post-cranial skeletons and mandibles and maxillae of small rodents which have been uncovered have no doubt become incorporated in the site as a consequence of the fossorial habits of these animals, their bones appearing to be quite fresh. All of the other bones in the collection are heavily incrustated with a deposit of calcium carbonate. Their condition may be described as sub-fossilized, for the compact and cancellous tissues themselves are not in all cases mineralized.

An interesting feature of the larger bones is their assemblage in two heaps some twelve feet apart and at a depth of five feet (Plate. V). These are limb bones and they appear to have been fractured by man, perhaps for the extrication of the marrow (Plate. VI). The piles of bones do indeed suggest the refuse from a feast. Into the proximal end of a tibia a neat hole has been bored. Both piles of bones are surrounded with a fine "gravel" consisting of rounded quartz grains, nodules of kunkar, laterite pellets, angular feldspar, and pieces of disintegrated granite. Most of the components of this gravel, except the kunkar and iron nodules, have their origin from granite, probably the granite which is found in the northern part of this Mehsana District. The

explanation for this accumulation of "gravel" around these piles of bones is not obvious. The absence of cranial bones here and at other loci of the mound suggests that the early hunters butchered their game at the place where it was slain, carrying the choice portions of the animals to the area of occupation. However, no hearths have been found during the past twenty years of work at the site, and the piece of charcoal discovered in 1963 is therefore of considerable importance for purposes of radiocarbon dating. The presence of querns in close proximity to the bones may mean that some food preparation did occur in this part of the site, inspite of the absence of hearths.

In lieu of a well defined stratigraphy, a specific taxonomic classification of the fauna and the certain identification of the cultural horizons, the relative chronology of Langhnaj can be determined by the biochemical analysis of samples of bone collected systematically from graduated levels of a deep section. Twenty-eight bone samples were collected during the recent excavation from the surface to a depth of ten feet. At least two bone specimens were secured from each layer. These samples are presently being tested abroad for their contents of nitrogen, calcium carbonate, iron, fluorine, and the phosphates. The interpretation of the test results will clarify the problem of contemporaneity between upper and lower levels of the site. The charcoal sample referred to above may assist in the absolute dating of Langhnaj. The biochemical assays of several osseous specimens sent earlier to the chemists have been reported²², but these results remain inconclusive until they can be compared with the values to be obtained from the larger series collected in 1963.

Since the excavation of Langhnaj in 1944 some thirteen human skeletons have been found at depths ranging from two to six feet from the surfaces of the crest and the slopes of the mound²³. The latest excavation has added another specimen to this number (Plates. VIII-X). The skeleton was found two feet two inches underground in one of the trenches along the slope of the mound. The shallowness of this burial does not signify necessarily that the skeleton and its associated

22 Three bone samples collected during previous excavations have been sent to Dr. KENNELH Y. OAKLEY of the British Museum (Natural History), London, for biochemical assay. Since 1953 when these samples were studied, two others have been submitted in 1963. Dr. Oakley reports in a personal communication to one of the authors (K. A. R. K.) the following results : (1) the nitrogen content of two of the samples of human bone collected from depths of four feet and five feet seven inches are 0.40 and 0.10 respectively (percentage of nitrogen in 100 grams of ground bone sample); (2) fluorine assay of three other bone samples indicates a percentage of 0.03 for a cervid bone near the surface of the ground, 0.39 and 0.43 for cervid and hominid bones from the layer of the "buried soil"; (3) percentages of calcium carbonate for these same three samples are 10.0, 20.0 and 30.0 respectively. Fluorine and nitrogen percentages of these orders strongly suggest that the specimens are of post-Pleistocene date.

23 KARVE, I., KURULKAR, G. M., *Human Remains Discovered So Far : a Preliminary Report on the Human Skeletal Remains Found at Langhnaj in February and December 1944*, 4-19, Poona; KHAN, A. H., KARVE, I., Identification of a Few Bone Remains from Langhnaj, *Investigations into the Prehistoric Archaeology of Gujarat, Being the Official Report of the First Gujarat Prehistoric Expedition by H. D. Sankalia*, 1941-42, 313-14, Baroda, 1946; SANKALLA, H. D., KARVE, I., Early Primitive Microlithic Culture and People of Gujarat, *AA* 51.1.28-34, 1949; ERHARDT, S., *Fruhmensliche Skelette aus Langhnaj in Gujarat, Vorderindien*, *ZMA* 54.2.151-62, 1963.

cultural and faunal remains belong to a cultural horizon which is later than that with which the other burials have become associated. Some of these earlier discovered skeletons came from layers only two feet deep. Furthermore, the slope is that portion of the mound most vulnerable to the ravages of weathering and erosion. Each year a film of top soil is removed from the slopes of the mound, but the crest supports a more stable ground cover. Like the other skeletons in the Langhnaj series, the bones of this recent specimen are coated with a rough mineralized concretion. Sub-fossilized bones are what may be expected when osseous tissue is buried in the kind of dry, sandy and calcarious soil found in this part of Northern Gujarat, and this condition is not in itself an indication of great antiquity for the skeletons. Bones of recently deceased domesticated cattle which were picked up from the surface of the mound revealed initial stages in this process of mineralization.

