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A STUDY OF THE CRANIAL AND SKELETAL MATERIAL EXCAVATED AT NIPPUR

DARIS RAY SWINDLER

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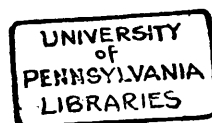


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FOREWORD

The skeletal material presented in this report was recovered at Nippur in 1948 and 1949 by the joint expedition of the University Museum of the University of Pennsylvania and the Oriental Institute of the University of Chicago. The field director was Dr. Donald E. McCown of the Oriental Institute. The particular site covered by this report was named Tablet Hill A because of the many tablets unearthed during the excavations. The skeletal material of the first season was collected and measured in the field by Dr. Carleton S. Coon; that of the longer second season by Mr. Frank A. Hildebrandt, the physical anthropologist who accompanied the two expeditions. This material was then sent to the University Museum of the University of Pennsylvania where it was made available to me.

I should like to express my gratitude to Professor Wilton M. Krogman, Professor Loren C. Eiseley, Dr. Richard M. Snodgrasse, and Dr. Francis R. Steele for their encouragement and assistance to me in carrying out this report.

INTRODUCTION

The skeletal material studied in this paper was unearthed at Nippur by the joint expedition of the University Museum of the University of Pennsylvania and the Oriental Institute of the University of Chicago. . . . The problems to be considered are the sexing of the crania, the age at death of the individuals, the pathology present, the racial affinities of the people, and the uniformity and stability of a racial type.

The procedure followed is essentially one of comparison. The Nippur crania are compared with other skulls that have been recovered in Mesopotamia and other sections of the Near East. This method enables us to ascertain the similarities or differences that may exist between these ancient populations. For the comparison, as well as the study involving physical types, we shall employ two techniques. One is that of description, in which we shall attempt to assay the morphological characteristics of the crania to determine their racial ties. The other technique is measuring and the subsequent reduction of these data into means and indices. By the utilization of these two methods, we hope to show the racial affinities of the Nippur crania with the Mediterranean physical type. Craniostat drawings and photographs were made of four crania to help facilitate the reader in better visualizing this type.

The utilization of a familiar test in statistics, known as the T-Test, will help to prove that the Nippur crania and the ninth century Islamic crania may be considered as one population. We believe if the homogeneity of these two samples can be proven, it will in turn, reveal the stability and uniformity of the Mediterranean physical type during the passage of many centuries in Mesopotamia.

THE NIPPUR SITE

Nippur is situated about five miles north of the modern town of Afej, or some 130 road miles from Baghdad in Iraq. In ancient times Nippur, with Babylon and Warka, was the principal, as well as the most influential city in Babylonia. A large canal, now dry and for miles entirely filled with sand and rubbish, divides the site into two almost equal parts. This canal, now called Shatt en-Mil, is supposed to be a continuation of the famous canal which, branching off from the Euphrates above Babylon, once carried life and fertility to the otherwise barren plains of Central Babylonia (Hilprecht, 1904, p. 161). During this period of efflorescences Nippur was the home of scholars, schools, priests, and libraries, as well as the site of the Ekur Temple of Enlil. The importance of this temple is increased by the fact that Enlil headed the Sumerian pantheon and was the leading deity of Mesopotamia from earliest historic times down to the ascendancy of Marduk of Babylon in the first quarter of the second millennium B.C. (Steele, 1949, p. 15). Therefore, the many monarchs reigning over the land must have made many pilgrimages to Nippur, bringing with them numerous votive offerings. This fact, coupled with the presence of the many libraries containing tablet after tablet of cuneiform literature, has been the reason for many expeditions to Nippur.

From the preceding paragraph it is easily understood why Nippur has long attracted the eye of the archeologist. This enthusiasm started some 60 years ago when Dr. H. V. Hilprecht led the pioneer party to Nippur. Since that time the University of Pennsylvania has participated in four expeditions to Nippur. However, for the last forty-nine years this ancient city has had to take a back seat in deference to such important sites as Ur and Gawra, to mention only two outstanding examples. Then in September 1948, Dr. Thorkild Jacobsen, Director of the Oriental Institute of the University of Chicago, organized an expedition to reopen the famous mounds which had furnished so much rich material in the past. This expedition was of short duration and returned to the States after a few months in the field. Immediately another trip was planned for the following year. It was from this longer more extensive expedition that the skeletal material to be considered in this report was obtained. At the present writing further excavations are being undertaken at Nippur and it seems appropriate at this time to reiterate the words of Dr. Steele, "No one can say for sure just what the future holds, but we are entitled to as much certainty as archaeological research will allow that if ever there was a site potentially rich in both inscriptional and cultural material, Nippur is that place" (Steele, 1949, p. 21).

Before considering the skeletal material in any detail a brief discussion of the manner in which the Babylonians buried their dead seems in order. These ancients like so many others, usually buried their dead in a contracted position, thus believing that one should leave this world as he entered it. Although Steele reported no evidence of cremation, Hilprecht mentioned that he excavated many funeral vases and other remains illustrating the practice of cremating the dead (Hilprecht, 1904, p. 544). The burials were of two types, one consisting of two large jars laid face to face while the other was a deep, short, slipper shaped clay sarcophagus which has been called "bath tub" coffin. This last type was commoner in the earlier periods, although both methods of interment were practiced in every horizon. The material culture placed with the dead ranged from crumbling dates and bones to robes, pottery, and cylinder seals with an occasional cup or vase with blackish deposits of unknown liquids in them. Hilprecht reported finding no gold or silver ornaments (Hilprecht, 1904, p. 162) with the dead. Steele, however, found an occasional gold nose ring in the burials. He also found, in the upper two levels, what he has called "egg shell" bowls. These were very thin and delicate containers, each having some sort of design pressed upon them.

In many instances the materials as well as the remains of the dead were in a very poor state of preservation. The large double jar burials contained the better material because the "bath tub" coffins, originally sealed with wooden lids, after many centuries rotted away and allowed the elements a free hand at

their contents. Occasionally a "bath tub" had been sealed with a lid of terra cotta and the remains were in a much better condition.

The Islamic burials consisted of either palm wood coffins or simple earth burials. The former were long and rectangular and had been constructed with two- to three-inch iron nails. The latter were merely simple earth burials with the body extended. These people placed very practical household utensils with their dead. Now and then a glass bottle was found in a coffin, suggesting perhaps a continuation of the idea of having a container of some sort of nourishment accompany the deceased on his journey to the next world. These recall the clay cups containing the blackish liquid from the earlier Babylonian periods.

CHRONOLOGY AT NIPPUR

The archeological horizons, from which the skeletal material studied in this report was unearthed, represent a continuum of time covering some four hundred years. There was no evidence uncovered during the excavation to indicate any marked interruption or ethnic intrusion throughout the period covered in this paper. The culture, however, did not remain static but the changes were slow and gradual, which suggests the phenomenon known as culture drift. As will be seen, the skeletal evidence points toward an ethnic continuity which of course, does not presuppose cultural stagnation. The actual time scale for this site has not been thoroughly worked out, although, the following dates supplied by Dr. Steele for the five levels are in all likelihood pretty nearly correct.

Chronology at Nippur

| | |
|-------------|--|
| Nippur IV-V | <i>ca.</i> 900 B.C. to <i>ca.</i> 700 B.C. |
| Nippur III | <i>ca.</i> 640 B.C. to <i>ca.</i> 620 B.C. |
| Nippur II | <i>ca.</i> 550 B.C. to <i>ca.</i> 530 B.C. |
| Nippur I | <i>ca.</i> 530 B.C. to <i>ca.</i> 500 B.C. |

Table No. 1

On top of level I was found an assortment of debris which contained numerous burials of the Islamic period (*ca.* ninth century A.D.). This material was collected and studied by Dr. Carleton S. Coon of the University Museum of the University of Pennsylvania. The statistical data which emerged from this work was made available to me, in order that a comparative study could be made between the earlier Babylonians and the later Muslims of this area of Mesopotamia. The results appear in a later section of this paper and we shall see that they further substantiate our original premise, that Mesopotamia has been inhabited for many millennia by a comparatively homogeneous physical type.

THE AMOUNT OF SKELETAL MATERIAL FROM NIPPUR

The total number of crania and mandibles uncovered are divided first by horizon and then by age group in Table No. 2.¹

¹Under "adults" were included all data sheets that had been marked 18⁺ by Mr. Hildebrandt. This procedure had to be followed since about half the crania were left in the field.

Number of Crania and Mandibles

| Period | ADULTS | | CHILDREN | |
|---------|--------|-----------|----------|-----------|
| | Crania | Mandibles | Crania | Mandibles |
| V-IV | 14 | 13 | 3 | 3 |
| III | 14 | 13 | 4 | 4 |
| II | 14 | 13 | 3 | 3 |
| I | 4 | 4 | 1 | 1 |
| Islamic | 11 | 11 | | |
| Totals | 57 | 54 | 11 | 11 |

Table No. 2

From this total of fifty-seven crania about half (twenty-five) were brought to the University Museum for a more intensive study in the laboratory. As previously stated, many of the skulls were in a poor state of preservation and these were measured in the field by Mr. Hildebrandt. The twenty-five brought to the University Museum were in much better condition, although a few had been broken en route. These skulls were reconstructed by Mr. W. Hall.

It should be added here, that there are two additional crania in this collection. One is No. 159 and is represented by the skull and mandible. It was uncovered in another opening of Tablet Hill known as Tablet Hill B. Since the stratigraphy is not known for this second site we can not actually place it in our chronology. The other cranium, No. 157, was found in the Islamic level and, again, there is no date for this particular horizon.² Ideally this material should have been incorporated with Dr. Coon's Islamic tabulations; however, we did not consider these crania sufficient justification for redoing his statistics. Both of these skulls will be discussed when morphological types are considered. In addition to these and the other adult crania, there were also five children's crania brought to the University Museum.

The long bones that accompanied these skulls, with the exception of two femora, were left in the field. All measurements of the long bones were performed during the excavation by Mr. Hildebrandt. In a later section dealing with the appendicular skeleton we shall enumerate this material in greater detail.

THE SEX AND AGE OF THE NIPPUR SKELETAL MATERIAL

When we now segregate the fifty-seven crania into male and female and place them in their proper levels, we arrive at a sex distribution as seen in Table No. 3. This table does not contain the eleven children's skulls. The explanation for this is, that at this very young and immature stage in morphological development, the individual has not yet attained the more rugged characteristics of the adult, which are employed as diagnostic criteria in differentiating males from females. Two fairly reliable criteria which are used to differentiate between male and female skulls are the development of the supraorbital ridges, the ridges immediately above the bony orbits, and the massiveness of the ridges on the back part of the skull from which the neck muscles have their origin and insertions. It thus becomes apparent that the investigator

²There were also measurements taken on four other Islamic crania by Mr. Hildebrandt. Means have been worked up from this material and these will be presented later.

must proceed with caution when attempting to sex the crania of children.³ Krogman pointed out this difficulty when he wrote, "Obviously in the crania of such young children sexing is almost impossible — that up to about twelve to fifteen years of age, each, (M) for male, and (F) for female, should be queried" (Krogman, 1940, p. 7).

Sex Distribution

| Period | Male Crania | Female Crania |
|---------|-------------|---------------|
| V-IV | 4 | 10 |
| III | 12 | 2 |
| II | 11 | 3 |
| I | 2 | 2 |
| Islamic | 8 | 3 |
| Totals | 37 | 20 |

Table No. 3

If now we compare the total number of children's crania as listed in Table No. 2 with the total number of adults as given in Table No. 3, we notice a one-sided ratio in favor of the adults. This ratio of children to adults is probably not entirely representative of the actual condition because the more friable children's crania are not so likely to survive. Also manifest in Table No. 3 is the greater number of male skulls surviving in any period, except level V-IV. The explanation for this is difficult to find and the only plausible answer may be the type of burial. We did not have access to the burial sheets, but if the women of this day were buried in the large double jars while the men had been interred in one of the more perishable structures we might have the reason for this greater number of females.

The average ages of the males and females appear in Table No. 4. The assessment of the age of these people was solely on the basis of endocranial suture closure since only two femora were returned and a study of the epiphyseal union of the long bones was impossible. Because of the scarcity of the material, the skulls were grouped together as the table shows.

Age of Crania

| Period | No. | Males | No. | Females |
|---------|-----|-------|-----|---------|
| V-IV | 2 | 27.5 | 7 | 28.9 |
| III | 9 | 30.2 | | |
| II-I | 3 | 28.9 | | |
| Islamic | | | 1 | |
| Total | 14 | | 8 | |

Table No. 4

³By using children in this sense, we may include infants and children. Adolescents would fall between childhood and adulthood and the assessment of sex is more reliable.

Since the population we are considering may be thought of as representing a late historic people, the average ages in Table No. 4 are not startling. The mortality peak in such a group is generally agreed, by almost all authorities, to be in the mid-third and early fourth decade and our averages fall within this period. In his study of the crania from Tepe Hissar, Krogman found the following averages (Krogman, 1940, p. 9):

| | |
|-------------------------|------------|
| Hissar II (both sexes) | 27.8 years |
| Males | 30.0 years |
| Females | 27.7 years |
| Hissar III (both sexes) | 29.4 years |
| Males | 30.5 years |
| Females | 28.3 years |

It will be noted that these findings are very similar to those for the inhabitants of Nippur. Also, in both studies the difference in age between the male and female is practically negligible.

We now have an idea as to the amount and age of the skeletal material under consideration in this report. It is now time to turn our attention to a more detailed study of the crania and attempt to arrive at some definite conclusions concerning the racial affinities of these people. For this analytical study we shall employ both the metric and the morphological techniques. The former method is concerned with comparing the measurements and indices between different samples, while the latter is one of description in which the physical anthropologist assays the discernible characteristics of a group of crania to determine their racial ties. Since this population is virtually unknown, we must affiliate them with some known cranial type, even though the two may be separated by a large gap spacially and temporally. Angel, (Angel, 1944) as well as Krogman, has pointed out this necessity when dealing with unknown skeletal populations. Concerning this, Krogman has written, "Here, it seems to me, is the essence of cranial (racial) typology. Indeed, it is virtually mandatory that we do so, else there might result a chaotic typology which was little else than site-type run rampant" (Krogman, 1949, pp. 419-420). For the present, we shall identify the crania as basically Mediterranean. In the light of further study, we shall substantiate this identification.

MORPHOLOGICAL OBSERVATIONS ON ADULTS

We can at once state that all crania here considered belong to the Caucasian division of mankind. There is no evidence whatsoever of Negroid or Mongoloid characters in these people. The male skulls are somewhat pentagonoid in shape, produced by a swollen parietal region. The female crania are more ovoid and both show a moderate flattening of the lambdoid region. In both male and female crania there appears to be some bulging on the lateral aspects of the parietal bones; however, this does not compensate for the much greater length and in practically every instance the skulls are long-headed.

