Human Skeletal Remains from the Cemetery of Timargarha

Part VII

By

WOLFRAM BERNHARD, Ph.D., D.Sc.
Anthropological Institute,
University of Mainz, West Germany

HUMAN SKELETAL REMAINS FROM THE CEMETERY OF TIMARGARHA

By Dr. WOLFRAM BERNHARD

SECTION — 1

1. INTRODUCTION

The following report deals with the skeletal remains exhumed during the excavation of the protohistoric cemetery at Timargarha (Dir-State, North-West Pakistan) conducted by the Department of Archaeology, University of Peshawar, in collaboration with the Department of Archaeology Government of Pakistan (Karachi) in 1965. At the kind invitation of the above mentioned Departments and the financial support by the Deutsche Forschungsgemeinschaft the author was able to participate in the excavation and was responsible for the analysis of the anthropological material. In 1964 excavation at Timargarha were mostly revealed *well preserved human remains*[1], but in 1965 the bone material was in a very bad condition. Only with greatest care it was possible to get useful material for anthropological study.

Archaeological Background: The cemetery of Timargarha belongs to a cultural complex wide-spread in the mountain region of Northwest Pakistan. It could be traced till today from the border of Afghanistan to the Indus i.e. the region of old Gandhara. Dani (1966) has proposed the nomenclature "Gandhara Grave Complex". Yet the term does not imply that the graves are typical of Gandhara. It simply means that in the present state of exploration we are likely to find them also in Afghanistan and the areas east of the Indus River (compare DANI 1966). Based on the sequence study of that region, DANI could distinguish, for the first time, three main cultural periods one following the other, which according to his tentative dating extend from the middle of the second millennium B.C. right into the historic period (approximately 8th-7th centuries B.C.). Meanwhile the date for the early period could be confirmed by radiocarbon dating, performed on bone material at the University of Heidelberg, W. Germany. The inflexed burial of grave 101, which according to Dani belongs to cultural period 1, yielded an absolute age of at least 3380 ± 60 years, indicating that the earliest period began latest in 15th century B.C. (see also below). According to DANI the three cultural periods differ from one another not only in pottery but also in funerary rites and the introduction of iron in period III. Therefore it may be infered that we are dealing with people or peoples who are passing from Bronze to Iron Age (see Section 10 on Discussion and Conclusion).

Similarly three periods had been differenciated by STACUL (1966) in his recently published report on the pre-Buddhist necropolises in Swat, which belongs to the same cultural complex. However, it is difficult to compare at present the three periods of Stacul with those of Dani.

Concerning the cultural relationships to other pre- and proto-historic sites of Asia, a question which is also important to a certain degree for the anthropological analysis, we mostly refer to the above mentioned work of Stacul. As earlier mentioned by ANTONINI (1963) in her preliminary notes on the excavation of the necropolises found in Swat, STACUL also considers most of the cultural associations with West Asia and Asia Minor. Regarding the typology of the pottery he points out many features in common with analogous pottery discovered in Palestine (4th Millennium B.C.), Khurab, Bampur and Katakan in Persian Makran, Tepe Hissar phases IIB, IIIA and III1B. Shah Tepe phase II A. the deepest level at Charsada, (Bala Hisar) the tombs of cemetery R 37 at Harappa, the most recent strata of Gawra, Hasanlu V Giyan I, Turang Tepe, Sialk, Mundigak IV, and Chanhu-daro II.

According to STACUL the metal objects, especially the different types of copper hair pins, are related to similar types found in the Veri cemetries (Soviet Caucasus) in tombs dating from the late Bronze Age, finds at Coban in late Bronze Age tombs, at Anau, Giyan, Sialk. and other sites already mentioned in connection with the pottery.

As critique of ANTONINI, which is however also true of STACUL, DANI (1966) is of the opinion, that many of these cultural associations are questionable on ground of long time gap.

Contrary to ANTONINI and STACUL, Prof. JETTMAR, ethnologist at the University of Heidelberg and an expert of Asian prehistory, suggests relationships to the North i.e. Middle Asia, especially the steppe region, as will be discussed in a later section.

From an anthropological point of view, especially from the aspect of the racial history of the Pak-Indian sub-continent, the bone material from Timargarha is of prime importance both geographically and chronologically. Besides the anthropological finds, excavated by the Italian Archaeological mission in the neighbouring Swat, which however has not been published yet[2], the skeletal remains from Timargarha are the only pre- and proto-historic anthropological material found in the extreme north-western corner of the sub-continent. This region is generally considered

as one of the most important gateways for immigration of foreign people from West and Central Asia to India. To emphasise the chronological importance DANI points out that "it is at this time that we learn from literature about the historic play of the enigmatic people, well known as Aryans, in this region. If in these graves we are not in the track of the Aryans, we are close upon their heels". (DANI 1966).

SECTION — 2

MATERIAL

The collection comprises unburnt and burnt skeletal remains of 137 individuals found in 82 graves of site No. 1 and 2. The material varies from complete skeletons to only a few but characteristic bone pieces representing one individual. Especially the children graves revealed only tiny bone fragments. Their discovery was possible as most of these graves had a stone lining, and were covered with big stone slabs. Yet the collection does not include the bones of all graves opened during 1965 season. Owing to different reasons the bones of some graves could not be collected. The maximum number of these graves were opened earlier than the author's arrival at Timargarha. Due to heavy rainfall these graves were filled in with mud or collapsed, so that the scanty bone pieces found in them were destroyed and could not be salvaged.

Owing to the bad state of preservation of the bone material only 25 skulls were in a good state or could be restored so that they were useful for ostiological or material study and report. In this number some skulls are included, which were exhumed during 1964 season (numbered as skulls 01-06). Unfortunately the postcranial skeletons belonging to these skulls were not salvaged. The material was transported to the Anthropological Institute University of Mainz, West Germany, for final analysis.

SECTION — 3

METHODS AND TECHNIQUES

A) Estimation of age at death.

The eruption of the deciduous and permanent teeth as well as the epiphyseal union of various parts of the skeleton were the criteria for age determination of non-adults.

The age of death of grown up individuals was based — as far as preserved — on the whole skeleton. NEMESKERI et al. (1960) have developed a combined method of age determination based on skeletal material of known age, which in 80% of the cases determines the actual age at death within an error limit of 2 to 5 years. This method is based on the combination of four morphological features, which during lifetime show characteristic age variations: The closure of the endocranial sutures, the age change of the spongy structure of the proximale epiphyses of humerus and femur and the developmental stages of the pubic symphysis. The age determination by this method is far more exact than the usual method based on the closure of the external sutures of the skull and hence of great value for palaedemographic analysis of prehistoric population. Unfortunately, owing to the bad state of preservation this method could be applied only in a few cases of this material. In many skeletons the pubic symphysis and the upper portions of humerous and femur were missing or so badly damaged that exact judgement regarding their structure was not possible. The determination of the closure of the endocranial sutures was also very difficult, especially in the case of the well preserved crania as the inside space of these skulls was filled up with well-backed earth, the removal of which was not possible without damaging the cranium.

For this reason the age had to be determined on the usual method of outer suture closure, according to the scheme of VALLOIS (1937) (see HEBERER et al p. 335). The other features were taken into consideration when the sutural arrangement could not be assessed. The attrition of the teeth was also very helpful in these cases where the other skeletal parts for age determination were missing. According to BROTHWELL's (1963) suggestion the wear pattern of the teeth of the individuals of unknown age were compared with the attrition of those individuals whose age could be determined relatively exactly by other age criteria. The sexual differences in attrition were also accounted for. The age determination of cremated material is completed basically on the same principles as valid for age assessment of unburnt skeletons. The changes due to the burning, however, made the analysis more difficult, so that in most cases only a broad classification of age was possible (adult, mature, senile). This is also true of those skeletons, where main features for age determination were missing.

B) Determination of sex

The determination of sex was based on usual sex characters of skull, pelvis and remaining skeleton (compare MARTIN-SALLER 1959, MONTAGU 1960, KROGMAN 1962, BROTHWELL 1963). In some cases, how-

ever, the sex could be assessed only by a few features, as the significant skull and pelvic region were mostly decomposed or so badly damaged that an exact estimation of the sex characters was not possible. In some other cases the sex determination was totally impossible, owing to the bad state of preservation of the material. Sexing of non-adults, which is very difficult owing to the less marked sex characters, could be established only in a few cases. The difficulty was all the more increased as most of the bones of children and juveniles were in a very bad condition.

C) Measurements and photographs

Most of the measurements were taken according to MARTIN's method with the instruments recommended by him (MARTIN-SALLER 1957). Only the measurements of facial flatness, which are not described by MARTIN were taken according to WOO and MORANT (1934) or according to the Russian metrical scheme. For linear measurements of facial flatness (e.g. the dakryal breadth and height and simotic breadth and height) a co-ordinate calliper was employed. Angular measurements were taken directly on the skull after proper orientation on the craniophore. The measurements were selected, keeping in mind the metrical comparison with neighbouring anthropological series from Pakistan, India and West and Middle Asia. Most of the basic measurements and indices are furnished in the collective tables at the end of the report. Linear and curvilinear measurements are given in millimeters.

The photographic material consists of photos of the well preserved skulls, which were utilised for anthropological and metrical report. The skulls are shown in norma frontalis, lateralis, occipitalis and verticalis. Regarding norma lateralis the better preserved side is given.

D). Estimation of cranial capacity and stature

The cranial capacity could not be determined with a direct method i.e. by filling of the inside space of the cranium by mustard-seed or other substances (compare MARTIN-SALLER Vol. 1, p. 470). All skulls were either fragmentary or the inside was filled with hard clay, the removal of which was not possible without damaging the skull. For that reason it was necessary to apply one of the various formulae for estimation of cranial capacity. GUPTA, DUTTA and BASU (1962) found for the Harappa bone material that estimation of cranial capacity by Lee-Pearsons Naqada formula was closest to the results direct measurements. As Timargarha

material comes from the same geographical area and as it has been shown later on that no great metrical differences could be observed between the two series, therefore, it can be assumed that this formula, applied to our material, also gives satisfactory results. Lee-Pearsons Naqada formula is as follows:

Capacity for Males = 0.000352. (L × B × H) + 372,39
" " Females = 0.000416. (L × B × H) + 189,81

(L denotes maximum cranial length, B maximum cranial breath, H vertical porion height).

Out of the various formulae for estimation of the stature, Pearson's "regression formula", DUPERTIUS and HADDONS "general formula" and the Tables of MANOUVRIER as well as those of TROTTER and GLESER are mostly used. The values estimated according to PEARSON and MANOUVRIER are relatively low whereas those according to DUPERTIUS and HADDON and TROTTER and GLESER are relatively high, as it is known from literature (compare also EHRHARDT 1964). In case of our material the methods of MANOUVRIER and TROTTER and GLESER were employed. The latter method was also used by EHRHARDT (1964), who estimated the stature of 32 protohistoricekeletons from India.

E). Type diagnosis

The typological classification of the skulls was performed on the basis of metrical and morphognostic characteristics using the nomenclature common to prehistoric anthropology of South, West and Middle Asia (Mediterranean, Proto-Mediterranean, Australoid, Proto-Australoid, Veddoid, Nordic, Proto or Palae-Europid, Cromagnid etc.). The concept of type means to us a combination of certain morphological features. The problem, how far these types are identical with races or racial types in a strict genetical sense, should not be decided here.

During an "International Symposium on the Anthropology of Neolithic" in autumn 1966 in Mainz, SCHWIDETZKY suggested to replace the traditional typological classificatory concepts as Mediterranean, Nordic, Cromagnid etc. by more neutral terms, which at the same time present a brief morphological characteristic of the skull. The first part of such nomenclature explains the main features of the face and the second one those of the brain-case of the skull. For example, according to the new terminology the Mediterraneans and the Nordics, which are difficult to dis-

tinguish on the basis of the skull, can be termed as Lepto-dolichomorphs and the Cromagnid skulls as Eury-dolichomorphs. In the same manner the other types can also be characterized. There are further possibilities of differentiation with the help of additions like gracile, robust, aquiline etc. (i.e. gracile Lepto-dolichomorphs). Above all, the new nomenclature has the advantage that it helps in avoiding misleading associations regarding the geographical origin of the types, which are implied in most of the traditional terms. In the present work the attempt is made to use the new nomenclature along with the old terminology.

SECTION — 4

DESCRIPTION OF THE SKELETAL REMAINS OF THE GRAVES

The following is a short description of the bone material found in each grave, relating the burial position (orientation, facing etc.) of the skeletons in situ, the state of preservation of the bone material, the age and sex of each individual (as far as possible) including the detail of the main characters on which the age and sex determination was based. The establishment of age and sex of well preserved skulls is relegated to another section, where they will be thoroughly analysed. Here however, it is not intended to give a catalogue-like specification of all bones found in each grave.

The description is given in serial numbers. The position of each grave at the site can be seen from the site plan (Figs. 12, 17 and 18) in the archaeological report. The graves with the Nos. 101-199 belong to site No. 1, the graves with the numbers over 200 to site No. 2. The graves which did not contain any bone material or the bones of which could not be collected (see section 2) are omitted here. This section is not only interesting from an anthropological point of view but also from an archaeological aspect. The careful study of the skeletons, especially in situ, has revealed plenty of details concerning the varied burial customs, which are one of the characteristic features of the proto-historic population of Timargarha.

A. Site No. 1

Grave No. 101

In this grave skeletal remains of three individuals were found. One of them was a burial in flexed position facing north and that of an old woman of more than 60 years of age (101 a). Like other burials of the same type the body was placed on one side with legs inflexed and the head turned to one side. The arms were bent and the hands placed together in

front of the face. Orientation of the grave and the body was from west to east (i.e. the skull in the west, post-cranial skeleton in the east)[3]. The remains of the other two individuals were found in a disordered position close to the northern wall of the grave chamber. One of them belongs to a young woman of approximately 20 to 25 years of age at the time of death (101 b). The left partial bone of the skull of this individual was found fractured. From the close observation of this fracture it can be safely determined that it was caused by the blow of an edged tool and perhaps the death occurred due to this blow, as no signs of regeneration can be seen. The fracture was covered with earth and was discovered during the cleaning of the skull in the laboratory. Therefore the possibility can be eliminated that the fracture was caused by the implements of labourers during excavation.

The remains of the third individual present a male of about 35 years of age (101 c). All skulls were well preserved or could be restored and were useful for anthropological analysis (see section 7).

Grave 103

This grave contained the remains of one individual buried in regular inflexed posture facing south. The bones, specially the skull, were at a high degree of decomposition. Yet the massiveness of the cranial and post-cranial bones, the strongly developed muscular ridges and a fragment of a very massive lower jaw clearly indicate that the remains are those of a male. The molars show only a little sign of attrition which corresponds to an age of 20 to 30 years.

Grave 104

This grave revealed skeletal remains of two individuals. One of them was lying in regular inflexed position facing south. The skull was badly broken. Most of the calvarium and the facial skeleton were missing. The frontal bone which could be partially restored shows a strongly projecting superciliary and glabellar region and a rounded upper margin of the orbits. A fragment of the lower jaw and the long bones are rather robust. There is no doubt that the remains belong to a male individual of 40 to 50 years age group, as is proved by the wear pattern of the heavily worn off teeth.

The skeletal remains of the second individual were found scattered near the southern wall of the grave chamber. The skull was broken too, but it was possible to restore it partially. It exhibits typical female sex

characters and belongs to an individual of about 20-25 years of age, as all sutures are still visible and show no signs of ossification. From the post-cranial skeleton only fraction of the upper extremities were found, whereas the bones of the lower part of the body were missing.

Grave 105

In this grave was found nothing but few teeth without roots, which probably belong to an infant who died at an approximate age of less than one year. Nothing can be said concerning the sex and the burial position of this individual.

Grave 107

This grave revealed the burial of a child in flexed position facing south. The bones were extremely fragile and in a very bad condition. Only a few bone-pieces of the skull and some teeth were preserved. Besides some milk teeth, one incisor of the permanent dentition was found indicating an approximate age of 5 to 7 years, which is also in accordance with the measurements of the long bones in situ.

Near the facial part of the child's skull were lying some more tiny pieces of bones and a few deciduous teeth without roots. Petrous portions of two right temporals, which were distinctly smaller than those of the above mentioned individual, indicate that in this grave two more individuals were buried, who were probably less than one year old. Owing to the scantiness of the remains of these two infants nothing can be said about the burial position.

Grave 108

From this grave skeletal remains of a child lying in inflexed posture facing north were found. The bones were in a very fragile condition and could not be preserved. A fragment of the upper jaw clearly indicates that the permanent incisors are still inside the jaw but shortly before eruption. The determined age of about 6-7 years accords with the approximate measurement of the long bones and the sitting height. As usual in the case of non-adults it is very difficult to say anything about the sex of the individual.

Grave 109

In the south-western part of the grave chamber was found a frag-

mentary skull, including the mandible and bones of the post-cranial skeleton of an animal. The bones were determined by a zoologist as belonging to a young female goat about 6 to 8 months of age (see section "Zoological remains"). The only human remains found in this grave were a radius and some teeth. The comparison of the wear pattern of these teeth with those of known age suggests, that they belong to an individual of about 20-30 years of age. Sex was not determinable. It is evident that no complete burial took place.

Grave 111-B

In this grave the excavation exposed skeletal remains of a complete lower part of a human body lying in natural semi-contracted position. thus the skull would have faced south. The remains included pelvis, femura, tibiae, fibulae, tarsals, metatarsals. phalanges, and three lumbal vertebrae. All these bones were lying in natural position in the eastern part of the grave. The western part did not contain a single bone of the upper part of the body. As the bones of the lower part of the body are extremely well preserved, it is impossible that the upper part of the skeleton has totally decomposed. It seems that the body was cut into two pieces between the second and third lumbal vertebrae and only the lower part of the body was buried in this grave[4].

The massiveness of the bones, the deep and narrow sciatic notch (and other characteristics of the pelvis), the large diameter of the caput femoris (49 mm) and the well developed muscle markings clearly indicate a male individual. The pubic symphysis shows stage 1 according to Nemeskeri (1960) which corresponds to a mean age of 31 years.

When removing the bones the writer found in the south-eastern corner of the grave chamber a small heap of bones consisting of fragments of a skull including some teeth, fragments of humerus and ulna and some small burnt pieces of skull, ribs and long bones. The author was informed by the site supervisor, that these bones belong to another, overlapping grave and not to the individual buried in grave 111-B. This could also be confirmed by the anthropological analysis and differences in colour and structure of the surafce of the bones.

Grave 114

This grave contained skeletal remains of an individual lying in flexed

position facing north. Although the skull was badly crushed by earth pressure, it was still possible to determine the age and sex of the individual. The remains belong to a female more than 60 years of age (see section 7). The sex determination on the basis of the skull is in accordance with the gracility of the post-cranial skeleton and the ill-marked muscular ridges. Near the bones of the upper limbs were found burnt remains of another individual, especially two cercical vertebrae and an incisor of the permanent teeth.

The urn in the north-western corner of the grave chamber did not contain any (burnt or unburnt) human remains. But another pot of the grave furniture revealed small pieces of burnt human bones. Two small fragments of the calvarium with sutures, a piece of the zygomatic arch, a fragment of a humerus (14 inches in length), and some other bone pieces which could not be identified. It was not possible to determine the age and sex and to decide whether the burnt remains found at different places of the grave belong to one individual.

Grave 117

Among the pottery of the grave furniture some long bones and small skull pieces of one individual were scattered all over the floor of the grave chamber. The lower part of a femur shaft broken in several pieces was found in a bigger pot. The well marked linea aspera is the only sign that the individual may be of male sex. The age was not determinable. Nevertheless it can be stated that the individual was at least adult.

Grave 119

Close to the north-western wall of the grave chamber were found slightly burnt pieces of skull and fragments of long bones of two individuals. Portions of the frontal bones and the orbits clearly show opposite sex characters, thus leading to the conclusion that a male and a female were buried here. The teeth of a relatively well preserved lower jaw, not heavily worn off, indicate an age of about 25-30 years. As the mandible is comparatively massive in structure it is highly probable that it belongs to the male. The age of the female could not be determined exactly, but the individual was at least adult because all epiphyseal lines as far as preserved seem to have already fused.

In the south-eastern corner of the grave chamber were found many

pieces of pottery including one urn, which contained slightly burnt bones mainly of the post-cranial skeleton belonging to the above described individuals.

Grave 122

Cremated remains of several individuals were found in different urns. One urn contained equally burnt and heavily calcined bones of two individuals. The number of individuals buried in this urn could be determined by two petrous portions of the temporals of the right and left side and other remains.

Corresponding bone pieces of both individuals show remarkable differences in thickness (though equally burnt) and suggest that the remains are those of a male and a female. All epiphyseal lines seem to be fused. The alveoli of a fragment of the mandible show that the 3rd molar had erupted. Therefore it can be concluded that both individuals were at least adult A second urn revealed further burnt remains. Contrary to urn no. 1 the bones were not equally burnt. Some bones were calcined, others only slightly charred, indicating the lesser amount of heat of the funeral pyre. Analytical study of these remains showed that this urn contained the bones of only one individual. The massiveness of the bones, the well developed superciliary ridges, the rounded upper margin of the orbits, the presence of the third molar and the fused epiphyseal lines indicate that the remains are those of a male adult.

In another urn were found cremated remains of a 4th individual. Concerning the stage of cremation, they show similarities to the remains of urn no. 2 as they were also unequally burnt. The bones are comparatively gracile; a fragment of the slightly cremated frontal bone shows an extraordinarily sharp upper margin of the orbits, thus belonging probably to a female. The epiphyses of a slightly burnt fragment of a humerus had already united, nevertheless the epiphyseal line was partially still visible. Therefore it may be deduced that the individual was about 20 years of age.

Grave 123

Most of the bones of the two individuals buried in this grave were found in a very disturbed order. Only the lower legs of one individual were lying in natural position suggesting originally a burial in flexed position probably facing south. Only tiny pieces were preserved from the skulls. As

the bones of the post-cranial skeleton, especially the pelvic bones, were very fragmentary too, the age and sex are very difficult to determine. Yet the bones of the lower extremities found lying in natural position are massive with well developed muscle markings, whereas the corresponding bones of the other individual are comparatively gracile. This is the only sign that in the grave were buried a male and a female individual. From the fact, that all epiphyses are already fused, it can be concluded that both individuals were at least adult.

Grave 124

This grave exposed the skeletal remains of one individual. The burial position was not quite clear. At least parts of the post-cranial skeleton were probably disturbed. However the bones of the lower extremities, the lower jaw and the broken skull were lying in natural position facing north. Although most of the characteristic parts of the skeleton for sex determination are missing the thin cranial bones, the gracile lower jaw and the gracile long bones suggest a female. As the teeth are not very much worn off and only one third molar of the lower jaw had erupted, an age of approximately 21 years can be assessed.

Grave 125

Near the western wall of the grave chamber were found a few pieces of human skull and two teeth accompanied with bone fragments of the post-cranial skeleton (humerus, ulna and femur). It is evident that no burial in natural flexed position took place. Owing to the scantiness of the remains the age and sex diagnosis is very difficult. Nevertheless, the massiveness of the bones and the attrition of the teeth suggest a male of a higher age group. The opposite (eastern) corner of the grave was occupied by animal bones, belonging to a horse, a stag, and a smaller ruminant, possibly a goat or sheep (see Section "Zoological remains"). More than half of one of the long animal bones was found inserted between the stone courses of the southern wall of the grave chamber.

Grave 132

In this grave skeletal remains of a child were found in a very fragile condition. The body was placed in flexed position facing north. A fragment of the mandible clearly shows that the child died at an age of changing the deciduous teeth. A permanent canine and the second pre-molar had already erupted, indicating an age of about 11 years. This age determina-

tion accords well with the approximate length of the long bones and the sitting height measured in situ.

Grave 133

In this grave were found only tiny pieces of skull and a fragment of humerus together with some deciduous teeth without roots. It seems that they had not erupted yet and thus belong to an infant less than one year of age. Owing to the scantiness of the find it is impossible to tell exactly the burial position. Nevertheless the way the small bone pieces were found suggests that the body was placed in flexed position facing north. Sex was indeterminable.

Grave 134

Skeletal remains of two individuals were found in a heaped position together with pottery in the eastern half of the grave chamber, whereas the western part was practically empty. The fashion in which the bones were lying shows that no standard inhumation took place. The calvarium of one skull was relatively well preserved, whereas the facial skeleton and the mandible were missing. It belongs to a female of about 25-30 years of age (see section 7). The sex determination based on characters of the skull is in agreement with the gracility of the post-cranial skeleton belonging to this skull.

On the left parietal of the skull a slight deepening can be seen (see Fig. 42,Pl. LXVIII) caused by an injury which was totally healed when the death occurred. Only fragments were found from the second skull. As the characteristic parts are missing, sex and age determination is very difficult. Only the well marked muscular attachment areas and the massiveness of a fragment of the mandible suggest a male. As the alveoli of the molars are closed due to the loss of these teeth during life time, a higher age group (senile) can be assessed.

Grave 136

According to the nature of inhumation, this was the unique burial[5] of the entire cemetery because the skeleton was found lying in an extended position. Th burial showed no signs of ritual inhumation, as the skeleton was not found placed in the prevailing style of grave chambers and also deviod of any kind of pottery. The bones were at an advanced stage of

fragility. From the skull bones only the mandible was relatively well preserved. Its massiveness suggests a male individual of approximately 25-30 years of age based on the attrition of the teeth.

Grave 137

Skeletal remains of two individuals mixed with some animal bones were scattered all over the grave chamber punctuated by pottery. There are no signs that one of the individuals was lying in a standard burial position. From the striking differences of size and massiveness of the fragmentary skulls, the teeth, the post-cranial skeleton and the development of the muscle markings one can conclude that in the grave were buried a male and a female. The teeth of the male individual are heavily worn off. The attrition corresponds to an age of 50-60 years, whereas the teeth belonging to the female show only little signs of attrition indicating an age of about 20 years.

The animal bones belong to probably a male sheep, a hare and a young ruminant, not yet specifically determined of the size between a sheep and a stag (see section "Zoological remains").

Grave 138

Skeletal remains of two individuals were found in this grave. The way the bones were lying more or less corresponds to the manner seen in the previously described grave no. 123. In the western part of the grave chamber the bones were found highly disturbed whereas in the eastern half the lower extremity bones of one individual were lying in natural position suggesting the regular burial in a flexed position facing south. Only a few pieces were preserved from the skull including fragments of both lower jaws with postmortal loss of the teeth. As the characteristic parts of the skulls are missing sex determination was very difficult. The only criteria that the individual whose legs were found in natural position, was of male sex are the massiveness of the long bones and the large and well developed attachment areas of the muscles. Assessment of age of both individuals was not possible. Nevertheless it can be stated that they were grown up i.e. at least adults.

Grave 139

This grave revealed the post-cranial skeletons of two individuals but

only one skull of a male of about 30 to 35 years of age which was relatively well preserved (see section 7). The bones of the upper and lower extremities including the bones of the hands and the feet of one individual were found in natural position. From the direction in which the bones were lying one can deduce that the body originally must have been placed in flexed position facing north. The other bones of this individual were disturbed and lying in a jumbled manner mixed up with the bones of the second individual. It was, however, not possible to decide which of the post-cranial skeletons belongs to the skull and to determine the sex and the exact age of the second individual. Nevertheless it can be stated that it was at least an adult.

Grave 140

The grave exposed skeletal remains of a child in a very advanced stage of decomposition lying in flexed positition. Only small pieces of the skull, some fragments of ribs, vertebrae and humerus were preserved. As the upper and lower jaw and all teeth are missing exact age determination was not possible. Yet the size and the thickness of the bones correspond to those of a child of about 7 years of age. It is interesting to note the variation in the orientation of the child's body. In all graves with burials in flexed position, described earlier, the orientation of the body was from west to east (i.e. the skull was lying in the western part of the grave chamber, and the post-cranial skeleton in the eastern half). In this case the orientation was from east to west (skull in the east facing north).

Grave 142

In this grave three individuals were buried. The nearly complete and relatively well preserved skeletons including the skulls of two of these individuals were lying in highly jumbled manner in the north-western part of the grave chamber, whereas the opposite corner was practically empty. The skulls which were useful for anthropological analysis belong to a male (142 a) of about 30 to 40 years of age and a female (142 b) of approximately the same age group (see section 7). Most of the bones of the third individual were found at a deeper level of about 1 foot. Only some bones including the fragmentary skull which could not be restored were mixed up with the bones of the other two individuals in the superficial level. Except the upper extremities, the skull, and the pelvic region, which were slightly disturbed, all other bones of the skeleton, especially the total vertebral column, the ribs and the lower extremities were found lying in natu-

ral position and leave no doubt, that originally a burial in flexed posture facing south took place. The massiveness of the long bones, typical male sex characters of the pelvis and a relatively large diameter of the caput femoris suggest that the individual was probably of male sex. The age at death was about 20-25 years, assessed by the fact that all epiphyseal lines of the long bones have fused and the teeth show only a little sign of attrition.

Grave 144

This grave revealed skeletal remains of one individual lying highly disturbed. The skull was found in the western part of the grave together with one femur, while the fragmentary lower jaw was lying in the opposite corner of the grave chamber near the second femur. The only sign, that originally a natural burial took place, can be seen from the position of tibia and fibula of both legs, lying parallel side by side according to their anatomical position. Except the facial skeleton the skull was relatively well preserved and useful for anthropological analysis (see section 7). It belongs to a female of approximately 20-25 years of age. The age diagnosis based on the skull accords with the extreme gracility of the long bones.

Tiny fragments of skull, mandible and long bones suggest, that in the grave a second individual was buried. A fragment of the lower jaw shows a milk molar without root, which seems to have not erupted yet. Its developmental stage corresponds to an age of approximately 6 months to a year, which accords with the general size and thickness of the bone fragments.

Grave 146

The western part of this grave without stone lining was occupied by a few pieces of skull, some fragments of ribs and humerus of a child. The bones were at a high degree of decay. From the position of these scanty remains it can be deduced that the body was lying in flexed position facing north. As far as from the fragments of the upper and lower jaw can be judged, all deciduous teeth had erupted. A second incisor of the permanent dentition, visible at a fracture of the mandible, shows a crown and neck but no root. Its developmental stage corresponds to an age of 5-6 years.

Grave 148

Skeletal remains of one individual lying in usual flexed position

facing north were found from this grave. The skull was fragmentary and broken, the facial skeleton missing. The skull bones are moderately thick, a fragment of the frontal bone shows a sharp upper margin of the orbit; the glabella and the superciliary arches are not very much developed, the bones of the post-cranial skeleton are gracile with weak muscle markings, thus belonging to a female individual. Age at death was about 30-35 years assessed by the arrangement of preserved sagittal suture and the wear pattern of the teeth.

Grave 149

Human skeletal remains and animal bones were found in this grave in an extremely disturbed order. Skull fragments of two individuals could be distinguished by corresponding parts of the occipital bones and two fragmentary mandibles. One of the lower jaws was lying with the rami close to the western wall of the grave chamber resting on a small piece of long bone. It is highly probable that it was placed there deliberately and intentionally. Close to it was found the mandible of an animal. The second lower jaw was discovered together with pieces of ribs in a pot (Reg. No. 94). The fragments of one of these skulls are very massive, the mastoid processus large, the external occipital protuberance, the glabellar and superciliary region well developed thus belonging to a male. The sex of the second skull is questionable, as all characteristic parts for sex determination are missing or insignificant. In both cases the arrangement of the sutures could not be exactly judged. Yet the closed alveoli of the molars and premolars of both lower jaws suggest a higher age group of more than 60 years (senile). Contrary to the two skulls, only the fragmentary post-cranial skeleton of one individual was found in the grave. It probably belongs to the male skull. The developmental stage of the pubic symphysis confirms the age determination based on the lower jaw. It shows stage 5 according to Nemeskeri, which corresponds to a mean age of 69 years.

In a pot (Reg. No. 89) were found burnt and semi-burnt remains of a third individual whose age and sex was not exactly determinable. Nevertheless it can be stated that the individual was at least adult. The possibility, that the urn contained the burnt post-cranial skeleton of the second individual may be excluded, as also burnt remains of a skull were found. The animal bones belong to an old female sheep, approximately 10 years of age (see Section "Zoological remains").

Grave 151

Remains of one individual were found in this grave. The skull was badly broken and at an advanced stage of decomposition. It was found in the western part of the grave placed on its right side and facing south, whereas the long bones were found side by side, mostly parallel to the long axis of the grave chamber. On the top of these bones was placed the mandible. It is evident that no natural burial took place. In addition, the size of the grave would have been too small to bury a grown up individual even in flexed or crouched position. This burial type shows similarities to that of Grave No. 191, in which the bones were placed in a corresponding manner. The characteristic parts of the skeleton for sex determination are missing. But the massiveness of the long bones, the well developed muscular attachment areas, the heavily built fragment of the mandible and the big size of the teeth suggest a male individual. The attrition of the heavily worn off teeth corresponds to an age of approximately 50-60 years.

Grave 153

From this grave were revealed only tiny pieces of skull, mandible, long bones and some deciduous teeth without roots, which belong to an infant below 1 year of age. Due to the scantiness of the find nothing can be said concerning the burial position.

Grave 157

In this grave were found skeletal remains of one individual lying in flexed position facing north. The vertebral column was unusually curved. However owing to the bad state of preservation of the vertebrae it was not possible to decide whether this deviated position was caused by an abnormal burial position or by pathological deformation of the vertebral column. The facial part of the skull was relatively well preserved and was useful for anthropological analysis (see section 7). It belongs to a female of about 30-35 years of age. The sex diagnosis is supported by the gracility of the post-cranial skeleton and the ill-marked attachment areas of the muscles.

Grave 158

This small pit without any grave furniture contained only a few tiny pieces of burnt bones. The fragments are too small and insignifant to

say anything concerning the sex and age of the individual. Only the small size of the grave suggests the burial of an infant.

Grave 159

Only fragments of a skull, some rootless deciduous teeth and small fragments of the post-cranial skeleton were found in this grave. They belong to an infant below one year of age. The sex could not be determined. It seems that the body was placed in semi-flexed position probably facing south.

Grave 160

In this grave were found skeletal remains of one individual lying in fixed position facing north. The bones were in a bad stage of preservation; neither the skull nor the long bones were complete. All bones were extremely gracile. A second molar of the permanent teeth seems to have just erupted as it shows no sign of dental attrition. From this it may be assessed that the individual was of juvenile age (between 14 and 20 years) and possibly female. A better limitation of age on the basis of the epiphyseal union was not possible.

Grave 162

From this pit skeletal remains of three individuals were recovered. Most of the bones were lying in a very disordered position entangled with each other and punctuated by pottery. Like the animal bones of grave No. 125 two human femura were found inserted between the stones of the wall of the grave chamber. A deeper level (about 6 inches) at the eastern side of the grave chamber revealed the lower extremities of one individual lying in natural flexed position, thus the body must have been placed originally in flexed position facing south. From the massiveness of the bones and the well marked muscular attachment areas it can be deduced that they belong to a male.

The fragmentary skulls of the three individuals and two mandibles were found at different spots of the grave. The best preserved skull shows typically male sex characters and a totally fused sagittal suture, indicating an age of more than 60 years. This age determination is supported by the lower jaw, showing already closed alveoli of the molars and premolars due to the loss of these teeth during lifetime. The fragments of the second

skull are of typical female sex character and those of an individual of about 20-25 years of age, deduced from the fact that all sutures are still open, the teeth of the mandible are not very much worn off and the third molar had erupted.

The fragments of the frontal bone were only found from the third skull. The extremely well developed glabella and superciliary arch, the rounded upper margin of the orbits and other characters leave no doubt that it was the skull of a male, which most probably belongs to the post-cranial skeleton originally lying in natural position. The age was not exactly determinable, but the individual was at least mature.

Grave 165

Disturbed and scattered all over the grave chamber, the skeletal remains of two individuals were found. One of the mandibles was lying in a pot. Undoubtedly no burial took place in usual flexed position. Both skulls were so well preserved that they were useful for anthropological analysis (see section 7). They belong to a male of approximately 50-60 years of age (165a) and a female of an age between 20 and 30 years. The sex determination based on the skulls is in accordance with the postcranial skeletons showing opposite sex characters.

Grave 173 A

Almost in the centre of an irregular circle of stones was found another big stone, around which were scattered skeletal remains of one individual. Beside a fragment of the skull were revealed fragments of all long bones (2 femura, 2 tibiae, 2 humeri, 2 radii and 2 ulnae and 1 phalange). But no remains of vertebral column. ribs, pelvis and scapula were found. Only a fragment of the parietal was preserved from the skull, partially lying in a bowl-on-stand. As the characteristic parts of the skull are missing an exact age and sex determination was impossible. But the moderate thickness of the skull bones, the well marked parietal protuberance and parts of the sagittal and lambdoid suture, which had not undergone synostosis yet, suggest an adult female below 30 years of age.

Grave 173 B

Skeletal remains of two individuals were scattered all over the floor of the grave chamber, underneath grave No. 173 A. Most of the bones were lying in a very disturbed order. However it seems that at least humerus,

radius, ulna and probably one of the skulls as well were lying in natural flexed position facing north. The skulls were well preserved and could be used for anthropological analysis(see section 7).

One of the skulls (173 B a) belongs to a male of 40-50 years of age whereas the other one was that of a female of a slightly younger age group, about 30-35 years (173 Bb).

Grave 176

This grave revealed skeletal remains of two individuals. One of them was lying in the southern part of the grave chamber in regular flexed position facing north. The fragmentary skull and the lower jaw are extremely massive, the glabella well developed, the mastoids large thus suggesting a male. The synostosis of the cranial sutures could not be judged, due to the fragmentary condition of the skull. Yet the attrition of the teeth which are very much worn off, indicate an age of approximately 40-50 years.

The bones of the second individual were found lying disturbed near the northern wall of the grave chamber. Yet the position of some bones, like some vertebrae and bones of the upper arms suggest, that this individual was also buried originally in natural fashion probably facing north. The fragments of the postcranial skeleton and the skull differ characteristically from those of the above individual. They are extremely gracile and thus undoubtedly belong to a female. The wear pattern of the teeth corresponds to an age of approximately 35-40 years.

Grave 177

Skeletal remains of one individual were lying scattered all over the floor of the grave chamber. The skull was found almost in the centre of the grave; Its right occipital, temporal and basal part are heavily distorted by earth-pressure. The facial skeleton and parts of the frontal and temporal bones are missing and fractured (see section 7). It is interesting to note that inside the skull was found a fragment of a rib of about 4 inches in length. From this it can be concluded that the skull was already fractured when the burial of the bones took place. The skeleton belongs to a male of about 35-40 years of age.

Grave 180

From this grave were revealed skeletal remains of at least two indivi-

duals. Most of the bones were in a bad state of preservation, and lying in a haphazard manner. Only the bones of the lower extremities including the feet bones and radius and ulna of one individual were lying in natural position in the southern part of the grave chamber indicating originally a burial in flexed position facing north. As the bones including the skull fragments belonging to this individual are extremely gracile and thin, it can be assumed that it was a female. The wear pattern of the teeth corresponds to an age of approximately 30-35 years.

Most of the remains of the other individual were found lying in the north-western part of the grave. They are comparatively massive in structure and thus probably belong to a male. As the teeth are badly worn off, an approximate age of 40-50 can be assessed. In the same part of the grave were found tiny pieces of bones, especially of skull, which were extremely thin and do not belong to the above individual. Yet it was not possible to say whether these scanty bone fragments belong to the female or to a third individual (possibly a juvenile).

Grave 182

From this grave were found the postcranial skeleton of an individual lying in natural position, whereas the skull was missing. The bones of the postcranial skeleton are still noticeable and are relatively well preserved Hence it is very difficult to think of the skull's total decomposition. The position of the long bones indicates a burial in flexed position facing south. As the characteristic parts of the skeleton for age and sex determination are missing, nothing can be said about the age and the sex of the individual buried in this grave, except that it was at least adult.

