

## Human Skeletal Remains of the Jamdat Nasr Period from Tell Gubba, Iraq

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From 1977 to 1980, the Japanese Archaeological Expedition to the Hamrin Basin directed by Prof. Hideo Fujii, Director of the Institute for Cultural Studies of Ancient Iraq, Kokushikan University, unearthed a particularly unique architectural remains of a round building with five-fold circular walls (CW3, CW4, CW5, CW6 and CW7) with a center-circular platform functioning as a core of the building, five circular corridors (C2, C3, C4, C5 and C6) placed between, and a moat encircling furthest outside the seventh wall (CW7), which is assumed to be in the Jamdat Nasr period.

Several pits were unearthed below the floors of the corridors C3, C4, C6 and C7, and from the pit 14 (1m in diameter and 2.3m in depth) of the corridor C6, human skeletal remains of 18 individuals were uncovered. The jumbled human skeletons in the pit suggest that the corpses were not buried with ritual burial, but thrown away into the pit after their death nearly at the same time. The incident may have happened at the time of collapse of the building, that is, around the end of the Jamdat Nasr period (Odani and Ii, 1980).

The sex and age compositions of 18 individuals from the pit 14 are as follows: three infants before the age of 6, seven juveniles after the age of 6, two adolescents between the ages of 12 to 20, three adult males, one adult female, one older adult male, and one adult male whose age is unknown because of an earlier fusion of cranial sutures (Table 1). Here, attention should be fixed to the high ratios of infants and adult males in population.

Table 1 Age and Sex Distribution of the Skeletons

Place Level Age/Sex	Pit 14				JN2		XII-11		Total
	Male	Female	Unknown	Total	Female	VII	VIIa	VII	
Child	-	-	3	3	-	-	-	-	3
	6 - 12	-	7	7	-	-	-	-	7
	15 - 20	2	-	2	-	-	-	-	2
Adult	20 - 40	3	1	4	1	1	1	-	7
	40 - 60	1	-	1	-	-	-	-	1
	Unknown	1	-	1	-	-	-	1	2
Total	7	1	10	18	1	1	1	1	22

In addition to the human remains from the pit 14 mentioned above, some other human skeletal remains of the same period, the Jamdat Nasr period, were uncovered. They are an adult female from the moat, an adult male of JN2 from Layer VII, an adult male from Layer VIIa of step between C2 and C3 in the grid-unit XII-11, an adult female from the east trench of the circular corridor 6 and a cranial fragment burnt black from the moat.

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## I. Human Remains from Pit 14

### 1. IR430 Adult Male (Plate 1)

The major part of the neurocranium is preserved, but most facial parts are missing. Of the postcranial bones, the lower limb bones including right and left femora without the distal ends, most part of bodies of the right and left tibiae, a left fibula without the proximal end, most tarsal bones except the right talus and all metatarsal bones are preserved well. But the other parts such as the cervical vertebrae, ribs, ulnae, radii and right hip bones are fragmentary.

The neurocranium is generally stout and has significant characteristics as male such as marked elevations of superciliary arches and glabella region and developed external occipital protuberance and mastoid processes. The closures of the outer tables in the coronal and sagittal sutures are beyond the middle stage. Occulusal surfaces of the 1st and 2nd molars show high degree of wear. From these observations, this individual seems to be an older adult.

As the maximum cranial breadth is rather narrow, the cranial index (69.5) is near the upper limit of the hyper-dolichocran. A wormian bone is in left lambdoid suture. On the frontal bone, 2-3 supra-orbital nerve grooves are observed on both sides. The pilastric index of the left femur is high, and the platymeric index (70.6) of the left femur belongs to hyper-platymer and that (75.8) of the right femur, platymer. The platycnemic index (75.0) at the level of nutrient foramen implies eucnemic.

### 2. IR431 Juvenile

The neurocranium is comparatively well preserved except for regions of the right and left temporal fossae. The other skeletal remains are only some fragments of the maxilla and zygomatic bones of face and no postcranial bones are unearthed.

The third upper molar is not erupted and the attrition of the second upper molar is quite slight. No ossification is observed in cranial sutures and spheno-occipital synchondrosis.

The characteristics of the skull are as follows: markedly long head, three wormian bones in the coronal suture and prominent elevation in the nasion region.

### 3. IR433 Adult Male (Plate 2)

Most part of the neurocranium is well preserved except for some parts of the base, and the frontal bone is joined with a left zygomatic bone. The mandible is also nearly complete except for its right head. However, it is difficult to reconstruct the face because of the absence of the right and left maxillae and the right zygomatic bones.

Except for coccygeal vertebrae, the other vertebrae are preserved. The 12 pairs of ribs can be identified while they are fragmentary. The remains of the upper extremities are composed of right and left clavicles, scapulae and humeri, among which the right humerus is nearly complete, missing a lateral epicondyle. Of the lower extremities, the right and left hip bones are preserved, but not the limb bones.

This individual is identified as male on the basis of the hip bone morphology. Of the pubic symphyseal faces, billowing disappears, and marked dorsal margins and ventral ramparts appear, but they are weak at the superior edges and a little prominent at the inferior edges. These characteristics suggest that this individual is about 30 years old at death.

The maximum length and the basion-bregmatic height of the neurocranium are moderate, but the maximum cranial breadth is relatively wide. Therefore, the cranial index (74.9) is at the upper limit of the

dolichocran, the cranial length-height index (70.6) in the orthocran, and the cranial breadth-height index (94.3) in the metriocran.

The degrees of developments of the bregma region, the supraorbital tori, the mastoid processes and occipital ridge are relatively remarkable, and as a whole, the neurocranium is stout. There are many nonmetric cranial traits as mentioned below. On the right side of the occipital bone, a biasterionic suture is detectable, which shows a presence of the right lateral part of the tripartite inca bone. Some traces of the metopic suture are observable directly above the nasion and in front of bregma. A developed osteophyte is in the right and left temporal lines of the frontal bone. A sutural fissure appears just inside the left temporal line and reaches the supra-orbital margin. The other traits are the traces of transverse zygomatic suture on the both sides and a trace of the incisive suture on the right maxillary palatine process.

The bones of the upper extremities are massive and stout. The stature is calculated to be 163.8 cm from the maximum length of the left humerus.

#### 4. IR434 Adult Male (Plate 3)

Only the cranium is preserved while postcranial bones are missing. The skull vault is nearly complete but the base and its surroundings are damaged. The facial parts are found missing except for the base of the right nasal bone.

The sagittal, lambdoid, squamous, occipito-mastoid and parieto-mastoid sutures are obliterated with complete fusions of the outer and inner tables of the skull, while the coronal and sphenosquamous sutures are still open. The neurocranium is very long (maximum length: 207 mm), narrow (maximum breadth: 125 mm) and low (basion-bregma height: 122 mm). The cranial index (60.4) falls within the range of the ultradolichocran, the breadth-height index (97.6) in the upper part of the metriocran. From behind the bregma, a sagittal protuberance extends backward. On the lateral sides of it, sagittal depressions are visible, of which the outer margins extend along the temporal lines. The parietal bones are long and flat. It is assumed from the remains of the right process that the size of the mastoid processes seems to be very small, while the tips of the both processes are missing. The base of the neurocranium is quite flat with the palate, the sphenoid and the occipital bones positioned nearly on the same plane.

It is difficult to estimate the age of the subject, because the facial and postcranial bones are missing and the condition of the fusions in cranial sutures is not normal, while the sphenoccipital synostosis is ossified. This individual is assumed to be male from relatively prominent developments of the tori of the glabella region, superciliary and external occipital protuberance.

From the peculiar form of this skull, it is evident that the skull is a case of scaphocephaly which is by far the commonest of the synostotic deformities, that is the craniostenosis, in which the skull is deformed by premature suture closure. According to a clinical study by Shillito, Jr. and Matson (1968), sagittal synostosis (scaphocephaly) has highest frequency (55%) among five primary craniosynostosis in which 78.5% were observed in males, while 21.8% in females. It shows that males are involved more frequently than the females in scaphocephaly.