The supraorbital ridges are median in type, with the males possessing ridges more strongly developed than the females. The forehead is of medium breadth and exhibits some degree of sloping in the males; in the females the forehead is almost straight until it reaches the approximate level of metopian where it commences to slope. The frontal bosses are moderately developed in both sexes, with perhaps a slight edge in favor of the males. There is no evidence of a metopic suture in either sex.

Mention has already been made to the parietal bones in the discussion on head form and length. Nothing remains to be said about this area, except that the parietal foramina are of normal size and are commonly two to three in number.

The temporal bones seem to be of normal proportions and nothing unusual was noticeable. They are somewhat fuller in their posterior portion where this bone joins the occipital bone than in their anterior section. This widening of the temporals along with the somewhat swollen condition of the parietals may tentatively be said to have resulted from a mixture with a broad-headed type or is, in itself, evidence of

an emerging type. Whatever its cause, we are not able at this time to come to any definite conclusions. The posterior root of the zygomatic arch is well developed in the males and travels posteriorly across the temporal bone, although this crest does not travel out onto the parietal bone. Its appearance in the female is from slight to absent. The mastoid processes are of moderate size in the males, while in the females these processes are of slight construction.

In almost every skull there is a protuberance of the occipital region posteriorly. This occipital bun, as it may be called, is also associated with an occipital torus on practically every skull. Both conditions are much more pronounced on the male than on the female crania. The supreme, superior, and inferior nuchal lines, which afford attachment for the neck musculature, are usually well developed in the males, much weaker in the females. The Inion is smaller in the females than in the males. There are no Inca bones present in any of the skulls; however, several Wormian bones occur frequently in the lambdoid suture.

The face region is moderately narrow and the lateral extension of the molars is not great. The nasion depressions are from shallow to fairly deep in the males and the nasal bones are represented in both sexes as concavo-convex and suggest an aquiline type of nasal profile in some instances. The anterior nasal spine is of medium size in both sexes. The orbits tend to be rather broad relative to their height, although to a lesser extent in the female. Their form is from rhomboidal to almost square and the inclination of the lower border is downward, which gives the orbits the appearance of drooping.

The incidence of prognathism is very slight. A few skulls show a tendency toward alveolar protrusion, particularly male skull 221; however, this is the exception, not the rule. The maxilla are frequently full and well rounded, but there is no forward extension of the midfacial region.

The palate in both sexes is parabolic in shape, except for the above mentioned skull No. 221. The palate in this one is elliptical, high and very narrow. Every skull, barring the above exception, has a broad palate which is usually high. In a few males, the palate is extremely wide in relation to its length. The females also possess broad palates, although not to the extent exemplified by the males.

Skull No. 157, a female from the Islamic period, and No. 159, a male from Tablet Hill B, have been mentioned previously. It is only right, we feel, to include them in our morphological observations. Both of these crania present no marked morphological deviations from those set forth in the above paragraphs. The male skull can be aligned with the more muscular individuals from Tablet Hill A while the female conforms, in almost every respect, with the females from Tablet Hill A. In other words, these two crania may be considered as being the same racial type, Mediterranean, as the other skulls discussed in this report. Here the question of age is paramount because Sir Arthur Keith has pointed out, "On the evidence now before me, I have come to the conclusion that in ancient times the whole of Mesopotamia was inhabited by a people of the same physical type and of the same racial origin" (Keith, 1927, p. 214). The Islamic skull is much later than the cranial material from Tablet Hill A. Thus, although we should be the first to admit, one skull is not very conclusive evidence, we feel that the predominant race⁴ of ancient Mesopotamia was of the same physical type and of the same racial origin. Ehrich (Ehrich, 1939) and Buxton (Buxton, 1924) have found results from their studies that also corroborate Keith's statement. In the final section of this report we have compared our statistical data with Dr. Coon's material on the ninth century Islamics; as will be seen, this also lends support to the above theory.

MANDIBLES

The mandibles are not particularly large; there is not a great depth to the body and the ramii tend from moderate to rather broad. The female jaw is somewhat lighter in appearance. There is usually a good prominence to the mental eminence. The corpus is moderate in bulk and when the mandibles are observed from above, they have a somewhat "oval" shape instead of a "square" appearance. At the mandibular

⁴We have used "predominant race" because we feel that Dr. Keith's statement is too inclusive.

angle there is little, if any, eversion. There is no alveolar prognathism present and the genial tubercles are of normal size. The mandibulae of Nippur thus seem to fit into the type of lower jaws found to occur in the Mediterranean physical type. In fact, they correspond very closely to the gracile Mediterranean types that Krogman studied from Tepe Hissar. He says of the Mediterranean jaw, "In the Mediterranean male type the chin is prominent, but the corpus is moderate in bulk, ramus moderate in width, and the mandibular angle straight, to give an "oval" type of jaw" (Krogman, 1940, p. 30). The only difference between the male and female jaw in this respect is one of size.

CHILDREN'S CRANIA

There were only five skulls returned from the field, two of which are quite friable and in a very poor state of preservation. Their ages, as determined by tooth eruption, are as follows:

| | | |
|---------|------------|------------|
| No. 224 | <i>ca.</i> | 1 year |
| No. 213 | <i>ca.</i> | 6 years |
| No. 210 | <i>ca.</i> | 6 years |
| No. 215 | <i>ca.</i> | 7 years |
| No. 278 | <i>ca.</i> | 9-10 years |

The age plus the condition of the material hinders one from making any definite conclusions as to racial affinities. We might, however, tentatively say that, if these children had lived, they probably would have been of the general type outlined in this report.

STATISTICAL OBSERVATIONS

The metric data and indices are presented in the usual tabular form at the end of the paper. All measurements were taken in the field by Mr. Hildebrandt. The majority of the indices have been computed by me from his data sheets. For this statistical study the material was grouped according to the horizon from which it came.⁵ Thus, we grouped all male crania from levels 1-5 for tabulation; the female crania were grouped similarly.⁶

In practically every measurement and index these people conform to the Mediterranean physical type. They are long-headed, with a cranial index of 70.86 for the males, and 73.67 for the females. The somewhat larger index for the females is to be expected, since in any racial type, the females tend to be more pedomorphic than the males. In the length-height index we see that the males (70.25) have a lower head than the females (72.30), while the males (70.65) have a slightly broader forehead than the females (69.75).

The total facial index is mesoprosopic or of medium breadth in the males (89.45) and the females (90.73) are represented by a leptoprosopic or narrow face. However, as one may easily see, the difference between these two indices is practically negligible. Consideration of the upper face reveals both sexes to possess medium breadths, although the males (52.38) are slightly narrower than the females (50.64). The orbital index is mesocouch or medium, and here again a sex characteristic may be noted. The males have an index of 80.42 and the females, 84.46, which depicts them as having an orbit somewhat higher relative to its breadth than the males. This hypsicouch condition is generally accepted as a female characteristic. On the nasal dimensions the nose of the males (51.10) is just slightly broader than that of the females (50.08). The palate is broad, very broad for both male and female. The indices are respectively 90.67 and 94.69. This broad palate plus the above noted swelling of the parietal regions suggest the

⁵All field sheets with an age of 18+ marked on them were utilized in the statistical tabulations.

⁶It should be added here that the Islamic and Tablet Hill B data were excluded from this study.

possibility of some slight modifications due to a broad-headed element.

We also segregated the crania into their respective levels and worked out the means for these skulls. These tables are numbered from 19 to 28 and appear at the end of the paper. They do not present any marked deviations from the means of the sample as a whole. In only a few instances are these means different by more than two standard deviations from the means of the grouped crania. This of course, does not prove an absolute racial continuity from period to period but we believe it at least hints that there was some sort of racial likeness existing among these people. It should be added that, morphologically, this whole series of crania show only slight differences. In other words, we feel certain that these crania represent only one physical type and the few heavier more rugged skulls that are discernible in this series represent the outer limits of the range, and not another type. This same reasoning is applicable to the one medium-headed cranium in the sample.

CRANIOSTAT DRAWINGS

In order for the reader to see the amount of variation that actually exists within this physical type, we made craniostat drawings and took photographs of four of the crania. The drawings were made on the Western Reserve Craniostat on millimeter paper. Three views were drawn, *norma facialis*, *norma lateralis*, and *norma verticalis*, all oriented in the Frankfort Horizontal and the transporionic axis. They represent two male and two female crania from our sample of twenty-five who show the greatest range in measurements and morphological characters. A short discussion of each skull follows.

Plates No. I and II represent a male individual of the Mediterranean physical type. The skull is dolichocranic with a cranial index of 70.80 while the length-height index is medium, 71.32. As may be seen in *norma lateralis*, the supraorbital ridges are of medium size and the occipital torus is fairly prominent. Also, an occipital bun is present and there appears to be some flattening in the lambdoid region. The concavo-convex profile of the nose, which is present in the majority of the crania, may be clearly seen in this drawing. When viewed from above, the skull is a long ovoid with the zygomatic arches projecting laterally to the cranial contour. In the front view, the upper face is wide, 48.46, as is the fronto-parietal index, 72.26. A slight droop of the orbits may also be seen in this view.

Plates No. III and IV depict another male of the Mediterranean physical type. The condition of this skull is very poor and the lateral drawing is made of the right rather than of the conventional left side because of a large hole in the left temporal and parietal bones. The cranium is hyperdolichocranic with an index of 66.84. Head height is low with an index of only 68.88. The forehead is rather low and the slope is gradual with some flattening seen at the bregma. The supraorbital ridges are moderately developed and the nasion depression is medium. There is no prognathism. Again we notice some flattening of the parietal bones above the lambdoid suture which helps to accentuate the occipital protuberance. The occipital torus is only moderately discernible. The nasal profile is only barely concavo-convex and the mastoid processes are not very large in this skull or the one previously discussed.

Norma verticalis must be viewed with some caution because of the excessive amount of post mortem warping that has occurred. However, it seems legitimate to classify this skull as pentagonoid regardless of this warping. The left side is noticeably flattened, allowing the zygomatic arches to become more apparent.

In *norma facialis* we see that width is the greatest dimension represented by this face. Fronto-parietal, upper face, and the nasal index are all on the wide side. Here again we note a downward and lateral slant to the orbits.

Plates No. V and VI are of a female of the Mediterranean type. The first observation one makes when viewing this skull is the excellent condition of the teeth. Every tooth in the upper dental arcade is in perfect condition; they are well formed and attrition is very slight. This same situation prevails in the mandibular dentition. In fact, this is one of the finest dentitions we have ever seen, ancient or modern.

The age at death was approximately twenty-seven years.

As viewed in norma lateralis the skull is long-headed, 71.19. The forehead is practically vertical to about ophyryon where it commences gradually to slope posteriorly. There appears to be some lambdoid flattening, and an occipital bun is barely discernible. Present also, is a moderate development of the torus occipitalis. The length-height proportion is just within the orthocranic or medium bracket, with an index of 70.11. The supraorbitals are very small, although a portion of the external table is broken away. In hand with this feature is the smallness of the mastoid processes. Finally, the nasal profile is seen to be only slightly concavo-convex.

In the front view the skull appears well formed with some flattening in the parietal regions. The face is wide, although tending to be somewhat narrower than the two males. Again, a slight droop to the orbits is noticeable.

From the top of the skull, it is ovoid with some bulging at the parietal eminences. The left zygomatic arch is more apparent than the right one. This asymmetry is due to the expansion of the temporal bone along the squamosal suture, post mortem, rather than to any malfunction of the growth process during the individual's life.

Plates No. VII and VIII contain the second female. This skull is the only one in our collection that is not long-headed. The cranial index is 76.61, which places it within the mesocranic or medium headed category. There is no lambdoid flattening; in fact, this portion of the skull appears round and gives the impression of being full. The height-length ratio is 77.19, a very high head. The nasal depression is shallow and the supraorbitals are small. There is no evidence of prognathism and the nasal profile is straight. There is no development of the occipital bun as present in the other skulls.

In the front view the face is seen to be narrow. The orbits are large and high with only a slight droop. The nose is hyperchamerrhine with an index of 58.33. The forehead is well formed and rather wide.

When viewed from above the skull is ovoid. A general over all fullness to the cranial contour also may be observed in this view. This is the only skull in the entire series from Nippur that might possibly be another physical type. The Alpine type, *per se*, is usually defined as brachycranic but mesocranic indices of 77-80 are not unusual. As seen above, this skull just falls within the mesocranic category and since this is a female skull, this is not unusual for the females in any group to tend to be more round-headed than the males. A round-headed element was reported by Buxton to be present at Kish, although, Keith and Ehrich found nothing but long-heads at Ur and Yorgan Tapa. We feel the skull represented here belongs to the Mediterranean type but exhibiting some mesocranic features, not enough, however, to set up a new type. Mesopotamia thus appears to have been a land of long-heads with only a sporadic sampling of a mesoid element.

TEETH

Sir Arthur Keith found the teeth of the men and women of Ur and al 'Ubaid to have been in a state of extreme wear. The people of al 'Ubaid lived during the fourth millennium B.C. or earlier, while the inhabitants of Ur are dated between 1900 and 1700 B.C. Although the skulls under discussion in this report are of a later time, there are many interesting points of convergence between the teeth of those three populations. There are few cavities seen in the teeth in our collection, while Keith reported none whatsoever for the people of Ur and only three in the material from al 'Ubaid. The general wear of the teeth was marked in both people, with perhaps a more extreme degree reported by Keith, for he writes, "I have never seen in any race ancient or modern, teeth worn to the degree shown by the men and women which Mr. Woolley unearthed at al 'Ubaid" (Keith, 1927, p. 239). Another point of similarity may be seen in the actual amount of wear. In our study, we found one individual who had worn his lower first molars down to the roots and had been actually using the roots in mastication. This same condition occurred in another individual, a female; however, this time the teeth involved were the upper first molars. This same

extreme degree of attrition was reported by Keith for a female from al 'Ubaid.

The explanation for this wear of the teeth most surely lies, not in the teeth themselves, but rather in the type of food these people ate and their methods of grinding grain. The teeth show no reason to suspect them of not being as hard as any tooth in the mouth of a modern man; we noted that when a pulp cavity had become exposed, it was filled up with secondary dentine. When we now turn to the food, the real cause becomes manifest. It seems very logical that much dust and grit became mixed with the food either by carelessness or by using soft stones on which to grind grain. In either case, it is apparent that eating food with a "gritty flavor" for a number of years would easily account for the wear of the teeth exemplified by these people.

As is well known, the third molar or wisdom tooth in modern peoples shows a tendency toward a reduction in size or in many cases to disappear entirely. This same situation was present among the dwellers at Nippur. This reduction in the size of third molars occurred in the majority of the skulls and in one male individual, all four of the third molars had failed to erupt. The Islamic skull had the right mandibular third molar missing. The left one was present but very much reduced in size, in fact, the posterior cusp or hypaconulid had failed to form.