Grave 183

Skeletal remains of two individuals were found in this grave. One of them was lying in natural flexed position facing south. The skull is very fragmentary and the characteristic parts for sex determination are missing. But the extremely massive long bones with well marked muscular attachment areas leave no doubt that it was a male. On the basis of the wear pattern of the teeth, an age of approximately 30-35 years can be assessed. The fragments of the second individual lying in disorderly position close to the southern wall of the chamber are comparatively gracile and suggest a female. The attrition of the teeth corresponds to an age of approximately 25-30 years. The south-eastern corner of the grave was occupied by a

bowl-on-stand, on the rim of which were found side by side vertebrae of a small animal. They were determined by a zoologist as the tail vertebrae of a snake. (See chapter "Zoological remains").

Grave 184

In this small stone-lined pit of the size of a small child's grave, was found an urn containing only slightly charred bones of the post- cranial skeleton of one individual. The mouth of the urn was covered by placing the skull on it. The facial and the right parietal part of the skull were charred, whereas the other parts showed no or only little signs of burning. It was placed on the mouth of the urn in a fashion that it was supported and fixed by horizontally and vertically placed long bone piece (see Fig. 111 Pl. LXXXIV b). The skull is relatively small in size (length diameter about 175), the nuchal chrest, the mastoid processes, the glabella and the superciliary arch are only moderately developed and the upper margin of the orbits is extremely sharp. All sutures seem to be still open, the teeth are not badly worn off, suggesting a female of approximately 20-25 years of age at the time of death.

Grave 185

The grave revealed skeletal remains of an individual at a high degree of decomposition. In the south-western part of the grave were found a few fragments of the skull and bones of the upper extremities whereas in the opposite part of the grave chamber were lying the long bones of the lower legs in a crossed manner. It was impossible to decide whether a burial in traditional flexed position took place or not. All bones are relatively gracile, which is the only sign that the individual might have been a female. The age was not exactly determinable, but at least adult can be predicted.

Grave 186

Here were found the remains of two skulls separated by a pot and one axis vertebra. One of the skulls, which was relatively well preserved, was resting on its base facing west (186a). It belongs to a female of approximately 25-30 years of age (see section 7). The skull shows a fracture in its frontal part. Yet it could not be decided whether this fracture was caused ante mortem, immediately post mortem or by the excavating labourers. The presence of the axis vertebra — the only representative of the postcranial skeleton — suggests that the skull probably was buried at a

stage, when the first cervical vetrebra was attached to the skull with organic material. Even then this contradicts the fact that the lower jaw was missing.

The second individual was only represented by a very massive fragment of the frontal bone of the skull. The upper margin of the orbit is rounded, the superciliary arch and the glabella are well developed and the sinus frontalis extremely large and extended thus indicating a male of adult age group.

Grave 189

The grave contained the skeleton of a child lying in flexed position facing north. The exact age could be determined on the basis of the right half of the lower jaw which was well preserved. The milk incisors had fallen out, the corresponding teeth of the permanent dentition and the 1st permannet molar are still inside the jaw but immediately before eruption, indicating age of 5-6 years.

Grave 190

This grave differed from most of the other graves of the cemetery. as its shape was oval and devoid of a stone lining. It contained the skeleton of one individual lying in natural flexed position facing south. All bones including the broken and fragmentary skull are extremely massive in structure. For example the diameter of the head of the femur and the circumference of the femur are 61 mm and 96 mm respectively thus exceeding all other measured bones of the cemetery. The individual was undoubtedly male, the year pattern of the teeth corresponds to an age of approximately 30-35 years.

Grave 191

In this grave were found long bones and the skull of one individual. The size of the grave is too small for a regular burial even in flexed position. Some of the long bones were lying crossed, others parallel to the long axis of the chamber. On top of the bones placed in crossed manner, the skull was resting on its base and facing towards east. The mandible was found near the southern wall. Except the long bones (femur, tibia fibula. humerus etc.) no traces could be found of the other bones of the postcranial skeleton (pelvis, ribs, vertebrae etc.) It is not likely, that these bones

have totally decomposed. Therefore it can be assumed, that only the long bones and the skull were burried. The burial system corresponds to that of grave 151.

The sex of the individual is questionable, as some sex characters of the skull and the postcranial skeleton tend to male, while others are in female direction. As small portions of the sagittal suture have already fused an age of approximately 30-35 years can be assessed. This accords with the wear pattern of the teeth.

Grave 192

From this grave were found skeletal remains of one individual being placed in regular flexed position facing north. The left hand was found lying inside a copper vessel. The right half of the skull is relatively well preserved, whereas the left side, the side on which the skull was resting is decomposed, fractured and compressed. It belongs to a female of approximately 30-35 years of age (see section 7).

Grave 194

In this grave were found skeletal remains of one individual in a very fragmentary condition. Even then it can be said that the individual was lying in flexed position facing south. As the characteristic parts of the skeleton for sexing are missing and the preserved bone fragments are of medium size and thickness, it is questionable to which sex this individual belongs. The attrition of some molars suggest the age of approximately 50-60 years. Below the thoracic region of the body at a slightly lower level were found some burnt skull pieces of a second individual. Its age and sex, however could not be determined, due to the scantiness of the remains. Yet the individual seems to be at least adult.

Grave 196

From this grave were excavated the skulls of two children together with some long bones. One of the skulls was found in the north-western corner of the chamber resting on its basal part and facing towards east. Some deciduous teeth without roots which had not erupted yet, indicate an age of about six months. The other skull was resting on its left parietal part and facing north. All deciduous teeth had erupted and show signs of attrition, corresponding to an age of approximately six years. The post-

cranial skeletal remains which belong to this skull were found in a slightly disturbed order in the eastern part of the grave. Yet it seems likely that originally they were lying in natural flexed position and were probably disturbed at a later time, possibly in connection with the reopening of the grave to provide space for the burial of the second individual. Both skulls were very fragile and near to complete decaying.

Grave 197

Skeletal remains of two individuals were found in different levels of the grave. At the uppermost level the complete skeleton including the skull of one individual was lying scattered among a lot of pottery, mostly in the western part of the grave chamber. The skull was relatively well preserved and useful for anthropological analysis (197 a). It is that of a female of approximately 20 years of age. The sex determination based on the skull is in accordance with the gracility of the long bones and the weakly developed muscle markings. The skeleton of the second individual was found at a level of about 10 inches deeper. Contrary to the former individual the bones were lying in natural flexed position facing south. Only the bones of the upper extremities were slightly disturbed, which is supported by the fact, that one humerus and one ulna of this individual were found mixed up with the bones of the first mentioned individual at the higher level. Only a fragment of the right parietal and the mandible were preserved from the skull, whereas the bones of the post-cranial skeleton were at a very good state of preservation. The long bones and the mandible are relatively massive, the muscular attachment areas well marked, the chin is prominent. indicating that the individual was probably a male. The wear pattern of the teeth corresponds to the age of about 25-30 years.

Grave 198

Within an irregular oval grave chamber without stone lining were found the skull of a child and some tiny fragments of the postcranial skeleton. The position of these bones suggests a burial in flexed position facing north. Contrary to the postcranial skeleton the skull is relatively well preserved. It is the only skull of a child found in the whole cemetery, which is nearly complete (see Section 7). All milk teeth had erupted, except the canines and the second milk molars which have just started to erupt, indicating an age of 18 months. Sex was not determinable.

B. SITE No. 2

Grave 201

This grave was occupied by an urn, which contained semi-burnt and-charred human remains. Two individuals could be distinguished by corresponding fragments of the frontal bone. One fragment which is extremely massive in structure, shows an extraordinarily rounded upper margin of the orbits and a large sinus frontalis whereas the other fragment is relatively gracile. From this it may be deduced that in the urn were buried a male and a female individual. Most of the sutures, as far as preserved, were still open, suggesting a younger age group. Yet it can be said that both individuals were at least adult. Although two individuals were buried in this urn, the quantity of bone material, especially that of the postcranial skeletons, is relatively small. For the reason it seems possible that the urn did not contain the whole burnt remains of the two individuals.

Grave 202

From this grave skeletal remains of one individual lying in semiflexed position were exhumed. Yet the orientation of the body differed from most of the burials of the same type The body was oriented from east to west, i.e. the skull was lying in the eastern part of the grave chamber and facing south whereas the postcranial remains were found in the western part. The skeleton including the skull was at a high degree of decay, and fragmentary. However the gracility of the long bones, the ill-marked muscular attachment areas and the extremely sharp upper margin of the orbits suggest a female individual. From the other characteristic parts of the skeleton useful for age and sex determination were not preserved.

Grave 204

The grave revealed the skeleton of one individual lying in flexed position facing south and oriented in the same fashion as the remains of grave No. 202 i.e. from east to west. There was also another deviation from the burials of the same type. In this case the left lower arm was extended and placed over the inflexed lower extremities, while the right arm was bent and lying in traditional manner in front of the face. Most of the characteristic parts of the skeleton for age determination are missing. Yet the moderate thickness of the skull bones and a fragment of the mandible as well as the gracility of the long bones and the weak development of muscle markings suggest a female individual. All sutures of the skull seem to be still open indicating the age of approximately 20-25 years. This age determination also agrees with the wear pattern of the teeth.

Grave No. 209

Here were found the skeletal remains of one individual lying in traditional flexed position facing south. The skull was the best preserved one from site No. 2 and belongs to a female (see section 7). As all cranial sutures are open the age of approximately 20-25 can be assessed.

Grave 210

Extremely fragile and fragmentary remains of several individuals were heaped up in the western part of the grave chamber whereas the opposite part was occupied by pottery. The fragmentary skulls were found near the western wall of the chamber, while the remains of the postcranial skeletons, especially the long bones, were mostly lying parallel to the northern wall. Below this heap of bones the skeleton of one individual was found in natural flexed position facing north. The gracility of the long bones and of the fragmentary skull as well as the sharp upper margin of the orbits indicate a female individual.

On the whole at least 5 individuals were buried in this grave, confirmed by the same number of corresponding fragments of the frontal bone and 9 femura. Beside the mentioned female at least two of the remaining four skeletons could be determined as male. The skull bones of these individuals are extremely robust and thick with round upper margins of the orbits and extremely well developed glabella and superciliary arches. The sex of the other individuals could not be determined. It was also impossible to assess the age of most of the individuals due to the absence of the sutures and the teeth. Only the approximate age of one male individual could be determined by the wear pattern of the teeth as 35-40 years. Yet it can be stated that the other individuals were at least adults as all epiphyseal lines of the long bones had already fused.

Grave No. 212

Skeletal remains of one individual were found in this grave lying in flexed position facing north. The badly broken skull, whose skull cap could be restored is very interesting as it shows a trephinning of round-oval shape at the bregma region (see Fig. 110 Pl. LXXXIVa and Section 8). Although the characteristic parts of the skeleton for sex determination are not preserved the extreme gracility of all bones leaves no doubt that it was a female within the age limit of 30-35 years, assessed by the fact that a portion of the sagittal suture had already undergone synostosis.

Grave 217

The grave revealed the sekleton of one individual lying in crouched position facing south. The bones were in a very fragmentary condition. The characteristic portions of the skeleton for age and sex determination were missing. Yet it can be said that the individual was at least an adult.

The north-eastern corner of the grave chamber was occupied by an urn, lying at a slightly deeper level than the remains of the above mentioned individual. It contained mostly heavily burnt bones of three individuals, recognized by corresponding bone fragments. At least one of the individuals was of juvenile age. Different long bones (tibia, femur and humerus) clearly show, that the epiphyseal lines had not fused at the time of death, whereas the epiphyses of the other individual had totally fused indicating a higher age group. The bone fragments of one of these individuals are relatively massive and show well marked muscular attachment areas and thus suggest a male. However nothing can be said concerning the sex of the other two individuals.

Grave 218

The visage urn, found in this grave contained equally burnt and heavily calcined remains of at least to individuals distinguished by corresponding fragments of two lower jaws. As all epiphyseal lines had been already fused and the third molars of both fragments of the lower jaw had erupted an age of at least adult can be assessed. The sex determination, however, was difficult. The only sign that in the urn might have been buried a male and a female individual is the different size and thickness of corresponding bone fragments.

Grave 220 a

This small grave revealed tiny pieces of skull, long bones and one rootless milk molar, which probably had not erupted yet, indicating an age of below one year. Due to the scantiness of the remains nothing can be said about the burial position.

Grave 220 b

Close to the eastern wall of the above described grave, another grave of similar size was found, devoid of any bone material. Yet it is highly

probable that in this grave also a child or infant was buried, whose bones, however, had totally decomposed.

Grave 223

Skeletal remains of one individual lying in traditional flexed position facing north were found in this grave. The skull was fragmentary, the lower jaw missing. Yet the relatively sharp upper margin of the orbits, the moderate thickness of the bones, the weakly developed muscle markings and the extremely wide angle of the sciatic notch of the hip bone suggest a female individual. As the characteristic parts of the skull were missing, age determination was only possible on the basis of the spongy tissue of the proximal end of the femur showing stage 1 according to Nemeskeri et al. (1960) which corresponds to a mean age of 31 years.

In front of the regular burial close to the northern wall of the grave chamber the remains of another individual were found lying in much disordered manner mixed up with the bones of the upper extremities of the first described individual. They belong to a child of approximately 7 years of age, which could be determined exactly by the eruption of the permanent teeth.

Grave 228

One of the corners of this grave was occupied by the postcranial skeleton of one individual, the long bones of which were lying mostly in crossed manner. The skull being at a bad state of preservation was found in the opposite corner facing upwards. Near the western wall some teeth which belong to the probably decomposed lower jaw were revealed resting on a stone. It seems likely that these remains were placed in this fashion deliberately. Due to the fragmentary condition of the skull and the other parts of the skeleton, an exact sex determination was not possible. The seemingly well developed glabella and the big size of the teeth are the only signs that the individual might have been a male. As the sagittal suture had totally fused and the teeth are heavily worn off an age of about 40-50 can be assessed.

Grave 237

This grave revealed an urn, which contained burnt, semi-burnt and charred bones of one individual. An exact sex and age determination was very difficult. Anyhow the diameter of the caput femoris, though burnt,

ranges within the male variation. As all epiphyseal lines are closed and all cranial sutures seem to be open an age of approximately 20-30 years can be assessed.

Grave 240

In this grave skeletal remains of two individuals were found. The relatively well preserved bones of the lower extremities of one individual were lying in natural position thus indicating a burial in usual flexed position facing north. The other parts of the skeleton including the skull were represented only by tiny fragments and some teeth, the attrition of which corresponds to an age of approximately 40-45 years. Sex determination was not possible. The remains of the second individual were burnt and mostly found scattered at a slightly deeper level among the bones of the first mentioned individual. Sex and age determination was not possible yet it can be said that the individual was at least adult.

Grave 241

In this grave were found skeletal remains of one individual lying in regular flexed position facing south. The skull was fragmentary and broken. The glabella and the superciliary arches were well developed the upper margin of the orbits rounded, the mastoid processus large and thus indicating a male. The sex determination is supported by the massiveness of the long bones the well developed muscle markings and the large diameter of the caput femuris which clearly falls within the male variation. All sutures, as far as preserved, are still open; only a small piece of the sagittal suture has commenced to fuse. Thus an age of about 30-35 years can be assessed.

Grave 242

This grave was occupied by the skeleton of one individual lying in regular flexed position facing south. The bones including the skull were very fragmentary, the characteristic parts for sex determination missing. The attrition of the molars found in this grave corresponds to an age group of about 30-35 years.

Grave 244

The grave revealed skeletal remains of a child lying in regular flexed position facing south. The upper and lower jaw of the fragmentary skull

clearly show, that the first molar of the permanent teeth had erupted, and the Ist permanent incisor had just started to erupt thus indicating an age of approximately 8 years. Nothing can be said concerning the sex of this individual.

Grave 245

In this small grave chamber was found only pottery but no bone material. Like grave No. 220 b it can be assumed that originally in this grave was buried a child or infant, whose bones, however, are totally decomposed.

Grave 247

This grave provided with a stone floor revealed mostly long bones of the lower extremities of two individuals, while the other parts of the skeletons were represented only by tiny bone fragments and some teeth. Concerning the burial position nothing can be said exactly. Yet it seems possible that at least the bones of the lower extremities of one individual were lying in natural position in a flexed manner.

As the femura and tibiae of both individuals extremely differed in size, massiveness and the development of the muscle markings a male and a female can be suggested. The attrition of the teeth found in this grave corresponds to an age of about 25-30 years. It was not possible to say, to which of the individuals they were belonging. However it can be stated, that both individuals were at least adult.

Grave 248 A.

In this grave only a few pieces of the skull, the long bones and some teeth were found. From the position of these scanty remains it can be deduced that the body was placed in flexed position facing north. All deciduous teeth seemed to have erupted. From the permanent teeth found some molars without roots, corresponding to a developmental stage of about 4-5 years.

Grave 248 B.

This grave was situated close to the eastern wall of the above grave and revealed similar remains as grave 248 A. Beside the seemingly erupted deciduous teeth were also found some rootless molars of the second denti-

tion probably at a slightly lower stage of development. From this it may be deduced that the individual was approximately 4 years of age.

Grave 250

Skeletal remains of two children were found in this grave. One of them was lying in flexed position facing north. Although the skull was fragmentary and totally compressed by earth pressure the age determination was possible. A small fragment of the upper jaw clearly shows that the first incisor of the permanent teeth had just started to erupt indicating the age of approximately 7-8 years.

In front of this individual, close to the northern wall of the grave chamber very fragmentary remains of a second child were found in highly disturbed position. An exact age determination of this individual was not possible as the upper and lower jaws were totally decomposed. Yet it seems that its age group was similar to that of the above individual, as the long bones of both children are similar in size and thickness.

Grave 251

The urn found in the western part of the grave contained mostly slightly burnt remains of three individuals, distinguished by corresponding fragments of the upper and lower jaw. One of them was a child, whose deciduous teeth had erupted. The size and thickness of the lower jaw correspond to an age of about 3 years. The second individual was of juvenile age group. Except the third molar all permanent teeth had erupted indicating the age limit between 15 and 21 years. As the size of the lower jaw is relatively small, it may be deduced that the age of this individual corresponds more to the lower limit of this age group. Though of a small size the madible is massive in structure suggesting a male individual. The third individual was grown up as all permanent teeth including the third molars had already erupted. The gracility of the lower jaw and the postcranial bones indicate an adult female.

Grave 253

In this small grave tiny fragments of the skull, long bones and some deciduous teeth without roots, were found. Two petrous portions of the same side different in size and shape indicate that in this grave two individuals were buried. According to the teeth one of them was an infant below 1 year of

age, whereas the other individual was of a slightly higher age group (2-3 years). Due to the scantiness of the bone material nothing can be said concerning the burial position.

Grave 254

The western part of the grave chamber was found packed with a heap of bones (skull fragments and bones of postcranial skeletons) of several individuals lying in a very disturbed and disordered position. The opposite (eastern) part of the grave was absolutely empty or only occupied by pottery. At least 5 individuals could be identified, mostly on the basis of skull fragments. Most of them were found close to the western and northern wall of the grave chamber at different spots (designed from a—d), whereas the bones of the postcranial skeletons were lying in the centre of the grave. The fragmentary skulls (a) and (b) were lying near the western wall of the grave and belong to grown up individuals. They show, as far as preserved, opposite sex characters thus indicating a male and a female. This diagnosis is also supported by evident sex differences of the lower jaws and the long bones. An exact age diagnosis was not possible as the sutures are not preserved and the teeth are missing or broken. Yet the lower jaws of both individuals clearly show closed alveoli of the molars due to the loss of these teeth during life and thus a higher (senile) age group can be assessed. The skull fragments (c) and (d) were situated close to the northern wall and belong to children. Fragments of the upper and lower jaw were preserved from the skull (c). Beside the milk molars the first molar of the permanent teeth had already erupted indicating an age of approximately 7 years. Skull (d) was only represented by fragments of the brain-case. As no teeth were preserved the assessment of age was very difficult. But compared with skull (c) corresponding fragments of the frontal bone and the orbits show only slight differences in size and thickness. Thus we can say, that skull (d) belonged to the same or a slightly younger age group than skull (c). It is interesting to note that the upper margins of the orbits of both individuals show remarkable differences. The upper margin of the orbits of skull (c) is relatively rounded, whereas that of skull (d) is extremely sharp. The sex determination of childern is very difficult due to the moderate marked sexual traits. In this case it is probable that the skulls (c) and (d) belong to a male and female individual. The fragmentary skull No. (e) was found opposite to (a) and (b) in the eastern part of the grave chamber together with fragments of the long bones of an infant. Besides deciduous teeth a permanent molar was found without root. Its developmental stage corresponds to an age of approximately 2-3 years. No. sign was traced to assume if any of these in-

dividuals was placed originally in traditional flexed burial fashion.

Grave 256

In eastern part of the grave which was probably divided by a short line of stones from the western part which contains only pottery, the skeletal remains of at least 4 individuals were found. The burial system shows similarities to that of grave No.254. Fragments of four skulls and four mandibles were found at different spots near the walls of the grave chamber, whereas the postcranial remains were lying one on another to a height of nearly one foot in the centre. The long bones were placed almost parallel to the long axis of the grave. The best preserved skull was found in the north-eastern corner lying over a stone as if deliberately placed there. The massiveness of the bones, the robust and prominent chin, the still open sagittal suture and the wear pattern of the teeth suggest a male of approximately 20-30 years of age. The remains of the second skull found in the south-eastern corner shows also male sex characters. The attrition of the teeth suggest a slightly older age than the above individual (approximately 30-35 years). Most likely a fragment of the frontal bone shows signs of trephining.

The fragments of the other two skulls found near the southern and northern wall of the grave chamber belong to female individuals. One of them was of younger age. The attrition of the teeth corresponds to an age of approximately 20-25 years. The second female must have been of a higher age group (senile) as the alveoli of the molars were already closed due to the loss of the teeth during lifetime. However an exact age determination was not possible as no skull fragments with sutures were preserved and the teeth were missing. Same as in the case of grave 254 it can be assumed that no natural burial took place.

Grave 262

The grave revealed a burial of one individual placed in crouched position facing north. The skull was badly broken and very fragmentary. Most of the characteristic parts for sex and age determination were missing. Yet the gracility of the lower jaw and the long bones, the weakly developed muscle markings and the extremely sharp upper margin of the orbits suggest a female. The molars are very much worn off and correspond to an age approximately 50-60 years.

Grave 265

The western part of the grave was occupied by the fragmentary skull and some long bones of one individual.Most of these long bones were placed parallel to the long axis of the grave chamber. It is evident that no burial in natural flexed position took place. The upper margin of the orbit is relatively sharp, the mastoid processes small, the occipital protuberance very weakly developed, the postcranial bones thin and gracile, thus indicating a female individual. The basiphenoid suture had already fused suggesting a grown up individual. Yet an exact age diagnosis was not possible as the teeth are missing and the cranial sutures are only partially preserved. However, a younger age group (20-30 years) can be assessed as none of these sutures had undergone synostosis.

Grave 270

From this grave were exhumed skeletal remains of one individual lying in traditional flexed position facing south. Although most of the characteristic parts of the skeleton for sex determination are missing, the well developed supaorbital rigdes, the large and extended sinus frontalis and the massiveness of the long bones suggest a male. All teeth and most of the cranial sutures are missing. Therefore the assessment of the age at the time of death is very difficult. As, however most of the preserved sutures have undergone synostosis a higher age group can be assumed. This accords with the structure of the well preserved pubic symyhysis showing stage 4 according to Nemeskeri which corresponds to a mean age of 58 years.

SECTION — 5

SOME NOTES ON THE FUNERARY RITES AT TIMARGARHA

As the description of the graves in the previous section indicates three main types of burial customs are to be distinguished[6]:

1) Inflexed burials, where the individuals were lying with bent arms and legs on one side and mostly oriented from west to east or north-west to south-east,
2) Cremated burials, where the burnt remains were mostly found in urns,
3) Fractional or partial burials, where only the bones or parts of the skeleton were buried after the decomposition of the flesh as a result of the exposure of the dead body in the open field or at other places.

According to Dani (1966) these three main types of burial customs are related to three different cultures and periods, as will be cussed in detail in a later section.

Moreover ,the anthropological analysis of the skeletal material, especially the study of the skeletons *in situ* has shown many details and variations of these main types of funerary rites, which may also be interesting from an archaeological point of view.

One of the striking features is the fact, that these three main burial types in its purest form could be traced only in a relatively small number of graves, whereas most of the burials cotnaining more than one individual revealed a mixing of two basic types.

The inflexed burials of adults (concerning the non-adults see later) in their typical form was found only in the following graves 103, 148, 157, 190, 192, 203, 212, 241, 242, 262, and 270. The graves 202, 204, 111B and 182 belong to the same type but they differ from the previous one in orientation or in the fact, that only parts of the body were buried in inflexed position.

The greatest number of inflexed burials were mixed with the third burial type, i.e. fractional or partial burials. As in many of these graves the skeletons lying in inflexed position, were partially disturbed (for example in graves 123, 138, 139, 142, 144, 162, 180, 196, 197) the priority of the inflexed burials can be concluded.

The chronological sequence of burial of the individuals found in this mixed type of burials can be reconstructed as follows: Originally a burial in natural flexed position took place in these graves. At a later time the grave was reopened which led to a partial disturbance of the inflexed burial. As most of the skeletons were disarticulated in its upper part whereas the lower portion was found in anatomical position, it can be concluded that the graves were opened on the western end where in most of the cases the upper part of the skeleton was lying. After the reopening of the graves, the bones of probably the exposed individuals (i.e. the second individual) were buried mostly. by throwing the remains in the pit without care as can be deduced from the position of the remains. Regarding the time difference between the two burials we can only say from an anthropological point of view that the second burial took place at the time when the flesh of the inflexed burial was decomposed. From the forensic medicine we know that the body decomposes within 2-10 years, which varies according to climate and soil composition. The other possibility can be that

the second burial resulted after a long gap of time, so that the graves with inflexed burials of period I, were used again in period III. The discovery of the graves might have been no problem due to the stone lining and covering of the chambers with big stone slabs, which made it easy to find the graves even after hundreds of years. This assumption is supported by the archaeological finds. For example in grave 142 beside a fractional burial was found a skeleton in natural inflexed position at a lower level. Parts of an iron snaffle of a horse in the grave undoubtedly related to Period III according to Dani. Hence we can interpret that the inflexed burial took place earlier than the fractional burial which is typical for the last cultural period (see section "Discussion and Conlusion").

Again it seems that not all graves where burials in flexed position were found along with disarticulated bones, can be considered as mixture of the above described burial type I and II i.e. a combination of an inflexed and a fractional burial. Contrary to most of the other graves the inflexed burials were totally undisturbed in these graves. It seems that in these cases the other individuals were buried earlier in natural position and in course of the later burials the bones were pushed to the side to provide space for the new burial. This assumption is supported by the fact that care had been taken in removing the bones to the side.

This assumption is again supported by the first radiocarbon dates from grave 101 which seems to belong to this burial type. As already mentioned in the introductory section the inflexed burial in this grave yielded an absolute age of 3380 years while the age of the disarticulated bones in the same grave was determined as 2805 years, indicating a time difference of nearly 600 years. This result would be in favour of a fractional burial after a long gap of time. A firm solution of this assumption is possible when this time gap is confirmed by further radiocarbon analysis.

Such graves, where an inflexed burial was mixed with cremated remains, were comparatively small in number. In its purest form we find this combination in grave 217[7] which revealed an urn containing burnt remains of two individuals besides an undisturbed skeleton in natural inflexed position. It is difficult to determine with the help of anthropological finds whether the burials took place at the same or at different time periods. The undisturbed position of the inflexed burial does not speak against the earlier burial of the burnt remains. The urn was found in a corner of the grave chamber which did not contain any other human remains Therefore the reopening of the grave in this part without disturbance of

the inflexed burial can be imagined. Yet this question may better be decided from an archaeological point of view. (See description of the grave, P. 100).

However, it is difficult to explain those graves where burnt remains without urn were found beside an undisturbed inflexed burial. The cremated remains were quantitatively not enough to represent one individual.

In case of the inflexed burials, a relationship between burial position and sex, already suggested by the archaeological finds, is further confirmed by anthropological analysis. As far as sex diagnosis was possible with anthropological methods it has shown that the female individuals were lying on the left side and facing north as conditioned by the west-east orientation of the body, while the males were lying on the right side facing south. This is also vaild for the graves 111 B and 182 though only the lower part of the body or a body probably without head was buried.

In this connection the two graves 202 and 204 were of special interest. These two burials differentiate themselves from other inflexed burials as the bodies were placed inversely in east-west direction (head in the east). The two skeletons determined as female were lying like other females on the left side but facing south like males owing to the reverse orientation of the body. Therefore we can conclude that the facing of the body during the burial according to the sex was in favour of the side of the body than the cardinal direction.

Except those graves where this rule could not be confirmed due to the bad state of preservation of the bones, there are only a few graves which are in contradication to the above rule (grave 176, 209). The number of cremated burials in their purest form is comparatively small. All burnt bones were kept in urns with the exception of grave 119 where like the inflexed burials with burnt remains, parts of the cremated bones were scattered on the floor. Most of the urns contained remains of more than one individual. In some urns burnt bones of children of juvenile individual were found beside the remains of grown up individuals of both sexes. The degree of burning of the bones varies from strongly burnt to slightly burnt or slightly charred, thus indicating a different type of the furneral pyre. In case of grave 184 most of the bones were only slightly charred. The cranium placed on the mouth of the urn, was nearly totally preserved and only the facial part showed traces of burning (see Fig. 111). The lesser degree of burning and the irregularly distributed burning traces resemble the burning me-

thod as occasionally practised during the same time in Syr-Darya Delta. There the dead was not burnt on a pack of wood but the body was wrapped with a straw mat or with reed. This was lighted resulting in an irregular roasting and burning of the body (compare Jettmar 1967). Numerically the fractional and partial burials in their purest form were approximately equally represented as the typical inflexed burials. To the burial type, in which no bones were found in articulated position, belong the graves 109, 117, 125, 137, 151, 165, 173 a, 177, 186, I9I and 228. In most cases these graves give the impression that the bones were thrown without care in the grave chamber after decomposition of the body. However some other graves show a certain intentional care regarding the arrangement of the bones.

This is true concerning the graves 151 and 191 where a certain order was necessary due to the small size of the grave. But the position of the lower jaw in grave 149 and the crossed manner of the long bones in grave 228 also suggest a certain amount of intention involved in accommodating the bones. The same may be true in case of the graves 254 and 256. In these graves remains of several individuals were found. The skulls or fragments of the skulls were lying close to the walls of the chamber, whereas the long bones and the remaining bones of the postcranial skeleton were heaped with more or less care in the centre of the grave. In grave 256 a skull was lying on a raised stone platform, perhaps also a lower jaw in grave 228[8].

It is still open to question whether these graves with many individuals belong to family graves or not. Anthropology is in position to explain this problem with the help of morphological comparisons. However, in case of our material this analysis was not possible due to the fragmentary condition of the skeletons. Only one anthropological find is in favour of accepting a family or a clan burial. In grave 256 four fragmentary lower jaws were found exhibiting an extreme wide angle of the ascendant ramus as it was not found in case of any other skull of the cemetery. Although a little is known regarding the heredity and the genetical condition of this feature, we may assume that this character is typical of a particular family or clean. On the basis of the sex and age comparition in same graves we are also able to suggest family graves, particulary in those graves where two adults of different sex are buried along with the remains of children.

All the graves containing animal bones along with human remains belong to the fractional burial type (grave 109,125,137,149,183). The position of the animal bones, for example the animal skull in grave 109, suggests an

intentional burial of such bones. Very strange is the fact that in grave 125 two long animal bones were inserted approximately 6-7 inches in between the wall stones of the grave. The same was true of two human femura in grave 162.

The animal bones had been confirmed by a zoologist as belonging to the following animals: Horse, goat, sheep, stag, hare and snake (see also section "Zoological remains"). It seems likely that the burial of the bones of these animals besides human remains was of ritual meaning, which may be true specially in the case of the snake tail found on the rim of a votive vessel in grave 183.

In the graves 109 and 125 only a few human skeletal remains were found, which do not represent all the bones of an individual. It is unlikely to think that the rest of the remains have decomposed, as the available material is in a good state of preservation. Therefore in such cases a partial burial may be assumed. The burial of incomplete skeletons could also be confirmed in some other graves of the fractional burial type. In grave 186 only two skulls without postcranial skeleton were found, whereas grave 104 only revealed a skull and the bones of upper extremities but no remains of the lower part of the body. Grave 191 contained only the skull and the long bones of one individual whereas the bones of the remaining skeleton were missing. Grave 139 revealed two postcranial skeletons but only one skull. Whether one skull of grave 186 belongs to one of these skeletons or not is very difficult to say.

Contrary to adults, inflexed position was the most common burial type in case of children. As has been observed in the case of the adults, the children were also lying on right or left side suggesting a relationship between sex and facing too. However, this could not be confirmed as the exact sex determination of non-adults is very difficult. Most of the children graves contained only one individual. Remains belonging to more than one child or infant were only found in Grave 107, 196, 253 and 254. In case of the last grave nothing could be said regarding the burial position due to the scanty remains. The inflexed burial in grave 107 pertaining to a 7 year old child along with the remains of two other infants, was completely undisturbed. Therefore the same burial custom as in grave 101 can be suggested i.e. a secondary inflexed burial, where the remains of the earlier buried individuals were put aside to provide space for the new burial. Contrary to this in grave 196 the partially disturbed skeleton found together with the remains of a second infant in disarticulated position suggests the possibility

of reopening the grave for a fractional burial. Children remains found in grave 254 along with the skeletons of two adult individuals in haphazard manner may also be considered as fractional burials of children. Theoretically, however, it is possible to imagine that the children were originally buried in natural position and the bones were later disturbed by a fractional burial of the adults. It is also difficult to explain the burial type of grave 144 where very scanty remains of an infant were found with the disturbed skeleton of a young woman.

Burnt burials of children or juveniles could be traced only in association with adults, as all burnt remains of children were found in urns also containing the remains of adult individuals. Therefore it seems quite possible that the inflexed burial (see above pp. 76ff. and 103ff. for the children graves — editor) of a single individual was the prevailing burial type in the case of children and other burial customs were practised only in association with the burial of adults. At the same time when this chapter was finished the work of Stacul on the archaeological results of the excavation of pre-Buddhist cemetery at Swat was published as mentioned in the introductory section. The work of Stacul confirms the findings at Timargarha and above all the typology of the funerary rites with the exception of the relationship between sex and facing in case of inflexed burials. However there are certain differences regarding the interpretation of the finds. Yet the present circumstances do not allow to analyse these different interpretations here. The same is true of the differences in interpretation between Stacul and Dani, especially concerning the chronological sequence of the prevailing burial type.

SECTION — 6

SOME DEMOGRAPHIC NOTES ON TIMARGARHA POPULATION

According to the palaeodemographic pilot study of Acsadi and Nemeskeri (1957) on the population of a mediaeval cemetery of Hungary, a full demographic analysis and biological reconstruction of prehistoric populations, which also include estimation of the population number in different time periods, is only possible if two basic conditions are fulfilled:

1) The anthropological series under investigation should be complete (i.e. it comprises the whole material of the cemetery),) or at least the extent of the completeness should be known, and

2) the chronological sequence and the duration of the use of the cemetery should be properly known.

In case of our material these two requirements are not met. The excavated area does not represent the whole cemetery and even the extension of the graveyard is not known. Secondly we do not know the exact duration for which the cemetery was used.

However Acsadi and Nemeskeri are of the opinion, that part series, especially when no selection of the skeletons took place (e.g. if not only the well preserved adult individuals were selected for analysis) are also af great significance for the biological reconstruction of prehistoric populations and are of great value from an archaeological, general-anthropological and palaeo-anthropological point of view. As our material corresponds to these restricted conditions, an approximate analysis of the demographic structure of Timargarha population is possible. Tab. 1 shows the site, sex and age distribution of all skeletons excavated at Timargarha. As the individual number in the particular age group is too small for consideration of both sites separately, the palaeodemographic analysis had to be based on the material handled together.

Out of 137 skeletons which could be salvaged from both sites, the age of 103 individuals was determined within the age variation of 5 to 10 years. In 34 cases, however, it was only possible to say, that the individuals were at least adults. The sex of 96 individuals could be determined out of 104 adults. The same is true of 2 out of 3 juveniles (age group 15-19 years). In some cases it was possible to determine the approximate age but not the sex. Such individuals are noted in Tab. 1 as? Children and infants are not shown sex wise as the sex was not prorperly determined.

The sex proportion of the individuals whose sex could be determined is 46 males to 42 females. From these figures result a sex ratio of 1000 males to 913 females. This number shows a slight shortage of the females, which is in accordance with the general biological sex proportion. If we consider the proportion of non-adults to adults we find a percentage of 24.09 non-adults to 75.91% adults (Tab. 1). As compared with other prehistoric populations the frequency of non-adults is relatively low (see Hausler 1966). The same is true of the percentage of infants who died below 1 year of age, being 8.03%. Concerning prehistoric populations generally a higher mortality rate is assumed, which is considered to be confirmed by the mortality of infants by present day tribal populations, living under si-

milar living conditions as prehistoric populations. For example Angel found for ancient Greek populations of Middle Bronze Age a mortality of infants below 1 year being 34.9% and for the classical Greek period a percentage of 29.9 (compare Angel in Howells 1960). The low percentage of infants below 1 year in case of our material may be caused partially by the fact, that some graves of which the bones could not be salvaged (see section 2) belong to children. Yet, even if we include these graves (which according to the report of the site supervisor are of small number), we do not get such a high percentage as generally assumed and assessed by Angel. There are also no signs that some of the children were buried in other parts or outside the cemetery, which would diminish the percentage of infants too. (compare Schwidetzky 1965, Hausler 1966). On the other hand certain new investigations have reported on prehistoric populations also showing relatively low mortality rates for children. Acsadi and Nemeskeri found for series of different time periods from Hungary a frequency of mortality for infants which never increased more than 10-20%. The same is true of North American prehistoric populations, where the death rate for infants below 1 year varies from 6% to 19.5% (compare Brabender 1965). Yet it would lead too far to discuss here these special problems in detail.

If we consider the age group 1-7 years, we find relatively a high mortality rate of 10.95% which exceeds the present day mortality for this group. This percentage fits well with the finds concerning other prehistoric populations e.g. the series from Hungary and North America (compare Acsadi and Nemeskeri 1957, Brabender 1965). According to Acsadi and Nemeskeri the high mortality in the age group 1-7 years signifies the bad living conditions and exogenelethal factors. On the other hand the comparatively low death rate of infants below 1 year indicates that the endogenic causes of death were relatively low. After the decrease in mortality in the age group 8-19 years there is a remarkable increase within the age group 20-30 years, where the mortality curve shows its peak, when both sexes are handled together.

Detailed informations concerning the death conditions in the particular adult age group, especially the distribution of the mortality of both sexes are recorded in Tab. 2. Here only those individuals are taken into consideration, whose age and sex could be assessed. The distribution differences and peak positions among males and females are most remarkable. In case of males the mortality peak is reached in the age group 30-40 years. The peak is low, and the mortality is relatively well distributed among other age groups. Contrary to this in case of females the peak is already reached

in the age group 20-30 years, when the frequency is double than in the same age group for males. Consequently the death rate in the other age group is relatively low, as compared with males, with the exception of the senile age group, where the death rate is nearly the same for males and females. The high mortality of the females in the younger age groups and consequently the lower life expectancy, is also to be observed in other prehistoric populations and is generally considered as due to childhood mortality for younger females.

If we compare the mortality rate of adults in our material with other prehistoric populations the same decreasing trend is observed from adult to senile age group (tab. 3). However the percentage of mortality in the age group 20-40 is higher than in most of the other series considered for comparison°. Yet it would lead us too far to discuss this and other special problems in this limited demograpic analysis.