Historically, a scaphocephaly is known from Neolithic times onwards (Brothwell, 1981), but most cases have been discovered in the American Indian graves in the central and south-western states of the United States of America. They are as follows: a female about 30 years old from a grave of the early 14th century near Troy in Kansas (Eiseley and Asling, 1944), a male of the first half of his thirties from Newaku ruin of the late 10th century B. C. in California (Hohenthal and Brooks, 1960), and ten individuals including infants, juveniles and adolescents from the ruins of the period between 11th to 14th centuries in Arizona (Bennett, 1967). As for the other examples outside North America, an adult female from the old ruin of the 7th to 8th centuries in Essen region of Germany and a juvenile about 4–5 years old and an adolescent male

probably in the Edo period in Japan are reported (Tokudome et al., 1982).

The characteristics of the scaphocephaly appear in several papers. Brothwell (1981) described that the parietal bones are more flattened than usual and some degree of medial ridging (keeling) is also often found in these skulls. Eiseley and Ashling (1944) observed ridgings on both sides of the sagittal suture around the obelion. Of our material, IR434, we also found the parietal bone long and flat with the medial ridging and the sagittal depression. As the remarkable characteristics, Eiseley and Asling (1944) pointed out the deeply channeled cranial sinuses and accompanied "digital impressions", the peculiar form of the considerably small mastoids and two curious bosses near obelion. On the skulls from California, however, Hohenthal and Brooks (1960) described only the slight depression in the medline of the completely closed sagittal suture as a character of the scaphocephaly and found no anomaly on the inner table and the long and heavy mastoids characterizing a normal adult male there. Of the material from Germany, "digital impression" is not described, but a weak mastoid process is observed (Kunter, 1971). Of the IR434 skull, no "digital impression" is observed in its roentgenogram, but an extremely small mastoid process, a median ridging and depressions positioned on both sides of the sagittal suture can be sorted out.

The metrical traits of the scaphocephaly are a long maximum cranial length, narrow maximum cranial breadth, low value in the length-breadth (cranial) index, high value in the breadth-height index, and long sagittal arc (parietal arc) and chord (parietal chord) (Eiseley and Asling, 1944). The cranial measurements and indices of the specimen IR434 are compared with those of the other specimens from California, Kansas, Germany and Edo, while the measurements available for IR434 are small in number (Table 2). The cranial

Table 2 Measurements and Indices of the Scaphocephaly

Designation of Crania	IR.434	California	Kansus	Sudhessen	Edo
Sex	Male	Female	Male	Female	Male
Age	Adult	Adult	Adult	Mature	Adult
1 Maximum cranial length	207	203	194	186	199
5 Cranial base length	108	111	103	101	-
8 Maximum cranial breadth	(125)	120	121	125	115
11 Biauricular breadth	109	-	-	112	-
17 Basion - bregmatic height	122	140	139	129	-
20 Auricular height	112	114	121	114	-
25 Sagittal arc	(398)	392	387	387	-
26 Frontal arc	144	130	122	125	-
27 Parietal arc	(128)	125	135	136	-
28 Occipital arc	(126)	137	130	123	-
29 Frontal chord	124	-	107	104	-
30 Parietal chord	(124)	-	126	128	-
31 Occipital chord	( 94)	-	104	94	-
32(1) Forehead slope angle	56	-	-	73	-
32(5) Salient angle of forehead	127	-	-	137	-
1+8+17/3 Cranial module	(151.3)	154.3	151.3	146.7	-
8:1 Cranial index	( 60.4)	59.1	62.4	67.2	57.8
17:1 Length - height index	58.9	69.0	71.6	69.4	-
17:8 Breadth - height index	( 97.6)	116.7	114.9	103.2	-
20:1 Length-auricular height i.	54.1	56.2	62.4	61.3	-
20:8 Breadth-auricular height i.	( 89.6)	95.0	100.0	91.2	-
27:26 Frontoparietal index	( 88.9)	96.2	110.7	108.8	-
29:26 Frontal index	86.1	-	87.7	83.2	-
30:27 Parietal index	( 96.9)	-	93.3	94.1	-
31:28 Occipital index	( 74.6)	-	80.0	76.4	-

indices for all specimens fall within the range of 57.8-67.2, having large values of the maximum length and small values of the maximum breadth, and the Iraqi specimen is similar to California and Kansas. There are no marked differences for the sagittal indices of the frontal, parietal and occipital bones among the specimens. But the basion-bregma height of IR434 is quite different from those of the other specimens, while the auricular height of IR434 is nearly the same as that of California and Germany. Therefore, the



lower value of the basion-bregma height of IR434 is not due to the height of brain case but due to the flatness of the base of the neurocranium.

#### 5. IR434–1 Juvenile

The skeletal remains of the individual is very limited. They are a parietal, a maxilla, a portion of zygomatic bone and fragments of the first cervical vertebra are found. The eruption of the permanent teeth of the upper jaw except for the 1st molar estimates the age of the juvenile at 6 to 7 years old.

#### 6. IR435 Adolescent Male

Nearly all the postcranial bones are preserved, but the skull is missing except for a mandible. The mandible has no left ramus and no right head. The eruption of the 3rd molar is in the early stage.

The thoracic and lumbar vertebrae are nearly complete, but some of the cervical vertebrae are missing, and also the sacral and coccygeal vertebrae are not found except the first sacral vertebra. Many fragments of the ribs and the body and manubrium of the sternum are recognizable.

The right and left clavicles have no acromial epiphyses, and the sternal epiphyses are preserved separately. The remains of the scapula are confined to the fragments respectively containing the following parts: glenoid cavity, spine, lateral border and coracoid process. The distal epiphyses of the right and left humeri have completely been fused with the shafts, yet the proximal epiphyses are separately preserved from the shafts. The other remains of the upper limbs are fragments of left ulnar shaft and the proximal epiphyses of right and left radii, which have been fused with the shaft.

The hip bones are highly damaged, but it is observable that the fusions among the three bones in the acetabulums have been completed, but of the iliac crests and the ischial tuberosities have not been united. The right and left femora are well preserved, and their proximal and distal epiphyses and the greater and lesser trochanters have completely been fused with the shafts, but still each epiphyseal line is detectable. A right tibia has no proximal end, and fragments of the shaft of the left tibia are preserved, but there is a complete right fibula of which proximal epiphysis has not been united with the shaft. The other remains of the lower limbs are patellae, calcanei and tali.

From the morphology of the hip bone, the sex of this specimen is identified as male. The epiphyseal fusion of the upper and lower limbs and the configuration of the pubic symphyseal face make it presumable that IR435 died at the age of 17 to 19.

As a whole, the upper and lower limbs are slender, and the stature is estimated at 169.0 cm from the maximum length of the left femur.

#### 7. IR436 Juvenile

Reconstruction of the neurocranium is nearly completely feasible, and the mandible is intact. As for the facial bones, only fragments of the maxilla and zygomatic bone are observable. Almost all the bones of the whole body are present, while they are in fragment.

The epiphyses of long bones and the three hip bones are all separated. The 1st molar is the only permanent tooth that has erupted, of which slight wear suggests that the subject's death age ranges from 7 to 8.

Although this is a juvenile, its skull is extremely long, and big wormian bones are confirmed in sagittal suture near the lambda.

#### 8. IR437 Adult Female (Plate 4)

There remain the skull, the vertebrae, the ribs, the right clavicle, the right and left hip bones, the right

and left femora and the right talus.

Reconstruction of the brain case was possible, though some parts were missing, but not that of the facial bones such as the right and left zygomatic bones, the maxillae, and the left nasal bone. The mandible lacks its right half.