One child's skull, No. 215, exhibited a Carabelli's cusp on the upper first permanent molars. This is an accessory cusp generally found bilaterally on the anterior portion of the lingual surface of upper molars. It is a derivative of the cingulum and evolutionarily it is a recent character, not being characteristic of fossil hominids. The Australopithecine have been reported to have pits but no cusps, while in the *Sinanthropus* material not even pits have been found. Dahlberg reported this cusp as occurring in 41% of the first molars and 8% of the second in American Whites (Dahlberg, 1951, p. 169). It has a sporadic occurrence in the American Indian with its greatest incidence in Melanesian and White populations. No other cusps were found in our collection and to the best of our knowledge this character has not been found in any other cranial material from Mesopotamia. Perhaps the reason for its absence in the remaining skulls is due to the extreme wear of the adult teeth.

THE LONG BONES OF NIPPUR

The measurements and indices for the long bones appear in Tables No. 5 and 6. There are only two femora in the collection. They are both from the same individual and one has a compound fracture just below the greater trochanter. This subtrochanteric fracture has healed but there is a marked callus formation and the femur is obviously greatly shortened. The other femur is of normal proportions.

The length of the femur and tibia indicates a stature of 1684.92 mm. (66 inches) for males, and 1508.45 mm. (59 inches) for females. Krogman found the average stature of the Tepe Hissar males and females to be 1654.36 mm. (65 inches) and 1527.83 mm. (60 inches) respectively. One of the most frequently observed features of the femur is the ratio between the sagittal and transverse diameters taken at subtrochanteric level, expressed as the platymetric index. The index for the Nippur femora is 83.87 and 83.68 for males and females respectively. Krogman found an index of 76.42 for the males and 76.90 for the females of Tepe Hissar, while Buxton reported 80.17 for Kish "A" male femora. All three of these indices are uniformly platymetric, a condition generally accepted as primitive.

The sagittal and transverse proportions of the tibia are expressed in terms of the platycnemic index. At Nippur the ratio is eurycnemic with indices of 75.78 and 73.73 for males and females. At Hissar these ratios are 65.58 for males and 72.11 for females. Buxton found a 65.22 index for the Kish "A" material. The Nippur male and female and also, the Hissar female are eurycnemic or advanced, while the Hissar male and the Kish "A" male are mesocnemic or intermediate.

The humero-radial index is an expression of the ratio of the lower arm to the upper arm. For Nippur these indices are respectively 76.80 and 77.66 for male and female. At Hissar, Krogman found an index of 73.51 for the males and 72.47 for the females, while the Kish "A" males had an index of 76.40. All

of these indices are at or near the bounds of brachymesaticerchic which is the radio-humeral proportion indicative of a type tending toward the primitive ratio.

Male and Female Long Bones

| | Males | | | Females | | |
|---------------------|-------|---------|--------|---------|---------|--------|
| | No. | Range | Mean | No. | Range | Mean |
| Humerus (Max. L.) | 26 | 280-350 | 323.07 | 17 | 250-300 | 284.11 |
| Radius (Max. L.) | 21 | 200-260 | 248.09 | 19 | 200-230 | 217.36 |
| Ulna (Max. L.) | 22 | 220-290 | 269.54 | 15 | 220-260 | 240.66 |
| Humero-radial index | 21 | 71- 83 | 76.80 | 15 | 74- 82 | 77.66 |

Table No. 5

Male and Female Long Bones

| | Males | | | Females | | |
|---------------------|-------|---------|--------|---------|---------|--------|
| | No. | Range | Mean | No. | Range | Mean |
| Femur | | | | | | |
| Max. L. | 26 | 400-490 | 450.76 | 17 | 360-430 | 405.88 |
| Sub. Troch. Trans. | 25 | 28- 37 | 32.76 | 17 | 25- 33 | 28.35 |
| Sub. Troch. A. P. | 25 | 22- 38 | 27.80 | 17 | 20- 30 | 23.52 |
| Platymeric index | 24 | 65-117 | 83.87 | 16 | 72-111 | 83.68 |
| Tibia | | | | | | |
| Max. L. | 24 | 320-420 | 381.66 | 19 | 290-360 | 341.05 |
| Trans. Diam. | 23 | 21- 33 | 26.43 | 16 | 18- 29 | 21.87 |
| A. P. Diam. | 23 | 23- 38 | 33.30 | 16 | 19- 35 | 27.36 |
| Platycnemic index | 19 | 66- 92 | 75.78 | 15 | 62- 84 | 73.73 |
| Fibula | | | | | | |
| Max. L. | 17 | 310-400 | 364.70 | 15 | 300-360 | 332.66 |
| Femoro-tibial index | 23 | 79- 88 | 84.39 | 17 | 80- 87 | 83.47 |
| Intermebral index | 18 | 65- 71 | 68.27 | 14 | 65- 70 | 67.64 |

Table No. 6

DISCUSSION

The foregoing pages have dealt almost exclusively with a description of the physical type living at Nippur from *ca.* 900 B.C. to *ca.* 500 B.C. Consideration was also given to the thesis that Mesopotamia has been inhabited for many centuries by a physical type that remained strikingly uniform and stable. In order to help substantiate this idea Tables No. 14 to 18 were prepared. These contain the measurements and indices of the skeletal material excavated in Mesopotamia to date. These sites range in time from the fourth millennium skulls of al 'Ubaid to the Parthians described by Hamy. In view of the small size of the groups cited for comparison in the Tables, a detailed analysis of each measurement individually and the exact position of the Nippur series would be of small value. The material is presented in the tables and only a few specific comments are necessary.

Male Skulls: In length, breadth, and cephalic index the Nippur crania come very close to the measurements of the Yorgan Tapa, al 'Ubaid, and Ur material, but in height the Yorgan Tapa crania are somewhat higher. For auricular height the Nippur and Yorgan Tapa crania are practically the same; in fact, the only major difference is seen to exist in the Kish "A" crania. Minimum frontal breadth is the most constant measurement in the entire series. The basion nasion length exhibits close similarity in all groups except the Kish "A" series. Except for the transverse arc of the Yorgan Tapa crania, this arc as well as the sagittal arc is somewhat larger in the Nippur material. In height-breadth, height-length, and fronto-parietal indices the Nippur skulls are closer to al 'Ubaid, although no marked discrepancies appear in the whole series. The larger basion-bregma height recorded for the Yorgan Tapa and Ur crania account for the greater height-breadth indices in these two groups.

Facial breadth is slightly greater in the Nippur series and is closest to the three crania from Ur. Total face is very similar in the Nippur, Yorgan Tapa, and al 'Ubaid series with only Ur showing any great difference. In upper face height, Nippur is the lowest and this same condition persists in the total and upper face indices. The cranio-facial index, however, is practically coincident in the Nippur and Ur samples with Yorgan Tapa only slightly lower. Nasal height and breadth as well as the nasal index show little variation. Orbital height and breadth are remarkably constant throughout the entire series, while interorbital width shows more variation, except in the Yorgan Tapa and Nippur skulls. Palate length and breadth are large in both the Nippur and Yorgan Tapa material, although two different methods of measuring were employed. In the former, the measurements were taken internally, while in the latter they were taken externally. The whole series represents a fairly orthognathous group with only al 'Ubaid and Parthians being mesognathous.

In general, it appears that in the measurable characters of the male skulls the Nippur crania are closer to the Yorgan Tapa, al 'Ubaid, and Ur groups than to the Kish "A" or "W" Graves or the Parthian series.

Female Skulls: In length, breadth, and basion-bregma height the Nippur crania are nearest the Ur material, minimum frontal is uniformly low in all groups. The Nippur auricular head height is again closest to the Ur mean. Basion-nasion length is greatest at Nippur. The sagittal arc is intermediate between the Yorgan Tapa and the Kish "A" Graves while the transverse arc appears largest at Nippur. The cephalic index is very close for Nippur, Yorgan Tapa, Ur, and the Kish "A" Graves, while for the Parthians and Ur, it is somewhat greater. The height-length index is fairly constant throughout, except for the Kish "A" Graves. The height-breadth index is greatest for the Kish "A" Graves and smallest for al 'Ubaid. The fronto-parietal index does not vary significantly except for the al 'Ubaid crania.

The bi-zygomatic diameter is greatest in the Parthians, although this is on the basis of only one skull. Yorgan Tapa shows the largest total and upper facial heights being most closely approached by Nippur and Ur. Again, nasal height and breadth as well as orbital height and breadth remain reasonably close throughout the series. Interorbital width is similar for Nippur and Yorgan Tapa and shows its greatest distance at Ur. Palate length and breadth is again large for the Nippur and Yorgan Tapa crania. The Nippur crania lie between the al 'Ubaid and Ur skulls in the total facial index while they are the smallest in upper facial proportions. The cranio-facial index is rather high in the Yorgan Tapa series while at Nippur and the other sites it is somewhat lower. Here again, the gnathic index indicates

orthognathic faces for the Yorgan Tapa and Nippur crania.

Mandibles: Both the male and female mandibles from Nippur and Yorgan Tapa appear fairly uniform, with one exception, the condylosymphion length. This may be explained away on the basis of different techniques employed by the two investigators. In fact, the jaws from all groups appear rather similar, although the bi-condylar width of the Kish "A" and "W" Graves is much narrower than either the Nippur or Yorgan Tapa diameters.

The relationship of the Nippur skulls to the other groups varies with each character; however, it seems apparent that the closest correspondence of factors is with the Yorgan Tapa, al 'Ubaid, and Ur crania. In general it can be said that there is a surprising similarity throughout the crania in all the series cited.

We have made one further comparison, we compared the Nippur material with the ninth century A.D. Islamic crania studied by Dr. Coon. To test the homogeneity of these two samples we used a familiar test in statistics, known as the T-Test. This measures the probability that the difference obtained between two means could have been equaled or exceeded by chance sampling of one population. Any difference greater than 3.0 is always significant. We employed the small sample formula in our calculation. This is written as follows:

$$T = \frac{(M_1 - M_2) \sqrt{\frac{N_1 N_2}{N_1 + N_2}}}{\sqrt{\frac{N_1^2 - 1}{N_1 - 2} + \frac{N_2^2 - 1}{N_2 - 2}}}$$

T. Values for Nippur and Coon's Islamic Crania

| Nippur | | | | Islamic | | | | T. Value |
|--------------|-----|--------|------|--------------|-----|--------|------|----------|
| Measurement | No. | Mean | S.D. | Measurement | No. | Mean | S.D. | |
| Max. Lg. | 23 | 193.70 | 5.38 | Max. Lg. | 16 | 189.72 | 9.47 | 1.63 |
| Max. Br. | 22 | 136.90 | 5.53 | Max. Lg. | 27 | 139.14 | 8.39 | 1.05 |
| Ba-Br. Ht. | 19 | 136.74 | 5.96 | Ba-Br Ht. | 23 | 135.43 | 9.22 | 0.52 |
| Min. Front. | 26 | 96.69 | 4.53 | Min. Front. | 19 | 95.84 | 2.46 | 0.70 |
| Bi. Orb. | 20 | 99.00 | 1.83 | Bi. Orb. | 20 | 94.30 | 3.73 | 6.98 |
| Orb. Br. | 20 | 39.95 | 1.60 | Orb. Br. | 14 | 40.35 | 2.11 | 0.61 |
| Orb. Ht. | 23 | 32.57 | 1.86 | Orb. Ht. | 13 | 34.00 | 1.84 | 2.17 |
| Bi. Zyg. | 22 | 133.32 | 5.72 | Bi. Zyg. | 21 | 129.00 | 7.95 | 2.01 |
| Int-orb. Br. | 20 | 22.90 | 1.20 | Int-orb. Br. | 21 | 21.33 | 3.15 | 2.04 |
| Up. Face | 23 | 68.91 | 4.69 | Up. Face | 20 | 68.00 | 4.95 | 0.60 |
| Low. Face | 23 | 32.39 | 3.23 | Low. Face | 27 | 32.77 | 3.04 | 1.63 |
| Bi-cond. | 22 | 125.05 | 6.91 | Bi-cond. | 17 | 121.41 | 6.32 | 1.65 |
| Bi-gon. | 19 | 95.65 | 7.48 | Bi-gon. | 22 | 99.00 | 6.34 | 1.51 |
| Na. Ht. | 22 | 53.63 | 4.04 | Na. Ht. | 23 | 50.23 | 4.45 | 2.62 |
| Na. Br. | 24 | 26.71 | 2.13 | Na. Br. | 29 | 23.63 | 1.73 | 6.37 |

Table No. 7

The measurements listed in Table No. 7 were chosen because we believe them to be reliable in the identification of race. We said in another section that we are dealing with a Mediterranean physical type. Thus, if these dimensions are guides in the classification of racial types, we must suppose that the T factor be at a minimum if these two groups are to be thought of as constituting one physical type. A glance at Table No. 7 appears to confirm the above premise. There are only two instances where the amount of T exceeds 3.0. These are bi-orbital breadth and nasal breadth. The other values of T are quite low, except possibly nasal height which might be significant. The inference seems clear: the valley of the Euphrates and Tigris in and around Nippur was inhabited in both early and late times by a Mediterranean physical type which remained fairly homogeneous through the passage of centuries.

CONCLUSIONS

The basic cranial type at Nippur was long-headed. There was one female skull that might possibly suggest the presence of a brachycephalic element in these people. Definite brachycephaly did not exist, but the swelling of the parietal regions and the broad palates seem to suggest the possibility of some slight modification due to a broad-headed element. Ehrich reports this condition for several of the skulls from Yorgan Tapa; however, Keith sees no brachycephalic elements in the crania from Ur or al 'Ubaid. Since the Yorgan Tapa crania were later in time than those from Nippur, and the Ur and al 'Ubaid crania earlier than either of the above, it appears that the broad-headed element in Mesopotamia did not make its appearance as early as it did in other sections of the Near East. Krogman reported brachycephaly from Tepe Hissar III, *ca.* 2000-1500 B.C.

This long-headed group was identified by us as belonging to the Mediterranean physical type. There is also some suggestion that a variant of this type, which Ehrich and others have called Eurafrican, may be present. Ehrich considers it to be the dominant racial type at Yorgan Tapa and the basic factor in the population of Mesopotamia. This is probably true, since the Eurafrican type is actually only a more muscular variant of the Mediterranean type. In other words, this Eurafrican variety seems to fall toward the upper limit of the range allowed for the Mediterranean physical type.

The comparative study revealed the stability and uniformity of the Mediterranean physical type both in time and space. Today, it is still the dominant type in this region, although, probably not so racially homogeneous as in ancient times. An interesting point may be mentioned: Coon maintains that the contaminated water of the Euphrates has acted as a sort of "equalizer." The racial composition of the rural districts of the Mesopotamian portion of Iraq has not changed since Sumerian times – the foreigners could not survive (Coon, 1951, p. 255).

We hope that this study has contributed towards a better understanding of the racial problem in ancient Mesopotamia. Any racial question is complex and the one at Nippur is no exception. We feel certain, however, that Mesopotamia has been inhabited for many centuries by a fairly homogeneous physical type which we have identified as essentially Mediterranean.

