EXCAVATIONS AT THE NJORO RIVER CAVE

STONE AGE CREMATED BURIALS IN KENYA COLONY

BY

M. D. AND L. S. B. LEAKEY

Published in association with the Museums' Trustees of Kenya and the Royal Anthropological Institute

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FOREWORD

It is a natural accident of the history of archaeological science that the attention of archaeologists should have been primarily concentrated on the more accessible sites in Europe and the Near East. It is also a natural result of this circumstance that the general reader may have been led to regard these areas as the main scene of the cultural development of early Man—even in palaeolithic and neolithic times. Archaeologists have been well aware, of course, that this is only true in a limited sense, for in the history of Stone Age cultures there is evidence that novel developments must have been frequently due to the intrusion of 'foreign elements' from elsewhere. But in many cases the sources of such intrusive elements are still quite uncertain, and for this reason it is clearly a matter of great importance that endeavours should be made to trace them by intensified research in more remote parts of the world.

Already inquiries have established that palaeolithic and neolithic communities were, in fact, widespread in very ancient times, extending over the Old World to the extremities of Asia and Africa. Indeed, there is now good reason to believe that in the uplands of East Africa well-organized societies of Palaeolithic Man were already flourishing perhaps as much as 100,000 years ago. These discoveries in East Africa (which incidentally may have a very important bearing on the evolution of similar types of culture in Europe during the latter part of the Ice Age) are in great part the direct result of the indefatigable labours of my friends Dr. L. S. B. Leakey and his wife, Mary Leakey. Dr. Leakey, who is the Director of the Coryndon Museum at Nairobi, combines a remarkable energy of mind and body with a peculiar 'flair' for seeking out archaeological sites of importance, and these faculties are also shared by Mary Leakey who, like her husband, is an archaeologist by training and achievement. During the Pan-African Congress of Prehistory held at Nairobi in 1947 I had the privilege of visiting with the Leakeys a number of the sites described and investigated by them in Kenya and, with other members of the Congress, I was deeply impressed with the extent of their archaeological activities and the importance of the results to which these were leading.

In the present volume Dr. and Mrs. Leakey present a detailed report on a primitive culture of comparatively late date, found by them in a cave on the banks of the Njoro river near Lake Nakuru. This culture is estimated to have an antiquity not greater than 850 B.C., and is represented by cultural relics of unusual interest. The latter were found associated with a number of charred human skulls and bones, and it is evident that the cave was used as a crematorium. The importance of the discovery lies partly in the fact that, while the culture revealed by the excavations (and described in full detail by Mary Leakey) can be paralleled in some respects by other examples of neolithic and mesolithic cultures in East Africa, it shows quite distinctive features of its own. The other main point of interest is that, as Dr. Leakey's craniological studies clearly demonstrate, the people who were responsible for the culture were not negroes, or even 'negroids'. It is certainly a very remarkable fact that at this relatively late date East Africa was still inhabited by a non-negroid population, and this raises a whole series of problems of the greatest importance regarding

the distribution of the different racial elements on the continent of Africa in early times.

It is well that Dr. and Mrs. Leakey have completed this detailed report of their finds. Much more work of the same kind needs to be done in order to elucidate the early history of Man in Africa, and it is to be hoped that the excellent example set by the authors of the present volume will be followed, with equal zest and with the same careful analysis of results, by others in the same field.

W. E. LE GROS CLARK

DEPARTMENT OF HUMAN ANATOMY
OXFORD
1949

PREFACE

In presenting this report on the excavations at the Njoro River Cave we wish to express our gratitude to the Museums' Trustees of Kenya who have made available the sum of £150 towards the costs of publication and also to the Council of the Royal Anthropological Institute who have generously made a further sum of £50 available from the Rivers Fund.

The collections from Njoro are now housed in the Coryndon Museum, Nairobi, and the type material will remain there, but duplicate material other than the human remains will be available for distribution after the publication of this report.

L. S. B. L.

M. D. L.

NAIROBI
19 *January* 1950

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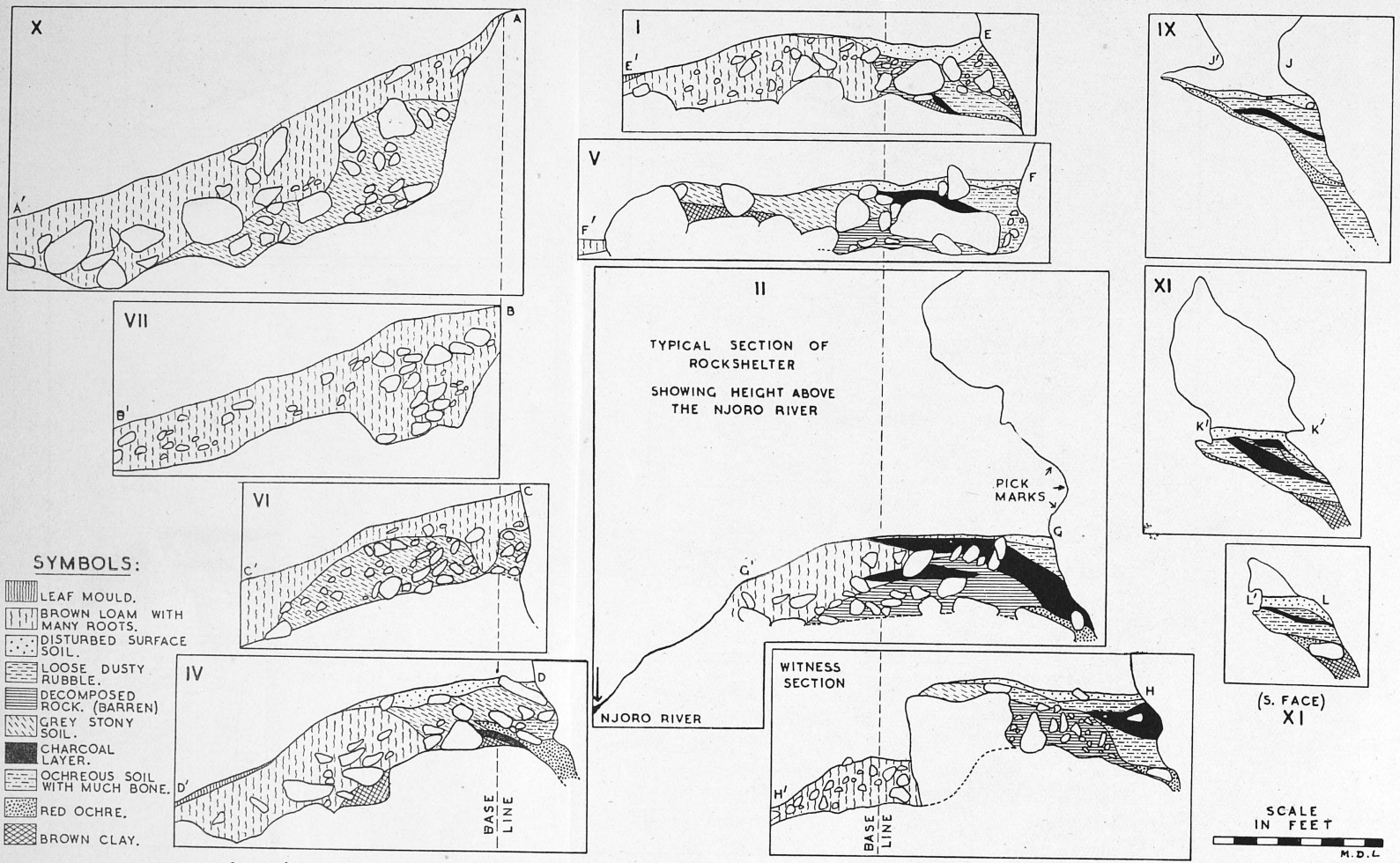

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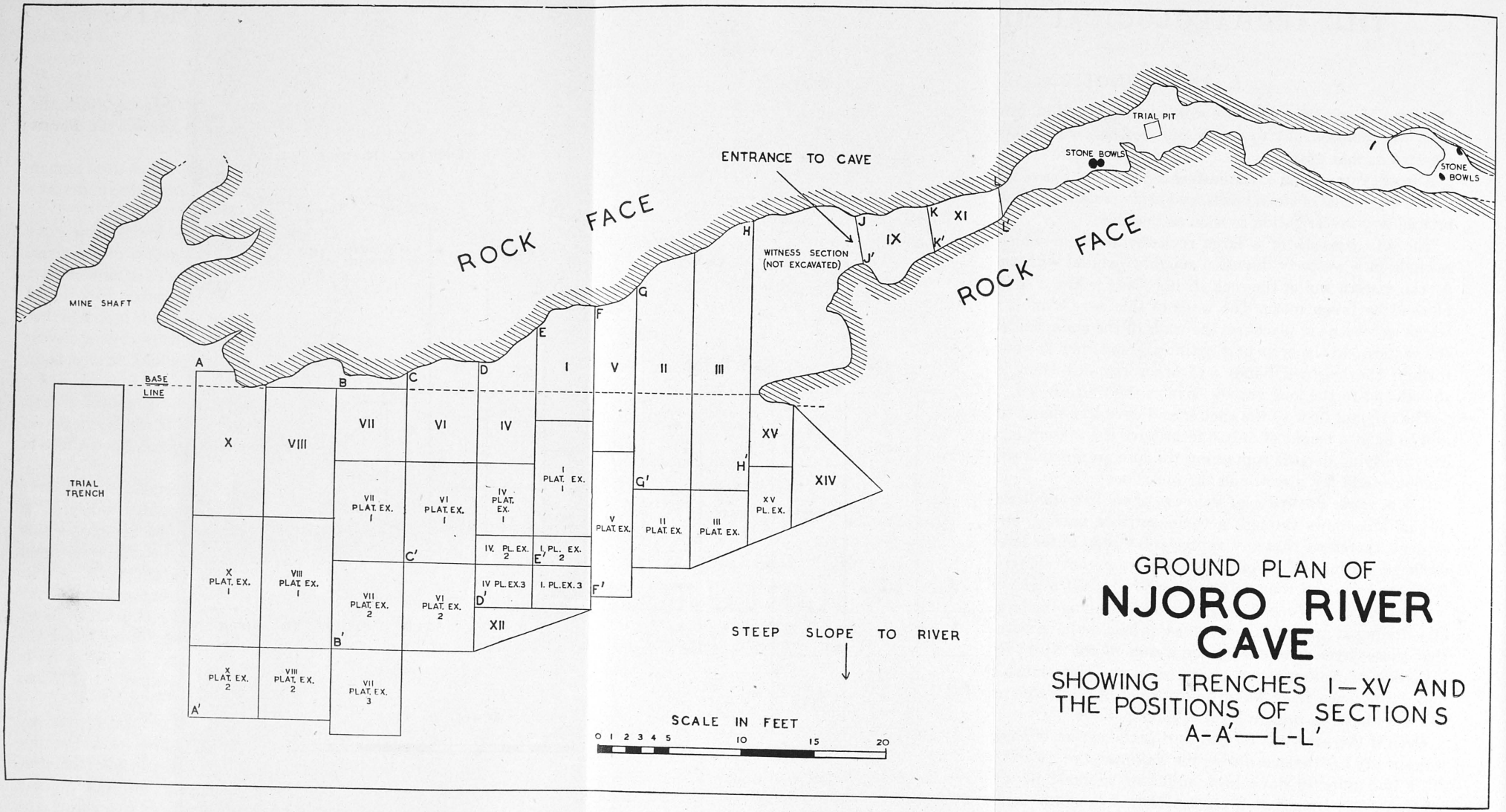


GROUND PLAN OF NJORO RIVER CAVE

SHOWING TRENCHES I—XV AND THE POSITIONS OF SECTIONS A-A'—L-L'

PART I

THE ARCHAEOLOGICAL REMAINS

I. INTRODUCTION

DURING March 1938 when we were visiting the Hon. Mrs. Grant at Njoro, the cave was pointed out to us by our hostess, whose land adjoins the Forest Reserve in that area.

A brief examination of the surface deposit in the cave revealed charred human bones, fragments of stone bowls, and other remains. It was decided to undertake preliminary investigation as soon as possible.

The site consists of a large rock-shelter from which a low narrow cave extends in a westerly direction roughly parallel with the course of the river. At the eastern end of the rock-shelter there is also a shallow cave, now in part blocked by fallen rocks. The walls of this cave exhibit numerous pick marks which also occur in places on the walls of the main shelter.* It is probable that the eastern cave was in part artificially cut, but it was not used as a crematorium, the calcined bones and other remains being confined to the main shelter and to the long narrow cave at the western end.

The original floor of the shelter and cave was found to be composed of rock and to lie at a height of only 5 feet above the present level of the Njoro River. The overlying deposit containing the human remains averaged $3\frac{1}{2}$ to 4 feet in thickness and lay directly on the rock floor.

A few yards upstream of the cave there is a small waterfall, and the river in this area flows through a comparatively narrow, steep-sided valley. It is evident, therefore, that any appreciable rise in water-level—such as that which occurred during either of the two more recent climatic wet phases—would flood the cave and remove any deposit which it might contain.

The cave itself is one of a series to be seen along the banks of the Njoro River† all standing at approximately the same height above water-level. It seems likely that these caves were cut by the waters of the Njoro River during either the Makalian or Nakuran wet phase when the river must have reached a fairly high level, since Lake Nakuru into which it flows rose respectively to 375 and 145 feet above its present level at those periods.

Even if the cave was formed during the earlier of these two wet phases and was already in existence during the Nakuran, the rise of water-level at that time must undoubtedly have been sufficient to flood it, and we must therefore conclude that its use as a crematorium was subsequent to the Nakuran wet phase. A provisional date of 850 B.C. has been suggested for this period and provides a backward limit for the dating of the material discovered at the Njoro Cave. There is, unfortunately, no definite evidence concerning the forward limit of time, other than the condition of the deposit, on which no humus

* The significance of these pick marks will be discussed later.

† One of the caves mentioned above, situated several miles farther down the river, was excavated by Dr. J. D. Clark of the Livingstone Museum, Northern Rhodesia, and yielded similar calcined human bones, beads, &c.

or other overburden had accumulated. From all the available evidence, to be discussed later in this paper, it would seem that the culture is comparatively late and may represent the survival of a stone age people into recent times.

The rock into which the cave is cut is a blackish-grey consolidated volcanic ash which is to be found over a wide area to the south and west of Lake Nakuru. This deposit of ash is known to be of recent origin and was probably formed during the interval between the Gamblian Pluvial and Makalian wet phase. In places, it overlies an old land surface containing implements of the Magosian culture (Deighton's Cliff, Elmenteita).

Excavations

At the invitation of Mrs. Grant we began excavation in the cave on 18 April 1938 and continued for a period of three weeks. We were assisted by Mrs. B. E. B. Fagg and by Miss E. M. Paine. A number of trained native workmen were also employed. All the soil removed from the cave was passed through $\frac{1}{4}$- and $\frac{1}{8}$-inch riddles. On 13 October we returned for a further period of excavation lasting four weeks.

Almost the whole area of the rock-shelter was excavated by means of a series of parallel trenches, dug as nearly as possible at right angles to the wall of the shelter. (See Plan and Sections.) Each trench was extended outwards beyond the platform of the shelter and these extensions yielded a few stone bowls, pestles, beads, &c., but no human bones other than a few scattered fragments which, together with the other objects found on the scree, had clearly been displaced from their original positions.

A small area at the mouth of the cave itself was also excavated, but the deposit within the cave was left untouched, together with a 7-foot wide witness-section outside the entrance to the cave. A trench was dug outside the entrance of the eastern cave, but this proved almost entirely barren.

The main features revealed by the excavations are as follows:

Cremated burials of about eighty individuals were found, some of these appeared to be intact, but in other cases only parts of the bodies remained, scattered pieces of the skulls and other bones being found subsequently at a considerable distance from the rest of the skeleton and at a different level in the deposit.

Many of the human bones and grave goods were heavily stained with red ochre and a layer of this material, sometimes several inches thick, was found to cover the floor of the shelter, concentrated particularly near the back wall where the floor sloped downwards to form a crevice.

Associated with the human remains were a number of rather degenerate obsidian implements of Elmenteitan facies, potsherds, stone bowls, pestles, and lower grindstones, together with considerable quantities of beads made from chalcedony, agate, microcline felspar, &c. There were, in addition, a variety of perishable substances such as a wooden vessel, basket-work, gourds, and other articles which are not normally found in stone-age sites, but which had become carbonized during the cremation of the human remains and thus preserved. No trace of metal was found.

The number of adults cremated at the site corresponds almost exactly with the number of stone bowls, pestles, and lower grindstones, so that it seems that

these three articles were placed as grave goods with males and females alike and not confined to one sex, as was the case in other branches of the Kenya Neolithic.

The disturbed condition of many of the cremated burials does not appear to be due to the burrowing of scavenging animals since the deposit as a whole was well-stratified; black, charcoal-containing layers alternating with ochreous strata. It seems more likely to have been caused by human agency, namely, the continued use of the small area available for repeated cremations and burials; the concentration eventually becoming so great that it was impossible to insert further bodies without disturbing those buried at a previous date. (Late stone-age communal burial grounds of a similar nature are known elsewhere in East Africa, and some suggestion of partial burning was also noticed at Bromhead's Site, Elmenteita.)*

ACKNOWLEDGEMENTS

We wish to express our great gratitude to the Hon. Mrs. Grant for her unlimited hospitality and unfailing help during our excavations; to Mrs. Fagg and to Miss Paine for their active assistance, and to Mr. Petrie who very kindly lent us his house during part of our stay at Njoro.

Our thanks are also due to the Conservator of Forests for permission to excavate within the Forest Reserve, and to the following who have most kindly supplied reports on various materials submitted to them during the preparation of this paper: Dr. Nel of the Geological Survey, Pretoria, for identification of the materials of the stone beads; Mr. Huddlestone of the Kenya Geological Survey for identification of the materials of the pestles and grindstones; Mrs. Quiggin for her report on the basket-work; Mrs. Trowell for supplying the botanical name of the sedge used in the manufacture of beads, and Dr. Chalk for his report on the charcoals.

II. THE OBSIDIAN INDUSTRY

THE implements and waste material were found through the deposit, with no marked concentration of artefacts in any particular locality.

MATERIAL

With the exception of one lava flake, the industry is made entirely from obsidian.

Although no petrological examination of the material has been possible, on superficial examination it appears that about 80 per cent. of the implements and waste flakes are made from an opaque black obsidian showing a bottle-green tinge when seen in thin section similar to that which occurs *in situ* on Mt. Eburu, some 25 miles south of Njoro. The raw material from this source has been analysed by Mr. Game of the Dept. of Mineralogy, British Museum, who reports that it belongs to the trachyte group of obsidians.[1]

The remainder of the implements and waste flakes are made from a semi-translucent grey-coloured obsidian of which the origin is still unknown. It is interesting to note that this variety appears to have been particularly selected for the manufacture of crescents, only a very small proportion being made from the opaque black obsidian, although among the larger implements such as blades, burins, scrapers, &c., both varieties are well represented.

* See *Stone Age Races of Kenya*, p. 69. (S. B. Leakey. O.U.P. 1935.)

Find Table

Trenches	*Individuals (adults)*	*Infants*	*Stone bowls*	*Pestles*	*Grindstones*	*Implements*	*Waste Flakes*	*Potsherds*	*Stone beads*	*Stone pendants*	*Sedge-seed beads*	*Wooden and nut beads*	*Bone beads*	*Bone pendants*	*Bone awls*
Surface	..	..	3	1	..	..	..	..	12	..	..	..	..	..	..
I.	4	..	1	10	5	12	9	22	38† 153 (Ns)†	1	155	..	1	2	..
I. Pl. Ex.	..	..	1	..	..	2	..	11	7	..	..	..	..	..	..
II	17	..	1	10	17	6	15	13	64† 46 (Ns)	1	178	..	..	8	..
II. Pl. Ex.	..	..	1	..	..	2	..	2	1	..	..	..	..	..	..
III	6	..	14	18	8	8	5	12	80	..	326	..	..	..	..
III. Pl. Ex.	..	..	..	2	..	..	..	3	10	..	..	..	..	..	..
IV	7	..	14	6	11	13	130	17	24	1	379	..	2	5	..
IV. Pl. Ex.	..	..	5	2	1	7	..	2	26	..	..	..	..	..	..
V	7	..	4	5	2	8	12	13	19	1	49	..	..	4	..
V. Pl. Ex.	..	..	1	..	..	1	..	..	4	..	..	..	..	..	..
VI	12	6	2	5	3	7	2	24	33† 16 & 16, 23, 7 (Ns)	..	458† 1,014 (Ns)	..	8	10	1
VI. Pl. Ex.	..	..	11	2	5	15	7	119	32	..	62	..	..	..	..
VII	..	..	7	1	3	5	4	66	..	..	26	..	..	..	..
VII. Pl. Ex.	..	..	5	2	4	25	23	130	..	..	10	..	..	..	..
VIII	..	..	..	1	1	29	32	12	14	..	..	..	..	..	..
VIII. Pl. Ex.	..	..	1	..	..	18	78	46	2	..	..	..	..	..	..
IX	11	..	3	8	6	9	6	4	101† 40 (Ns)	..	429† 330 (Ns)	220	..	..	3
X	..	..	..	..	..	5	5	16	..	..	..	..	..	..	..
X. Pl. Ex.	..	..	..	..	..	19	49	..	1	..	..	..	..	..	..
XI	14	..	3	3	9	10	2	14	82	1	504	164	..	..	..
XII	..	..	..	2	..	2	2	..	3	..	..	..	..	..	..
XIV	..	..	..	..	..	..	..	3	5	..	..	..	..	..	..
XV	..	..	1	..	2	3	2	9	..	..	..	..	..	..	..
Totals	78	6	78	78	77	206	383*	538	859	5	3,920	384	11	29	4

* A proportion of the larger fragments have been counted in addition to the whole and bulb ends of waste flakes.

† (N) refers to groups of beads found together as necklaces, &c.

Implements

Among the 206 complete implements recovered, crescents are the most numerous category. Long, two-edged blades of Elmenteitan type are also comparatively plentiful. Backed blades, burins, doubly backed crescents or borers, *lames écaillées*, and scrapers also occur, but are poorly represented. Amongst by-products of manufacture are burin spalls, cores, and regenerating flakes.

In addition to the complete specimens mentioned above, fragments of backed blades, blades and crescents account for a further 134 specimens, while the total of waste material recovered consists of 244 whole and bulb ends of flakes and 359 distal fragments, in which the bulbar extremity is missing.

Backed Blades. Ten complete examples and 14 fragments were recovered. The complete specimens range in length from 77 to 32 mm. with an average of 48 mm. On the whole, the series is asymmetrical and poorly made. In five examples the retouch on the blunted back is restricted to the distal extremity and extends along the edge for only about one-third of the length of the implement. In the remaining five, it extends along the whole of one lateral edge but is roughly executed.

Blades of Elmenteitan type. Twenty-nine complete specimens, 23 butt-end, and 51 distal fragments were recovered. The complete examples range in length from 135 to 54 mm. with an average of 76·6 mm. Both lateral edges of these

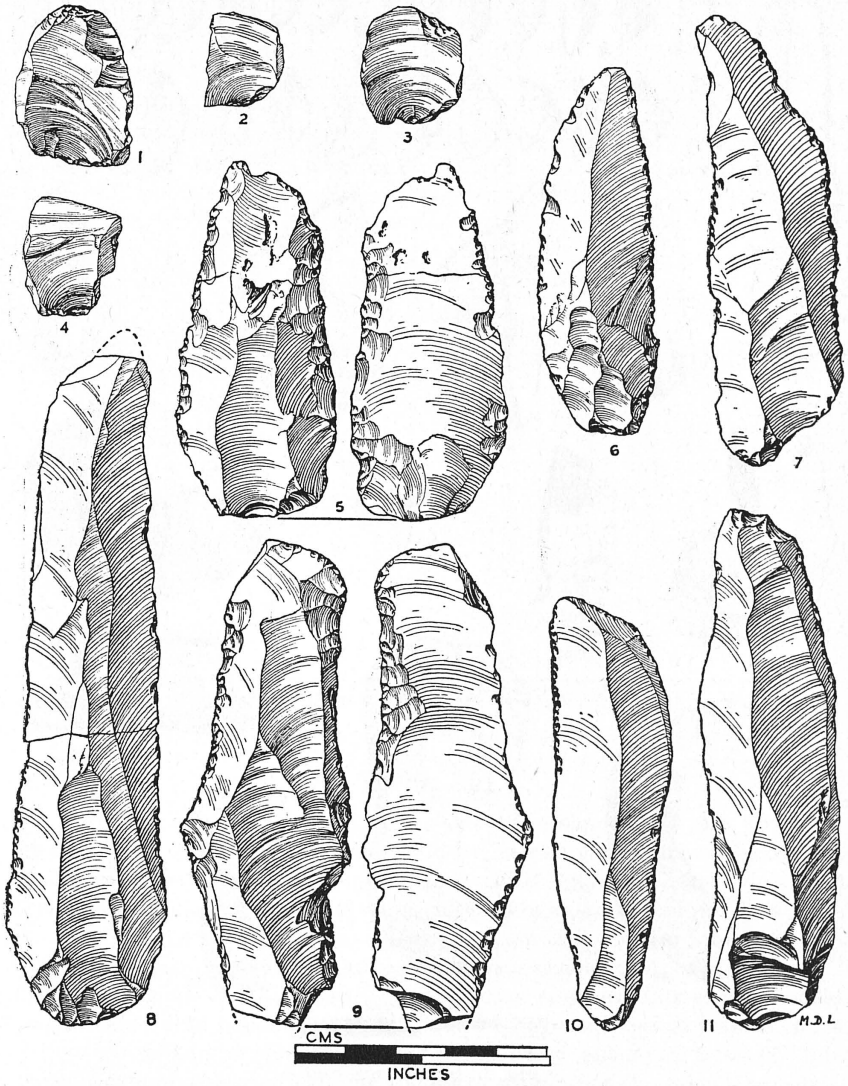


FIG. 1. Implements.
Nos. 1–4 inc. *Lames écaillées.* Nos. 5–11 inc. Two-edged blades of Elmenteitan type.

implements have apparently been used for cutting purposes and generally exhibit signs of heavy utilization. In some examples a somewhat crude retouch is also present. The lateral edges are rarely parallel and the blades vary considerably in width. In ten specimens it is noticeable that the upper and

lower faces of the butt-end have been deliberately trimmed in order to reduce the thickness, presumably for hafting.

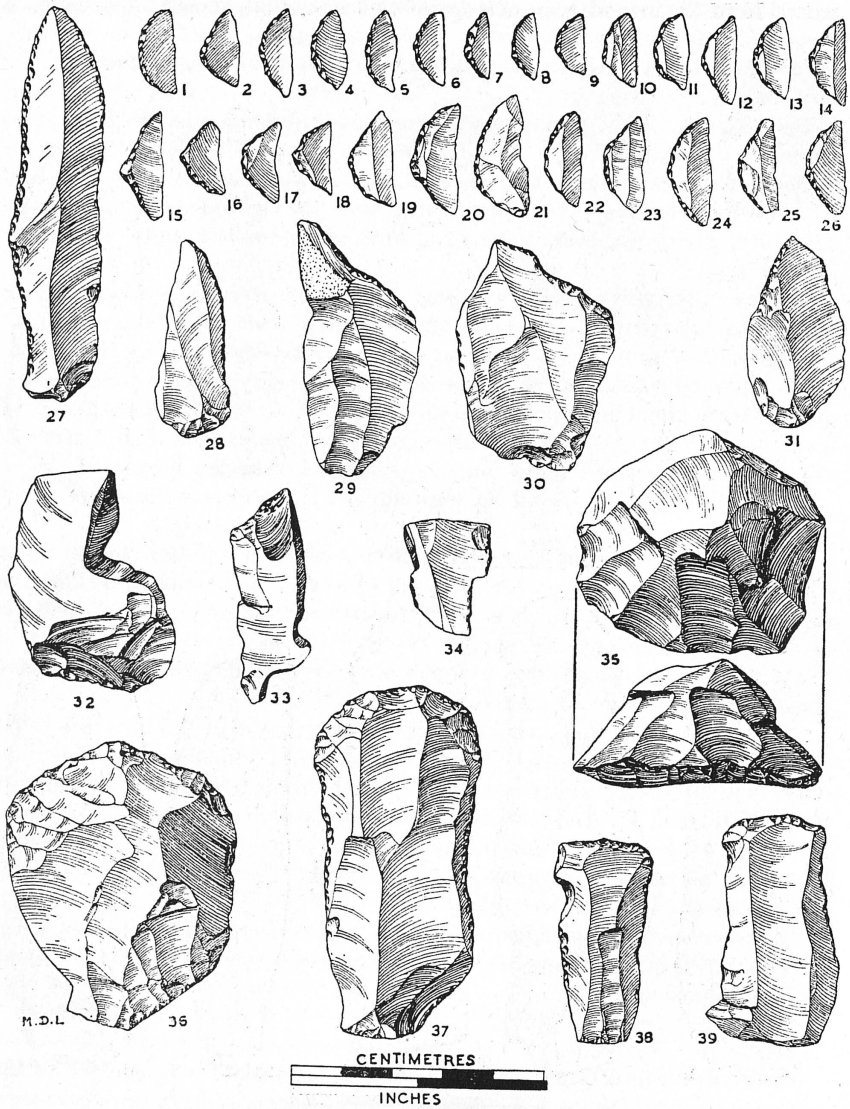


FIG. 2. Implements, *cont.*

Nos. 1–26 inc. Crescents. Nos. 32–4 inc. Angle burins.
Nos. 27–31 inc. Backed blades. No. 35. Core.
Nos. 36–9 inc. End scrapers.

It may be noted that seven of the blades were found broken in two or more pieces, with the fragments lying at a considerable distance from one another. This observation was also made during the excavation of Bromhead's Site, Elmenteita, a burial site belonging to the Elmenteitan culture.

Burins. The four examples recovered are all crudely made angle burins. With the exception of one oblique angle burin in which a burin spall has been struck from the lateral edge of a *lame écaillée*, the implements are made on straight broken edges and consist of *burins simples*. The largest example, measuring 44 mm. in length, also shows a well-made *lame écaillée* on the butt end.

Burin Spalls. Eight examples were recovered, ranging in length from 49 to 14 mm.

Cores. Three examples were recovered, two of which are roughly conical in form. In these the flakes have been struck from the circumference of the base. The third specimen appears to be a fragment of a large flake and is irregularly shaped.

Crescents. Sixty-five complete examples were recovered, together with 74 fragments. The complete specimens range in length from 28 to 11 mm. with an average of 15·7 mm. The average maximum width for the series is 6·5 mm. Although a few sub-triangular forms occur, the majority are true crescents and are relatively broad in proportion to their length. Twenty-seven examples show no dorsal ridges or *arrêtes*. The greater number of the crescents are in a remarkably fresh state of preservation and show no signs of having been used.

As already noted, nearly all the crescents are made from a translucent grey obsidian.

Lames Écaillées. Seven examples were recovered in addition to the *lame écaillée* which is present on the butt-end of one of the burins. All show the shallow, scaled flaking which is characteristic of these implements. In three cases the working edge is also curved.

Regenerating Flakes. Three examples were recovered, one of which shows considerable utilization on all the edges.

Scrapers. Five examples were recovered, these consist of 1 small steep-sided core scraper, 2 square-ended scrapers on blades, 1 round-ended scraper on blade, and 1 broad specimen, discoidal in form although the retouch is confined to the distal end. The end-scrapers on blades vary in length from 69 to 40 mm.

Utilized Flakes. In addition to the implements described above, fifty-seven flakes and pieces were recovered which cannot be described as tools although the edges show considerable signs of use.

Hammerstone. A small elongate pebble of white quartz was found, measuring 40 mm. in length and 19 mm. in width. Both extremities are pointed and show traces of abrasion.

Conclusions

The series of implements described above is too small for an analysis of the percentages of tool types or for detailed measurements to be of any real value. It has been shown, however, that crescents are the most common tool in the series, with 65 complete specimens and 74 fragments. Elmenteitan-type blades, of which there are 29 complete specimens and 74 fragments, are also comparatively plentiful, while the remainder of the implements such as backed blades, burins, *lames écaillées*, and scrapers are relatively scarce, with less than a dozen in each category.

The scarcity of cores and hammerstones and the small amount of waste

material suggest that most of the implements were probably manufactured elsewhere, presumably at the living site.

Although the series is limited, there is sufficient material to demonstrate that there are close analogies to the Elmenteitan culture and that the technique is unlike that of the Kenya Capsian derivatives, such as the industry found at the Naivasha Railway Rock-shelter and that of the Hyrax Hill variant of the stone bowl culture, in both of which long two-edged blades are almost entirely absent and where the form of crescent is very different. Broad crescents, lacking a dorsal ridge, are common in the Elmenteitan, as at Njoro, but scarce in the Kenya Capsian derivatives.

The number of backed blades, burins, scrapers, and *lames écaillées* is very limited, but the form of these implements and the percentage of each type in the assemblage as a whole are very similar to those found in the Elmenteitan.

It will be seen from the above that the obsidian industry recovered from the Njoro River Cave bears many resemblances to the Elmenteitan. Since the known distribution of this culture is so far confined to the Rift Valley area surrounding Njoro and Elmenteita, it seems reasonable to regard the Njoro industry as directly derived from the Elmenteitan.

III. THE POTTERY

Some 500 sherds were recovered. Among these it is possible to distinguish 12 vessels, although only 2 are sufficiently complete for reconstruction. Sherds belonging to all 12 vessels were widely scattered and occurred at varying levels, with a concentration at the northern end of the shelter, particularly on the slope below Trenches VI, VII, and VIII.