All the cervical vertebrae and the lumbar vertebrae and the intact sacral bone are ready, but some of the thoracic vertebrae are missing. The ribs and the right clavicle are fragmentary. The hip bones are comparatively well preserved except for the pubis of the right and the frontal half of the iliac blade and some portions of the pubis and the ischium of the left. The both femora are lacking their greater trochanters and the distal ends.

From the morphology of the hip bone, this is identified as female. Judging from the slight wear observed in the 1st and 2nd molars, and all the unclosed cranial sutures, this specimen is estimated at the age of 20 to 25.

It has rather a big skull. There are a wormian bone near lamda and two supra-orbital nerve grooves on the left side of the frontal bone. Both the clavicle and the femur are slender. The platymeric index is of hyper-platymer for the left femur (72.4), and platymer for the right one (75.9).

#### 9. IR438 Infant

Only the brain case fragments with its extremely thin bone wall are confirmed here. The lateral part of the occipital bone had been united to the occipital squama, but not yet to its basilar part. With the size of its brain case taken into consideration, this is perhaps a 2-3 year old infant bone.

#### 10. IR439 Infant

Fragments of the brain case and the mandible, the crowns of milk teeth and permanent teeth, and almost all the extremities and trunk are still observable. Judging from separations of epiphyses from shafts in all the extremities, uneruption of the first molar and development of the root of the milk teeth, this is presumed to be an infant bone at the age of 4 to 5.

#### 11. IR441 Adolescent Male

There remain the skull, the vertebrae, the ribs, the left scapula, the left humerus, the right and left hip bones, the femora and the tibiae. The skull is too fragmentary to be reconstructed. The mandible lacks condylar process. Further, all the extremities are badly broken.

The epiphyses of the long bones are separated from the shafts and the three parts of the hip bone are not yet united together, and no eruption of the 3rd molar has been observed. The age at death is estimated as 15 to 16. Despite its young age, male features are already shown in the hip bone, thus resulting in its sex as male.

#### 12. IR442 Adult Male (Plate 5)

The whole skeleton is comparatively well preserved. The brain case is nearly intact, but among the facial bones only the left zygomatic bone and the left mandibular ramus are present.

The 5th to 7th cervical vertebrae, the 1st to 4th thoracic vertebrae and the coccygeal vertebrae are missing, whereas the sacrum is intact. All the ribs and the sternum are fragmentary.

The right and left clavicles and the scapulae are partially damaged. The greater and lesser tubercles, of the left humerus, proximal end of the right humerus, and the distal ends of the right radius and ulna are missing, but the left radius and ulna are intact. Among the skeletons of the hands, there still remain the right and left hamates, the right capitate, the 1st to 3rd metacarpal bones of both hands, all the proximal

phalanges, all the left medial phalanges, and the left 1st distal phalanges.

Most of the iliac blade and the pubic bone are largely absent from the right hip bone, whereas the left hip bone is comparatively well preserved while absence of the pubic bone. The right and left femora, patellae, the left tibia and fibula are all nearly intact but the right tibia has no distal end, nor does the fibula have proximal and distal end. The left talus and calcaneus, all the metatarsal bones, the 1st to 4th proximal phalanges and the 1st distal phalanges of both sides, and the right 2nd and 3rd metatarsal bones are remaining.

From the hip bone morphology, this is identified as male. The molar wear is slight and any closure of the cranial sutures is not recognized. Thus, this specimen's death age is estimated within the range of 20 to 30.

Though it is impossible to measure the maximum length of the brain case, its grabella-lambda length is extremely long, and the maximum breadth is moderate, so that the cranial index will certainly be within the hyperdolichocranic category. It is large in the auricular height. The left coronal suture has many wormian bones and the right and left hypoglossal canals are divided into two, respectively.

The long bones of the extremities are long and slender, allowing a low caliber index in the humerus and the femur. The platymetric indices (left: 72.7; right: 74.2) belong to hyper-platymetric and the platynecmic indices (left: 64.7; right: 63.6) to the lower limit of the mesocnem, from which strong flattening traits of the extremities are noticed. From the maximum length of the left femur, the stature is calculated at 166.9 cm.

### 13. IR443 Juvenile

Nearly the whole skeleton is present. All the milk teeth and the 1st molar are firmly implanted in the alveoli of the upper and lower jaws. Furthermore, the unerupted permanent teeth other than the 1st molar is recognized in jaws, and the crown of the 2nd molar nearly comes up to the upper margin of alveolar. Then, this is probably a 7–8 year old juvenile.

### 14. IR444 Juvenile

Almost all the bones of the whole skeleton are ready here. Only the milk teeth are firmly implanted in the alveoli of the maxilla and mandible and the 1st molar, a permanent tooth, is just about to go into eruption. So, this seems to be a 4–5 year old child.

### 15. IR445 Juvenile

The whole skeleton is preserved. The eruption of all the milk teeth and the permanent 1st molar has been confirmed in the upper and lower jaws, while the traces of wear in the 1st molar are weak. Therefore, this is presumably a juvenile at the age of 6 to 7.

### 16. IR446 Infant

Fragments of the skull, vertebra, rib, clavicle, scapula, humerus, ulna, hip bone, femur and calcaneus are present, while the bones of extremities are very few. This is in the stage of its 2nd milk teeth having just erupted, so that this specimen is estimated at the age of 3 to 4.

### 17. IR447 Juvenile

Nearly the whole skeleton still is well-preserved. The skull and the mandible are intact except for the cranial base. The right and left humeri, the right radius, and the left femur are also perfectly present, but the epiphyses of limb bones are all separated from the shafts. The separation of the three bones of the innominate is observable, too. All the milk teeth and the permanent 1st molar are implanted in the alveoli

of jaw bones. Considered from the total length of the long limb bone, this is probably a child at the age of 6 to 8.

### 18. IR450 Adult Male (Plate 6)

The whole skeleton is left behind with compact bones in quality. Though it has the skull and upper limbs damaged, the lower long limbs are preserved markedly well.

The brain case lacks most of the occipital and the base of the skull, but only the skull cap is present. The facial bones preserved are fragments of the right and left zygomatic bones, the left maxilla and mandible existing.

There remain fragments of sacrum, lumbar vertebrae, and small pieces of the 6th to 12th thoracic vertebrae and ribs, while neither cervical vertebrae nor sternum are present.

The left clavicle has no acromial end, nor does the right one have its both ends. The scapulae have their broken pieces of the right and left lateral angles remain here. The left humerus has no proximal and distal ends; the right humerus has no proximal end; the left radius has no head and distal end of the shaft; the right radius has no head; the left ulna has no olecranon and distal end; the right ulna has no olecranon. As for bones of hands, there are the right trapezium, all the right and left metacarpal bones, all the proximal phalanges except for the left third one, and all the middle phalanges except for the left 5th one, whereas distal phalanges are absent.

On both sides the hip bone lacks anterior parts of the iliac crests, superior ramus of the pubis and the ischial ramus. The right and left femora and tibiae, the left fibula, and the right patella are all intact. But the right patella lacks its head, while there is no left patella here. The foot bones observable here include the right and left tali, calcanei, navicular bones, the left 1st to 3rd cuneiform bones, the right cuboid bone, all the metatarsi and fragments of 4 proximal phalanges and one medial phalange.

From the morphology of the hip bone, its sex is identified as male, and its age at death is presumably in the thirties, based on the appearance of the pubic symphyseal face.

The maximum breadth of the neurocranium is small, and its cranial index (72.4) belongs to dolichocran. Measurement of its basion-bregma height is impossible, but its skull height seems to be low. Its superior mastoid crista and external occipital protuberance are strong, and mastoid process is large.

The long bones of extremities are generally slender. The platymeric index (left: 63.6; right: 66.7) is significantly hyper-platymeric, and the platycnemic index (left: 59.4; right: 61.3) is platycnemic.

The stature calculated from the maximum length of the left femur is 162.0 cm.

## II. Human Remains from the moat

### 1. IR427 Adult Female

Only the skull vault constituted by the frontal bone, the right and left parietal and part of occipital bone and the right and left temporal bones which have no joining with the above, is present.