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TABLES

MALES

Cranial Measurements and Indices

| | No. | Range | Mean | S.D. | C.V. |
|---------------------------|-----|---------|-------------------|-------|------|
| Length (l) | 23 | 182-202 | 193.70 \pm 1.12 | 5.38 | 2.78 |
| Breadth (b) | 22 | 126-146 | 136.90 \pm 1.18 | 5.53 | 4.04 |
| Min. forehead (b') | 26 | 36-108 | 96.69 \pm .89 | 4.53 | 4.68 |
| Ba-br height (h') | 19 | 124-150 | 136.74 \pm 1.37 | 5.96 | 4.36 |
| Auric. height (oh) | 22 | 108-129 | 118.36 \pm 1.24 | 5.80 | 4.90 |
| Ba-na (lb) | 19 | 95-115 | 106.05 \pm 1.07 | 4.66 | 4.39 |
| Trans. arc (q') | 18 | 292-328 | 314.83 \pm 2.41 | 10.24 | 3.25 |
| Sag. arc (s) | 19 | 368-410 | 392.89 \pm 2.59 | 11.31 | 2.87 |
| Na-br arc (s') | 23 | 117-140 | 130.52 \pm 1.39 | 6.64 | 5.09 |
| Br-la (s ₂) | 23 | 120-146 | 138.17 \pm 1.58 | 7.58 | 5.48 |
| La-opis (s ₃) | 20 | 110-133 | 121.75 \pm 1.58 | 7.08 | 5.81 |
| Cranial (b/l) | 22 | 65- 77 | 70.86 \pm .62 | 2.91 | 4.10 |
| Height-length (h/l) | 20 | 63- 77 | 70.25 \pm .73 | 3.27 | 4.65 |
| Height-breadth (h/b) | 19 | 84-111 | 98.79 \pm 1.48 | 6.46 | 6.53 |
| Breadth (b'/b) | 22 | 64- 76 | 70.68 \pm .74 | 3.49 | 4.93 |

Table No. 8

MALES

Facial Measurements and Indices

| | No. | Range | Mean | S.D. | C.V. |
|---------------------------------|-----|---------|-------------------|------|-------|
| Na-gn (gb) | 22 | 109-129 | 118.36 \pm 1.26 | 5.89 | 4.98 |
| Na-pros (g'h) | 23 | 59- 76 | 68.91 \pm .98 | 4.69 | 6.80 |
| Mid-face (gb) | 21 | 85-107 | 97.57 \pm 1.19 | 5.46 | 5.59 |
| Bi-zyg (j) | 22 | 122-140 | 133.32 \pm 1.22 | 5.72 | 4.29 |
| Nas. height (nhl) | 22 | 47- 61 | 53.63 \pm .86 | 4.04 | 7.53 |
| Nas. breadth (nb) | 24 | 22- 31 | 26.71 \pm .43 | 2.13 | 7.97 |
| Interorb. width (dc) | 20 | 20- 28 | 22.90 \pm .27 | 1.20 | 5.24 |
| Orb. breadth (o ₁ l) | 20 | 36- 43 | 39.95 \pm .36 | 1.60 | 4.00 |
| Orb. height (o ₂ l) | 23 | 29- 37 | 32.57 \pm .39 | 1.86 | 5.71 |
| Pal. length (g ₁ 'l) | 23 | 32- 52 | 41.17 \pm 1.10 | 5.25 | 12.75 |
| Pal. breadth (g ₂) | 23 | 34- 48 | 40.30 \pm .77 | 3.72 | 9.23 |
| For. Mag. length (fml) | 19 | 33- 48 | 37.37 \pm .89 | 3.88 | 10.38 |
| For. Mag. breadth (fmb) | 15 | 26- 33 | 30.06 \pm .52 | 2.01 | 6.68 |
| Total face (gh/j) | 20 | 81- 95 | 89.45 \pm .92 | 4.13 | 4.61 |
| Upper face (g'h/j) | 21 | 43- 63 | 52.38 \pm 1.00 | 4.60 | 8.78 |

Table No. 9

continuation of Table No. 9

| | No. | Range | Mean | S.D. | C.V. |
|---|-----|--------|------------------|------|------|
| Nasal (nb/nsp) | 20 | 46- 60 | 51.10 \pm .80 | 3.60 | 7.04 |
| Orbital (o ₂ l/o ₁ l) | 19 | 76- 90 | 80.42 \pm .77 | 3.37 | 4.19 |
| Palatal (g ₂ /gl ₁) | 21 | 80-109 | 90.67 \pm 1.56 | 7.14 | 7.87 |
| Foraminal (fmb/fml) | 13 | 67- 89 | 80.08 \pm 1.96 | 7.05 | 8.80 |
| Cranio-facial (j/b) | 21 | 90-107 | 98.09 \pm .84 | 3.86 | 3.93 |

Table No. 9

FEMALES

Cranial Measurements and Indices

| | No. | Range | Mean | S.D. | C.V. |
|-------------------------------|-----|---------|-------------------|-------|------|
| Length (l) | 11 | 166-193 | 181.64 \pm 2.63 | 8.73 | 4.80 |
| Breadth (b) | 12 | 126-141 | 133.25 \pm 1.31 | 4.53 | 3.39 |
| Min. forehead (b') | 11 | 88- 99 | 93.09 \pm 1.05 | 3.50 | 3.75 |
| Ba-br height (h') | 8 | 129-138 | 134.50 \pm 1.15 | 3.25 | 2.41 |
| Auric. height (oh) | 7 | 107-124 | 117.00 \pm 2.48 | 6.56 | 5.60 |
| Ba-na (lb) | 9 | 93-107 | 100.22 \pm 1.59 | 4.76 | 4.74 |
| Trans. arc (q') | 6 | 297-319 | 310.00 \pm 3.03 | 7.43 | 2.39 |
| Sag. arc (s) | 5 | 365-392 | 379.60 \pm 6.14 | 13.76 | 3.62 |
| Na-br arc (s ₁) | 8 | 121-138 | 129.00 \pm 2.07 | 5.85 | 4.53 |
| Br-la arc (s ₂) | 6 | 117-150 | 135.50 \pm 5.08 | 12.45 | 9.18 |
| La-opis arc (s ₃) | 7 | 115-129 | 118.00 \pm 1.88 | 4.97 | 4.21 |
| Cranial (b/l) | 12 | 68- 78 | 73.67 \pm .85 | 2.96 | 4.01 |
| Height-length (h/l) | 10 | 69- 77 | 72.30 \pm .71 | 2.26 | 3.12 |
| Height-breadth (h/b) | 10 | 90-106 | 99.30 \pm 1.45 | 4.59 | 4.62 |
| Breadth (b'/b) | 11 | 65- 77 | 69.73 \pm 1.11 | 3.69 | 5.29 |

Table No. 10

FEMALES

Facial Measurements and Indices

| | No. | Range | Mean | S.D. | C.V. |
|---|-----|---------|-------------|------|-------|
| Na-gn (gh) | 11 | 103-119 | 112.00±1.76 | 5.85 | 5.22 |
| Na-pros (g'h) | 11 | 59- 71 | 63.73±1.42 | 4.73 | 7.42 |
| Mid-face (gb) | 11 | 83- 99 | 93.27±1.44 | 4.77 | 5.11 |
| Bi-zyg (j) | 9 | 118-132 | 124.33±1.72 | 5.15 | 4.14 |
| Nas. height (nbl) | 13 | 45- 57 | 49.85± .90 | 3.26 | 6.53 |
| Nas. breadth (nb) | 14 | 22- 30 | 25.21± .63 | 2.36 | 9.36 |
| Interorb. width (dc) | 11 | 17- 22 | 20.27± .45 | 1.49 | 7.35 |
| Orb. breadth (o ₁ l) | 12 | 34- 43 | 38.75± .81 | 2.80 | 7.22 |
| Orb. height (o ₂ l) | 13 | 28- 37 | 32.69± .76 | 2.75 | 8.41 |
| Pal. length (gl ₁) | 13 | 37- 47 | 42.08± .74 | 2.66 | 6.32 |
| Pal. breadth (g ₂) | 12 | 36- 44 | 40.25± .65 | 2.26 | 5.61 |
| For. Mag. length (fml) | 9 | 31- 40 | 35.78± .83 | 2.48 | 6.93 |
| For. Mag. breadth (fmb) | 7 | 26- 32 | 29.28± .80 | 2.13 | 7.27 |
| Total face (gh/j) | 11 | 84- 98 | 90.73±1.44 | 4.80 | 5.29 |
| Upper face (g'h/j) | 11 | 40- 58 | 50.64±1.49 | 4.96 | 9.79 |
| Nasal (nb/nsp) | 13 | 40- 58 | 50.08±1.41 | 5.09 | 10.16 |
| Orbital (o ₂ l/o ₁ l) | 13 | 76- 92 | 84.46±1.63 | 5.86 | 6.93 |
| Palatal (g ₂ /gl ₁) | 13 | 84-113 | 94.69±2.27 | 8.16 | 8.61 |
| Foraminal (fmb/fml) | 7 | 73- 89 | 82.86±2.22 | 5.87 | 7.08 |
| Cranio-facial (j/b) | 10 | 89- 98 | 92.30± .89 | 2.83 | 3.06 |

Table No. 11

MALES

Mandibular Measurements and Indices

| | No. | Range | Mean | S.D. | C.V. |
|------------------------|-----|---------|-------------------|------|------|
| Condylo-symphysion Lg. | 16 | 119-135 | 127.38 \pm 1.37 | 5.49 | 4.31 |
| Symphysis Ht. | 23 | 26- 39 | 32.39 \pm .68 | 3.23 | 9.97 |
| Bi-gonial Di. | 19 | 83-106 | 95.63 \pm 1.72 | 7.48 | 7.82 |
| Minimum ramus Br. | 18 | 31- 39 | 34.78 \pm .62 | 2.65 | 7.62 |
| Bi-condylar Br. | 19 | 114-139 | 126.00 \pm 1.50 | 6.91 | 5.48 |
| Zygo-gonial index | 19 | 60- 86 | 73.05 \pm 1.55 | 6.76 | 9.25 |
| Fronto-gonial index | 18 | 87-112 | 99.50 \pm 1.74 | 7.37 | 7.40 |

Table No. 12

FEMALES

Mandibular Measurements and Indices

| | No. | Range | Mean | S.D. | C.V. |
|------------------------|-----|---------|-------------------|------|-------|
| Condylo-symphysion Lg. | 12 | 115-128 | 118.67 \pm 1.35 | 4.68 | 3.94 |
| Symphysis Ht. | 13 | 24- 34 | 28.31 \pm .85 | 3.06 | 10.80 |
| Bi-gonial Di. | 12 | 82- 94 | 88.91 \pm 1.07 | 3.72 | 4.18 |
| Minimum ramus Br. | 14 | 27- 35 | 31.64 \pm .57 | 2.13 | 6.73 |
| Bi-condylar Br. | 11 | 105-128 | 116.64 \pm 2.47 | 8.27 | 7.09 |
| Zygo-gonial index | 11 | 66- 76 | 71.54 \pm 1.04 | 3.47 | 4.85 |
| Fronto-gonial index | 11 | 88-107 | 96.45 \pm 1.70 | 5.66 | 5.86 |

Table No. 13

TABLE No. 16. FEMALE SKULLS: CRANIAL MEASUREMENTS AND INDICES

| | NIPPUR | | YORGAN TEPA | | AL 'UBAID | | UR | | KISH A-GRAVES | | PARTHIANS | |
|----------------------------|--------|--------|-------------|--------|-----------|-------|-----|-------|---------------|-------|-----------|-------|
| | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean |
| Length (l) | 11 | 181.64 | 4 | 179.5 | 3 | 180.3 | 3 | 183.0 | 3 | 178.7 | 1 | 171.0 |
| Breadth (b) | 12 | 133.25 | 6 | 130.4 | 3 | 140.0 | 3 | 132.0 | 3 | 130.7 | 1 | 136.0 |
| Ba-br ht. (h) | 8 | 134.50 | 6 | 130.83 | 3 | 131.0 | 1 | 136.0 | 2 | 140.5 | 1 | 130.0 |
| Auric. ht. (oh) | 7 | 117.0 | 7 | 110.0 | 4 | 112.2 | 3 | 116.6 | 1 | 112.0 | - | - |
| Min. front. (b) | 11 | 93.09 | 4 | 93.0 | 2 | 91.0 | 3 | 93.0 | 4 | 92.3 | 1 | 94.0 |
| Ba-na (lb) | 9 | 100.22 | 5 | 98.4 | 3 | 95.0 | 1 | 97.0 | - | - | - | - |
| Sag. arc. (s) | 5 | 379.60 | 3 | 365.0 | - | - | - | - | 1 | 380.0 | - | - |
| Trans. arc. (q) | 6 | 310.0 | 6 | 303.4 | - | - | - | - | 1 | 285.0 | - | 288.0 |
| Cranial (b/l) | 12 | 73.67 | 3 | 74.7 | 3 | 77.6 | 3 | 72.2 | 3 | 73.5 | 1 | 79.5 |
| Ht.-lgth. (h/l) | 10 | 72.30 | 4 | 73.75 | 2 | 75.2 | 1 | 72.2 | 2 | 78.1 | 1 | 76.0 |
| Ht.-brdth. (h/b) | 10 | 99.30 | 4 | 99.5 | 3 | 93.6 | 1 | 103.0 | 2 | 109.1 | 1 | 98.4 |
| Brdth. (b ¹ /b) | 11 | 69.73 | 4 | 72.0 | 2 | 64.5 | 3 | 70.7 | 3 | 71.9 | 1 | 69.12 |