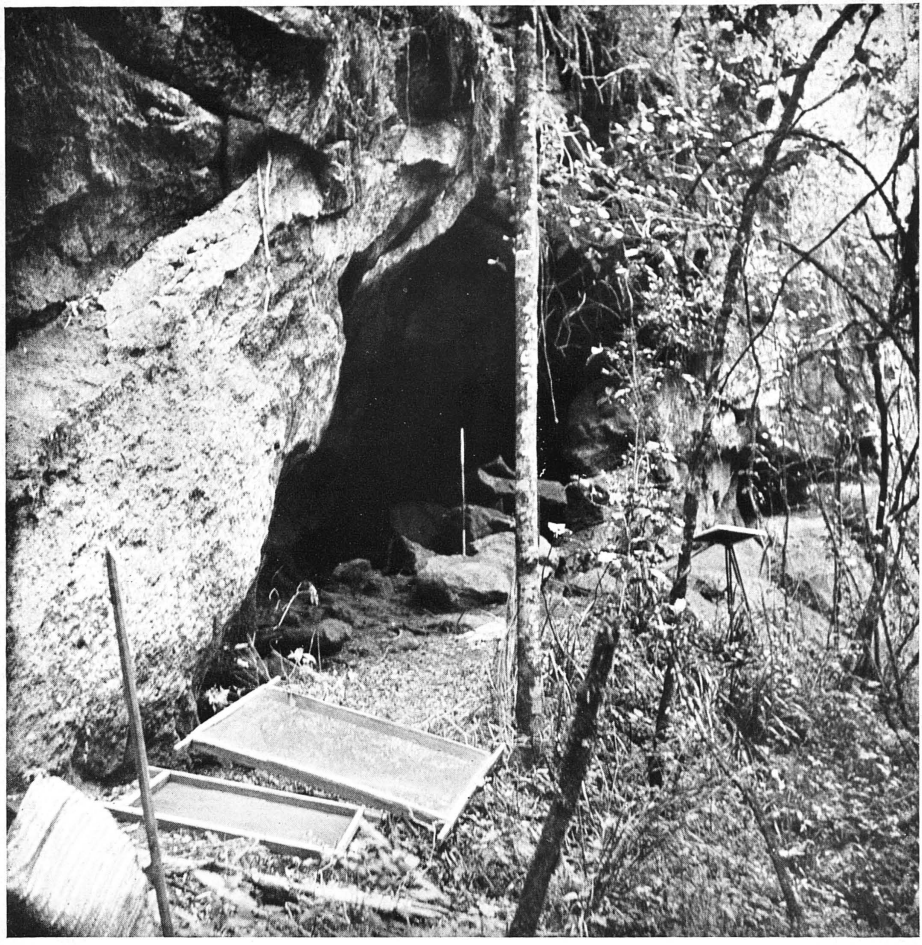
The pottery is hand-made and all the vessels appear to have been made by the coil or ring method.

The following forms may be distinguished: a globular pot with pointed base, of which three examples probably occur; a shallow bowl or basin, represented by three fragmentary vessels; and a small vessel with constricted mouth and wide base. With the exception of one globular pot, all are very incomplete.

The rim-types are simple and are either straight, slightly pinched-in on the exterior, or somewhat incurved. Three examples of lugs were found, two of which are present on a small vessel of burnished ware. These are so small that they must have been mainly for decorative purposes. The third example is considerably larger and is pierced.

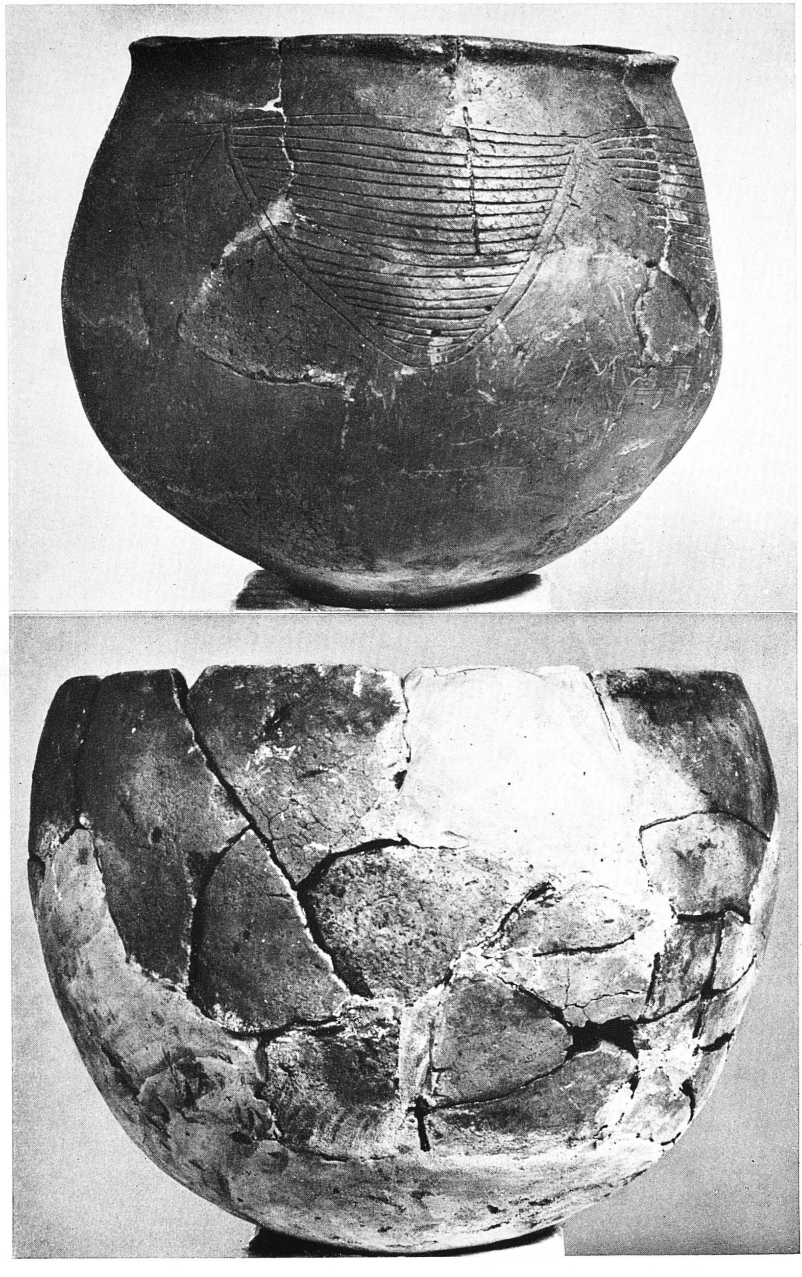
A pointed base is present on the relatively complete globular pot mentioned above, while the preserved section of one of the shallow bowls indicates that the base was roughly flattened. No other form of base was recovered.

Particularly large grits are present in nearly all the thick sherds. The finer wares show an even texture and are also hard and well fired. Secondary firing of some of the sherds during the cremation of the human remains renders it difficult to determine the original colour, but it seems that with the exception of the two fine-gritted burnished vessels, wall and basal sherds were for the most part reddish-brown or buff-coloured on the exterior and grey or black on the interior. The thick coarse wares appear to have been poorly fired and whenever secondary firing has not taken place they are soft and friable.



THE NJORO RIVER CAVE BEFORE EXCAVATION

PLATE II



TWO RECONSTRUCTED POTS
(The bases are pointed)

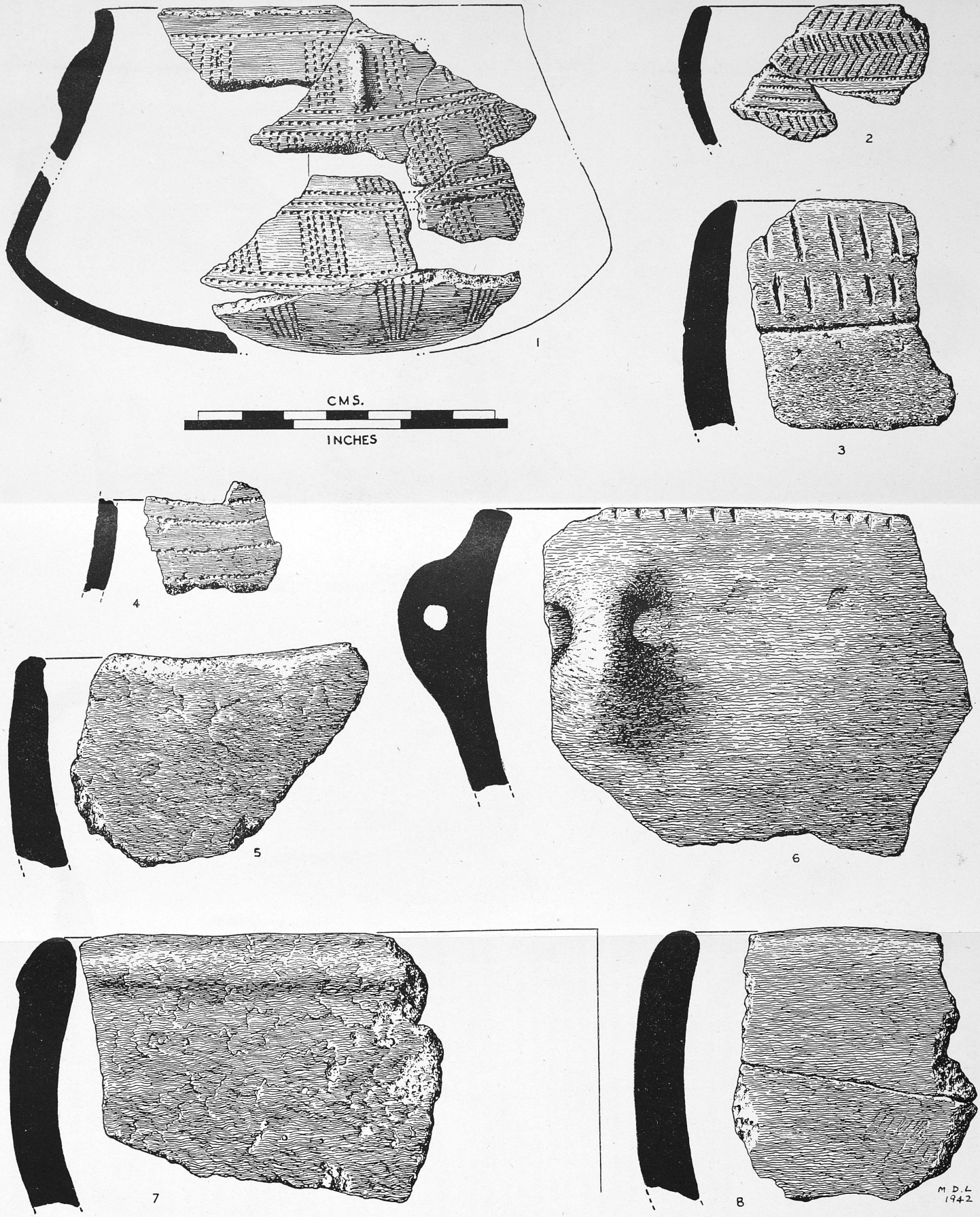


FIG. 3

Three perforations drilled after firing are present on the large vessel shown in Fig. 4, No. 1. Two of these are set close together to form a pair 2 inches below the rim, whilst a third is present near the base. Traces of another perforation can be seen in the small burnished vessel shown in Fig. 3, No. 1.

There is little variety in decoration; the principal motifs are dotted lines applied in parallel rows or forming a herring-bone pattern, together with incised designs. These include the looped pattern seen on the reconstructed globular pot and rows of short parallel incisions, either oblique or vertical. (See Fig. 3, Nos. 3 and 6.)

Description of Figure 3

1. *Small bowl of fine burnished ware.* The diameter of the mouth can be estimated at approximately 4 inches and the vessel widens towards the base, which appears to have been flat. The decoration consists of four horizontal and a number of slightly oblique parallel rows of dots. Two small vertical lugs are present just below the rim, apparently placed on opposite sides of the vessel. Traces of a rivet hole can also be seen near one of the lugs.

The sherds belonging to this vessel are both black and reddish-brown in colour. It seems likely that the latter have become altered through secondary firing and that black was the original colour. Both interior and exterior surfaces are highly polished and burnished. The thirty-two sherds belonging to this vessel were widely scattered and were recovered from Trenches I to V, VII, and X, besides the platform extensions of III and IV.

2. *Two adjoining sherds.* These belong to a vessel of fine red ware with matte surface. The decoration consists of dotted lines forming a herring-bone pattern, combined with a group of four horizontal dotted lines. Twenty sherds belonging to this vessel were recovered from Trenches I to V, X, and XV.

3. *Rim sherd of coarse ware.* This shows a decoration of roughly executed vertical incisions applied in two horizontal bands above a single incised line. From the platform extension of Trench IV.

4. *Wall sherd of fine burnished black ware.* This ware is very similar to that of No. 1. The decoration consists of four parallel dotted lines. Fourteen sherds belonging to this vessel were recovered from Trenches II to V and from the platform extensions of Trenches I, IV, and VI.

5. *Undecorated rim sherd.* This is brownish-black in colour, and shows large grits. Eight sherds belonging to this vessel were recovered from Trenches I, IV, and VI.

6. *Sherd bearing a pierced lug.* This belongs to a vessel of well-fired reddish-brown ware. The rim is straight and shows a decoration on the lip of small vertical incisions or notches. These appear to have been placed in groups and are not continuous. Eighteen sherds belonging to this vessel were recovered from Trenches I to VII, IX, XI, and XII.

7. *Weathered rim sherd.* This is of very coarse reddish-brown ware with particularly large grits. The rim is slightly pinched-in on the exterior. Diameter of the mouth estimated at approximately 10 inches. Twenty sherds belonging to this vessel were recovered from Trenches I, IV, VI, VII, IX to XII, and XV.

8. *Two adjoining sherds.* These belong to a vessel with slightly incurved rim. The ware shows relatively small grits and the surface is smoother than in the majority of such sherds. They are light buff-red on the exterior and grey or black on the interior. Thirteen sherds belonging to this vessel were recovered from Trenches II to IV and VII, and from the platform extensions of I, IV, VI, and VII.

Conclusions

Although the pottery from the Njoro Cave is very fragmentary, its resemblance to Elmenteitan pottery is striking. Globular pots with pointed bases, shallow flat-bottomed bowls, and rims notched along the lip, are all recorded from Elmenteitan sites. These have also yielded a few sherds of thin red and black burnished wares, but none show the same high degree of burnishing as

those from Njoro. This can so far only be matched among the pottery from the Wilton B Rock-shelter at Lukenia, 25 miles south of Nairobi. Pierced lugs similar to that on the vessel with notched rim are not known from any other

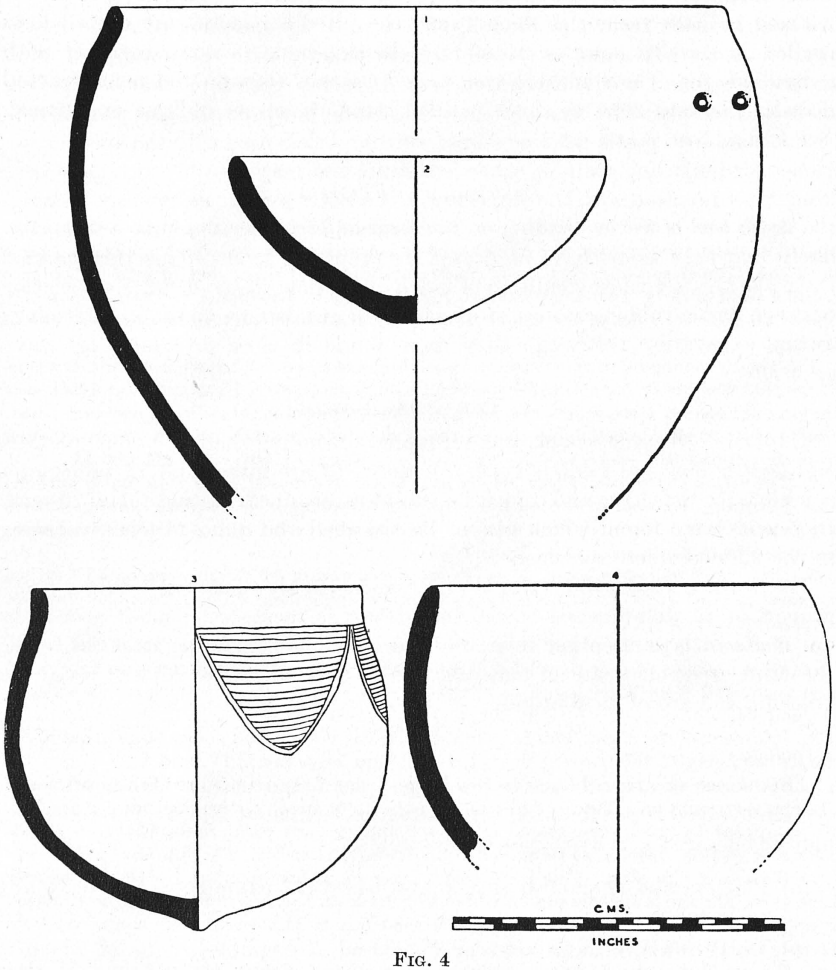


FIG. 4

site, although true handles occur in the Gumban B variant of the stone bowl culture.[2]

The six types of decoration discovered at Njoro cannot be regarded as distinctive since they are all found among the pottery usually associated with stone bowls before rouletted cord decoration came into general use.

IV. THE STONE BOWLS, PESTLE-RUBBING STONES, AND LOWER GRINDSTONES

As will be seen from the Find Table on p. 4 the numbers of stone bowls, pestles, and grindstones correspond almost exactly with the number of adult individuals found in the excavated area. It seems, therefore, that each adult, male and female alike, was buried with a stone bowl, pestle, and grindstone.

The combined pestle-rubbing stones were doubtless used with the lower grindstones for preparing grain or other foodstuffs and may possibly also have been used in conjunction with the stone bowls, the latter serving as mortars. Many of the bowls are, however, made from such soft and friable rocks that it seems unlikely that they would have been used for preparing foodstuffs in this manner. Owing to the disturbed condition of much of the deposit, no definite association between pestle-rubbing stones, stone bowls, or grindstones could be determined during excavation, although they were found in close proximity on many occasions.

1. The Stone Bowls

A total of 78 stone vessels was recovered, including shallow basins, platters and deeper bowls of various types. Of these, 56 are intact and 22 sufficiently complete for the shape and dimensions to be ascertained. An additional 70 small fragments were found which cannot be classified and almost certainly belong to the 22 incomplete specimens.

Taken as a whole, the series is crude and roughly made with only a small proportion of well-finished bowls. In every case these better-made specimens are made of lava or other relatively hard and homogeneous material, while the crude specimens are of soft and friable volcanic tuffs. All the rocks are volcanic and are of local origin.

Typology

This series of stone bowls is the largest yet found in East Africa although certain evolved types found at other sites are lacking at Njoro. The collection may be classified into five types, as follows:

(*a*) Platters and shallow basins, round-based. 17 examples. (Fig. 5, Nos. 1 to 17 inc.)

(*b*) Deep bowls, either round- or flat-based. 7 examples, none of which is complete. (Fig. 5, Nos. 18 to 24 inc.)

(*c*) Bowls with convex sides and narrow, sharp rims. Flat- or round-based. 19 examples. (Fig. 6.)

(*d*) Oblong and oval bowls, comprising elongate forms of the three foregoing types. 14 examples. (Fig. 7.)

(*e*) Crude vessels of indeterminate form in which the shape of the outside appears to be largely of natural origin. 21 examples. (Fig. 8.)
(Two examples of each type are also shown in Plate II.)

The bowls in class (*e*) have been grouped together in spite of some superficial dissimilarity in form since all appear to have been made from naturally

shaped rock fragments such as the small waterworn boulders which occur in the bed of the Njoro River, hollowed out on one side to form a crude basin.

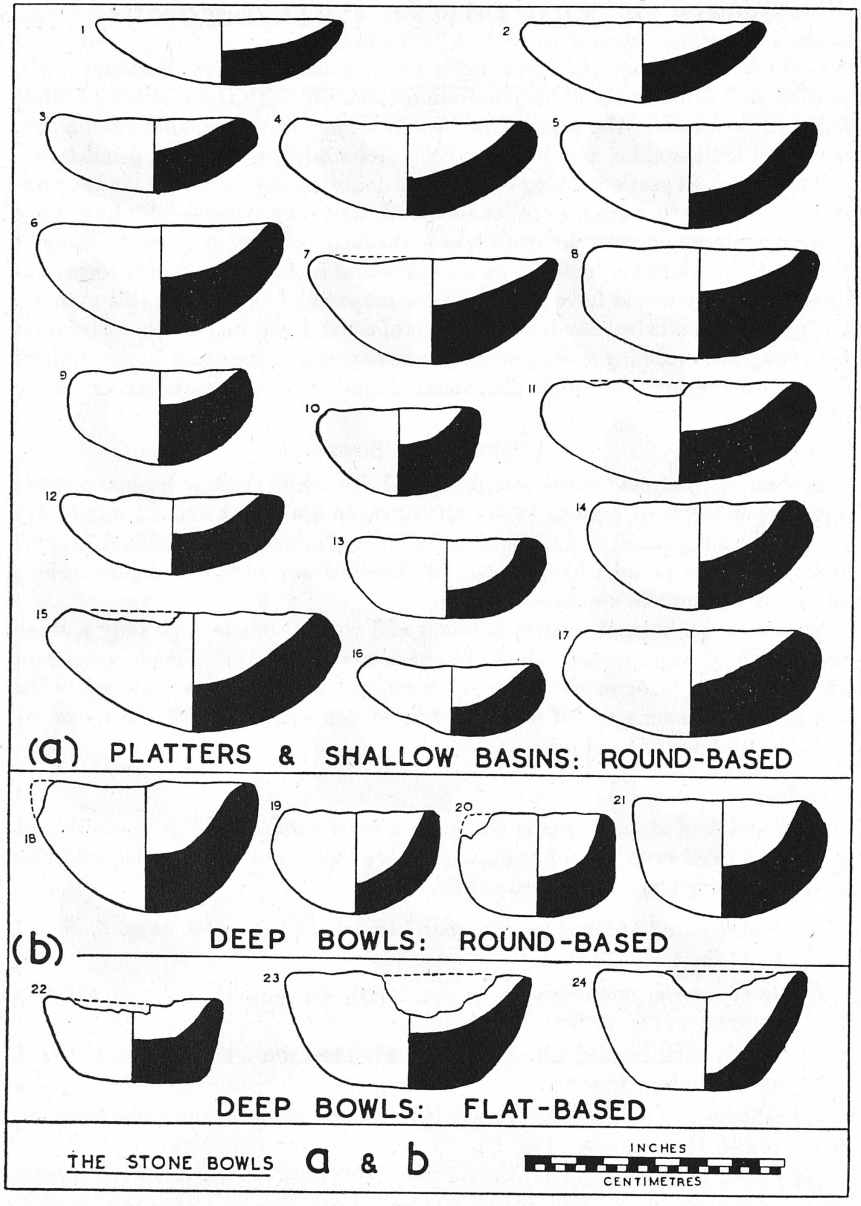


FIG. 5

The exterior surfaces exhibit little or no trace of artificial shaping beyond a slight trimming of the base.

Although the majority of the bowls are roughly made, none seems to be

unfinished, and their crudity appears to be entirely due to poor workmanship and poor materials. The presence of a few well-made specimens shows that the requisite technical skill did exist and we are forced to assume that these rough bowls were never intended to be highly finished.

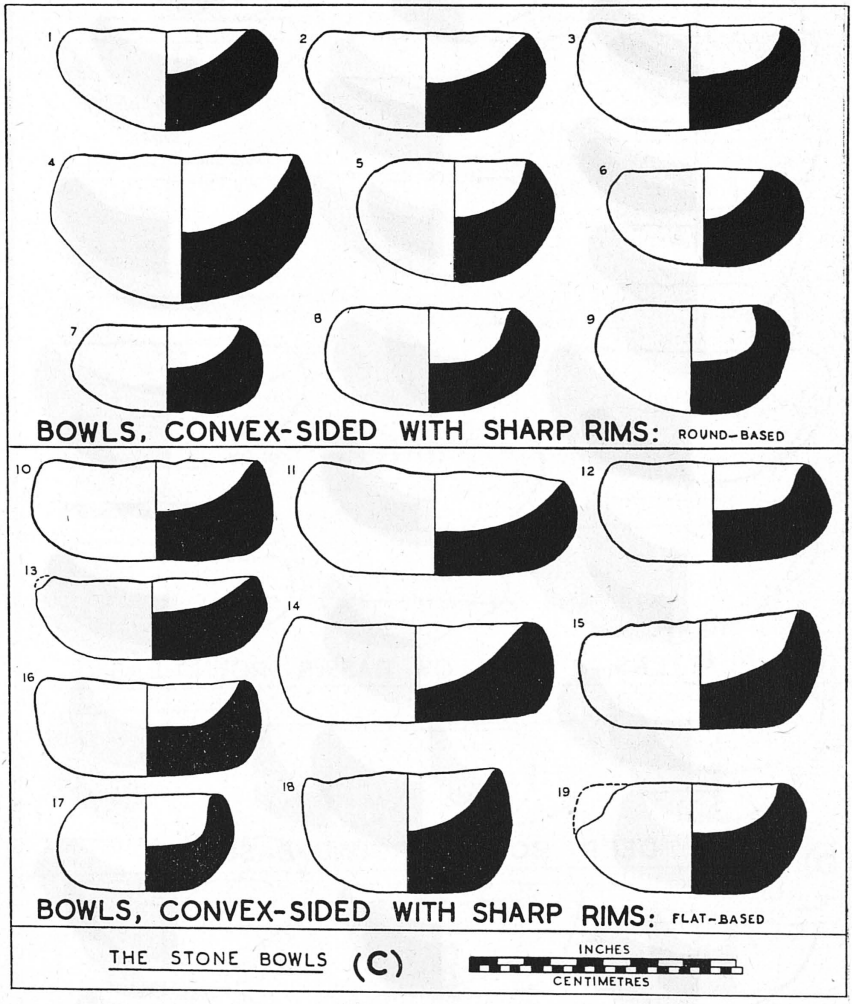


FIG. 6

A number of the bowls still retain pecked tool-marks on the base of the interior, measuring up to 7 mm. in diameter, and some shallow grooved marks are also occasionally visible on the sides. The outside surfaces are generally more carefully finished than the interior and the bases are usually rubbed smooth and sometimes even polished. No trace of smoothing or polishing is to be found on the interior surfaces.

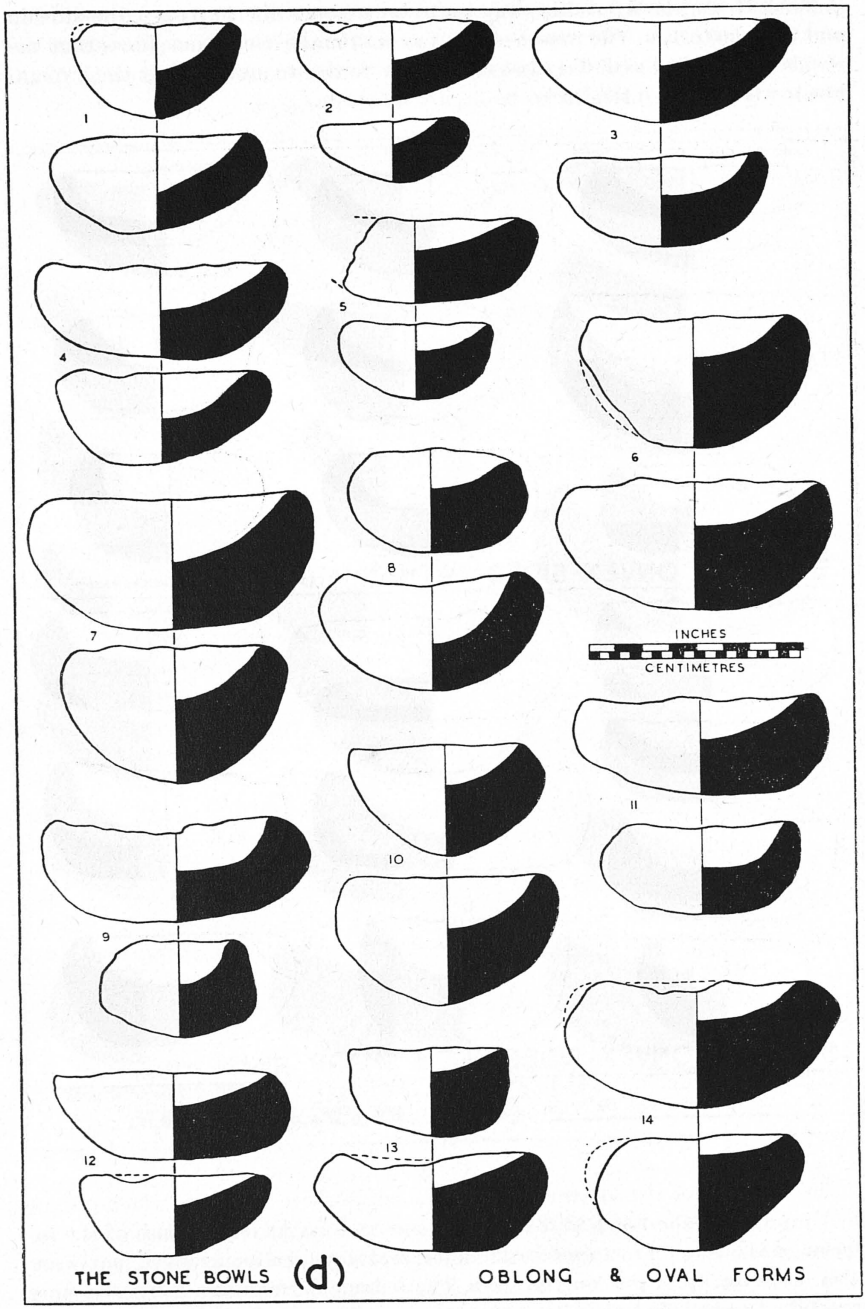

1
2
3
4
5
6
7
8
INCHES
CENTIMETRES
9
10
11
12
13
14
THE STONE BOWLS (d) OBLONG & OVAL FORMS

FIG. 7

Many of the bowls not otherwise burnt are extensively charred on the interior and must have been subjected to fire for a considerable time, since the carbonization when it is exposed in sections of broken bowls, frequently extends throughout the thickness of the bases.

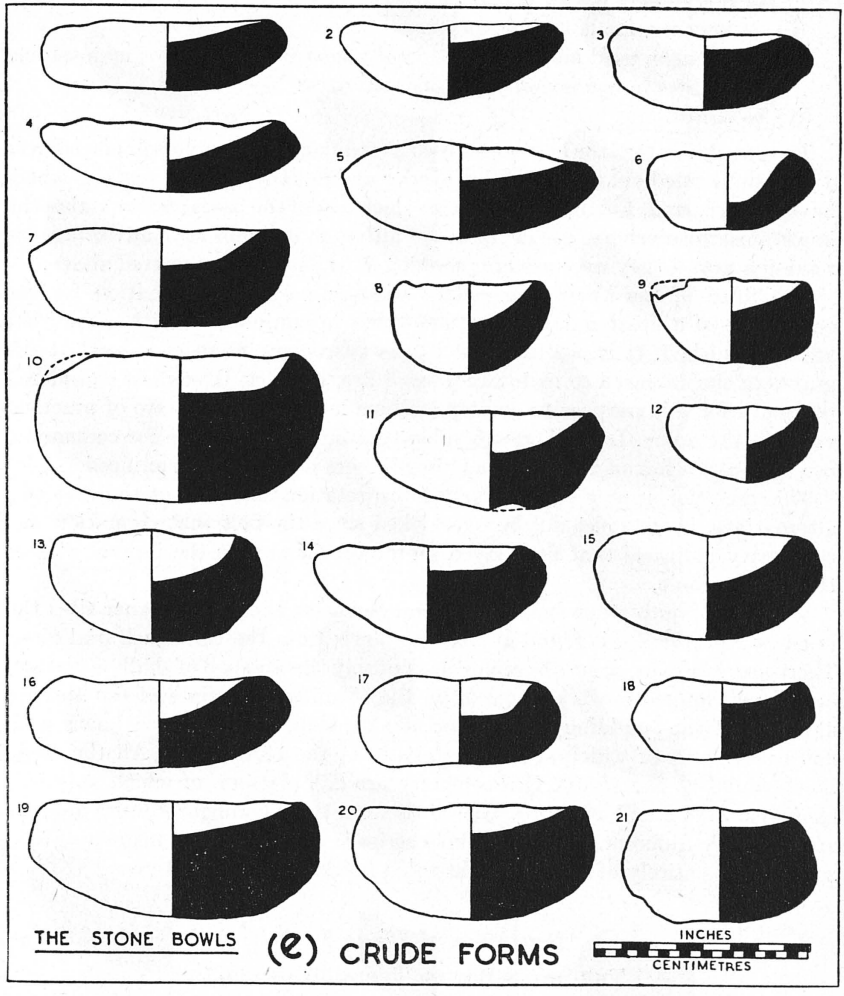


FIG. 8

The charring of the interior of many stone bowls is a feature which occurs not only at Njoro but also at many other sites in East Africa and indicates that although the bowls were sometimes unquestionably used as mortars, they were often used for some purpose connected with fire. No evidence bearing on this method of using the bowls has yet come to light, nor has it been possible to discover an explanation by means of modern parallels. However, it seems reasonable to assume that the bowls were probably used for one of the following

purposes, any of which would result in the interiors of the bowls becoming charred:

(i) as cooking-vessels in which the process of cooking was carried out by retained heat, the bowls being heated beforehand by means of charcoal or hot embers placed inside;
(ii) as braziers, for household purposes;
(iii) as braziers, used only for ceremonial purposes, possibly for maintaining small fires in connexion with funerary rites;
(iv) as lamps.

The possibility that the bowls were used as ordinary cooking-vessels placed over a fire can be ruled out since it is the interior and not the exterior surfaces which have been charred. Further, the extreme thickness of the bases clearly makes the bowls most unsuitable to use in this way* although it would be of advantage for retaining heat if they were used for cooking by the method suggested above.