SECTION — 7

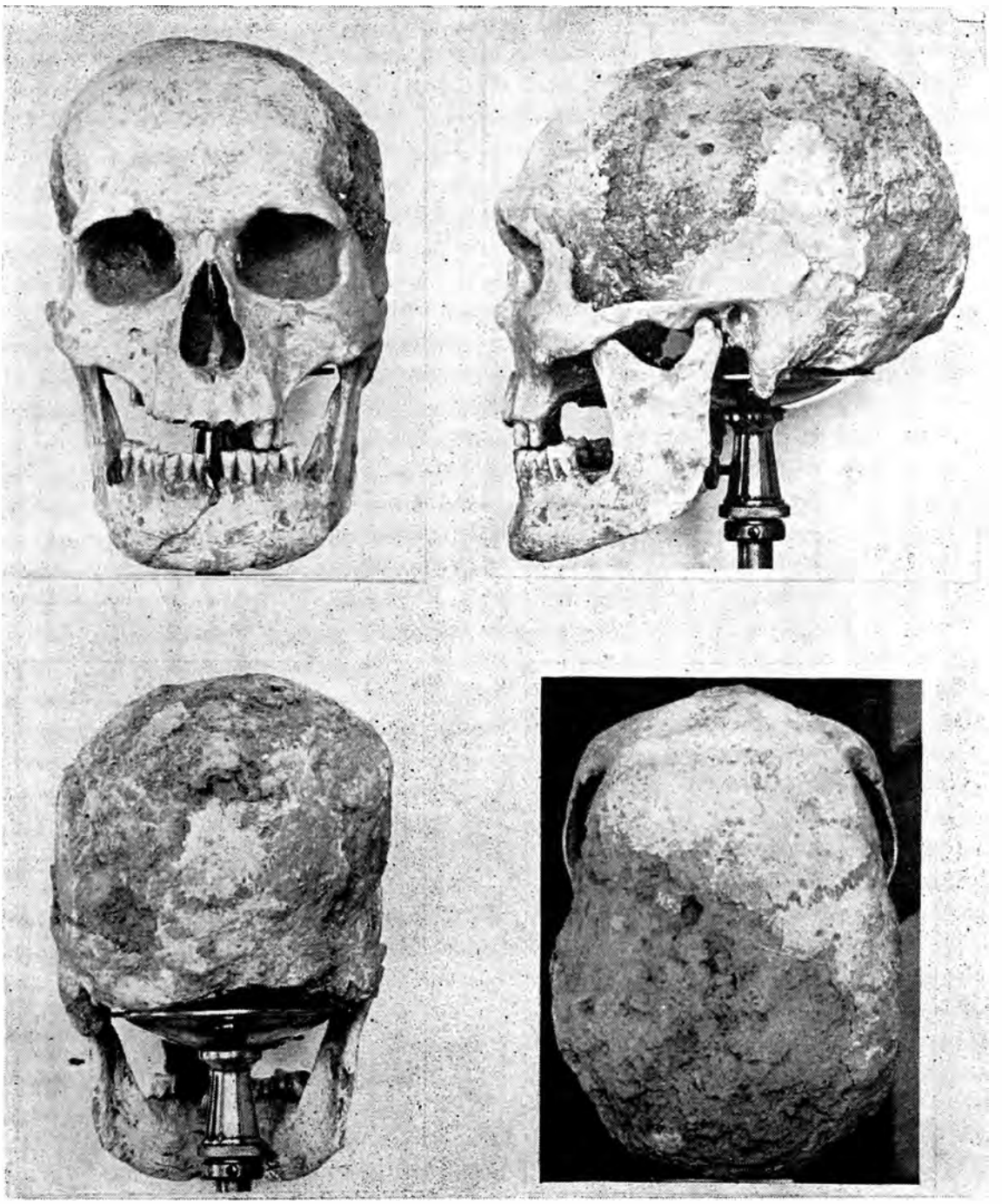
MORPHOLOGICAL AND METRICAL ANALYSIS OF THE SKELETAL MATERIAL

A. SKULLS

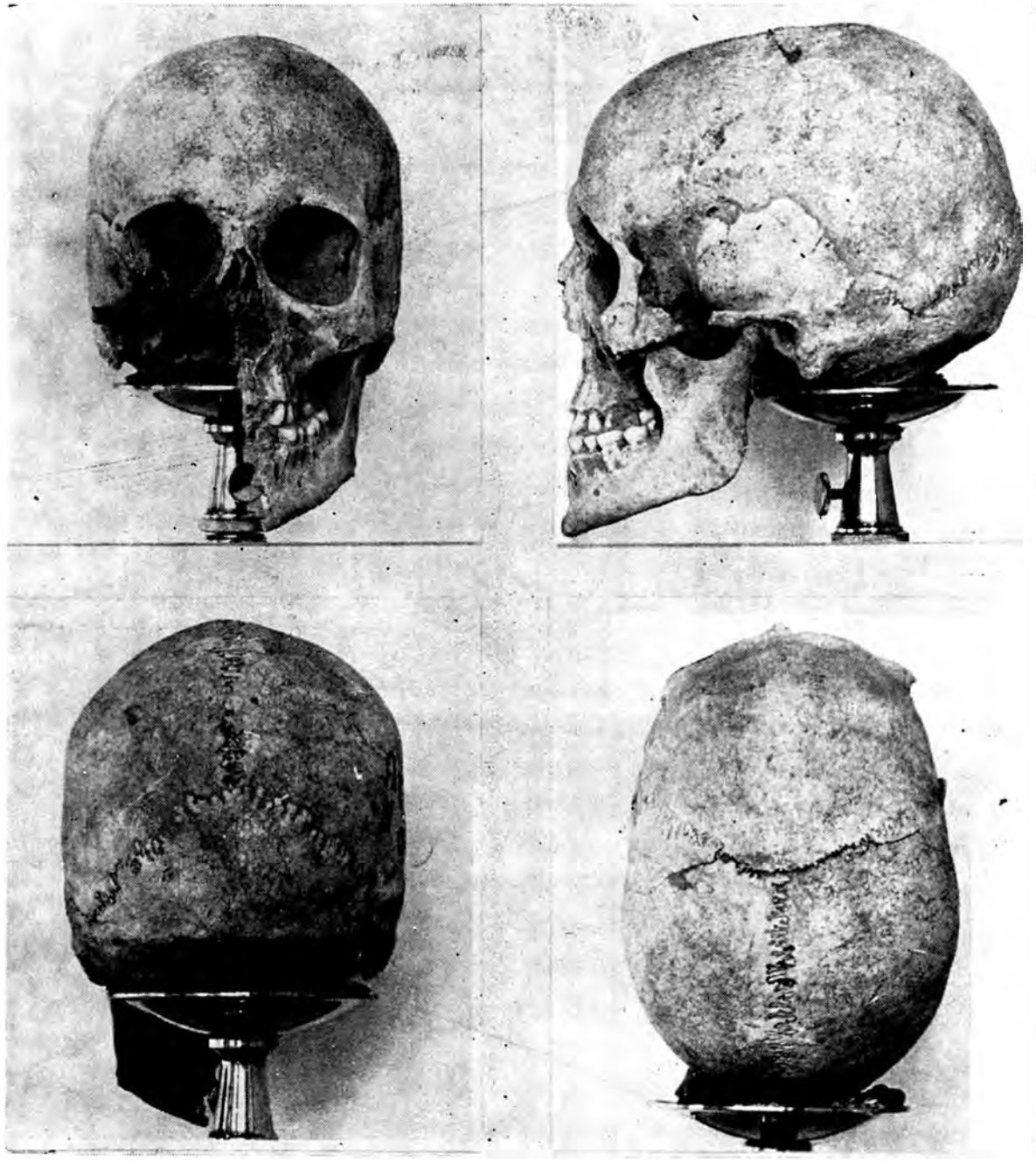
Altogether 25 skulls were so well preserved or could be restored to such an extent that an anthropological analysis was possible. As already mentioned in Section 2, in this number are included some skulls, which were salvaged during 1964 excavation.

A greater number of anthropometric measurements could be taken on 9 male and 11 female skulls, which are given in detail together with the main indices in the collective Tables A-C at the end of this work. The remaining 5 skulls were so badly damaged, compressed, or distored that no (or only a small number of) useful measurements could be taken. On the other hand these skulls were complete enough for a descriptive analysis of the main morphological features. A small number of further skulls could also be partially restored, especially the skull cap. Yet these skulls were not complete enough for proper anthropological analysis.

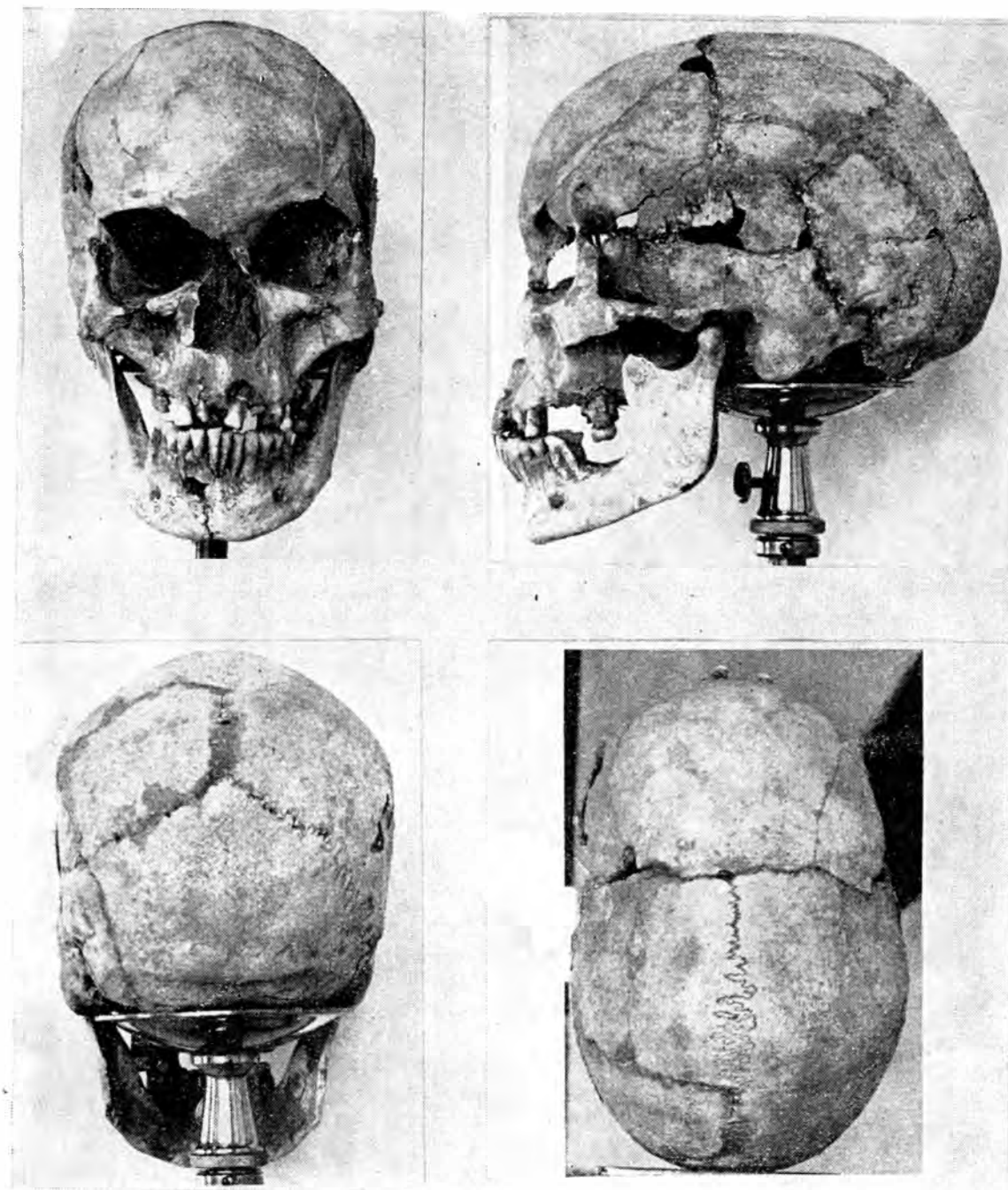
A short description of the main morphological characters and a typological classification of each skull are given in the following pages. It is supported as far as possible by the main cranial and facial measurements and indices and based on the methodological principles described in Section



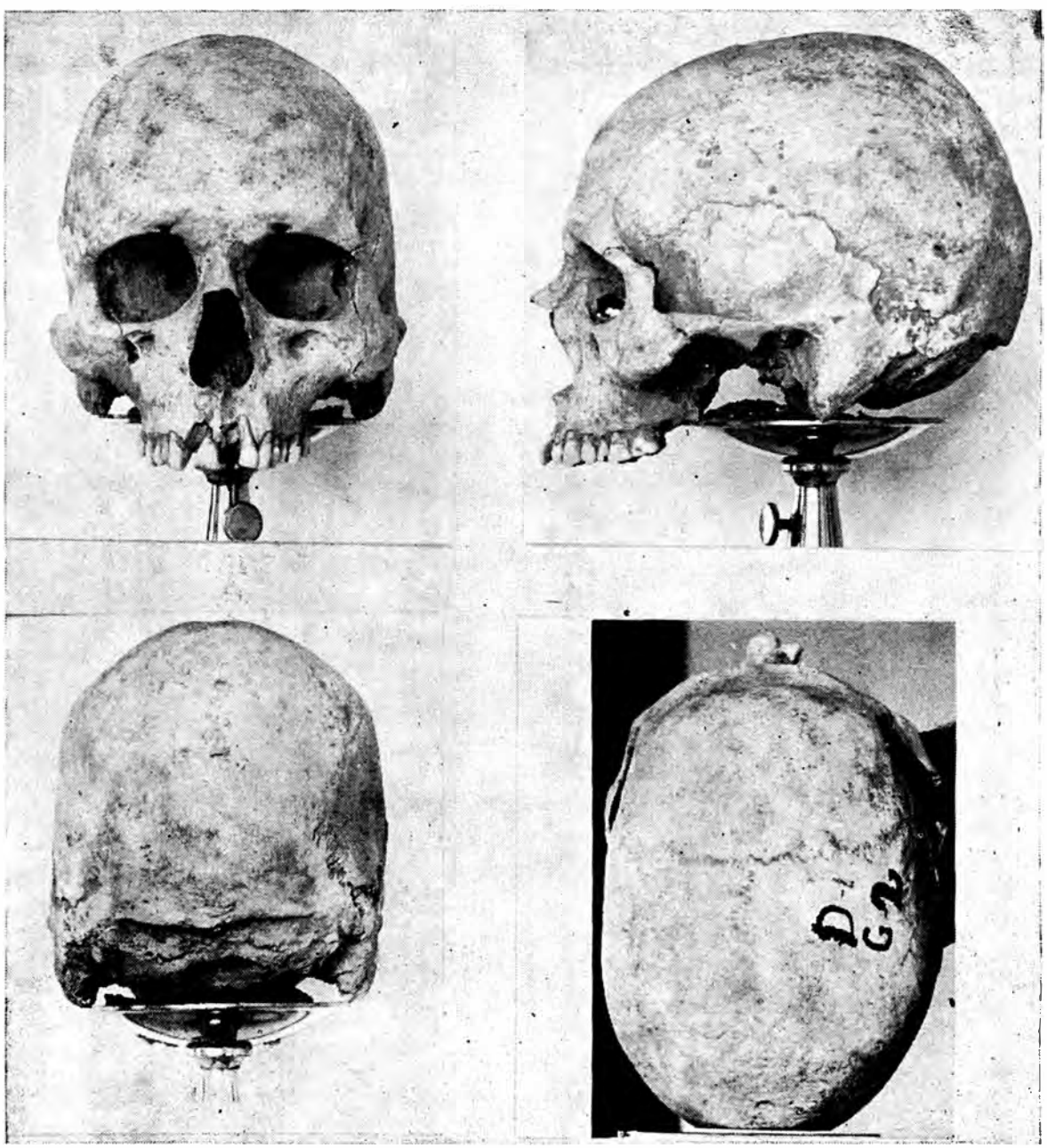
Pl. LVIII *(Figs. 1 - 4)* Skull No. 01



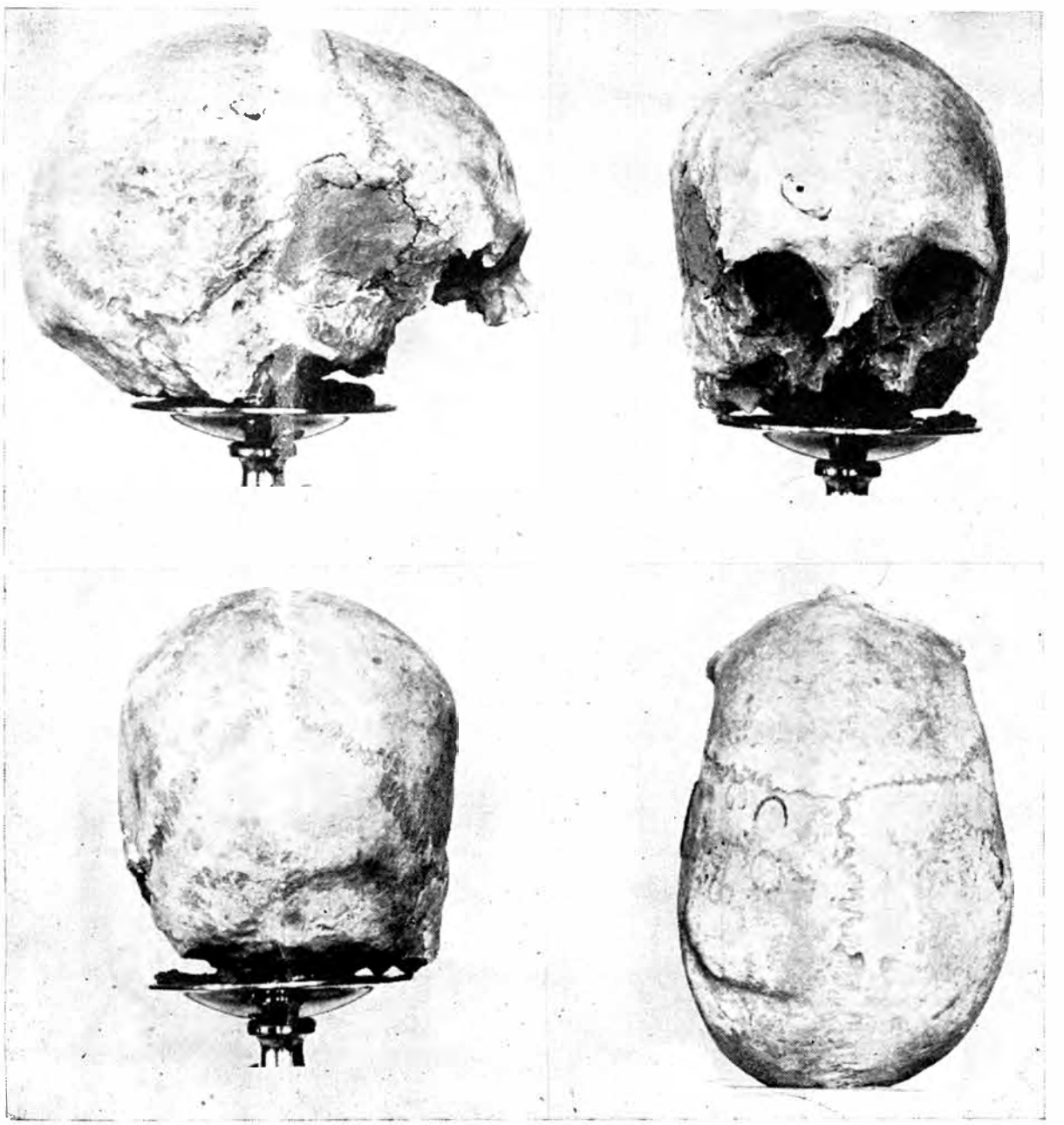
Pl. LIX *(Figs. 5 - 8)* Skull No. 62



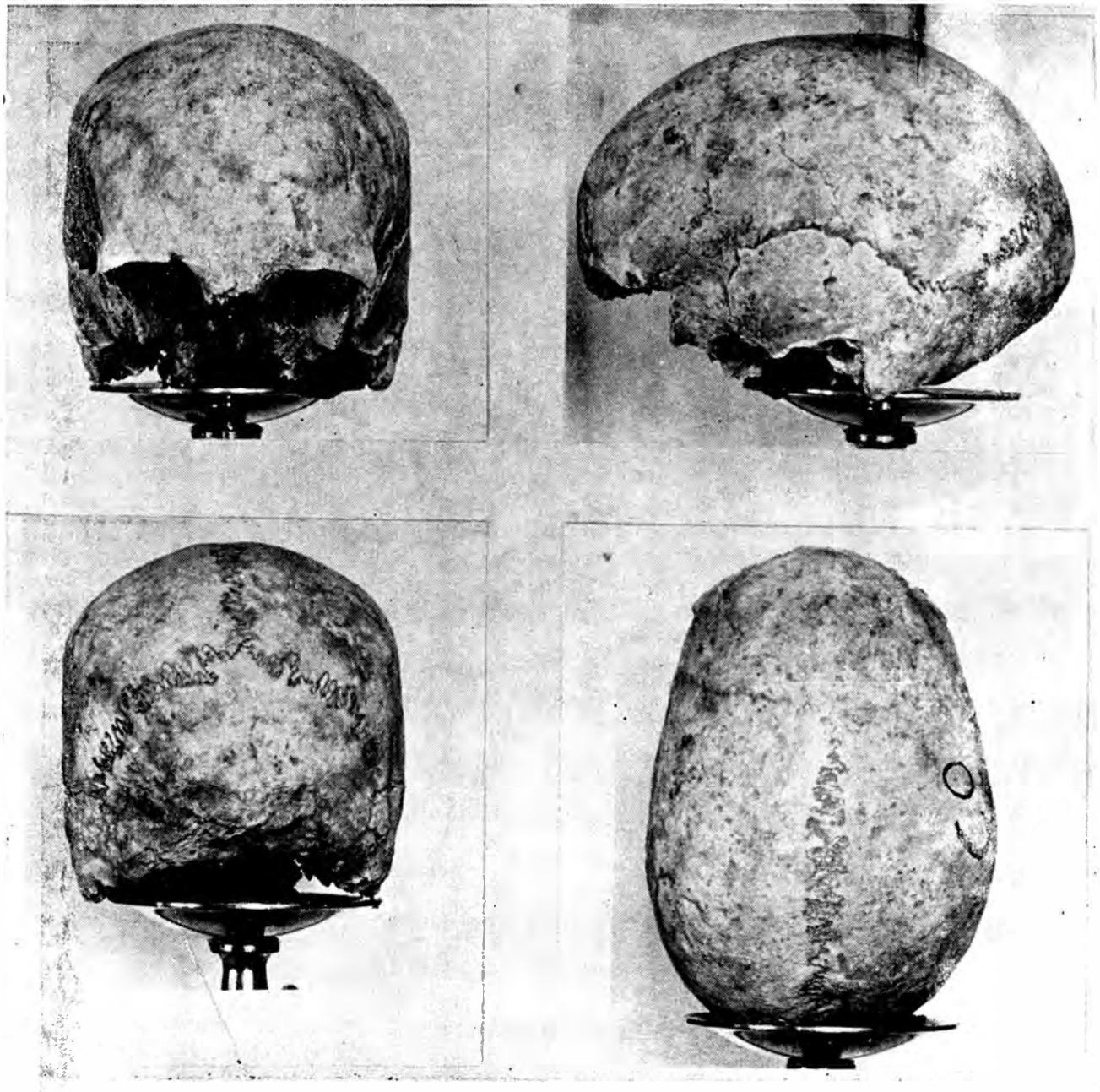
Pl. LX *(Figs. 9 - 12)* Skull No. 03



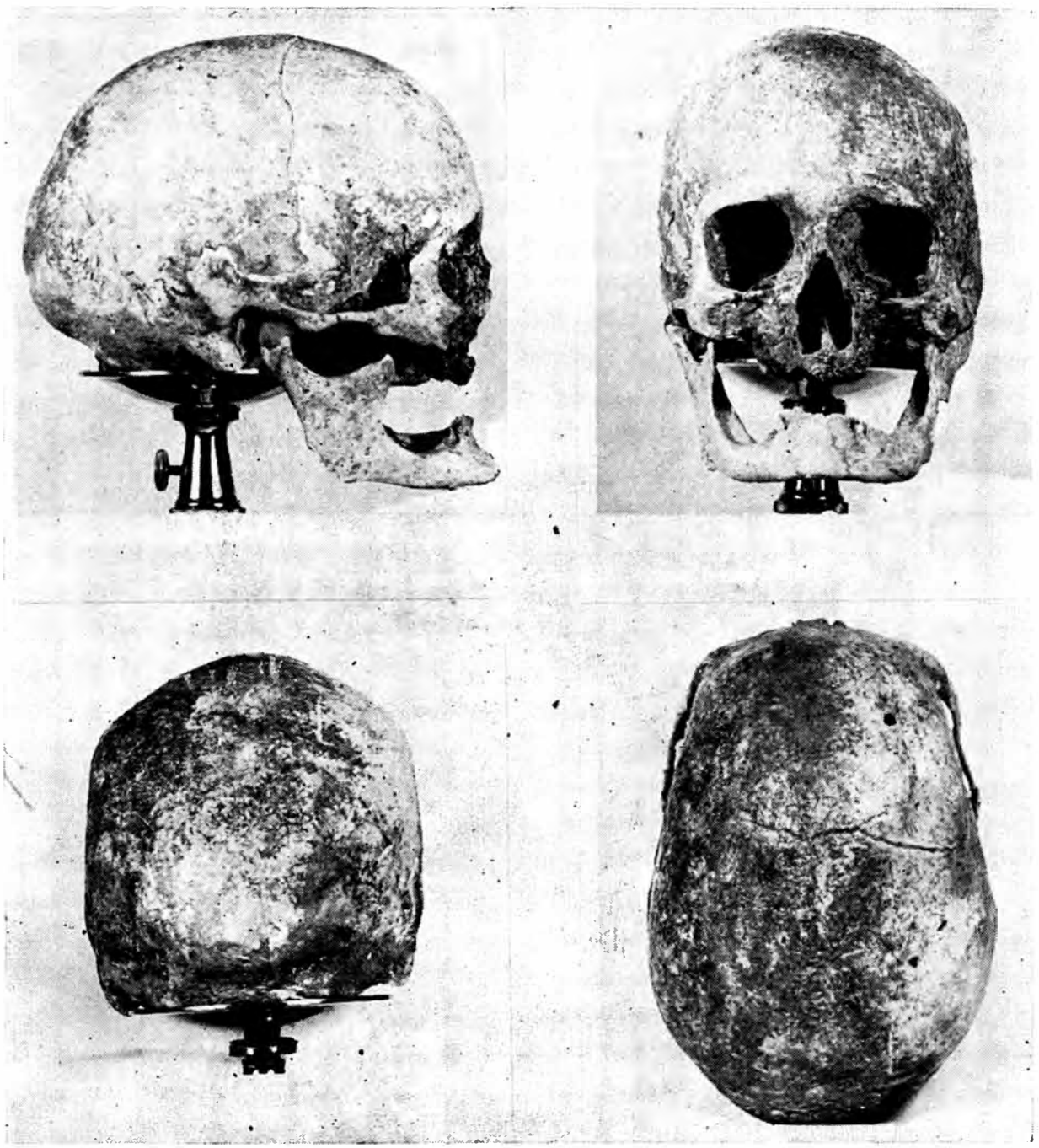
Pl. LXI *(Figs. 13 - 16)* Skull No. 04



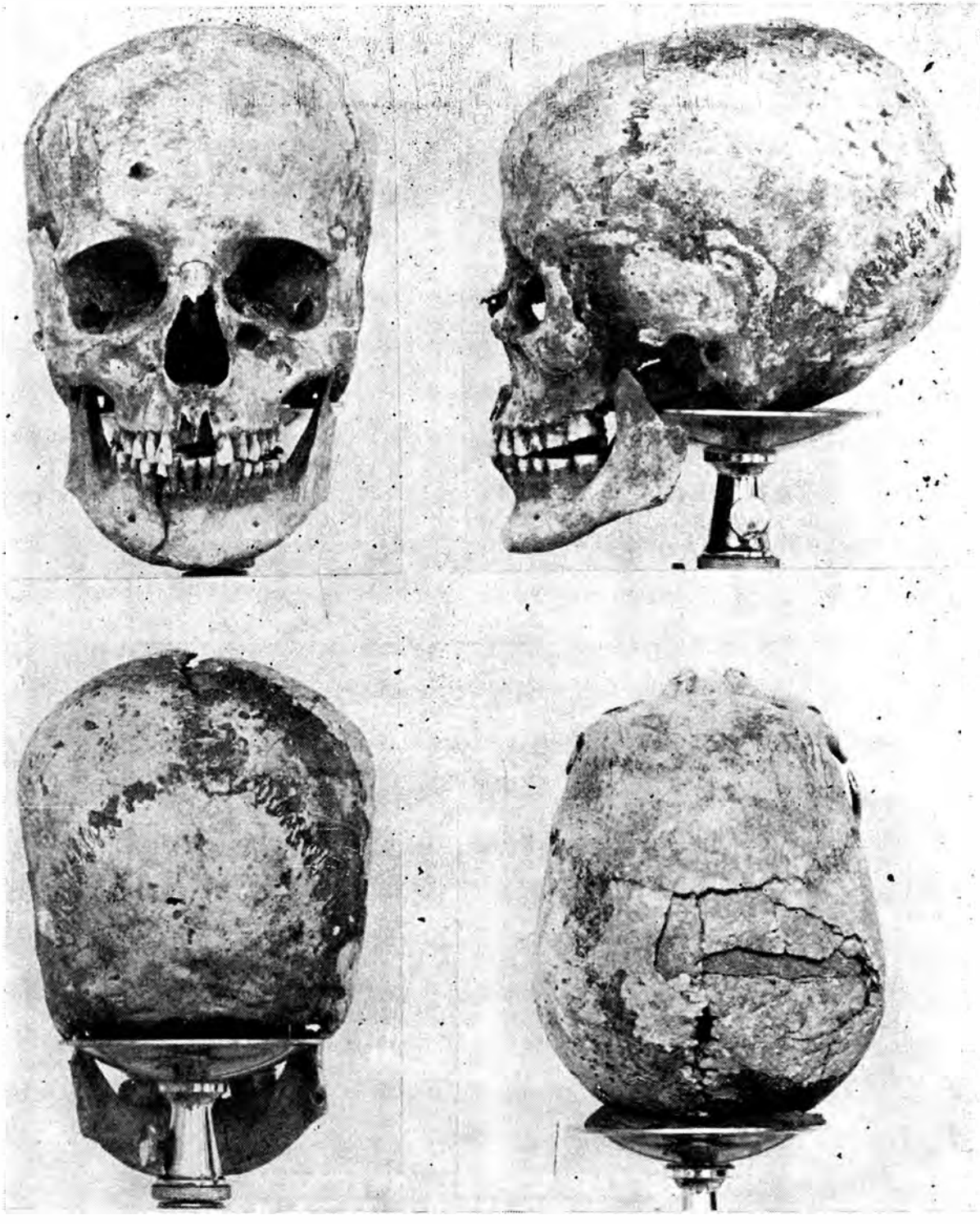
Pl. LXII *(Figs. 17-20)* Skull No. 05



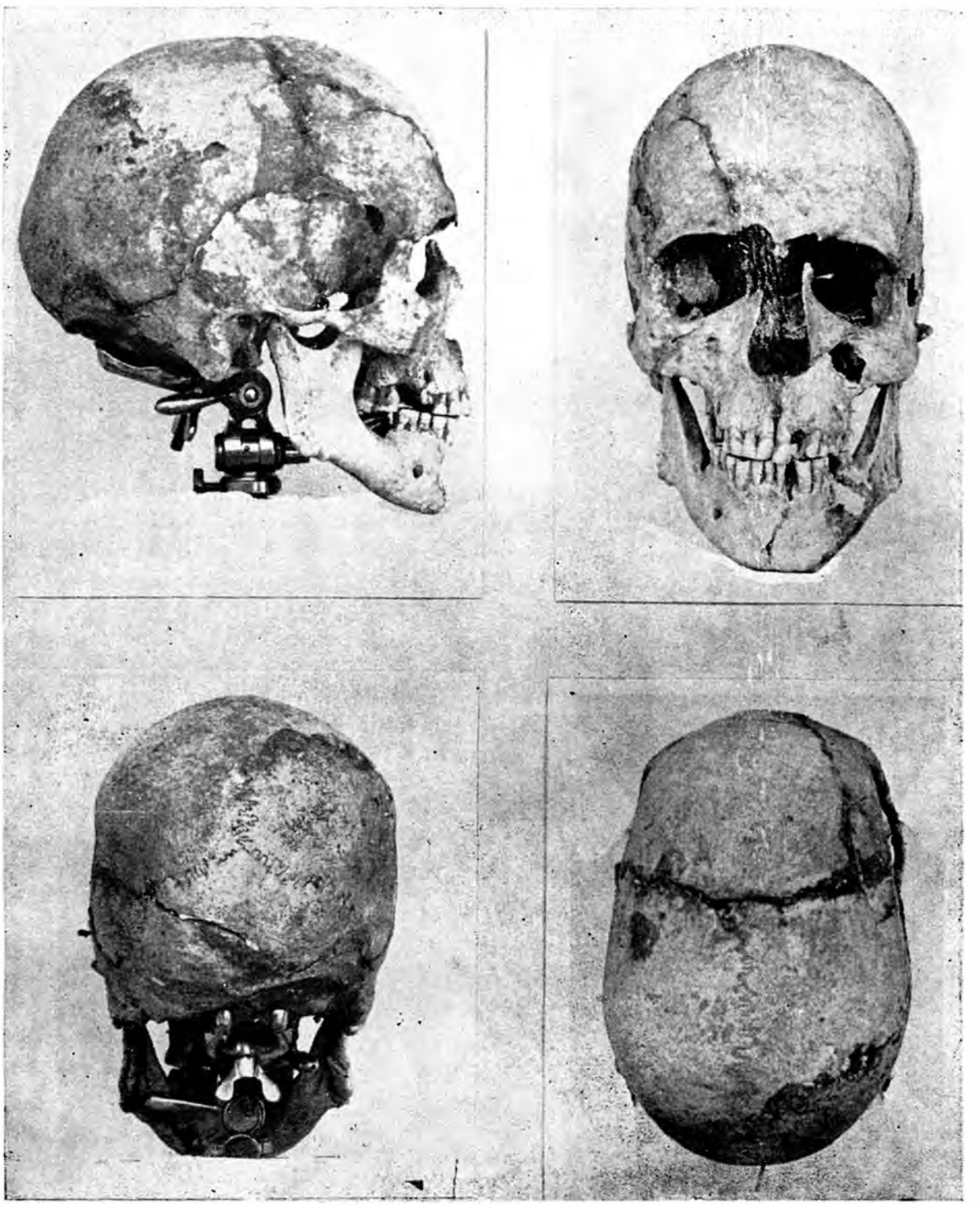
Pl. LXIII *(Figs. 21 - 24)* Skull No. 06



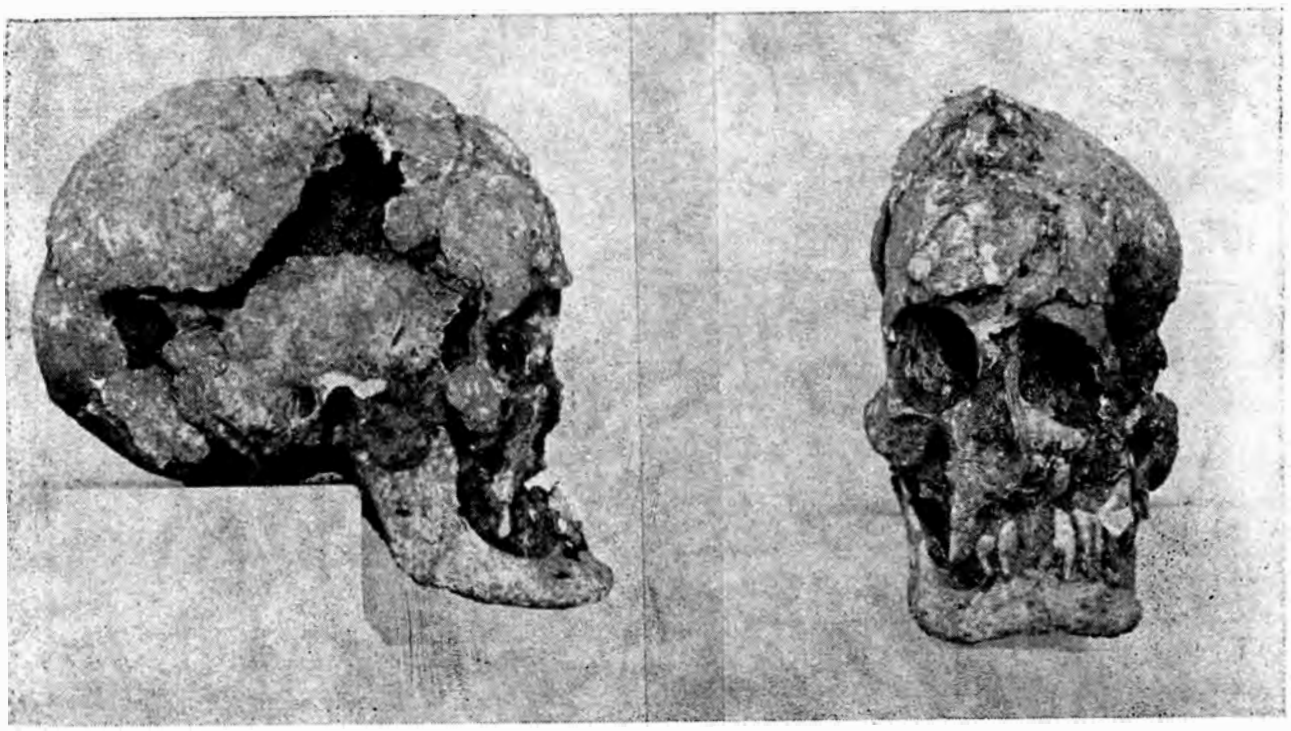
Pl. LXIV *(Figs. 25-28)* Skull 101a



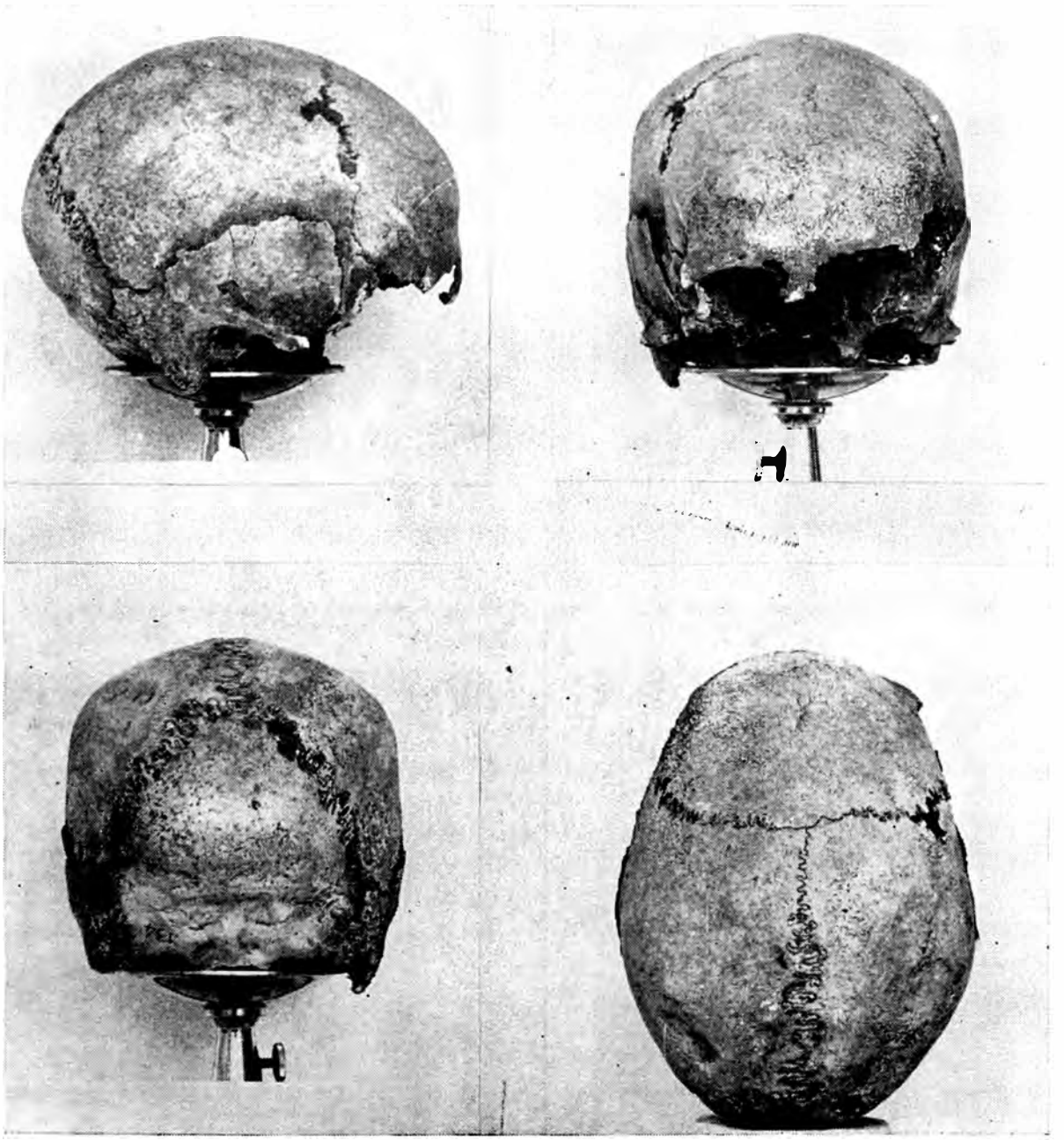
Pl. LXV *(Figs. 29 - 32)* Skull No.101 b