TABLE No.17. FEMALE SKULLS: FACIAL MEASUREMENTS AND INDICES

| | NIPPUR | | YORGAN TEPA | | AL 'UBAID | | UR | | KISH A-GRAVES | | PARTHIANS | |
|---|--------|--------|-------------|-------|-----------|-------|-----|-------|---------------|-------|-----------|-------|
| | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean |
| Bi-zyg. (j) | 9 | 124.33 | 2 | 119.5 | 3 | 122.6 | 1 | 120.0 | 1 | 110.0 | 1 | 127.0 |
| Na-gn (gh) | 11 | 112.0 | 2 | 115.5 | 4 | 104.0 | 1 | 111.0 | - | - | - | - |
| Na-pros (g ¹ h) | 11 | 63.73 | 6 | 67.67 | 3 | 64.0 | 1 | 65.0 | 1 | 62.0 | - | - |
| Nas.-ht. (nhl) | 13 | 49.85 | 6 | 50.25 | 3 | 49.0 | 1 | 46.0 | 1 | 49.5 | 1 | 52.0 |
| Nas.-brdth. (nb) | 14 | 25.21 | 7 | 23.0 | 4 | 23.4 | 4 | 24.2 | 1 | 30.5 | 1 | 23.0 |
| Orb. ht. (o ₂ l) | 13 | 32.69 | 5 | 33.7 | 3 | 31.6 | 1 | 31.0 | 1 | 34.4 | 1 | 36.0 |
| Orb. brdth (o ₁ l) | 12 | 38.75 | 4 | 37.8 | 3 | 37.0 | 1 | 39.0 | 1 | 37.0 | 1 | 36.0 |
| Interorb. br. (dc) | 11 | 20.27 | 5 | 19.6 | 5 | 24.8 | 1 | 25.0 | - | - | 1 | 23.0 |
| Pal. lgth (gl ¹) | 13 | 42.08 | 7 | 52.6 | - | - | - | - | - | - | 1 | 56.0 |
| Pal. brdth (g ₂) | 12 | 40.25 | 6 | 59.8 | - | - | - | - | - | - | - | - |
| Tot. face (gh/j) | 11 | 90.73 | - | - | - | - | - | - | - | - | - | - |
| Up. face (g ¹ h/j) | 11 | 50.64 | 1 | 56.0 | 3 | 85.3 | 1 | 92.0 | - | - | - | - |
| Cran-fac (h/b) | 10 | 92.30 | 2 | 97.5 | 3 | 87.7 | 1 | 91.0 | 1 | 56.4 | - | - |
| Nasal (nb/nhl) | 13 | 50.08 | 6 | 46.17 | 4 | 48.9 | 1 | 52.0 | 1 | 61.6 | 1 | 44.2 |
| Orbital (o ₂ l/o ₁ l) | 13 | 84.46 | 3 | 91.7 | 3 | 86.3 | 1 | 79.5 | 1 | 91.9 | 1 | 100.0 |
| Palatal (g ₂ /gl ¹) | 13 | 94.69 | 6 | 115.0 | - | - | - | - | - | - | - | - |
| Gnathic index | 10 | 93.83 | 5 | 92.75 | 1 | 97.8 | 1 | 97.9 | - | - | - | - |

TABLE No. 18. MALE MANDIBLES: MEASUREMENTS AND INDICES

| | NIPPUR | | YORGAN TEPA | | AL 'UBAID | | UR | | KISH A-GRAVES | | KISH W-GRAVES | |
|---------------------------|--------|--------|-------------|--------|-----------|-------|-----|-------|---------------|-------|---------------|-------|
| | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean |
| Condylo-Symphysion Length | 16 | 127.38 | 8 | 103.67 | - | ----- | - | ----- | 24 | 107.6 | 1 | 102.0 |
| Symphysis Ht. | 23 | 32.39 | 10 | 33.05 | 7 | 35.7 | 3 | 34.5 | 28 | 32.8 | 3 | 30.1 |
| Bi-Gonial Diam. | 19 | 95.63 | 6 | 98.0 | 6 | 98.6 | - | ----- | 8 | 92.4 | 1 | 97.0 |
| Min. Ramus Brdth. | 18 | 34.78 | 12 | 34.6 | - | ----- | - | ----- | 27 | 32.5 | 4 | 33.4 |
| Bi-Cond. Wdth. | 19 | 126.0 | 22 | 123.5 | - | ----- | - | ----- | 3 | 116.7 | 2 | 116.3 |
| Zygo-Gonial Index | 19 | 73.05 | 11 | 80.0 | - | ----- | - | ----- | - | ----- | - | ----- |

TABLE No. 18₁. FEMALE MANDIBLES: MEASUREMENTS AND INDICES

| | NIPPUR | | YORGAN TEPA | | AL 'UBAID | | UR | | KISH A-GRAVES | |
|---------------------------|--------|--------|-------------|-------|-----------|-------|-----|-------|---------------|-------|
| | No. | Mean | No. | Mean | No. | Mean | No. | Mean | No. | Mean |
| Condylo-Symphysion Length | 12 | 118.67 | 3 | 104.0 | - | ----- | - | ----- | - | ----- |
| Symphysis Ht. | 13 | 28.31 | 3 | 32.0 | 5 | 37.2 | 1 | 33.0 | 1 | 27.0 |
| Bi-Gonial Diam. | 12 | 88.91 | 1 | 87.0 | 3 | 93.0 | 1 | 94.0 | - | ----- |
| Min. Ramus Brdth. | 14 | 31.64 | 4 | 31.63 | - | ----- | - | ----- | 2 | 28.8 |
| Bi-Cond. Wdth. | 11 | 116.64 | - | ----- | - | ----- | - | ----- | - | ----- |
| Zygo-Gonial Index | 11 | 71.54 | - | ----- | - | ----- | - | ----- | - | ----- |

MALES

Cranial Measurements and Indices of Cranium from Level I

| | No. | Mean |
|-------------------------------|-----|--------|
| Length (l) | 1 | 190.00 |
| Breadth (b) | | |
| Min. forehead (b') | | |
| Ba-br height (h') | 1 | 133.00 |
| Auric. height (oh) | 1 | 112.00 |
| Ba-na (lb) | 1 | 100.00 |
| Trans. arc (q') | | |
| Sag. arc (s) | 1 | 378.00 |
| Na-br arc (s ₁) | 1 | 128.00 |
| Br-la arc (s ₂) | 1 | 140.00 |
| La-opis arc (s ₃) | 1 | 112.00 |
| Cranial (b/l) | | |
| Height-length (h/l) | 1 | 70.00 |
| Height-breadth (h/b) | | |
| Breadth (b'/b) | | |

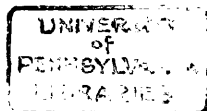
Table No. 19

MALES

Facial Measurements and Indices of Cranium from Level I

| | No. | Mean |
|--|-----|--------|
| Na-gn (gh) | 1 | 122.00 |
| Na-pros (g'h) | 1 | 69.00 |
| Mid-face (gb) | | |
| Bi-zyg (j) | | |
| Nas. height (nhl) | | |
| Nas. breadth (nb) | 1 | 25.00 |
| Interorb. width (dc) | 1 | 23.00 |
| Orb. breadth (o' ₁) | | |
| Orb. height (o ₂) | 1 | 35.00 |
| Pal. length (gl') | 1 | 46.00 |
| Pal. breadth (g ₂) | 1 | 42.00 |
| For. Mag. length (fml) | 1 | 48.00 |
| For. Mag. breadth (fmb) | | |
| Total face (gh/j) | | |
| Upper face (g'h/j) | | |
| Nasal (nb/nsp) | | |
| Orbital (o ₂ /o ₁) | | |
| Palatal (g ₂ /gl ₁) | 1 | 91.30 |
| Foraminal (fmb/fml) | | |
| Cranio-facial (j/b) | | |

Table No. 20



FEMALES

Cranial Measurements and Indices of Crania from Level I

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 1 | | 193.00 |
| Breadth (b) | 2 | 126-139 | 132.50 |
| Min. forehead (b') | 2 | 92- 96 | 94.00 |
| Ba-br height (h') | 1 | | 138.00 |
| Auric. height (oh) | 1 | | 123.00 |
| Ba-na (lb) | 1 | | 94.00 |
| Trans. arc (q') | 1 | | 319.00 |
| Sag. arc (s) | 1 | | 405.00 |
| Na-br arc (s ₁) | 1 | | 138.00 |
| Br-la arc (s ₂) | 1 | | 150.00 |
| La-opis arc (s ₃) | 2 | 115-117 | 116.00 |
| Cranial (b/l) | 1 | | 72.00 |
| Height-length (h/l) | 1 | | 71.00 |
| Height-breadth (h/b) | 1 | | 99.00 |
| Breadth (b'/b) | 2 | 69- 73 | 71.00 |

Table No. 21

FEMALES

Facial Measurements and Indices of Crania from Level I

| | No. | Range | Mean |
|---|-----|---------|--------|
| Na-gn (gh) | 2 | 103-110 | 106.50 |
| Na-pros (g'h) | 2 | 61- 61 | 61.00 |
| Mid-face (gb) | 1 | | 96.00 |
| Bi-zyg (j) | 1 | | 128.00 |
| Nas. height (nhl) | 2 | 47- 48 | 47.50 |
| Nas. breadth (nb) | 2 | 26- 30 | 28.00 |
| Interorb. width (dc) | 2 | 21- 22 | 21.50 |
| Orb. breadth (o' ₁ l) | 2 | 34- 39 | 36.50 |
| Orb. height (o ₂ l) | 2 | 28- 31 | 29.00 |
| Pal. length (g' ₁) | 2 | 40- 43 | 41.50 |
| Pal. breadth (g ₂) | 2 | 30- 42 | 36.00 |
| For. Mag. length (fml) | 2 | 31- 37 | 34.00 |
| For. Mag. breadth (fmb) | 1 | | 26.00 |
| Total face (gh/j) | 1 | | 86.00 |
| Upper face (g'h/j) | 1 | | 48.00 |
| Nasal (nb/nsp) | 1 | | 54.17 |
| Orbital (o ₂ l/o ₁ l) | 2 | 73- 74 | 72.50 |
| Palatal (g ₂ /g ₁) | 2 | 75- 97 | 86.00 |
| Foraminal (fmb/fml) | 1 | | 84.00 |
| Cranio-facial (j/b) | 1 | | 92.00 |

Table No. 22

MALE

Cranial Measurements and Indices of Tablet Hill B Cranium

| | No. | Mean |
|-----------------------------|-----|--------|
| Length (l) | 1 | 198.00 |
| Breadth (b) | 1 | 142.00 |
| Min. forehead (b') | 1 | 101.00 |
| Ba-br height (h') | 1 | 134.00 |
| Auric. height (oh) | 1 | 116.00 |
| Ba-na (lb) | 1 | 103.00 |
| Trans. arc. (q') | 1 | 315.00 |
| Sag. arc. (s) | 1 | 402.00 |
| Na-br arc (s ₁) | 1 | 129.00 |
| Br-la arc (s ₂) | 1 | 150.00 |
| La-opis (s ₃) | 1 | 120.00 |
| Cranial (b/l) | 1 | 71.71 |
| Height-length (h/l) | 1 | 67.68 |
| Height-breadth (h/b) | 1 | 94.37 |
| Breadth (b'/b) | 1 | 71.13 |

Table No. 23

MALE

Facial Measurements and Indices of Tablet Hill B Cranium

| | No. | Mean |
|---|-----|--------|
| Na-gn (gh) | 1 | 119.00 |
| Na-pros (g'h) | 1 | 72.00 |
| Mid-face (gb) | | |
| Bi-zyg (j) | 1 | 135.00 |
| Nas. height (nhl) | 1 | 55.00 |
| Nas. breadth (nb) | 1 | 28.00 |
| Interorb. width (dc) | 1 | 25.00 |
| Orb. breadth (o' ₁) | 1 | 40.00 |
| Orb. height (o ₂) | | |
| Pal. length (gl' ₁) | 1 | 41.00 |
| Pal. breadth (g ₂) | 1 | 31.00 |
| For. Mag. length (fml) | 1 | 35.00 |
| For. Mag. breadth (fmb) | | |
| Total face (gh/j) | 1 | 88.00 |
| Upper face (g'h/j) | 1 | 53.00 |
| Nasal (nb/nsp) | 1 | 52.72 |
| Orbital (o ₂ l/o ₁ o) | | |
| Palatal (g ₂ /gl' ₁) | 1 | 75.61 |
| Cranio-facial (j/b) | | |

Table No. 24

FEMALE

Cranial Measurements and Indices of Islamic Cranium

| | No. | Mean |
|-------------------------------|-----|--------|
| Length (l) | 1 | 185.00 |
| Breadth (b) | 1 | 137.00 |
| Min. forehead (b') | 1 | 92.00 |
| Ba-br height (h') | 1 | 126.00 |
| Auric. height (oh) | 1 | 105.00 |
| Ba-na (lb) | 1 | 95.00 |
| Trans. arc (q') | 1 | 296.00 |
| Sag. arc (s) | 1 | 376.00 |
| Na-br arc (s ₁) | 1 | 125.00 |
| Br-la arc (s ₂) | 1 | 121.00 |
| La-opis arc (s ₃) | 1 | 130.00 |
| Cranial (b/l) | 1 | 74.05 |
| Height-length (h/l) | 1 | 68.11 |
| Height-breadth (h/b) | 1 | 91.97 |
| Breadth (b'/b) | 1 | 67.15 |

Table No. 25

FEMALE

Facial Measurements and Indices of Islamic Cranium

| | No. | Mean |
|---|-----|--------|
| Na-gn (gh) | 1 | 113.00 |
| Na-pros (g'h) | 1 | 69.00 |
| Mid-face (gb) | 1 | 94.00 |
| Bi-zyg (j) | 1 | 124.00 |
| Nas. height (nhl) | 1 | 52.00 |
| Nas. breadth (nb) | 1 | 27.00 |
| Interorb. width (dc) | 1 | 19.00 |
| Orb. breadth (o' ₁ l) | 1 | 40.00 |
| Orb. height (o ₂ l) | 1 | 33.00 |
| Pal. length (g ¹ l') | 1 | 37.00 |
| Pal. breadth (g ₂) | 1 | 41.00 |
| For. Mag. length (fml) | 1 | 35.00 |
| For. Mag. breadth (fmb) | | |
| Total face (gh/j) | 1 | 90.73 |
| Upper face (g'h/j) | 1 | 55.65 |
| Nasal (nb/nsp) | 1 | 51.92 |
| Orbital (o ₂ l/o ₁ l) | 1 | 82.50 |
| Palatal (g ₂ /g ¹ l') | 1 | 112.30 |
| Foraminal (fmb/fml) | | |
| Cranio-facial (j/b) | | |

Table No. 26

MALES

Cranial Measurements and Indices of Islamic Crania

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 4 | 177-186 | 182.25 |
| Breadth (b) | 4 | 135-142 | 137.75 |
| Min. forehead (b') | 5 | 96-100 | 98.40 |
| Ba-br height (h') | 4 | 135-143 | 139.25 |
| Auric. height (oh) | 4 | 105-120 | 112.00 |
| Ba-na (lb) | 4 | 93-113 | 101.50 |
| Trans. arc (q') | 4 | 306-323 | 313.75 |
| Sag. arc (s) | 3 | 385-396 | 390.65 |
| Na-br arc (s ₁) | 4 | 128-140 | 132.00 |
| Br-la arc (s ₂) | 3 | 130-139 | 134.33 |
| La-opis arc (s ₃) | 3 | 118-126 | 121.33 |
| Cranial (b/l) | 4 | 73- 80 | 75.50 |
| Height-length (h/l) | 4 | 74- 81 | 76.50 |
| Height-breadth (h/b) | 4 | 100-102 | 101.00 |
| Breadth (b'/b) | 4 | 68- 74 | 71.25 |