The third of the above suggestions offers a possible explanation for the occurrence of a great number of crude bowls in conjunction with a few that are well finished. It is possible that it was customary to place a bowl at the graves of the deceased to maintain a small fire, but that it was not considered necessary for this purpose to employ well-made bowls which were of practical value in the home. Instead, rough substitute bowls were made for ceremonial use although a few of the well-made bowls were occasionally sacrificed.

This does not appear such a likely interpretation as either of the first two alternatives, but it must not be overlooked since the fact that cremation was customary indicates that fire played an important part in the funeral rites of the Njoro people.

When the Njoro stone bowls are compared with those from other sites the greatest resemblance is found among the bowls from the Nakuru Burial Site.[4] There are, however, some discrepancies, notably the absence of shallow platters and sharp-rimmed bowls of type (*c*) in the Gumban B series and the absence at Njoro of the 'pudding basin' type and of deep, straight-sided bowls with flat bases, both of which are characteristic of the Gumban B. All the stone bowls found at the Hyrax Hill cemetery are flat platters, of which only two examples were found at Njoro. The bowls from the Ngorongoro burial mounds are also very different, since the whole series is unusually well made and consists almost entirely of deep, straight-sided bowls of Gumban B type.[5]

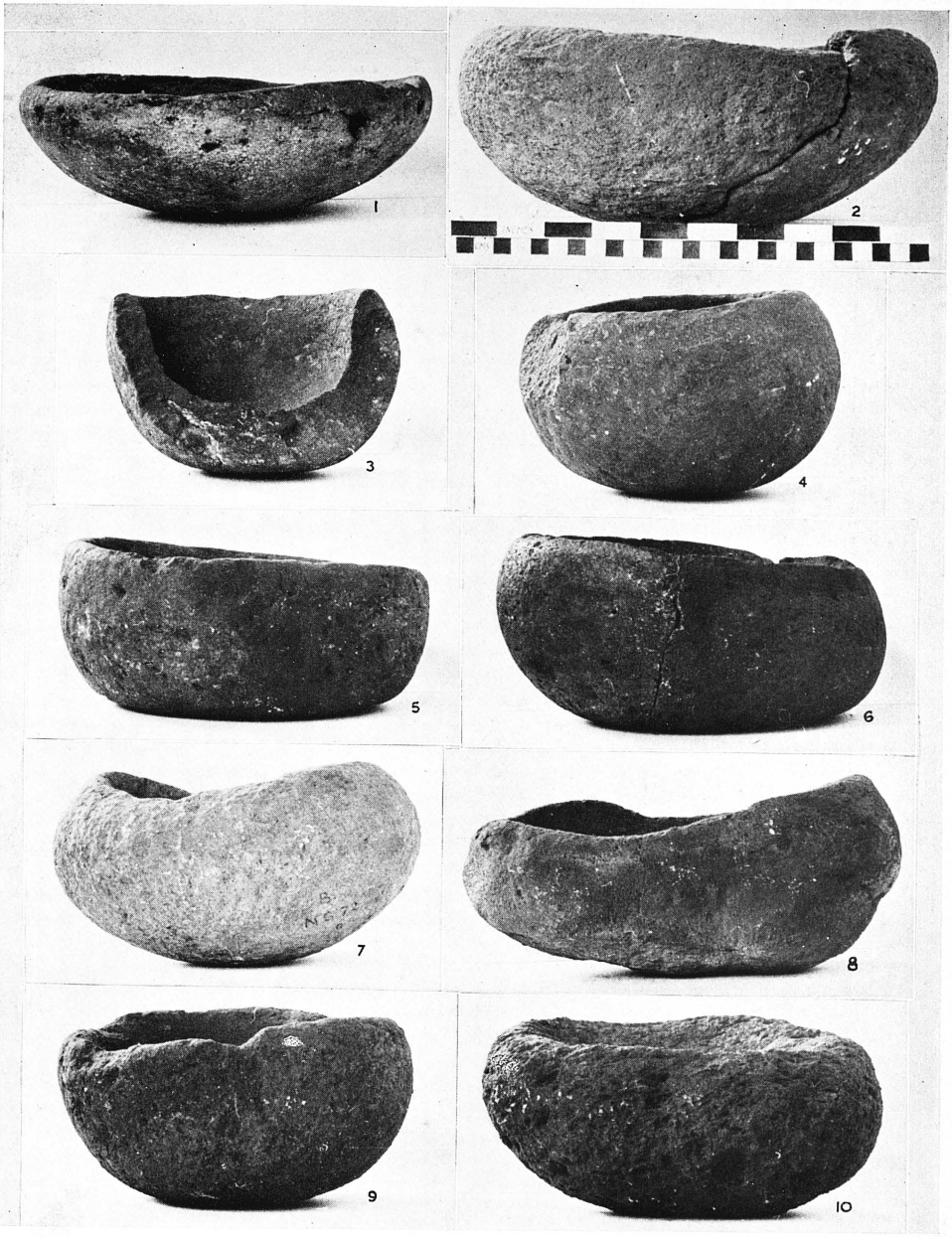
Description of Figure 5

The Stone Bowls, Types (*a*) and (*b*)

(*a*) Platters and Shallow Basins

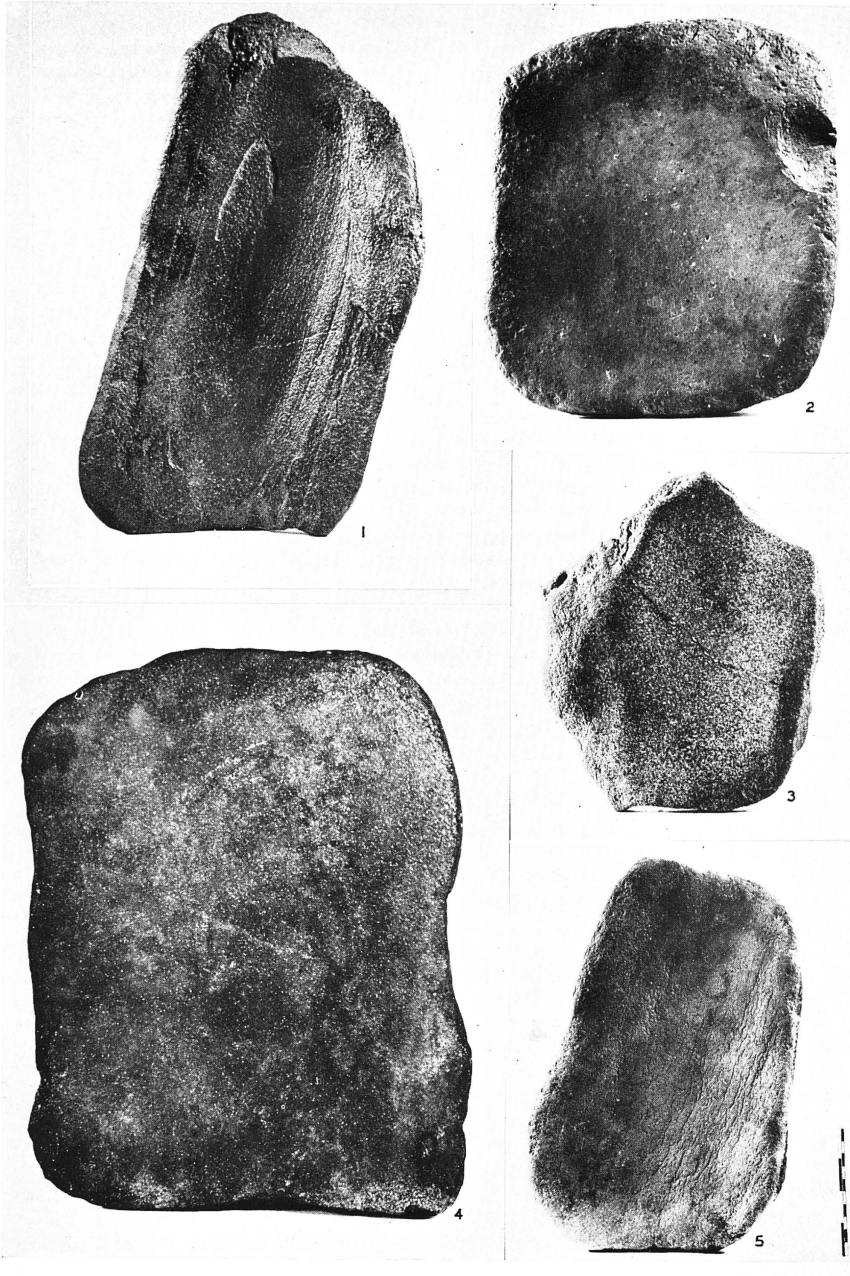
Measurements: in complete specimens the maximum and minimum diameter measurements have been taken at right angles to one another. These refer to the widest part of the vessels and may be at the apex of the rim, as in the platters, or some distance beneath it, as in the case of bowls of type (*c*). An average height and depth measurement is given for each bowl except in the case of very asymmetrical specimens where the maximum and minimum are recorded.

* Mr. A. J. Arkell, lately Commissioner for Archaeology in the Sudan, informs me that certain modern Sudanese tribes do employ stone bowls for cooking over a fire, but these bowls have relatively thin sides and bases and are quite unlike the East African prehistoric stone bowls.



THE STONE BOWLS, SHOWING TWO EXAMPLES OF EACH FORM

Nos. 1 and 2 type (*a*), platter and shallow basin, round-based; Nos. 3 and 4 type (*b*), deep bowls, either round or flat-based; Nos. 5 and 6 type (*c*), bowls with convex sides and sharp rims, either round or flat-based; Nos. 7 and 8 type (*d*), oblong and oval forms; Nos. 9 and 10, crude forms



THE LOWER GRINDSTONES

1. Well-made stone platter, rim thin and sharp. Severely burned. Diameter 230–40 mm. Height 67 mm. Depth 33 mm. NSB. 72, from Trench XI. (Reconstructed from a number of pieces.)

2. Well-made, carefully shaped platter showing shallow grooved tool marks on the interior. Diameter 238–43 mm. Height 82 mm. Depth 46 mm. NSB. 73, from surface soil inside cave.

3. Crude, ill-made basin showing large pecked tool marks on interior. Rim uneven. Diameter 190–208 mm. Height 77 mm. Depth 37 mm. NS. 230, from Trench V.

4. Well-made shallow basin, incomplete. Diameter *circa* 256 mm. Height 97 mm. Depth 51 mm. In two fragments. NSB. 63, from the platform extension of Trench X and NSB. 63*a*, from the surface of the scree.

5. Slightly oval basin, well-made, base very smooth, pitted tool marks on sides and exterior. Cracked and damaged by fire, interior blackened, remainder of basin burned light red. Diameter 212–43 mm. Height 104 mm. Depth 66 mm. NS. 176, from Trench III.

6. Entire basin burned, part of rim missing. Interior surface rough, showing some tool marks; ochre-stained. Base very smooth and blackened by fire. Diameter 254–63 mm. Height 133 mm. Depth 86 mm. NS. 167, from Trench IV.

7. Interior burned, surface rough, showing shallow grooved tool marks. Rim greatly damaged by rodent gnawing. Diameter 243–9 mm. Height 109 mm. Depth 51 mm. NSB. 74, from surface soil in cave.

8. Clumsy vessel with very thick base, complete but cracked by fire. Diameter 216–33 mm. Height 114 mm. Depth 49 mm. NS. 87, from Trench III.

9. Thick-based shallow basin. Interior surface rough, showing pecked tool marks. Diameter 193–8 mm. Height 97 mm. Depth 34 mm. NS. 90, from Trench III.

10. Small basin, rim slightly damaged. Diameter 135–47 mm. Height 73 mm. Depth 36 mm. NS. 86, from Trench III.

11. Rim greatly damaged, interior of bowl burned, exterior surface unusually smooth. Diameter 267 mm. Height 100 mm. Depth 46 mm. Two fragments. NSB. 33, from Trench VI and NSB. 55, from Trench VI, platform extension.

12. Large fragment, representing over half of a basin. Interior surface and sides rough, showing pitted tool marks. Base smooth and polished. Diameter 215 mm. Height 84 mm. Depth 41 mm. NS. 177, from Trench II.

13. Well-made basin, slightly oval in shape, composed of three fragments. Diameter 173–201 mm. Height 84 mm. Depth 56 mm. NS. 17, from Trench II, NS. 92, from Trench III, and NSB. 25, from Trench VI.

14. Composed of three fragments which represent approximately two-thirds of the basin. All fragments are blackened on the interior surface and show grooved tool marks converging to the centre. Diameter 208 mm. Height 104 mm. Depth 59 mm. NS. 16 and 16*a*, from Trench II, and NS. 100, from Trench IV.

15. Large shallow basin with very rough surface, in three pieces. Diameter 279–92 mm. Height 120 mm. Depth 78 mm. NSB. 40, from Trench VI, platform extension, NSB. 46 and 46*a*, from Trench VII.

16. A crude and irregularly shaped basin in which the height of the sides varies more than 1 inch. Interior blackened by fire and also ochre-stained. Diameter 180–5 mm. Height 71–86 mm. Depth 53 mm. NS. 184, from Trench III.

17. Crude basin blackened by fire on the interior. Diameter 241–9 mm. Height 112 mm. Depth 53 mm. NSB. 50, from Trench VII.

(*b*) Deep Bowls, Round- and Flat-based

18. Two fragments representing half a deep bowl, interior heavily blackened, remainder of bowl burned red. Well-made bowl with base and rim slightly polished. Diameter *circa* 225 mm. Height *circa* 129 mm. Depth *circa* 73 mm. NS. 173, from Trench III.

19. Fragment representing half a bowl. Well made, base smooth. Remainder of surface rough, showing tool marks which are particularly distinct at the bottom of the bowl. Diameter *circa* 162 mm. Height 104 mm. Depth 79 mm. NSB. 16, from Trench IX.

20. Half a bowl very similar in form to (19) although not so well made; blackened by fire on interior. Diameter *circa* 156 mm. Height 105 mm. Depth 66 mm. NSB. 62, from Trench IX.

21. Approximately half of bowl preserved. Rim sharp, interior surface and base

smooth. Walls rough, showing tool marks. Burned red. Diameter *circa* 195 mm. Height 117–32 mm. Depth 62 mm. NSB. 57, from the platform extension of Trench V.

22. Fragmentary bowl with flat base, greatly cracked and damaged by fire. Diameter *circa* 183 mm. Height 89 mm. Depth 68 mm. NS. 134, from Trench II.

23. Approximately one-third of bowl preserved. Interior blackened by fire. Base flat and polished, remainder of surface rough, showing tool marks. Estimated diameter 245 mm. Height 115 mm. Depth 56 mm. NS. 148, from Trench III.

24. One-third of bowl preserved. Base flat and thin in centre, blackened by fire on interior. Estimated diameter 205 mm. Height 117 mm. Depth 102 mm. NSB. 4, from the platform extension of Trench IV.

Description of Figure 6

The Stone Bowls, Type (*c*)

(*c*) Convex-sided Bowls with Sharp Rims. Round- and Flat-based

Round-based

1. A well-made symmetrical bowl with markedly convex sides, the greatest diameter being some 40 mm. below the apex of the rim. Interior heavily blackened. Diameter 202–10 mm. Height 92 mm. Depth 45 mm. NSB. 54*a*, from Trench VI.

2. Unusually well-made bowl, in two pieces. Base smooth on exterior, interior shows tool marks. Diameter 226–8 mm. Height 99 mm. Depth 49 mm. NS. 220 and 228, both from Trench IV.

3. Well-made bowl. Interior shows very distinct pitted tool marks which are also present on the base and sides. Whole bowl charred. Diameter 205–10 mm. Height 110 mm. Depth 56 mm. NS. 168, from Trench III.

4. Large, thick-based bowl. Rim slightly damaged. Diameter 233–43 mm. Height 142 mm. Depth 99 mm. Discovered in the surface soil of the rock-shelter before excavation.

5. Rim and outside of base smooth, interior rough and showing distinct pitting, particularly in the bottom of the bowl. Whole bowl charred and one side stained by red ochre. NSB. 67, from Trench IX.

6. Small, well-made bowl, slightly ochre stained. Diameter 178–88 mm. Height 70–96 mm. Depth 48 mm. NS. 25, from Trench I.

7. Small section of rim missing. Bowl reconstructed from three fragments. NSB. 17, from Trench VI, NSB. 38, from Trench VII, and NS. 199, from Trench IV.

8. Somewhat oval in shape, surface very weathered. Diameter 191–211 mm. Height 80–100 mm. Depth 54 mm. NSB. 51, from Trench VII.

9. Rim slightly incurved. Interior greatly charred. Diameter 188 mm. Height 70–105 mm. Depth 46 mm. In three pieces. NS. 36, NS. 50, and NS. 178, all from Trench II.

Flat-based

10. Fragment representing approximately half of a wide, flat-based bowl. Rim slightly damaged. Interior charred. Base and sides smooth and slightly polished. Diameter *circa* 230 mm. Height 99 mm. Depth 54 mm. NS. 78, from Trench IV.

11. Very well-made shallow bowl. The whole of the exterior is carefully smoothed. Rim sharp and narrow but slightly damaged. NS. 26, from Trench I.

12. A somewhat crude shallow basin, very weathered and made from particularly coarse material. Diameter 213–23 mm. Height 94 mm. Depth 45 mm. NSB. 22, from the platform extension of Trench VI.

13. Fragment representing half a shallow, flat-bottomed bowl. Rim chipped and damaged. Diameter 225 mm. Height 89 mm. Depth 45 mm. NSB. 65, from surface of scree below rock-shelter.

14. Large bowl with flat base which is relatively thin in the centre. Interior charred. Diameter 248–62 mm. Height 112 mm. Depth 80 mm. NSB. 26, from the platform extension of Trench VI.

15. Very well-made bowl, slightly oval, with particularly sharp rim. Whole of exterior carefully smoothed. Interior rough, showing pitting. Base charred. Diameter 226–33 mm. Height 90–109 mm. Depth 66 mm. In three pieces, NS. 192 and 192*a*, from Trench XV, and NS. 196, from Trench III.

16. Shallow bowl, rough on interior but smooth on exterior surface. Rim even and

regular but thicker than usual in bowls of this type. Diameter 214–22 mm. Height 78–96 mm. Depth 48 mm. NS. 143, from Trench IV.

17. Interior charred. Sides less convex than usual. Diameter 170–3 mm. Height 94 mm. Depth 51 mm. NS. 171, from Trench III.

18. A relatively deep bowl with very sharp rim. Base somewhat damaged. Grooved marks visible on interior which is also charred. Diameter 198–202 mm. Height 102–20 mm. Depth 58 mm. In four pieces, NSB. 12, from Trench IV, NSB. 16 and 27, from Trench VI, and NSB. 39, from Trench VII.

19. Fragment representing half a shallow, flat-based bowl. Whole surface rough, particularly on the interior. Diameter *circa* 224 mm. Height 110 mm. Depth 48 mm. NDB. 32, from Trench VI.

Description of Figure 7

The Stone Bowls, Type (*d*)

(*d*) Oblong and Oval Bowls

1. Oblong bowl, round-based. Rim and sides of unequal thickness. Section of rim missing. Max. diameter 211 mm., min. diameter 172 mm. Height 95 mm. Depth 56 mm. Found below rock-shelter at the edge of the Njoro River.

2. Small oblong bowl, very crude and made from particularly coarse material. Max. diameter 193 mm., min. diameter 137 mm. Height 76 mm. Depth 29 mm. NSB. 1, from the platform extension of Trench I.

3. Shallow oval basin, interior shows distinct tool marks. Severely cracked by fire and burned light red in colour. Max. diameter 251 mm., min. diameter 193 mm. Height 94 mm. Depth 43 mm. NS. 55, from Trench I.

4. Shallow oval basin, broken into five pieces. Interior shows tool marks and is very charred. Max. diameter 240 mm., min. diameter 199 mm. Height 85 mm. Depth 39 mm. NSB. 37, from Trench VII.

5. Incomplete oblong basin, interior charred. Outside surface rough, but appears to have been artificially shaped. Max. diameter not measurable, min. diameter 147 mm. Height 79 mm. Depth 31 mm. NSB. 73, from Trench III.

6. Large oval basin, very crude, with one end considerably wider than the other. Max. diameter 261 mm., min. diameter 221 mm. Height 127 mm. Depth 41 mm. NSB. 49, from Trench VII.

7. Massive oblong bowl with thick base and rim. Interior charred and showing pitting. Max. diameter 272 mm., min. diameter 216 mm. Height 127 mm. Depth 61 mm. NSB. 7, from the platform extension of Trench IV.

8. Well-made bowl, boat-shaped, with both ends higher than the median part. Rim sharp and sides convex. Entire surface shows pitting. Interior charred. Max. diameter 215 mm., min. diameter 167 mm. Max. height 117 mm., min. height 93 mm. Depth 53 mm. NS. 72, from Trench I.

9. Oval bowl in which one end is considerably wider than the other. Both ends are of greater height than the median part. Max. diameter 254 mm., min. diameter 150 mm. Max. height 115 mm., min. height 99 mm. NS. 237, from surface of Trench II.

10. Oval bowl with one end thicker and broader than the other. Interior smooth and ochre-stained. Max. diameter 217 mm., min. diameter 183 mm. Height 120 mm. Depth 49 mm. NS. 144, from Trench II.

11. Crude, irregularly shaped bowl, broken into five pieces. Base rounded on outside but flat inside. Max. diameter 242 mm., min. diameter 198 mm. Height 78–102 mm. Depth 46 mm. NS. 8, from Trench IV.

12. Crude shallow basin, roughly oval in form but very uneven in thickness. Rim partly damaged. Interior shows parallel grooved marks and is ochre-stained. Max. diameter 227 mm., min. diameter 173 mm. Height 87 mm. Depth 33 mm. NS. 142, from Trench IV.

13. Very crude bowl with part of rim missing. Max. diameter 222 mm., min. diameter 153 mm. Height 108 mm. Depth 42 mm. In two pieces. NS. 27, from Trench I, and NS. 96, from Trench IV.

14. Crude shallow basin. Large part of rim missing. Interior charred and also shows pitted and grooved tool-marks. Max. diameter 260 mm., min. diameter (?) 210 mm. Height 122 mm. Depth 31 mm. NS. 47, from Trench II.

Description of Figure 8

The Stone Bowls, Type (*e*)

(*e*) Crude Bowls. (Note: owing to the great asymmetry in form, the measurements given for these bowls are only approximate.)

1. Crude shallow basin with convex sides. Exterior surface natural. Diameter 198–231 mm. Height 81 mm. Depth 38 mm. NSB. 45, from Trench VII.

2. Very shallow oblong platter, whole surface extremely rough and rim ill defined. Diameter 172–208 mm. Height 76 mm. Depth 23 mm. NS. 170, from Trench III.

3. Roughly circular piece of stone with one face slightly hollowed to form a shallow basin. Burned. Diameter 172–90 mm. Height 82 mm. Depth 28 mm. NS. 122, from Trench IV.

4. Fragment representing approximately half a very crude shallow basin. Interior slightly charred. Estimated diameter 241 mm. Height approx. 76 mm. Depth approx. 40 mm. NSB. 35, from the platform extension of Trench VII.

5. Shallow basin broken into two pieces, very irregular in shape. Interior charred. Diameter 200–8 mm. Height 94 mm. Depth 40 mm. NSB. 24 and 41, both from Trench VI.

6. Small basin roughly sub-triangular in form. Whole surface very rough and exterior apparently natural. Diameter 140–60 mm. Height 76 mm. Depth 47 mm. NSB. 21, from Trench VI.

7. Fragmentary basin, very asymmetrical in form. Part of rim and one side missing. Interior charred and ochre-stained. NS. 172, from Trench III.

8. Small crude bowl, rim damaged. Diameter 150–8 mm. Height 88 mm. Depth 36 mm. NSB. 168, from the platform extension of Trench VIII.

9. Small bowl, roughly circular, part of rim damaged. Interior charred. Diameter 139–56 mm. Height 86 mm. Depth 32 mm. NSB. 69, from Trench XI.

10. Shallow bowl with particularly thick base, very crude. Interior shows clear tool marks which are also visible in places on the exterior; possibly unfinished. Diameter 244–53 mm. Height 112 mm. Depth 30 mm. In two pieces, NS. 98, from Trench IV, and NS. 112, from Trench II.

11. Approximately three-quarters of a bowl broken into three pieces. Roughly oblong in shape, with a very rough surface. Diameter *circa* 191 mm. Height 96 mm. Depth 43 mm. Found on surface of scree below the rock-shelter.

12. Oval bowl with very rough surface except for the exterior of the base, which is polished. Diameter 170–80 mm. Height 81 mm. Depth 43 mm. NS. 88, from Trench III.

13. Crude bowl, exterior surface entirely natural. Rim irregular and uneven in height. Interior severely charred. Diameter 173–201 mm. Height 107 mm. Depth 54 mm. NSB. 19, from the platform extension of Trench VI.

14. Fragment representing approximately two-thirds of a shallow basin, roughly oblong in form. Burned. Interior shows tool marks. Diameter *circa* 224 mm. Height 92 mm. Depth 28 mm. NSB. 34, from the platform extension of Trench VII.

15. Rough bowl with exterior surface natural, partly ochre-stained. Diameter 183–213 mm. Height 104 mm. Depth 48 mm. NS. 166, from Trench IV.

16. Very crude basin, in two pieces and with two parts of the rim missing. Interior heavily charred. Diameter 249–66 mm. Height 91 mm. Depth 38 mm. NSB. 20 and 23, both from the platform extension of Trench VI.

17. Crude basin, irregular in shape, made from particularly coarse material. Ochre-stained. Diameter 173–88 mm. Height 90 mm. Depth 34 mm. NS. 187, from Trench IV.

18. Irregularly shaped piece of stone, slightly hollowed out on one face. Ochre-stained. Diameter 148–73 mm. Height 112 mm. Depth 40 mm. NS. 232, from Trench V.

19. Large shallow bowl, very crude, with thick base and blunt, uneven rim. Interior shows tool marks. Exterior does not appear to have been artificially shaped. Diameter 256–75 mm. Height 110 mm. Depth 40 mm. NS. 99, from Trench IV.

20. Irregularly shaped piece of stone, slightly hollowed on one side; particularly coarse material. Diameter 195–226 mm. Height 110 mm. Depth 31 mm. NSB. 52, from Trench VII.

21. Similar to NSB. 52; interior charred. Diameter 160–83 mm. Height 112 mm. Depth 23 mm. NS. 202, from Trench IV.

2. The Pestle-rubbing Stones

Seventy-eight combined pestle-rubbing stones were found. Nearly all, in common with the lower grindstones, are made from basement complex rocks which do not occur in the neighbourhood of Njoro.

A large number of the pestle-rubbing stones are deeply stained by red ochre, whilst those found in the carbonized levels are blackened.

With the exception of eight waterworn pebbles, which are slightly roughened at the ends and have been used only for pounding, the whole series appears to have been artificially shaped, either before use or as a result of specialized utilization. It may be divided into seven types.

(*A*) (*Fig. 9, Nos. 1–4*). Fourteen examples, ranging in length from 97 to 64 mm. These are cylindrical in form with slightly tapered ends, suggesting an elongate barrel. Some lateral flattening is occasionally present but it is never very pronounced and the median cross-sections are nearly circular. The diameter of the extremities is approximately equal.

(*B*) (*Fig. 9, Nos. 5–10*). Seventeen examples, ranging in length from 112 to 63 mm. These are pear-shaped and round-sectioned, but lateral flattening on opposite sides is sometimes present at the narrow end. The broad end is always slightly convex and in a few specimens it lies oblique to the long axis of the implement.

(*C*) (*Fig. 9, Nos. 11–13*). Eight examples, ranging in length from 98 to 79 mm. With the exception of one oval specimen, all are sub-triangular in shape. Four flat rubbed surfaces are present on the body of each implement, two of which, on opposite sides, are relatively broad and form the upper and lower faces. Those on either side have been rubbed obliquely and the implements are therefore parallelogram in cross-section.

(*D*) (*Fig. 9, Nos. 14–16*). Six examples, ranging in length from 90 to 56 mm. These include two triangular, two discoidal, and two elliptical specimens, all of which have a flat, rubbed surface on the upper and lower face, while the sides are convex or nearly straight and never rubbed obliquely as in the preceding type.

(*E*) (*Fig. 9, Nos. 17–19*). Ten examples, ranging in length from 134 to 71 mm. This type includes seven oblong, bolster-shaped specimens, two discoidal, and one roughly sub-triangular. The cross-sections are plano-convex and one face is flat or even concave whilst the remaining surfaces are convex and although smooth have not been used for rubbing. The flat or concave surfaces are always rough.

(*F*) (*Fig. 9, Nos. 20–2*). Seven examples, ranging in length from 111 to 58 mm. One discoidal specimen is included in this class, the remainder are roughly elliptical in shape with a triangular cross-section. All show three flat-rubbed surfaces, one of which is broad and forms the base of the triangle whilst the other two intersect to form a dorsal ridge.

(*G*) (*Fig. 9, Nos. 23–4*). Six examples, ranging in length from 88 to 71 mm. This type is ovoid in shape and has a transverse oblique surface at the broad end. The narrow extremities are usually bruised and the broad ends also show some roughening.

In addition to the seven types of pestle-rubbing stones described above,

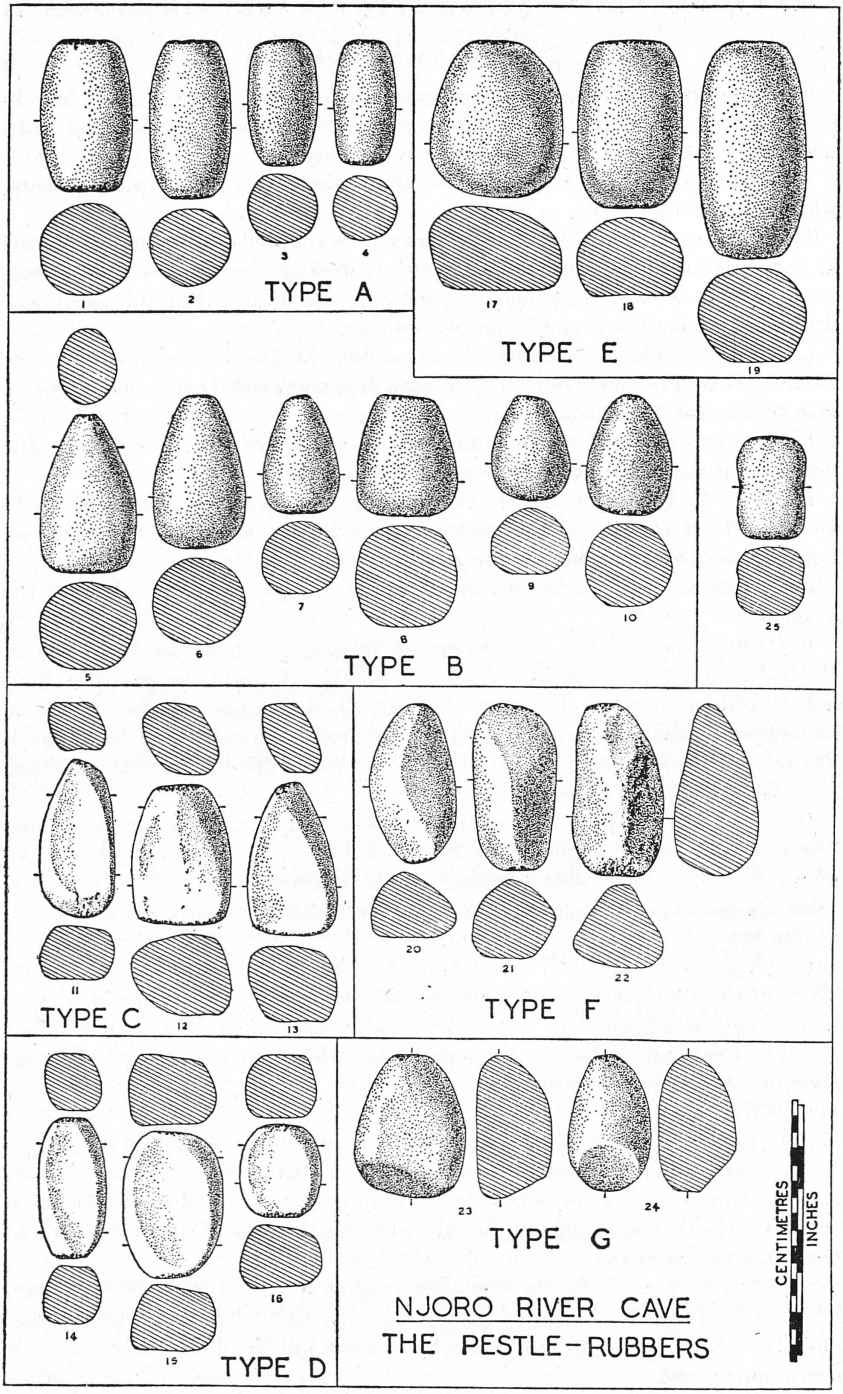

TYPE A
1
2
3
4
TYPE E
17
18
19
TYPE B
5
6
7
8
9
10
25
TYPE C
11
12
13
TYPE F
20
21
22
TYPE D
14
15
16
TYPE G
23
24
CENTIMETRES
INCHES
NJORO RIVER CAVE
THE PESTLE-RUBBERS

FIG. 9

there are two examples of pestles showing small circular depressions or pitted areas, one of which is shown in Fig. 9, No. 25. In this specimen, two small depressions are present on opposite faces and it is possible they were merely for the purpose of obtaining a better grip of the implement. NS. 60 (not illustrated) shows five well-marked hollows on different faces; it is of a type found at a number of other Neolithic sites in Kenya and sometimes considered to be a form of anvil.

The Njoro series of pestle-rubbing stones is by far the most numerous known in East Africa although small numbers of these implements had previously been found at several Neolithic sites, namely, the Nakuru Burial Site, Hyrax Hill I, the Naishi Cave at Elmenteita, and the Ngorongoro burial mounds in Tanganyika Territory. Combined pestle-rubbing stones have also been found by the late Archdeacon Owen in the Nyanza province where they were associated with the Kenya Smithfield.