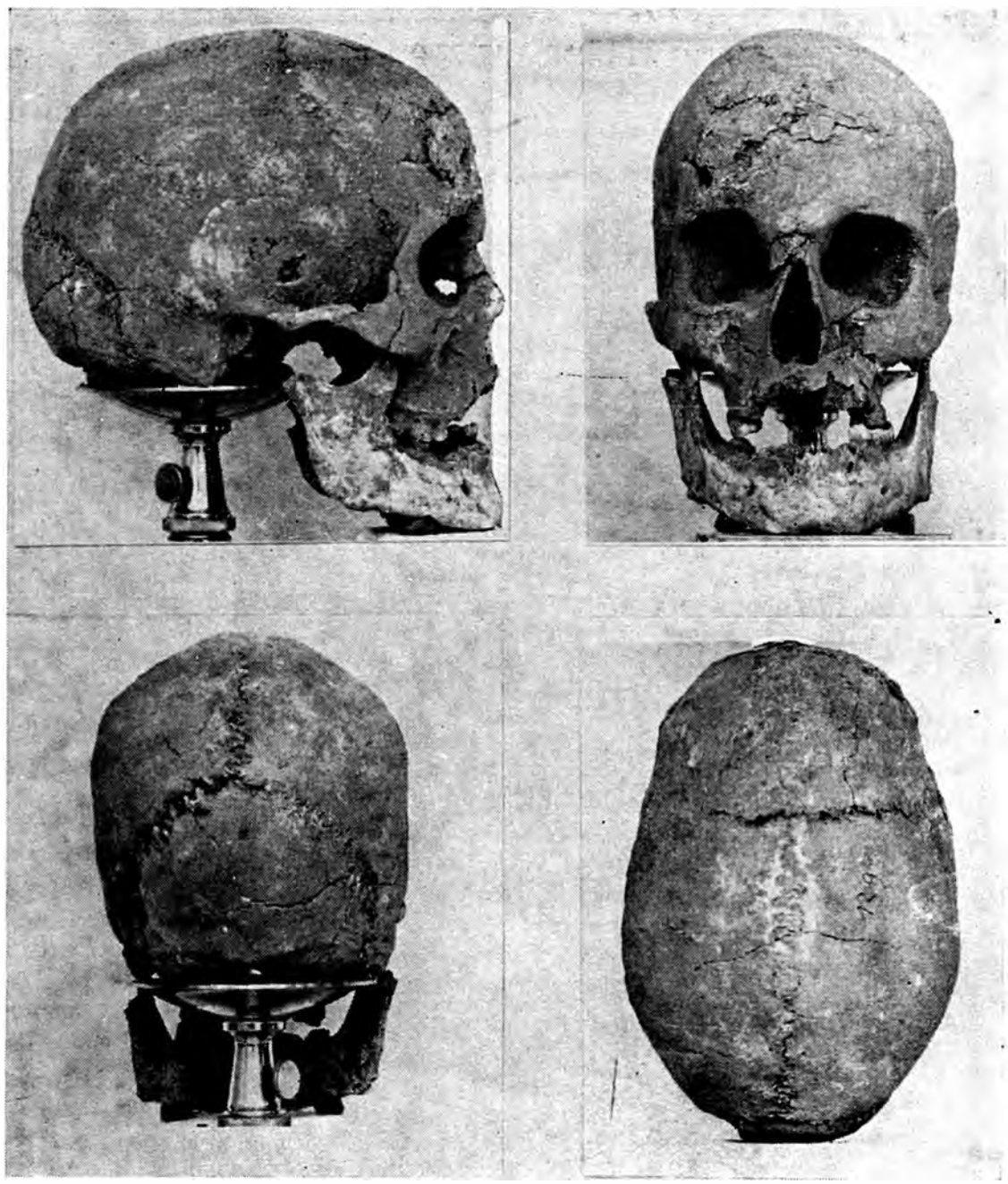
(Figs. 33-36) Skull 101 c



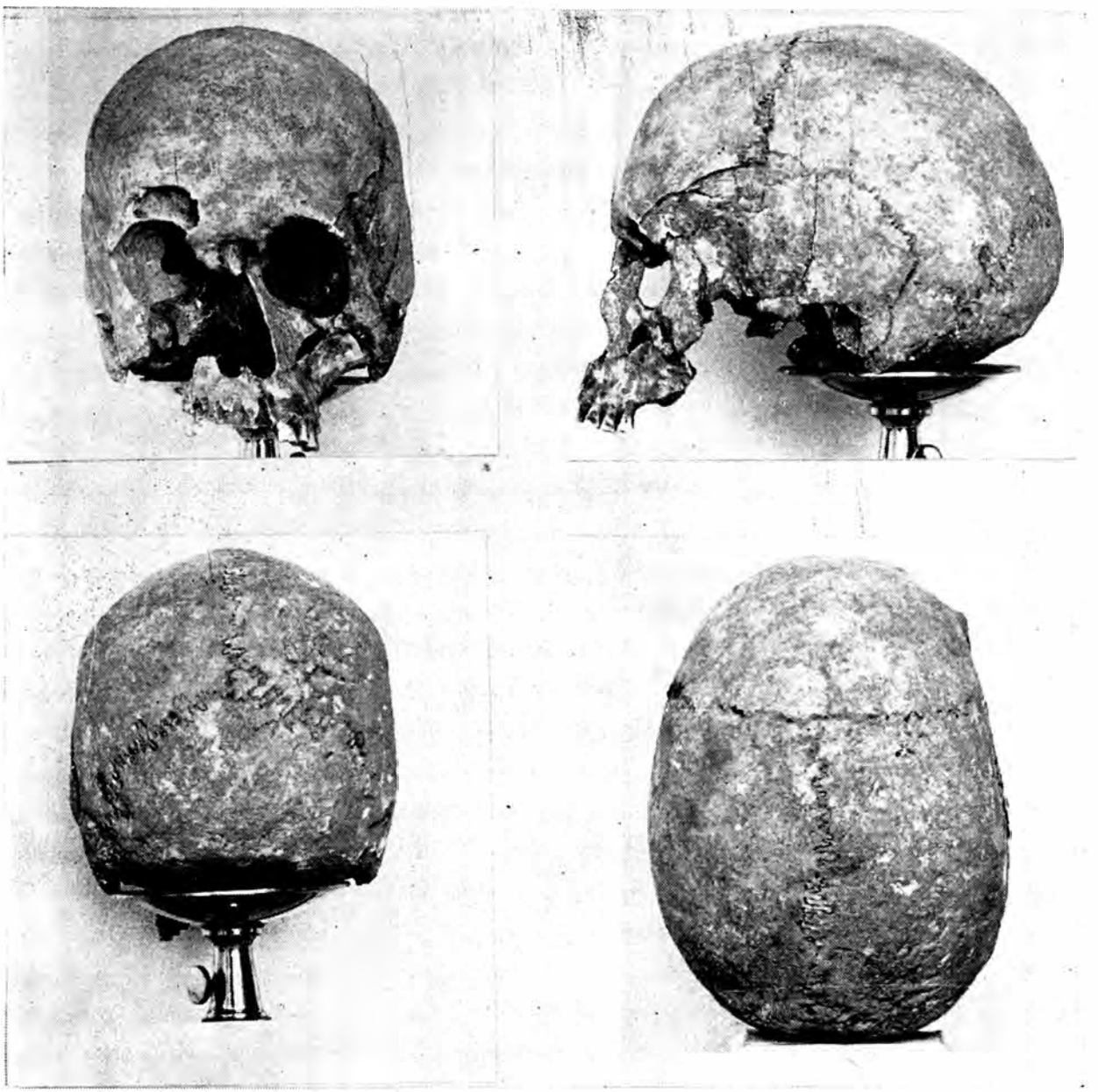
Pl. LXVII *(Figs. 37-39)* Skull No. 114



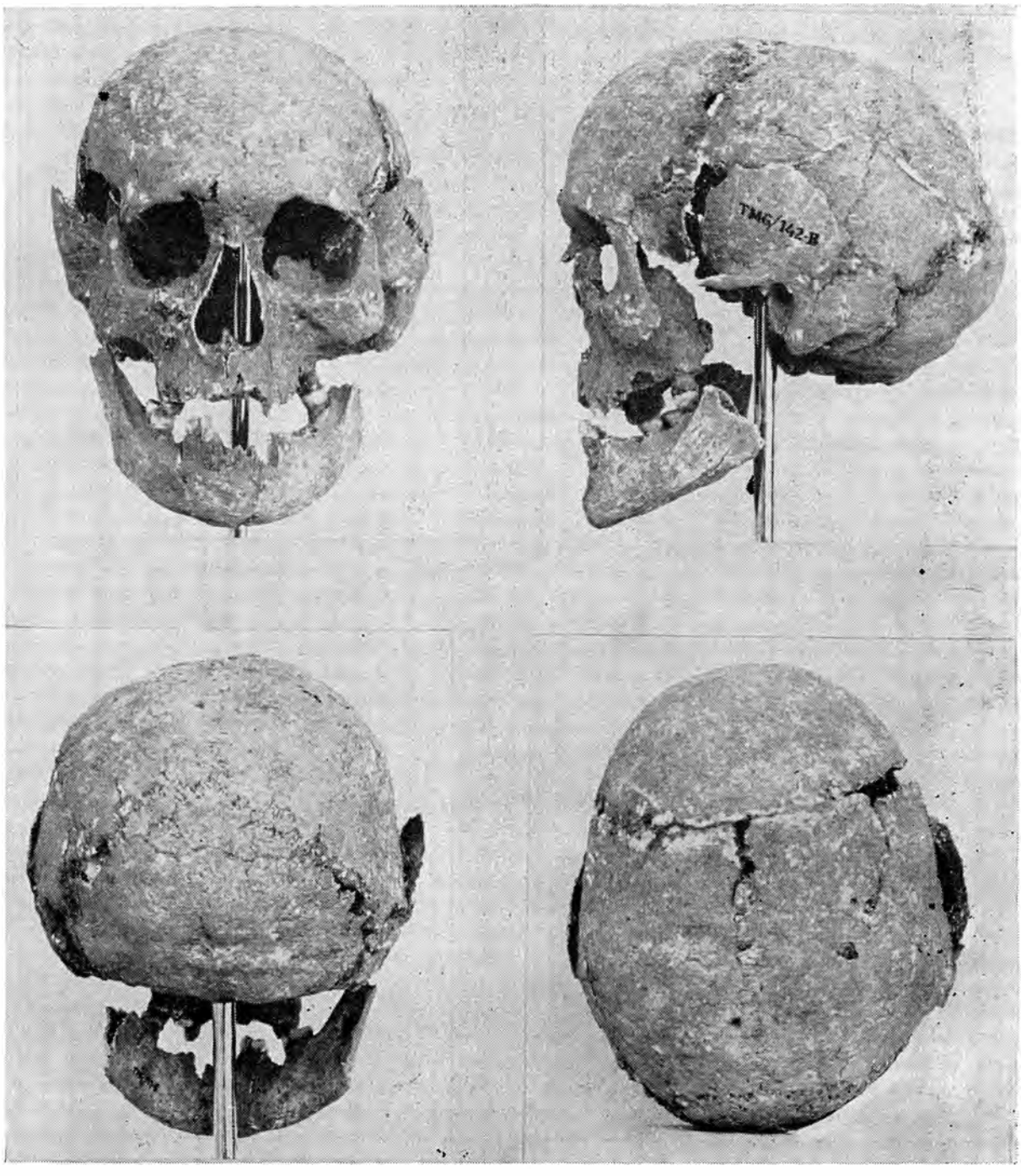
Pl. LXVIII *(Figs. 40 - 43)* Skull No.134 a



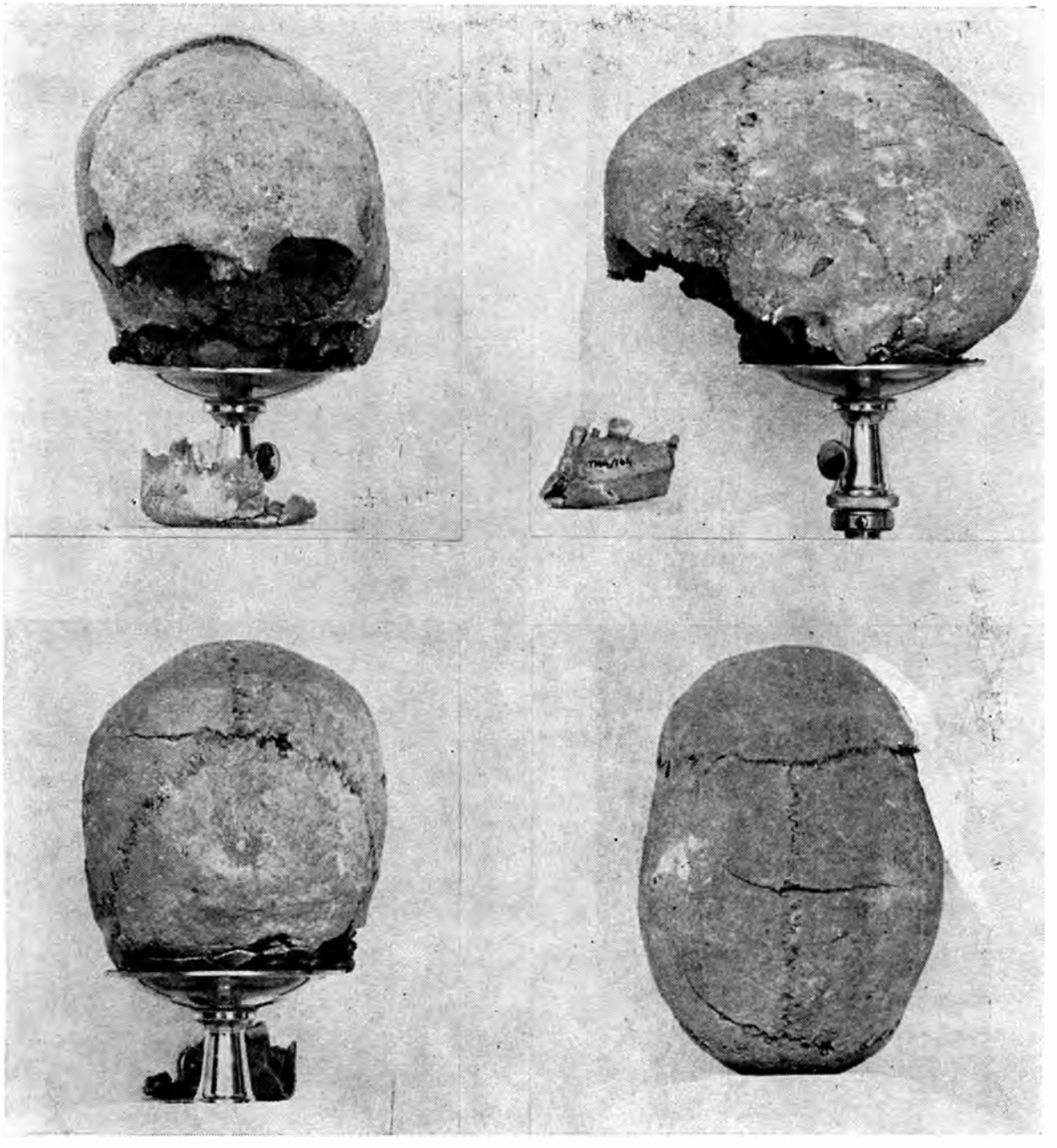
Pl. LXIX. *(Figs. 44 - 47)* Skull 139 a



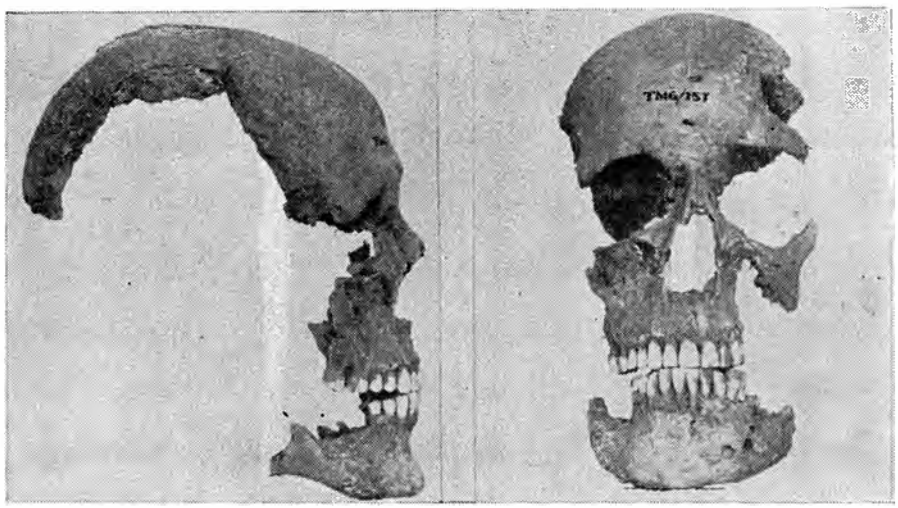
Pl. LXX *(Figs. 48 - 51)* Skull No.142 a



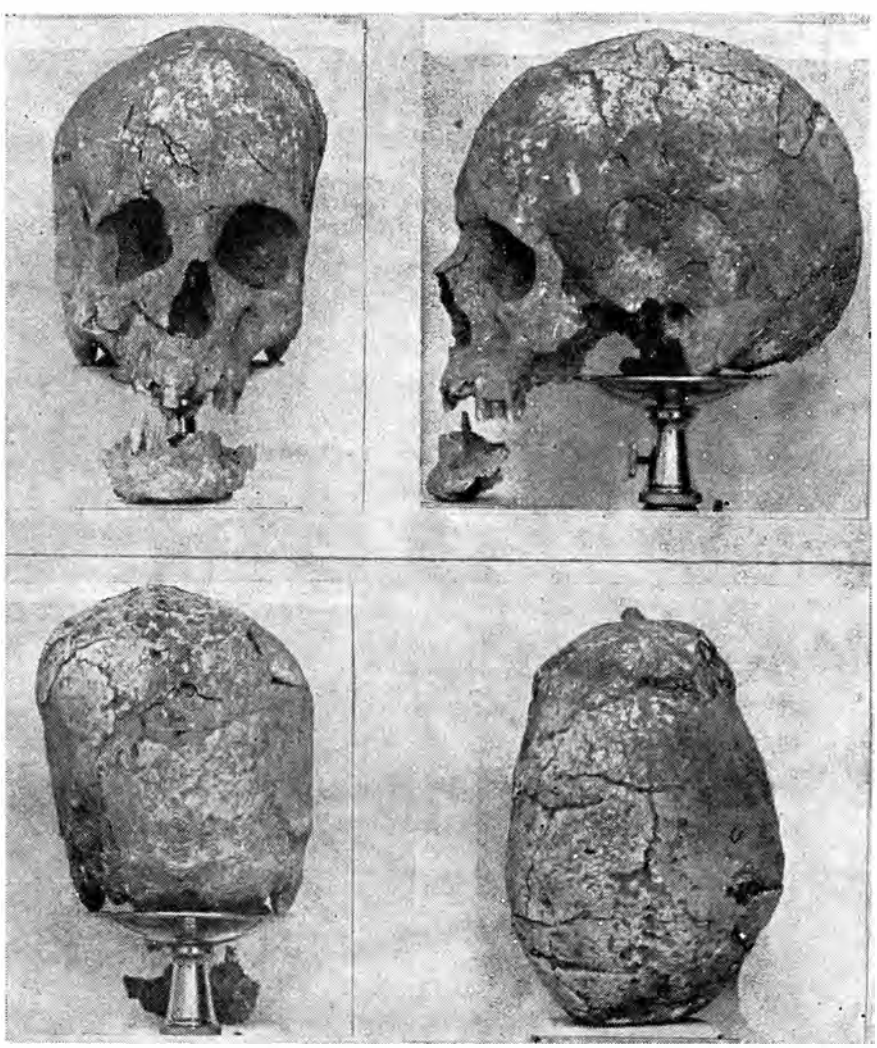
Pl. LXXI *(Figs. 52-55)* Skull 142 b



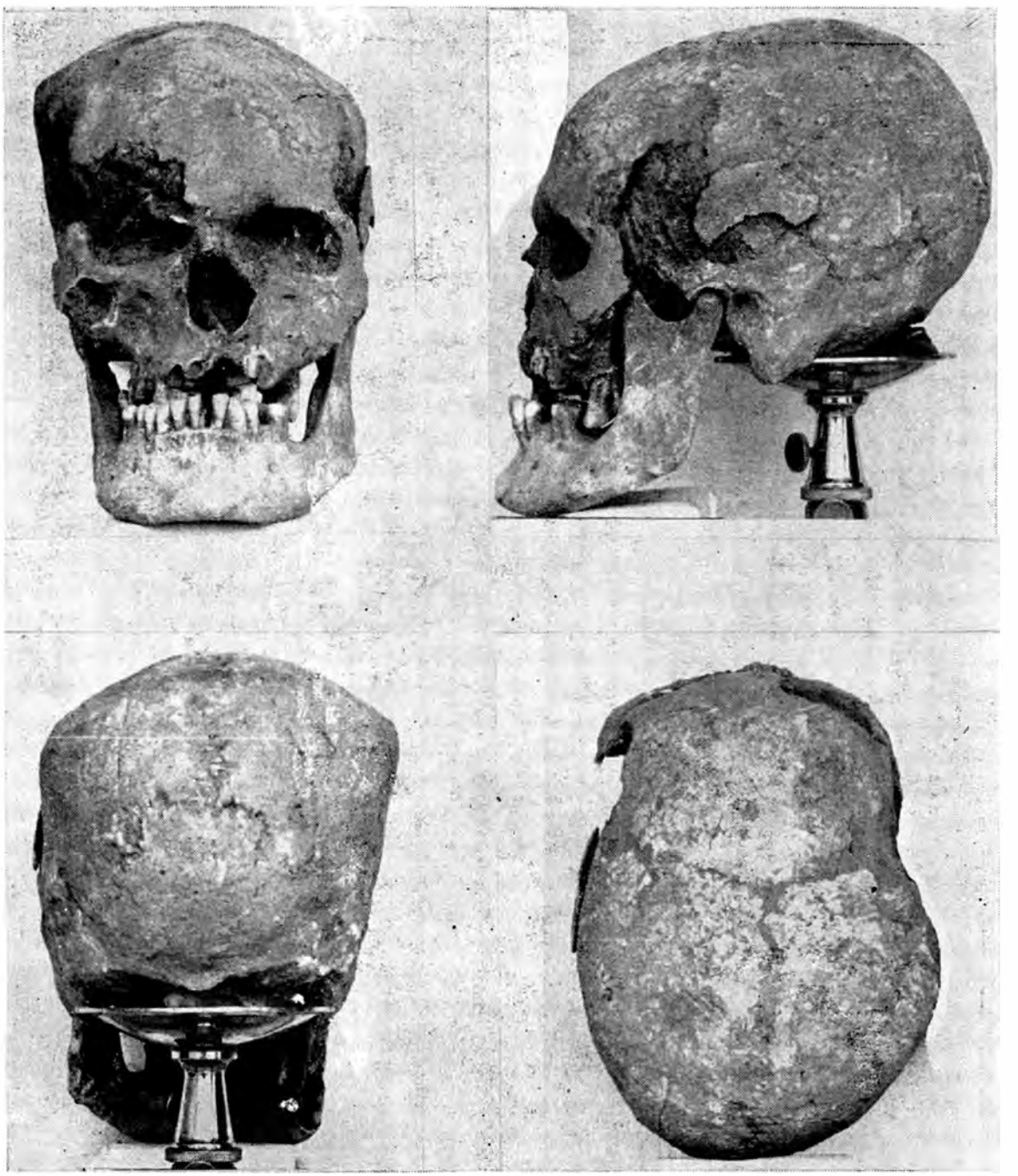
Pl. LXXII *(Figs. 56 - 59)* Skull No.144



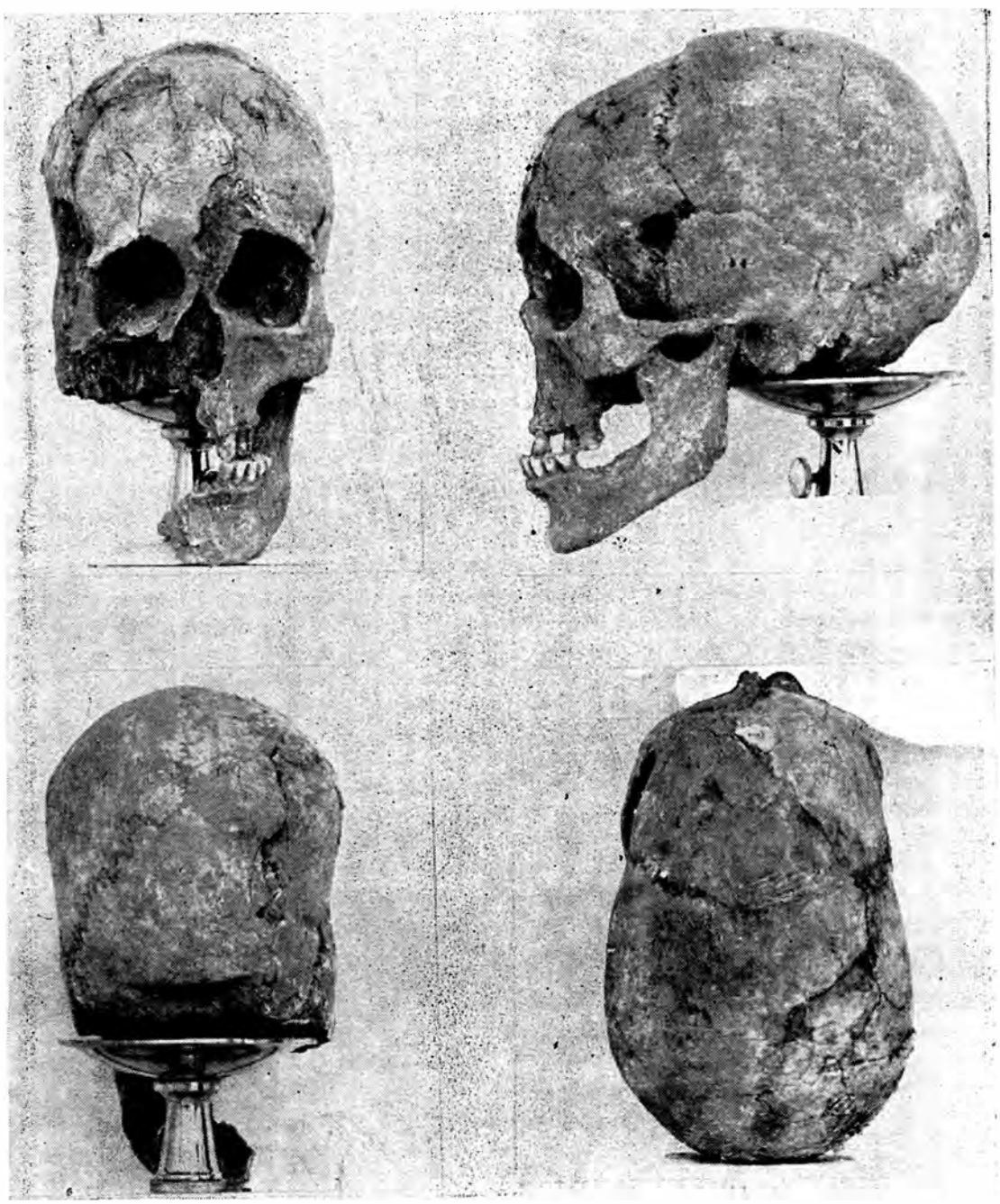
Pl. LXXIIIa *(Figs. 60 - 61)* Skull No. 157



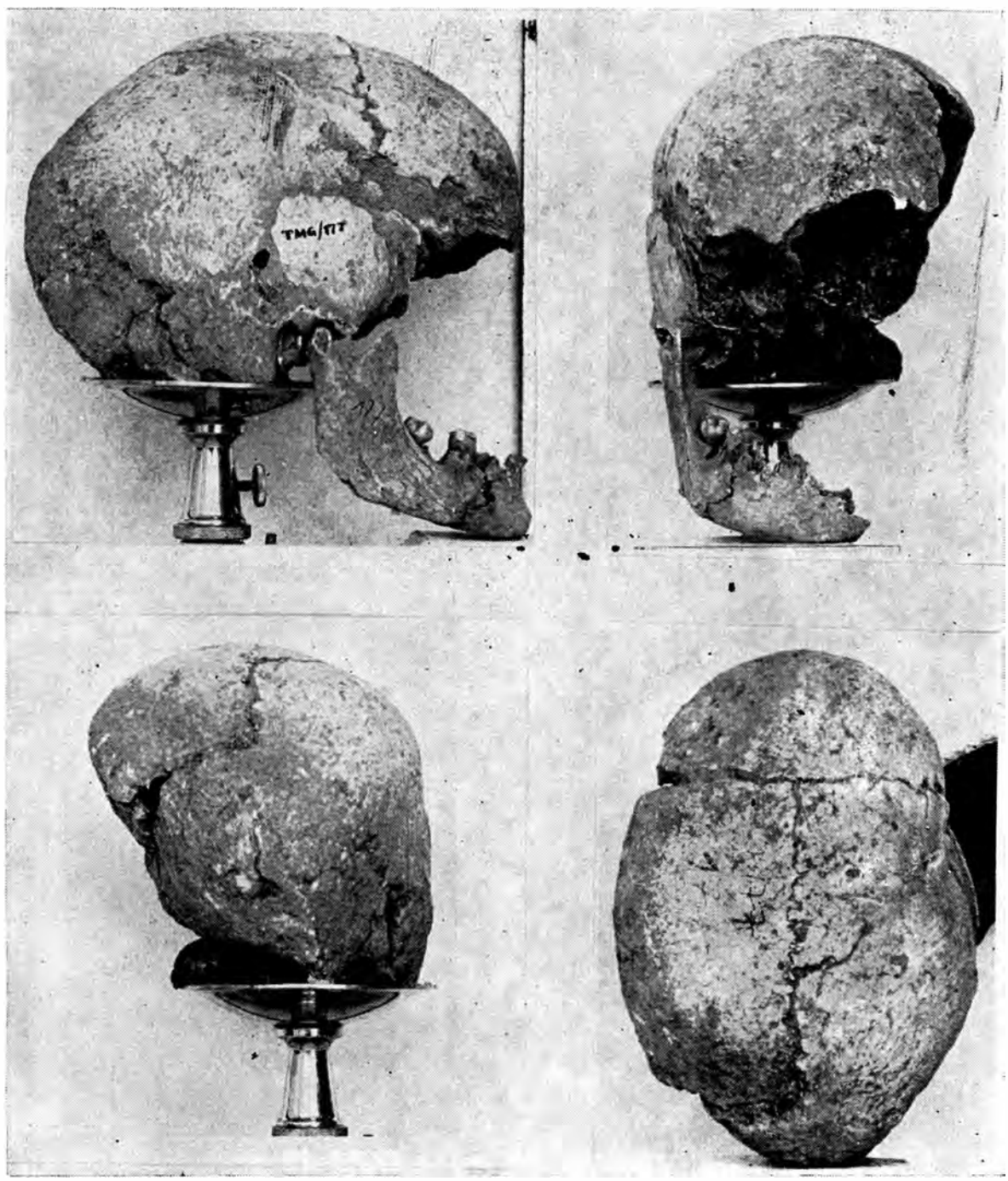
Pl. LXXIIIb *(Figs. 62 - 65)* Skull No. 165 a



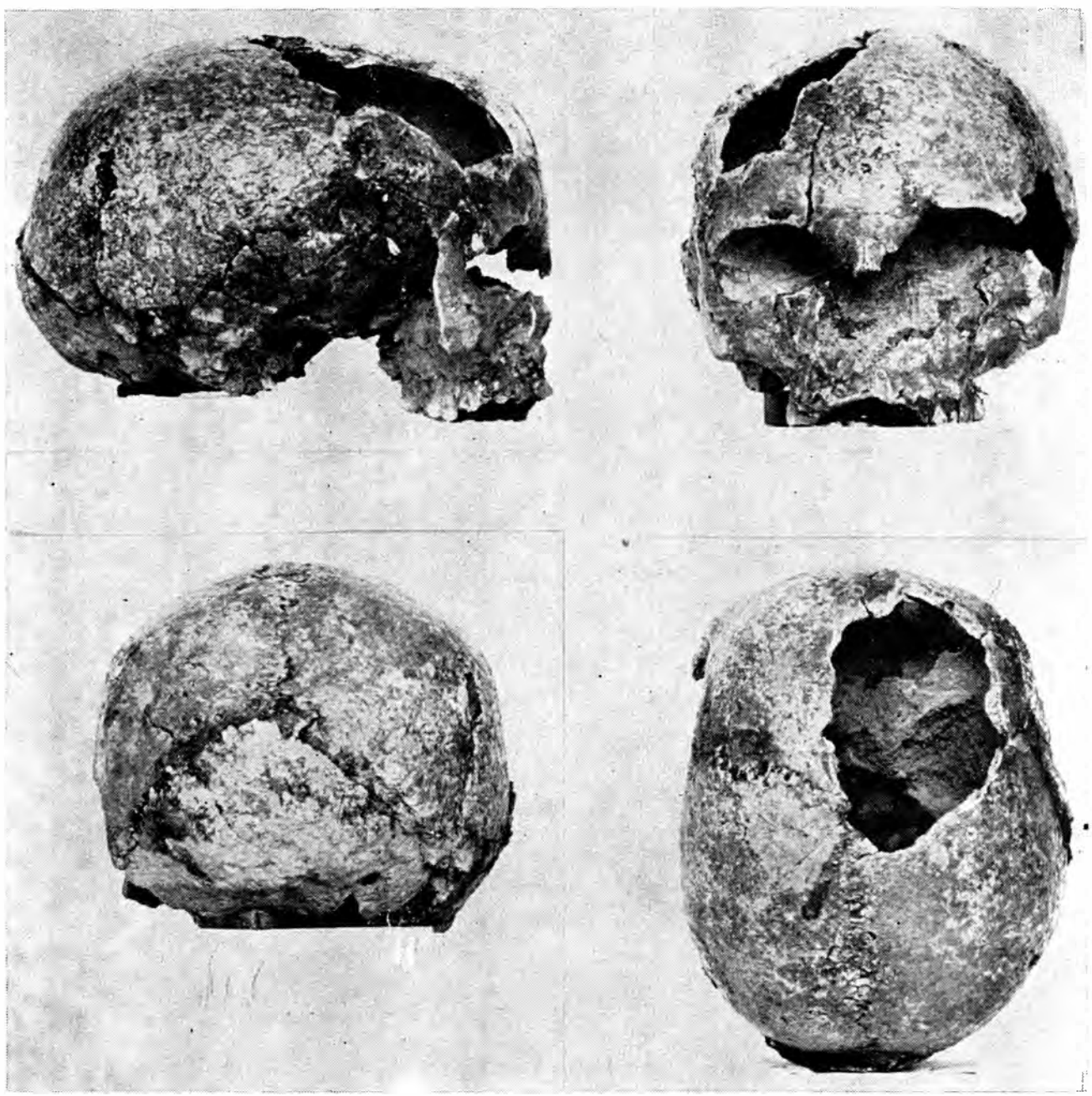
Pl. LXXIV (*Figs.* 66 - 69) Skull No. 173 B-a



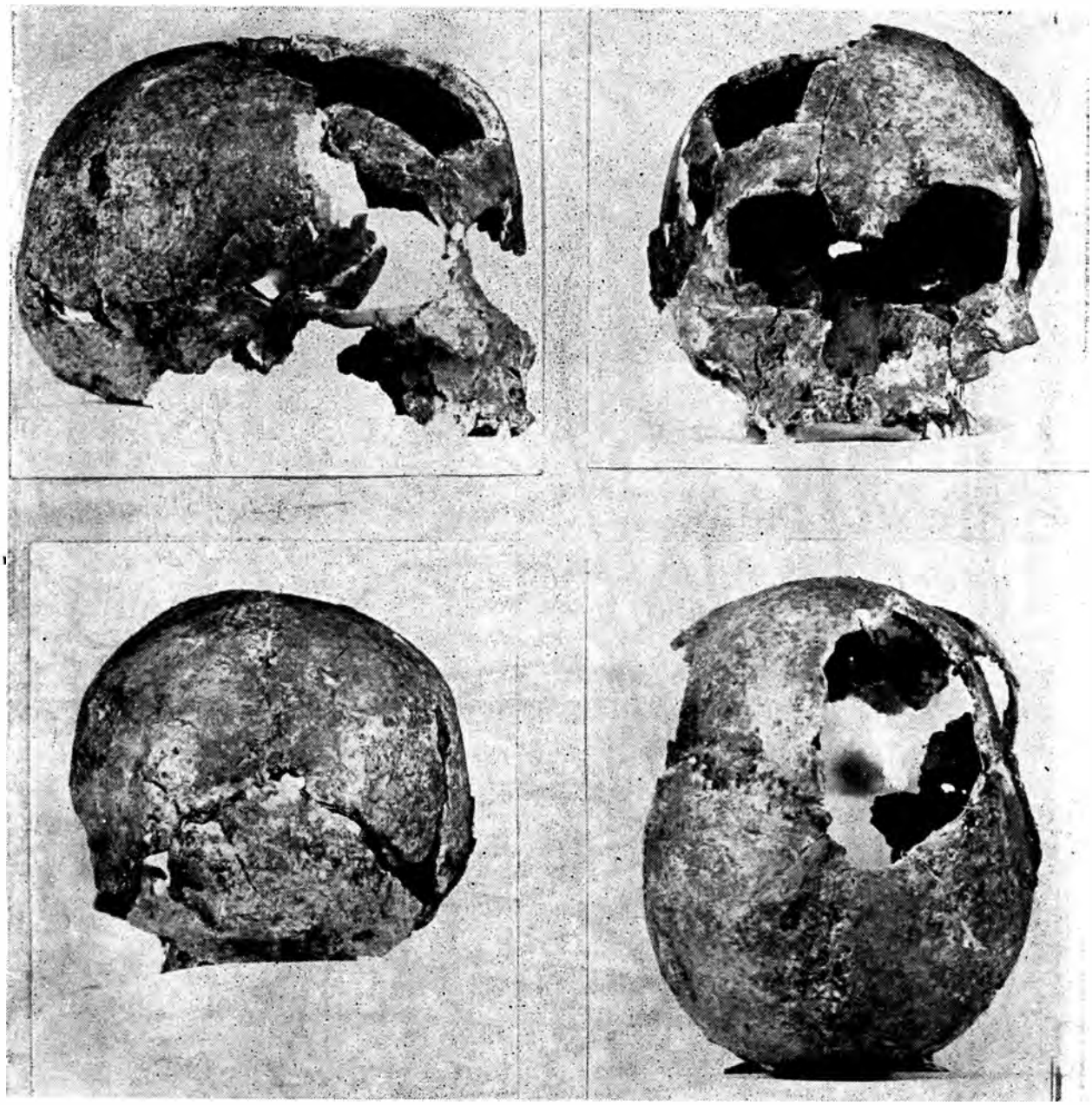
Pl. LXXV *(Figs. 70-73)* Skull No. 173 B-b