Table No. 27

MALES

Facial Measurements and Indices of Islamic Crania

| | No. | Range | Mean |
|---|-----|---------|--------|
| Na-gn (gh) | 5 | 109-118 | 114.40 |
| Na-pros (g'h) | 3 | 66- 73 | 70.00 |
| Mid-face (gb) | 4 | 95-108 | 102.50 |
| Bi-zyg (j) | 4 | 124-138 | 132.50 |
| Nas. height (nhl) | 5 | 48- 64 | 55.60 |
| Nas. breadth (nb) | 4 | 23- 26 | 24.75 |
| Interorb. width (dc) | 3 | 19- 24 | 21.66 |
| Orb. breadth (o' ₁ l) | 4 | 37- 43 | 39.75 |
| Orb. height (o' ₂ l) | 5 | 34- 38 | 35.40 |
| Pal. length (g' ₁) | 2 | 42- 44 | 43.00 |
| Pal. breadth (g ₂) | 3 | 39- 44 | 41.00 |
| For. Mag. length (fml) | 5 | 35- 40 | 36.40 |
| For. Mag. breadth (fmb) | | | |
| Total face (gh/j) | 4 | 80- 91 | 86.25 |
| Upper face (g'h/j) | 3 | 53- 54 | 53.33 |
| Nasal (nb/nsp) | 2 | 65- 76 | 70.50 |
| Orbital (o ₂ l/o ₁ l) | 4 | 80- 86 | 82.25 |
| Palatal (g ₂ /g ₁) | 2 | 96-101 | 98.50 |
| Foraminal (fmb/fml) | | | |
| Cranio-facial (j/b) | | | |

Table No. 28

FEMALES

Cranial Measurements and Indices of Crania from Level II

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 3 | 166-178 | 172.00 |
| Breadth (b) | 3 | 127-136 | 132.66 |
| Min. forehead (b') | 1 | | 89.00 |
| Ba-br height (h') | 1 | | 122.00 |
| Auric. height (oh) | 1 | | 109.00 |
| Ba-na (lb) | 1 | | 93.00 |
| Trans. arc (q') | | | |
| Sag. arc (s) | | | |
| Na-br arc (s ₁) | 1 | | 126.00 |
| Br-la arc (s ₂) | | | |
| La-opis arc (s ₃) | | | |
| Cranial (b/l) | 3 | 76- 78 | 76.65 |
| Height-length | 1 | | 69.00 |
| Height-breadth (h/b) | 1 | | 89.00 |
| Breadth (b'/b) | 1 | | 65.00 |

Table No. 29

FEMALES

Facial Measurements and Indices of Crania from Level II

| | No. | Range | Mean |
|---|-----|---------|--------|
| Na-gn (gh) | 1 | | 118.00 |
| Na-pros (g'h) | | | |
| Mid-face (gb) | 2 | 83- 99 | 91.00 |
| Bi-zyg (j) | 2 | 113-122 | 117.50 |
| Nas. height (nhl) | 2 | 45- 47 | 46.00 |
| Nas. breadth (nb) | 3 | 22- 25 | 23.60 |
| Interorb. width (dc) | 1 | | 20.00 |
| Orb. breadth (o' ₁) | 2 | 38- 40 | 39.00 |
| Orb. height (o ₁) | 2 | 29- 35 | 32.00 |
| Pal. length (g' ₁) | 1 | | 42.00 |
| Pal. breadth (g ₂) | 1 | | 40.00 |
| For. Mag. length (fml) | | | |
| For. Mag. breadth (fmb) | | | |
| Total face (bh/j) | 1 | | 96.00 |
| Upper face (g'h/j) | | | |
| Nasal (nb/nsp) | 1 | | 53.19 |
| Orbital (o ₂ l/o ₁ l) | 1 | | 80.50 |
| Palatal (g ₂ /g' ₁) | 2 | 90- 95 | 92.50 |
| Foraminal (fmb/fml) | | | |
| Cranio-facial (j/b) | 1 | | 90.00 |

Table No. 30

MALES

Cranial Measurements and Indices of Crania from Level II

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 7 | 182-200 | 189.85 |
| Breadth (b) | 7 | 126-144 | 135.14 |
| Min. forehead (b') | 10 | 86-102 | 94.50 |
| Ba-br height (h') | 5 | 118-140 | 127.40 |
| Auric. height (oh) | 6 | 108-127 | 116.66 |
| Ba-na (lb) | 6 | 84-106 | 94.50 |
| Trans. arc (q') | 5 | 289-314 | 302.20 |
| Sag. arc (s) | 3 | 377-392 | 385.33 |
| Na-br arc (s ₁) | 5 | 120-140 | 126.80 |
| Br-la arc (s ₂) | 6 | 120-146 | 133.16 |
| La-opis arc (s ₃) | 4 | 110-132 | 118.75 |
| Cranial (b/l) | 7 | 65- 75 | 71.28 |
| Height-length (h/l) | 5 | 63- 76 | 68.20 |
| Height-breadth (h/b) | 5 | 85-111 | 94.40 |
| Breadth (b'/b) | 7 | 64- 76 | 69.00 |

Table No. 31

MALES

Facial Measurements and Indices of Crania from Level II

| | No. | Range | Mean |
|---|-----|---------|--------|
| Na-gn (gh) | 8 | 109-125 | 115.87 |
| Na-pros (g'b) | 8 | 60- 76 | 67.87 |
| Mid-face (gb) | 7 | 85- 98 | 92.42 |
| Bi-zyg (j) | 7 | 122-138 | 127.42 |
| Nas. height (nhl) | 8 | 47- 61 | 53.87 |
| Nas. breadth (nb) | 9 | 22- 30 | 25.66 |
| Interorb. width (dc) | 5 | 21- 22 | 21.60 |
| Orb. breadth (o' ₁ l) | 5 | 37- 42 | 39.80 |
| Orb. height (o' ₂ l) | 7 | 30- 37 | 33.42 |
| Pal. length (gl') | 8 | 32- 46 | 40.25 |
| Pal. breadth (g ₂) | 8 | 34- 44 | 38.12 |
| For. Mag. length (fml) | 4 | 35- 40 | 36.75 |
| For. Mag. breadth (fmb) | 5 | 27- 33 | 29.40 |
| Total face (g/j) | 6 | 87- 94 | 91.66 |
| Upper face (g'h/j) | 7 | 43- 57 | 52.85 |
| Nasal (nb/nsp) | 7 | 46- 56 | 49.71 |
| Orbital (o ₂ l/o ₁ l) | 7 | 73- 87 | 80.14 |
| Palatal (g ₂ /gl' ₁) | 7 | 81- 97 | 91.42 |
| Foraminal (fmb/fml) | 4 | 73- 83 | 78.00 |
| Cranio-facial (j/b) | 6 | 90-102 | 96.16 |

Table No. 32

FEMALES

Cranial Measurements and Indices of Cranium from Level III

| | No. | Mean |
|-----------------------------|-----|--------|
| Length (l) | 1 | 186.00 |
| Breadth (b) | 1 | 135.00 |
| Min. forehead (b') | 1 | 88.00 |
| Ba-br height (h') | 1 | 135.00 |
| Auric. height (oh) | 1 | 119.00 |
| Ba-na (lb) | 1 | 101.00 |
| Trans. arc (q') | 1 | 309.00 |
| Sag. arc (s) | 1 | 382.00 |
| Na-br arc (s ₁) | 1 | 137.00 |
| Br-la arc (s ₂) | 1 | 128.00 |
| La-opis (s ₃) | 1 | 115.00 |
| Cranial (b/l) | 1 | 72.58 |
| Height-length (h/l) | 1 | 72.58 |
| Height-breadth (h/b) | 1 | 100.00 |
| Breadth (b'/b) | 1 | 65.18 |

Table No. 33

FEMALES

Facial Measurements and Indices of Cranium from Level III

| | No. | Mean |
|---|-----|--------|
| Na-gn (gh) | 1 | 119.00 |
| Na-pros (g'h) | 1 | 71.00 |
| Mid-face (gb) | 1 | 96.00 |
| Bi-zyg (j) | 1 | 123.00 |
| Nas. height (nhl) | 1 | 51.00 |
| Nas. breadth (nb) | 1 | 27.00 |
| Interorb. width (dc) | 1 | 22.00 |
| Orb. breadth (o ₁ ¹) | 1 | 39.00 |
| Orb. height (o ₂ ¹) | 1 | 33.00 |
| Pal. length (g ₁ ¹) | 1 | 47.00 |
| Pal. breadth (g ₂) | 1 | 40.00 |
| For. Mag. length (fml) | 1 | 37.00 |
| For. Mag. breadth (fmb) | | |
| Total face (gh/j) | 1 | 96.75 |
| Upper face (g'h/j) | 1 | 57.72 |
| Nasal (nb/nsp) | 1 | 52.94 |
| Orbital (o ₂ ¹ /o ₁ ¹) | 1 | 86.84 |
| Palatal (g ₂ /g ₁ ¹) | 1 | 85.11 |
| Foraminal (fmb/fml) | 1 | |
| Cranio-facial (j/b) | 1 | 91.11 |

Table No. 34

MALES

Cranial Measurements and Indices of Crania from Level III

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 10 | 188-202 | 196.90 |
| Breadth (b) | 10 | 120-145 | 137.50 |
| Min. forehead (b') | 10 | 90-102 | 98.30 |
| Ba-br height (h') | 9 | 130-150 | 138.66 |
| Auric. height (oh) | 10 | 113-129 | 119.70 |
| Ba-na (lb) | 9 | 104-111 | 108.66 |
| Trans. arc (q') | 9 | 312-326 | 320.55 |
| Sag. arc (s) | 10 | 379-407 | 397.20 |
| Na-br arc (s ₁) | 10 | 117-135 | 129.70 |
| Br-la arc (s ₂) | 10 | 134-152 | 142.40 |
| La-opis arc (s ₃) | 10 | 117-130 | 124.20 |
| Cranial (b/l) | 10 | 66- 73 | 70.00 |
| Height-length (h/l) | 9 | 67- 76 | 70.55 |
| Height-breadth (h/b) | 9 | 91-105 | 100.22 |
| Breadth (b'/b) | 10 | 66- 76 | 71.60 |

Table No. 35

MALES

Facial Measurements and Indices of Crania from Level III

| | No. | Range | Mean |
|--|-----|---------|--------|
| Na-gn (gh) | 8 | 117-129 | 123.37 |
| Na-pros (g'h) | 9 | 59- 75 | 69.77 |
| Mid-face (gb) | 9 | 94-107 | 101.33 |
| Bi-zyg(j) | 10 | 133-140 | 136.30 |
| Nas. height (nhl) | 9 | 49- 61 | 53.88 |
| Nas. breadth (nh) | 9 | 26- 31 | 28.11 |
| Interorb. width (dc) | 9 | 22- 28 | 24.33 |
| Orb. breadth (o' ₁) | 9 | 38- 43 | 40.33 |
| Orb. height (o ₂) | 9 | 30- 33 | 32.00 |
| Pal. length (g' ₁) | 9 | 39- 50 | 45.55 |
| Pal. breadth (g ₂) | 9 | 36- 48 | 41.77 |
| For. Mag. length (fml) | 9 | 33- 41 | 36.77 |
| For. Mag. breadth (fmb) | 7 | 29- 33 | 30.71 |
| Total face (gh/b) | 8 | 85- 94 | 90.12 |
| Upper face (g'h/j) | 9 | 43- 56 | 51.11 |
| Nasal (nb/nsp) | 8 | 46- 60 | 52.37 |
| Orbital (o ₂ l/o ₁) | 9 | 70- 80 | 75.44 |
| Palatal (g ₂ /g ₁) | 9 | 80-115 | 92.33 |
| Foraminal (fmb/fml) | 7 | 71- 89 | 82.00 |
| Cranio-facial (j/b) | 10 | 94-104 | 99.00 |

Table No. 36

MALES

Cranial Measurements and Indices of Crania from Level IV-V

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 3 | 190-198 | 193.00 |
| Breadth (b) | 3 | 135-146 | 141.33 |
| Min. forehead (b') | 4 | 94-104 | 97.50 |
| Ba-br height (h') | 3 | 137-143 | 140.00 |
| Auric. height (oh) | 3 | 117-129 | 121.66 |
| Ba-na (lb) | 3 | 105-109 | 107.66 |
| Trans. arc (q') | 3 | 322-338 | 331.00 |
| Sag. arc (s) | 3 | 383-396 | 390.66 |
| Na-br arc (s ₁) | 4 | 130-139 | 136.00 |
| Br-la arc (s ₂) | 3 | 138-145 | 141.66 |
| La-opis arc (s ₃) | 3 | 102-115 | 113.33 |
| Cranial (b/l) | 3 | 68- 76 | 73.00 |
| Height-length (h/l) | 3 | 72- 74 | 72.66 |
| Height-breadth (h/b) | 3 | 96-106 | 99.33 |
| Breadth (b'/b) | 3 | 66- 71 | 69.33 |

Table No. 37

MALES

Facial Measurements and Indices of Crania from Level IV-V

| | No. | Range | Mean |
|---|-----|---------|--------|
| Na-gn (gh) | 3 | 118-126 | 123.00 |
| Na-pros (g'h) | 3 | 68- 74 | 71.66 |
| Mid-face (gb) | 3 | 96-102 | 99.00 |
| Bi-zyg. (j) | 3 | 132-140 | 136.00 |
| Nas. height (nhl) | 3 | 50- 56 | 53.33 |
| Nas. breadth (nb) | 3 | 25- 29 | 26.66 |
| Interorb. width (dc) | 3 | 20- 22 | 21.33 |
| Orb. breadth (o' ₁ l) | 4 | 40- 41 | 40.25 |
| Orb. height (o ₂ l) | 4 | 31- 34 | 32.25 |
| Pal. length (gl') | 3 | 42- 52 | 46.66 |
| Pal. breadth (g ₂) | 3 | 43- 44 | 43.66 |
| For. Mag. length (fml) | 2 | 36- 45 | 41.60 |
| For. Mag. breadth (fmb) | 2 | 30- 33 | 31.51 |
| Total face (gh/j) | 3 | 84- 95 | 90.33 |
| Upper face (g'h/j) | 3 | 54- 63 | 57.66 |
| Nasal (nb/nsp) | 3 | 48- 52 | 50.00 |
| Orbital (o ₂ l/o ₁ l) | 4 | 70- 81 | 76.25 |
| Palatal (g ₂ /gl ₁) | 3 | 84-102 | 94.00 |
| Foraminal (fmb/fml) | 2 | 67- 89 | 78.00 |
| Cranio-facial (j/b) | 3 | 95- 98 | 96.33 |