The superior orbital torus, the temporal line and the nuchal line are undeveloped, and then its mastoid process is small. No fusion of the coronal, sagittal and lambdoidal sutures is confirmed in the inner and outer tables, so that this seems to be a female bone in the twenties.

The maximum length of the skull is unmeasurable, but the cranial index evidently proves it to be in the range of dolichocran. No parietal foramen are noticed on either side. There exists an interparietal bone, and the frontal bone contains 2 to 3 supra-orbital nerve grooves on both sides.

## 2. IR440 Adult

Only the black-burnt fragments of an adult's neurocranium is present.

# III. Human Remains from Layer VII, JN2

## 1. IR448 Adult Male

Remaining here are only the fragments of neurocranium, the right and left zygomatic bones, the left maxilla, the body of mandible, the 2nd cervical vertebrae, a piece of thoracic vertebra, two pieces of ribs, the right and left hip bones, and the head of femur. Gomphosis of the teeth ranging from the left incisor to the 2nd molar is observed in the upper and lower jaws, and that of the right 2nd premolar, the 1st and 3rd molars, in the lower jaw. Besides, the 1st and 2nd molars located upper right are still preserved as isolated teeth.

This is judged to be male from the morphology of the hip bone. The slight molar wear suggests that this specimen died at the age from 20 to 40.

# IV. Human Remains from Corridor VI, East Trench

## 1. IR451 Adult Male

This is limited only to the bones of upper and lower limbs. The bones of right upper limb except for distal phalanges are present, but bones of the left upper limb are missing. The bones of lower limbs remained are the right hip bone, the right and left femora, the left tibia, and fibula.

This is identified as adult male from the hip bone morphology, but its age estimation is hard to make in detail.

As a whole, the long bones of the limbs are rather short and stout with robust development recognizable around the muscle attachments. The platymeric index (112.0) for the left femur is of the eurymer, and the platycnemic index (62.9) for the left tibia is platycnemic. The stature calculated from the maximum length of the right humerus is rather short, i.e., 156.6 cm.

Of all the twenty-two human remains of the Jamdat Nasr period unearthed from Tell Gubba, eleven individuals are adults or young adults. Among them, six specimens are available for calculation or estimation of cranial index, all of which have turned out to belong to either dolichocran or hyper-dolichocran. Wormian bones are frequently located in the principal cranial sutures, especially in lambdoid suture. The high incidence of the supra-orbital nerve groove is noted. There are no skull available for facial measurement and observation. The bones of limb are generally long, with the estimated stature covering 162.0 to 169.0 cm for 4 males, except for that of 156.6 cm for IR451, thus resulting in the average stature of 163.7 cm for male. While platymeric index of IR451 is exceptionally eurymeric, those of all the other specimens are either of platymer or of hyper-platymer. Meanwhile, platycnemic index varies from platycnem, mesocnem to euricnem. In general, individual variability among them is small.

A principal components analysis of the cranial measurements is conducted on 21 populations for male, including Tell Gubba of the Jamdat Nasr period, other 6 Iraqi sites, 4 Iranian sites of various periods and Alishar Hüyük site in Turkey. For all population, the four measurements of the maximum cranial length, maximum cranial breadth, basion-bregma height and minimum frontal breadth are analyzed.

Table 3 Comparative populations and sources from the West Asia

Designation Number	Site	Country	Period	Literature
Iraq( ■ )				
JN	Tell Gubba	Iraq	Jemded Nasr	Ikeda, Wada, & Ishida
1	Himrin D* group	Iraq	Islamic	Wada,1985
2	Himrin B* group	Iraq	Islamic	Wada,1985
3	Nippur	Iraq	Islamic	Swindler,1956
4	Yorgan Tepe	Iraq	ca. 300 A.D.	Ehrich,1939
5	Nippur	Iraq	Neo-Babylonian	Swindler,1956
6	Ur	Iraq	Early Dynasties	Keith,1927
7	Al-Ubaid	Iraq	Ubaid	Keith,1927
Iran( ● )				
1	Shah Tepe	Iran	Islamic	Fürst,1939
2	Lameh Zamin	Iran	Sasanian/Parthian	Suzuki,1982
3	Dailaman	Iran	Parthian	Ikeda,1968
4	Dailaman	Iran	Achaemenian	Ikeda,1968
5	Shah Tepe	Iran	Bronze age	Fürst,1939
6	Shahr-i Sokhta	Iran	Copper . Bronze age	Pardini & Sharvari-Negahban,1976
Turkey( ▲ )				
1	Alishar Hüyük	Turkey	Turkish age	Krogman,1939
2	Alishar Hüyük	Turkey	Roman age	Krogman,1939
3	Alishar Hüyük	Turkey	Hellenistic age	Krogman,1939
4	Alishar Hüyük	Turkey	Phrygian age	Krogman,1939
5	Alishar Hüyük	Turkey	Hittite Empire age	Krogman,1939
6	Alishar Hüyük	Turkey	Early Bronze age	Krogman,1939
7	Alishar Hüyük	Turkey	Copper age	Krogman,1939

\* D : dolichocranic B : brachycranic

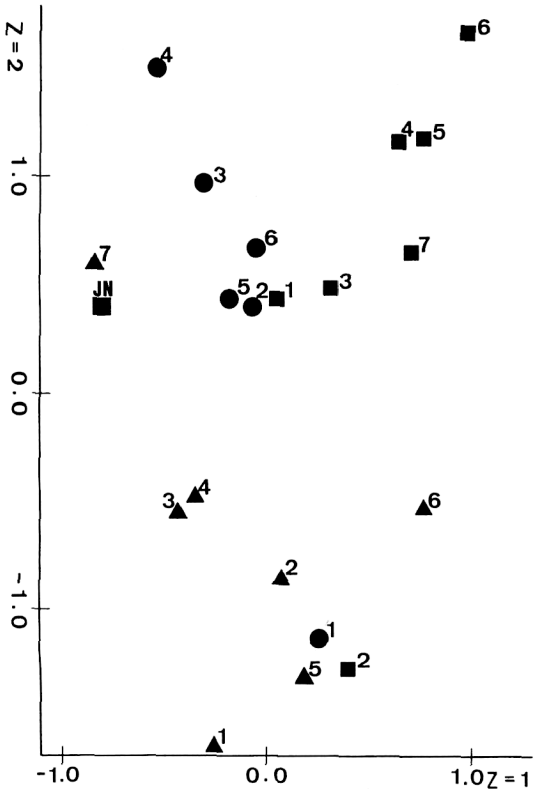


Fig. 1. Principal components analysis of 20 populations using four variables. Symbols and superior figures are identical with those of Table 3.

The 1st component (account: 38.83%) has a relatively high correlation with all measurements, the minimum frontal breadth (0.52) and the maximum cranial breadth (0.52), the maximum cranial length (0.41), the basion-bregma height (0.36), so that the separation in this component is related with the skull size, especially with its breadth. The 1st component separates the several Iraqi populations in positive side from the Iranian and Turkish populations in negative side, among which the Gubbah population is situated on the utmost negative side together with that of the Alishar Hüyük bronze period (Fig. 1).

The correlations of the 2nd component (account: 33.66%) with the maximum cranial length (+0.58), the basion-bregma height (+0.57), the maximum cranial breadth (-0.52), and the minimum frontal breadth (-0.27) suggest that this component is related with the ratios of the breadth to the length and height of the cranial vault. In the 2nd component six Alishar Hüyük populations later than the bronze period and Shah Tepe-and-Hamrin Islamic period brachycranic groups in negative side are clearly sepa-

rated from the other populations. Of all the latter groups, the Gubba population is placed the utmost negative together with the four populations of the Nippur Islamic period, the Hamrin dolichocranic Islamic period, the Shah Tepe bronze period, and the Lameh Zamin Sasanian/Parthian period.