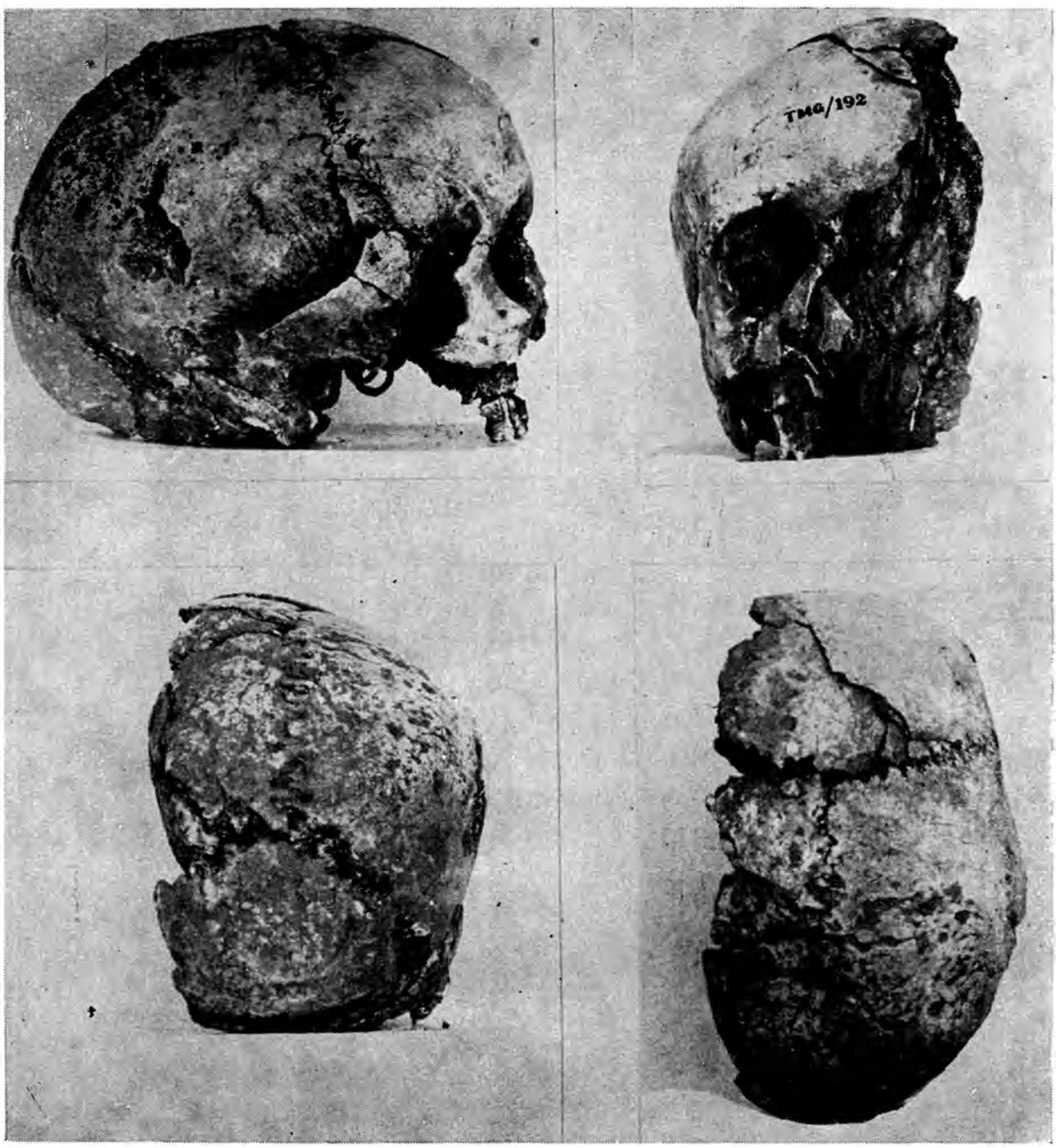
Pl. LXXVI (*Figs. 74 - 77*) Skull No. 177



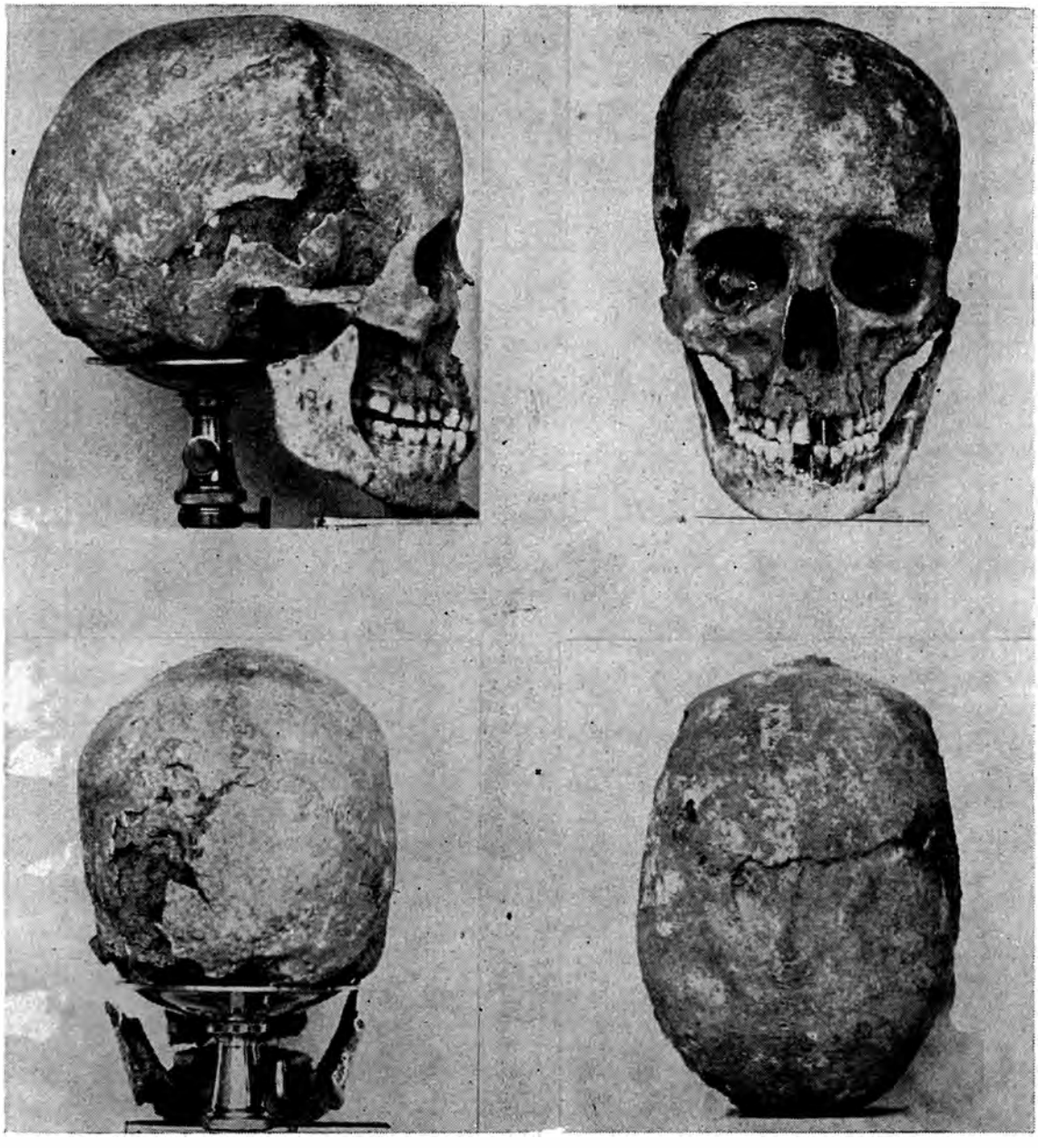
Pl. LXXVII (*Figs. 78 - 81*) Skull No. 186 a (before restoration)



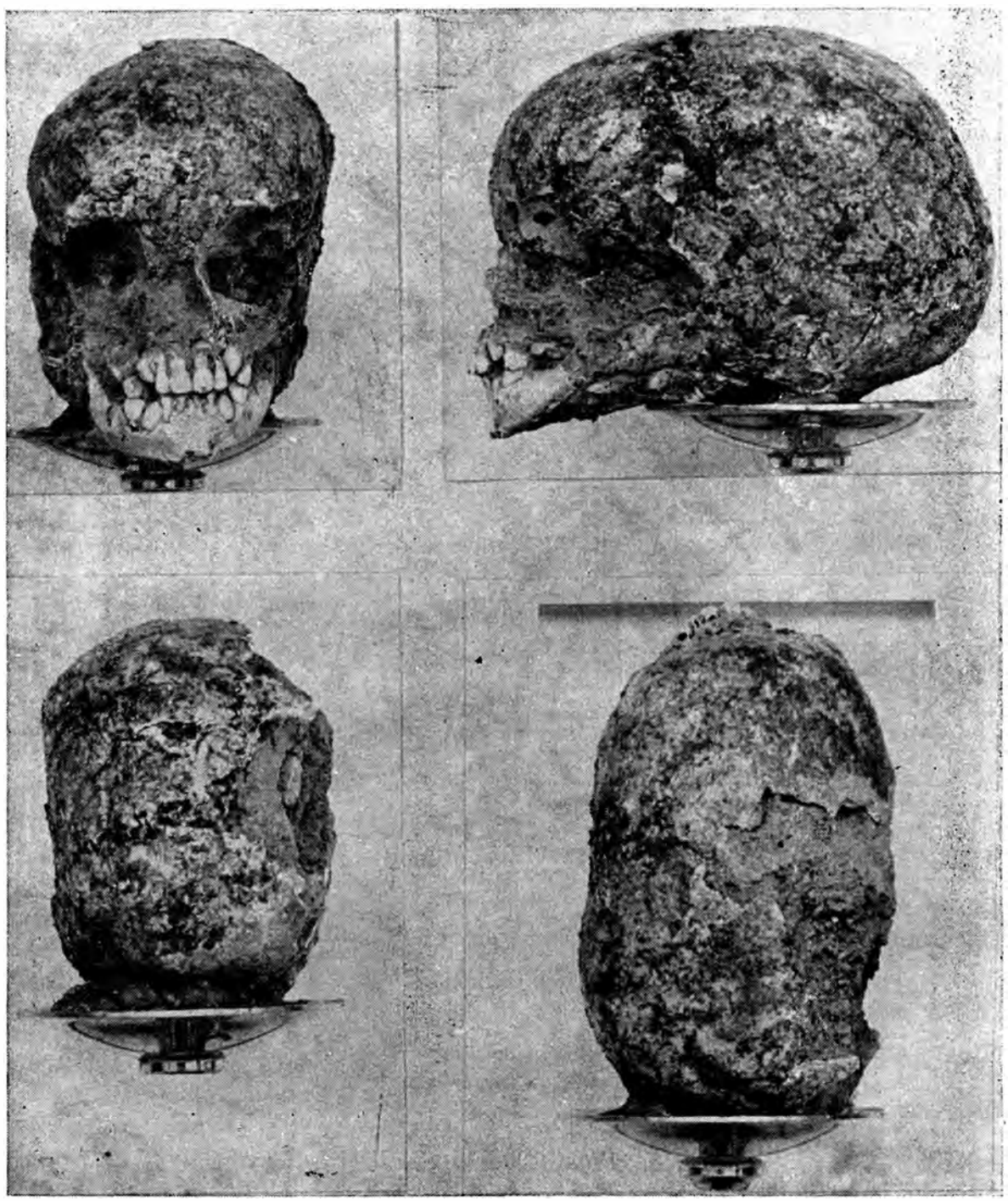
Pl. LXXVIII *(Figs. 82-85)* Skull No. 186 a (after restoration of the skull, damaged during transportation)



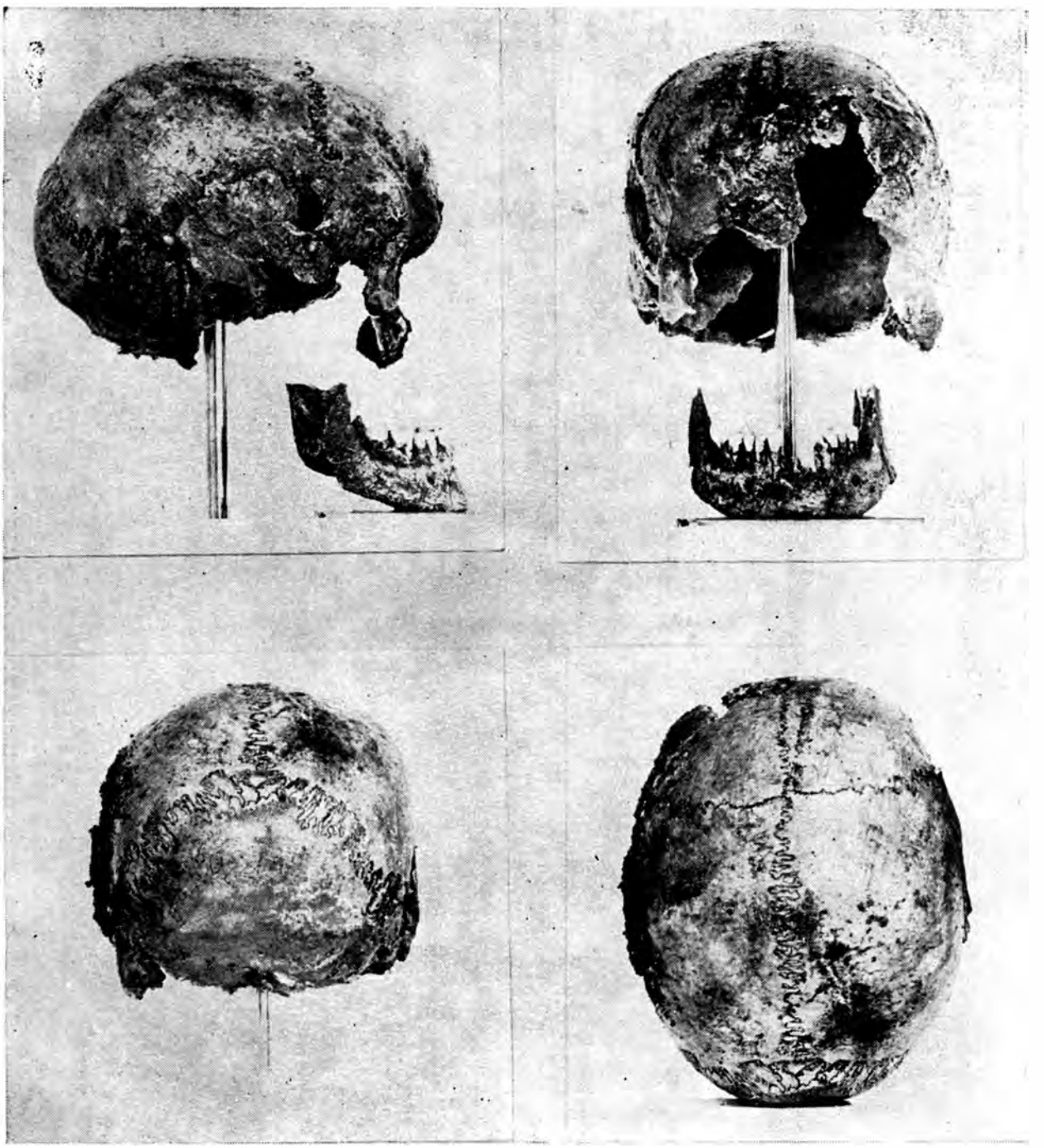
Pl. LXXIX *(Figs. 86-89)* Skull No. 192



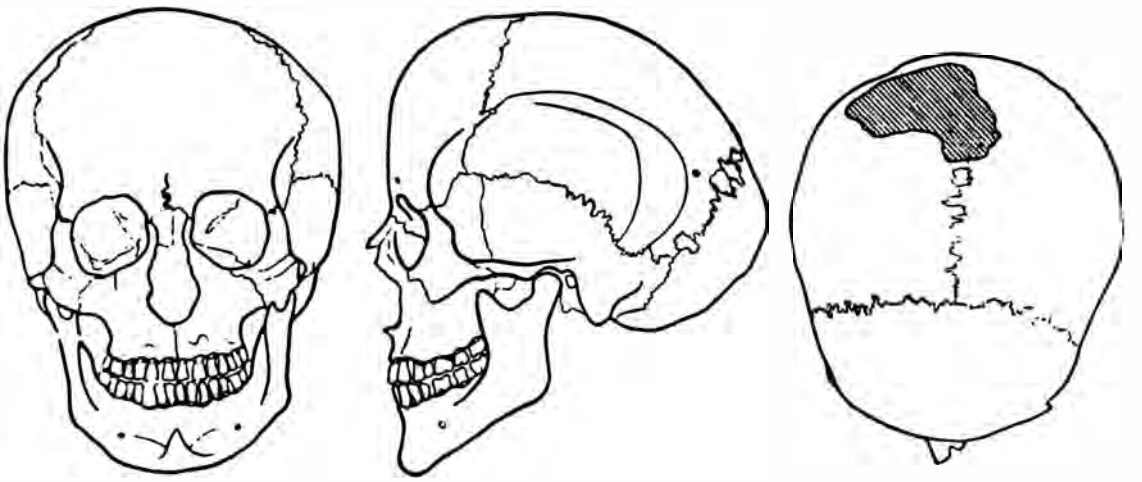
Pl. LXXX *(Figs. 90 - 93)* Skull No. 197 a



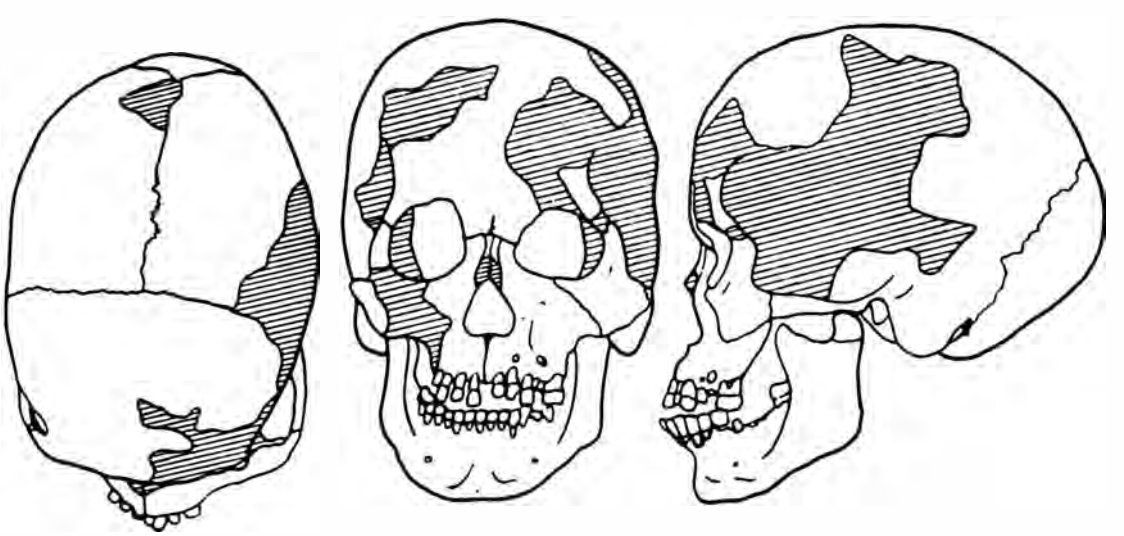
Pl. LXXXI *(Figs. 94-97)* Skull No. 198



Pl. LXXXII *(Figs. 98 - 101)* Skull No. 209



Pl. LXXXIIIa *(Figs. 102-104)* Skull No. 56 from Kalaly-Gyr (after Trofimova, 1959)



Pl. LXXXIIIb *(Figs. 105-109)* Skull No. 5 from Monzukly-Tepe (after Trofimova 1964 a)

Pl. LXXXIVa *(Fig. 110)* Trephination of Skull No. 212

Pl. LXXXIVb *(Fig. 111)* Skull No. 184 resting on an urn

3. The sequence of the description of the skulls follows the serial number, which are identical with the numbers of the grave in which the skulls were found. When more than one skull of a single grave could be utilized for anthropological analysis they are further denoted by small letters, which correspond to those given in Section 4.

Skull No. 01 (Figs. 1-4 Pl. LVIII). (Grave No. 1 Trench B 1).

The extremely well developed supra-orbital ridges, the prominent glabella, the long and strong mastoid processus, the rounded upper margin of the orbits and the massiveness of the cranial bones clearly indicate a male individual. Parts of both parietals and the occipital bone are decomposed and eroded. Yet the shape of the skull can still be recognized by the earth filling of its inside. The arrangement of the sutures could not be determined, except a small portion of the coronal suture, which is still open and shows no evidence of beginning of fusion. From the fact that the 3rd molar of maxilla and mandible had not erupted yet, and the first and second molar show only little signs of attrition an age of about 20-25 years at the time of death, can be assessed.

Compared with the other measured male skulls of the cemetery the maximum cranial length and breadth are undoubtedly highest (g-op = 196, eu-eu = 138). The cephalic index, being 70.41, is dolichocranic, ranging close to the limit of the hyperdolichocranic class. In norma frontalis the forehead is low, the face broad and of medium height. The total facial index (89.21) and the upper facial index (52.25) are mesoprosopic and mesen respectively. The bizygomatic breadth, which is absolutely the greatest of all measured skulls, exceeds the maximum cranial breadth of the skull thus resulting a transversal cranifacial index of 100.22. The orbits are rectangular, relatively low and mesoconchic (O.I. = 77.27). This value lies close to the border of the chamaeconchic group. The nasal aperture is high and of medium breadth, 'the nasal index being 48.08 is distinctly mesorrhinic. In norma lateralis the extremely projecting superciliary arches and the well developed glabellar region are remarkable. The low forehead is retreating and passes into a faintly arched vertex and a moderately protruding occiput. The relatively low length-height and breadth-height indices (L.-H index = 67.35, L.-A.H. index = 58.16 = chamaecranic and B.H. index = 95.65, B.-AH. index = 82.61 = metriocranic differentiate the skull from most of the other finds of the cemetery. The facial portion of the skull is orthognatic. The nasal bridge is not very prominent and projecting, the zygomatic bones are protruding, the canine

fossa flat thus giving the face a certain degree of horizontal and vertical flatness, which is supported by the measurements and indices of facial flatness (see Section 7, C).

The mandible is of extremely powerful built. Its measurements exceed those of all other lower jaws found at the cemetery. The chin is not very prominent, the corpus of the mandible is massive, the rami which rise nearly vertically are broad and high.

In norma occipitalis the side walls of the skull rise nearly vertically and pass into a slightly curved outline of the vertex. In norma verticalis the skull is birsoides in outline after the classification system of Sergi with a strong post-orbital or temporal compression and strongly everted zygomatic arches.

The calculated cranial capacity (Lee's Naqada formula) is 1458 cc, which places the skull in the aristencephalic class. The typological classification is very difficult. On the whole the broad-faced, long and narrow-headed skull with relatively low orbits shows some archaic features, which, however, differ from those of the so-called "Protoaustraloid type" found in Mohenjodaro, Harappa and other sites of South and West Asia (see also Section on 'Discussion and Conclusion).

More similarities can be seen to the Protoeuropoid type which is found since the Neolithic in North-east Europe and North-West Asia (compare Ginzburg 1966). Yet the marked tendency of facial flatness suggests Mongoloid admixture. According to the new nomenclature (see Section 3,5) we may classify this skull as robust and flatfaced Eurydolichomorph.

Skull No. 02 (Figs. 5-8 Pl. LIX) (Grave No. 1, Trench L O)

The skull, whose right facial portion including the mandible are decomposed is that of an adult female. Its small size, the thin and delicate component bones, the weakly developed mastoids and the ill-marked glabella and superciliary region, the sharp upper margin of the orbits and the smooth contour of the skull are typical female sex characters. All the teeth including the wisdom teeth had erupted. Most of the sutures are still open, only a small portion of the sagittal suture give the appearance of having commenced to fuse, thus indicating an age of about 30-35 years which accords with the wear pattern of the teeth.

The skull, the length and breadth diameter of which are comparatively small (g-op 173, eu eu = 128) is distinctly dolichocranic (L.-B. index = 73.99). In norma frontalis the forehead is high and rounded; the frontal eminences are well marked. Though half of the facial skeleton is missing, the basic measurements and indices could be at least approximately determined. The face, medium in height but relatively narrow, is leptoprosopic and mesen; the total facial index and the upper facial index being 91.74 and 53.72 respectively. The nasal index could not be calculated. Yet the nasal aperture appears high and narrow. The orbits are high, rounded and hypsiconchic (O.I. = 87.18).

In norma lateralis the forehead is only slightly inclined and sweeps back in a south contoured regular curve to meet the rounded occiput. According to the length-height and breadth-height indices (L.-H index 72.25, B.-H. index =97.65) the skull is orthocranic and metriocranic, whereas the length-auricular height and breadth-auricular-height indices being 65.31 and 88.28, place the skull into the hypsicranic and akrocranic class.

As already mentioned, the glabellar region and the superciliary arches are inconspicuous or only slightly marked. The straight nasal bridge is medium, projecting and narrow, the nasal root low and shows a marked depression. The gracile lower jaw with a moderately developed chin has a relatively low but broad ascendant branch. In norma occipitalis the skull is of typical house shaped contour with well marked parietal eminences. Norma verticalis is ovoides in outline. The calculated cubic capacity of the skull is 1231 cc. i.e., euencephalic.

The smooth-contoured gracile, narrow-headed, and narrow-faced skull with high orbits can be considered to belong to the (gracile) Mediterranean type (gracile Leptodolichomorph).

Skull No. 03 (Figs. 9-12 Pl. LX) (Grave No. 1 Trench C O).

The skull was broken. Yet it was possible to restore it nearly completely. Only small portions of the frontal and temporal bones are missing. The skull is that of a male. The cranial bones are rather thick, the mastoid processus broad and massive, the nuchal chrest well marked, the upper margins of the orbits rounder, and on the whole the skull is of relatively big size. The absence of a marked glabella and superciliary region which are also male characters, can be explained by the type to which the skull belongs (see below). Portions of the

sagittal and especially the coronal suture have already ossified or at least commenced to fuse suggesting an age more than 40 years. This accords with the heavily worn off teeth and the fact that the alveoli of the second and third molars of the mandible are closed by ossification owing to the loss of these teeth long before death, which also speaks for a higher age.

The skull is long and narrow (g-op = 192, eu-eu = 130). The cephalic index, being 67.71, puts it in the hyperdolichocephalic group. In norma frontalis the forehead is high and broad, the rounder orbits are mesoconchic (O.I. = 78.75). The broad and relatively low nasal aperture is distinctly hyperchamaerrhinic (N.I. = 59.52). The face is low (n-pr = 63, n-gn = 109) but comparatively narrow (zy-zy = 125), thus resulting a total facial and upper facial index of 83.85 and 50.40, which place the face into the euryprosopic and mesen (but close to the euryen) class.

As striking feature of norma lateralis can be considered the high degree of alveolar prognathism. The facial profile angle being 77° distinctly ranges within the prognathic class. As already mentioned the glabellar region is inconspicuous, the nasal root seems not to be very depressed. The other characters of the nasal bones could not be determined, as they are broken off. The lower jaw is of medium size and thickness, the chin medium developed, the rami relatively high and broad.

The dental occlusion belongs to the edge-to-edge bite of the anterior teeth. The forehead is steep and only slightly receding and passes upwards and backwards in the smooth curve of the vertex and the slightly protruding occiput, which retreats sharply from the nuchal chrest. According to the L.-H. Index (68.23) the skull is chamaecranic, whereas the L.-AH. Index being 59.38, places it within the orthocranic class. Yet, the B.-T. index (100.77) and the B.AH. Index (87.69) belong to the acrocranic class, which is due to the small maximum breadth of the skull. Norma lateralis shows nearly vertical arising lateral sidewalls, a typical house-shaped contour and a well marked nuchal chrest. The outline of norma verticalis is ovoides after the classification system of Sergi. The calculated cranial capacity is 1374 cc. or distinctly euencephalic. The main characters of the skull are the low face and low orbits, the high nasal index, the marked alveolar prognathism, the steep forehead and the moderately developed glabella and superciliary region, characters which are considered by v. Eickstedt as paedomorph (or infantile) primitive. Except the extreme dolichocephaly this combination of morphological features is characteristic for the Veddoid racial type living today in Central and South In-

dia. Therefore we may classify this skull as belonging to the Veddiform type[10] or according to the new nomenclature as Paedoeurydolichomorph.

Skull No. 04 (Figs. 13-16 Pl. LXI.) (Grave No. 2 Trench B 1)

The skull is complete, except the mandible which is missing, and belongs to a male individual, On the whole it appears robust and rugged. The glabella and the superciliary arches are well marked, the upper margin of the orbits rounded, the mastoid processus large and massive and the nuchal chrest and the temporal line are extremely well developed. Portions of the sagittal, lambdoid and coronal suture have already ossified, indicating an age of about 40-45 years, which accords with the wear pattern of the teeth. Contrary to the rugged appearance of the skull the absolute dimensions are comparatively small (g-op = 179; eu-eu = 126). The cephalic index being 70.39 places it in the dolichocranic group, close to the limit of the hyperdolichocranic class.

In norma frontalis the forehead and the face appear low and broad; the bizygomytic breadth exceeds the greatest cranial breadth thus resulting a cranio-facial index of 102.24. The upper facial index, being 51.82, places the face in the mesen class. The orbits are low, rectangular and chamaeconchic (O.I. = 72.09); the nose is high narrow and leptorrhinic (N.I.=45.10).

In norma temporalis the moderately high forehead recedes and slopes back posteriorly and merges with the rounded occiput, which sharply retreats from the well marked nuchal chrest. According to the length-height index (74.86) the skull directly ranges at the border of the orthocranic and hypsicranic group whereas the length-auricular height index (64.80) is distinctly hypsicranic. Both, the breadth-height (106.35) and the breadth-auricular height index (92.06) belong to the akrocranic class which is due to the small size of the breadth diameter. The facial skeleton shows in norma lateralis a low and depressed nasal root and a high, prominent and convex nasal bridge. The spina nasalis is well developed, the upper incisors of the maxilla are projecting forward. In norma occipitalis the skull is of typical house-shaped contour. The side walls rise vertically and join in a rounded curve. In norma verticalis the skull is sphenoides in outline and shows projecting zygomatic arches and the prominence of the nose. The calculated cranial capacity is 1294 c.c., i.e. oligencephalic.

The rugged-bony dolichocranic skull with relatively broad face and low orbits can be considered belonging to the Cromagnoid or Palaeeuropoid type, which is represented at that time by the Andronovo type of North-east

Europe and Middle Asia. According to the new nomenclature we may classify this skull as robust Eurydolichomorph.

Skull No. 05 (Figs. 17-20 Pl. LXII) (From Grave No. 3 Trench L O)

The skull is incomplete.The facial part, including the mandible and portions of the cranial base and the temporals were missing. As the glabella and the superciliary arches are well developed, the upper margins of the orbits are rounded, and the occipital attachment areas of the muscles are well marked, a male individual can be suggested. All sutures are open, except a small portion of the sagittal suture, which shows traces of synostosis, indicating the age of about 30-35 years.

The long and extremely narrow skull (g-op = 191, eu-eu = 128) is distinctly hyperdolichocranic (L.-B. Index 67.02). In norma frontalis the the forehead is high and rounded. Though the lower parts of the orbits are lacking, it seems that the orbits were relatively high and rounded. The right side of the forehead shows an injury probably caused to the blow of a weapon. Yet the bone shows signs of regeneration, indicating that the death was not caused by this injury (see Section 8). In norma lateralis the forehead is slightly inclined and passes into a high arched vertex and a rounded occiput, which is sharply retreating at the well developed nuchal chrest. The skull is comparatively high. The basion-bregma height being 145 is beside that of skull 165 a, the highest of all measured skulls of the cemetery. Consequently the skull is hpysicranic (L.-H. Index = 75.92; L.-AH. Index = 63.87) and akrocranic (B.-H. Index = 113.28; B.-AH. Index = 95.31) The nasion is deeply depressed at the root passing upwards in a well developed glabella and superciliary region. The nasal bridge is long, prominent with a marked aquilinity of the nose.

In norma occipitalis the lateral walls of the skull show a slight tendency of divergence as they rise from above (norma verticalis) the skull is of an elongated birsoides outlines. In this view, at the left parietal a flat deepening can be seen (compare also norma lateralis) representing a totally healed injury probably caused by the cut of a sharp weapon.

The calculated cubic capacity is 1422 cc. or euencephalic. The long-and narrow-headed skull with a high vault and a long, prominent and aquiline nose and seemingly high orbits can be placed in the Mediterranean stock. Yet the prominent and aquiline nose combined with the narrow head is characteristic for a subgroup of the Mediterraneans called by Osanin as

Chorasan type and by von Eickstedt as Iranid type (see also Section 'Discussion and Conclusion). According to the new nomenclature we may classify this skull as aquiline Leptodolichomorph.

Skull No. 06 (Figs. 21-24 Pl. LXIII) (Grave No. 2b Trench C O)

The skull whose cranial base and facial segment including the mandible are missing is that of a female individual. It is gracile, smooth-contoured with ill-marked supraorbital ridges, weak muscular attachment areas, small mastoids and extremely sharp upper margins of the orbits. All sutures are still open indicating an age of approximately 20-25 years. The skull is moderate in length and breadth (g-op = 176, eu-eu = 127) and dolichocranic (L.B. Index = 72.15).

In norma lateralis the medium high forehead rises vertically and ascends into a smooth curve upto the high vertex, which slopes backwards in a protruding but rounded occiput. The skull is hypsicranic and akrocranic; the length-auricular height and breadth-auricular height indices being 65.91 and 91.34 respectively. In norma occipitalis the lateral walls of the skull rise vertically and join in the rounded curve of the vertex. Outline of norma verticalis corresponds to Sergis ovoides shape.

The calculated cranial capacity is 1268 cc., i.e. eucencephalic. Due to the missing of the facial part of the skull the type-diagnosis is very difficult. But it seems likely that the gracile, smooth-contoured long and narrow skull with a relatively high vault belongs to the Mediterranean (Leptodolichomorph) type. As differential diagnosis is also in question, the Veddiform (Paedo-eurydolichomorph) type is represented in our series by the female skulls 101 b and 197. Specially in favour of this diagnosis is the vertically arising forehead, which is one of the characteristic feature of this type (see also skull 03 .

Skull No. 101 a (Fig. 25-28 Pl. LXIV)

The skull is complete. The weakly developed supraorbital ridges, mastoids and muscle markings as well as the sharp upper margin of the orbits suggest a female. All sutures have undergone synostosis, except small portions of the sagittal and lambdoid suture, indicating the age over 60 years. This age diagnosis is supported by the premortal loss of most of the teeth and the considerable degree of atrophy of mandible and maxilla. The skull is long and moderate in breadth (g-op = 184, eu-eu = 128) thus re-

sulting in a hyperdolichocranic index of 69.57, which ranks close to the limit of the dolichocranic class.

In norma frontalis the face appears relatively low, which is only partially caused by the high degree of atrophy of the alveolar processes. Therefore the measurement of the facial height and the estimation of the facial indices was not possible. The orbits are rectangular; the orbital index being 85.00 directly ranges between the limits of meso-and-hypsiconchic. The piriform aperture is high and narrow. The nasal index (= 46.96) ranges between the limits of lepto-and mesorrhiny. The gonal angles of the lower jaw appear to be relatively broad and everted.

In norma lateralis the moderately high forehead recedes and passes in a well arched curve of the vertex and a relatively strong protruding occiput (occiput en chignon). The vault of the skull is low (basion-bregma height 128 mm; the auricular height 114 mm). According to the length-height index (69.57) and the length-auricular height index (61.95) the skull is chamaecranic and orthocranic, whereas the breadth-height index (100.0) and the breadth-auricular height index (89.06) place it in the akro-and metriocranic class, which is due to the small breadth diameter of the skull.

In norma lateralis the facial part of the skull appears orthognathic, the nasal root is only slightly depressed, the nasal bridge which is not very prominent seems to be slightly concave. The chin is projecting, the ascendent ramus low and strongly inclined.

Norma occipitalis shows a typical house-shaped contour and relatively strongly marked parietal eminences. Norma verticalis is of an elongated pentagonoides shape. The calculated cubic capacity being 1307 cc. places the skull in the aristencephalic class. The long-headed skull with seemingly low face and broad and everted gonial angles can be typologically classified as Cromagnoid (Eurydolichomorph). This diagnosis is supported by the protruding occiput (occiput en chignon), which is generally considered as one of the characteristic features of this type. Yet the relatively high orbits also suggest Mediterranean admixture.

Skull 101 b (Figs. 29-32 Pl. LXV)

The skull is complete and in a good state of preservation. Only the condyles processes of the mandible are missing. It is typically female: small, smooth-contoured, gracile with weak supraorbital ridges, muscular

impressions and mastoids. The frontal and temporal eminences are well marked. The upper margin of the orbits is sharp. All sutures are still open, except the sphenobasilaris which had already fused. The 3rd molars of the maxilla had erupted (but were fallen out post mortem), whereas those of the mandible are still inside the jaw, thus indicating an age of about 20-25 years. The skull is extremely small in length and normal in breadth (g-op = 166, eu-eu = 130) and of a high cephalic index (78.31), which is distinctly mesocranic. Beside that of skull No. 186 it is the highest length-breadth index out of all the measured skulls of the cemetery. In norma frontalis the forehead is rounded, the face low and medium in breadth. According to the total facial index and the upper facial index (85.71 and 51.26 respectively) the face is mesoconchic and mesen, but close to the border of the euryprosopic and euryen clas. The orbits are rectangular, moderately high and mesoconchic (O.I. = 78.95); the nasal aperture low, medium in breadth and chamaerrhinic (N.I. = 52.16).

In norma lateralis the forehead rises vertically and passes into a high but only slightly curved vertex and a well rounded occiput. The skull is distinctly hypsicranic (L.-H. Index = 80.12, L.AH. Index = 71.68) and acracranic (B.-H. Index = 102.31, B.AH. Index = 91.53). Th striking feature of norma lateralis is the marked alveolar prognathism of the facial skeleton. The nasal root is only slightly depressed, the nasal bridge straight, short and moderately prominent. The corpus of the lower jaw is of medium height and thickness, the chin strongly projecting Norma lateralis shows a typical house-shaped contour and slightly diverging side walls. As anatomical variation, a wormian bone may be mentioned at the confluence of lambdoid and sagittal suture. Norma verticalis is rhomboides in outline and shows the injury already described (see section 4 b, grave 101). The calculated cranial capacity is 1258 cc, or euencephalic. As main characters of this gracile and mesocephalic skull can be considered the marked alveolar prognathism, the low face and orbits, the broad nose and the extremely steep forehead. Concerning these features the skull shows similarities with the male skull No. 03 and likewise it can be typologically classified as Veddiform (Paedo-Eurydolichomorph).