Some of the features of the new skeletal specimen are unique when compared with the earlier finds. The position of burial is dorsal extension, while the other burials from Langhnaj are in various attitudes of lateral flexure. While the skulls of the other thirteen specimens point to the East, the recent find has its head oriented to the West. Its face is turned slightly to the North and the left hand rests upon the left ilium. A *Dentalium* shell bead on the ilium and the faunal associations are the kinds of objects already observed in the vicinity of earlier finds. However, the new specimen is surrounded by fragments of both wheel-made and hand-made pottery. The possibility of these ceramic wares having been intrusive in the burial area cannot be ruled out of consideration.

While no pit line was discernible, it is obvious that this skeleton, as well as the ones discovered earlier, reveal the existence of true burial customs among the ancient inhabitants of Langhnaj. The authors do not support the view that these skeletons were thrown haphazardly into the ground subsequent to some battle or traumatic event as has been suggested by another researcher²⁴. Nor can the fractures across the surfaces of the crania from Langhnaj be interpreted with any certainty to be the results of blows with heavy instruments. These cracks in the skulls, as well as in the post-cranial portions of the skeletons, are the natural consequences of the weathering of the osseous tissues within the microenvironment of the mound. If changes of temperature and humidity in the soil can effect the fracturing of stones buried for considerable periods of time, then human bone cannot be considered as exempt from these forces. Further destruction is due to the pressure of overlying layers of soil and the ravages of small animals and vegetation. One of the authors has observed many examples of this type of post-mortem bone damage in American Indian cranial and post-cranial specimens where it would be untenable to conclude that an untimely and violent death was met by the specimens in every case. For similar reasons the evidence for cannibalism at Langhnaj cannot be supported. Were these specimens the vestiges of unwilling participants in a cannibal feast, one would expect to find signs of a consistent method for fracturing the skulls prior to the extraction of the brain. But all portions of these skulls

24 EHRHARDT, s., Schlagspuren Brüche und Sprünge an den Skeletten von Langhnaj im nördlichen Gujarat, Vorderindien, *Anthr. An.* 24.2-3. 178-83, 1960.

have suffered breakage. The most efficient technique for taking the brain out of a fresh skull, as practiced by cannibals whose customs have been recorded²⁵, involves the cracking of the basilar and posterior portions of the brain case, for here the cranial architecture is weakest. Attempting to pull out the brain after breaking the frontal and parietal bones with their heavy tori and muscular attachments and architectural solidity would be an unfair challenge to the heartiest of cannibalistic Epicurians.

The examination of the new skeletal material from Langhnaj is now in progress. Superficial observation indicates that the complete skeleton is that of an adult male of between twenty-five to thirty years of age at time of death. The post-cranial bones suggest that the stature of this specimen during life was well within the medium range for world populations today; about five feet five inches to five feet seven inches. The cranial bones are robust and the bones of the lower extremity indicate considerable muscular robusticity. Additional but incomplete human bones and some teeth were uncovered in adjacent trenches at depths from three to five feet, but these are too fragmentary to be anthropometrically rewarding.

Until the collections of cultural and osteological materials have been thoroughly studied in the laboratory, it is premature to formulate definite conclusions about the new evidence from Langhnaj. Therefore the following points must be considered as the bases for continued research and formulation of new questions concerning the place of Langhnaj in the prehistory of the Indian Sub-continent.

1. The geological stratigraphy of the site, as observed in all eight of the trenches excavated, reveals a dark grey-brown sandy soil extending from the surface to a depth of about three feet. This is succeeded by a layer of grey sand of light hue which merges with the calcareous and kunkar-filled deposits at a depth of five feet. The "buried soil" of which ZEUNER speaks was not visible to the excavators. Rather it was noted that the composition of the soils in the trenches examined is unmarked by any hiatus of a stratigraphic nature.

2. The problem of the existence of a stratigraphical sequence is of interest since it suggests to the archaeologist that if a "buried soil" is not present, then interpretation of the cultural horizons must suffer drastic revisions. The authors are unable to distinguish any horizon marked off by cultural content which can be exclusively identified with a Late Stone Age culture, although such layers have been described during previous excavations at *Andharo Timbo*. The only cultural change that is evident from scrutiny of these eight trenches is the change from modern wheel-made pottery in the topmost layer to the cruder, hand-made pottery of the underlying layer. Microliths are found at all depths. Where microliths decrease in quantity, so do the pottery and other cultural artifacts. Hence a correlation of geological stratigraphy with cultural horizons is unsubstantiated.

3. The chronological position of Langhnaj must be reexamined in the light of the discovery of copper, for this is the first evidence for early metals from this site. It may well mean that certain Late Stone Age cultural elements have been

²⁵ VON KOENIGSWALD, G. H. N., *Meeting Prehistoric Man*, 75, Thames and Hudson, London and New York, 1956.

found in association with a tradition whose origins are Chalcolithic. On the other hand pottery can no longer be regarded as the hallmark of food-producing societies in the past. The association of pottery with Mesolithic and Late Stone Age cultures in Europe, Africa and Southeast Asia indicates that its invention preceded the abandonment of the hunting-gathering way of life in many regions.

4. The skeleton appears to be contemporary with those burials which have been found since 1944, although certain features of the circumstances of burial are unique. Until the results of the biochemical analysis have been submitted, it remains uncertain whether these sub-fossilized specimens are related to the upper or lower levels of the mound. The absence of metals in association with the burials favors the traditional interpretation that these are the manufacturers of the early microlithic industry.