The pestles from the Nakuru Burial Site, mainly of the pear-shaped type (*B*), were associated with both stone bowls and grindstones, as were the Ngorongoro specimens. The latter are of types (*D*) and (*E*). At Hyrax Hill the pestles were of types (*B*), (*D*), and (*G*) with one pitted specimen, they were found in female burials only, associated with stone platters.

The materials of the pestles are as follows:

Quartzite	48	Rhyolite	2
Quartz-schist	1	Jasper	1
Vein quartz	1	? Basalt	6
Granite	1	Fine-grained diorite	2
Micro-granite	2	Nepheline phonolite	6
Horneblende-granite	1	? Phonolite	1
Porphyritic horneblende granite	1	Nepheline syenite (porphyritic)	3
Nyanzian volcanic	2	Total	78

Description of Figure 9

The Pestle-rubbing Stones

Measurements: the maximum diameter has been measured at the widest part of each specimen and the minimum diameter at right angles to it. The greatest width naturally varies in position according to the type of pestle and is not necessarily central.

Type (*A*)

1. Length 92·5 mm. Max. diameter 55·5 mm., min. diameter 51 mm. Material, granite. NSP. 10, from Trench VI.

2. Length 97·5 mm. Max. diameter 49·5 mm., min. diameter 47 mm. Material, nepheline phonolite. NS. 233, from Trench I.

3. Length 76 mm. Max. diameter 42 mm., min. diameter 41 mm. Material, nepheline phonolite. NSP. 18, from Trench IX.

4. Length 76·5 mm. Max. diameter 38·5 mm., min. diameter 38 mm. Material, nepheline syenite. NSP. 11, from the platform extension of Trench VII.

Type (*B*)

5. Length 97 mm. Max. diameter 57 mm., min. diameter 56 mm. Material, quartzite. NSP. 20, from Trench IX.

6. Ochre-stained and highly polished. Length 94 mm. Max. diameter 58 mm., min. diameter 53·5 mm. Material, quartzite. NS. 174, from Trench III.

7. Length 72 mm. Max. diameter 48 mm., min. diameter 46 mm. Material, probably sandstone or fine-grained quartzite. NSP. 22, from Trench IX.

8. Length 77 mm. Max. diameter 61·5 mm., min. diameter 60 mm. Material, rhyolite. NS. 214, from Trench V.

9. Length 63 mm. Max. diameter 48 mm., min. diameter 42 mm. Material, quartzite. NS. 11, from Trench I.

10. Length 73 mm. Max. diameter 53 mm., min. diameter 50 mm. Material, quartzite. NSP. 5, from the platform extension of Trench IV.

Type (C)

11. Length 97·5 mm. Max. diameter 47 mm., min. diameter 32 mm. Material, quartzite. NS. 128, from Trench III.

12. Length 85·5 mm. Max. diameter 61 mm., min. diameter 52 mm. Material, quartzite. NSP. 25, from Trench XI.

13. Length 94 mm. Max. diameter 56 mm., min. diameter 46 mm. Material, diorite. NS. 110, from Trench IV.

Type (D)

14. Length 87 mm. Max. diameter 41 mm., min. diameter 36 mm. Material, quartzite. NS. 185, from Trench III.

15. Length 90 mm. Max. diameter 61 mm., min. diameter 41 mm. Material, quartzite. NS. 223, from Trench I.

16. Length 56 mm. Max. diameter 50 mm., min. diameter 40·5 mm. Material, quartzite. NS. 121, from Trench III.

Type (E)

17. Length 95 mm. Max. diameter 81 mm., min. diameter 51 mm. Material, quartzite. NS. 154, from Trench III.

18. Length 103 mm. Max. diameter 64 mm., min. diameter 47·5 mm. Material, quartzite. NS. 14, from Trench II.

19. Length 134 mm. Max. diameter 66 mm., min. diameter 57·5 mm. Material, quartzite. NS. 82, from Trench III.

Type (F)

20. Length 97 mm. Max. diameter 53 mm., min. diameter 40 mm. Material, quartzite. NS. 165, from Trench IV.

21. Length 102 mm. Max. diameter 51 mm., min. diameter 46 mm. Material, nyanzian volcanic. NS. 70, from Trench I.

22. Length 105 mm. Max. diameter 56 mm., min. diameter 50·5 mm. Material, microgranite. NS. 34, from Trench II.

Type (G)

23. Length 88 mm. Max. diameter 67 mm., min. diameter 43 mm. Material, quartzite. NSP. 23, from Trench IX.

24. Length 82·5 mm. Max. diameter 52 mm., min. diameter 48 mm. Material, quartz-schist. NS. 69, from Trench I.

Pitted pestle

25. Length 62 mm. Max. diameter 43 mm., min. diameter 37 mm. Material, quartzite. NS. 83, from Trench III.

3. The Lower Grindstones

The lower grindstones found in the Njoro River Cave are all simple in form. They consist of comparatively thin flat slabs of rock of various sizes. Sometimes both the upper and lower faces are flat, but more often one face has been considerably hollowed out by wear.

As in the case of the stone bowls and of the pestles, the number of grindstones (77), tallies almost exactly with the number of adult individuals found in the cave.

Although the grindstones obtained from the ochreous layers are deeply stained by red ochre, those from the carbonized levels show no trace of ochre. It is unlikely, therefore, that the grindstones became stained when being used for grinding ochre and the staining has almost certainly been caused by contact

with the ochre in the deposit. There seems little doubt that the grindstones were used for grinding grain of some sort, although none was found in spite of careful search and although the conditions were such that it could have been preserved.

Only eight grindstones are made from volcanic rocks which occur in the neighbourhood of Njoro. The remainder are of basement complex materials which can be matched in the Sotik district. Approximately half of the total number are made from a particular form of tabular quartzite which fractures naturally into thin slabs.

Nineteen of the complete grindstones are large and rectangular or oblong in shape; these have clearly been trimmed before being used. The remainder are relatively small, irregularly shaped slabs which had been used in their present form, since the edges are worn smooth and the centres usually hollowed. It seems probable, in view of the distance from which raw material had to be transported, that when a large grindstone broke, any fragments of serviceable size were not discarded but put to further use.

A representative selection of five complete grindstones is shown in Plate IV.

The materials of the grindstones have been identified as follows:

Basement complex quartzite	15
,, ,, ,, fine-grained	2
,, ,, ,, coarse-grained	3
,, ,, ,, sugary	2
,, ,, ,, with muscovite	13
,, ,, ,, with muscovite, fine-grained	2
,, ,, ,, with muscovite, coarse-grained	2
Quartz-muscovite schist	6
,, ,, ,, coarse-grained	1
Biotite-schist	2
,, ,, fine-grained	6
Muscovite-schist	4
Very muscovite-rich schist	1
Granite or migmatite, fine-grained	1
Quartz-muscovite migmatite	1
,, ,, ,, medium-grained	1
Migmatite, fine-grained	1
Biotite-granite-gneiss	1
Biotite ? chlorite fine-grained schist	1
Biotite-granite (gneissose ?), fine-grained	2
Granite-gneiss, fine-grained	1
Quartz-muscovite gneiss	1
Basic lava (Tertiary), fine-grained	2
,, ,, ,, slightly vesicular	2
Altered basic vesicular lava (Tertiary)	1
Altered basic lava with felspar phenocrysts	1
Fine-grained basic lava with felspar phenocrysts	1
Volcanic tuff—plentiful obsidian fragments	1
Total	77

Description of Plate IV

The Lower Grindstones

1. Oblong grindstone, considerably worn, ochre-stained. Material: quartz-muscovite schist. Length 43 cm. Breadth 23 cm. Average thickness in centre 1 cm., at edge 3 cm. NSG. 50, from Trench XI.

2. Rectangular grindstone, surface flat and unworn, blackened. Material: volcanic tuff with plentiful obsidian fragments. Length 31 cm. Breadth 27 cm. Average thickness 5 cm. NS. 28*b*, Trench I.

3. Small grindstone of irregular form, centre worn hollow. Material: fine-grained granite-gneiss. Length 26 cm. Breadth 21 cm. Average thickness 2·5 cm. NSG. 34, from Trench VII.

4. Large rectangular grindstone, both upper and lower surfaces worn smooth but not extensively hollowed. Material: schist, very muscovite-rich. Length 43 cm. Breadth 33 cm. Average thickness 2·5 cm. NS. 155, from Trench II.

5. Oblong grindstone, considerably worn and also ochre-stained. Material: Basement System quartzite. Length 30 cm. Breadth 20 cm. Average thickness in centre 3 cm., at edge 4 cm. NSG. 44, from Trench IX.

V. ORNAMENTS

1. The Stone Beads and Pendants

Probably the most interesting feature of the culture revealed at the Njoro River Cave is the assemblage of over 800 beads and some pendants made from semi-precious stones such as agate, quartz, chalcedony, and microcline felspar or 'amazon stone'.

Though a few similar beads were known before 1940, from the later stone-age cultures of East Africa, they were exceedingly rare and generally considered to have been imported. However, the very large number discovered at Njoro, and the fact that all the materials are known to occur in Kenya, may be taken to indicate that such beads were manufactured locally; but it is still possible that foreign influence was responsible for the inception of the industry. It is difficult to explain on other grounds the adoption by a primitive people of such an essentially specialized craft.

It has already been shown that the Njoro culture was of the stone age and it is not known for certain how stone beads were drilled and ground at that period. A method used in India which involves the use of a thorn fed by emery powder has been suggested by the late Sir Flinders Petrie and is quoted by the authors of *The Badarian Civilization* (p. 27), in connexion with similar beads found at Badarian and Predynastic sites. If corundum or emery is necessary for the drilling, it may be significant that this mineral occurs in Kenya, in a district which also yields microcline felspar.

Material and Form

Although a large number of the beads were burned during the cremation of the human remains and have become altered to an opaque grey colour, the following rocks have been identified: various forms of chalcedony, agate, green and white quartz, microcline felspar, plagioclase, steatite, albite, and labradorite.

The exact sources of these materials have not been identified, but it seems that the chalcedony and agate were probably obtained from the volcanic tuffs of the Mau escarpment, where they are known to occur and where there are numerous mine-shafts and shallow workings still to be seen. None of these workings have yet been excavated and there is no evidence as to their date or concerning the people responsible, but it may be considered fairly certain that they antedate the occupation of the region by the present native popula-

tion and it is probable that they are connected with the Njoro stone bead industry.

The origin of the microcline felspar is uncertain, for although it is known to occur in the region of Sultan Hamud, together with corundum, this area lies at a distance of over 200 miles from Njoro. A more likely potential source would seem to be the basement complex rocks near the Mara River, Sotik, which is only 60 miles from Njoro across the Mau escarpment. This area was, moreover, almost certainly known to the Njoro people and exploited for quartz and for the tabular quartzite from which many of the lower grindstones are made.

Of the stone beads and pendants 563 were found scattered through the deposit in the cave and rock-shelter, but the remainder were found in groups which proved to be necklaces lying in relatively undisturbed positions. These necklaces are described on pp. 29–31, but it will be seen from the illustrations in Plate VI that the beads made from semi-precious stones were invariably inter-spaced on the strings with small sedge-seed beads. (See p. 33.) In one case, black steatite disks take the place of the seed beads.

The whole series of stone beads shows a most skilful and careful workmanship, in marked contrast to that of the bone beads and pendants which are extremely crude, although made from more tractable material.

A very high polish is present on the beads made from chalcedony, agate, and microcline felspar. In some specimens this has worn off, revealing the underlying ground surface, which is granular in appearance.

With four exceptions, the perforations are relatively wide and of the 'hour-glass' form, with chamfered extremities. In a number of beads there is a slight ridge on the wall of the perforation, at the junction of the two-directional drilling, lying either at the mid-point or, more frequently, closer to one end than the other. The four examples of nearly straight-sided perforations are also relatively wide.

Considerable difficulty was experienced in classifying the various types of beads, since apart from the distinctive barrels, they were found to grade from sub-spherical forms to flat disks, without any obvious lines of demarcation. In order to arrive at a satisfactory basis for any subdivision it was found necessary to measure the length and breadth of each bead and so obtain the length-breadth ratio or index. (In asymmetrical specimens a mean was taken.) When the indexes were considered in conjunction with simple approximation, it was found that the beads could be divided into six categories, namely: barrels, spheroids, flattened spheroids, straight-sided disks, flat disks, and a few rare forms which can be ranked as sundries.*

1. *Barrels*

Barrel-shaped, with a length-breadth index of over 95. The average index for the 12 beads in this group is 109. The materials include agate, amber-yellow and milky-white chalcedony, and green and white quartz. The bead NB. 571, which is made from white quartz, is unique in the series, since the surface is coated with a black polish which has worn off on one side revealing the white quartz underneath. The wall of the perforation is also coated with black, indicating that a wash was probably used.

* The stone beads in the necklaces were not included; in every case the forms were duplicates of those represented among the loose beads.

2. *Spheroids*

These are sub-spherical in form, the diameter being greater than the length. The sides are convex and there is no flat surface at the ends of the beads. Length-breadth index of 95 to 55, with an average index for 51 beads of 70·2. Materials include chalcedony, green and white quartz, and agate.

3. *Flattened Spheroids*

These are similar in general form to the preceding group, in that the sides have a pronounced curve, but distinguished by the presence of a flat surface at one or at both ends of the beads. Although the indices overlap with those of the spheroids, the average for the group is lower. Index of 70 to 44, with an average of 53·1 for the 49 beads in the group. Materials include chalcedony, agate, albite, and white quartz.

4. *Straight-sided Disks*

All the beads in this group, although varying considerably in relative length and breadth, are characterized by nearly straight sides and by a sharp angle between the sides and the flat surface at either end. Index of 63 to 33, with an average of 46 for the group of 19 beads. The materials include chalcedony, labradorite, and agate, but the majority of the group are made from microcline felspar and albite, and it is possible that the material may be in part responsible for the shape since the perforations are also more nearly straight-sided than in any other group.

5. *Disks*

These are characterized by a relatively wide flat surface at each end of the beads. A few examples approach very closely to the flattened spheroids, but all the disks are wider in proportion to length, with indices of 44 to 31. The average for the group of 61 beads is 37. Materials include chalcedony and agate.

6. *Flat Disks*

This is by far the most common type of bead in the series, with 361 examples. Nearly all are made of chalcedony. The group is similar in general form to the disks, but of considerably greater width in proportion to length. The indices are all under 31, with an average of 24·6.

7. *Sundries*

There are, in addition to the above, six beads which do not fall within any of the groups. They are not duplicated and may be considered as sundries.

NB. 111, made from oligoclase andesine, exhibits a most unusual type of perforation which is elliptical in cross-section and parallel-sided, although the ends are bevelled. There is also a pronounced and apparently intentional transverse flattening of the bead, the lesser diameter of the bead itself corresponding with the wide diameter of the perforation.

NB. 7, made of chalcedony, might be described as a truncated barrel or, alternatively, as an unusually elongate flattened spheroid. The perforation is parallel-sided.

NB. 561 S and T are two large microcline felspar beads, unlike any others in the series since they are quite asymmetrical.

Two obsidian beads, NB. 190 and 567, are interesting when compared with the rest of the series, since the perforations are formed by a natural bubble hole in the obsidian and the beads have been shaped by chipping alone, without any trace of grinding or polishing. One bead shows considerable abrasion of the ridges, indicating that it was probably worn for a considerable length of time. It is curious that these two beads are merely chipped, since obsidian would presumably present no greater difficulties for polishing or grinding than the chalcedony and quartz which were generally used for bead making. It is possible that naturally perforated fragments of obsidian were regarded as amulets.

Pendants

Stone pendants are relatively scarce and only five were found. NB. 22, 27 mm. long, is made of pale yellow chalcedony and simulates the form of a claw. A flat, tongue-shaped pendant, NB. 30, is made of veined microcline felspar and measures 24·5 mm. in length. It shows an unusual perforation which was clearly intended to keep the pendant flat during wear; it is undercut on opposite sides, so that a string passed through the hole would lie nearly straight. NB. 13, an oval pendant, measuring 22 mm. in length and 18 mm. in maximum diameter, is particularly well made and still retains a high polish in spite of burning. NB. 29 is also oval in shape although smaller; the length is 15·5 mm. and the maximum width 14 mm. NB. 12 is a flat chalcedony pebble which does not appear to be artificially shaped, but merely pierced for suspension.

The Necklaces

As already mentioned, five groups of beads were found in relatively undisturbed positions. After being uncovered the beads were numbered and plotted on a plan so that they could be re-strung in approximately the original sequence.

1. The string NB. 514 consists of 16 stone and 176 sedge-seed beads. It measures 9 inches in length in its present form. The stone beads are interspaced by groups of 6 seed beads for about half the length of the string; the remaining portion, presumably worn at the back, is composed of seed beads alone. Although all the beads have been burned so that the stones have become cracked and altered in colour to an opaque dull grey, banded structure is still visible in all except the flat disks and they are therefore presumably made of agate. The forms include 1 spheroid, 5 flattened spheroids, 1 straight-sided disk, and 9 flat disks. They are arranged in the following order: the straight-sided disk is central in front, flanked to the right and left by a flat disk beyond which is the spheroid on one side, paired on the opposite side by the flattened spheroid. The remaining beads are not arranged according to form and may have been strung on a colour basis.

This necklace was found in Trench VI, close to Skull No. 48, considered to be that of an adult female, and was most probably associated with it.

2. NB. 517, also from Trench VI, is described as a necklace, but may have been worn round the head or in some other fashion. A head band is suggested by the presence of a double row of seed beads on either side, each $2\frac{1}{2}$ inches long, which could have been looped over the ears if the string were worn on the head. The string is at present $12\frac{1}{4}$ inches long and is composed of 23 stone and 302 sedge-seed beads. All have been severely burned.

In front and at the sides, five sedge-seed beads intervene between each stone bead, while the rear portion is made up entirely of seed beads. Thirteen flat disks, spaced by seed beads, form the front of the string. Beyond these, on either side, is a flattened spheroid which is placed at the beginning of the double row of seed beads. After these, and again matched on either side, are 1 spheroid, 2 flattened spheroids, and a large bead similar to NB. 561 which is shown in Fig. 10. These two beads, although burned, also appear to have been made

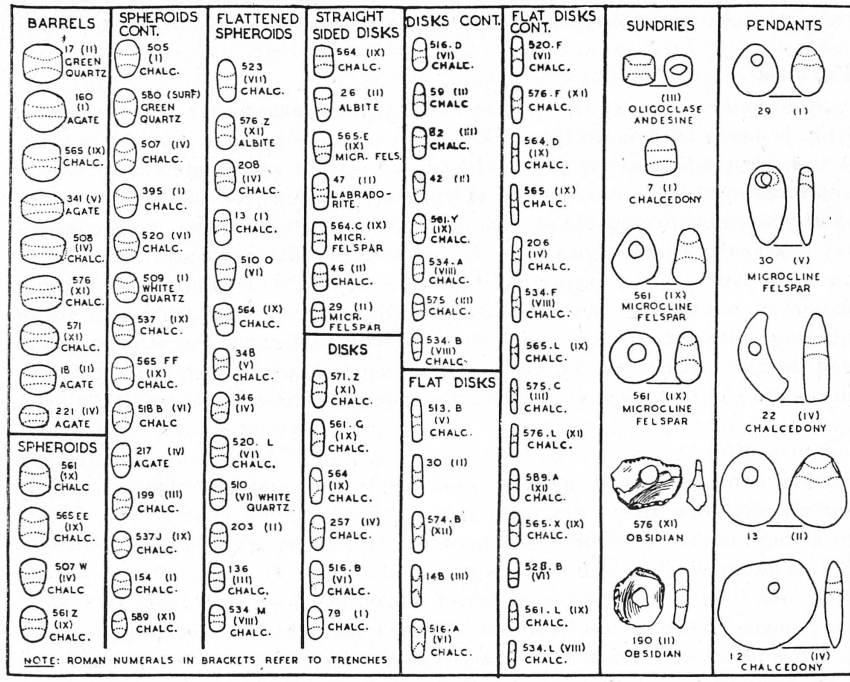


FIG. 10

from microcline felspar; they mark the termination of the subsidiary rows of seed beads which correspond to the parts of the main string composed of spheroids and flattened spheroids.

3. NB. 530. This necklace, which is 27½ inches long, was most likely worn as a double string. It is composed of 536 sedge-seed beads and 7 stone beads. An unusually large bone pendant was found near it and is probably associated. The relative positions of the beads could not be ascertained with the same degree of certainty as in the other necklaces, but the stone beads appeared to lie only at one end of the string with an interval of about half an inch between each. An average of five seed beads has been placed between each stone bead in the reconstruction, but this is not claimed to correspond exactly with the original number. It was also impossible to determine the exact position of the bone pendant, but it seems reasonable to assume that it hung central on one of the loops formed by the double string and it has been placed accordingly in the reconstruction. The pendant is 67 mm. long, and shows a decoration of

9 transverse incised lines, arranged in three groups. (Similar decoration occurs on one other pendant.) The stone beads comprise 1 disk (burned), 5 flat disks (1 burned), and one large irregularly shaped bead which appears to have been made from microcline felspar, although it is burned and now a dull grey colour. The material of the flat disks is agate.

4. The necklace NB. 560 was recovered from one of the ochreous levels which overlay the rock floor on the south side of Trench IX. It has escaped burning. In its present form the string is $18\frac{1}{2}$ inches long and was presumably worn as a double loop or as a girdle. The stone beads comprise 3 flattened spheroids and 1 disk of agate, together with 36 flat disks made of chalcedony. The sedge-seed beads number 350 and groups of 10 or 11 were found between each stone bead, except in the case of 8 flat disks which occurred in pairs on either side of the 4 agate beads. These are at opposite ends of the string and would presumably hang in front if it were worn in a double loop round the neck. The sedge-seed beads are mostly light brown in colour with a few nearly white specimens; they are unusually well preserved and have retained a high polish.

5. The short necklace or armlet NB. 233 was found close to the rock face in the south-east corner of Trench II. It lay near a very fragmentary skull. Unlike any of the necklaces previously described, the 46 chalcedony and agate beads which form the string were not associated with seed beads but with 48 black steatite disks. Although the beads were not found lying in sequence, the fact that almost equal numbers of each kind of bead occur suggests that they were strung alternately and they have been re-strung in that order. The string measures $5\frac{3}{4}$ inches in length and is composed of 26 flattened spheroids and 20 disks. A proportion of the beads have become grey-coloured due to burning, but the majority are in relatively good condition.

In addition to the four necklaces and one necklet (?) described above, a further group of 153 stone beads was found as a group in the south-east corner of Trench I. Although these were found concentrated within a small area, they were clearly not in an undisturbed state since many had fallen to a lower level in the dusty soil which occurred between the rock wall and the stones lying against it. All the beads are very severely burned; they include 147 flat disks and 2 spheroids, the latter probably made from agate.

Conclusions

The first recorded discovery of stone beads from a prehistoric site in East Africa was that made by Dr. Arning in 1915, during the excavation of a burial mound in the Ngorongoro crater, N. Province Tanganyika Territory.[5] This was followed in 1916 by the discovery of further stone beads when another of the Ngorongoro mounds was opened by the late Prof. Reck. From the published descriptions and illustrations these beads appear to be entirely similar to the Njoro series,* not only in form but also in material. (It may be mentioned that

* All the human remains and larger objects from the Ngorongoro burials were lost by Reck and Arning during the German retreat in Tanganyika, but the ornaments and excavator's notes were fortunately saved. In order to throw further light on the burials and, if possible, to obtain fresh material in place of that which was lost, Mr. J. C. Trevor and the writer visited the site during 1941 and excavated one of the mounds. The results obtained tally very closely with the more conservative of the findings made by Reck and Arning. It is hoped to publish the report before long.

certain aspects of the burial methods at Ngorongoro also present great similarities to Njoro, while the cylindrical bone beads described on p. 35 of this report are at present only known from these two sites.)

During 1926, an agate barrel bead similar to the Njoro series was found with the primary interment and associated with a faience bead, at the Nakuru Burial Site,[4] which lies 15 miles distant from Njoro. This bead is now in the Cambridge Museum of Archaeology and Ethnology.

Both these beads were submitted to the late Mr. Beck who was unable to suggest a date although he commented on the resemblance to certain Mycenean beads, dated *circa* 1500 B.C., and also to some late neolithic beads from Algeria. The agate bead appears to be entirely similar to the Njoro barrel beads, in form, type of perforation, grinding, and polishing.

Excavations at Hyrax Hill, Nakuru, conducted by the writer in 1937–8, yielded a single flat disk bead made from chalcedony which is indistinguishable from the Njoro flat disks.[1] It was associated with two sedge-seed beads in one of the female burials in the neolithic cemetery. Although the beads are similar to those from Njoro, the culture and method of burial employed at the two sites are quite unlike and seem to preclude direct contact.

Apart from the beads from the three sites mentioned above, no further examples of stone beads are known in East Africa which can be compared with the Njoro series, and they also appear to be entirely absent in Africa south of Tanganyika. It may be mentioned, however, that a few agate and carnelian beads, generally hexagonal and with narrow parallel-sided perforations, have been picked up from the beach at Zanzibar and two examples are also known from the Rift Valley area. One of the latter, an hexagonal prism, was picked up on the surface near the Nakuru Burial Site whilst the excavations were in progress. The second specimen is reported to have been found on the slopes of Mount Meru, near Arusha in Tanganyika.

REPORT ON SIXTEEN BEADS FROM THE NJORO CAVE

By the late H. Beck

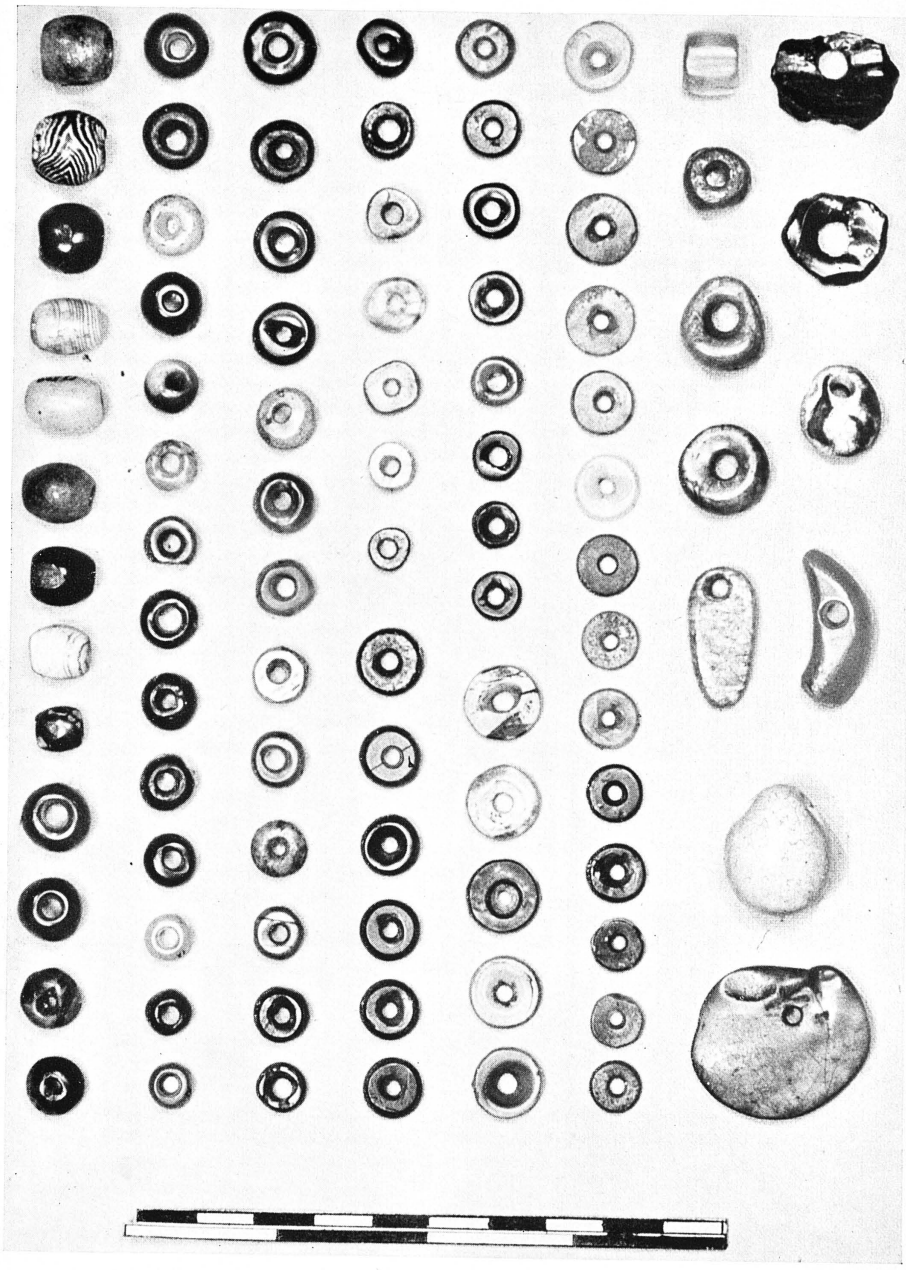
The sixteen beads sent from Njoro are well made beads all of the same civilization. Some of them show great resemblance to the pre-dynastic Egyptian work.

Fifteen Beads of Amorphous Quartz

Of the sixteen beads sent, fifteen appear to be made of various forms of amorphous quartz which differ in name according to the colour. There is a good deal of latitude as to the names used, but personally I should class most of them as chalcedony, carnelian, or agate. All the beads have been tested for hardness and they all give results which agree with amorphous quartz.

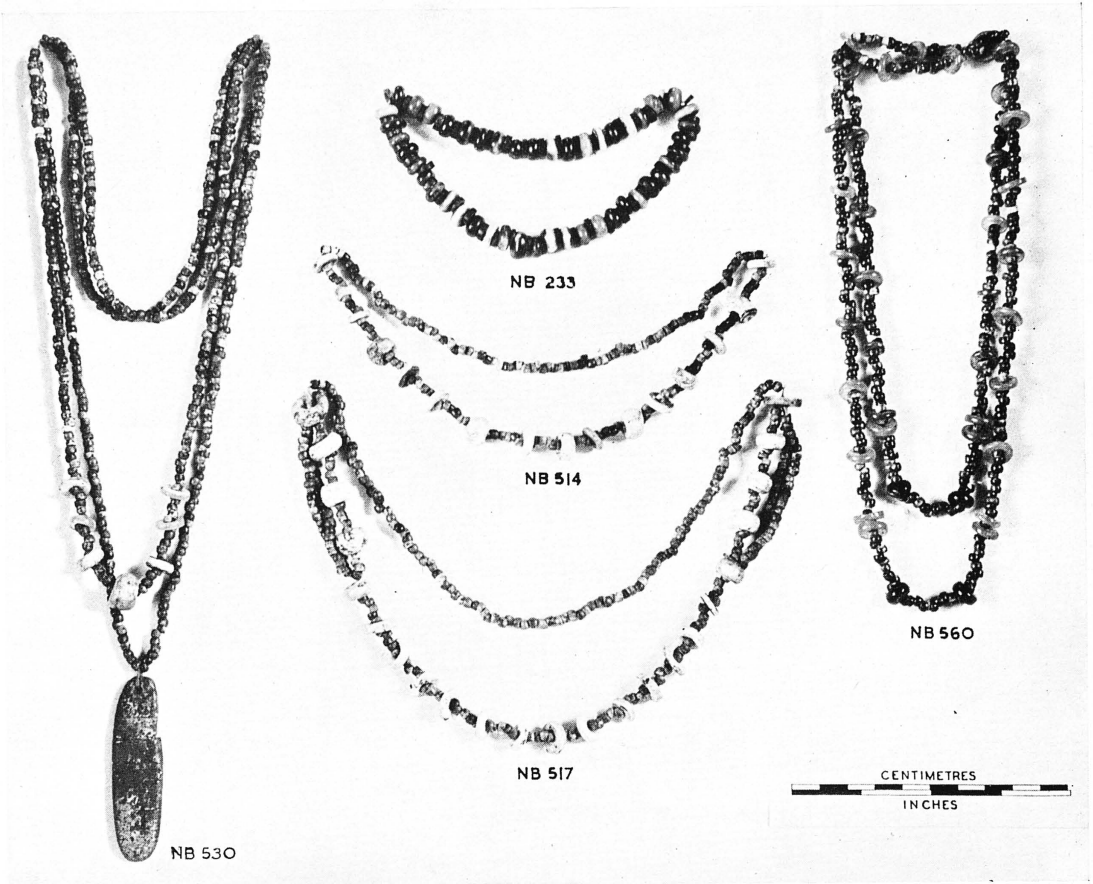
No. 200

The exception (No. 200), proves to be felspar. The original suggestion was that it might be jade and I have a jade bead from Peru which appears to be entirely the same in colour and hardness, but the specific gravity is entirely different. This bead is 2·74 while the Peruvian bead is 2·41.



STONE BEADS AND PENDANTS

(See p. 30 for key to materials, &c.)



FOUR RECONSTRUCTED NECKLACES AND ONE ? ARMLET, MADE UP OF STONE BEADS INTERSPACED WITH SEED BEADS

Surface. The surface of many of the quartz beads shows extensive signs of burning at a high temperature.

Colour. The colour of some of the beads suggests that an alkali may have been used in the fire.

Shape. The beads are oblate in almost all cases, but there are a few disk cylinders.

Perforation. The perforation, bored from both ends, is single and large in diameter. In many cases it is chamfered.

Material. Microcline felspar has been found in large quantities in many sites. In Egypt, while appearing at various dates, it is especially noticeable in predynastic times and in the twelfth Dynasty. In Mesopotamia it is found at Ur and Niniveh and in the Indian civilization it appears at Harappa. The Mesopotamian and Indian beads are not very accurately dated, but the probable date of some of them is between 2,500 and 2,750. It is interesting that a felspar bead has turned up among these finds.

What is curious is that there are no ostrich-shell beads, one would have expected these and their absence is noteworthy.