Skull No. 101 c (Figs. 33-36 Pl. LXVI).

The skull is massive in structure and undoubtedly male. It was broken yet it was possible to restore it. Only small portions of the glabellar region, the nasal bones and parts of the left frontal and parietal are missing. Except a small portion of the sagittal suture, which has already fused, all

other sutures are still open, indicating an age of about 30-35 years. This age determination is in accordance with the wear pattern of the teeth. The skull is long, narrow (g-op = 195, eu-eu = 131) and distinctly hyperdolichocranic (L.-B. index = 67.18).

In norma frontalis the forehead appears high and the face long. The total facial index being 93.23 places the face in the leptoprocophic class, whereas the upper facial index (54.89) directly ranges between the limit of mesen and lepten. The bizygomatic breadth exceeds the breadth diameter of the skull thus resulting in a craniofacial index of 101.53. The orbits are rounded, slightly inclined laterally downwards, and mesoconchic (O.I. = 80.49). The nasal aperture is relatively high, medium in breadth and leptorrhinic (N.I. = 45.28). In norma frontalis the mandible is massive in structure and high in its symphyseal part. The bigonial breadth is great, the gonial angles everted.

In norma lateralis the high forehead retreats and passes upwards into a high arched vertex. The occiput moderately protrudes and shows a sharp retreat at the well marked nuchal chrest. According to the length-auricular height index (63.07), the breadth-height and breadth-auricular height index 104.46 and 93.89 respectively, the skull is distinctly hypsicranic and akrocranic. Only the length-height index (70.26) places the skull in the orthocranic class, which is due to the great cranial length of the skull.

In norma lateralis the facial segment of the skull appears very massive with a slight tendency of prognathism and a robust lower jaw whose chin region has medium projection.

The ascendent ramus of the mandible is high and broad. Norma occipitalis shows vertically arising side walls, ill-marked parietal eminences and a well arched curve of the vertex. Norma verticalis is ovoides in outline.

The calculated cranial capacity is 1478 cc. or distinctly aristencephalic. On the whole the long-headed, long-faced and robust skull with high vault shows many features in common with skulls of Corded People of the European Neolithic, who are generally considered belonging to the Nordic type. Yet these types are also found in prehistoric series of Asia, for example in anthropological finds of Turkmenia. According to the new nomenclature we may classify this skull as robust Leptodolichomorph.

Skull No. 114 (Figs. 37-39 Pl. LXVII)

The skull is badly crushed from side to side, especially in the frontoparietal region. The restoration was not possible. The skull bones are extremely thin, the upper margin of the orbits sharp, the mastoids small, the glabella and superciliary region seemingly ill-marked, suggesting a female individual. This is supported by the gracility of the postcranial skeleton. The lambdoid suture is still open, whereas most of the sagittal suture, as far as we can judge, have already ossified, indicating an age of over 60 years at the time of death (senile). This accords with the heavily worn off teeth, the closed alveoli of the molar due to the premortal loss of the teeth and the considerable degree of athrophy of the lower jaw.

As the whole skull is badly damaged and a restoration was not possible, anthropological measurements could not be taken. Nevertheless some characteristic features of the skull can be judged (especially in norma occipitalis) showing a relatively well preserrved and only slightly deformed parietooccipital region. The face, the nose and the orbits appear to have originally been high and narrow. The forehead is high and only slightly inclined, the vertex and the occiput are highly arched, smooth-contoured and well rounded. It seems likely that the long- and narrow-headed and- faced skull with seemingly leptorrhinic nose and high orbits belongs to the Mediterranean type (Leptodolichomorph).

Skull No. 134 a (Figs. 40-43 Pl. LXVIII).

The skull, whose facial segment including the mandible is missing, is that of a female individual. The cranial bones are delicate, the upper margin of the orbits extremely sharp, the superciliary arches, the muscular markings and the mastoid processes are absent or weakly developed. On the whole the skull appears gracile and smooth-contoured. Except a small portion of the sagittal suture, which gives the appearance of having commenced to fuse, all sutures are open, indicating an age of about 25-30 years.

The skull is long and broad (g-op = 186, eu-eu = 141). The maximum cranial breadth is the greatest of all measured female skulls of the cemetery. The cranial index being 75.81 ranks in the mesocranic class but close to the border of dolichocrany. In norma lateralis the moderately high forehead rises nearly vertically and slopes back in a high and well rounded vertex and a slightly protruding occiput. The skull is distinctly hypsicranic and akrocranic; as the length-auricular height and breadth-auricular height in-

dex are 66.67 and 87.94 respectively.

In norma occipitalis the skull is of typical-house-shaped contour with well marked parietal eminences. Norma verticalis is pentagonoides in outline with a slight bulging at the parietal region. In this view a slight deepening can be seen at the left parietal near the lambdoid suture, caused by an injury, which is however totally healed (see also section 8).

The calculated cranial capacity is 1542 cc. i.e. distinctly aristencephalic. As the facial part of the skull is missing in size the cranial index and the mid-sagittal curve of the skull show striking similarities with that of skull No. 06. Therefore the same may be true concerning the typological classification.

Skull No. 139 a (Figs. 44-47 Pl. LXIX).

The skull is in a rather good state of preservation and nearly complete. The facial segment shows small but insignificant fractures, the lamina externa of the forehead is eroded and the condyles processes of the mandible are missing. The skull is that of a male individual. The upper margins of the orbits are rounded, the mastoid processes medium in length but extremely broad, the skull bones and the mandible are massive in structure. All sutures are still open except small portions of the sagittal suture which have commenced to fuse suggesting the age of about 30-35 years which accords with the wear pattern of the teeth.

The skull is long and moderate in breadth (g-op = 190, eu-eu = 129) and thus distinctly hyperdolichocephalic (L.-B. index = 67.89).

In norma frontalis, the face is medium in length but narrow. The upper facial index being 54.69 lies at the border of the mesen and lepten class, whereas according to the total facial index (91.41), the face is leptoprosopic. Although the bizygomatic breadth is comparatively small, it is nearly as large as the maximus cranial breadth, thus resulting in a high transversal cranio-facial index of 99.22. The nose is extremely high, narrow and leptorrhinic. The nasal index being 38.46 is one of the lowest of all measured skulls of the cemetery. The orbits are nearly squarish in shape and extremely hypsiconchic. The orbital index of 97.74 is the higest of all skulls. Contrary to the high and narrow face the mandible appears broad; its gonial angles are strongly everted.

In norma lateralis the forehead is slightly inclined; the cranial vault

is well arched in the frontoparietal region and slopes backwards and downwards into a slightly protruding occiput. The skull is distinctly orthocranic; the length-height and the length-auricular height index 51.58 and 62.11, respectively, whereas the breadth-height index (105.54) and the breadth-auricular height index (91.47) place it in the akrocranic class. In lateral view, the facial skeleton appears orthognathic, the nasal root is low and depressed, the nasal bridge which is only partially preserved seems to be medium prominent and straight. The mandible is of powerful built, with a robust corpus and broad ascendent branches. The chin is massive and only moderately projecting. The contour in norma verticalis shows an elongated ovoides outline. The calculated cubic capacity is 1390 cc, or euencephalic. The general morphological characters described above, especially the long and narrow head and face and the extremely high orbits clearly place the skull in the Mediterranean (Leptodolichomorph) stock. Only the robust and broad mandible with everted gonial angles and the relatively high craniovacial index does not fit in this typo-diagnosis and suggests Cromagnoid admixture.

Skull No. 142 a (Figs. 48-51 Pl. LXX).

The skull is incomplete; both zygomatic arches, the mandible and portions of the right facial side are missing. Although some characters like the weak mastoid processes and the moderately developed muscular markings of the occiput tend in female direction, it seems likely that the skull belongs to a male individual. The skull bones are very massive, the size of the skull is comparatively big, the forehead recedes, the frontal eminences are ill-marked, the upper margin of the preserved left orbit is extremely rounded and the glabella strongly developed. The large extention of the sinus frontalis, visible at the fracture of the left side of the frontal bone, is also considered as male sex character. All sutures are open except a small portion of the sagittal suture, which has commenced to fuse indicating the age of about 30-40 years. Compared with other male skulls of the cemetery the skull is medium in length, relatively broad (g-op = 189, eu-eu = 137) but distinctly dolichocranic (L.-B. Index = 72.49).

In norma frontalis the orbits are high, rounded and hypsyconchic. (O.I. = 87.18). Although parts of the lateral side walls of the nasal aperture are missing the nasal breadth could be measured. The nasal index being 41.51 places the high and narrow nose in the leptorrhinic class. Estimation of the facial indices was not possible as the zygomatic arches and the lower jaw are missing. Yet it seems that the face is of medium height and breadth.

In norma lateralis the forehead retreats and passes in a well rounded vertex and a slightly protruding occiput. The skull is orthocranic; the length height and length-auricular height indices are 72.49 and 60.85 respectively. According to the breadth-height index (100.00) the skull is acrocranic, whereas the breadth-auricular height index (83.94) places it in the metriocranic group. In norma lateralis the face appears orthognathic with a slight tendency of prognathism; the nasal rootis low and depressed. The other characters of the nose could not be judged due to the missing of the nasal bones.

Norma lateralis shows a typical house-shaped contour. As anatomical variation a wormian bone may be mentioned at the confluence of the sagittal and lambdoid suture, which can be recognised in lateral view also, Norma verticalis is ovoides in outline according to the classification system of Sergi. The calculated cranial capacity is 1421 cc. and thus distinctly euencephalic. There is no doubt that the long-and narrow-headed skull with high orbits and leptorrhinic nose belongs to the Mediterranean (Leptodolichomorph) type.

Skull 142 b (Figs. 52-55 Pl. LXXI)

The skull was badly broken, especially in its facial part; yet it was possible to restore it nearly completely. Only the rami of the mandible are partially or totally missing. The skull shows a slight degree of distortion visible at the everted squamous parts of the temporals in norma frontalis and a slight bulging of the right parieto-temporal region in norma verticalis. It was not possible to correct this in the course of restoration. The sharp upper margins of the orbits, the weak mastoids, the ill marked muscle markings of the occiput, the small size of the thin cranial bones and the marked frontal eminences suggest a female. Only the strongly developed glabella is in favour of male sex. Most of the sagittal suture have undergone synostosis. while the other sutures seem to be still open. (The coronal suture could not be judged exactly, as the skull was broken in this area). The age of death can be assessed approximately 30-40 years, which corresponds to the wear pattern of the teeth.

The skull is medium in length and comparatively broad (g-op = 183, eu-eu = 137), but dolichocranic (L.-B. index 74.86). In norma frontalis the forehead appears high and rounded. The face is high, the upper facial and total facial height being 71 mm and 124 mm respectively are the highest values of all female skulls except those of skull 157. Unfortuntely the facial indices could not be calculated as both zygomatic arches are broken off.

The orbits are high. The better preserved left one is rectangular in outline and hypsiconchic (O.I. = 85.37). The nasal aperture is high, medium in breadth and mesorrhinic (N.I. = 48.07).

In norma frontalis the high face is extremely orthognathic and slightly inclined inwards. The mandible is medium in size and thickness and the nasal root is strongly depressed. The major portion of the nasal bones are broken off and missing. Yet it seems that the nasal bridge was projecting and probably straight. The high forehead is relatively steep and passes upwards in a well arched curve up to the bregma, which is the highest point of the skull. From there the contour of the vertex sloped downwards to meet the protruding occiput after a considerable degree of lambdoid flatening. According to the length-auricular height index (63.39) the skull is hypsicranic, whereas the breadth-auricular height index (84.67) places it in the metriocranic class. The outline in norma occipitalis differs slightly from the typical house-shaped contour of most of the other skulls. The lateral walls are rounded and form a uniform curve with the well arched vertex, thus resulting in a rounded or oval shape of this norma. Norma verticalis is ovoides in outline with a tendency to spheroides contour.

The calculated cranial capacity is 1400 cc. or aristencephalic. The main characters of the skull described above especially the high and seemingly narrow face and the high orbits place the skull in the Mediterranean stock. Yet the skull is of special interest because it shows some features similar to a female skull (No. 56) found in an ossuary at Kalaly-Gyr in Chorazmian. The similarity extends especially to norma lateralis which shows a very typical outline (see Fig. 102-104 Pl. LXXXIIIa).

The facial segments of both skulls are extremely orthognathic, and pass upwards in a high and steep forehead upto the bregma which is the highest point of the skulls. From there the mid-sagittal curve of the skull slopes downwards and meets the protruding occiput after a lambdoid depression. It is interesting to note, that both skulls show wormian bones, especially in the lambdoid suture. Yet no conclusion should be drawn out of this fact. Skull No. 56 from Kalaly-Gyr is considered by Trofimova as prototype of the Transcaspian type, a high faced sub-group of the Mediterraneans (Leptodolichomorphs).

Skull No. 144 (Fig. 56-59 Pl. LXXII).

The skull is incomplete. The whole facial segment, the cranial base,

the zygomatic arches and a portion of the temporal are missing. The lower jaw is fragmentary. The skull is typical female: The upper margins of the orbits are rounded, the forehead relatively steep, the frontal eminences well marked, the mastoids and the muscular attachment areas of the occiput weakly developed. All cranial sutures have not undergone synostosis. Thus the age of 20-25 years can be assessed.

The skull whose maximum cranial length is the greatest of all female skulls (g-op = 189, eu-eu = 134) is distinctly dolichocephalic (L.-B. Index = 70.89). In norma lateralis the forehead rises vertically and slopes back into a rather high vertex. The occiput is slightly protruding. The skull is metriocranic, the breadth-auricular height index being 83.21. The length-auricular height index lies on the border of orthocrany and hypicrany (62.96). Norma occipitalis shows slightly bulging lateral side walls joining the well arched curve of the vertex. Norma verticalis is birsoides in outline. The calculated cranial capacity is 1444 cc. or aristencephalic. The small fragment of the lower jaw is gracile in appearance and shows a medium projecting chin region. Like other cases in which only the calvarium is preserved the type-diagnosis is very difficult. As the mid-sagittal curve corresponds to those of the skulls No. 06 and No. 134, the same may be true concerning the typological classification.

Skull No. 157 (Figs. 60-61 Pl. LXXIII a)

The skull is in a bad state of preservation. Except the sagittal portions of the frontal, and the parietals the whole calvarium is decomposed. Contrary to this, the facial skeleton including the mandible are well preserved, although large portions of this region are missing too. The skull bones are thin, the upper margin of the orbits sharp, the teeth small, which are typical female sex characters. Though the marked glabella, the prominent chin and the rugged appearance of the skull are in favour of a male, the female sex of the individual, however, could be confirmed by the extreme gracility and the ill-marked muscle markings of the post cranial skeleton.

As a small portion of the sagittal suture has started ossification the age of about 30-35 years at the time of death can be assessed which accords with the wear pattern of the teeth.

Owing to the fragmentary condition of the skull-cap, the cephalic index could not be calculated. In norma frontalis the face appears high and narrow. The total facial height and the upper facial height being 125 mm 73

mm, exceed the same measurements of all other female skulls of the cemetery. As the bizygomatic breadth could not be measured, the estimation of the facial indices was not possible. The orbits, especially the better preserved and less deformed right one, seems to be of medium height. The nasal aperture is high, narrow, and distinctly leptorrhinic (N.I. = 41.51).

In norma lateralis the face appears orthognathic. The nasal bridge which is depressed on its root is prominent and straight. The medium high corpus of the mandible shows a projecting symphyseal part. The other characters of the skull could be judged owing to the fragmentary condition.

On the whole the high-faced and also seemingly narrow-faced and narrow-headed and-though female-relatively rugged skull with high and leptorrhinic nose shows similarities to skulls of the Corded or Battle-axe People of the European Neolithic period, which are generally considered belonging to the Nordic type. According to the new nomenclature we may classify this skull as robust Leptodolichomorph. From this point of view the strongly developed glabellar region can be considered more as a type than sex character (see also skull No. 101 c).

Skull No. 165 a (Figs. 62-65 Pl. LXXIII b).

Except the fragmentary mandible and the missing zygomatic arches the skull is complete and in a fairly good state of preservation. The small fractures and the slight degree of distortion, visible especially in norma occipitalis and verticalis, are insignificant. The strongly developed mastoids, the rounded upper margins of the orbits, the shape of the forehead and other characters leave no doubt that it is a male skull. Due to the erosion of the skull bones the arrangement of the sutures is difficult to determine. Yet it seems that the sagittal suture had totally and the other sutures had partially fused, suggesting an age of about 50-60 years which accords with the heavily worn off teeth. The skull is of medium cranial length and breadth (g-o = 189, eu-eu = 130) and hyperdolichocranic (L.-B. Index = 68.78). In norma frontalis the forehead and the face appear extremely high and narrow. The upper facial height being 78 mm is the greatest of all skull of the cemetery. As the bizygomatic breadth was undeterminable, the facial indices could not be estimated. The orbits are high nearly squarish and distinctly hypsiconchic (OI = 87.50). The piriforme aperture is extremely high and narrow. The nasal index of 35.09 is the lowest of all measured skulls.

In norma lateralis the extremely high vault of the skull is remarkable. The basion-bregma height (148 mm), the auricular-height (129 mm) and the length-height and breadth-height indices (L.-H. Index = 78.31, L-AH. Index = 68.25, B.-H. Index = 113.85, B.-AH. Index = 99.23), which distinctly place the skull in the hypsi and acrocranic class, surpass all other skulls of the cemetery. The face is orthognathic with a depressed nasal root and a high, prominent and aquiline nasal bridge. From the medium developed glabella the forehead retreats and passes into a high and well arched contour of the vertex and a rounded occiput. The fragment of the lower jaw is medium in height and the chin is moderately projecting. Though the skull is slightly destorted, it shows in norma occipitalis a well expressed house-shaped contour, with high side walls. Norma verticalis is elongated ovoides in outline. The calculated cranial capacity is 1488 cc. and thus distinctly aristencephalic.

The long-and narrow headed and faced skull with a high vault, and hypsiconchic orbits clearly belongs to the Mediterranean type. By the prominence and the aquilinity of the nose it can be furthermore placed in its Khorasan or Iranid subgroup which may be called according to the new nomenclature as aquiline Leptodolichomorph (see also skull 05).

Skull 173 B - a (Figs. 66-69 Pl. LXXIV).

The skull is nearly complete. Only small portions of the right orbit, the frontotemporal region, the left zygomatic arch and the right ascendent ramus of the mandible are fractured or missing. The orbits, especially the right one is slightly compressed vertically. The massive skull with long and broad mastoids, a well developed nuchal chrest, and rounded upper margins of the orbits is undoubtedly male. The sutural arrangement is not clearly to determine as parts of the sagittal and coronal sutures are eroded. Yet it seems that most of the sagittal suture had already fused, indicating the age of at least 40 years. This accords with the dental attrition. The fact that the alveoli of some molars of the lower jaw are closed owing to the loss of the teeth during life, suggests a higher age group too.

The skull is of medium length and comparatively broad and low (g-op = 191, eu-eu = 139) but distinctly dolichocranic (L.-B. Index = 72.77) In norma frontalis the forehead and the face appear broad and low. The upper and the total facial index are 47.06 and 85.92 respectively, and thus the face is euryen, and mesoprosopic but close to the limit of the euryprosopic class. The orbits appear extremely low which is only partially caused by the

vertical compression. The orbital index, calculated from a corrected measurement of the orbital height is 66.66, and thus orbit is distinctly chamaeconchic. The nose is low and medium in breadth and chamaerrhinic. (N.I. = 58.54). As already mentioned the lower jaw is extremely massive and high and the preserved left gonial angle is strongly everted. The striking features of norma lateralis are the massiveness of the lower facial segment, the strongly projecting chin, the nearly vertically arising and high ascendent ramus of the mandible, and the low and receding forehead, which passes in a low and flat curve of the vertex and a bulged but well rounded occiput. The nasal root is deeply depressed, the glabella well marked, the nasal bridge seems to be medium projecting and straight. The skull is distinctly chamaecranic and tapeinocranic. The length-height and breadth-height indices (L.-H. Index = 64.92, L.-AH. Index = 56.54, B.H. Index = 89.20, B.-AH. Index 77.69) are the lowest of all measured skulls of the cemetery except those of the skull No. 01. Norma occipitalis shows a slightly distorted house-shaped contour. Norma verticalis is birsoides in outline, with bulging at the right parietal which is likely to be caused by the distortion post mortem. The calculated cranial capacity is 1382. cc. or euencephalic. The left side of the maxilly and the left zygomatic bone show a pathologic change which will be analysed in section 7. The long-and low-headed, broadfaced skull with low orbits and a massive lower jaw with everted gonial angles and high rami shows similarities to the Andronovo type and thus it can be classified as Cromagnoid or Palaeuropoid (robust Eurydolichomorph).

Skull No. 173 B-b (Figs. 70-73 Pl. LXXV)

The skull is in a fairly good state of preservation. The right half of the lower facial segment is decomposed and the right frontal and temporal portion of the skull is slightly fractured and compressed. The skull is typically female: smooth-contoured, gracile, with sharp upper margins of the orbits and thin and delicate cranial bones, and ill-marked supra-orbital ridges. Most of the sagittal suture has already fused, while the other sutures are still open indicating the age of approximately 30-35.

The skull is extremely dolichocranic. The cranial index being 63.44, is the lowest of all skulls of the cemetery and results from a relatively great cranial length and an extremely small breadth diameter (g-op = 186, eu-eu = 118). As can be seen from the symmetrical contour of norma verticalis and norma occipitalis, the low breadth diameter of the skull is not caused by the lateral compression of the skull described above, which is limited to

the temporal region and does not extend to the parietal area. In norma frontalis the face appears high and extremely narrow. The facial and the nasal indices could not be estimated owing to the impossible task of measuring the bizygomatic and the nasal breadth. The better preserved left orbit is nearly square and thus distinctly hypsiconchic (O.I. = 86.84).

In norma lateralis the forehead is steep and passes upwards and downwards in an almost smooth and uniform curve. According to the length-height and length-auricular height index being 70.43 and 61.29 respectively, the skull is orthocranic, whereas the breadth-height index (111.02) and the breadth-auricular height index (96.61) place it in the acrocranic class. In lateral view the face shows a slight degree of alveolar prognathism and a protrusion of the lower jaw and teeth. The mandible is gracile in structure, the chin medium prominent. Norma occipitalis is of typical house-shaped contour with high and vertically arising lateral walls, marked parietal eminences, and a comparatively well developed nuchal chrest. The contour of norma verticalis is elongated ovoides in outline. The calculated cranial capacity is 1231 cc. or euencephalic. According to the main characters described above, this skull can be typologically classified as gracile Mediterranean (gracil Leptodolichomorph).

Skull 177 (Figs. 74-77 Pl. LXXXVI).

The skull is incomplete. The whole facial skeleton, parts of the left fronto-parietal region and the left half of the mandible are missing. In addition the cranial base and the left parieto-occipital region show a considerable degree of distortion by earth pressure. The deformation of the bones of this region was so strong, that the restoration was not possible. The skull bones are thick and massive, the upper margin of the orbits — as far as preserved —are rounded, the mastoid processes which are partially broken off seem to have been broad and large and thus the skull undoubtedly belongs to a male individual. The age determination based on the closure of the cranial sutures is very difficult. It seems that the sutures especially the sagittal suture had partially ossified, but was opened again forcibly in connection with the postmortal distortion of the skull. The attrition of the preserved molars of the fragmentary lower jaw suggests an age of about 35-40 years.

Although being badly damaged some basic measurements could be at least approximately taken. The skull is relatively long and narrow. The approximate measurements of the cranial length and breadth are 194 mm and

134 mm respectively thus resulting in a hyperdolichocranic index (69.07). In norma lateralis the skull is relatively low (auricular height 112 mm). The L.-AH. Index and the B.-AH. Index (57.73 and 83.58) place it in the chamaecranic and metriocranic group. The forehead is low and receding and passes upwards and backwards in an only slightly arched curve of the vertex and a markedly protruding occiput (occiput en chignon). The low jaw is massive with a medium prominent chin. The broad and high ascending ramus of the mandible rises nearly vertically. The right half of norma occipitalis which is well preserved shows a typical house-shaped contour with a low and rounded vault. Norma verticalis is of pentagonoides outline with a slight bulging at the parietal region. The calculated cranial capacity is 1407 cc. (euencephalic). The low and receding forehead, the moderate height of the vault, the occiput en chignon and the massiveness of the bones give the skull primitive appearance. From the fact that the partially preserved upper margin of the right orbit is only slightly arched, it may be deduced that the orbits were originally rather low.

As the facial parts of the skull are missing the type-diagnosis is very difficult. Yet many of the characters described above are typical for the Proto-or Palaeeuropid type, common at that time in Eastern Europe and Central Asia.

Skull 186 a (Figs. 78-85 Pl. LXXVIII)

The skull, the mandible of which is missing, is in a very bad condition. It shows a large elliptical gap in the right frontoparietal region and a second one in the frontotemporal part which extends to the cranial base. From the first mentioned gap a fissure runs over the forehead downwards to the upper margin of the orbit. The skull is vertically compressed especially in its facial part. Yet it was possible to restore it so that the main characters of the skull can be recognized and basic measurements could be taken.

The skull undoubtedly belongs to a female. It is small in size the upper margin of the orbits the skull bones are relatively thin, the upper margin of the orbits extremely sharp, the forehead steep and the development of the preserved right mastoid processes is extremely weak. All sutures seem to be still open except a small portion of the sagittal suture which has commenced to fuse suggesting the age of about 25-30 years.

The skull is small in length but comparatively broad (g-op = 173

eu-eu = 136) thus resulting in a high cranial index of 78.61, which belongs to the mesocranic class. The length-breadth index is the highest of all skull of the cemetery except that of skull No. 101 b. In norma frontalis the forehead and the face appear extremely low and broad. The comparison of the metrical data shows that the upper facial height is of an intermediate position, while the bizygomatic breadth (which could only approximately be estimated owing to the missing of the left zygomatic arch surpasses that of the other female skulls of the cemetery. Consequently the facial index is low (48.91) and the face distinctly euryen Like the face the orbits are medium high but extremely broad, thus resulting in a mesoconchic orbital index of 77.27.The nasal aperture is relatively high while the other characters of the nose could not be judged as its lateral walls are badly damaged.

In norma lateralis the low forehead rises nearly vertically. The contour of the vault is low, moderately arched, and sloped backwards in a rounded occiput. In this view the facial skeleton shows very characteristic features. A depression of the high nasal root is totally missing; the nasal bones are flat with no projection at all giving thus this region a high degree of flatness, which can be seen especially from the photographs of the skull before restoration (Figs. 78-81 Pl. LXXVII). Owing to the fragmentary condition of the areas, the simotic and dacryal index could, however, not be calculated. In the middle segment of the projecting cheek-bones and the shallow canine fossa are remarkable.

The vault of the skull is extremely low. The auricular height of 95 mm is the lowest value of all measured skulls. Consequently the length-auricular height and breadth-auricular height index, being 54.91 and 69.85 respectively, are extremely low, and thus the skull is chamaecranic and tapeinocranic. In norma occipitalis the lateral walls are low and rounded giving the skull in this view a rounded-oval shape. Norma verticalis is sphenoides in outline. The calculated cranial capacity is 1120 cc. (oligocephalic).

As striking features of this skull can be considered the medium high but extremely broad face, the considerable degree of facial flatness, the extremely low vault and the relatively high cephalic index. With the exception of the low face and orbits the above described characters are typical of the Mongoloid type. This typological classification could be established by the naso- and zygomaxillar angles too, which clearly point out the Mongoloid character of this skull (see Section 7, C).

Skull No. 192 (Figs. 86-89 Pl. LXXIX).

The skull is in a very bad state of preservation. The left lateral half, the side on which the skull was resting is fractured, decomposed and compressed; the mandible is missing. The restoration of the skull was not possible and no useful measurements could be taken. Nevertheless the main morphological characters of the skull can be recognised and described. On the whole the skull appears small, smooth and gracile with a sharp upper margin of the preserved right orbit, absent superciliary ridges and small mastoid characters which speak of a female skull. All sutures seem to be open, except a small portion of the sagittal suture which gives appearance of having commenced to fuse indicating an age of about 30-35 years at the time of death.

In norma frontalis the face appears medium in height with a high and rounded orbit. Yet no exact measurement of the orbit could be taken because its lower and medial margin is fractured and eroded. In norma lateralis the forehead is relatively steep and passes upwards and backwards in a smooth contoured, well arched vertex and arounded and only slightly protruding occiput. Norma occipitalis is, as far as can be judged from the preserved half, of house-shaped contour with a slightly diverging side wall. Norma verticalis seems to be ovoides in outline. From this view it can also be deduced that the skull was most likely dolichocranic.

The smooth contoured, gracile, seemingly dolichocephalic skull, with high orbits most probably belongs to the Mediterranean (Leptodolichomorph) type. From an archaeological point of viey it is interesting to note that during the cleaning of the skull three small metal rings probably belonging to a necklace, were found loosely attached with the cranial base. In fig. 87 two of these rings can be seen in the space between the mastoid processes and the maxilla.

Skull No. 197 a (Figs. 90-93 Pl. LXXX).

The skull is in a relatively good state of preservation and nearly complete. Only little portions of the right occipito-temporal region and both condyles processes of the mandible are fractured or missing. The skull is typical female. The upper margins of the orbits are extremely sharp, the mastoid processes small, the frontal and parietal eminences well marked, the glabella and the superciliary arches weakly developed. All sutures are open, the wisdom teeth of the maxilla are already visible, while those of the

mandible had not yet erupted thus suggesting an age of approximately 20 years, which accords with the only slightly worn off molars. The skull is medium in length and breadth (g-op = 183, eu-eu = 130) and dolichocranic (L.B-. Index = 71.04). In norma frontalis the forehead is high and rounded, the face is medium high and broad. The total facial index and the upper facial index being 88.71 and 52.63 respectively place the skull in the mesoprosopic and mesen class. The orbits are rounded with a tendency to rectangular and mesoconchic (OI. = 82.50). The piriform aperture is medium high but extremely broad (28 mm) leading to a hyperchamaerrhinic nasal index of 59.57. which is the highest of all measured skulls. Compared with the upper facial segment the bigonial breadth is relatively low so that a narrowing of the face downwards results. In norma lateralis the high forehead rises vertically from the ill-marked glabella and passes in the moderately arched contour of the vault and the rounded occiput. According to the length-auricular height index (63.93) and the breadth-height and breadth-auricular height index (99.23 and 90.00) the skull is hypsicranic and acrocranic whereas the length-height index being 70.49 places it in the orthocranic class. In lateral view the considerable degree of alveolar prognathism is remarkable. The mandible, which is not very massive, shows a moderately projecting chin and a broad ascendent branch. The nasal root is only slightly depressed and the nasal bridge is not very high, and consave.

Norma occipitalis is of a typical house-shaped contour, norma verticalis is ovoides in outline. The calculated cranial capacity is 1348 cc. and eucncephalic. The main characters of the skull are the expressed prognathism, the steep forehead, the relatively low orbits and the high nasal index. With these features the skull shows similarities to the female skull No. 101 a and the male skull No. 03 and likewise it can be typologically classified as Veddiform (Paedoeurydolichomorph).

Skull 198 (Figs. 94-97 Pl. LXXXI).

This is the only better preserved skull of an infant found in the whole cemetery. Except the fractured right half, it is nearly complete. The age could be assessed exactly on the basis of the eruption of the milk teeth. All deciduous teeth had erupted except the second milk molars and the canines which, however, had just started to erupt, indicating an age of approximately 18 months.

The length of the skull is 155 mm, whereas the cranial breadth could

not be determined because of the fragmentary condition of the right parietal region. Yet the skull appears extremely narrow and is most probably hyperdolichocranic as can be judged from norma occipitalis, showing an extremely elongated ellipsoides outline. In norma frontalis the face is low (upper facial height = 38 mm, total facial height = 61 mm) whereas the orbits appear relatively high.

In norma lateralis the extremely steep forehead passes upwards and backwards in a well arched curve of the vertex and the occiput. In this norma the low facial segment shows a considerable degree of alveolar prognathism, which is also visible in norma verticalis. In norma occipitalis the side walls of the skull are high and rise nearly vertically. The outline is of typical house-shaped contour.

The main characters of this long and narrow skull are the relatively low face, the steep forehead and the marked alveolar prognathism. As already shown in connection with the description of other skulls this combination of morphological features is typical for the so-called Veddiform type (see skull 03, 101 b, 197). The typological classification, however, may be considered with some caution, as some of these traits, especially the steep forehead are typical infantile features.

Skull No. 209 (Figs 98-101 Pl. LXXXII).

This skull represents the only well preserved skull of Site No. 2. Except the lateral margin of the right orbit, the whole facial segment and the cranial base are missing. The frontal bone shows a large gap, which includes the glabella region too. The cranial bones are thin, the forehead rather steep and thus suggesting a female. This diagnosis is supported by the gracility of the long bones. As all sutures are still open and the third molars of the lower jaw had not yet erupted an age of approximately 20 years or a slightly younger age can be assessed.

Except the cranial breadth no useful measurement of the cranium could be made. Yet the skull appears long, relatively broad, and mesocranic (according to the approximately calculated cranial index being 77.52). The high and steep forehead passes upwards in a well arched curve of the vertex and a slightly protruding occiput. The lower jaw, the corpus of which is medium in height and thickness shows a moderate projecting chin region.

In norma occipitalis the lateral walls of the skull are medium in

height, and slightly curved thus giving the skull in this view a more oval shape. Norma occipitalis is spheriodes in outline and shows some anatomical variations of the sutures (metopic suture and some wormian bones at the lambdoid suture) which can be seen in norma occipitalis too.

Owing to the fragmentary condition of the skull the typolocial classification is very difficult. As the skull shows some features in common to the skull 06 the same may be true concerning the typological differential diagnosis.

B. POSTCRANIAL SKELETON AND STATURE.

Just like the skulls the postcranial skeletons were mainly badly preserved. This was also true of the anthropologically most significant regions of the postcranial skeletons, particularly the long bones. Notwithstanding, it was possible to measure 56 long bones belonging to 17 males and 12 females. The measurements of 4 more long bones were not taken into consideration because the sex determination was not possible. Quite a good number of the measured long bones were still complete but in such a bad state, that even with the help of preservants they oculd not be salvaged. Therefore the measurements had to be taken in situ. This is specially valid for some femura and tibiae. Yet only those measurements (taken in situ) are presented here which could be made exactly. Out of the many possible measurements of long bones only the most significant ones are selected here, which are important for the determination of the stature and the calculation of the length-thickness indices. The individual measurement and indices are given in the Collective Tables. In 3 cases the extremity bones of both sides were available. So far as small metrical differences between both sides were observed, the arithmetic means are given.

Humerus

Measurements had been made on 11 humeri of adult individuals (7 male and 4 female). The average maximum length is 324.1 mm for males and 311.25 mm for females; the length-thickness indices being 19.49 and 17.51 respectively, show considerable sex differences, which, however, may be due to the small number of bones available for analysis.

Radius

6 male but only two female radii were useful for anthropological

measurements. The average maximum length is 49.33 for males and 237 mm for females. The length thickness index, calculated from the physiological length (measurement No. 2 according to Martin) and the minimum circumference of the shaft, is 18.31 in case of males and 17.70 for females.

Ulna

Only 5 ulnae (3 male and 2 female) were so well preserved that anthropological measurements could be taken. The arithmetic mean of the maximum length is 265.33 for the male group and 249.5 mm in case of females. The length-thickness indices calculated from the physiological length (measurement No. 2 according to Martin) and the minimum circumference of the shaft are 16.15 for males and 15.12 for females.

Femur

Measurements have been made on 9 male and 6 female femura. Most of the length measurements could be taken only in situ, and correspond to the maximum length (measurement No. 1 according to Martin), while the length in natural position of these bones could not be estimated. As the assessment of the stature according to Manouvrier and the calculation of the length-thickness index are based on the length in natural position, 3 mm were subtracted from the maximum length as proposed by Martin-Saller (1957 I. p 595).

The average maximum length is 456.33 mm in case of males and 421.33 mm for females. The mean robusticity indices are 19.48 and 19.18 respectively.

Tibia

9 male but only two female tibiae could be utilised for anthropological measurements. The average maximum length and the length-thickness indices are 381.33 and 20.89 for males and 352.5 mm and 20.42 mm for females. As in the case of the femura most of the length measurements could be taken only in situ.

Fibula

Anthropological measurements could be made only on one male and

two female fibulae. The length measurement and length-thickness index. of the male bone are 350 mm and 10.00 whereas the corresponding mean values of the two female fibulae are 338.5 mm and 10.20.

All measured bones did not show any pathological changes and also did not exhibit any specific morphological characters which are worth mentioning here.

The metrical comparison of the postcranial skeletal material from Timargarha with other skeletal series will be done in a later research work. Yet it should be mentioned here that according to the length-thickness indices the population of Timargarha exhibits a high degree of robusticity, which surpasses, for example, that of the neighbouring prehistoric groups from Harappa, even the compratively robust series from Cemetery R 37. However in case of R 37 this may be due to the larger length of the long bones, as we know that the length-thickness index decreases with increasing bone length.

Stature

As already mentioned in an earlier section the stature was estimated according to the method of Manouvrier and that of Trotter and Gleser, the latter of which is mostly used in recent research works. For comparison purposes it is, however, possible to estimate the stature according to any other method on the basis of the individual measurements of the long bones given in the Collective Tables at the end.

In our material the stature could be calculated for 17 male and 12 female individuals. In some of these cases this could be done only on the basis of the measurements of one single long bone. The estimated stature from each long bone is given in the Collective Table E. It shows that in case more than one long bone of an individual were available, the stature values calculated from different bones show no great differences. According to the method of Manouvrier the stature varies from 157.1 to 178.9 cm for the male group and between 145.5 and 164.0 cm for females. The corresponding values for the method of Trotter and Gleser are 163.6-181.8 cm for females. The corresponding values for the method of Trotter and Gleser are 163.6-181.8 cm for males and 148.2- 167.3 cm for females.

The mean stature is 168.0 cm (Manourvier) and 171.6 (Trotter and Gleser) respectively for the male group and 158.4 and 160.7 in case of the

female group, thus showing a difference of approximately 3 cm between both the methods. The average stature of the male and female group, estimated by arithmetic mean of the stature of each individual, differs only slightly from the values of a more exact method of assessment of the mean stature for groups, which is described by Martin-Saller (Vol. I, p. 593). According to this method the mean stature of a group is determined as follows: The stature mean from every bone (radius, femur, tibia etc.) is multiplied with the number of particular bones and all such products are added together and divided by the number of all bones taken into consideration. On the basis of this calculation method the mean stature for the male group is 168.1 cm according to Menouvrier and 171.9 cm according to Trotter and Gleser. The corresponding values for the female group are 159.1 cm (Manouvrier) and 161.5 cm (Trotter and Gleser).

According to the same method the mean stature for both sites was estimated separately, although in cases of site No. 2 only a relatively small number of measured long bones of males were at our disposal. The mean stature in case of the male group is 168.2 (Manouvrier) and 172.0 (Trotter and Gleser) for site No. 1 and 167.7 and 171.5 for site No. 2. The corresponding values for the females are as followes: Site No. 1, 159.9 and 161.8 cm; site No. 2, 158.4 cm and 161.2 cm. Thus the differences of the stature between both sites are relatively small and statistically insignificant.

The estimation of stature of the particular typological groups distinguished on the basis of the skull material was not possible as the number of measured long bones was too small.

The comparison of the stature of the protohistoric population of Timargarha with other skeletal series will be done in a later research work. Yet it can be said, that the stature of approximately 170 cm for the males and 160 cm for the females ranges in the upper part of the variation limits of the stature i.e. that the population of Timargarha cemetery is relatively high statured.