Table No. 38

FEMALES

Cranial Measurements and Indices of Crania from Level IV-V

| | No. | Range | Mean |
|-------------------------------|-----|---------|--------|
| Length (l) | 4 | 183-191 | 187.25 |
| Breadth (b) | 4 | 129-141 | 134.50 |
| Min. forehead (b') | 5 | 92- 99 | 95.60 |
| Ba-br height (h') | 4 | 133-138 | 135.75 |
| Auric. height (oh) | 3 | 118-124 | 120.33 |
| Ba-na (lb) | 4 | 102-107 | 104.24 |
| Trans. arc (q') | 3 | 310-315 | 311.66 |
| Sag. arc (s) | 3 | 383-392 | 386.66 |
| Na-br arc (s ₁) | 4 | 121-130 | 126.50 |
| Br-la arc (s ₂) | 3 | 135-145 | 139.00 |
| La-opis arc (s ₃) | 3 | 116-129 | 121.33 |
| Cranial (b/l) | 4 | 68- 75 | 71.75 |
| Height-length (h/l) | 4 | 70- 74 | 72.25 |
| Height-breadth (h/b) | 3 | 100-106 | 99.66 |
| Breadth (b'/b) | 4 | 67- 72 | 68.50 |

Table No. 39

FEMALES

Facial Measurements and Indices of Crania from Level IV-V

| | No. | Range | Mean |
|---|-----|---------|--------|
| Na-gn (gh) | 4 | 108-117 | 112.00 |
| Na-pros (g'h) | 6 | 60- 70 | 63.00 |
| Mid-face (gb) | 5 | 90- 97 | 94.60 |
| Bi-zyg (j) | 4 | 120-132 | 127.50 |
| Nas. height (nhl) | 6 | 48- 57 | 51.50 |
| Nas. breadth (nb) | 6 | 22- 28 | 25.00 |
| Interorb. width (dc) | 5 | 17- 21 | 19.60 |
| Orb. breadth (o' ₁ l) | 5 | 34- 42 | 39.80 |
| Orb. height (o ₂ l) | 5 | 31- 37 | 32.60 |
| Pal. length (gl' ₁) | 6 | 40- 45 | 42.16 |
| Pal. breadth (g ₂) | 6 | 38- 44 | 40.63 |
| For. Mag. length (fml) | 4 | 35- 40 | 37.00 |
| For. Mag. breadth (fmb) | 4 | 27- 32 | 30.00 |
| Total Face (gh/j) | 4 | 84- 93 | 88.25 |
| Upper face (g'h/j) | 5 | 47- 54 | 50.20 |
| Nasal (nb/nsp) | 6 | 44- 58 | 48.83 |
| Orbital (o ₂ l/o ₁ l) | 6 | 70- 84 | 78.00 |
| Palatal (g ₂ /gl' ₁) | 6 | 93-105 | 96.83 |
| Foraminal (fmb/fml) | 4 | 73- 89 | 81.50 |
| Cranio-facial (j/b) | 4 | 93- 98 | 95.00 |

Table No. 40

APPENDIX

As a further means of comparison with the Nippur material, Dr. Coon has graciously compiled his data on the appendicular skeletons of the tenth century Islamic population.

This additional step seemed advisable since we have previously compared the crania of these two populations, pp. 15-16, of this report.

As this monograph was written prior to the final compilation of the Arab material, we submit the following tables as an appendix.

NIPPUR, ADULT MALE ARABS (TENTH CENTURY)

| | No. | Range | Mean | S.D. | C.V. |
|-------------------|-----|---------|--------------|------|------|
| Stature | 33 | 154-178 | 166.00± 1.12 | 6.42 | 3.87 |
| Femur head diam. | 24 | 41- 52 | 46.67± .40 | 1.97 | 4.22 |
| Femur length L. | 37 | 37- 50 | 43.54± .44 | 2.69 | 6.18 |
| Femur length R. | 32 | 38- 49 | 43.50± .50 | 2.86 | 6.57 |
| Tibia length L. | 32 | 32- 44 | 37.34± .48 | 2.69 | 7.20 |
| Tibia length R. | 31 | 31- 42 | 37.16± .57 | 2.74 | 7.37 |
| Humerus length L. | 24 | 28- 36 | 30.96± .42 | 2.06 | 6.67 |
| Humerus length R. | 24 | 28- 36 | 31.21± .42 | 2.06 | 6.60 |
| Ulna length L. | 13 | 23- 30 | 25.92± .56 | 2.02 | 7.79 |
| Ulna length R. | 12 | 22- 29 | 25.58± .56 | 1.93 | 7.55 |
| Tibio-fem. I. | 32 | 80- 91 | 85.19± .49 | 2.83 | 3.31 |

Table No. 41

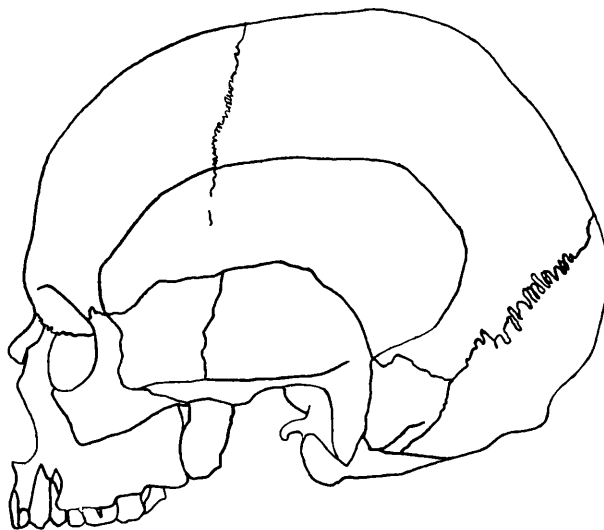
NIPPUR, ADULT FEMALE ARABS (TENTH CENTURY)

| | No. | Range | Mean | S.D. | C.V. |
|-------------------|-----|---------|-------------|------|------|
| Stature | 27 | 143-166 | 153.19± .98 | 5.10 | 3.33 |
| Femur head diam. | 20 | 35- 48 | 41.35± .67 | 3.01 | 7.28 |
| Femur length L. | 20 | 37- 46 | 40.95± .52 | 2.31 | 5.64 |
| Femur length R. | 25 | 37- 45 | 41.00± .81 | 2.02 | 4.93 |
| Tibia length L. | 22 | 30- 41 | 34.23± .74 | 2.54 | 7.42 |
| Tibia length R. | 22 | 31- 41 | 34.09± .50 | 2.35 | 6.89 |
| Humerus length L. | 19 | 27- 33 | 28.95± .37 | 1.61 | 5.56 |
| Humerus length R. | 19 | 27- 32 | 28.90± .29 | 1.25 | 4.32 |
| Ulna length L. | 16 | 21- 29 | 24.38± .52 | 2.09 | 8.57 |
| Ulna length R. | 9 | 21- 26 | 23.33± | | |
| Tibio-fem. I. | 25 | 74- 92 | 83.04± .78 | 3.88 | 4.67 |

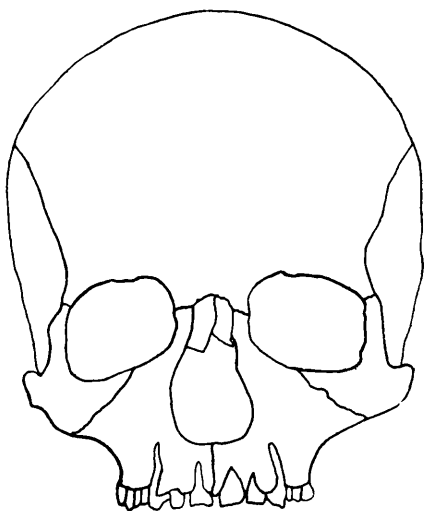
Table No. 42

PLATES

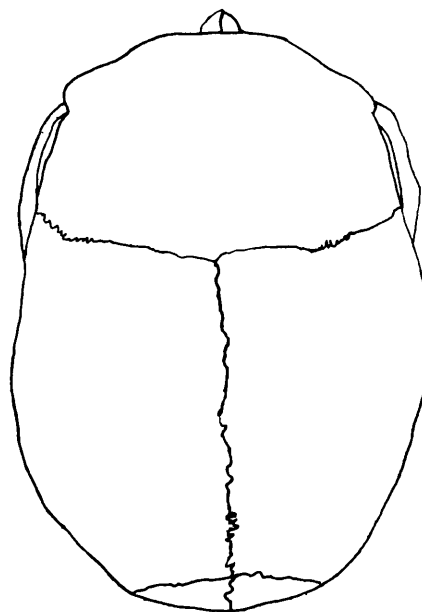
PLATE I



Norma Lateralis.

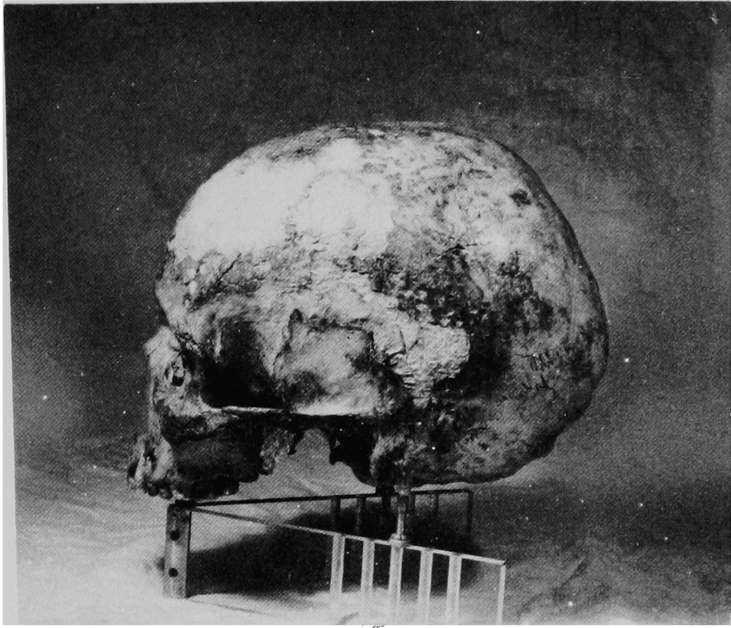


Norma Facialis.

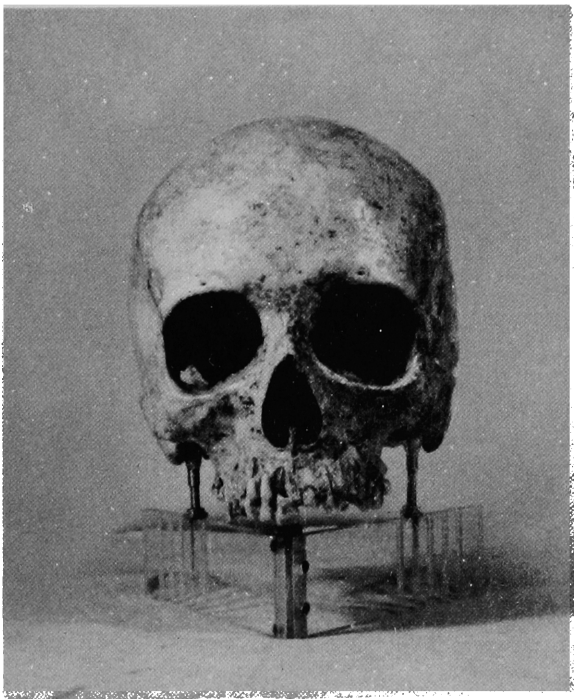


Norma Verticalis.

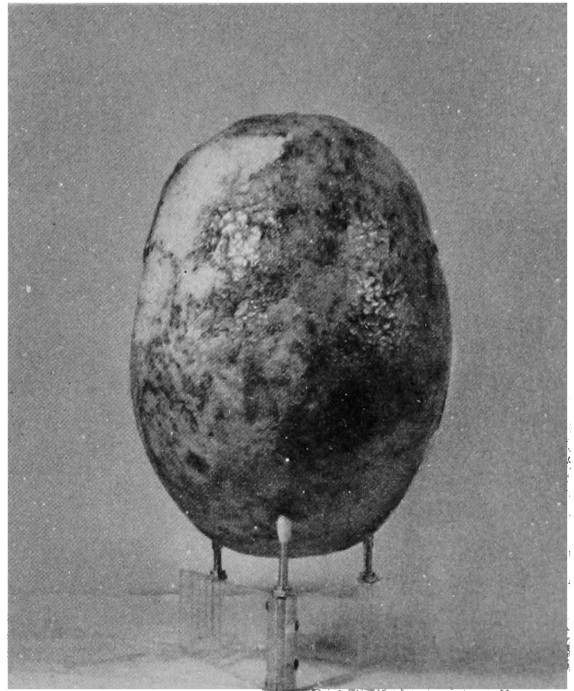
CRANIOSTAT DRAWINGS: MEDITERRANEAN MALE



Norma Lateralis.



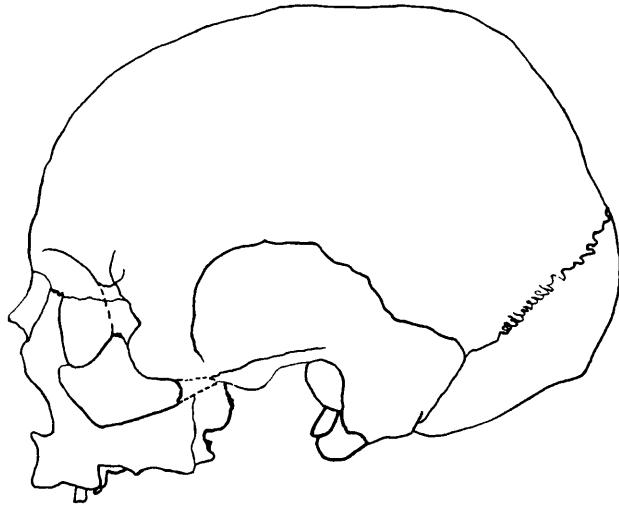
Norma Facialis.



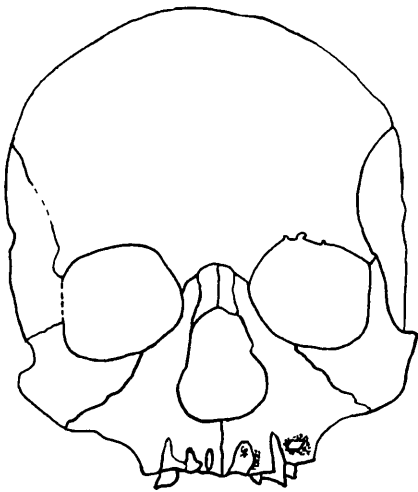
Norma Verticalis.