2. The Sedge-seed Beads

Nearly 4,000 of these beads were recovered during the excavations. Since many are in an extremely fragile state, it is likely that a greater number were originally present, many of which have not survived owing to being in exposed parts of the deposit where conditions were not favourable for preservation.

The beads are brittle and very light in weight; a string of 500 weighing rather less than half an ounce. They measure on an average 3 mm. in length and 4 mm. in width, with a wide central cavity or perforation. The sides or walls of the beads are very slender and are less than half a millimetre thick.

Although there is great uniformity in size, the form of the beads is somewhat variable. Specimens with straight sides and with both ends of the same width are relatively scarce. More often, one end is considerably narrower than the other, with a smaller perforation and with rounded sides, converging at either end. From the general appearance of these beads and from the form of the perforation, it is clear that they were not artificially bored, but made from some objects naturally hollow in the centre.

As a result of chemical analysis carried out on similar beads obtained from the neolithic cemetery at Hyrax Hill, it was established that the substance from which they were made was organic and was particularly rich in silica. The most reasonable explanation, therefore, seemed to be that these beads were made from some unusually hard seed-coat. Identification of the particular seed presented considerable difficulties, since complete seeds have never been found. At length, during a visit to the Uganda Museum, Kampala, the writers noticed several strings of beads identical with the supposed seed beads from Njoro and other sites. These had been obtained from the Bagishu tribe, who occupy the north-east slopes of Mount Elgon.

Subsequent inquiries revealed that although such beads are now no longer made by the Bagishu, they had been made from the hollow seed-coat of a sedge, *scleria racemosa*, which grows near rivers and in marshes. The natural colour of the seeds is brown and they are oblong in shape. In order to make

a bead, both ends of a seed are ground off, the material being too hard and too brittle to be cut. Each bead is reported to have taken about five minutes to manufacture and after they had been ground to the desired length, they were threaded and rubbed between the hands with sand to polish the surfaces.

According to one Gishu informant, the beads were once very common but they have now been replaced by glass trade beads, the few that survive being regarded as heirlooms and only worn by the older women on ceremonial occasions.

The seed beads from Njoro include many black, white, and grey specimens, as well as those which have retained the natural brown colour of the seeds. It is difficult to determine whether the alteration in colour of a proportion of the beads has been caused intentionally to enhance their decorative value or whether it is due to various stages of carbonization caused accidentally during the cremation of the human remains. The white and grey beads have clearly been fired; they are cracked and very fragile. But the black specimens are as well preserved as the unburned brown beads, retaining the same degree of polish and hardness. The black coloration may therefore be intentional, although the alteration is probably accidental in the case of the white and grey specimens.

In addition to the large numbers of seed beads found at Njoro and the few discovered at Hyrax Hill, some have been found at a small rock-shelter near Naivasha and also in the upper levels of Lion Hill cave, Nakuru. Owing to the nature of the material from which they were made, these beads clearly could not survive for any length of time unless given unusually favourable conditions for preservation and it seems probable that although they have not been found at many sites, they were widely used by the late Stone Age peoples in East Africa. Seeds of various sorts are today used for beads by many tribes, but it is interesting that the seeds of the sedge *scleria racemosa* and the method of making the beads are not known to be used by any tribe other than the Bagishu; a very primitive and backward people.

3. Beads made from Nuts

About 300 small disks and two barrel-shaped beads were found within a small area in Trenches IX and XI, at the entrance to the narrow part of the cave.

These beads are all carbonized and are very fragile. The material has a woody texture and since the perforations are clearly of natural origin and not artificially bored it seems likely that the beads were made from nuts, treated in the same manner as the sedge seeds.

The disk beads vary in size from 2·5 to 5 mm. in width, with a corresponding difference in length. The perforations are generally elliptical and there is often a ridge on the interior of the beads running the length of the cavity. On the two sides of the beads which correspond with the broad axis of the perforation the walls are noticeably thinner, suggesting that not only the inner cavity, but the nut as a whole was elliptical in cross-section, so that the exterior had to be ground down on two sides to obtain circular disks.

The barrel-shaped beads measure 10 and 16 mm. in length respectively and 10 mm. in width. They appear to have been made from fair-sized nuts, larger than those used for the disks.

4. Bone and Ivory Beads and Pendants, etc.

Pendants (*Fig. 11, Nos. 1–14*)

Eight of the fourteen complete pendants found are decorated by means of notches along the edges, incised lines, or a vertical row of dots down the centre. Six of the fragmentary examples are also decorated in the same manner.

With the exception of NBO. 10 and 14, which appear to be of ivory, the pendants are made of bone. A few examples are relatively well made, but the majority, especially the undecorated specimens, are extremely crude and consist merely of the tongue-shaped splinters of bone drilled and partly polished.

The positions in which the pendants were found suggest that they were worn by only a small proportion of the individuals cremated at the site. Three examples were isolated, but all the remainder were found in four distinct groups, three of which could be associated with skeletons, and it is perhaps significant that two of these have been identified as immature individuals.

The distribution was as follows:

One complete and seven broken pendants were found near skeletons 10 and 11 in Trench II. The two skulls lay touching one another and both are immature. Four complete and three broken pendants were with skeleton 33 in Trench IV. The skull of this individual is very incomplete, but it has been assessed as that of a young adult male. Seven complete and two fragmentary pendants were found with skeleton 52 in Trench VI, another immature individual. With it were also a number of cylindrical bone heads. Lastly, a group of four very burnt bone pendants was found in the north-east end of Trench V, but could not be associated with any particular skeleton.

The grouping of the pendants and their positive association in three cases with immature individuals strongly suggest that they were worn by young people and that only full adults used the stone beads and pendants. If the ornaments were made by the individuals who wore them, this might account for the inferiority in the workmanship of the bone pendants.

Bone Beads (*Fig. 11, Nos. 16–25*)

Ten complete and three broken bone cylinders were found which appear to have been used as beads. They vary in length from 16 to 27·5 mm. and the interior cavity does not seem to be artificially hollowed, but to be formed by the natural hollow in the centre of the bone, probably that of some large bird. The extremities are cut and polished and the beads are either parallel-sided or slightly wider at one end than the other. They are somewhat oval in cross-section.

Six of the complete and the three broken specimens were found grouped round skull 52 in Trench VI, where, as previously described, nine bone pendants were also found.

Regarding previous discoveries of bone pendants and cylinder beads, it may be mentioned that pendants have so far only been found at one other site, namely, the Iron Age settlement at Hyrax Hill, which is of very recent date.

Cylinder bone beads were found in the Ngorongoro burials by Reck and Arning and seven additional specimens were found there by the writer and Mr. J. C. Trevor in 1941. These are similar in every respect to the Njoro specimens. No other site has yet yielded comparable beads.

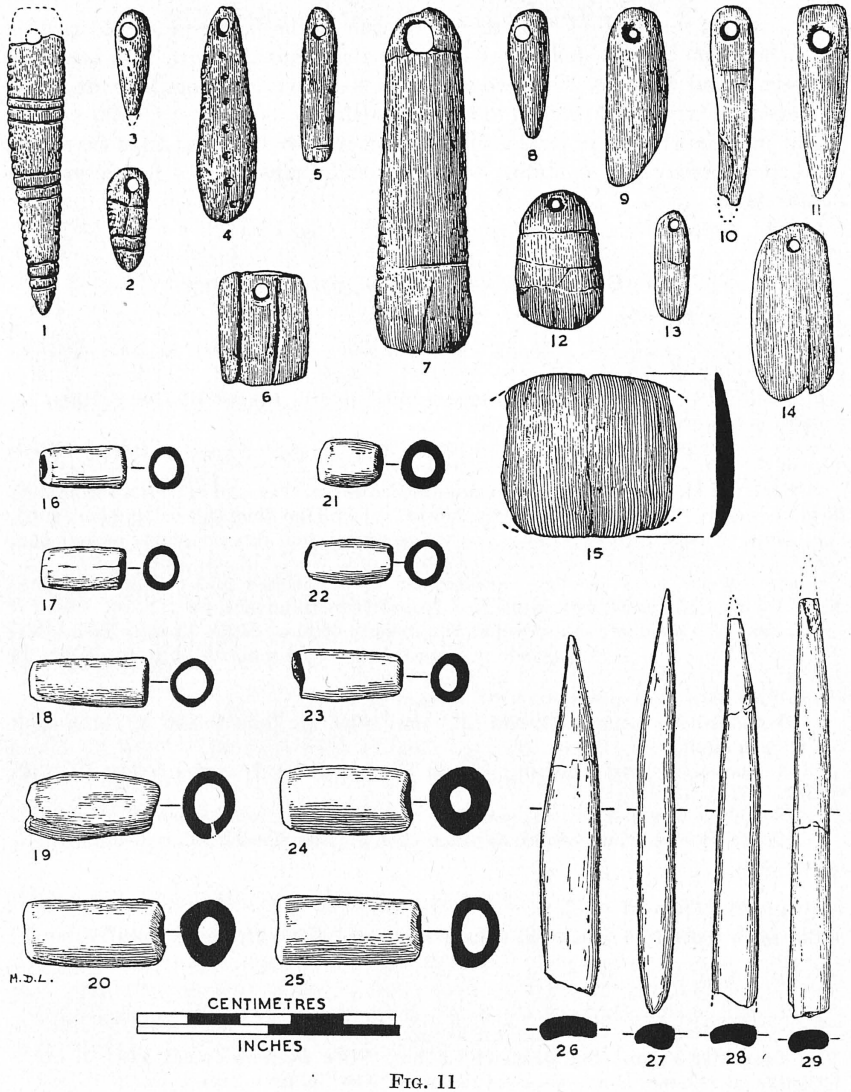


FIG. 11

OTHER BONE AND IVORY OBJECTS

Bone Awls (Fig. 11, Nos. 26–9)

Four bone awls were found; they are made from highly polished splinters of bone and the points are particularly sharp. NBO. 47, from Trench IX, appeared to have been placed with the male skeleton, No. 54. The remainder could not be associated with any individual.

Two Extremities of Elephant Tusks (Plate VII)

Two tips of elephant tusks were found in Trench III; they are severely burned and damaged, but in both specimens it is clear that the broad end has

been cut and rounded off. The present length of the better-preserved tusk is $6\frac{1}{4}$ inches, but the tip end is missing and the original length was probably between 8 and 9 inches. The second specimen is now $5\frac{1}{4}$ inches long. It is too damaged for the original length to be estimated.

The purpose of these objects is obscure, but it is possible that they were used as pestles, perhaps for pounding some particular substance or for ceremonial occasions.

Description of Figure 11

The Bone and Ivory Beads, Pendants, etc.

Pendants (Nos. 1–14)

1. Incomplete pointed bone pendant with notched edges and nine incised transverse lines. NBO. 43, from Trench V.
2. Small ivory pendant with decoration similar to (1). Length 19·5 mm. NBO. 10, from Trench I, with skull No. 4 (immature).
3. Bone pendant showing two faint incised lines. Length 19 mm. NBO. 16, from Trench IV, with skull No. 33 (young adult male).
4. Bone pendant with spatulate tip and notched edges, ornamented with a row of dots down the centre. Length 41 mm. NBO. 3, from Trench II, with skull No. 7 (young adult).
5. Bone pendant, ochre-stained. The tip is square and shows a single incised line. Length 30 mm. NBO. 15, from Trench IV, with skull No. 33 (young adult male).
6. Rectangular ivory pendant showing two deeply incised lines. Length 22 mm. NBO. 14, from Trench II, with skulls Nos. 10 and 11 (both immature).
7. Large bone pendant with spatulate tip. Length 66 mm. NBO. 32, from Trench VI.
8 and 9. Two crude bone pendants. Lengths 24 and 34 mm. respectively. NBO. 33 and 34, from Trench VI, with skull No. 52 (sub-adult).
10. Incomplete bone pendant. NBO. 6, from Trench II.
11. Pointed bone pendant. Length 37 mm. NBO. 35, from Trench VI, with skull No. 52 (sub-adult).
12. Round-ended ivory pendant. Length 27 mm. NBO. 36, from Trench VI, with skull No. 52 (sub-adult).
13. Small flat bone pendant. Length 20·5 mm. NBO. 19, from Trench IV.
14. Crude bone pendant. Length 34 mm. NBO. 31, from Trench VI, with skull No. 52 (sub-adult).

Broken Ivory ?Plaque (No. 15)

Maximum width 3·15 mm., max. thickness 3·5 mm. NBO. 24, from Trench IV.

Cylindrical Bone Beads (Nos. 16–25)

16. Length 16 mm. Max. diameter 8 mm. NBO. 42, from Trench VI.
17. Length 16·5 mm. Max. diameter 8·5 mm. NBO. 23, from Trench IV.
18. Length 22·5 mm. Max. diameter 9·5 mm. NBO. 38, from Trench VI.
19. Length 25 mm. Max. diameter 12·5 mm. NBO. 2, from Trench II.
20. Length 27·5 mm. Max. diameter 12 mm. NBO. 39, from Trench VI.
21. Length 12 mm. Max. diameter 9 mm. NB. 582, from Trench VI.
22. Length 16·5 mm. Max. diameter 8 mm. NB. 569, from Trench VI.
23. Length 20 mm. Max. diameter 9 mm. NBO. 41, from Trench VI.
24. Length 25 mm. Max. diameter 12·5 mm. NBO. 40, from Trench VI.
25. Length 26·5 mm. Max. diameter 13·5 mm. NBO. 20, from Trench IV.

(All the beads from Trench VI were found with skull No. 52.)

Bone Awls (Nos. 26–9)

26. Bone awl. Length 68 mm. NBO. 45, from Trench VI, near skeleton No. 45.
27. Bone awl. Length 81 mm. NBO. 49, from Trench XI.
28. Incomplete bone awl. NBO. 47, from Trench XI, with skull No. 54.
29. Bone awl, point missing. NBO. 48, from Trench XI.

VI. THE CARBONIZED OBJECTS

As already mentioned in the introduction, a number of perishable substances were found at the Njoro River Cave preserved by carbonization during the cremation of the human remains. Among these objects are a carved wooden vessel, gourds or calabashes, four varieties of basket-work, plaited cord, leather or hides, and a number of logs of wood, twigs, leaves, nuts, thorns, &c.*

1. *The Wooden Vessel*

This was found in close proximity to skull No. 35 in Trench V, at a depth of approximately 2½ feet from the surface. The greater part of the vessel is preserved, although it had been crushed by the weight of the overlying stones and soil. It has also become warped and distorted by the heat, which has rendered perfect reconstruction impossible.

The whole of the exterior of this vessel, presumably a drinking-cup, is carved with an elaborate pattern remarkable for its exact and skilful execution when it is considered that it was carried out with stone implements. As may be seen from Plate IX, the carving on the upper two-thirds of the vessel consists of small close-set rectangles giving the general impression of a honeycomb. At the rim and repeated 1 inch below it, is a horizontal raised band 3 mm. wide. A third raised band occurs at the base of the honeycomb decoration, separating it from the pattern on the base. This is round and is ornamented with a series of concentric circles from which four panels of grooved decoration are drawn upwards to abut on to the lowest of the three raised bands. The spaces between the grooved panels are filled in with small raised knobs.

The measurements of the vessel are as follows: height 140 mm., estimated diameter of the mouth 52 mm., estimated maximum diameter 75 mm.

2. *Gourds or Calabashes*

Many fragments of carbonized gourd were found in parts of the deposit. The majority are too small for the form of the gourd to be ascertained, but two specimens, both obtained from Trench V, undoubtedly belong to bottle-gourds (*lagenaria vulgaris*). The varieties of bottle-gourd are not usually considered edible once ripe, and it may be concluded that the gourds found at Njoro are the remains of calabashes and other receptacles and not of foodstuffs.

The most complete calabash recovered is shown in Plate X, No. 3. It is warped to such an extent that all the fragments cannot be fitted together.

The decorated neck of another calabash is shown in the same illustration. It shows groups of dotted lines running diagonally from the mouth to the body of the vessel across the shoulder.

Two adjoining fragments of the base of another calabash show two small perforations, measuring 1·5 mm. in diameter, which were presumably used to repair a crack in the vessel.

3. *Basket-work*

These fabrics are made from vegetable-fibre twine of various thicknesses. With the exception of one strip of relatively finely woven material, they are

* The beads made from nuts described on p. 34 are of course also carbonized but have been included in the section on 'Ornaments' for convenience.

fairly coarse and probably represent the remains of string bags or baskets similar to the hand-woven bags made by the women of many East African tribes of the present day. There is no suggestion that any form of loom was employed.

(*a*) This is the most complete woven article recovered. It consists of a fairly closely woven material which appears to have formed a medium-sized string bag. The shape is not easy to determine, since the parts preserved are folded and crumpled into a mass and are so fragile that it is not possible to disentangle them. There is, however, a portion of the selvedge of the material, presumably forming the edge of the bag, where the weave is of an open pattern, not unlike crochet. (See Plate XI, No. 3.)

(*b*) This consists of about a dozen fragments of a strip of finely woven material. The ends are tapered and the strip measures three-quarters of an inch across at the widest part. The total length of the pieces amounts to just over 10 inches, but the strip must originally have been much longer and may possibly have been a belt. It was found in Trench V, close to the carved wooden vessel. (See Plate XI, No. 2.)

(*c*) This consists of three pieces of an open-weave material. The stitch is similar to that on the selvedge of the string bag (*a*). The fragments are too small to give any indication of the type of article to which they belonged; all were found in Trench V. (See Plate XII, Nos. 1 and 2.)

(*d*) Examples of a type of wicker-work in which narrow bamboo slats are interlaced with twine. All the pieces found are too small to determine the size or form of the articles to which they belonged, but they seem likely to be the remains of mats or coarse baskets. (See Plate XI, No. 1.)

(*e*) Large quantities of plaited cord made from fibre twine were found in various parts of the deposit. In most cases, this cord was found lying round the skeletons and was also sometimes associated with a burnt substance which it has been impossible to identify for certain but which has the appearance of being leather or hide. The positions of the skeletons relative to the cord and leather (?) suggest that the bodies had been clothed in leather garments or wrapped in skins and then bound round with cord into contracted positions before being cremated. (An example of a skull looped round with cord is shown in Plate VIII, No. 2.)

Most of the plaited cord measures on the average 8 mm. in width and 3 mm. in thickness, but a few pieces were found of both coarser and finer plaits. (See Plate XII, Nos. 3–7.)

Besides the plaited cord, there were a few examples of cord made from double or triple strands of twine, twisted together.

REPORT ON SAMPLES OF BASKETRY

By Mrs. A. H. Quiggin

(*a*) and (*c*) My impression is that these bits are not coiled but twined, as there is no evidence of any foundation, but it is difficult to feel any certainty. With skilled work, it is hard to distinguish twined from coiled work without disintegrating it. If the bits are parts of a soft bag, it is much more likely to be twined than coiled.

(*b*) This fragment is puzzling. It looks like coiled work, but as it is part of a strip with tapered ends, it is more probably twined (cf. *Notes & Queries*, 1929, p. 246, Fig. 4), assuming that the lines cross the strip diagonally, not at right angles. If the lines are parallel with the length, it looks like weaving, but I presume this is out of the question.

(*d*) This is clearly coiled work, as the foundation is visible, a flat strip of leaf (?). The stitch looks like 'Figure of 8', often called Navaho, one of the easiest of the coiling patterns. (Ib., p. 248, Fig. 2.)

(*e*) Narrow flat 4-ply and 5-ply plaits, 5 mm. to 1 cm. broad, neatly and carefully made of strands of twisted fibres.

IVORY ? PESTLES

Two tips of elephant tusks cut and rounded at the lower ends; possibly used as pestles

1. Stone bowls and lower grindstones as uncovered during excavation in Trench V

2. The carbonized wooden vessel as uncovered. Skull 50, encircled by a loop of plaited cord, may be seen below the vessel and the articulated bones of a human foot above it

PART II

THE CRANIA

By L. S. B. LEAKEY, M.A., PH.D.

I. INTRODUCTION

THE method of cremation which was adopted by the people who used the Njoro River Cave as a depository for their dead is described in the Summary and Conclusions. It led inevitably to the charred bones of many different individuals being mixed up and makes it very difficult to assess how many bodies are represented by the bones obtained from any particular trench.

In order to arrive at a figure which would represent—within narrow limits—the number of people cremated in the excavated area, the skull and mandibular fragments from each trench were sorted out on the basis of the number of definitely identifiable parts. The list of the parts chosen and the results of this analysis are shown in the accompanying table. In compiling this table, if a skull was more or less complete the parts were still listed. All adults and sub-adults were taken into account, but the remains of infants were omitted and have been treated separately.

While excavations were in progress, the approximate number of individuals represented by the bones from each trench was recorded, but this method naturally led to an exaggerated figure. For the mandible and perhaps a temporal of one skull might be in one trench and therefore be counted for the purposes of that trench as representing an individual, while other parts of the same skull might be found in one or more of the other trenches where they would be recorded in the field numbers as representing another individual.

In fact, on the basis of the rough field calculations, it seemed that a total of 106 adults might be represented. When the material was in the laboratory a much more careful checking became possible, as described above, and the resulting table shows that the adults and sub-adults totalled a minimum of seventy-eight individuals for the whole collection based on the number of existing nasions including those of the complete skulls.

It is possible that in the case of some of the very poorly preserved skulls in 'wet biscuit' condition, the nasions were so perished as to be unidentifiable, so that it would not be unreasonable to allow a margin of three or four. But it may be taken as practically certain that the total of adults and sub-adults represented was not less than 78 and probably did not exceed 84.

The fact that so many of the skulls were in a fragmentary condition has made sexing of the material exceedingly complicated, but in final analysis it can be said that there were probably 47 males and 20 females, with a balance of 11 individuals doubtful or indeterminable.*

The state of preservation of the skeletal material is very variable and the

* The limb bones and other parts of the skeleton, as distinct from the crania, have not been studied for this report.

Table to show Minimum Number of Adult and Sub-adult Individuals in the Njoro River Cave based on the Total Number of Skull Parts Recovered from each Trench. (Infants are not taken into Account in this Table.)

	Trenches								
	I	*II*	*III*	*IV*	*V*	*VI*	*IX*	*XI*	*Totals*
R. O. angle	7	10	11	7	5	16	5	3	64
L. O. angle	4	8	8	12	5	14	6	7	64
Nasion	8	12	10	11	10	12	8	7	78
R. malar	8	10	10	7	5	13	5	3	61
L. malar	8	13	18	6	8	13	2	1	69
R. palate	9	11	13	11	4	11	3	8	70
L. palate	7	13	12	9	2	12	6	0	61
R. mandible	8	12	7	8	5	9	6	13	68
L. mandible	6	10	9	12	4	12	4	11	68
Symphysis	9	14	7	12	5	12	9	5	73
R. mastoid	5	9	6	10	3	11	10	5	59
L. mastoid	6	7	9	9	5	11	7	10	64
Basi-occipital	8	8	12	10	5	14	12	5	74
R. condyle	6	14	6	12	4	14	4	14	74
L. condyle	10	11	10	12	4	15	7	8	77

following terms were used in the field to describe the different conditions. These will be referred to in this report, and are as follows:

'Clinker' condition;
'Dry biscuit' condition;
'Wet biscuit' condition.

By 'clinker' condition is meant a condition in which the cremated bones become exceptionally hard and have a metallic tone when struck, resembling that of clinker. Bones in this condition are invariably warped and sometimes also shrunk. The colour varies from white to dark grey. In skulls which have been burned to this condition the teeth have invariably been reduced to a white powder and cannot be preserved.

By 'dry biscuit' condition is meant a condition in which the cremated bones become flaky and sometimes powdery. They are friable and sometimes warped. Treatment with shellac is usually fairly successful and parts at least can be preserved. Such bones are usually light brown in colour.

By 'wet biscuit' condition is meant a condition in which the bones are reduced to a soft pulp, rather resembling a 'Marie' biscuit which has been soaked in water. Such bones were found to be almost impossible to preserve, although occasionally the less affected parts of a skull could be saved.

In addition to the three states of preservation described above, a proportion of the bones were burned to a hard, black condition. These are seldom warped and could always be treated satisfactorily with shellac.

There is no evidence as to the factors causing these variable conditions of preservation, but they may be assumed to be due to the bones having been cremated under different conditions.

II. NOTES ON THE HUMAN REMAINS FROM EACH TRENCH

Trench I

Skull No. 1 (Field No. I. 5)

This individual is represented by the greater part of the vault of the cranium of a small brachycephalic skull, together with a fragment of right maxilla. The right temporal bone is preserved, but parts of the right parietal and parts of the

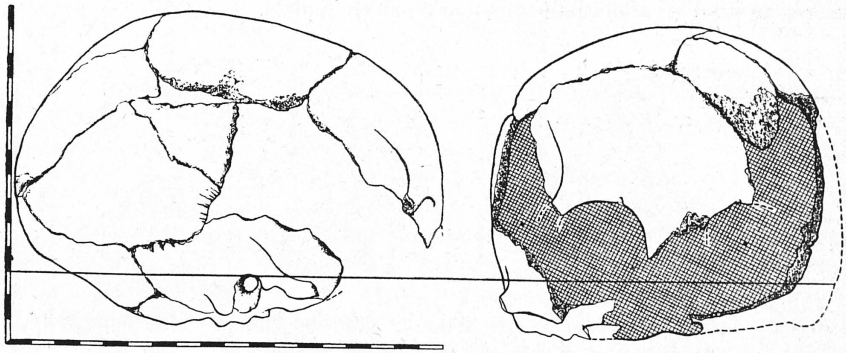


Fig. 12. Njoro River Cave Skull No. 1

right side of the frontal are broken away, leaving a gap between them and the temporal. On the left side, the parietal and parts of the frontal are also broken away, while the left temporal is missing. The right external orbital angle is also missing. The whole of the sphenoidal arc and parts of the basi-occipital are also wanting, together with the whole of the face, with the exception of the right maxilla which is itself partly damaged.

The coronal and sagittal sutures are fused and the lambda suture partially closed.

The general form of the skull, together with the very small size of the right mastoid and the infantile form of the forehead, all suggest a female skull. The skull has been burned to a deep brown colour, but is not warped.

The maxilla fragment includes part of the palate and the alveolus from the region of the 3rd molar forwards to the approximate position of the 1st premolar, but no teeth are present, all having been lost during life. The alveolus also shows marked signs of paradontal disease.

The only measurements possible on this skull are the following:*

L′	175 mm.	S1	125 mm.
B	140 ? mm.	S2	105 mm.
S	355 mm.	S3	125 mm. ?
		S3′	110 mm. ?

From these figures a length-breadth index of 80 (?) is reached.

In general form and appearance this skull very strongly recalls the female skull F1 from Bromhead's Site, Elmenteita.

* *Note*: I have employed the same standard measurements and methods of measurement as set out in ch. iv of my *Stone Age Races of Kenya*, O.U.P. 1935. The scale shown in the illustrations of the skulls is of centimetres and the drawings were made by means of the Leakey–Harper drawing-machine.

In one particular this skull is most unusual; the tympanic plate of the right auditory meatus has a form not often encountered in humans and recalling the form seen in the anthropoid apes.

Skull No. 2 (Field No. I. 6)

Owing to the extremely small size of the facial bones and of the mandible, this skull was classified in the field as being that of an infant. When, however, the various fragments were cleaned and pieced together, it became evident that it represented an abnormally small and elderly female.

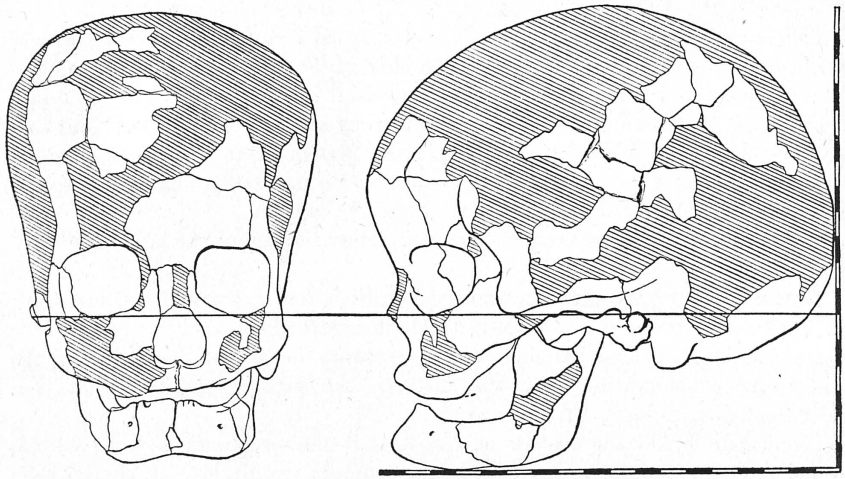


FIG. 13. Njoro River Cave Skull No. 2

The remains are very broken and large parts are missing, but enough has been preserved to give a reasonably accurate idea of the size and shape, showing that it is an ultra-dolichocephalic scaphoid type.

The preserved parts include the greater part of the face, the right side of the frontal and parts of the left side, the greater part of the left temporal, together with parts of the left parietal and the greater part of the occipital. The right temporal is also preserved, exclusive of the squamosal position.

The coronal suture is almost completely fused and the lambda suture only partially so. Such fragments as remain of the central part of the parietals show that here fusion was complete.

The alveolar regions of both the palate and the mandible show extreme absorption, and this, taken into consideration with the condition of the main sutures, suggests extreme old age at the time of death.

The small infantile form of the forehead, the very smooth surface of the occipital, and the small mastoids all strongly suggest that the sex was female.

The face is very small, and the right nasal bone which is preserved in position is extremely flat and small. The nasal aperture has an absolute width of only 19 mm. while the nasal height is approximately 40 mm., giving the very low nasal index of 47·5.

The only reliable measurements which can be taken are the following:

L′	173 mm.?	G′H	48 mm.	100 B/L′	69·3.
B	120 mm.	NH(L)	40 mm.	100 NB/NH(L)	47·5.
B1	82 mm.	NB	19 mm.	100 O2(L)/O(L)	65·9.
Bi-mastoid width 91 mm.		O1(L)	41 mm.		
		O2(L)	27 mm.		

The mandible is extremely small and as a result of great alveolar absorption, exhibits an absolutely infantile appearance. The condyles are also very small (left condyle 16×9 mm., right condyle 14·5×7 mm.); the bi-condylar width is only 80 mm.

Skull No. 3 (Field No. I. 7)

This is represented by broken and very warped fragments of a skull which has been burned to a white, clinker-like condition. The warping of the fragments is so extreme that reconstruction is impossible.

From the large size of the mastoids, the fairly strong occipital crest and the well-marked supra-orbital ridges, it can be presumed to represent a male, although, if this is correct, the skull represents an unusually small male, quite unlike some of the other male skulls from the Njoro Cave.

The sagittal and coronal sutures are completely fused, but the lambda suture is partially open.

The teeth in both the maxillae and the mandible were so cracked and damaged by fire that they could not be saved. All the teeth, however, except the left lateral incisor, would seem to have been present at the time of death. This fact, taken into consideration with the state of the sutures, suggests that the individual died in early middle age.

The mandible, like the skull, is so warped that measurements are not possible except at a few points. It is a small and compact mandible with the greater part of the left ascending ramus and the right condyle broken away, but otherwise complete, except for the teeth, which broke into powder on being exposed. The left lateral incisor had been extracted at an early age and the alveolus had fused to a sharp edge at this point.

The height of the corpus at the symphysis is 32 mm. and at the 2nd molars 25 mm. The maximum width of the left ascending ramus is 37 mm. There is a form of exostosis on the inner aspect of the mandible in the region of the premolars and the 1st and 2nd molars.

Skull No. 4 (Field No. I. 11)

This is represented by a large number of fragments of a very warped skull in 'clinker' condition, with an associated warped mandible lacking the left condyle and coronoid. The bone of the skull is thin and the nature of the frontal bone suggests that the sex was female.

None of the main sutures are closed and the individual seems to have been a young adult. The maxillae are missing but no teeth had been lost from the mandible before death, although all turned to powder on exposure.

The only measurements possible on this individual are the symphysial height, 29·5 mm., the height of the corpus of the mandible at the 2nd molars, 27 mm., and the maximum width of the ascending ramus, 30·5 mm.

It is not possible to assign the remaining bones from Trench I to any parti-

cular individuals, with the exception of the bones of an infant which will be described later in this report with other infantile remains.

Among the remainder of the material, the following should be mentioned:

(*a*) A fragment of a mandible including the symphysial region, in which all four incisors are present.

(*b*) The symphysial area and the left side of the corpus of a mandible which exhibits very marked alveolar absorption in the region of the left lateral and central incisors, indicating that these teeth were almost certainly extracted during life.

(*c*) A right palatal fragment from 3rd molar to central incisor in which the teeth have been lost post mortem, but showing that no incisors on this side of the face had been extracted during life.

TRENCH II

Skull No. 5 (Field No. II. E)

This is represented by a nearly complete skull and mandible, which, though burned to a deep brown colour, is very little warped.

The missing pieces are parts of the occipital, parts of the right parietal, the left temporal bone, the left wing of the sphenoid, parts of the left malar, and parts of the frontal in the region to the right of the nasion. The left condyle of the mandible is damaged and a few teeth have been lost post mortem from both the mandible and maxillae.

The main sutures of this skull are not fused and the teeth show relatively little sign of wear, suggesting that the individual died when a young adult.

The conformation of the frontal bone, the development of the superciliary and supra-orbital regions, and the size of the mandible all suggest a male, but the mastoids are small and weak. A male sex, however, seems fairly certain. (An associated femur is male.)

The individual was ultra-dolichocephalic. (Index: 68·61.)

The following measurements can be taken with a reasonable degree of accuracy:

L	188 mm.	S	365 mm.	100 B/L	68·61
B	129 mm.	S1	125 mm.	100 H′/L	61·95
B1	90·5 mm.	S2	125 mm.	100 B/H′	110·73
G′H	67·5 ? mm.	S3	115 mm.	100 NB/NH(L)	47·91
GB	86 ? mm.	S3′	91 mm.	1002 (R)/O1(R)	89·87
PH	22 mm.	*fmb*	28·5 mm.	*Occ. index	56·46
NB	23 mm.	*fml*	38·5 mm.	Ultra-dolichocephalic skull index	68·61
NH(L)	48 ? mm.	GL	85·5 mm.		
LB	93·5 mm.	O1(R)	39·5 mm.		
H′	116·5 mm.	O2(R)	35·5 mm.		
U	506 mm.				