C. GENERAL ANTHROPOLOGICAL CHARACTERS OF THE PREHISTORIC POPULATION OF TIMARGARHA CEMETERY.

After the detailed morphological, metrical and typological analysis of the skeletal material in the preceding chapters, especially the study of the individual skulls, in following the series from Timargarha the material should be considered on the whole i.e. as population. This analysis should

be based on the arithmetical mean of the essential anthropological measurements and indices which are given for both sexes in Tab. 5.

If we consider the absolute measurements of the male group, the great cranial length and moderate breadth of the series are remarkable. The other absolute cranial and facial measurements are of intermediate position, with the exception of the bigonial breadth which is comparatively great.

More informations are to be expected from the cranial and facial indices. The cranial index being 69.4 is extremely low and distinctly hyperdolichocephalic. It results from a great cranial length and an extremely low breadth diameter, as already mentioned. According to the length-height index the skull of the male population is medium in height (orthocranic) but high-vaulted (acracranic) according to the breadth-height index, which is due to the moderate cranial breadth of the series. The orbits are of medium height and mesoconchic, whereas the nose is relatively narrow as can be deduced from the low and leptorrhinic nasal index. The upper facial index being 52.2 ranges in the mesen class i.e. that the upper facial height is medium in relation to the bizygomatic breadth. The total facial index is of an intermediate position too. Yet it ranges directly at the border of the meso-and leptoprosopic class and thus indicating a slightly higher face, which is due to the massive and high lower jaws.

In relation to the cranial breadth the face is relatively broad. The bizygomatic breadth exceeds the maximum cranial breadth thus resulting in a transverse craniofacial index over 100. The same is true of the lower part of the face (bigonial breadth) compared with the upper facial section (bizygomatic breadth), which is expressed by the high jugomandibular index of the male group. This will be evident if we compare the series from Timargarha with other series from Asia (see Tab. 6 of section 10).

According to the measurements and indices of facial flatness (simotic and dakryon index, nasomalar and zygomaxillar angles) the series from Timargarha proves to be distinctly Europoid. The two skulls (the male skull 01 and the female skull 186) classified as Mongoloid do not carry any weight concerning the whole series. Nevertheless these two skulls could clearly be distinguished on the basis of the measurements of facial flatness from the other skulls. For the male group the variation limit of these measurements and indices in Mongoloid direction (simotic index = 34.29,dakryon index = 51.32, Nasomalar angle = 145° and zygomaxillar

angle = 134°) belong to skull No. 01 (see also the Collective Tables A and C). In case of the female group the same is true of the zygomaxillar and nasomalar angles concerning the skull 186 (the dakryon and simotic index of this skull could not be determined). According to the method of Manouvrier the stature of the male group is 168.0 cm, whereas according to the method of Trotter and Gleser the stature of 171.6 cm was estimated. If we take the arithmetical mean of both values an average stature of approximately 170 cm results, which is as compared with other prehistoric and also recent populations, relatively high.

The variation range of most measurements and indices is relatively great as for example in the case of the nasal and the orbital indices. Only a few measurements or indices show a very limited variation; this is especially true of the cranial index, the variation of which comprises only 5 index points. The essential features of the male series from Timargarha can be stated as follows: long-and narrow-headed with high vault, medium high orbits, relatively narrow nose and medium high till high face, the breadth of which, however, is great in relation to the cranial breadth. The stature of the population is comparatively high and it seems that the postcranial skeletons are massive in structure. (compare section 7, B).

The main characters described above are also true of the female group. The metrical deviations between the male and the female series, especially concerning the absolute measurements correspond to the sexual differences. If we classify the whole series according to the anthropological types we find partially remarkable metrical differences between the different typological groups. Yet these differences are of no great value because the individual typological groups are represented only by a small number of skulls.

The metrical comparison of the series from Timargarha with other pre and protohistoric population from Asia will be given in a later section.

SECTION — 8

SOME PALAEOPATHOLOGICAL REMARKS ON TIMARGARHA BONE MATERIAL

As it is planned to give a full account of the pathological features of the human bones excavated at Timargarha cemetery in a later work after a special and more detailed study of the skeletons under a palaeopatholo-

gical point of view, only a few notes concerning the main pathological finds, as far as they involve changes in the skeleton, are presented here.

Except some anatomical anomalies like wormian bones and other sutural variations which, however, cannot be considered as pathological features in the strict sense, the number of pathological changes which could be traced at the present state of examination is relatively small. Most of them belong to the group of injuries and fractures. As far as they concern the skull they are already briefly mentioned in earlier sections.

The injury of the female skull No. 101 b (Figs. 29-32 Pl. LXV), mainly extended on the left parietal, is a typical depressed fracture of the skull with central impression and shows clearly the line where the instrument struck. This type of injuries is generally caused by edged but relatively blunt impliments or weapons. As no signs of healing can be detected one can assume that the death occured due to this injury (see also section 4, Grave 101).

Contrary to this, the injuries of skull No. 05 located on the right side of the frontal and the left parietal bones are nearly totally healed (Figs. 17-20 Pl. LXII). It seems likely that these wounds were caused by an instrument sharper than that in case of skull No. 101 b. The injuries are relatively narrow and not associated with secondary cracks, and possibly represent the cuttings of a sword or an axe. The injury at the frontal is a relatively deep incision, whereas that of the parietal is only a superficial scratch and possibly caused by a sword or another instrument clancing off the skull bone. The latter may also be true in the case of the superficial injury of skull No. 134, showing at the right parietal a slightly deepened scratch.

One of the most interesting pathological finds of the cemetery is the trephination of skull No. 212 belonging to a young female (see Fig. 110 Pl. LXXXIVa). The trephination hole is of rounded shape and located in the frontoparietal region of the skull at the confluence of the sagittal and coronal suture. Concerning the trephining technique it seems likely that the perforation resulted by slowly cutting out a roundel with a tool.

The internal circumference of the hole is nearly as large as the external one indicating a relatively steep cutting gradient. It seems that no signs of healing are traceable. The edges of the hole are sharp and the exposed deploic spaces of the spongy inner table show no signs of closing as can be see in Fig. 110, Pl. LXXXIVa from a small portion of the hole near the frac-

ture line. Therefore it is difficult to decide if this operation was performed ante mortem or post mortem.

Possibly another skull of site No. 2 also shows signs of trephination (compare grave 256). In this case it is, however, difficult to reach a final conclusion, because only a small portion of the trephined area of the skull is preserved.

These trephinations are of special interest as according to our knowledge these are the only cases to be observed in Pak-Indian Subcontinent till today.

Questionable, however, is the fracture of Skull No. 186 consisting of a hole on the right frontoparietal region and a fissure running over the frontal and including the right upper margin of the orbit. In this case it is possibly by a sharp stone during the burial, which is supported by the fact that no signs of healing are traceable.

Pathological variations on skulls owing to bone diseases could be found only in one case. As already described in an earlier section, in skull 173-a (thickening on the left molar bone with a rough and rugged surface was seen, which made the canine fossa to disappear. It seems highly likely that this deformation is caused by an inflammation of the bone probably by a chronic state of a periostitis, called as periostitis ossificans.

From the deceases of the jaw and the teeth, some cases of dental caries could be observed. It is however in the present state not possible to tell the exact percentage of this dental disease.

Only a small number of patho'ogical variations could be detected on the post-cranial skeletons which however may possibly be due to the bad state of preservation of most of the bones.

A healed fracture was found on tibia and fibula from grave 190. Both bones were united in the region of the old fracture.

Two tibiae belonging to the male skeletons from grave 138 and 165 are peculiarly thickened at the diaphysis and are unusually bowed. Yet it was not possible to clear up whether we are dealing here with pathological changes or not.

SECTION — 9

ZOOLOGICAL REMAINS

As already mentioned in earlier sections animal bones were found in some graves of Site No. 1 along with human remains. These finds throw not only light on the life customs and the economic conditions of Timargarha population. They are furthermore of special archaeological and ethnological interest because they seem closely connected with certain ritual practices. The animal bones found in the particular graves were determined by Dr. Hemmer, zoologist of the University of Mainz, as follows:

Grave 109

Fragments of the skull and the mandible and the distal parts of the limbs belonging to a female goat of 6-8 months of age.

Grave 125

1) Extremity bones of a domesticated horse (equus caballus),

2) the jaw of a stag (cervus sp.), approximately 8 to 10 year of age,

3) two teeth, which belong to a small ruminant, possibly goat or sheep.

Grave 137

1) Remains of a probably male sheep (ovis sp.), which could be prooved by a broken metacarpus,

2) Two fragments of a humerus and a metacarpus belonging to a young ruminant not yet specifically determined of the size in between a sheep and a stag,

3) fragments of the mandible and some limb bones of a hare.

Grave 149

Fragments of the skull and the mandible and parts of the proximale and distal extremities of an old sheep (ovis sp.) approximately 10 years of age.

Grave 183

Tail vertebrae of a snake, which were found lying over the rim of a dish-on-stand.

Further animal bones were exhumed during 1965 excavation season at site No. 3 in pits along with pottery near the right bank of Panjkora River where, however, no human skeletal remains were found. It is evident that the burial of these bones is closely connected with certain ritual practices too. These bones are at present under examination in the laboratory of Dr. Hemmer. The results will be published in a comprehensive study in near future.

SECTION — 10

DISCUSSION AND CONCLUSION

As the detailed description and typological classification of the particular finds have shown the high statured, long and narrow-headed, high vaulted and distinctly Europoid population along with relatively narrow nose and medium high but comparatively broad face, the skeletal materials do not belong to anthropologically a homogenuous group. Though there were only 25 skulls at our disposal for morphological and metrical analysis, we could at least distinguish 5 different main morpological types, which could be metrically differentiated too. The most common type is the *Leptodolichomorph* (Mediterranean type) including its subtypes as the Transcaspian type or the Khorasan type. This observation is not surprising as we already know from numerous excavations that from Palaeolithic period onwards the Mediterraneans or the more ancient form of this type (the "Asiatic Protomediterraneans "according to Cappieri) form the basic population element of South and Middle Asia from the Aegean Sea and Egypt to India and from Gulf of Oman to Caspian Sea.

Next to the gracile Mediterraneans, the rugged-bony and robust Eurydolichomorphs and robust Leptodolichomorphs (Protoeuropoids, Palaeeuropoids or Cromagnoids = Andronovo types, and Nordics) were the most common types. However it seems that these types were represented in the population of Timargarha in greater number as can be concluded from some fragmentary skulls which could not be included in the proper anthropological analysis.

Mongoloid elements were noticed in two skulls. Significant Mongoloid was the female skull No. 186, whereas the male skull No. 01 was classified as Palae-europoid with a strong Mongoloid admixture. Beside the undoubtedly Mongoloid features (like the flatness of the nasal region, the great breadth and the projection of the cheek bones,

the low depth of the canine fossa) the type diagnosis could be confirmed metrically with the help of the measurement and indices of facial flatness (see Section 7, C).

The so-called Veddiform type could be traced exactly in three skulls (2 female and one male). Yet it seems likely that this type was also represented by some skulls, the facial parts of which were missing. Probably the skull of the infant found in grave 198 belongs to this type too. But the classificatory concept of Veddiform or Veddoid requires a clarification. In the prehistoric Anthropology of Asia the term Veddoid is often equated with terms as Australoid, Proto-australoid, Dravidoid, Proto-dravidoid or Australo-veddoid (compare Friedrichs and Muller 1943, Ehrhard 1964, P. 44 and 1965, P. 47) and is used to classify a primitive skull type which is not only found in Mohenjodaro and Harappa but also in the remaining South Asian region. This type is described by most of the authors as long and narrow-headed, with faintly arched and low sagittal curve of the vault, protruding occiput, strongly marked muscular attachment areas, low and receding forehead with strongly projecting glabella and superciliary arches, deeply depressed nasal root, relatively broad and low face and as striking feature the marked alveolar prognathism.

According to Ehrhard (1964, p. 45) the description of this type, which varies concerning certain details among different authors characterizes more of a morphological form group than a distinct racial type, the further differentiation of which seems possible and necessary.

One of the reasons for the insufficient typological classification of the prognathic form group of the Asian region (including the so-called Asiatic Negroids) may be seen in the above mentioned equation, especially of the terms Veddoid and Australoid or Proto-australoid. V. Eickstedt (1934) who introduced the term Veddid in the science of race to characterize the racial groups living in Central India today has always disputed the opinion that the Veddids and the Australoids systematically belong together. According to V. Eickstedt both differentiate themselves by the fact that the Veddids represent an infantile primitive group, while the Australoids exhibit theromorph primitive features. One of the most important morphological differences between Veddoids and Australoids concerns the frontal region. Australoids are characterized by a relatively low and receding forehead with a projecting glabella and well marked superciliary arches. To the contrary the forehead of Veddids is relatively steep and shows a less marked glabellar and superciliary region. They are thus characterized as a more paedo-

morphic group. In addition the Veddids differentiate from the Australoids by smaller absolute measurements of the skull and the stature by lesser marked muscular attachment areas and other characters. Therefore the Veddids can be considered as more gracile type than the Australoids.

These differences between Veddids and Australoids could also be confirmed in a recent research work of Schwidetzky (1966) by multivariate statistical methods (Penrose and Sanghvi-distance) based on the material from the German India-Expedition (V. Eickstedt 1926-1929).

If we consider on the background of this discrimination the "Veddoid" skulls from the cemetery of Timargarha it can be stated that specially the combination of morphological features like the extremely steep forehead, the weakly developed glabellar and superciliary region, the marked alveolar prognathism and the gracility of the skulls corresponds to V. Eickstedt's infantile primitive Veddid type.

These skulls distinguish themselves not only from most of the so-called "Proto-australoid or Veddoid" skulls from Mohenjodaro, but also from type A of Harappa, which, according to Gupta, Dutta and Basu (1962) is typologically related with the above mentioned type from Mohenjodaro. The same is also true of the skull found at Kish and other sites of South Asia. These skulls are characterized besides the marked prognathism by a low and receding forehead, a projecting glabellar and superciliary region, a deeply depressed nasal root and well developed muscle markings and thus correspond to the Australoids in the sense of V. Eickstedt.

The presence of Veddiform skull types in the extreme north-western corner of the Pak-Indian Subcontinent is both interesting and important because these finds can be considered as geographical and chronological links between the Veddoids in Central India and the prehistoric finds with similar combinations of morphological features found in Turkmenia and the Caspian region. They are dated back to the 5th Millennium B.C. This is specially true of the skull No. 5 from Monsukly-Tepe (South-Turkmenia, 5. Mill. B.C., see Figs. 105-109) which shows striking similarities to the skull 03 from Timargarha. Prognathic skulls exhibiting Veddoid-like combinations of morphological features were also found in Kokca 3 south of the Aral Sea (2. Mill. B.C.) and in the towers of silence of Kalaly-Gyr in ancient Chorazmian.

The Russian anthropologist Trofimova calls this type besides the tra-

ditional terms (Veddoid, Indodravidoid etc.) as Equatorial type. With this nomenclature its hypothetical origin from the south should be noted. Trofimova believes to have found equivalents of similar morphological forms of the South, for example the skulls of Type A from Kish, skulls from Tepe-Hissar, Mohenjodaro, Adichanallur and other sites of South and West Asia (compare Trofimova 1957, 1964a, 1964b,). As a criticism of these morphological connections stated by Trofimova it may be mentioned here that Trofimova does not clearly distinguish between Veddoids and Australoids or Veddoid-like and Australoid-like skull types in the sense of V. Eickstedt, which in our opinion is necessary for the solution of the problem under consideration.

On the other hand the distinctly Veddiform skull types found in Timargarha and in the territory of the Soviet Union seem to confirm the assumption already made by V. Eickstedt more than 20 years ago (compare Eickstedt 1934) that the Veddids of India living today in a completely backward areas were spread farther to West and East and North in earlier time periods. Similar to V. Eickstedt, Trofimova is of the opinion that the Equatorial type living in prehistoric times in the southern territory of Central Asia migrated to this area from India (compare Trofimova 1964 b). Yet it seems to be premature at the present state of our exploration to draw any definite conclusion in this direction, especially concerning genetic connections between the present day Veddoids and the prehistoric anthropological finds mentioned above, as done by Trofimova.

As already mentioned in the introductory chapter Dani (1966) distinguished three main cultural and chronological periods in the Gandhara grave complex and the cemetery of Timargarha, which according to the tentative dating extend approximately over 1000 years (about 1500[11] B.C.-500 B.C.). Though the cultural continuity is observed through this whole time period, the three cultural periods differ from each other by certain changes in cultural elements and particulary by different burial rites. The period 1 inflexed burials are the only burial type whereas in period II beside the ritual complete burials, cremations are observed too. In period III these two burial types continue beside a newly introduced one, the so-called fractional burials probably after exposure of the body. Relatively great cultural differences are observed between the first two periods and period III. Period III differs from the other period by the introduction of new pottery types and iron. When we classify the anthropological material keeping these three different periods in mind it seems likely that the particular cultural periods are represented by different anthropological types.

Though the available anthropological material is too small to reach a final conclusion, the anthropological findings suggest that in period I those skull types are prevalent which are massive in structure and show certain archaic features. The Protoeuropoid and very archaic skull 01, the robust Cromagnoid skulls 04 and 101 a, the massive and rugged-bony skull 101 c and the Veddiform skulls 03 and 101 b belong beside others to this period. Not much can be said regarding the anthropological type of period II, because cremation rite was prevalent and practically no useful anthropological material was available.

In period III the gracile skull types, classified as Mediterneans are likely to be the most frequent anthropological type. Yet the other types could be observed too. (for example the Veddiform skull 197). To the same period belongs the distinctly Mongoloid skull 186.

The obvious anthropological differences between Period I and III suggest that during that time an immigration or at least a biological contact with foreign population groups took place. These may be responsible for the introduction of new cultural elements too. The manifold of the anthropological types, which exceeds the variation limits of a relatively isolated population confims this assumption. The great variation range of Timargarha population could be also observed regarding most of the craniological measurements and indices (see section 7, c).

The skull injuries, which are likely to be caused by weapons, as well as an arrow head-like copper piece discovered in the chest of a male individual[12] suggest hostile contacts with foreign groups too. This leads to the conclusion that the protohistoric population of Timargarha cemetery is at least partially not an indigeneous group. Thus the question arises regarding the biological origin and the biological connections with other prehistoric anthropological groups of the neighbouring areas.

In the introduction we have already discussed that in recent publications a chain of cultural relationships of the Gandhara grave complex to other cultures of the Asiatic region are pointed out from an archaeological and ethnological aspect. Cultural relationships do not always signify biological relations too, as we know from many examples that cultural elements can be transferred in different forms without any biological connections. Yet the cultural similarities often provide us the direction in which the biological origin and similarties are to look for.

In the present investigation the situation is, however, more com-

plicated because the archaeological similarities extend practically all over West, South and Middle Asia and many of these similarities are not yet confirmed.

In Tab. 5 and 6 some anthropological series from Asia are recorded which belong approximately to the same time period as the finds from Timargarha, and to which either archaeological or anthropological type similarities could be pointed out. The comparison of the series from Timargarha with these prehistoric population on the basis of the main anthropological measurements and indices shows that metrical similarities as well as differences could be observed between the series from Timargarha and all other groups from Asia.

Out of the comparison groups from South and West Asia (Harappa, Tepe Hissar etc.) the greatest similarities are noticeable to Tepe Hissar II when all measurements and indices are taken together. Still there are some greater differences concerning particular measurements. Tepe Hissar III and Harappa R 37 show lesser similarities, while the other series differ to a greater extent.

When we compare the male population from Timargarha with skull series from Middle Asia the surprisingly metrical affinities to Sakae groups from the Pamir are remarkable, where greater differences exist only concerning the facial measurements and indices. Partially there are also satisfactory metrical resemblance to other series from the North, especially to the small series from Tajikistan (2. Mill. B.C.) or to the skulls from the site Tasty Butak 1 north of Aral Sea which belongs to the Andronovo-culture.

Anthropological connections with North and North-west i.e. to pre-and protohistoric skeletal series from the south and south-western region of the Asiatic part of the Soviet Union exist also regarding the typological classification of the skull findings from Timargarha. Though no direct genetical relationships can be established from phenotypical affinities, morphological similarities are often indicative of such connections.

Already mentioned are the typological similarities between the Veddiform skull types from Timargarha and anthropological finds from Monzukly Tepe in South Turkmenia, Kalaly-Gyr and Kokca 3 in Ancient Chorazmian (south of Aral Sea). The same is true of the typological affinities between skull 142 b from Timargarha and skull 56, found in an ossuary of Kalaly Gyr. This skull was considered by the Russian anthropologist Trofimova representative of the Transcaspian type, a high and narrow faced

variant of the Europoid Dolichomorphs (Mediterraneans) which in recent days also represent the basic anthropological element of the population of Turkmenia.

The other Mediterraneans including there aquiline sub-group (Khorasan type according to Osanin), which form the main anthropological element of the population of Timargarha, especially in cultural period III, can be linked up with leptodolichocranic skull series from the Caspian region too. According to Ginzburg this type was wide spread in Middle Asia during the Neolithic and Bronze Age and is represented in the neolithic skull findings from Monzukly-Tepe, Ovadam-Tepe, Kara-Tepe, Geoksyur, Chapuz-Tepe, Anau, as well as in the Bronze Age skull series from South-Turkmenia (Tachirbaj), Tajikistan, the Ferghana valley, the region south of Aral Sea (Kokca 3) and partially from West Kazakistan (Al-zar, Tasty-Butak). In later periods the Sakae of the Southern Pamir belong to this type. Representatives of this type were also found among the Usuns of the region south of Lake Balkash and the vicinity of Taskent (compare Ginzburg 1966, p. 175 ff). According to Krogman (1940, p. 16) leptodolichomorph skulls with prominent noses are also traceable among the anthropological material from Tepe Hissar III.

The marked Cromagnoid component of the Timargarha population is also in favour of the anthropological connections with the North and Northwest i.e. the Middle Asiatic region. This typological component could be traced in some skulls but it is also expressed metrically in the comparatively high values of the transversal craniofacial index and the jugomandibular index (compare Tab. 5 and 6). The massive, eurydolichomorph (Cromagnoid) skulls from Timargarha with low and broad face, broad and everted gonial angles and a high and broad ascendent branch of the mandible show striking resemblance not only to anthropological finds of the Afanasevo and Andronovo culture (Andronovo-type) but also similarities to other Cromagnoid skulls of the whole territory of Northwestern Asia and Northeastern Europe, where this type is the basic anthropological population element up to the metal age. Farther to the south this type could be traced in Kokca 3, situated south of the Aral Sea during the middle of the second Mill. B.C. This site belongs to the Tazbag jab-culture, a variant of the Andronovo culture with strong cultural affinities to the lower Volga. At Kokca 3 the relatively robust Andronovo type forms the basic anthropological element besides a gracile and prognathic skull type, showing similarities to the Veddiform skulls found at Timargarha, as has been already mentioned. Yet the metrical relations between the series from Timargarha and

Kokca 3 are not so close. The presence of the relatively robust eurydolichomorph skull types (skull 101 c and 157) with strong similarities with skulls of the Corded People of the European Neolithic suggest connections in Northern and Northwestern direction too. Similar robust but high-faced and dolichocranic skulls are also found in prehistoric periods in Middle Asia e.g. in Kara-Tepe in South Turkmenia. Concerning this type anthropological relations could be found also with the West, especially Tepe Hissar, where according to Krogman the robust Protonordic type is the prevalent anthropological type beside the relatively gracile Mediterraneans.

Along with the most striking hint at the anthropological connection of Timargarha population with the North, can be considered the numerically small but very clearly Mongoloid component. In the Central Asiatic Region Mongoloid admixtures are observed for the first time with the Sakae and the Usuns of the Lake Balkash region in the first Mill. B.C., which is chronologically well in accordance with the Timargarha cemetery. According to Ginzburg (1966, p. 180)further in south and southwest (i.e. in the Caspian region) a certain degree of Mongdoid admixture is observed at a far later period and is connected with the formation of the Hunnic-Alanic clans at the beginning of the 1. Mill A.D. Possibly this opinion has to be corrected by the Mongoloid finds of Timargarha, which are definitely older than the beginning of the 1. Mill. A.D[13].

Typological comparisons were also made between the skull material from Timargarha and anthropological finds from South and Southwest Asia belonging approximately to the same time period. Except the Mediterranean type which is, as we know, the basic anthropological element in the whole South Asian region, no great similarities could be found on the basis of typological comparisons. As pointed out earlier close metrical similarities were observed between the male population of Timargarha and that of R 37 from Harappa. However, this could not be confirmed typologically. The primitive and robust so-called "Proto-australoids", which are beside the gracile Mediterraneans the most common type of R 37, differ characteristically from the Veddiform skull types from Timargarha as well as from the robust Cromagnoids or Palaeeuropoids as pointed out in details earlier.

Concerning the anthropological relationships of Timargarha population the first results of an extensive statistical comparison of the series from Timargarha with other anthropological series with the help of multivariate statistical methods (Penrose-distance) are of special interest.

In this first analysis (which is based on the 11 absolute cranial mea-

surements given in Tab. 5 and 6) were included beside the male skull series from Timargarha more than 130 longer Neolithic and Bronze Age series from Europe, North and South Asia, the Orient and North Africa[14]. Concerning the comparison groups from South Asia statistically significant similarities were only observed to the series from Tepe-Hissar III, but not to the skulls from Harappa (total series) and the series from Kish.

Contrary to this a surprisingly high number of statistically significant affinities were found to skull series from Middle and East Europe, and Middle Asia. This is true of the anthropological series belonging to the painted pottery from South Turkmenia, the Timber-grave culture of the lower Volga and Ukrainian, the western group of the Fatjanovo culture, a series of the Corded People from East Prussia and a series of the Aunjetitzer culture of Thuringia (Middle Germany), which is closely connected with the culture of the Corded People.

Although great caution is necessary regarding the interpretation of these statistical results, they not only confirm the conclusions based on typological comparison and the comparison of the arithmetic means, but also suggest that probably the morphological relationships to Eastern Europe are stronger than originally expected. The final results of this multivariate statistical analysis in which all available anthropological Series from South and Middle Asia and Europe are included, will be published later in a special work.

The anthropological connections with Middle Asia and Eastern Europe as shown on the basis of morphological comparison are confirmed by archaeological and ethnological findings too, which were emphasized by the German Ethologist Prof. Jettmar in a detailed investigation, which will be published in near future[15].

Though the information concerning the Gandhara Grave Complex at the disposal of Prof. Jettmar was scarce, he could show very interesting archaeological and ethnological relationships between the Gandhara Grave Complex and Middle Asia. In the opinion of Prof. Jettmar the final excavation reports from Swat and Dir State may present much more parallels.

Regarding the ceramics Jettmar[16] points out connections between pottery types from Swat and similar pots from the cemetery of Dyndybaj (Central Kazakistan) as well as from the Syr-darya region and the culture of Murgab area in South Turkmenia (Jaz Tepe 1). In South Turkmenia were

also found some specimens of the stone mace-head found in Swat and described by Antonini (1963, p. 23). According to Jettmar, there are further clear typological affinities between a bronze leaf-shaped blade with three central grooves and a circular disc as base (mentioned in Antonini's preliminary report), and metal objects which were developed in the Caucasus and are found also in the Ural region and the steppes of Southern Russia. In grave 142 an iron psalion (part of a horse bridle) with three holes was found which in the opinion of Jettmar typologically belongs to the Steppe region of Middle Asia, where these types are common in the Ist half of the Ist Mill. B.C. Because of the unusual material (iron) Jettmar originally suggested a retardation (i.e. a persistence of this type for a longer time period). However recently an iron psalion of the same type was found in Kazakistan too (personal communication with Prof. Jettmar).

The finding of the part of a horse snaffle in grave 142 and some bones of the same animal in grave 125 leave no doubt that we are dealing with a population breeding and using horses, which according to the general present day opinion were brought to India by the Aryans. These findings are in favour of the relationship of Timargarha population with the North i.e. the Middle Asiatic steppe region too.

Manifold structural parallels are also observed by Jettmar between the construction principles of the graves of the Gandhara grave complex and the tombs of the socalled Timber-grave culture in the Steppes, Sakae tribes at Ili and the Andronovo Culture.

Parallels can also be established with Middle Asia and even Europe regarding the relationship between sex and the position of the body in case of inflexed burials, which are found from the Neolithic onwards e.g. in Central Russian Fatjanovo Culture (compare Ozols 1962), the Andronovo Culture, among the Corded People and other different prehistoric groups of Europe (see Hausler 1966).

Possible relationships may be existing with the Syr-darya delta concerning certain practices of cremation, where the body is incompletely burnt or roasted, as we have already shown in the earlier section 5.

Particularly the manifold burial customs in the Gandhara Grave Complex have resemblances with Central Asia. According to Jettmar a great variation regarding the burial customs is observed in the Ist Mill. B.C. in this area, which is unique in the whole cultural history of mankind. This is

not only true of the royal burials but also of the other social groups.Particularly there are strong relationships to the northern region concerning the socalled fractional burials i.e. the inhumation of the bones after the decomposition of the body (found in period III of the Timargarha). This practice, adopted later by the Zoroastrians, was very common in the Ist Mill. B.C. among East Iranian tribes (Massagetae, Sogdians and Baktrians) as mentioned already in literature The exposure of the body was not the only funerary rite of these tribes, but it was found in peculiar association with body burials and cremations, which is in full agreement with the burial customs of Period III at Timargarha.

In this connection an investigation of the Russian archaeologist Rapoport on the evolution of the ossury burial rites may be of some importance. This burial custom was practised in the beginning of the Ist Mill. A.D. in Central Asia and was specially significant in connection with the Zoroastrian religion. According to Rapoport this rite, the origin of which can be be traced back to the Ist Mill. B.C., arose from a contamination of two burial customs widespread among the East Iranian tribes: the custom of exposing corpses for destruction by beasts and birds, and the custom of cremation accompanied by the placing of the ashes in urns. According to Rapoport so-called visage urns have served as prototypes of the ossuaries.

All these elements which (according to Rapoport) led to the ossuary rite in Central Asia are also observed in the cemetery of Timargarha including the visage urns (compare Dani 1966) which were also found in some specimens by the Italian excavation at Swat. With this background, the morphological similarities between skull 142 (found in the same grave like the iron psalion) and skull No. 56 from the ossuaries of Kalaly-Gyr may be of special importance.

If we sum up the previously mentioned details we may reach the following conclusion: Morphologically the population can be characterized as relatively high statured, long- and narrow-headed, with narrow nose and a medium high to high face, the breadth of which is, however, more in relation to the cranial breadth. Though a slight Mongoloid admixture could be observed, the series from Timargarha can be considered on the whole as distinctly Europoid (based on the measurements and indices of facial flatness). The metrical and specially the typological variation range, is great and comprises practically all types common in South, West, Middle and North Asia. Metrical and typological relationships are observed with the anthropological series from Tepe Hissar in the West; particularly close are, however, the anthropological connections with the North and Northwest

i.e. to the Middle Asiatic region and even Eastern Europe. This assumption could also be confirmed by archaeological and ethnological findings which show that the tribes who were living in the 2nd and Ist Mill. B.C. at the southern foothills of the Hindukush had manifold cultural connections with the North.

The present anthropological analysis and the available archaeological informations leave no doubt, that the protohistoric population groups coming to light from the cemetery of Timargarha are closely connected with the southern migration of foreign people into the Pak-Indian subcontinent which began in the second Mill. B.C. and also continued in the first Mill. B.C.

NOTES

1) In 1964 only a small number of graves were opened.

2) With the exception of the results of the study of one human skull from the necropolis of Butkara II in Swat (GENNA 1965) and the report on some traumatic lesions in some human bones from the same cemetery (G. ALCIATI and M. FEDELI 1965)

3) The orientation of the graves and the bodies varies in particular burials from west to east till south-west to north-east. These small variations are not taken into consideration in this report, which is also true of the facing. Only the main cardinal directions (west-east, south-north) are given here.

4) It is an example of fractional burial — editor.

5) See P. 59 note. As the author has corrected later in his footnote, this burial falls outside the scope of the Gandhara Grave Culture. It may be a Muslim burial.—ed.

6) Grave 136, the only burial where the skeleton was lying in extended position most probably belongs to a far later time and does not belong to this cultural complex.

7) This is a case of partial burial in a Grave having urns with cremated bones.—ed.

8) In this connection the question arises, whether these graves show certain structural similarities with collective graves as traceable till recent past in Gilgit Agency where the skulls are also placed on raised platforms after the decomposition of the flesh. (compare Jettmar 1967).

9) The handling together of males and females and of two of our age groups was necessary, as the data for the comparison is specified in that manner.

10) With the term "veddiform" it should be noted that this and other skulls show morphological (phaenotypical) similarities with the present day Veddoid racial type. The question whether there are genetical connections or not can not to be answered at the present state of exploration.

11) This date could be confirmed by radio-carbon dating (see Introduction).

12) Found in a grave of 1964 excavation season (verbal communication by Mr. F. A. Durrani, Peshawar).

13) In this connection however the question arises if a relatively flatfaced skull from Chapuz-Tepe (3rd Mill. B.C.) in South-Turkmenia already belongs to the Mongoloid stock (compare Trofimova 1964 b, p. 6).

14) This material was collected in connection with the preparation of the International Symposium on Neolithic (and Bronze Age) of Europe, Asia and North Africa in autumn 1966 in Mainz. Compare "Vergleichende statiscische Untersuchungen zur Anthropologie des Neolithikums" to be published in near future in HOMO, Zeitschr. f. d. Vergleichende Forschung am Menschen. This work contains an article of the author on South Asia, Orient and North Africa, in which, however, the material from Timargarha is not included.

15) Prof. Jettmar was kind enough to permit the author to go through the unpublished work.

16) The comparisons of Prof. Jettmar were only based on the Preliminary Notes on the Excavation of the Nedropolis found in Western Pakistan (Antonini 1963) and verbal communications by Prof. Tucci (Rome) and the author.

BIBLIOGRAPHY*

ACSADI, G. and J. NEMESKERI: Palaedemographische Probleme am Beispiel des frumittelalterlichen Graberfeldes von Halimba-Cseres. Kom. Veszprem/Ungarn. HOMO 8, 133-148, 1957.

ALGIATI, G. and M. FEDELI: On some traumatic lesions in human bone remains of the necropolis of Butkara II (Swat, West Pakistan). East and West, N.S. Vol. 15, Nos. 3-4, 168-173, 1965.

ANTONINI, Ch.S. : Preliminary notes on the excavation of the necropolises found in Western Pakistan. East and West, N.S. Vol. 14, Nos. 1-2, 13-26, 1963.

BRABENDER, I. : Beitrage zur palaobiologischen Rekonstruktion prahistodischer kalifornischer Populationen. HOMO 16, 200-230, 1965.

BROTHWELL, D.R. : Digging up bones. London 1963.

BUXTON, L.H.D. and D. RICE: Report on the human remains found at Kish. Journ. Royal Anthropol. Inst. of Great Britain and Ireland, Vol. 61, 57-119, 1931.

CAPPIERI, M. : The Mediterraneans in connection with the prehistoric Indian population. Proc. World Population Conf., Vol. II, 761-782. Rome 1954,

— : Die asiatischen Proto-Mediterranen. Ethnographisch-Archaeologische Zeitschr. (EAZ), 2, 95-111, 1961.

: Die Bevolkerung der Indus-Zivilisation. Anthropologischer Anz., 29, 22-23, 1965.

COON, C.S. and E.E. HUNT jr. : Anthropology A to Z. New York 1963.

DANI, H.A. : Gandhara grave complex in West Pakistan (in press).

EHRHARDT, S. : Uber protohistorische menschliche Skelettfunde in Vorderindien. Z.F. Morph. Anthr., 65, 33-52, 1964.

— and K.A.R. KENNEDY: Excavations at Langhnaj· 1944-63, Part III: The human remains. Poona 1965 (Deccan College Building Centenary and Silver Jubilee Series 27).

EICKSTEDT, E.v. : Rassenkunde und Rassengeschichte der Menschheit. Stuttgart 1934.

FRIEDRICHS, H.F. u. w. MULLER: Die Rassenelemente im Industal Wahrend des 4. u. 3. vorchristlichen Jahrtausends and ihre Verbreitung. Anthropos 28, 383-405, 1933.

FURST, C.M. : The skeletal material collected during the excavation of Dr. T.J. Arne in Shah Tepe at Astrabad-Gorgan in Iran. Reports from the scientific Expedition to the North-Western provinces of China under the leadership of Dr. Sven Hedin.- The Sino-Swedisch-Expedition — Publication 9, 9-35, Stockholm 1939.

GENNA, G. : First anthropological investigations of the skeletal remains of the necropolis of Butkara II (Swat, West-Pakistan). East and West, N.S., Vol. 15, Nos. 3-4, 161-167, 1965.

GINZBURG, V.V. : Materialy k antropologi i nasalenija Zapadnogo Kazachstana v epochu bronzy. Materialy I issledovanija po archeologi i SSSR 120, 186-198, 1962 (Materials concerning the anthropology of the population of West Kazachstan during the Bronze Age).

— K antropologii nasalenija Ferganskoj doliny v epochu bronzy. Materialy j issledovanija po archeologii SSSR 118, 211-218, 1962 (Anthropology of the population of Ferghana valley during Bronze Age).

— Die Entstehung des Mittelasiatischen Zwischenstromtypus. HOMO 17, 172-190, 1966.

GUPTA, P., P.C. DUTTA and A. BASU: Human remains from Harappa. In: Human skeletal remains from Harappa. Anthropological survey of India, Mem. No. 9, 13-278, Calcutta 1962.

HAUSLER, A.: Zum Verhaltnis von Mannern, Frauen und Kindern in Grabern der Steinzeit. Arbeits- und Forschungsber. zur Sachs. Bodendenkmal- pflege. 14/15, 25-73, Berlin 1966.

HERRERER, G.G. KURTH und I. SCHWIDETZKY: Anthropologie (Fischer-Lexikon). Frankfurt-Hamburg 1959.

HOWELLS, W.W.: Estimating population numbers through archaeological and skeletal remains. Viking Fund Publ. in Anthrop., New York 1960.

*Only such works are listed here which are specially mentioned in the present paper.