PHOTOGRAPHS: MEDITERRANEAN MALE

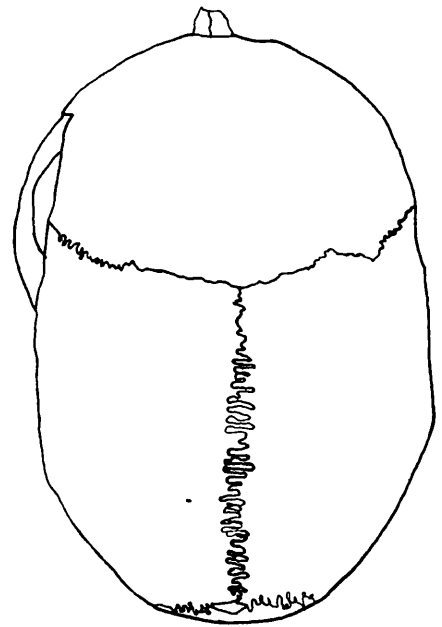
PLATE III



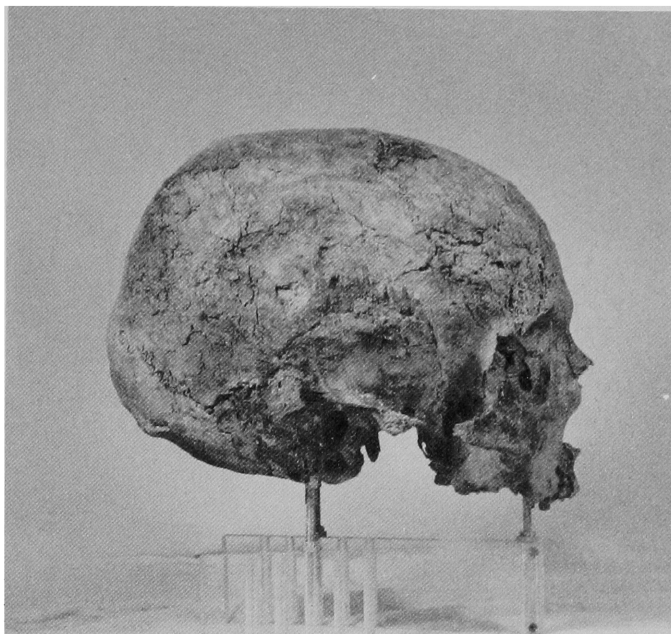
Norma Lateralis.



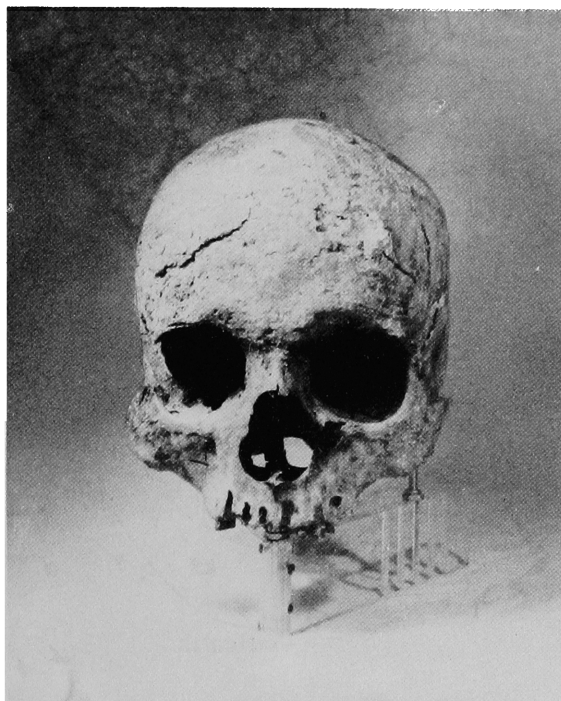
Norma Facialis.



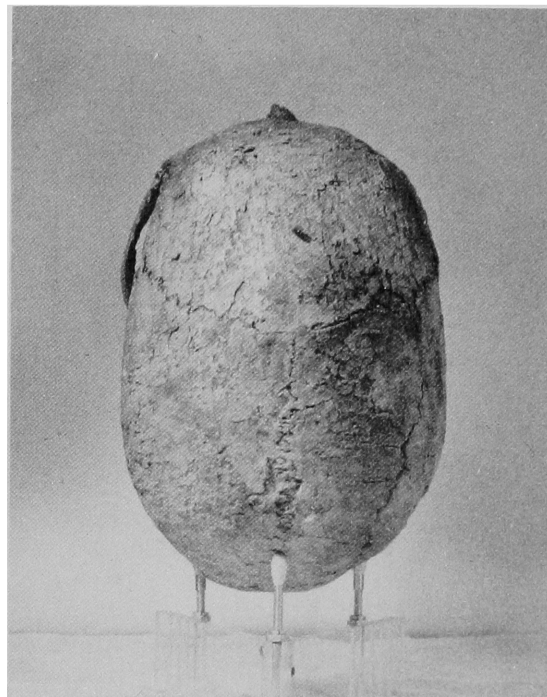
Norma Verticalis.



Norma Lateralis.



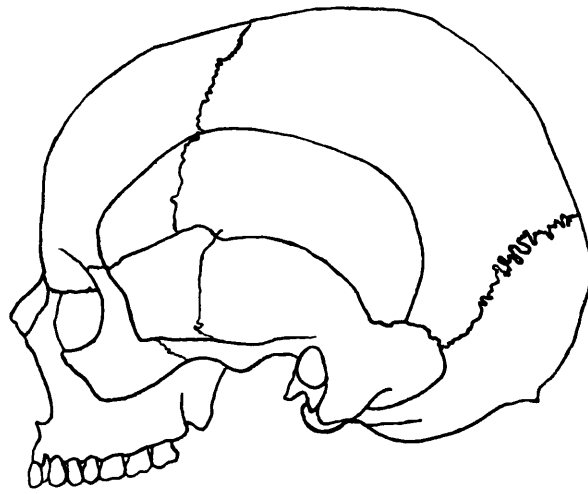
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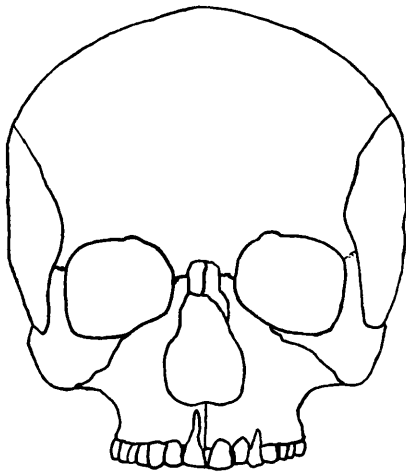
Norma Verticalis.

PHOTOGRAPHS: MEDITERRANEAN MALE

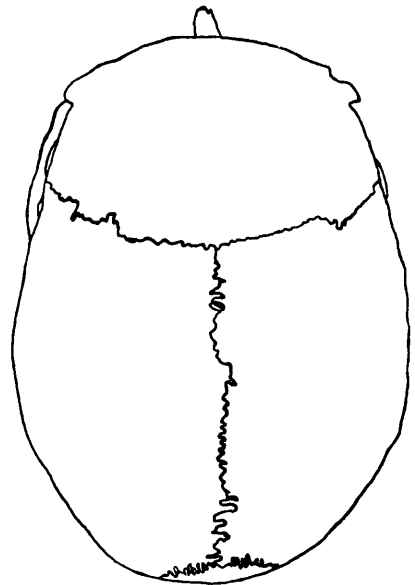
PLATE V



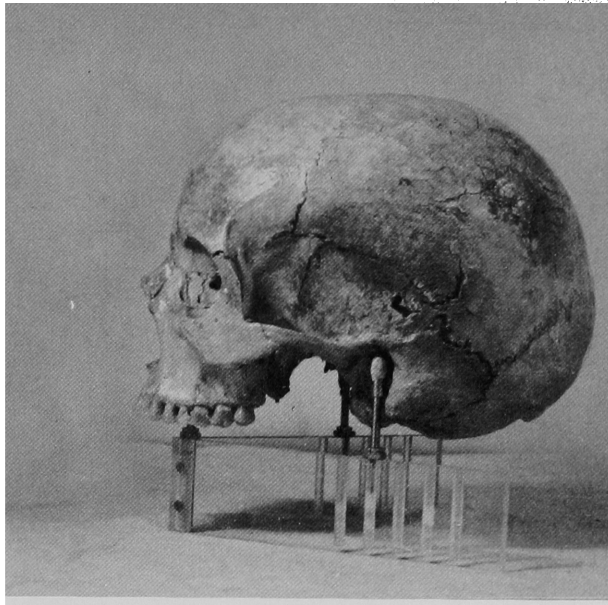
Norma Lateralis.



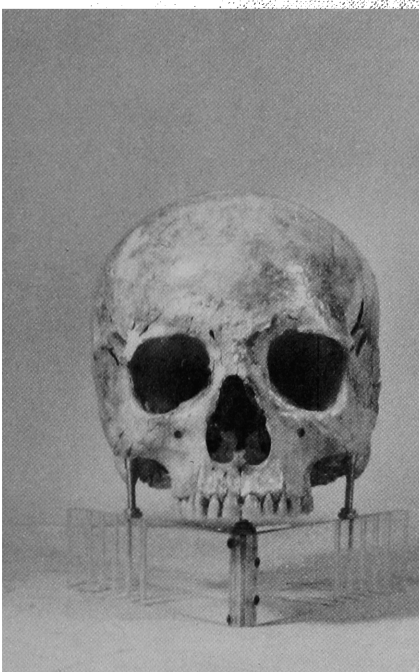
Norma Facialis.



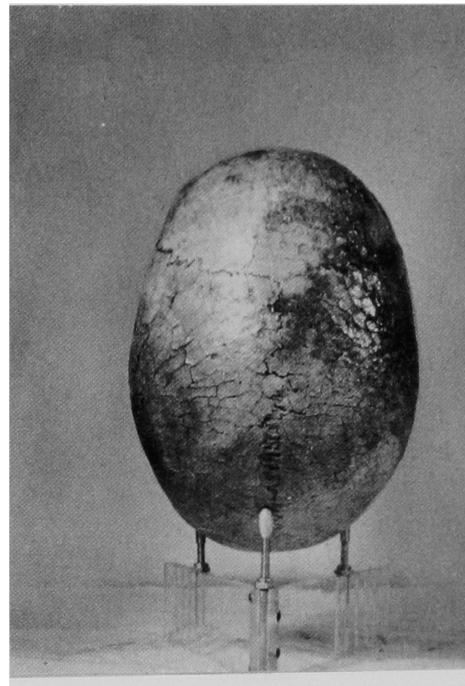
Norma Verticalis.



Norma Lateralis.



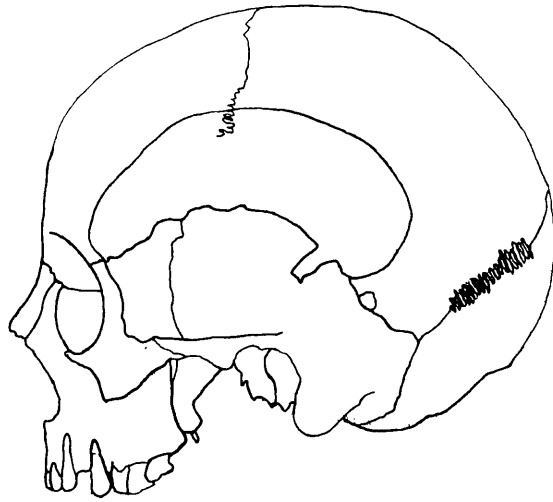
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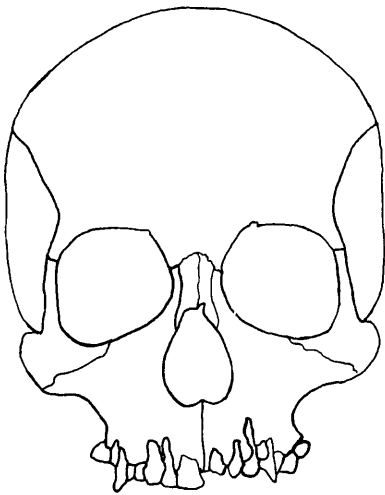
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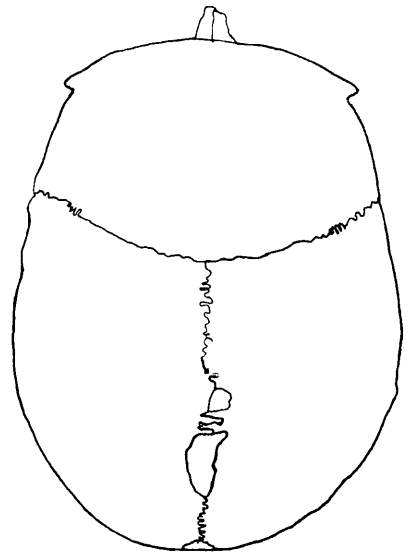
PLATE VII



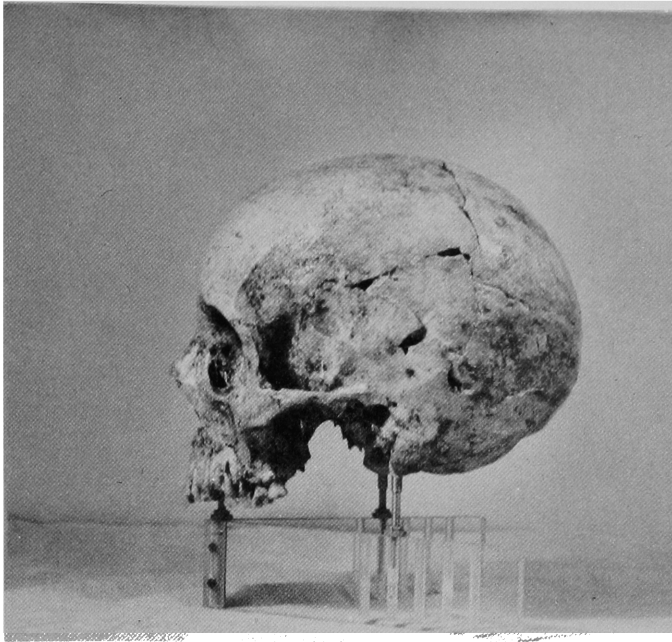
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Norma Facialis.



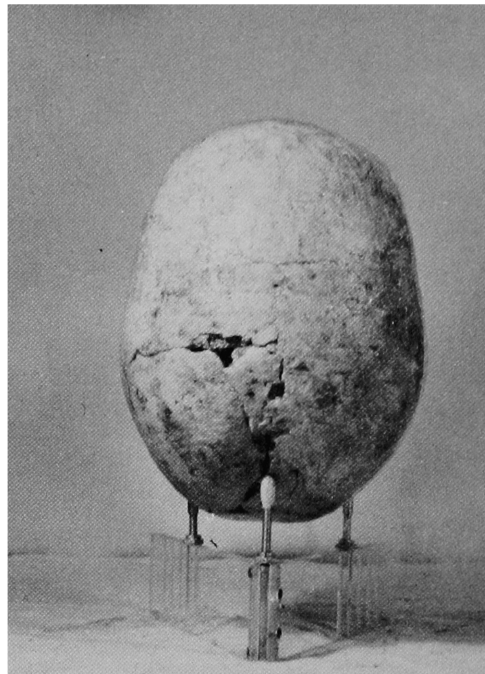
Norma Verticalis.



Norma Lateralis.



Norma Facialis.



Norma Verticalis.

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