The mandible is well preserved and is massive. On the left side the molars and premolars have been lost post mortem. The two central incisors appear to have been extracted during early life and there is a high degree of alveolar absorption in this region, combined with a tendency for the two lateral incisors to grow inwards and partially close the gap. In fact, the crowns of the two lateral incisors are in contact at the mid-line. The 1st molar is the largest tooth

* Occipital indices are all worked out from the Pearon formula $100\frac{S3}{S3'}\sqrt{\left(\frac{S3}{24(S3-S3')}\right)}$.

and the 3rd molar, which is also five-cusped, is the smallest. The 2nd molar has only four cusps.

There is very marked dental prognathism of the upper incisors in this skull, which is otherwise orthognathous.

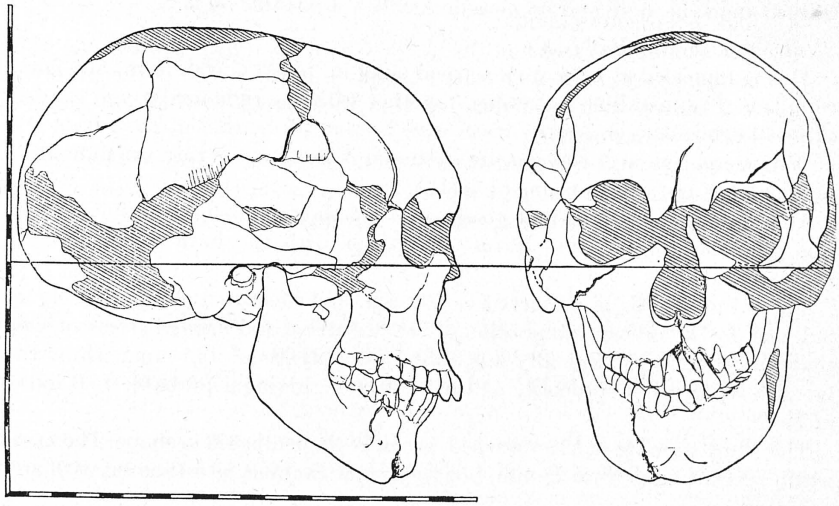


FIG. 14. Njoro River Cave Skull No. 5

The following mandibular measurements can be taken:

W1	114·5 mm.	*zz*	43 mm.
W2	89 mm.	*rb'*	32 mm.
H1	29 mm.	*cycr*	32·5 mm.
Height at 2nd molar	27 mm.	*cyb*	8 mm.
		cyl	19·5 mm.

Skull No. 6 (Field No. II. J)

This is represented by a very warped 'clinker' skull, which in spite of distortion, is relatively complete. The only parts missing are on the face in the region of the nasal aperture, fragments of the occipital, small parts of the frontal bone, and the squamosal element of both temporal bones. On the mandible, both ascending rami are damaged, including both condyles and the left coronoid.

All the teeth of the mandible and of the maxillae were present at death but all have been lost post mortem.

The coronal suture as well as the greater part of the sagittal suture is fused, but the lambda suture is relatively open. It seems probable that the individual died in early middle age.

The mastoids are unusually small, the frontal and occipital bones are very smooth, the palate is small and everything indicates a female.

Owing to the warping due to cremation, very few standard measurements can be taken.

The length is 170 mm. and the breadth in the region of 124 mm. which gives a L/B index of 72·94. A study of the skull, however, suggests that before it became warped the length was nearly 175 mm. and the breadth about 121 mm., which would give an index of 69·14.

The upper facial height was not less than 67 mm. and may have been slightly more, whilst the nasal height was approximately 43 mm. Owing to damage, the nasal width cannot be estimated.

The palate is deep relative to its small size. The mandible is even more warped than the skull and no measurements are possible on it.

Skull No. 7 (Field No. II. K)

This is represented by a very warped skull in 'clinker' condition, but fairly complete. The mandible is missing, together with the right malar and the left external orbital angle. All the teeth were present at death, but have been lost post mortem. The main sutures are open and it would seem that the individual was a young adult at the time of death.

The mastoids are large and prominent and there is a slight occipital crest. The palate is large. These features, together with the form of the frontal, suggest a male.

The actual length as preserved is 169 mm. and breadth 128 mm., giving an index of 75·74, but an examination of the distortion and lines of stress suggest that the length was originally less, more probably about 165 mm., whilst the breadth was greater, probably at least 130 mm., giving a probable L/B index of 78·78.

This skull, even though it is warped, is markedly pentagoid in shape. The nasal width was not more than 23 mm. but the height cannnot be estimated with any accuracy.

In form this skull approximates to the Elmenteita F1 type.

Skull No. 8 (Field No. II. R.)

This is represented by a nearly complete skull and mandible burned to a blackish-brown colour but not warped.

Most of the right side of the face is missing as well as the left condyle and part of the right corpus of the mandible. Other missing or damaged parts include the right external orbital angle and the adjoining parts of the frontal, parts of the right side of the occipital, and the central part of the sphenoid.

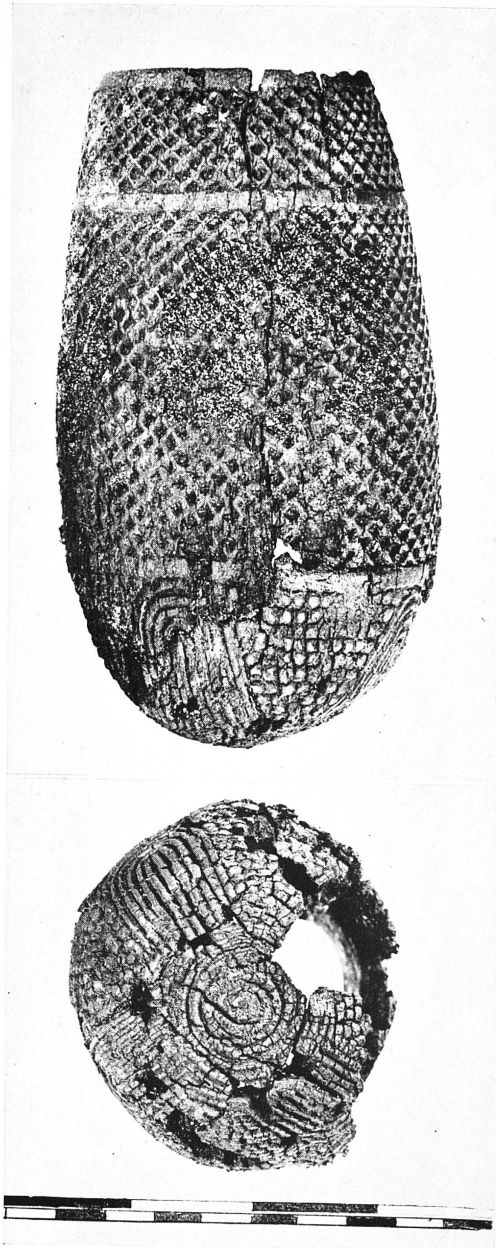
The sutures are very wide open. All the teeth were present at death, but all have been lost post mortem except for the 1st upper left premolar which is very little worn. The indications are that this individual was a young adult at the time of death.

There is a fairly pronounced occipital crest; the mastoids are large; these characters taken in conjunction with the configuration of the frontal, the large size of the palate and of the mandible suggest a male.

The temporal crests of this skull are very strongly marked, not only along the frontal bone, but also on the parietals.

The following standard measurements have been taken with reasonable accuracy:

L	187 mm.	O1(L)	41·5 mm.	100 B/L	71/39
B	133·5 mm.	O2(L)	38 mm.	100 H′L	61·49
H′	115 mm.	PH	22 mm.	100 B/H′	115/66
B2	87 mm.	S	369 mm.	100 NB/NH(L)	52·42
B3	87 mm.	S1	132 mm.	100 O2(L)/O1(L)	91·32
G′H	72 mm.	S2	120 mm.	Occ. index	54·84
NH(L)	51·5 mm.	S3	117 mm.	Dolichocephalic skull, index 71·39	
NB	27 mm.	S3′	89 mm.		



THE CARBONIZED WOODEN VESSEL
The lower photograph shows the design carved on the base

PLATE X

CARBONIZED GOURDS OR CALABASHES

1. Mouth of a gourd decorated with lines of dots (the dots have been filled with white in order to make them visible in the photograph); 2. Small fragment of the base of a gourd showing two ? repair holes; 3. Reconstructed calabash, distorted and warped by heat

The mandible is massive and the following measurements can be given:

Height of symphysis	36 mm.
Height at 2nd molars	28 mm.
Maximum width of ramus	40 mm.
cycr	33 mm.
cyl	23 mm.
cyb	11 mm.

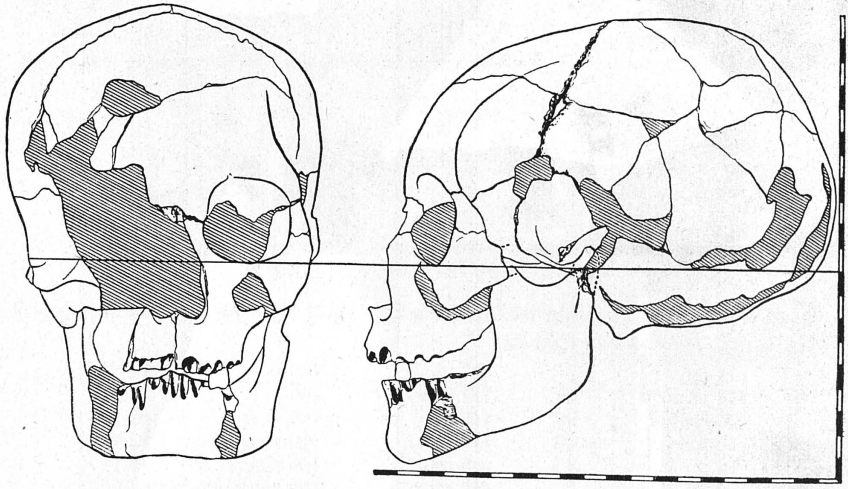


FIG. 15. Njoro River Cave Skull No. 8.

Skull No. 9 (Field No. II. N.)

This is represented by a nearly complete and unwarped skull which has been burned to a brownish-black colour. The mandible is also nearly complete save for the left ascending ramus.

On the skull the main missing parts are the nasal bones and the maxillary projections adjoining the nasal aperture, parts of the occipital in the region of the foramen magnum, and parts of the sphenoid.

The sutures are in the main open, but fusion has begun in the region of the bregma, both on the sagittal and coronal sutures.

The maxillae have suffered from extensive paradontal disease, with the result that all teeth were lost during life and the absorption has been so great that the sides of the palate are level with the roof. In the mandible there are also extensive signs of paradontal disease and most of the teeth were lost during life, the remainder post mortem.

From the condition of the mouth an advanced age might have been postulated, but the state of the sutures is against this and it seems likely that this individual died in early middle age.

There is a very strongly developed inion on the occipital and a slight occipital crest, the mastoids are large and the mandible massive. All the skull characters, in fact, suggest a male. The skull is, however, small and markedly pentagoid. It probably represents a male of the Elmenteita F1 type.

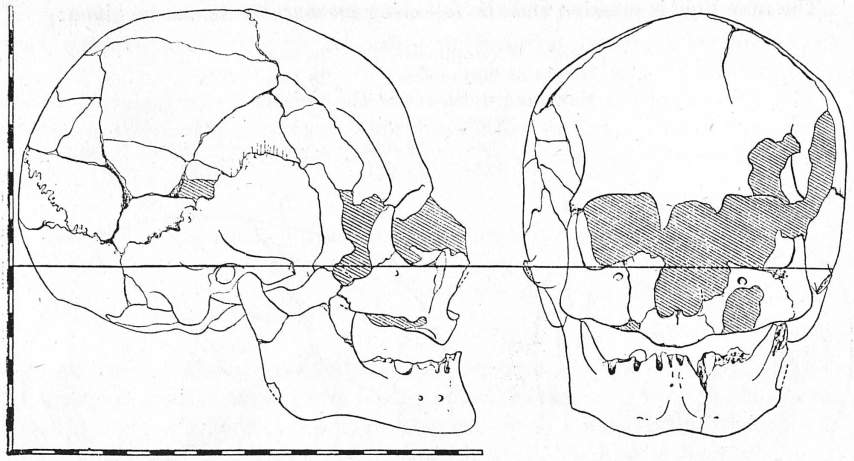


FIG. 16. Njoro River Cave Skull No. 9.

More measurements could be taken on this skull than on most of the others in the series, they are as follows:

L′	174 mm.	S	357 mm.	100 B/L	78·03
L	173 mm.	S1	121 mm.	100 B/L′	77·58
B	135 mm.	S2	119 mm.	100 B/H	107·16
B1	89 mm.	S3	117 mm.	100 H/L′	72·41
B2	89 mm.	S′3	89 mm.	100 NB/NH(L)	43·13
B3	103 mm.	U	496 mm.	100 O2(R)/O1(R)	82·05
H′	127 mm.	P.H	14 ? ? mm.	Occ. index	54·84
H	126 mm.	G′H	64 ? ? mm.	Brachycephalic skull, index 78·03	
OH	109 mm.	GB	87 mm.		
LB	91·5 mm.	NH(L)	51 ? mm.		
Q	295 mm.	NB	22 mm.		
Q′	298 mm.	O1(R)	39 mm.		
		O2(R)	32 mm.		
		GL	89 mm.		

On the mandible the following measurements are possible:

Height of symphysis	34 mm.
Height at 2nd molars	30·5 mm.
Maximum width of ramus	40·5 mm.

In addition to the condition resulting from extreme paradontal disease there is evidence of a severe abscess penetrating to the external wall of the mandibular corpus, near the roots of the 1st right molar. There is also an extensive bony exostosis on the inner aspect of the alveolar margin of the mandible, near the right 2nd and 3rd molars. There is also an unusual bony growth on the exterior aspect of the corpus, below the right 3rd molar. On the right side of the corpus there are two *foramina mentalia* instead of one, one of which is situated below the 1st premolar, while the second is 11 mm. farther back.

Skulls Nos. 10, 11, and 12 (Field Nos. II. A and B)

These three individuals are represented by a mixed mass of fragments in white 'clinker' condition. The bone is so warped that it is impossible to attempt any reconstruction, but clearly three individuals are represented, although in

the field it was considered that there were only two. So far as can be judged these remains represent a sub-adult with 3rd molars still unerupted (sex indeterminate), a small female skull, and a young adult male.

The only mandibular fragment that has the symphysial area intact shows that all the incisors were present and that none had been extracted during life. No measurements are possible on any of these individuals.

Skull No. 13 (*Field No. II. C.*)

This is represented by very crushed and powdery fragments of a massive skull and mandible which is almost certainly an adult male who died in early middle age. No measurements are possible.

Skull No. 14 (*Field No. II. D.*)

This is represented by fragments of a large but very poorly preserved skull that would appear to be that of a middle-aged male, as the sutures are partially closed. All the teeth have been lost post mortem so that the state of wear cannot be used as a guide to age. The palate is very large and the inion well marked. No measurements are possible.

Skull No. 15 (*Field No. II. F.*)

This is represented by a very broken and warped skull with parts of the mandible, all in 'clinker' condition. The bones are robust and the palate and mandible large. On the mandible the alveolar border is so damaged that it is not possible to ascertain whether any incisors had been extracted during early life.

On such meagre evidence as is available this would appear to be an adult male who died in early middle age. No measurements are possible.

Skull No. 16 (*Field No. II. G.*)

This is represented by the greater part of a skull without mandible, in wet 'biscuit' condition and very crushed. It seems to have been an adult male. No measurements are possible.

Skull No. 17 (*Field No. II. I.*)

This is represented by a nearly complete skull and mandible which, however, are so broken and warped that the parts cannot be fitted together. The main sutures are open and all the teeth were present at death, although they have been lost post mortem. No incisors had been extracted from the mandible during life. The bones of the vault of the skull are thin and the mandible is small and weak. The forehead is smooth. Everything points to a young adult female.

Skull No. 18 (*Field No. II. L.*)

This is represented by fragments of a very massive skull burned to a brownish-black colour. Part of the corpus of the mandible, including the symphysial area, is preserved.

The state of the sutures suggests a middle-aged adult and the size of the mandible and general appearance of the fragments indicate a male. The mandible is massive and very low at the symphysis. The symphysial height is 27 mm. and the height at the 2nd molars 28 mm.

This is an unusual type of mandible in the Njoro assemblage, where the symphysial height is nearly always greater than that at the 2nd molars.

Skull No. 19 (Field No. II. M.)

This is represented by fragments of a massive skull in 'biscuit' condition. The only part reasonably well preserved is the occipital, which has a large inion and a marked crest. It was probably a male and certainly adult. No measurements are possible.

Skull No. 20 (Field No. II. T.)

This is represented by parts of the frontal, almost the whole of the face, and fragments of a mandible, all burned to a blackish-brown colour. Other parts of the skull were present in a powdery condition.

The nature of the frontal bone, the general size of the face, and size of the palate all suggest a male. All teeth were present at death, but have been lost post mortem, so that nothing can be adduced as to the age at death.

The measurements of the face are as follows:

GB 105 mm., J 140 mm., EH 30·5 mm., NB 27 mm.

Skull No. 21 (Field No. II. V.)

This is represented by fragments of a very large skull in powdery condition. It is probably an adult male.

In addition to skulls 5 to 21 inclusive from Trench II this trench also yielded the following material which probably belongs to individuals described from the adjoining trenches:

(*a*) A massive mandible in good condition which may possibly be associated with No. 19 above. It is the mandible of a young adult in which the 3rd molars have only just come into wear. The mandible is complete except for the left ascending ramus. All the molars are preserved as well as the 1st premolars on both sides. The 2nd premolars, canines, and all the incisors have been lost post mortem, but no teeth were extracted during life. There is a very extensive bony exostosis on the inner aspect of the mandible along the alveolar margin on both sides, in the region of the premolars and 1st molars.

The symphysial height is 32 mm. and the height at the 2nd molars 28 mm.

(*b*) A mandibular fragment with the symphysial area intact, which shows that all four incisors had been lost in early life. The alveolar region here shows a great degree of absorption.

(*c*) Parts of a massive skull in 'clinker' condition, which may represent a distinct individual but which may belong to one of the skulls already described. The bone is so extremely warped and cracked that nothing can be said about it.

TRENCH III

Skull No. 22 (Field No. III. AA.)

This is represented by the greater part of a massive mandible burned to a brown colour. There were also a few associated fragments of skull which probably belong with the mandible, but these were in a very poor state of preservation.

The left ascending ramus of the mandible is missing and this has broken off at the point of the 3rd molar. The angle of the right ascending ramus is also broken. The right and left 1st molars are present, all the other teeth having

been lost post mortem except for the two central incisors which had been extracted early in life. The 1st molars do not exhibit much wear on the crowns and the individual probably died when a young adult. The size of the mandible strongly suggests a male. The following measurements have been taken:

Height at symphysis	37·5 mm.	Height at 2nd molars	30·5 mm.
zz	50 mm.	*cycr*	37·5 mm.

Skull No. 23 (Field No. III. BB)

This is represented by the left parietal, parts of the frontal, and a number of fragments of other parts of the skull burned to a blackish-brown colour. With it is associated a nearly complete mandible.

The sutures, especially the coronal, are nearly fused and the state of wear on the teeth in the mandible also points to advanced middle age.

The bone of the vault of the skull is unusually thick; the frontal attains a thickness of 12 mm. and the parietals of 11 mm. The general appearance of the fragments as well as the large size of the mandible suggest a male.

The left lateral incisor, both the left premolars, and the right and left 1st and 2nd molars are present in the mandible. All the other teeth appear to have been present at death, but have been lost post mortem. There is nothing to suggest that the central incisors were extracted in early youth.

The following measurements have been taken:

W1	114 mm.	*zz*	48·5 mm.
W2	103 mm.	*rb*	40
H1	40 mm.	*rb'*	37
Height at 2nd molars	31 mm.	G'2	36·5

Skull No. 24 (Field No. III. CC)

This is represented by the greater part of a cranium, including the parietals, a large part of the frontal, a large part of the occipital, and the right temporal bone. The base of the skull and the whole face are missing, as well as the left temporal.

The sutures are partially fused, the coronal more particularly so, suggesting that death occurred in middle age.

The skull is small, the occipital smooth, and the frontal gently rounded. The mastoid is small. These characters indicate a female.

The length and breadth can be estimated with some degree of accuracy as follows: 175 mm. and 122·5 mm. respectively, giving an index of 70.

Skull No. 25 (Field No. III. HH)

This is represented by parts of a skull burned to a blackish-brown colour and not warped. A large part of the vault is missing, including the posterior part of the frontal and the anterior portions of both parietals, but as the temporals give points of contact, reconstruction has been possible. Most of the face is missing, with the exception of the palate. The mandible is represented by the left half of the corpus and the right ascending ramus.

The sagittal and lambda sutures are partially closed, suggesting middle age.

The occipital is smooth and the mastoids small. These characters, taken in conjunction with the appearance of the frontal, suggest a female, in spite of the fact that the skull is a large one.

The only measurements possible on this skull are length 182 mm., breadth 140 mm., giving an index of 76·92.

The skull is pentagoid and, although larger than usual in this type, belongs to the Elmenteita F1 group.

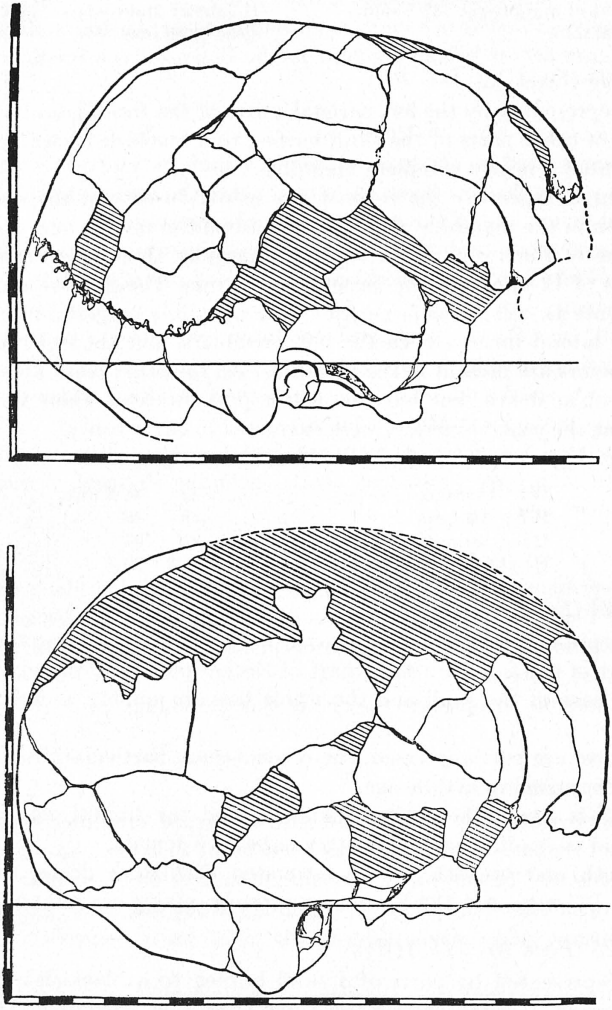


FIG. 17. Njoro River Cave Skulls Nos. 24 and 25

The palate is large and all the teeth were present at death, but have been lost post mortem. The inferior border of the nasal aperture is preserved; the nasal breadth being only 23 mm.

The left half of the mandible and part of the symphysial area were found in Trench III with the skull. The right ascending ramus, however, was found in Trench IX but can be associated without any doubt.

This ramus has a condyle which is very considerably deformed by disease

(probably arthritis). It fits perfectly into the skull which is also deformed by disease and affected in the region of the sygmoid notch. The left condyle also shows traces of deformation due to arthritis, but not to such a marked extent. All the teeth of the mandible have been lost post mortem, but it is evident that no incisors had been extracted during life.

The symphysial height is 38 mm. and the height at the 2nd molars 27·5 mm.

On the inner aspect of the alveolus in the region of the premolars there is a marked bony exostosis.

Skull No. 26 (Field No. III. DD)

This is represented by the greater part of a skull in 'clinker' condition. It is so warped by heat that the nasion almost touches the basi-occipital. Fragments of the facial region and of the mandible are also preserved.

The sutures are considerably fused, suggesting that death took place in advanced middle age. The general appearance of the skull and its small size suggest a female.

This skull, in spite of its warped condition, can clearly be classed in the brachycephalic-pentagoid group.

The face was short and small; the nasal aperture being wider than is usual in this group, having a width of 27·5 mm.

The associated mandibular fragment has lost both the ascending rami; although all teeth were present at death, including the central incisors, they have since been lost.

Skull No. 27 (Field No. III. EE)

This is represented by fragments of a skull burned to a black colour. It is in 'biscuit' condition. There is a mandibular fragment in similar condition. This shows a bony exostosis on the inner aspect in the region of the left premolars and 1st molars.

It is not possible to estimate the age of this individual.

TRENCH IV

Skull No. 28 (Field No. IV. 5)

This is represented by a damaged but unwarped cranium, together with parts of the face and mandible. It has been burnt to a light-brown colour and is in hard 'biscuit' condition. All the major sutures are very much fused and the molars, which are present in the right side of the mandible, exhibit such an advanced degree of attrition that death must have occurred in advanced middle age.

The mastoids are small, but there is a well-marked inion and occipital crest. These characters, taken in consideration with the general size and form, indicate a male.

The only measurements possible on the cranium are as follows:

L 177 mm., B 134 mm., B1 90 mm., 100 B/L 75·70

The left side of the mandible contains all three molars. On the 1st and 2nd molars the attrition has advanced so far that the pulp cavities are exposed over the whole occlusal surface. On the 3rd molar the pulp cavity has begun to be exposed.

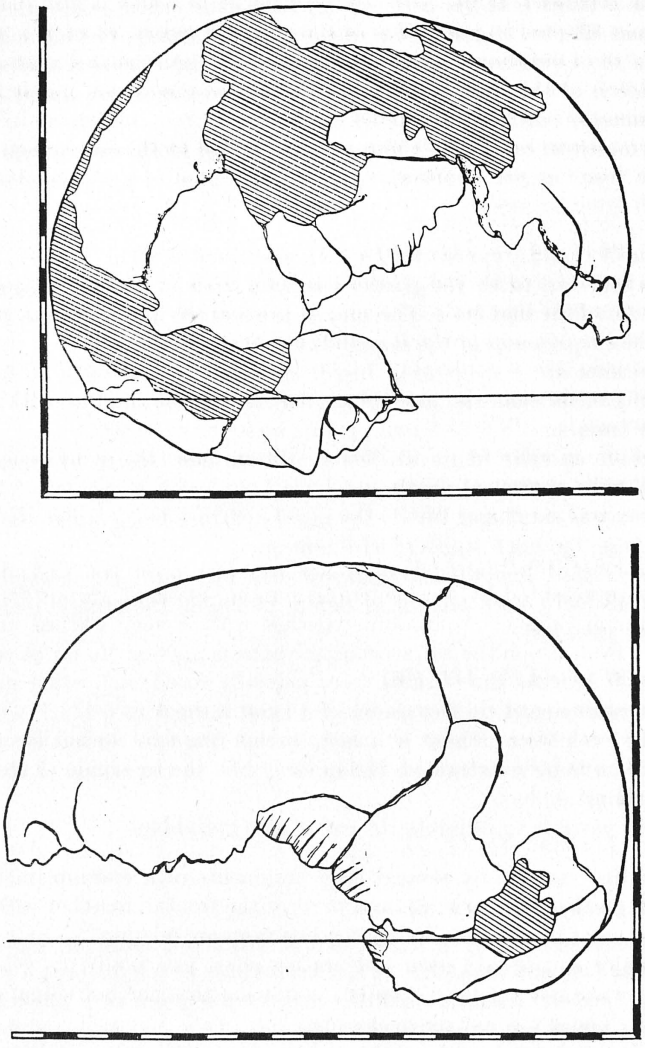


FIG. 18. Njoro River Cave Skulls Nos. 28 and 35.

Skull No. 29 (Field No. IV. 1)

This is represented by numerous warped fragments of a cranium in 'clinker' condition together with the greater part of the face, also in the same condition but less warped, and parts of the mandible.

The major sutures are considerably fused, suggesting that death occurred in advanced middle age. The form of the frontal bone, the small palate, and small mandible all suggest a female.

The only measurements which are possible are a few in the facial region, as follows:

NB 24 mm., NH(L) 55·5 mm., GH 75 mm., GB 83 mm.?, EH 21 mm.?

The nasal index is 43·24.

The mandibular fragment consists of the greater part of the right side, including the ascending ramus and the condyle, but the coronoid is missing. The symphysial area is intact, but the left side of the corpus is mostly lacking. An examination of the alveolar border suggests that the two central incisors were extracted in early life. The remainder of the teeth were present at death but have been lost post mortem.

Skull No. 30 (Field No. IV. 2)

This individual is represented by a fragmentary skull in 'clinker' condition, very warped. The preserved portions include parts of the face and palate and the left half of the mandible. The sutures are scarcely fused, indicating a young adult. The size of the palate and mandible and the configuration of the forehead suggest a female.

The only measurements possible are the nasal height and breadth which are NH(L) 46 mm. and NB 23·5 mm., giving an index of 51·08.

In the mandibular fragment, which just includes the symphysial area, all the teeth were present at death, but have been lost post mortem. The incisors were not extracted during life.

Skull No. 31 (Field No. IV. 3)

This is represented by a considerable number of small warped fragments of a cranium in 'clinker' condition, together with a very warped and shrunk mandible from which the left ascending ramus is missing. So far as can be seen from the fragments the sutures were partially fused, indicating middle age. There is insufficient evidence on which to assess the sex.

All the teeth were present at death, except the two central incisors which appear to have been extracted during early life, the remainder have been lost post mortem.

Skull No. 32 (Field No. IV. 7)

This is represented by several large fragments of a cranium including the occipital, parts of the parietals, and parts of the frontal, together with a mandibular fragment from which both ascending rami are missing.

The major sutures are open, the molars show practically no wear, and the 3rd molars are not yet fully erupted, indicating that the individual died when sub-adult. The sex is not determinable.

This skull belongs to the brachycephalic-pentagoid group of Elmenteita F1 type, but owing to its condition no measurements are possible.

The 3rd molar on the right side is inclined forwards and impacted against the crown of the 2nd molar. The incisors had not been extracted in early life.

Skull No. 33 (Field No. IV. 8)

This is represented by the occipital and both temporal bones of a very massive skull, the remaining parts were in such powdery condition that they could not be recovered.

Near this skull was found a mandibular fragment with both ascending rami missing. In size it could be associated with the skull, but it is in a different condition ('clinker'), and it probably represents part of another individual.

From the size and thickness of the occipital bone and the long inion, the skull may be presumed to represent a male. Age at death is uncertain, but it was probably before full maturity was reached. All teeth were present in the mandible at death but have been lost post mortem.

The mandible is too warped and cracked for any useful measurements to be taken. There are slight traces of bony exostosis on the inner aspect of the alveolus in the region of the premolars and 1st molars.

Skull No. 34 (Field No. IV. 10)

This is represented by numerous small and very warped fragments of a skull in 'clinker' condition, together with the greater part of a mandible in similar condition. No estimate of age at death or of sex is possible. All the teeth were present at death, but all have been lost post mortem.

In addition to the above skulls, Nos. 28–32 inc., from Trench IV, the following is worth mentioning although it in all probability belongs to a skull from another trench:

(*a*) An isolated left half of a mandible in 'clinker' condition and very warped. The left lateral incisor seems to have been extracted in early life, all the other teeth were present at death but have been lost post mortem.

TRENCH V

Skull No. 35 (Field No. V. NN)

This is represented by a more or less complete cranium from which the basi-occipital area is missing, as are the facial parts and the mandible. The coronal suture is almost completely closed and the sagittal and lambda sutures are partially fused, suggesting middle age at the time of death.

The size, thickness, and form of the frontal all suggest a male. It is a skull belonging to the pentagoid group. The only measurements possible are: L 188 mm., B 151 mm., 100 B/L 80·32.

Skull No. 36 (Field No. V. JJ)

This is represented by fragments of a skull burned to a blackish-brown colour and not warped. The parts preserved are portions of both parietals, part of the occipital and the right temporal. The sagittal suture is partially fused, suggesting middle age at the time of death. The mastoid on the right temporal is very small and the skull is of small proportions and probably represents a female, although the bones are thick for a woman.

Skull No. 37 (Field No. V. LL)

This is represented by numerous warped fragments of a skull in 'clinker' condition. The main sutures are quite unfused, suggesting a young adult. The form of the frontal and the character of the face and mandible suggest a female.

The facial area is less affected by warping than the cranium and the following measurements are possible:

G'H 76 mm., GB 82 mm., J 110 mm. ?, NH(L) 48 mm. ?, NB 22 mm.,
100 NB/NH(L) 45·83

The mandible is small and the right coronoid is missing as well as all the teeth except the left 3rd molar which was impacted. The missing teeth were lost post mortem and were all present at death, no incisors having been extracted

in early youth. The mandible is too warped and shrunk for measurements of any value to be taken.

Skull No. 38 (Field No. V. MM)

This is represented by the two parietals, most of the frontal and part of the occipital, together with the greater part of the mandible. It is a massive skull, burned to a blackish-grey colour and in 'dry biscuit' condition.

The sutures are relatively open and the left 3rd molar in the mandible shows practically no signs of wear, so that we may regard the remains as those of an individual who died soon after becoming adult.

The general size and form of the skull suggest a male.

Only approximate measurements are possible, but the length must have been in the region of 188 mm. and the breadth only 125 mm., giving an index of 66·48. Even if the error in estimating the length and breadth is slightly increased, the skull still belongs to the ultra-dolichocephalic group.