JETTMAR, K.: (in press - 1967)
KIYATKINA, T.P.: The formation of the anthropological type of the population of Tadjikistan, 11 pp., VII. Intern. Congr. of Anthrop. and Ethnol. Sciences (Moskau 1964). "Nauka" Publishing House, Moscow 1964.
KROGMAN, W.M.: Racial types from Tepe Hissar, Iran, from the late fifth to the early second Millenium B.C., Amsterdam 1940.
— The human skeleton in Forensic Medicine. Springfield 1962.
MARTIN, R. and K. SALLER: Lehrbuch der Anthropologie 3. ed. Vol. I, Vol. II, Stuttgart 1957, 1959.
MONTAGU, M.F.A.: A handbook of anthropometry. Springfield 1960.
MEMESKERI, J., L. HARSANYI and G. ACSADI: Methoden zur Diagnose des Lebensalters von Skelettfunden. Anthropologischer Anz. 24, 70-95, 1960.
OZOLS, J.: Ursprung und Herkunft der zentralrussischen Fatjanowo Kultur. Berliner Beitrage zur Vor- u. Fruhgesch., VOL. 4, Berlin 1962.
RAPOPORT, Y.A.: Some aspects of the evolution of Zoroastrian funeral rites (according to archaeological finds). Trudy XXV. mezdumarodnogo kongressa vostokovedow, M. 9-16 Avg. 1960. (XXV. Intern. Congr. of Orientalists papers, Moscow 1960), t. III, 127-134, Moskva 1963.
SCHWIDETZKY, I. : Europide und Mongolide in Russisch-Asien sejt dem Jungpalaolithikum. HOMO 14, 151-167, 1963.
— Sonderbestattungen und ihre palaedemographische Bedeutung. HOMO 16, 230-247, 1965.
— Statistische Untersuchungen zu v. Eickstedts Indientypologie und der Frage der Beziehung zwishchen Weddiden und Australiden, HOMO 17, 88-96, 1966.
SEWELL, R.B.S. and B.S. GUHA: Human remains. In: Marshall, J.: Mohenjodaro and the Indus civilization II, 599-648, London 1938.
STACUL, G.: Preliminary report on the pre-Buddhist necropolis in Swat (W. Pakistan). East and West, N.S., Vol. 16, Nos. 1-2, 37-79, 1966.
TROFIMOVA, T.A.: Palaeoanthropological remains coming from the territory of ancient Korezm. East and West, N.S. 8, Nos. 3-4, 283-302. 1957.
— Drevnee nasalenie Charezma po dannym paleoantropologii. 175 pp. Mat. Chorez. Exped. 2, Moskva 1959. (The ancient populations of Chorezmien according to palaeoanthropological data).
— Nasalenie srednej azii v epochu eneolita i bronzovogo wka i ego svjazi s indiej (po dannym kraniologii); (Population of Central Asia in the Eneolithic epoch and Bronze age and its connections with Indian peoples (according to craniological data). In: Modern Anthropology. Transactions of the Moscow society of naturalists Vol. XIV, 289-300, Moscow 1964 (a).
— Population of Southern Turkmenia in the ancient times and its Near Eastern and South Indian connections according to palaeoanthropological data. 13 pp. II. Intern. Congr. of Anthrop. and Ethnol. Sc. (Moscow 1964). "Nauka" Publishing House, Moscow 1964 Ib).
TROTTER, M. and G.C. GLESER: Estimation of stature from long bones of American Whites and Negroes. Am. J. of Phys. Anthrop. N.S. 10, 463-514, 1952.
TUCCI, G.: Preliminary report on an archaeological survey in Swat East and West. N.S. 9, No. 4, 279-328, 1958.
WOO, T.L. and G.M. Morant: A biometric study of the "flatness" of the facial skeleton in man. Biometrica XXVI, 196-268, 1934.

Acknowledgements

I wish to express my indebtness to all those persons and organisations whose help could only bring this work to completion.

I am particularly grateful to Prof. Dr. H.A. Dani, chairman of the Department of Archaeology University of Peshawar and Dr. F.A. Khan, Director of the Department of Archaeology, Government of Pakistan (Karachi), for the kind invitation and the invaluable guidance during my stay in Pakistan. To the staff members of both Departments, I also wish to express my thanks for their untiring assistance and cooperation not only during the excavation but also in transporting the material to Germany. My

indebtness is also due to the Vice-Chancellor of the University of Peshawar, Mr. Muhamad Ali and his officers for all the facilities provided to me during my stay in Peshawar.

For specific advice and guidance regarding anthropological and prehistoric problems and profitable discussions I have special reason to be grateful to Prof. Dr. I. Schwidetzky, University of Mainz and Prof. Jettmar, University of Heidelberg. It is a pleasure to acknowledge my sincere thanks and appreciations for the kind help of Dr. Roth-Lutra and Dr. Hemmer, University of Mainz in determination of age and sex of the skeletal material and the determination of the zoological remains. I am also indebted to Dr. Munnich and Mr. Berdau, II. Inst. of Physics. University of Heidelberg, for conducting the C^{14} -datings.

Finally I express my thanks to Mr. V.P. Chopra for the kind assistance in completing this work in English language. Last but not least are my thanks to Deutsche Forschungsge meinschaft (German Research Foundation), for the financial support of this research project.

Table 1: Site, sex and age at death distribution of all skeletons.

Age group (years)	Sex	Site No. I (n=)	Site No. II (n=)	Site I&II (n=)
0 — 1	M&F	9	2	11
1 — 7	M&F	7	8	15
8 — 14	M&F	1	3	4
15 — 19	M	—	1	1
	?	—	1	1
	F	1	—	1
20 — 30	M	5	2	7
	?	1	—	1
	F	14	4	18
30 — 40	M	8	3	11
	?	1	1	2
	F	6	3	9
40 — 50	M	5	1	6
	?	—	2	2
	F	—	—	—
50 — 60	M	2	1	3
	?	1	—	1
	F	—	1	1
Over 60	M	3	1	4
	?	1	—	1
	F	2	2	4
adults, age however not exactly determinable	M	8	5	13
	?	7	6	13
	F	3	5	8
Total (n=)		85	52	137

Table 2: Age at death and sex distribution of adults (explanations see text).

Age group (years)	Males n	Males %	Females		Males & Females %		Males & Females n	Males & Females %
20 — 29	7	22,6	18	56,3	25	39,7)	45	71,5
30 — 39	11	35,5	9	28,1	20	31,8)		
40 — 49	6	19,4	0	00,0	6	9,5)	10	15,9
50 — 59	3	9,7	1	3,1	4	6,4)		
Over 60	4	12,9	4	12,5	8	12,6	8	12,6

Table 3: Age at death distribution of Timargarha population compared with other prehistoric and ancient people of approximately the same time period (males and females[9]).

Location Period	n	Age at death (%) 20—39 years	40—49 years	Over 60 years	Source
Timargarha Bronze Age, Early Iron A.	63	71,5	15,9	12,6	Present material
Lower Austria Early Bronze A.	203	52,6	37,7	9,7	Franz and Winkler (1936)
Greece Middle Bronze, Early Iron A.	175	50,9	46,3	2,8	Angel (1947)
Egypt, Roman times	98	62,2	23,5	14,3	Pearson (1902)
Rome, during Empire	3676	68,3	18,6	13,1	Macdonell (1913)

Tab. 4: Main measurements and indices of the series from Timurgarha.

Measurements and Indices	Males (n=9) Mean	Variat. range	Females (n=11) Mean	Variat. range
Max. cran. length	190,22	(179 — 196)	180,20	(166 — 186)
Max. cran. breadth	132,00	(126 — 139)	130,90	(118 — 137)
Bas.-bregm. height	136,00	(124 — 148)	129,20	(125 — 133)
Min. front. breadth	93,75	(91 — 98)	91,67	(86 — 97)
Bizygomatic breadth	133,00	(125 — 139)	122,33	(114 — 137)
Total facial height	119,33	(109 — 126)	113,17	(102 — 125)
Upper facial height	70,25	(63 — 78)	66,57	(61 — 73)
Orbital height	33,25	(30 — 36)	33,13	(30 — 35)
Orbital breadth	41,50	(38 — 45)	40,00	(38 — 44)
Nasal height	50,00	(41 — 57)	48,13	(40 — 53)
Nasal breadth	22,88	(20 — 25)	22,86	(20 — 28)
Bigonial breadth	102,60	(87 — 111)	94,00	(91 — 97)
Cephalic index	69,40 (hyperdolichocranic)	(67,02-72,77)	72,87 (dolichocranic)	(63,44-78,61)
Length-height index	71,55 (orthocranic)	(64,92-78,31)	72,57 (orthocranic)	(69,75-80,12)
Breadth-height index	103,23 (akrocranic)	(89,20-113,85)	102,04 (akrocranic)	(97,65-111,02)
Trans. cranio-fac. ind.	100,72	(96,15-108,73)	94,73	(91,54-100,74)
Total facial index	88,72 (meso-(lepto)prosopic)	(83,85-92,23)	90,05 (leptoprosopic)	(85,71-93,85)
Upper facial index	51,85 (mesen)	(47,06-54,89)	52,21 (mesen)	(48,91-54,55)
Nasal Index	46,15 (lepto-(meso)rrhinic)	(35,09-59,52)	48,30 (mesorrhinic)	(41,51-59,57)
Orbital index	80,56 (mesoconchic)	(66,66-94,74)	83,30 (mesoconchic)	(77,27-87,18
Jugo-mandib. index	77,52	(69,60-81,62)	77,12	(73,39-80,67)
Simotic index	58,57	(34,39-83,15)	52,07	(30,63-68,29)
Dacryon index	72,01	(51,32-85,35)	65,43	(53,03-77,06)
Naso-malar angle	134,14°	(145-119)	139,50°	(145 — 131)
Zygomaxillar angle	120,00°	(134 — 112)	140,60°	(142 — 119)
Cranial capacity	1411,81 cc. (euencephalic)	(1293-1488)	13,14,85 cc. (aristencephalic)	(1120-1543)
Stature	(n=17)		(n=12)	
Manouvrier	168,0 cm	(157,1-178,9	158,4 cm	(145,5-166,0)
Trotter & Gleser	171,6 cm	(163,6-181,8)	160,7 cm	(148,2-168,5)

Tab. 5: Main craniological measurements and indices of the series from Timargarha and some other series from South and West Asia (only males).

Location (culture) Time period, Source	n max.	g-op M1**	eu-eu M8	ba-b M17	ft-ft M9	zy-zy M45	n-pr M48	mf-ek M51	orbh M52	n-ns M55	nasb M54	go-go M66	LBI 8/1	BHI 17/8	CFI 45/8	UFI 48/45	NI 54/55	OI 52/51	JMI 66/45
Timargarha 2.-1. Mill. B.C. Present series	9	190,2	132,0	136,0	93,8	133,0	70,2	41,5	33,2	50,0	22,9	102,6	69,1	103,2	100,7	51,9	46,5	80,5	77,5
Harappa (total) 2500-1500 B.C. Gupta et al. '62	29	185,9	136,2	134,0	96,2	131,2	69,2	41,6	33,4	51,6	26,2	88,5	73,5	98,4	95,9	51,6	50,6	80,6	68,8
Harappa R 37	14	187,5	133,3	133,8	95,2	131,3	70,6	42,4	33,9	51,9	26,7	89,1	71,1	100,2	97,9	52,7	51,1	80,3	69,7
Harappa G 289	7	180,8	138,5	133,5	98,5	127,9	66,6	40,6	32,1	50,7	25,7	91,0	76,4	96,9	90,8	51,7	50,7	79,5	75,6
Harappa H I	3	187,3	138.0	135,0	96,8	133,5	65,5	41,8	31,8	49,0	27,0	87,3	73,8	97,9	96,7	49,2	55,2	76,0	65,6
Harappa H II	6	189,1	144,7	134,8	95,8	136,0	70,3	40,6	34,5	52,7	25,5	79,0	76,7	93,7	97,8	50,0	47,6	85,4	55,5
Tepe Hissar II 2500-1500 B.C. Krogman '40	9	188,8	132,0	134,8	94,2	128,2	67,0	41,0	31,6	50,4	25,1	—	70,1	102,6	94,5	56,2	48,9	76,4	—
Tepe Hissar III 2000-1800 B.C.	111	188,4	134,2	134,9	95,7	127,7	70,0	41,4	32,0	50,6	25,5	—	71,3	100,6	94,9	54,6	50,6	77,3	—
Mohenjo-daro 3. Mill. B.C. Friedrichs '33	8	185,1	127,5	124,6	92,6	125,2	67,7	38,0	31,9	48,1	24,0	—	69.0	105,2	94,3	52,8	50,3	85,2	—
Shah Tepe (Hor. II) 2. Mill. B.C. Furst '39	4	189,8	141,0	122,0	—	120,0	70,0	37,0	31,0	49,0	23,0	—	74,3	89,7	93,3	56,9	46,9	83,8	—
Kish (A-Graves) 3. Mill. B.C. Buxton et al. '31	23	188,2	136,7	130,9	94,7	125,3	—	41,5	34,5	57,0	23,8	92,2	72,9	95,4	91,9	—	40,8	81,6	73,6*

* Measurements and indices calculated from the arithmetic means.
** Measurements taken according to Martin-Saller (see also Collective Tables A-C))

Tab. 6: Main craniological measurements and indices of the series from Timargarha and some other series from Middle Asia (only males).

Location (culture) Time period, Source	n max	g-op M1**	eu-eu M8	ba-b M17	ft-ft M9	zy-zy M45	n-pr M48	mf-ek M51	orbh M52	n-ns M55	nasb M54	go-go M66	LBI 8/1	BHI 17/8	CFI 45/8	UFI 48/45	NI 54/55	OI 52/51	JMI 66/45
Timargarha 2.-1. Mill. B.C. Present series	9	190,2	132,0	136,0	93,7	133,0	70,2	41,5	33,2	50,0	22,9	102,6	69,1	103,2	100,7	51,9	46,5	80,5	77,5
Kara Tepe 4.-3. Mill. B.C. Trofimova '64	15	194,8	134,9	143,7	95,2	129,9	72,6	42,4	31,3	51,4	26,5	106,4	69,4	105,7	96,8	56,0	52,1	74,9	81,2
Afanasevo 2500-1200 B.C. Colect. samp***	17	191,7	142,4	140,2	100,7	141,6	71,7	43,7	32,3	53,1	27,1	101,4	70,9	98,6	99,4	50,9	51,1	73,1	71,6
Andronowo 1700-1200 B.C. Coll. sample***	38	187,2	145,0	138,7	100,9	141,5	68,3	44,8	31,7	50,5	26,1	105,0	77,5	95,7	97,6	48,1	51,7	70,9	74,2
Kokca 3 2. Mill. B.C. Trofimova '59	5	185,4	139,0	140,2	101,4	136,2	68,6	45,2	30,8	50,0	24,3	—	72,2	101,2	98,0	50,4	48,7	68,4	—
Tasty-Butak 1 Bronze Age Ginzburg '62	4	189,2	133,5	136,5	91,7	129,0	66,5	39,7	30,7	49,5	24,2	—	70,6	104,6	96,6	53,1	49,2	77,3	—
Tadjikistan 2. Mill. B.C. Kiyatkina '64	4	196,0	138,0	142,2	98,0	139,0	77,0	46,5*	33,7	52,6	25,4	—	70,2	103,0*	100,7*	55,4	48,2	71,0	—
Tadjikistan 1. Mill. B.C.	16	183,5	146,1	139,3	98,0	137,9	70,0	42,1*	31,8	24,6	24,6	—	79,5	95,3*	94,4*	50,2	48,9	75,5	—
Ferghana valley Bronze Age Ginzburg '62	9	181,7	131,8	131,5	94,5	123,8	66,7	40,4*	32,4	47,1*	24,2	—	72,6	98,9	93,9*	54,0	51,3	80,2	—
Sakae (Pamir) 1. Mill. B.C. Kiyatkina '64	34	191,5	134,5	132,3	94,3	130,6	75,4	42,1*	34,6	54,2	24,5	—	69,9	98,3*	97,1*	58,0	46,0	82,1	—
Kalaly-Gyr 1 2.-3. Cent. A.D. Trofimova '59	31	182,0	144,7	138,6	97,6	132,5	72,9	42,0	33,5	54,1	26,3	—	79,9	94,8	9191,5*	54,9	48,7	79,6	—

* &

** Compare Tab. 5.

*** Collected in connection with the Neolithic & Bronze Age Symposium (comp. Sec. III, E).

Collective Table A: Basic Measurements of the Cranium

Skl. No.	sex	Age at death (years)	Maximum Cranial Length	Nasion-basion line	Maximum Cranial breadth	Minimum frontal breadth	Maximum frontal breadth	Biauricular breadth	Biasterionic breadth
			* M 1	M 5	M 8	M 9	M 10	M 11	M 12
01	Male	20-25	196	109	138	92	—	126	116
03	male	40-50	192	101	130	98	104	109	109
04	male	40-45	179	104	126	90	111	123	103
05	male	30-35	191	114	128	94	107	—	102
101c	male	30-35	195	(103)**	131	95	115	119	106
139	male	30-35	190	104	129	97	111	117	107
142a	male	30-40	189	104	137	93	115	125	107
165a	male	50-60	189	110	130	91	105	100	102
173a	male	40-50	191	89	139	—	—	120	117
02	female	30-35	173	91	128	91	110	111	103
06	female	20-25	176	99	127	92	106	113	98
101a	female	over 60	184	90	128	86	104	121	108
101b	female	20-25	166	94	130	93	115	112	102
134	female	25-30	186	—	141	—	115	125	106
142b	female	30-40	183	—	137	95	124	—	128
144	female	20-25	189	—	134	95	110	129	106
157	female	30-35	—	—	—	—	—	—	—
173b	female	30-35	186	94	1181	81	99	98	100
186	female	25-30	176	—	136	97	—	—	—
197	female	20	183	97	130	95	115	114	105

* = Measurements taken according to Martin-Saller Vol. I.
** = Measurement, which could be taken only approximately.

Collective Table A: Continued

Skl. No.	Basion-bregma height	Porion-bregma height	Horizontal circumference	Transvers. cranial arc (porion-porion)	Transvers. cranial arc (auriculare-auriculare)	Sagittal cranial arc	Frontal arc	Parietal arc	Occipital arc
	M 17	M 20	M 23	M 24	M 24b	M 25	M 26	M 27	M 28
o1	132	114	544	293	286	(385)	127	—	—
o3	131	114	527	300	293	393	134	127	132
o4	134	116	499	295	289	359	115	132	112
o5	145	122	518	—	—	374	131	136	107
101c	137	123	525	313	307	394	(138)	138	118
139	136	118	521	305	296	387	135	127	(125)
142	137	115	521	307	301	375	131	134	110
165a	148	129	515	320	314	381	138	130	113
173a	124	108	523	289	280	383	129	130	124
o2	125	113	490	296	290	359	129	125	105
o6	—	116	493	290	285	—	120	125	—
101a	128	114	498	284	274	358	120	122	116
101b	133	119	470	311	292	354	123	119	112
134	—	124	516	319	315	371	132	114	(125)
142b	—	116	529	301	296	—	131	122	—
144	—	119	526	328	321	—	115	118	—
157	—	—	—	—	—	—	119	108	—
173b	131	114	491	285	281	364	127	132	(105)
	—	95	494	—	—	—	114	118	—
197	129	117	510	308	302	377	131	131	(115)

Collective Table A: Continued

Skull No.	Frontal chord	Height of the curvature of the frontal bone over the frontal chord	Parietal chord	Occipital chord	Height of the curvature of the occipital bone over the occipital chord	Prosthion-basion line	External biorbital breadth	Internal biorbital breadth (IOW according to Woo and Morant 1934)	Subtense of the nasion from the chord IOW
	M 29	—	M 30	M 31	—	M 40	M 43	M 43/1	—
o1	107	22,0	—	—	—	102	109	105	16,7
o3	113	29,0	117	103	29,8	109	(106)	—	—
o4	104	22,0	117	94	26,1	98	99	94	18,6
o5	114	27,2	120	92	26,3	—	100	94	18,8
101c	(125)	—	124	101	26,0	97	106	99	—
129	115	(30,2)	117	94	—	96	100	92	22,0
142a	115	29,0	121	89	27,0	113	98	92	21,2
165a	120	—	113	89	—	99	99	94	28,1
173a	113	25,5	114	103	24,1	87	(109)	—	—
o2	111	29,1	108	88	25,5	85	96	89	16,5
o6	106	26,4	111	—	—	—	95	91	16,7
101a	110	25,1	112	94	32,9	(84)	96	88	16,3
101b	106	29,5	104	100	24,9	84	100	93	15,8
134	116	—	104	—	—	—	—	—	—
142b	109	28,5	111	—	—	—	97	90	20,4
144	102	—	107	—	—	—	—	—	—
157	107	24,3	97	—	—	—	92	—	—
173b	110	—	116	(82)	—	94	88	82	16,0
186	99	26,0	105	—	—	—	99	96	15,1
197	111	30,0	118	—	—	97	101	95	17,2

Collective Table A: Continued

Skull No.	Bizygomatic breadth	Bizygomaxillare breadth (GB according to Woo and Morant 1934)	Subtense of the subspinale from the chord BG	Nasion-gnathion line (Total facial height)	Nasion-prosthion line (Upper facial height)	Ant. interorbital breadth	Subtense from Ant. interorbital breadth	Orbital breadth	Orbital height
	M 45	M 46	—	M 47	M 48	M 5o	—	M 51	M 52
o1	139	1o6	22,8	124	73	18,7	7,2	44	34
o3	(125)	93	24,1	1o9	63	—	—	42	33
o4	137	95	28,5	—	71	15,1	1o,7	43	31
o5	—	—	—	—	—	19,9	11,o	—	—
1o1c	133	96	26,1	(124)	(73)	—	—	41	33
139	(128)	94	29,o	117	(7o)	2o,o	—	38	36
142a	—	—	—	—	7o	2o,5	1o,o	39	34
165a	—	94	32,o	(126)	78	19,o	11,9	4o	35
173a	136	—	—	116	64	17,o	9,o	45	3o
o2	(121)	—	—	111	65	14,4	8,o	39	34
o6	—	—	—	—	—	21,7	—	—	—
1o1a	119	87	2o,6	—	—	15,3	6,9	4o	34
1o1b	(119)	92	21,7	1o2	61	19,6	8,2	38	3o
134	—	—	—	—	—	—	—	—	—
142b	—	94	26,2	124	71	16,2	9,6	41	35
144	—	—	—	—	—	—	—	—	—
157	—	—	—	125	73	14,7	1o,o	—	32
173b	(114)	—	—	1o7	6o	(15,o)	—	38	33
186	(137)	96	16.8	—	67	—	—	44	34
197	124	95	21,1	11o	69	17,6	7,9	4o	33

Collective Table A: Continued

Skull No.	Nasal breadth	Nasal height	Maxillo-alveolar length	Maxillo-alveolar breadth	Palatal length	Palatal breadth	Dakryon chord (DC according to Woo Morant)	Dakryal subtense (DS according to	Simotic chord (SC according to	Simotic subtense (SS according to
	M 54	M 55	M 6o	M 61	M 62	M 63	DC	DS	SC	SS
o1	25	52	—	—	—	—	22,6	11,6	7,0	2,4
o3	25	42	53	62	51	45	—	—	—	—
o4	23	51	56	61	44	37	18,5	14,2	8,6	6,5
o5	—	—	—	—	—	—	19,8	16,9	13,7	6,3
1o1c	24	53	—	61	—	—	—	—	—	—
139	2o	52	—	62	—	38	—	—	—	—
142a	22	52	—	—	—	39	—	—	9,5	7,9
165a	20	57	6o	—	5o	—	19,3	14,4	9,9	5,5
173a	24	41	—	—	—	—	—	—	8,8	5,o
o2	(2o)	49	—	—	—	—	16,8	11,2	8,o	4,5
o6	—	—	—	—	—	—	—	—	—	
1o1a	23	49	—	—	—	—	19,4	12,o	6,7	3,o
1o1b	22	43	53	59	4o	37	19,8	1o,5	11,1	3,4
134	—	—	—	—	—	—	—	—	—	—
142b	25	52	—	59	—	—	19,6	14,6	7,9	5,1
144	—	—	—	—	—	—	—	—	—	—
157	22	53	—	—	—	—	17,o	13,1	8,2	5,6
137b	(20)	4o	—	—	—	—	—	—	—	—
186	—	(52)	—	69	—	—	—	—	—	—
197	28	47	53	62	43	37	18,5	11,o	7,1	3,4

Collective Table A: Continued

Skull No.	Frontal inclination angle (Nasion-metopion)	Frontal inclination angle (Glabella-metopion)	Facial profile angle	Nasal profile angle	Alveolar profile angle	Profile angle of the nasal bone	Angle of the nasal bone with nasion-prosthion line	Naso-malar angle	Zygo-maxillary angle
	M 32	—	M 72	M 73	M 74	M 75	M75(1)	M77	—
o1	75°	62°	86°	88°	84°	—	—	145°	134°
o3	84°	75°	77°	81°	73°	—	—	142°	126°
o4	77°	72°	84°	86°	82°	54°	30°	137°	118°
o5	—	—	—	—	—	—	—	136°	—
101c	—	75°	—	—	76°	—	—	—	123°
139	83°	78°	—	87°	—	—	—	129°	117°
142a	74°	68°	—	—	—	—	—	131°	—
165a	78°	73°	84°	86°	—	54°	30°	119°	112°
173a	80°	72°	—	—	—	—	—	—	—
o2	79°	72°	84°	87°	—	55°	29°	140°	—
o6	—	—	—	—	—	—	—	139°	—
101a	81°	76°	—	—	—	—	—	140°	130°
101b	94°	91°	78°	83°	71°	53°	25°	143°	130°
134	—	—	—	—	—	—	—	—	—
142b	—	—	—	—	—	—	—	131°	119°
144	—	—	—	—	—	—	—	—	—
157	—	—	—	—	—	—	—	—	—
173b	—	—	—	—	—	—	—	138°	—
186	—	—	—	—	—	—	—	145°	142°
197	92°	89°	79°	82°	72°	64°	15°	140°	132°

Collective Table B: Measurements and angles of the mandible.

Skull No	Bicondylar breadth	Bigonial breadth	Mandibular length	Maximum projective mandibular length	Symphysial height	Thickness of the mandibular body.	Height of mandibular ramus	Minimum breadth of mandibular ramus	Minimum breadth of mandibular ramus	Mandibular angle
	M65	M66	M68	M68(1)	M69	M69(3)	(3)M7o	M71	M71a	M79
o1	134	1o8	81	112	86	15	78	39	38	1o7°
o3	114	87	76	1o5	36	1o	64	32	31	119°
o4	—	—	—	—	—	—	—	—	—	—
o5	—	—	—	—	—	—	—	—	—	—
1o1c	115	1o3	73	114	38	15	62	32	31	137°
139	—	1o4	84	—	33	13	—	34	34	116°
142a	—	—	—	—	—	—	—	—	—	—
165a	—	—	—	—	32	12	—	—	—	—
173a	—	111	88	1o7	36	14	7o	32	31	12o°
o2	—	—	—	—	31	o8	6o	32	3o	117°
o6	—	—	—	—	—	—	—	—	—	—
1o1a	122	92	67	99	26	o9	65	31	29	122°
1o1b	—	96	66	—	3o	12	—	26	25	121°
134	—	—	—	—	—	—	—	—	—	—
142b	—	97	—	—	33	11	—	29	27	125°
	—	—	—	—	29	o9	—	—	—	—
157	—	—	—	—	35	12	—	—	—	—
173b	—	—	—	—	32	11	61	29	29	122°
186	—	—	—	—	—	—	—	—	—	—
197	—	91	72	—	29	1o	—	3o	3o	123°

Collective Table C: Estimated cranial capacity and main craniological indices.

Skull No.	Estimated Cranial Capacity	Length-breadth index	Length-hight index	Breadth-height index	Length-auricular height index	Breadth-auricular height index	Trans. fronto-parietal index	Total facial index
		M8/M1	M17/M1	M17/M8	M2o/M1	M2o/M8	M9/M8	M47/M45
o1	1457,7	7o,41	67,35	95,65	58,16	82,61	66,67	89,21
o3	1373,9	67,71	68,23	1oo,77	59,38	87,69	75,38	63,85
o4	1293,9	7o,39	74,86	1o6,35	64,8o	92,o6	71,43	—
o5	1422,3	67,o2	75,92	113,28	63,87	95,31	73,44	—
1o1c	1478,4	67,18	7o,26	1o4,46	63,o7	93,89	72,52	93,23
139	139o,4	67,89	71,58	1o5,54	62,11	91,47	75,19	91,41
142a	142o,5	72,49	72,49	1oo,oo	6o,85	83,94	67,8o	—
165a	1488,1	68,78	78,31	113,85	68,25	99,23	7o,oo	—
173a	1381,7	72,77	64,92	89,2o	56,54	77,69	—	85,92
o2	123o,8	73,99	72,25	97,65	65,31	88,28	71,o9	91,74
o6	1268,9	72,16	—	—	65,91	91,34	72,44	—
1o1a	13o6,7	69,57	69,57	1oo,oo	61,95	89,o6	67,19	—
1o1b	1258,1	78,31	8o,12	1o2,31	71,68	91,53	71,54	85,71
134	1542,7	75,81	—	—	66,67	87,94	—	—
142b	1399,7	74,86	—	—	63,39	84,67	69,34	—
144	1443,6	7o,89	—	—	62,96	88,81	7o,9o	—
157	—	—	—	—	—	—	—	—
173b	123o,7	63,44	7o,43	111,o2	61,29	96,61	68,64	93,85
186	1119,6	78,61	—	—	54,91	69,85	71,32	—
197a	1347,7	71,o4	7o,49	99,23	63,93	9o,oo	73,o8	88,71

Collective Table C: Continued

Skull No.	Upper facial index	Nasal index	Orbital index	Dacryal index	Simotic index	Transv. craniofacial index	Jugo-mandibular index	Jugo-frontal index
	M48/M45	M54/55	M52/M51	DC/DC	SS/SC	M45/M8	M66/M45	M9/M45
o1	52,25	48,o8	77,27	51,32	34,29	1oo,72	77,7o	66,19
o3	5o,4o	59,52	78,57	—	—	96,15	69,6o	78,4o
o4	51,82	45,1o	72,o9	76,76	75,58	1o8,73	—	65,69
o5	—	—	—	85,35	45,99	—	—	—
1o1c	54,89	45,28	8o,49	—	—	1o1,53	77,44	71,43
139	54,69	38,46	94,74	—	—	99,22	81,25	75,78
142a	—	41,51	87,18	—	83,15	—	—	—
165a	—	35,o9	87,5o	74,61	55,56	—	—	—
173a	47,o6	58,54	66,66	—	56,82	97,84	81,62	—
o2	53,72	4o,82	87,18	66,66	56,25	94,53	—	75.2o
o6	—	—	—	—	—	—	—	—
1o1a	—	46,94	85,oo	61,86	44,78	92,97	77,31	72,27
1o1b	51,26	51,16	78,95	53,o3	3o,63	91,54	8o,67	78,15
134	—	—	—	—	—	—	—	—
142b	—	48,o7	85,37	74,49	64,56	—	—	—
144	—	—	—	—	—	—	—	—
157	—	41,51	—	77,o6	68,29	—	—	—
173b	54,55	5o,oo	86,84	—	—	93,22	—	71,o5
186	48,91	—	77,27	—	—	1oo,74	—	7o,8o
197	52,63	59,57	82,5o	59,46	47,89	95,38	73,39	76,61

Collective Table D: Measurements and indices of the extremity bones (males)

Skl. No.	Humerus			Radius				Ulna			
	Maximum length	Minimum circumference of diaphysis	Length-thickness index	Maximum length	Physiological length	Minimum circumference of diaphysis	Length-thickness index	Maximum length	Physiological length	Minimum circumference of diaphysis	Length-thickness index
	M 1	M 7	7/1	M 1	M 2	M 3	3/2	M 1	M 2	M 3	3/2
101c	328	61	18,50	251	237	41	17,30	—	—	—	—
111B	—	—	—	—	—	—	—	—	—	—	—
123	—	—	—	—	—	—	—	—	—	—	—
138	—	—	—	—	—	—	—	—	—	—	—
142a	—	—	—	250	237	45	18,99	268	243	40	16,46
142c	300	62	20,67	243	229	43	17,17	257	230	39	16,95
151	320*	62	19,38	—	—	—	—	—	—	—	—
165a	—	—	—	—	—	—	—	—	—	—	—
173a	338	63	18,64	258	245	44	18,78	—	—	—	—
182	—	—	—	—	—	—	—	—	—	—	—
190	361*	66	18,28	—	—	—	—	—	—	—	—
197	319	62	19,44	248	237	44	18,58	271	246	37	15,64
210	—	—	—	—	—	—	—	—	—	—	—
228	—	—	—	—	—	—	—	—	—	—	—
241	303*	65	21,45	—	—	—	—	—	—	—	—
256	—	—	—	246	232	43	18,52	—	—	—	—
270	—	—	—	—	—	—	—	—	—	—	—
Mean	324,14	63,00	19,49	249,33	236,16	43,33	18,31	265,33	239,66	39,00	16,15

*Measurements which were taken in situ.

Collective Table D: Measurements and indices of the extremity bones (males) — continued.

	Femur			Tibia			Fibula		
	Maximum length	Circumference of the shaft at the middle	Length-thickness index	Maximum length	Minimum Circumference of diaphysis	Length-thickness index	Maximum length	Minimum circumference	Length-thickness index
Skl. No.	M 1	M 8	8/2+	M 1	M 1o b	1o6/1	M 1	M 4a	4a/1
1o1c	—	—	—	—	—	—	—	—	—
111B	486	91	18,84	4o6*	86	21,18	—	—	—
123	44o*	85	19,45	375*	76	2o,27	—	—	—
138	447*	88	19,82	—	—	—	—	—	—
142a	—	—	—	—	—	—	—	—	—
142c	44o	86	19,68	—	—	—	35o	35	1o,oo
151	—	—	—	365*	82	22,47	—	—	—
165a	445*	91	2o,59	—	—	—	—	—	—
173a	—	—	—	—	—	—	—	—	—
182	458*	87	19,12	—	—	—	—	—	—
19o	—	—	—	41o*	87	21,22	—	—	—
197	—	—	—	376	76	2o,21	—	—	—
21o	493*	91	18,57	4o8	9o	22,o6	—	—	—
228	—	—	—	338*	—	—	—	—	—
241	—	—	—	—	—	—	—	—	—
256	446*	86	19,41	36o	78	21,67	—	—	—
27o	452*	89	19,82	394*	71	18,o2	—	—	—
Mean	456,33	88,22	19,48	381,33	8o,75	2o,89	35o,oo	35,oo	1o,oo

* Measurements which were taken in situ

+ As the length in natural po sition (M 2) of most of the fe mura could not be measured, the index was calculated fr om the maximum length (M 1) after subtraction of 3 mm as proposed by Martin-Saller (compare Section 7 B., Stature).

Collective Table D: Measurements and indices of the extremity bones (females).

Skl. No.	Humerus			Radius				Ulna			
	Maximum length	Minimum circumference of diaphysis	Length-thickness index	Maximum length	Physiological length	Minimum circumference of diaphysis	Length-thickness index	Maximum length	Physiological length	Minimum circumference of diaphysis	Length?thickness index
	M 1	M 7	7/1	M 1	M 2	M 3	3/2	M 1	M 2	M 3	3/2
101 b	—	—	—	—	—	—	—	—	—	—	—
124	—	—	—	—	—	—	—	247	223	36	16,14
142b	—	—	—	240	228	42	18,42	—	—	—	—
165b	—	—	—	—	—	—	—	—	—	—	—
173b	—	—	—	234	218	37	16,97	252	227	32	14,10
180	—	—	—	—	—	—	—	—	—	—	—
197	307	55	17,92	—	—	—	—	—	—	—	—
204	300*	50	15,66	—	—	—	—	—	—	—	—
210	302	58	19,21	—	—	—	—	—	—	—	—
212	—	—	—	—	—	—	—	—	—	—	—
256	—	—	—	—	—	—	—	—	—	—	—
262	336	58	17,26	—	—	—	—	—	—	—	—
Mean	311,25	55,25	17,51	237,00	223,00	39,50	17,70	249,50	225,00	34,00	15,12

Collective Table D: Measurements and indices of the extremity bones (females) — continued.

Skl. No.	Femur			Tibia			Fibula		
	Maximum length	Circumf. of the shaft at the middle	Length-thickness index	Maximum length	Minimum circumference of diaphysis	Length-thickness index	Maximum length	Minimum circumference	Length thickness index
	M 1	M 8	8/2**	M 11	M 1ob	1ob/1	M 1	M 4a	4a/1
1o1b	418	79	19,o4	—	—	—	—	—	—
124	—	—	—	—	—	—	—	—	—
142b	—	—	—	—	—	—	—	—	—
165b	415*	81	19,66	—	—	—	—	—	—
173b	—	—	—	—	—	—	—	—	—
18o	—	—	—	—	—	—	329	34	1o,33
197	—	—	—	348	71	2o,4o	—	—	—
2o4	446*	82	18,51	—	—	—	348*	35	1o,o6
21o	—	—	—	357	73	2o,44	—	—	—
212	381*	74	19,58	—	—	—	—	—	—
256	425	81	19,19	—	—	—	—	—	—
262	443*	84	19,o9	—	—	—			
Mean	421,33	8o,17	19,18	352,5o	72,oo	2o,42	338,5o	34,5o	1o,2o

* & ** See Collective Table D: (Males).

Collective Table E: Estimated stature (in cm) from the particular long bones and mean stature of each individual calculated according to Manouvrier, Trotter & Gleser (males).

Skl. No.	Humerus		Radius		Ulna		Femur	
	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser
101c	166,6	171,3	169,3	174,0	—	—	—	—
111B	—	—	—	—	—	—	173,6	177,0
123	—	—	—	—	—	—	165,2	166,0
138	—	—	—	—	—	—	166,5	167,8
142a	—	—	168,9	173,6	169,1	173,3	—	—
142c	156,2	162,8	166,6	171,0	165,4	169,0	165,2	166,0
151	164,4	169,0	—	—	—	—	—	—
165a	—	—	—	—	—	—	166,0	167,3
173a	167,1	174,6	173,0	176,5	—	—	—	—
182	—	—	—	—	—	—	168,1	170,4
190	179,2	181,6	—	—	—	—	—	—
197	163,7	168,6	168,3	172,6	170,3	174,3	—	—
210	—	—	—	—	—	—	175,4	178,7
228	—	—	—	—	—	—	—	—
241	157,1	163,6	—	—	—	—	—	—
256	—	—	167,7	172,0	—	—	166,2	167,5
270	—	—	—	—	—	—	167,2	169,0
Mean	164,9	170,2	169,0	173,8	168,3	172,2	168,2	170,0

Collective Table E: Continued (males).

Skl. No.	Tibia		Fibula		Mean Stature	
	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser
101 c	—	—	—	—	168,0	172,2
111 B	177,0	181,0	—	—	175,3	179,0
123	168,1	173,0	—	—	166,7	169,0
138	—	—	—	—	166,5	167,8
142 a	—	—	—	—	171,3	173,5
142 c	—	—	163,7	165,5	163,4	166,9
151	165,8	170,5	—	—	165,1	169,3
165 a	—	—	—	—	166,0	167,3
173 a	—	—	—	—	170,1	175,6
182	—	—	—	—	168,1	170,4
190	178,5	182,0	—	—	178,9	181,8
197	168,1	173,5	—	—	166,7	171,6
210	177,7	181,5	—	—	176,6	180,1
228	160,0	163,8	—	—	160,0	163,8
241	—	—	—	—	157,1	163 6
256	165,0	169,2	—	—	166,3	169,6
270	173,0	178,0	—	—	170,1	173,5
Mean	170,4	174,7	163,7	165,5	168,0	171,6

Collective Table E: Females

Skull No.	Humerus		Radius		Ulna		Femur	
	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser	Manouvrier Trotter & Gleser	
101 b	—	—	—	—	—	—	155,8	157,2
124	—	—	—	—	162,8	163,3	—	—
142 b	—	—	166,0	168,5	—	—	—	—
165 b	—	—	—	—	—	—	154,9	156,5
173 b	—	—	163,0	166,0	165,2	165,5	—	—
180	—	—	—	—	—	—	—	—
197	158,2	161,0	—	—	—	—	—	—
204	155,9	158,7	—	—	—	—	161,2	164,2
210	156,8	159,7	—	—	—	—	—	—
212	—	—	—	—	—	—	145,5	148,2
256	—	—	—	—	—	—	156,8	159,0
262	**167,6**	**171,0**	—	—	—	—	160,4	163,5
Mean	159,6	162,6	164,5	167,3	163,5	164,5	155,8	158,1

Collective Table E: Continued (females).

Skull No.	Tibia		Fibula		Mean Stature	
	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser	Manouvrier	Trotter & Gleser
101 b	—	—	—	—	155,8	157,2
124	—	—	—	—	162,8	163,3
142 b	—	—	—	—	166,0	168,5
165 b	—	—	—	—	154,9	156,5
173 b	—	—	—	—	163,4	156,0
180	—	—	155,4	156,0	155,4	156,0
197	158,6	162,6	—	—	158,4	161,8
204	—	—	160,2	161,6	159,1	161,5
210	160,9	165,0	—	—	159,9	162,7
212	—	—	—	—	145,5	148,2
256	—	—	—	—	156,3	159,0
262	—	—	—	—	164,0	167,3
Mean	159,8	163,8	157,8	158,8	158,4	160,7