These comparative studies on the 1st and 2nd components denote that the Gubba group is in the range of dolichocranic racial type in West Asia, and makes a feature of the smallest neurocranium together with the group of Alishar Hüyük bronze period before brachycephalization began in Anatolia. The measurements applied for the principal components analysis are only the four neurocranium ones, and the specimens available for the inter-population comparison are very few. In due consideration of its small intrapopulation variation, however, it may be reasonable to say that the Gubba population of the Jamdat Nasr period should be regarded as one of the dolichocranic racial type in West Asia.

We are deeply grateful to Prof. Hideo Fujii and all the other members of the Iraqi Hamrin Basin Expedition, the Institute for Cultural Studies of Ancient Iraq, Kokushikan University for their kindness to favor us with the opportunity of taking this work.

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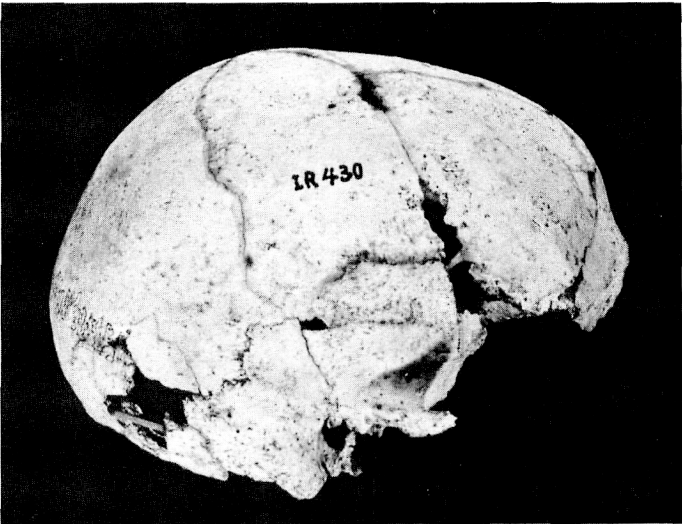
## Appendix 1 Measurements and Indices of the Skulls

Degignation of Crania Sex	IR.430 Male	IR.433 Male	IR.442 Male	IR.450 Male	IR.427 Female	IR.437 Female
1 Maximum cranial length	187	187	-	181	-	-
3 Glabello-lambda length	181	182	198	178	-	-
5 Cranial base length	-	101	-	-	-	-
Nasion radius	98	97	103	91	-	-
7 Foramen magnum length	-	41	-	-	-	-
8 Maximum cranial breadth	130	140	134	131	133	-
9 Minimum frontal breadth	-	-	97	89	-	-
11 Biauricular breadth	113	119	124	114	-	119
17 Basion - bregmatic height	-	132	-	-	-	-
Vertex radius	120	121	128	121	-	124
23 Horizontal circumference	-	526	-	-	-	-
24 Transverse arc	-	318	-	-	-	-
25 Sagittal arc	-	382	-	-	-	-
26 Frontal arc	126	121	-	140	-	-
27 Parietal arc	132	147	137	136	121	132
28 Occipital arc	-	114	-	-	-	-
29 Frontal chord	108	108	119	116	-	-
30 Parietal chord	118	127	124	119	108	113
31 Occipital chord	-	93	-	-	-	-
32(1) Forehead slope angle	62	66	-	64	-	-
32(5) Salient angle of forehead	127	134	-	121	-	-
33(4) Interoccipital chord angle	-	118	-	-	-	-
68(1) Mandibular length	-	109	-	-	-	-
69(3) Depth of mandibular corpus	-	14	-	-	-	-
70 Mandibular ramus height	-	61	70	-	-	-
71 Mandi. minimum ramus breadth	-	35	38	-	-	-
8:1 Cranial index	69.52	74.87	-	72.38	-	-
17:1 Length - height index	-	70.59	-	-	-	-
17:8 Breadth - height index	-	94.29	-	-	-	-

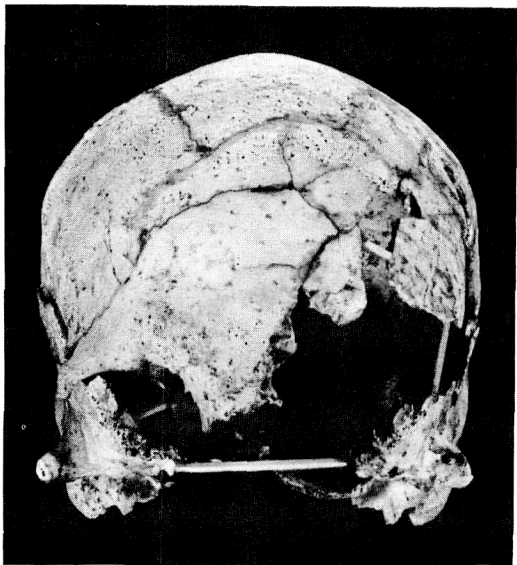


Appendix 2 Measurements and Indices of the Long Tubular Bones

Designation of bones Sex		IR.430		IR.433		IR.442		IR.450		IR.451		IR.437	
		Male		Male		Male		Male		Male		Female	
		L	R	L	R	L	R	L	R	L	R	L	R
Humerus													
1	Maximum length	-	-	-	322	-	-	-	-	-	297	-	-
3	Upper epiphysial breadth	-	-	-	51	-	-	-	-	-	-	-	-
4	Lower epiphysial breadth	-	-	-	-	-	-	-	61	-	-	-	-
5	Maximum di. of middle shaft	-	-	-	23	21	22	20	20	-	-	-	-
6	Minimum di. of middle shaft	-	-	-	18	15	16	14	15	-	-	-	-
7	Minimum circumference	-	-	-	64	57	61	56	56	-	61	-	-
7a	Middle shaft circumference	-	-	-	68	62	65	57	60	-	-	-	-
8	Head circumference	-	-	-	152	-	-	-	-	-	-	-	-
9	Max. transversal di. of head	-	-	-	46	-	-	-	-	-	-	-	-
10	Max. Sagittal di. of head	-	-	-	50	-	-	-	-	-	-	-	-
7:1	Caliber index	-	-	-	19.9	-	-	-	-	-	20.5	-	-
6:5	Cross-section index of shaft	-	-	-	78.3	71.4	72.7	70.0	75.0	-	-	-	-
9:10	Cross-section index of head	-	-	-	92.0	-	-	-	-	-	-	-	-
Radius													
3	Minimum circumference	-	-	-	-	-	40	37	37	-	41	-	-
4	Transversal diameter of shaft	-	-	-	-	-	15	13	13	-	18	-	-
5	Sagittal diameter of shaft	-	-	-	-	-	10	11	10	-	11	-	-
5(3)	Head circumference	-	-	-	-	-	69	-	-	-	-	-	-
5(6)	Lower epiphysial breadth	-	-	-	-	-	-	-	33	-	-	-	-
5:4	Cross-section index of shaft	-	-	-	-	-	66.7	84.6	76.9	-	61.1	-	-
Ulna													
2	Physiological length	-	-	-	-	-	-	-	239	-	-	-	-
3	Minimum circumference	-	-	-	-	-	35	34	34	-	36	-	-
11	Anteroposterior diameter	-	-	-	-	-	13	13	13	-	13	-	-
12	Transversal diameter	-	-	-	-	-	17	13	13	-	15	-	-
13	Upper transversal diameter	-	-	-	-	22	23	17	17	-	17	-	-
14	Upper anteroposterior di.	-	-	-	-	20	21	17	18	-	23	-	-
3:2	Caliber index	-	-	-	-	-	-	-	14.2	-	-	-	-
11:12	Cross-section index of shaft	-	-	-	-	-	76.5	100.0	100.0	-	86.7	-	-
13:14	Platoleni index	-	-	-	-	110.0	109.5	100.0	94.4	-	73.9	-	-
Femur													
1	Maximum length	-	-	-	-	455	454	429	424	-	-	-	-
6	Sagittal di. of middle shaft	32	30	-	-	28	28	22	24	29	30	23	24
7	Trans. di. of middle shaft	27	27	-	-	28	26	29	27	24	24	24	24
8	Middle shaft circumference	93	90	-	-	86	85	84	84	84	85	74	75
9	Subtrochanter transversal di.	34	33	-	-	33	31	33	33	25	-	29	29
10	Subtrochanter sagittal di.	24	25	-	-	24	23	21	22	28	-	21	22
21	Epicondylar breadth	-	-	-	-	79	81	-	76	-	-	-	-
8:1	Caliber index	-	-	-	-	18.9	18.7	19.6	19.8	-	-	-	-
6:7	Pilastric index	118.5	111.1	-	-	100.0	107.7	75.9	88.9	120.8	125.0	95.8	100.0
10:9	Platymeric index	70.6	75.8	-	-	72.7	74.2	63.6	66.7	112.0	-	72.4	75.9
7:21	Epicondylar-shaft breadth i.	-	-	-	-	35.4	32.1	-	35.5	-	-	-	-
Tibia													
1a	Maximum length	-	-	-	-	383	-	379	372	-	-	-	-
3	Max.proxi.epiphysial breadth	-	-	-	-	89	87	-	-	-	-	-	-
6	Max. dist. epiphysial breadth	-	-	-	-	-	-	48	48	-	-	-	-
8	Maximum di. of middle shaft	30	32	-	-	31	-	28	28	-	-	-	-
8a	For. nutricum anteropost. di.	36	-	-	-	34	33	32	31	-	-	-	-
9	Trans. di. of middle shaft	25	24	-	-	19	-	17	18	-	-	-	-
9a	Foramen nutricum trans. di.	27	-	-	-	22	21	19	19	-	-	-	-
10	Middle shaft circumference	89	-	-	-	83	-	75	75	-	-	-	-
10:1a	Caliber index	-	-	-	-	21.7	-	19.8	20.2	-	-	-	-
9:8	Middle platycnemic index	83.3	75.0	-	-	61.3	-	60.7	64.3	-	-	-	-
9a:8a	For. nutricum platycnemic i.	75.0	-	-	-	64.7	63.6	59.4	61.3	-	-	-	-
Fibula													
1	Maximum length	-	-	-	-	370	-	354	-	-	-	-	-
2	Maximum di. of middle shaft	17	-	-	-	16	-	17	-	-	-	-	-
3	Minimum di. of middle shaft	11	-	-	-	9	-	11	-	-	-	-	-
4	Middle shaft circumference	49	-	-	-	45	-	47	-	-	-	-	-
4:1	Caliber index	-	-	-	-	12.2	-	13.3	-	-	-	-	-
3:2	Cross-section index	64.7	-	-	-	56.3	-	64.7	-	-	-	-	-