Apart from the right condyle and coronoid, the mandible is nearly complete and the following teeth are preserved: left 3rd molar, both left premolars, right 2nd premolar, and right 1st molar, together with parts of the right 2nd molar. The 1st and 2nd left molars were lost during life as a result of an abscess which had penetrated through the exterior wall of the mandible in the alveolar region. The right lateral incisor and canine and the two left incisors had been lost before death, but do not appear to have been extracted in early life, as there is not the usual amount of absorption visible. The remaining teeth have been lost post mortem.

There is a very marked bony exostosis on the inner aspect of the mandible, along the inner margin in the region of the premolars.

No measurements of value can be taken owing to the damaged condition of the lower border of the corpus.

Skull No. 39 (Field No. V. PP)

This is represented by numerous warped fragments of a skull in 'clinker' condition. The right half of the face is the best-preserved part of the skull.

The coronal suture is completely fused and the lambdoid and sagittal sutures partially so, suggesting middle age. The general form of the frontal and of the mastoids indicates a male.

From the right half of the face it is possible to estimate certain measurements with some degree of accuracy, as follows:

G'H 70 mm., NH(R) 48·5 mm., NB 24·5 mm., PH 19 mm., 100 NB/NH(R) 50·57

The associated mandibular fragments include part of the symphysial area and it can be seen that the right lateral and central incisors had been extracted early in life.

Skull No. 40 (Field No. V. SS)

This is represented by part of a very broken skull in 'clinker' condition. It is also very warped. With it is a mandible, nearly complete, but equally warped. Mixed with the skull fragments were parts of a second skull which probably belong to one of the other skulls in this trench.

The thickness of the bone and size of the mandible suggest a male. Age is indeterminate.

The only measurements possible are on the face, as follows:

G'H 67 mm., GB 86 mm. ?, NH(L) 47 mm. ?, NB 24 mm. ?, 100 NB/NH(L) 51·06 ?

The mandible had all teeth present at death, except for the four incisors which seem to have been extracted during early life.

Skull No. 41 (Field No. V. RR)

This is represented by numerous small fragments in 'clinker' condition, which in the field were classified as two skulls (RR and OO). There is also a fragmentary mandible. Neither age at death nor sex can be estimated.

TRENCH VI

Skull No. 42 (Field No. VI. A. 6)

This is represented by a nearly complete cranium burned to a blackish-brown colour. The facial part, the mandible, and parts of the sphenoidal area are missing.

The coronal suture is partially fused, but the sagittal and lambda sutures are open. The basi-occipital suture is not fully fused, suggesting very strongly a sub-adult.

The frontal bone is smoothly rounded, the mastoids are very small and everything suggests an immature female. The skull is markedly pentagoid and belongs to the Elmenteita F1 type.

The following measurements can be taken:

L'	172 mm.	S	367 mm.	100 B/L	84·02
L	169 mm.	S1	135 mm.	100 B/L'	82·55
B	142 mm.	S2	130 mm.	100 H'/L'	70·3
B1	92·5 mm.	S3	130 mm.	100 B/H'	117·3
B2	92·5 mm.	S3'	102 mm.	Occ. index	56·04
B3	113 mm.	U	502 mm.	Ultra-brachycephalic skull, index 84·02	
H'	121 mm.				

Skull No. 43 (Field No. VI. A. 13)

This is represented by broken and warped fragments of a massive skull in which the frontal is missing.

The marked inion and occipital crest, the large size of the mastoids, and general massiveness of this skull suggest a male.

The sutures are relatively open, indicating a young adult, which is confirmed by the teeth.

The associated mandible is warped, especially on the left side. All three molars on both sides are preserved, as well as the right canine. The remaining teeth have been lost post mortem. No incisors had been extracted during life. The molars are somewhat massive for this series of skulls and are worth a special note. The 1st molars are large and rectangular, but the 2nd molars, which are also unusually large, are of unusual shape, being very wide anteriorly and very narrow posteriorly, the posterior lingual cusp being reduced to minute proportions. The 3rd molars are unusually small, both are displaced and incline forwards and inwards.

The measurements of this mandible are as follows:

W1	124 mm.	*crcr*	90 mm.	*cyl*	19 mm.
W2	104 mm.	*cycr*	40 mm.	*cyb*	8 mm.
H'	39 mm.	G'2	46 mm.	*rb*	38 mm.
Height at 2nd molars		31·5 mm.			

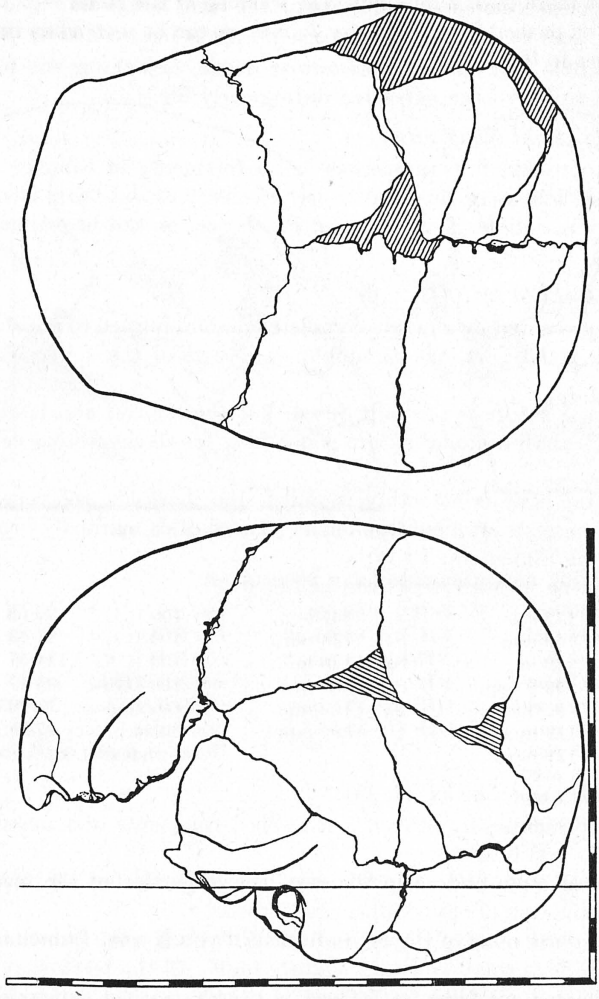


FIG. 19. Njoro River Cave Skull No. 42.

Skull No. 44 (Field No. VI. A. 16)

This is represented by a nearly complete skull and mandible burned to a brownish-black colour and slightly warped, the part most seriously affected being the facial region.

The missing parts are the right temporal and the greater part of the sphenoid.

The sutures are all considerably fused and this individual probably died in advanced middle age.

The appearance of the frontal, the small size of the palate and mandible and of the mastoids, and also the smooth occipital, all indicate a female. The skull belongs to the dolichocephalic group. The nose is very prominent.

Owing to warping, all measurements are approximate, but it is unlikely that

any figure is more than 2 mm. out. The warping of the facial region has led to the face being pushed forward nearly 20 mm. as can be seen when the mandible is articulated to the skull.

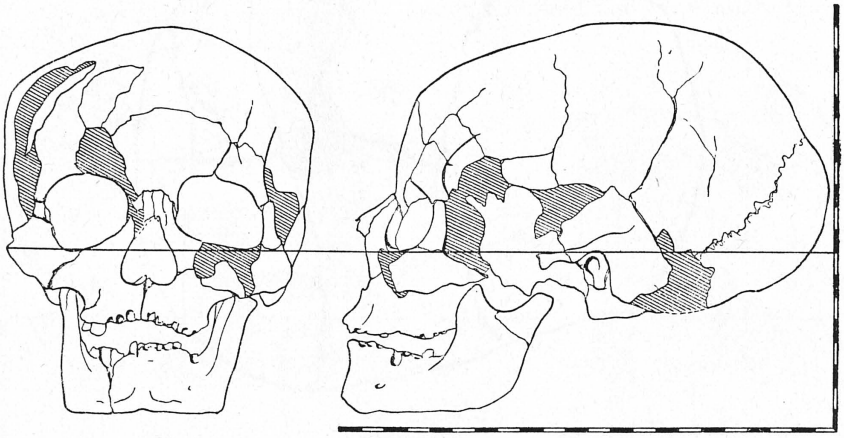


FIG. 20. Njoro River Cave Skull No. 44.

The following measurements have been taken:

L	190 mm.	G'H	68 mm.	100 B/L	70·52
B	134 mm.	GB	86·5 mm.	100 H'/L	61·55
B1	97 mm.	NH(L)	45 mm.	100 B/H'	114·53
H'	117 mm.	NB	26 mm.	100 NB/NH(L)	55·77
LB	96·5 mm.	O1L	43 ? mm.	100 O2L/O1L	77·90 ? ?
S	375 mm.	O2L	33·5 ? ? mm.	Occ. index	57.79
S'	128 mm.			Dolichocephalic skull, index 70·52	
S2	126 mm.				
S3	121 mm.				
S3'	98 mm.				
U	528 ? mm.				

All the teeth were present in the maxillae at death, but all have been lost post mortem.

This skull recalls one of the types from Willey's Kopje, Elmenteita.

The mandible is small and very slightly built. All the teeth were present at death but have since been lost. There is a very marked exostosis along the alveolar margin in the region of the canines and premolars, extending on both sides to the 1st molars. The principal mandible measurements are as follows:

W1	88 mm.	*zz*	44·5 mm.	G'2	34 mm.
W2	72 mm.	*crcr*	77 mm.	*cycr*	32 mm.
H1	30 mm.	*rb*	32 mm.	*cyl*	17 mm.
Height at 2nd molars 24·5 mm.				*cyb*	8 mm.

Skull No. 45 (Field No. VI. A. 19)

This is represented by a nearly complete skull burned to a blackish-brown colour. It is warped to some extent, more particularly on the left side of the occipital and the left parietal. The principal missing parts are the posterior half of the right parietal, the squamosal element of the right temporal, and the right half of the sphenoid.

The main sutures are relatively open and the indications are that this individual died as a young adult.

The form of the forehead, the size of the mastoids, the nature of the inion, and the size of the mandible all suggest a male.

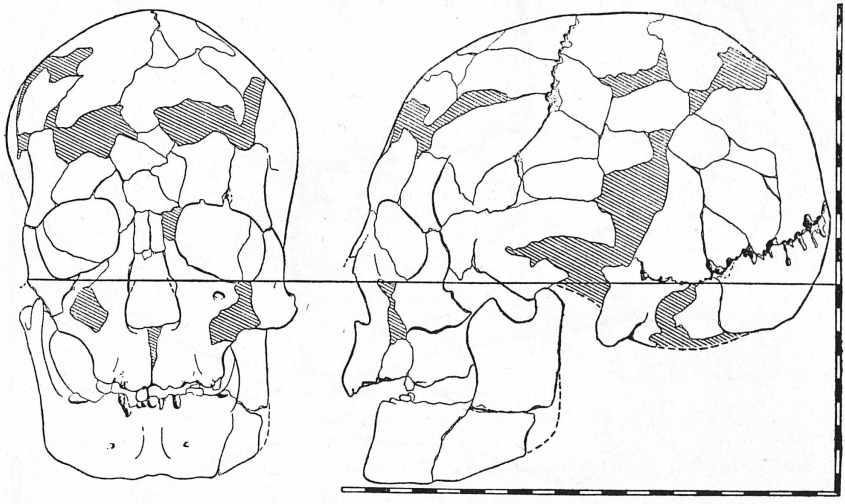


FIG. 21. Njoro River Cave Skull No. 45.

The skull is very long and narrow and is ultra-dolichocephalic; it recalls one from Willey's Kopje. The following measurements have been taken:

L	190 mm. ?	G'H	74 mm.	100 B/L	67·37
B	128 ? mm.	GB	85·6 ? mm.	100 NB/NH(L)	48·98
B1	98 mm.	NH(L)	49 mm.	100 O2R/O1R	74·41 ?
H'	130 mm.	NB	24 mm.	Occ. index	55·51
S	393 mm.	O1R	43 ? mm.	Ultra-dolichocephalic skull, index 67·37	
S1	135 mm.	O2R	32 ? mm.		
S2	148 mm.	PH	24·5 mm.		
S3	111 mm.				
S3'	86 mm.				

The mandible, which is practically complete, is massively built but somewhat warped. Both the central and both the lateral incisors had been extracted in early life. All the other teeth have been lost post mortem, but were present at death. The following measurements are possible:

Height at symphysis 33 mm., height at 2nd molars 28 mm.
rb 38·5 mm., *cyl* 20 mm., *cyb* 8 mm., *zz* 43 mm., *cycr* 30 mm.

Although the crown of the left 3rd molar is missing, it is evident from the angle of the roots that it was impacted. There is a slight exostosis on the inner aspect of the alveolar margin in the region of the 1st molar.

SKULL No. 46 (Field No. VI. A. 20)

This is represented by a nearly complete unwarped cranium, burned to a blackish-brown colour. The missing parts are: portions of the left frontal, the greater part of the sphenoids, and part of the basi-occipital. The face and mandible are both fragmentary.

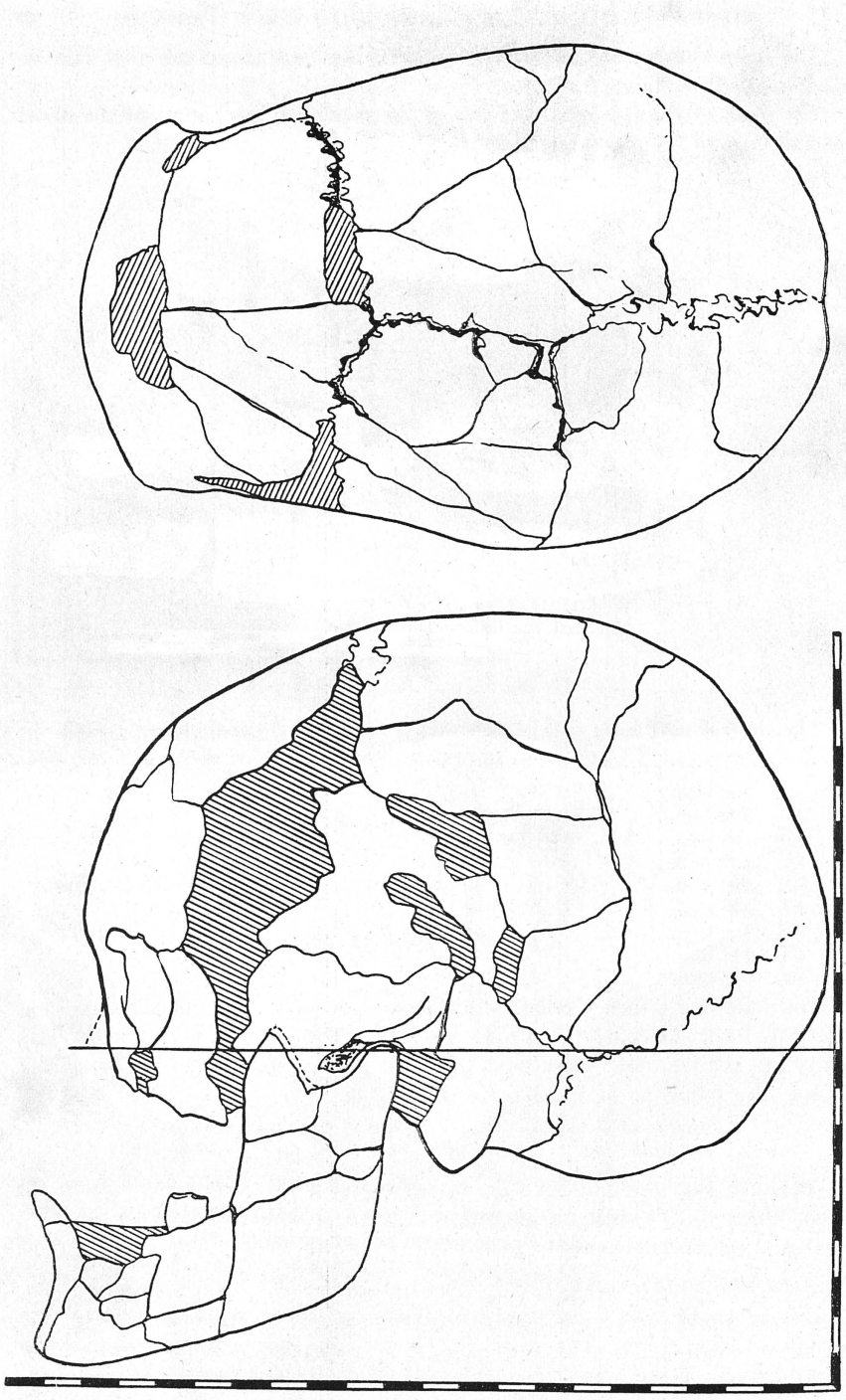
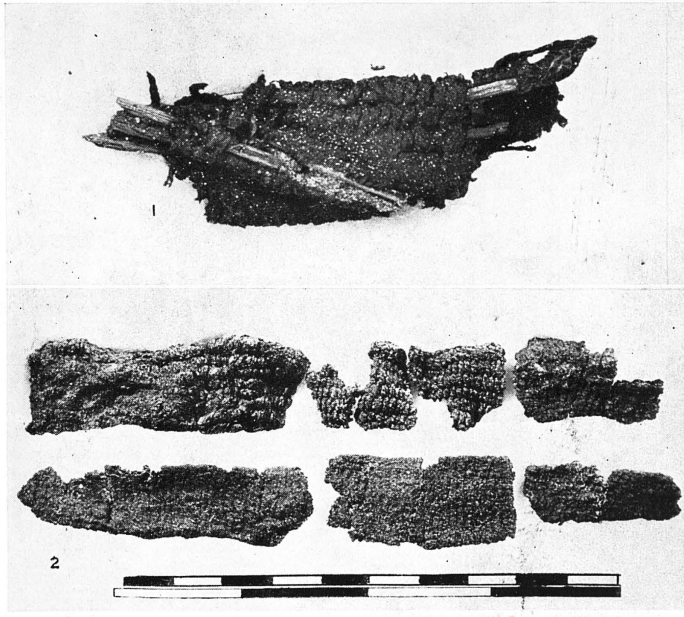
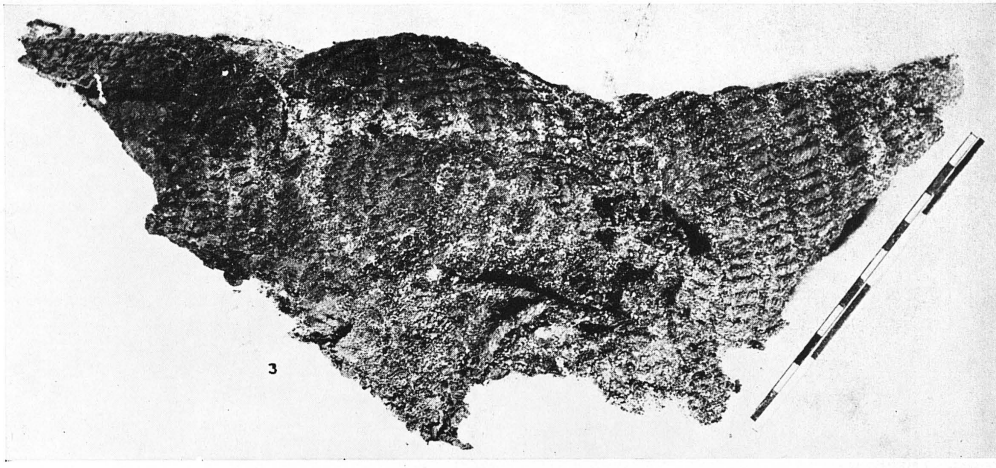


FIG. 22. Njoro River Cave Skull No. 46.

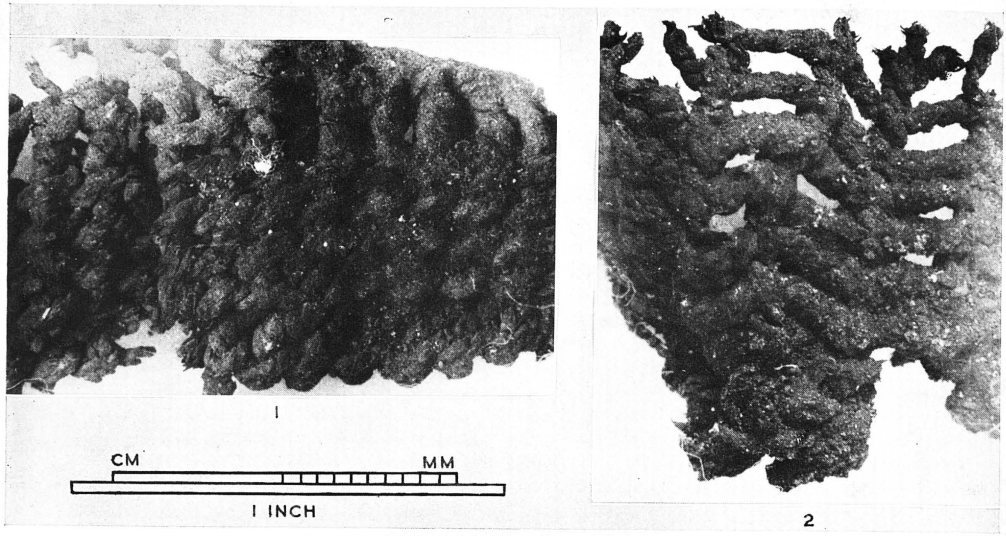


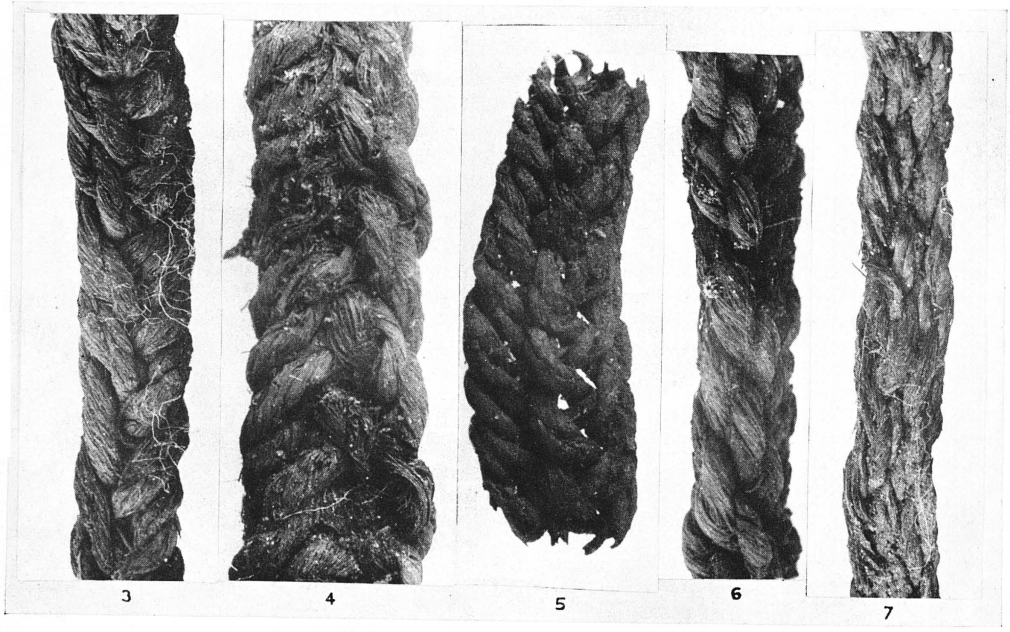


THREE EXAMPLES OF CARBONIZED FABRICS

1. Part of a mat or basket made from bamboo slats interlaced with twine (same scale as No. 2); 2. Fragments of a closely woven strip of material with tapered ends; 3. Part of a large string bag.

PLATE XII





ENLARGED PHOTOGRAPHS OF CARBONIZED MATERIALS

1 and 2. Fragments of string ? bag showing close and open mesh; 3–7. Various types of plaited cord.

The sutures are only partially fused and the 3rd molar shows practically no signs of wear; it may be assumed that the individual died in early adult life.

The mastoids are large, there is a distinct occipital crest, the mandible is massive, and all indications suggest a male.

The measurements that can be taken satisfactorily are:

L	198 mm.	100 B/L	66·16
B	131 mm.	Occ. index	55·24
B1	90 ? mm.	Ultra-dolichocephalic skull, index 66·16	
H′	127 ? ? mm.		
S	410 mm.		
S1	140 mm.		
S2	145 mm.		
S3	125 mm.		
S3′	100 mm.		
U	518 mm.		

Skull No. 47 (Field No. VI. A. 1)

This is represented by a large number of small fragments which include parts of the face and mandible. There is no means of assessing age or sex and no measurements are possible.

Skull No. 48 (Field No. VI. A. 2)

This is represented by numerous fragments in 'clinker' condition, all very warped. From the nature of the occipital and frontal bones and the size of the mastoids this was probably an adult female.

Skull No. 49 (Field No. VI. A. 4)

This is represented by numerous fragments of a skull in 'clinker' condition. The mandibular fragments include the symphysial area which reveals that the two central incisors had been extracted in early life. The mandibular fragments, parts of the frontal, and the mastoid suggest an adult female.

Skull No. 50 (Field No. VI. A. 7)

This is represented by numerous fragments of a skull in 'clinker' condition and very warped. The greater part of the face is intact and also the frontal bone. There are no associated mandibular fragments. The condition of the sutures suggests an adult in early middle age and the form of the frontal indicates a male.

The following facial measurements are possible:

G′H	66·5 mm.	PH	21 mm.	100 NB/NH(L)	50
GB	93 mm.	J	120 ? mm.	100 O2R/O1R	88·88
NH(L)	47 mm.	O1R	38 mm.		
NB	23·5 mm.	O2R	34 mm.		

Skull No. 51 (Field No. VI. A. 8)

This is represented by many fragments of a skull in warped 'clinker' condition, together with part of the right half of a mandible, very warped and shrunk, just including the symphysial area. Age and sex are indeterminate. The two central incisors had been extracted in early life.

Skull No. 52 (Field No. VI. A. 12)

This is represented by numerous warped fragments of a skull in 'clinker' condition. The 3rd molars are unerupted and it is probably a sub-adult of indeterminate sex.

Skull No. 53 (Field No. VI. A. 14)

This is represented by numerous warped fragments of a skull in 'clinker' condition. The 3rd molars are represented by germ teeth, so it was probably a sub-adult, sex indeterminate.

In addition to skulls Nos. 42 to 53 inclusive, the following fragments which were not associated with any particular skull deserve to be mentioned, these are:

(*a*) The greater part of a palate from which a number of teeth were lost during life as a result of acute paradontal disease.

(*b*) A small adult palate in which the right 3rd molar appears never to have been present.

TRENCHES VII and VIII

These trenches did not yield any skulls, although a few small fragments of human bone were found.

TRENCH IX

Skull No. 54 (Field No. IX. Z. 1)

This is represented by many fragments of a massive skull burned to a blackish-brown colour, the only parts that are well preserved are parts of the frontal and the left side of the face. The general form of the frontal and the massiveness of the bones indicate a male. The wear on the teeth in the maxilla fragment suggests that the individual died when a young adult.

The following measurements have been taken:

G'H	73 mm.	O1L	45 mm.	100 NB/NH(L)	49·05
GB	106 ? ? mm.	O2L	36 mm.	100 O2L/O1L	80
PH	23 mm.				
NH(L)	52 mm.				
NB	24·5 mm.				

Skull No. 55 (Field No. IX. Z. 2)

This is represented by fragments of a massive skull, including parts of the mandible, burned to a black colour. The facial region is the best preserved. The skull fragments and especially the massive mandible suggest a male. The teeth exhibit considerable signs of wear and indicate a middle-aged adult.

The following measurements have been taken:

G'H	76 mm.	O1L	47·5 mm.
GB	106·5 ? mm.	O2L	34 mm.
PH	25 ? mm.	100 NB/NH(L)	45·28
NH(L)	53 mm.	100 O2L/O1L	71·57
NB	24 ? mm.		

The mandible lacks the right ascending ramus, but is otherwise nearly complete. Both 3rd molars have been lost post mortem, as well as the left canine and lateral incisor. No teeth had been lost or extracted during life. There is a very considerable exostosis on the inner aspect of the alveolar margin in the region of the premolars. This is more pronounced on the left side than on the right. The symphysial height is 31·5 mm. and the height at the 2nd molars 26 mm.

Skull No. 56 (Field No. IX. Z. 3)

This is represented by many warped fragments of a skull in 'clinker' condition. The palate is the only part reasonably well preserved. All the teeth were present at death, but have been lost post mortem. The size of this palate, when compared with others in the series, suggests a female.

Skull No. 57 (Field No. IX. Z. 4)

This is represented by parts of a massive skull burned to a 'biscuit' condition. The only fragments reasonably well preserved are the two parietals and part of the frontal. The coronal and sagittal sutures are completely fused, suggesting advanced middle age at the time of death. The massiveness of the bone suggests a male.

Skull No. 58 (Field No. IX. Z. 5)

This is represented by a massive skull and part of the right side of the mandible. The massiveness of the mandible suggests a male. Such parts of the sutures as are preserved are very much fused, indicating advanced middle age. In the preserved parts of the maxilla and mandible it is evident that all the teeth were present at death, although they have been lost post mortem.

Skull No. 59 (Field No. IX. Z. 6)

This is represented by a large number of fragments of a skull and mandible burned to a 'biscuit' condition. The skull fragments are thick and the mandibular fragments massive, indicating a male, but the mastoids are very small. The age at death cannot be estimated, except that the individual was adult.

Skulls Nos. 60, 61, 62, and 63 (Field Nos. IX. Z. 7, 8, and 9)

These four skulls are represented by a mixed mass of broken and very warped skull fragments in 'clinker' condition. In the field they were only considered to represent three individuals. Many of the fragments show a curious green staining which has been analysed with a view to metal staining, but negative results were obtained.

Careful sorting of this mass of fragments shows that four individuals are represented by four distinct occipital bones. The sutures on all the fragments are very open, suggesting that all four were young individuals. Of the four, only one has a well-marked inion. The frontal fragments also indicate that the mass represents one male and three females. No maxilla or mandibular fragments were associated.

Skull No. 64 (Field No. IX. Z. 11)

This is represented by a mass of very poorly preserved skull fragments in powdery condition, together with an incomplete and very massive mandible somewhat better preserved. The right side of the corpus, the symphysial area, and part of the left side of the corpus are intact. The 1st right molar and the left canine were lost during life, all the other teeth were present at death, but have been lost post mortem. There is a marked exostosis on the inner aspect of the alveolar margin in the region of the premolars and 1st molars. Age and sex are indeterminate.

In addition to Nos. 54 to 64 in Trench IX there is a small mandible in 'clinker' condition which probably belongs to one of the group of skulls listed

as 60 to 63 inc. On the right side, part of the corpus and the whole of the ascending ramus is missing. There is no left 3rd molar on the part of the mandible preserved, but an examination of the alveolus shows that this tooth had never erupted, nor is there any germ tooth in the bony structure, so that it may be concluded that this individual would never have developed a 3rd molar on the left side. All the other teeth were present at death, but have been lost post mortem. This mandible is 24 mm. high at the symphysis and the height at the 2nd molars is 21 mm.

TRENCH X

No skulls were found in this trench.

TRENCH XI

Skull No. 65 (Field No. XI. D. 2)

This is represented by a burned and crushed skull in 'wet biscuit' condition, only small parts of which could be preserved, these include the two halves of the palate. The field notes indicate that the skull was that of a very massive male and this is confirmed by the size of the palate and other fragments. The teeth show very little sign of wear and the individual died as a young adult.

Skull No. 66 (Field No. XI. D. 3)

This is represented by part of the face and mandible of a very massive skull which was burned and in such powdery condition that very little could be saved. The size of the fragments suggests a male and the wear on the teeth indicates that death took place in advanced middle age. The following measurements can be obtained from the facial fragments: NB 265, NH(R) 56?, PH 23, 100 NB/NH(R) 41·03.

The left side of the palate is broken away, posterior to the 2nd molar, otherwise it is intact. On the left side the 1st and 2nd molars are preserved, the 1st molar having become inclined forwards during life so that the anterior part of the crown rests on the alveolar margin in the place where the 2nd premolar should be. This was lost during life and the alveolar margin shows absorption. The left canine was present at death, the remaining teeth on the left side having been lost during life.

On the right side the second and third molars were lost during life and also both premolars. The 1st molar crown was also lost during life, the stumps of the roots remaining in the alveolar margin and being worn by grinding. The canine and both incisors on the right side have been lost post mortem.

The mandible is represented by part of the left side only. The 1st molar was the only tooth present at death. The crown has been broken off post mortem.

Skull No. 67 (Field No. XI. D. 5)

This is represented by numerous fragments of a warped skull in 'clinker' condition. The sagittal suture is completely fused, suggesting advanced middle age. The size of the fragments suggests a male.

Skulls Nos. 68 and 69 (Field No. XI. D. 6)

These two individuals are represented by a mass of small skull fragments in a very poor state of preservation. All the sutures visible on the fragments

are very open, while the parts are massive. The assemblage probably represents two young adult males, although in the field only one skull was considered to be represented. The left maxilla of one of the two individuals is very well preserved and gives a nasal length of 57 mm. with a nasal width (estimated by doubling) of 25 mm. Ph. is 30 mm. and G'H 77 mm., 100 NB/NH(L) 43·86.

Skull Nos. 70, 71 (Field Nos. XI. D. 9, 11).

These are represented by very fragmentary skulls in 'biscuit' condition. The fragments are massive and suggest males. Age at death is indeterminate.

Skull No. 72 (Field No. D. 13)

This is represented by fragments of a skull burnt to a brown 'biscuit' condition, together with a mandible rather better preserved. The only part of the skull which is reasonably preserved is the frontal bone which is very massive and clearly that of a male. The teeth are very little worn and suggest a young adult.