Norma Lateralis

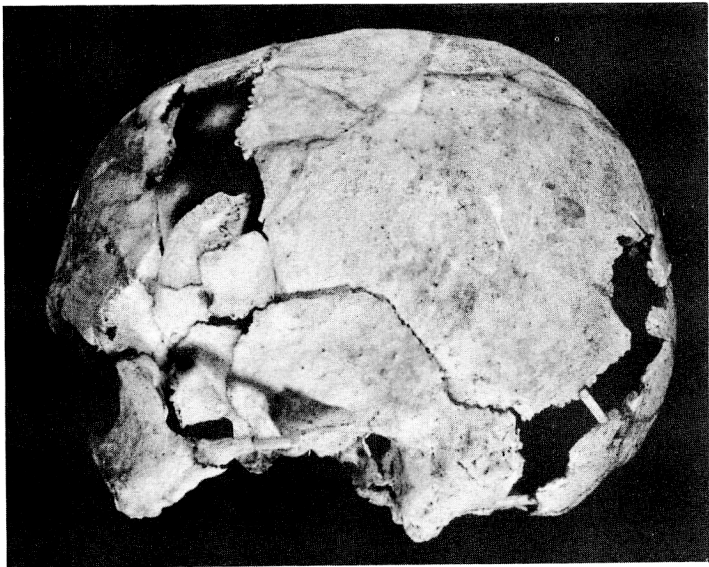


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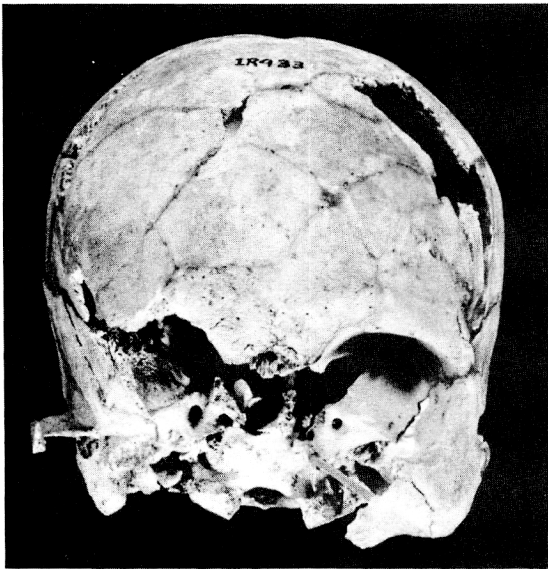


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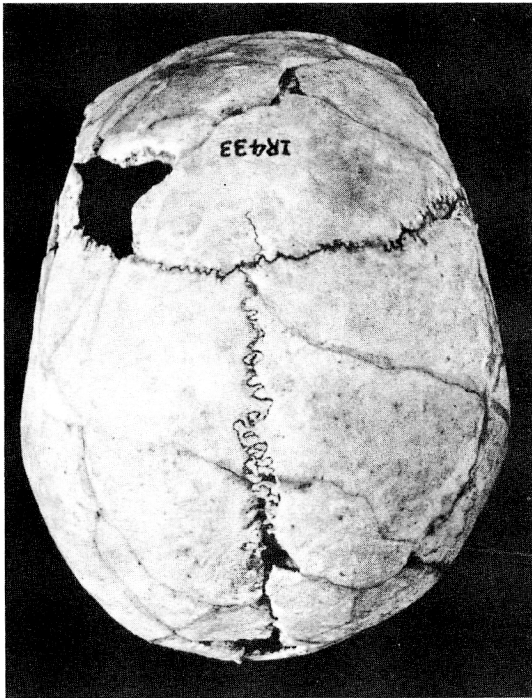
Plate 1 IR. 430 Mature Male



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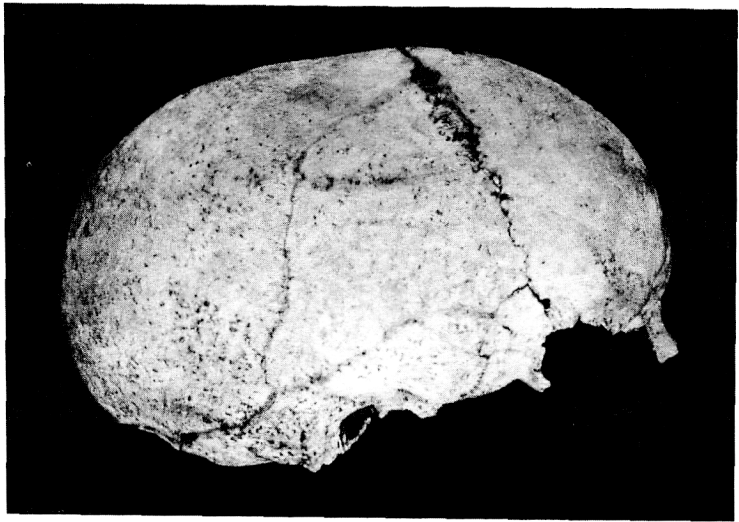