The right side of the mandible is complete except for the condyle. On the left side the whole of the ascending ramus is missing. All the teeth were present at death, but the right 2nd premolar, all four incisors, the left canine, and the left 1st premolar have been lost post mortem.

The height of the mandible at the symphysis is 36 mm. and at the 2nd molars 30 mm. The 3rd molars are very small and the 1st molars the largest.

Skull No. 73 (Field No. XI. D. 14)

This is represented by a mass of skull fragments burned to a black colour, together with the greater part of a massive mandible. The size of the mandible and the thickness of the skull fragments suggest a male, while the wear on the teeth, in which even the 3rd molars exhibit a high degree of attrition, indicate that death took place at an advanced age.

The right ascending ramus of the mandible is missing and also the left coronoid, otherwise the mandible is intact. All the teeth are present. The height of the symphysis is 36 mm., height at 2nd molars 31 mm.

This mandible is unusual in the arrangement of the canines and incisors, which form a more or less straight line. The two central incisors exhibit a most unusual type of wear, the enamel being worn off not only on the crowns, but also down the anterior aspect.

Skull No. 74 (Field No. XI. D. 16)

This is represented by many fragments of a massive skull and mandible, severely burned and in a crushed condition. The skull is particularly massive and was almost certainly male. The wear on the teeth, which are preserved, suggests that death took place during advanced middle age. All the teeth were present at death.

Skull No. 75 (Field No. XI. D. 17)

This is represented by a very crushed skull in 'biscuit' condition, the bones are small, and it was probably that of a female. The teeth were all present at death and they show extreme attrition, indicating a very aged individual.

Skull No. 76 (Field No. XI. D. 18)

This skull and mandible were in such powdery condition that only the palate could be brought back to the laboratory. This is large and probably represents a male. The 2nd molars had only just erupted at the time of death and the 3rd molars were still in the crypts, indicating a sub-adult.

Skull No. 77 (Field No. XI. D. 27)

This is represented by an immense and very massive frontal bone which clearly belongs to an individual not accounted for in any of the material described. It was found near the edge of the area left unexcavated as a witness section and the remainder of the skull is probably there. The measurements of this frontal bone are as follows:

B1	103 mm.	S1	140 mm.
B2	100 mm.	Frontal chord	124
B3	100 mm.		

It has a maximum thickness of 14 mm. and a minimum of 5·3 mm.

Skull No. 78 (Field No. XI. D. 28)

This is represented by fragments of another very massive skull (which cannot be the same as No. 77 since it includes parts of the frontal). The whole of the left temporal is preserved, as are the left parietal and parts of the right parietal. The sagittal suture is completely fused, indicating advanced middle age. In spite of the very small size of the mastoid it was probably a male. The left parietal has a maximum thickness of 16·5 mm., and a minimum of 4·5 mm.

In addition to skulls 65–78 inc. from Trench XI the following fragments, which may belong to some of the skulls described from other trenches, also deserve mention.

(*a*) The greater part of a mandible with the left condyle missing and the right ascending ramus broken off. The two central incisors had been extracted in early life: of the remaining teeth all save the 2nd right premolar and the 2nd right molar have been lost post mortem. There is a marked exostosis on the inner aspect of the alveolar margin in the region of the premolars on both right and left sides. The height at the symphysis is 32 mm. and at the 2nd molars 27 mm.

(*b*) Part of a large mandible from which the central incisors had not been extracted in early life. All the teeth have been lost post mortem. Height at symphysis 34 mm., height at 2nd molars 25·5 mm.

(*c*) The right half of a mandible in which the condyle exhibits signs of severe arthritic infection. The central incisors had been extracted in early life, the remaining teeth have been lost or damaged post mortem. The height at the symphysis is 33 mm. and at the 2nd molar 30 mm.

(*d*) The right half of a very crushed mandible in which the condyle exhibits signs of arthritic infection.

(*e*) A left mandibular fragment in which all the erupted teeth have been lost post mortem, but in which the left canine had never erupted but had become impacted against the roots of the 1st premolar.

(*f*) A small complete palate in which all the teeth were present at death but have been lost post mortem.

INFANTS

In addition to the seventy-eight adults and sub-adults listed in the foregoing pages, the excavations yielded the remains of four infants all found in Trench VI and in close proximity to each other.

Infant No. 1 (Field No. VI. A. 10)

Very fragmentary skull and mandible of an infant in which the 1st molars of the permanent dentition were still in crypts.

Infant No. 2 (Field No. VI. A. 11)

As No. 1.

Infant No. 3 (Field No. VI. A. 17)

Fragments of a skull of very small size which, judged by present-day comparative material, represents a child of about two years of age. No teeth are preserved.

Infant No. 4 (Field No. VI. A. 18)

Fragments of a skull, including parts of the maxillae and mandible of an infant in which the permanent central incisors were just erupting and in which the 1st permanent molar was in position at the time of death, together with a milk molar.

ANALYSIS OF THE AGE AT DEATH OF THE INDIVIDUALS CREMATED AT NJORO

Of the 78 adults and sub-adults whose remains have been identified, in 6 cases neither sex nor age at death can be estimated. In a further 6 cases the evidence for sex is inadequate, leaving a total of 65 individuals for analysis. The accompanying table shows the results.

This is interesting from several points of view. Even if the 11 individuals whose sex cannot be determined are considered as all having been females, the number of females is still much less than the number of males. On the determinable series, males number 42 with only 21 females. Of the males whose age can be estimated, 15 out of 34 never reached even early middle age, while 20 never reached full middle age. Only 1 out of 34 reached an advanced age.

Of the females whose age can be estimated, 8 out of 18 died before reaching early middle age, while 9 reached or passed middle age. Two out of 18 reached a really advanced age.

It seems, therefore, as though 'expectation of life' was rather higher among women than men once middle age was reached, the proportion of males and females who died before reaching even early middle age is about the same.

Table

	Males	*Females*	*Sex doubtful*	*Sex indeterminate*	*Totals*
Sub-adult	1	1	0	4	6
Young adults	14	7	1	0	22
Early middle age	5	1	0	0	6
Middle age	5	3	0	1	9
Advanced middle age	8	4	0	0	12
Aged	1	2	0	0	3
Age indeterminate	8	3	3	6	20
Totals	42	21	4	11	78

III. COMPARISON OF THE NJORO SKULLS WITH CERTAIN OTHER GROUPS

In spite of the fragmentary nature of the material from Njoro, enough measurements are available to allow of a few comparisons not only with other East African prehistoric skulls, but also with some of the data available in connexion with recent races inhabiting Africa.

Upper Palaeolithic man in East Africa is represented by skulls Nos. 4 and 5 from Gamble's Cave II,[6] by the Oldoway skull,[7] and by a skull from Naivasha[8]. All of these are associated with the Kenya Capsian culture (formerly termed Upper Kenya Aurignacian). Apart from mentioning that these skulls are dolichocephalic and show affinities with Upper Palaeolithic man in Europe, they need not be discussed here as they are very far removed from the Njoro group.

Of much more importance is a comparison with the Mesolithic and Neolithic races of Kenya, details of which have been published in *Stone Age Races of Kenya*[9] and in the *Report on the Excavations at Hyrax Hill*.[10]

Mesolithic and Neolithic sites have, in the past, yielded two distinct racial types, the one ultra-dolichocephalic with a relatively long face, narrow nose, and fairly prominent nasal bones, and the other brachycephalic, usually small and of pentagoid form with a much shorter face but also with a narrow nose and prominent nasal bones, although the nasal bridge is flatter. Both these types were represented at Bromhead's Site, Elmenteita (Mesolithic), and at Hyrax Hill (Neolithic). They are also present at Njoro.

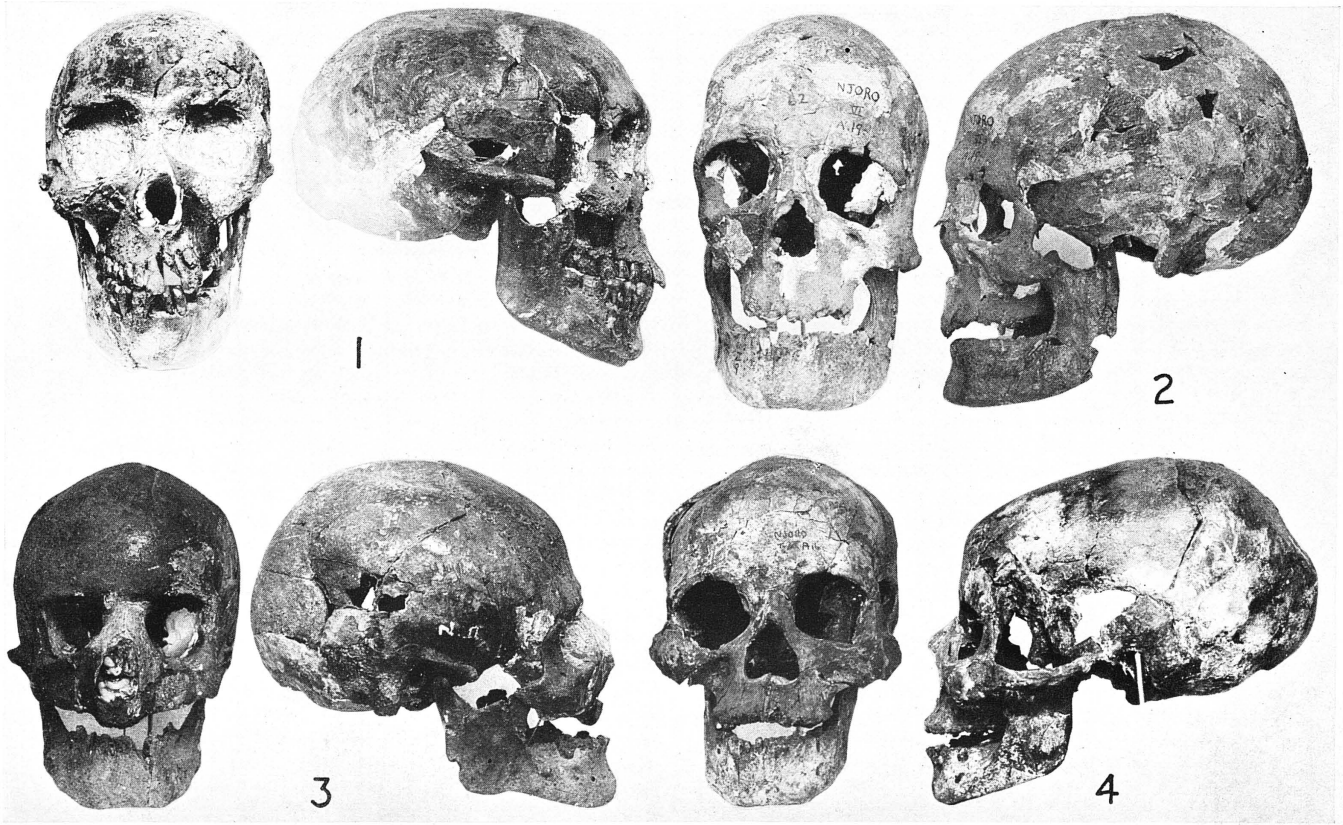
In addition to these two racial types, best represented by the skulls Elmenteita A and Elmenteita F1, there is a third racial type which first appears in the Neolithic, namely the ultra-dolichocephalic skulls from Willey's Kopje, Elmenteita. Apart from comparative measurements, a glance at the illustrations in *Stone Age Races of Kenya* will show how clearly this race differs from the dolichocephalic Elmenteita A type. The face is shorter, the nose even more prominent, and the form of the mandible quite distinct. This third racial type is also represented among the skulls from Hyrax Hill and Njoro.

As might be expected, not all the skulls in the series from the Njoro River Cave now under consideration fall exactly within one or other of these three racial groups. Some of them exhibit characters which suggest that they are the result of crossing. In spite of this, however, the three types can be clearly recognized and the human remains from Njoro cannot be described as a homogeneous group.

There are, however, certain other characters in respect of which the Njoro material is remarkably homogeneous.

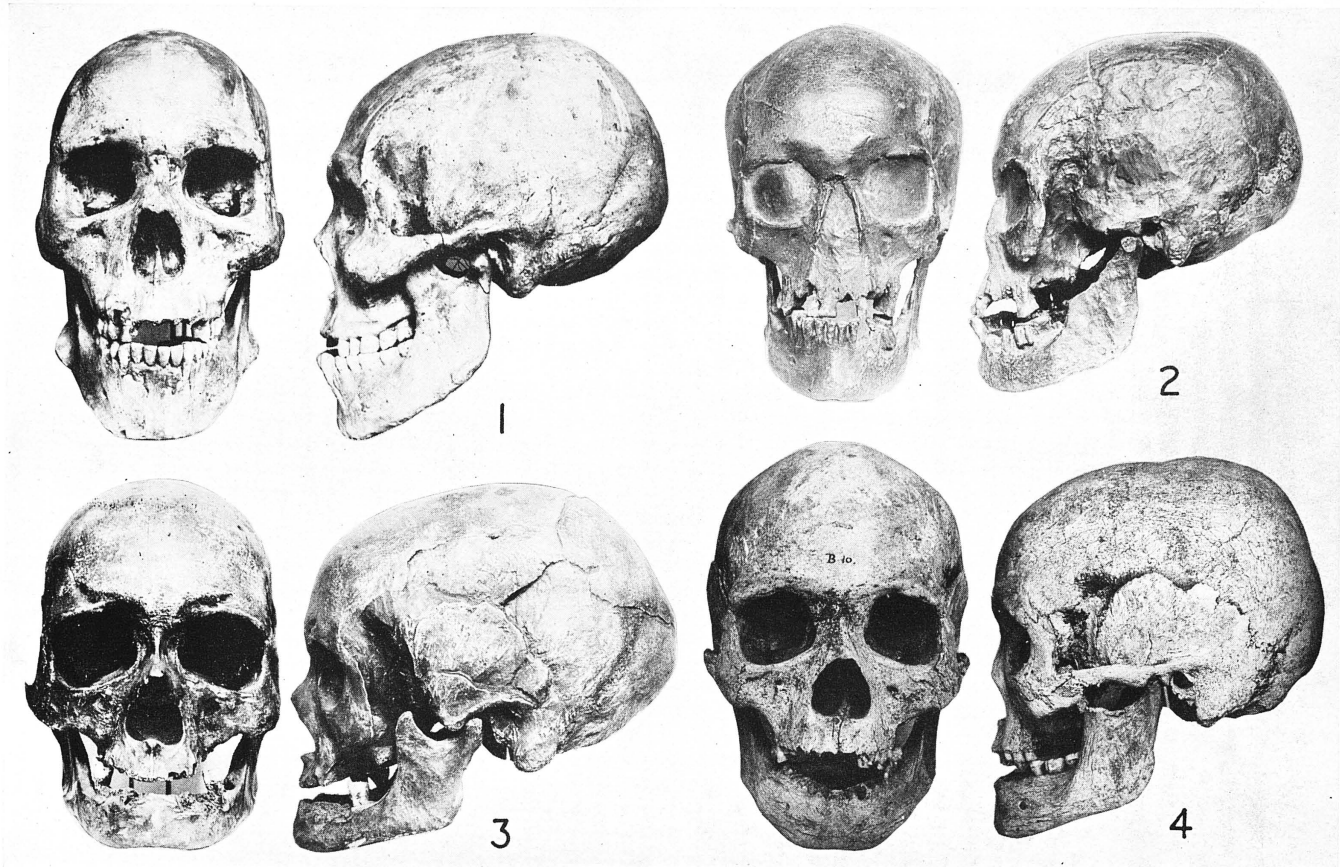
It is generally maintained that one of the characters that most clearly distinguishes the negro from other racial types is a relatively high occipital index. The mean figures given for negroes of the Gaboon, the Cameroons, and the Congo are respectively 67·8, 65·6, and 68·8.[11] I have no figures available for the negroes in America, but I understand they are of the same order.

Miss Kitson has pointed out in her study of negro crania from which these figures are taken that the Bantu-speaking peoples of Kenya and Tanganyika,



FOUR RECONSTRUCTED SKULLS FROM THE NJORO RIVER CAVE

1. Skull No. 5; 2. Skull No. 45; 3. Skull No. 9; 4. Skull No. 44



COMPARISON OF THREE PREHISTORIC RACIAL TYPES FROM EAST AFRICA WITH A MODERN NATIVE SKULL (KIKUYU)

1. Elmenteita A; 2. Elmenteita F1; 3. Willey's Kopje III; 4. Kikuyu

so far as is known, do not conform in respect of occipital index with the peoples of West and Central Africa. She gives the following figures for East African Bantu: Teita 59·5, Tanganyika natives 61·0.

A group of 13 skulls of a Bantu-speaking people, the Kikuyu, in the Coryndon Museum, gives a mean occipital index of 60·42, a figure which accords with those recorded by Miss Kitson. On the other hand, the mean occipital index of nine Nilotic skulls is 58·04, showing that these people are less negroid in respect of the occipital index than are the Bantu-speaking peoples.

The difference between the occipital indexes of the West and Central African groups and the East African Bantu group is not surprising since, despite woolly hair and dark skin, the Bantu group is clearly not wholly negro although negro admixture is evident.

When we turn to the Njoro people who are the subject of this report, we find that the mean occipital index of seven skulls is 55·82 with 57·79 as the highest individual index. Thus, in respect of this character, the Njoro people are even further removed from the negroes than are the present-day Bantu-speaking peoples.

When the Njoro series is compared with other Mesolithic and Neolithic skulls from Kenya we find that there is a close resemblance, the mean figure for a total of eleven skulls being 57·08.

If a high occipital index is regarded as one of the most constant characters of true negroes, probably an equally diagnostic feature is a high degree of platyrrhinny represented by nasal indexes.

Miss Kitson has shown that in this character the East African Bantu-speaking peoples are not very different from the negro and semi-negro races of Africa. She gives the following mean figures: Gaboon negroes 56·0, Angoni 58, Teita 58·3, Tanganyika natives 55·4. To this may be added the mean figure for the series of East African skulls in the Coryndon Museum, namely, Kikuyu 58·44, Nilo-Hamites 55·78.

Contrasted with these figures of normal nasal indexes for present-day African groups we find that the mean nasal index for 17 Njoro skulls is 47·88, while the mean for other Mesolithic and Neolithic skulls is 45·24. Both these figures are considerably lower than the mean nasal index for the Galla and Somali, who, of the present-day African peoples, are regarded as among the most leptorrhine.

Thus, in respect of the two characters most commonly regarded as typical of the negro races, the occipital index and the nasal index, we see that the Njoro skulls stand out as being quite dissimilar and non-negro, while they are closely linked with the other Mesolithic and Neolithic races of Kenya.

In this connexion it is perhaps not without interest to note that among present-day races of Kenya it is possible to select individuals occasionally who are very unlike the norm of the particular group to which they belong and who show a much closer resemblance to the Mesolithic and Neolithic types.

When more data become available in the future it may perhaps be shown that the differences between the East African peoples and those of West and Central Africa are due to the crossing of incoming negro elements with the non-negro races who inhabited Kenya during Mesolithic and Neolithic times.

SUMMARY AND CONCLUSIONS

THE culture revealed by the excavations at the Njoro River Cave includes many features previously known in the Neolithic and Mesolithic of East Africa, but there are also several new characters not previously recorded. Of these the method of cremation is perhaps the most remarkable and, summarizing the evidence obtained during the excavations, it may be assumed to have been probably carried out in the following manner.

Before cremation a body was bound into a contracted or ultra-contracted position with lengths of plaited fibre cord. The charred substance found in many cases surrounding the bodies (which may be taken to be leather or hide, although analytical tests have proved negative) indicates that either the deceased's clothing was not removed, or else that the body was wrapped in skins or hides before being tied in position. Necklaces and other ornaments were left on the bodies in some if not in all cases.

It seems that a shallow grave was dug for each body and that it was burned inside the grave, possibly being first covered over with a certain amount of soil, since, had the burning taken place above ground in the open air, the combustible grave goods would have burned to ashes and perished instead of being preserved as charcoal through carbonization. The very unusual degree of disturbance evident in the deposit suggests that as the limited area of the floor space was used up, later graves were dug into the area where earlier cremations had taken place even though it involved disturbing the older charred remains.

With each adult individual was placed a stone bowl, a pestle, and a grindstone, whilst in some cases sundry other domestic articles were also placed with the bodies in addition to their personal ornaments.

Red ochre clearly played a large part in the funerary rites, since many of the bones and grave goods still retain ochre staining, and it occurred in layers at intervals throughout the deposit besides having been liberally spread over the rock floor of the cave.

The obsidian industry is clearly derived from the Elmenteitan. It is somewhat degenerate, but not so ill made as that of the Gumban B variant of the stone-bowl culture, likewise derived from the Elmenteitan. In form and proportions the implements are quite unlike those of the Kenya Capsian, whose derivatives are known to have persisted into other branches of the Neolithic stone-bowl culture.

In the pottery there seem to be a number of different influences at work. We find similarities to the pottery of almost all the known branches of the stone-bowl culture and to the Wilton B and the Elmenteitan. A pierced lug was found at Njoro, but there is no suggestion of impressed-cord decoration, a form of decoration which elsewhere in the Nakuru district invariably coincides with the use of lugs and handles, both making their appearance in Gumban B times and continuing to be used until the present day.

The stone bowls are in general crude and the most evolved forms found at Ngorongoro and the Nakuru Burial Site do not occur at Njoro.

Little comparative value can be attached to the pestles or lower grindstones since the simple forms of these implements in use during the Neolithic in East Africa are necessarily very similar in whichever culture they occur.

In the stone beads and pendants, however, we find a most unusual and puzzling feature which is difficult to account for in the culture of a people still living in the Stone Age.

It seems unlikely, in the writers' opinion, that the manufacture of beads and pendants of this type was a spontaneous development of the Njoro people themselves and it seems more reasonable to assume that some extraneous influence was responsible for its inception.

We know that faience and carnelian beads—unquestionably imported—had reached the area to the east of Lake Nakuru during Gumban B times and it is possible that the Njoro people were inspired by a few imported beads to attempt copies from local materials. Trade goods such as beads were probably more easily acquired by the Gumban B people living in the open country in the floor of the Rift Valley than by the Njoro forest-dwellers who would be relatively isolated and less likely to come into contact with foreign influences even though, as seems likely, they lived in more recent times.

In his brief report on a sample of beads from Njoro, the late Mr. Beck commented on their resemblance to Predynastic beads. This is evident. But the Njoro collection lacks many of the Predynastic forms, so that it seems questionable whether any particular significance can be attached to the similarities which do exist.

Although the occurrence of large numbers of these beads may be due to the reason outlined above, this does not satisfactorily explain the means by which the Njoro people acquired the knowledge of how to drill and polish the quartzes, chalcedonies, and agate from which the beads are made. Furthermore, it is likely that future research will reveal that the bead-making industry was of considerable extent, since large numbers of mine-shafts and shallow workings occur in the rock on the Mau, similar to those in the Njoro Cave itself. Present-day natives have no knowledge of these workings and although they have not yet been investigated there seems little doubt that they are associated with the bead-making, since no material of any value occurs in the volcanic tuff other than the agate and chalcedony from which the beads and pendants were made.

There is no suggestion that stone beads have continued to be worn until modern times by any Kenya tribe, or even preserved as heirlooms, but we have already seen that the sedge-seed beads which occur in great quantity at Njoro were made and worn by the Bagishu tribe until recent years.

The study of the skulls from the Njoro site reveals that two quite distinct racial types are represented and there are a few that suggest they are the result of the crossing of these two racial types.

Despite the divergence of skull form, ranging from ultra-dolichocephalic to brachycephalic, the figures reveal a very remarkable homogeneity in respect of both the occipital index and the nasal index. In both these characters the series is very clearly differentiated from true negroes and also from the East African negroid tribes including the Bantu-speaking and Nilo-Hamitic groups.

While it is clearly impossible to deduce from these facts the colour of the skin of the Njoro people or the nature of their hair, it may be said with a high degree of certainty that they were not negroes in the accepted sense of the word. On the other hand, the Njoro skulls show a very marked similarity with

the known Mesolithic and Neolithic races of Kenya, excepting the racial type known as Elmenteita B, which does not appear to be present at Njoro.

From the apparently late date of the Njoro culture it might have been expected that the skulls would show a close resemblance to the living races of Kenya, but this is not the case.

The custom of extracting the central incisors of the lower jaw is widespread among the native races inhabiting Africa to-day and has been regarded by some authorities as characteristic of the Negro peoples. In fact, however, there is evidence to show that this custom was practised in Palestine during Mesolithic times by a people who were unquestionably not negro or even negroid.[12] It is also found in Kenya among the Neolithic people of Willey's Kopje, of the Nakuru Burial Site, and of the Makalia Burial Site. It was not practised by the Elmenteitan people of Bromhead's Site so that it is probable that the custom, in so far as it is found among the Njoro people, was not introduced by the racial group which is so clearly linked with the Elmenteita A and F1 types of Bromhead's Site but by the other racial element which is linked with the Willey's Kopje and Makalia Burial Site peoples.

The fact that this custom has become widespread in Africa shows that it may be regarded as an inheritance from the Stone Age and provides a link between the Stone-Age people and the living races.

The table setting out the approximate age at death of the individuals cremated at Njoro is interesting when compared with similar tables for prehistoric and modern peoples. It is clear that the expectancy of life among the Njoro people was considerably lower than today, as it was with the Mesolithic people of Bromhead's Site, Elmenteita.

Considering the apparently late date of the Njoro culture it is surprising that the links with the present-day peoples are so scarce. In fact, the only tribe which provides even a possible connexion are the Bagishu, living on the western slopes of Mount Elgon. These people, as already mentioned, used the seeds of the sedge *scleria racemosa* for making beads, but they also practised a form of cremation. Unfortunately, only very incomplete accounts of the Bagishu are available,[13] but it is recorded that when a person dies parts of the body are removed, and after the flesh has been consumed by the relatives in ritual cannibalism the bones are burned. Only certain parts are treated thus, the remainder of the body being dragged out into the bush to be disposed of by carrion-feeders.

This custom is clearly not closely comparable to the true cremation discovered at Njoro, but it does, nevertheless, provide a parallel, since cremation in any form is otherwise unknown in East Africa, so far as the writers are aware.

It is possible that further links with Njoro might be found among the Bagishu if investigation were to be carried out, since it is stated that they were cave-dwellers until recent years and, further, that a number of stone bowls have been discovered in the Elgon caves beneath the rubbish accumulated by the modern Bagishu occupants.

No close parallels to the Njoro method of burial and cremation are known among other prehistoric sites in East Africa, but at two sites, Bromhead's Site, Elmenteita, and the Ngorongoro Burial Mounds in Tanganyika Territory, there are certain features which are almost certainly connected.

ERRATA

Page 76, l.10, *delete reference* [12]

78, l.7, *delete the reference*

12. WEIDENREICH, F., 1936. *Pal. Sin.*, Series D, vol. vii.

At Bromhead's Site, attributed to the Elmenteitan culture, some traces of burning were noticed on a proportion of the human bones and crania; particularly on the skull F1. At the time, this slight burning was not considered to be of significance and was regarded as probably accidental, but in view of the subsequent discoveries at the Njoro Cave and the fact that some of the Njoro racial types and industry are clearly linked with the Elmenteitan, it is probable that the burning was intentional and formed part of the burial customs, although it was only partial and is not comparable to the true cremation found at Njoro.

At Ngorongoro, on the other hand, there is no trace of cremation, but the burial mound excavated by one of us in 1941 proved to be a communal grave containing the remains of a number of individuals, some of which were in a disturbed condition. As at Njoro, red ochre had been liberally applied to the bones and crania and was also found as a distinct layer beneath the lowest burials. It has been shown that the disturbance of the cremated burials at Njoro is unlikely to have been caused by scavenging animals: at Ngorongoro this can be definitely ruled out since the surface of the burial mound was sealed by a covering layer of stones, well packed and clearly in their original positions.

The slopes of the Ngorongoro caldera where the burial mounds are situated are entirely of open grassland and devoid of caves. In view of the other cultural links between Njoro and Ngorongoro, this suggests the possibility that the mounds may represent a slightly divergent adaptation to local conditions of the communal cave burials practised by the Njoro people.

The principal difference between this site and Njoro lies in the absence of cremation. But it is perhaps significant that marine shell ornaments occur at Ngorongoro as well as the stone beads and pendants that are entirely similar to the Njoro series; this presupposes that coastal trade was already well established—of which there is no suggestion at Njoro—and it seems possible that Ngorongoro represents a later branch of the Njoro culture in which cremation had ceased to be practised.

In conclusion, it can be stated that although the exact date of the culture discovered at the Njoro River Cave cannot be determined, it is later than the maximum of the Nakuran wet phase; that it is probably earlier than the branch of the same culture discovered at Ngorongoro and that the non-negroid racial types and the culture itself have apparently disappeared in East Africa, with the possible exception of a survival among the Bagishu tribe in eastern Uganda.

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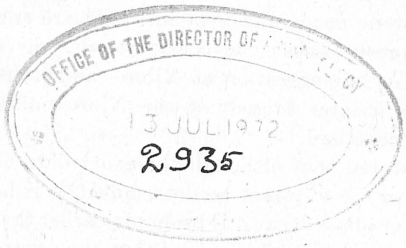

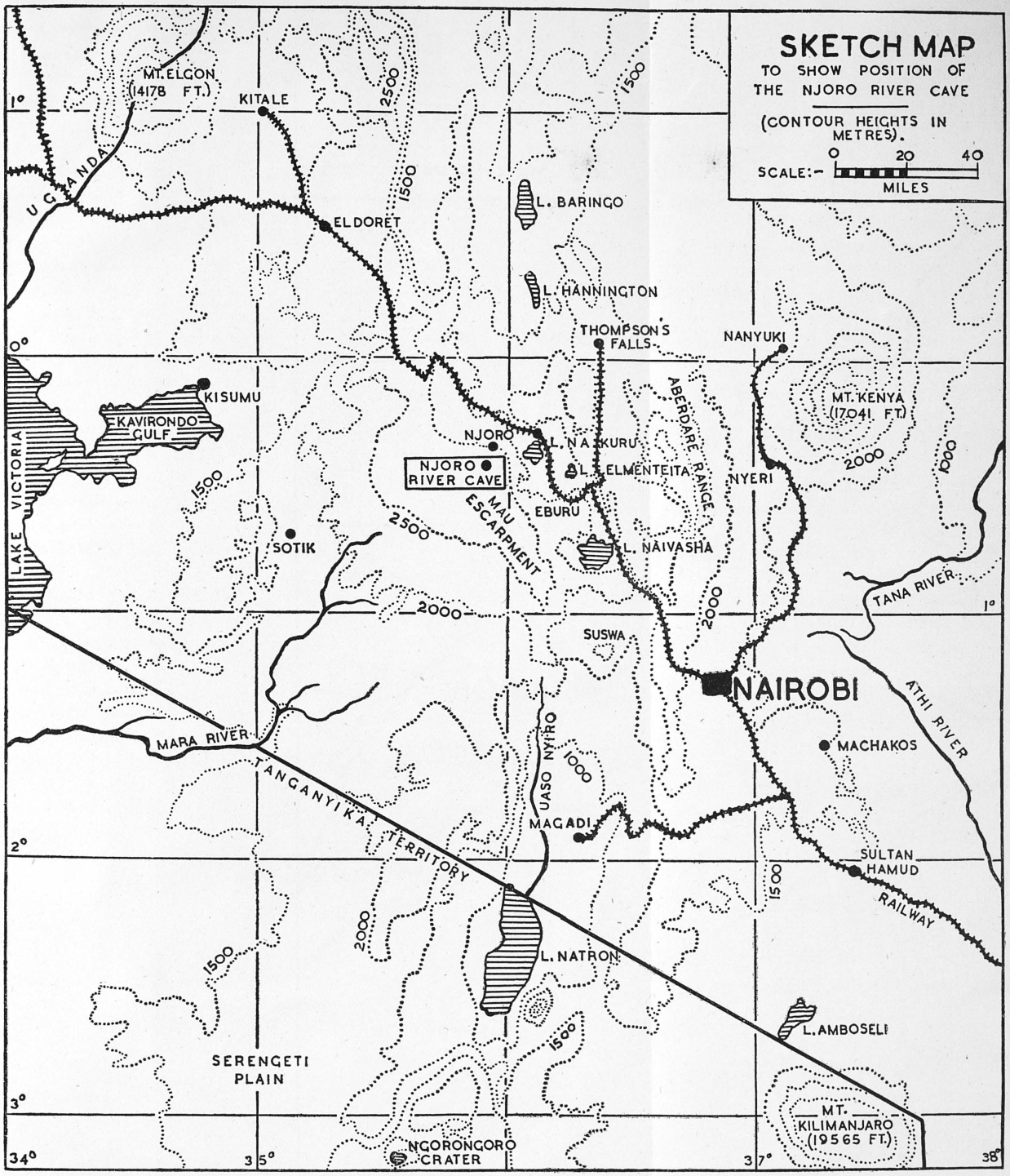
SKETCH MAP
TO SHOW POSITION OF THE NJORO RIVER CAVE
(CONTOUR HEIGHTS IN METRES).
SCALE:- 0 20 40
MILES
MT. ELGON (14178 FT.)
KITALE
UGANDA
ELDORET
L. BARINGO
L. HANNINGTON
THOMPSON'S FALLS
NANYUKI
MT. KENYA (17041 FT.)
ABERDARE RANGE
KISUMU
KAVIRONDO GULF
LAKE VICTORIA
NJORO
NJORO RIVER CAVE
L. NAKURU
L. ELMENTEITA
NYERI
MAU ESCARPMENT
EBURU
SOTIK
L. NAIVASHA
TANA RIVER
SUSWA
NAIROBI
ATHI RIVER
MACHAKOS
MARA RIVER
TANGANYIKA TERRITORY
UASO NYIRO
MAGADI
SULTAN HAMUD
RAILWAY
L. NATRON
L. AMBOSELI
SERENGETI PLAIN
MT. KILIMANJARO (19565 FT.)
NGORONGORO CRATER
1°
0°
2°
3°
34°
35°
37°
38°
1500
2000
2500
1000

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