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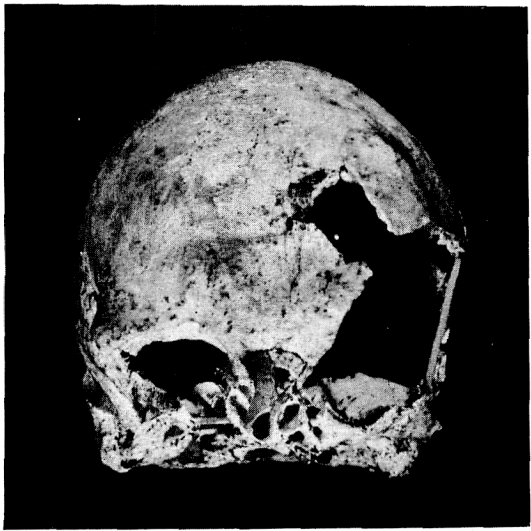


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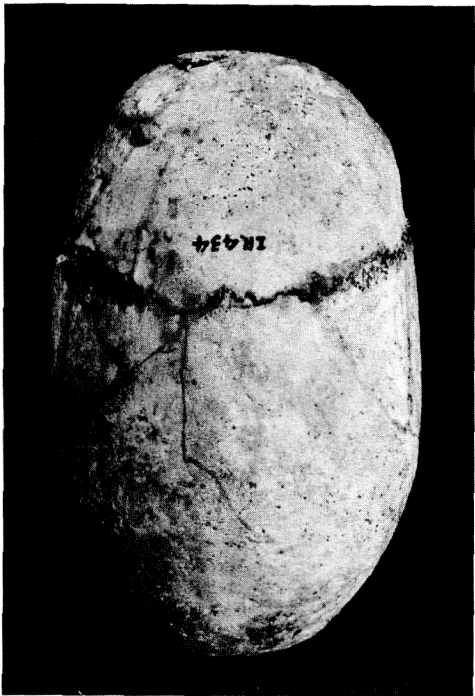
Plate 2 IR. 433 Young Male



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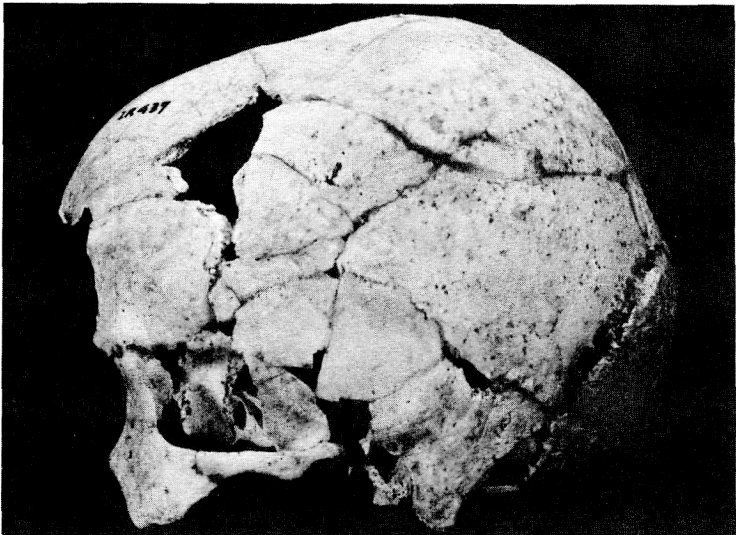


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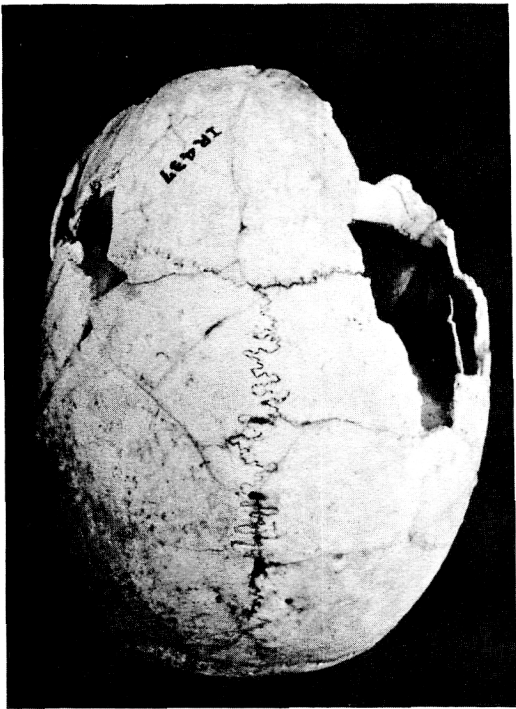


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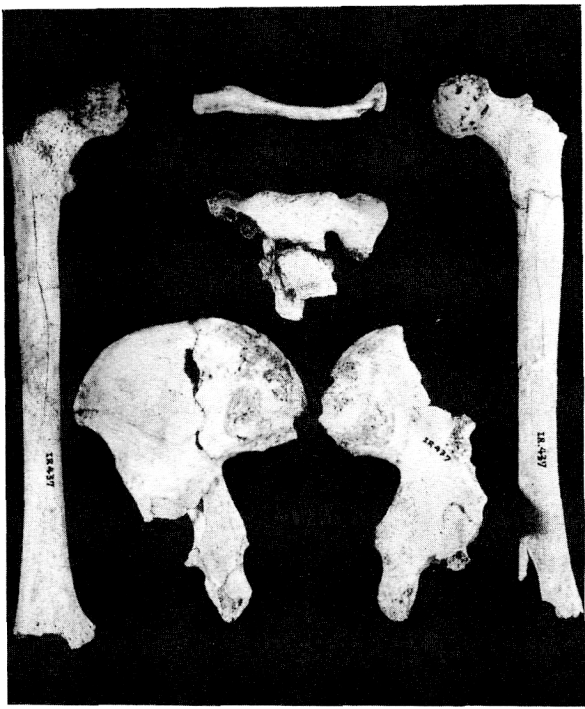
Plate 3 IR. 434 Adult Male



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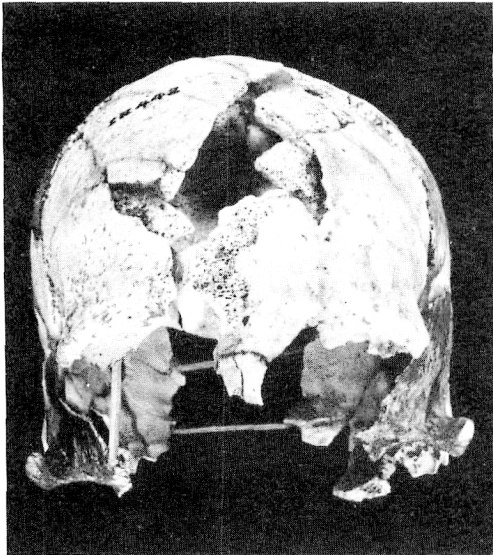


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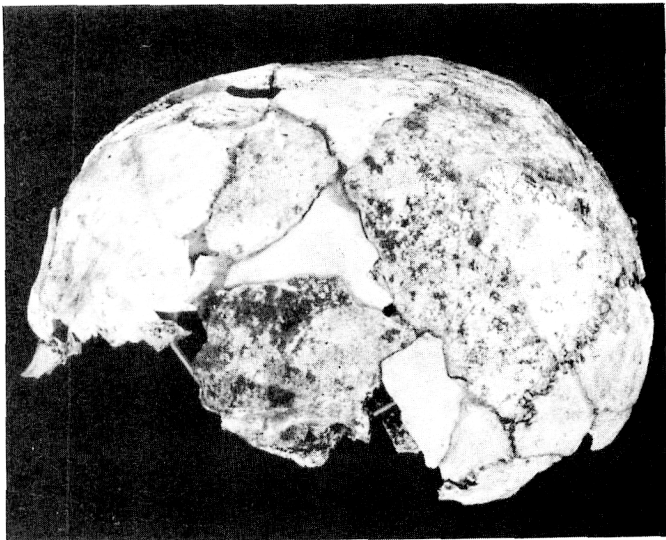


Post-cranial skeletons

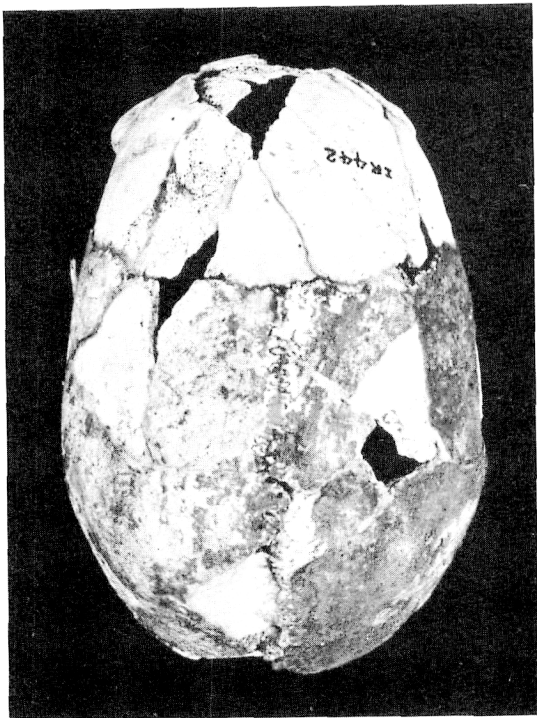
Plate 4 IR. 437 Young Female



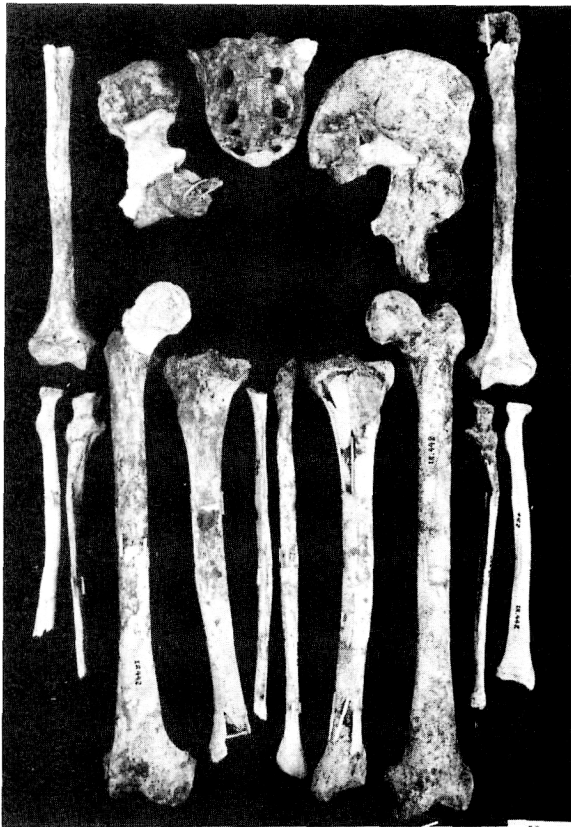
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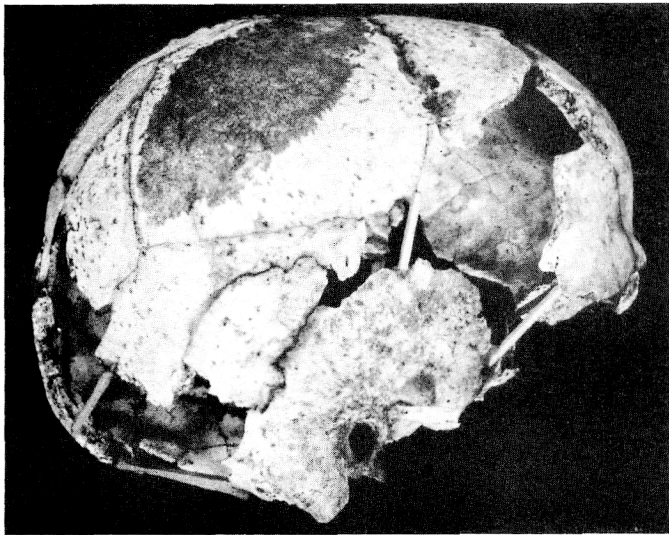


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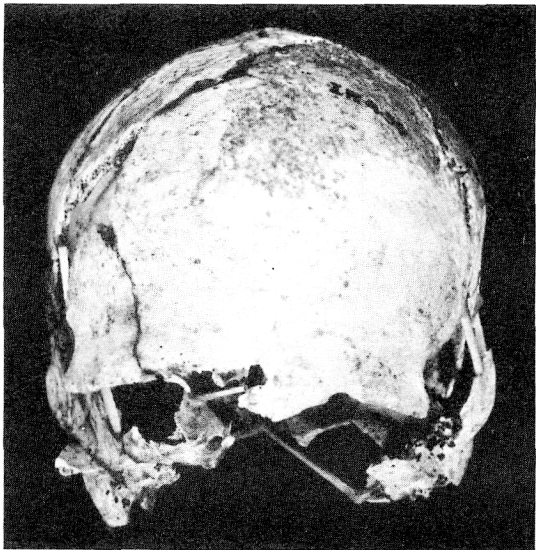


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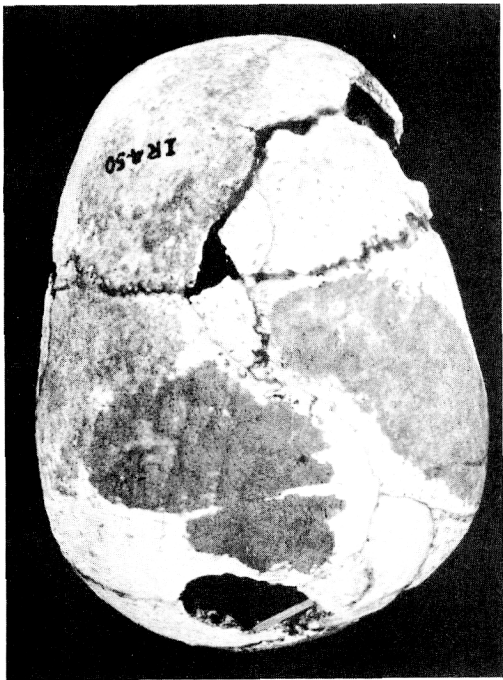




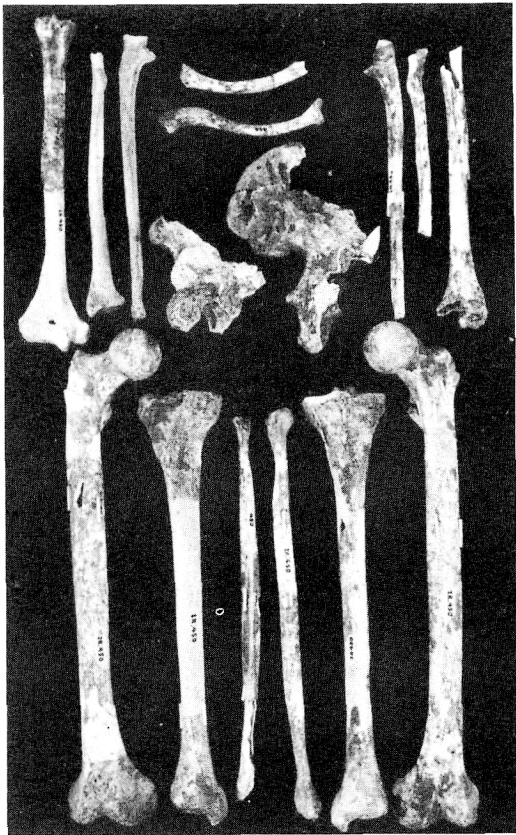
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Norma Facialis



Norma Verticalis



Post-cranial skeletons

Plate 6 IR. 450 Young Male