A NOTE ON THREE SKULLS FROM ALACA HÖYÜK

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During the course of an investigation for another study, I noticed that in the collection of Alaca Höyük skeletons preserved in the Department of Anthropology of the University of Ankara there were the remains of two skulls which, although represented by fragments, could be restored. I restored these two skulls (Alaca Höyük No. III and VIII) as much as possible. During the course of this investigation, I also restored the face of skull No. II, which had been partially described before[1].

These three skulls (Nos. II, III and VIII) were found in the Copper Age stratum of Alaca Höyük during the excavation season of 1936. It is believed that these individuals had been caught and killed under the falling stones during an earthquake[2].

Alaca Höyük No. VIII (Figs. 1, 2 and 3):

All the milk teeth of this individual had erupted and had been used. The first permanent molar, in both the upper and lower jaws, is still within its socket. Thus, this skull belongs to a child of approximately six years of age. The determination of the sex of a child's skeleton is a difficult task. Though it is not possible to reach a definite conclusion, the quite strongly deveped first permanent molars and the presence of a considerably

[1] Şenyürek, M. S.: Anadolu Bakırçağı ve Eti Sekenesinin Kraniyolojik Tetkiki. A Craniological study of the Copper Age and Hittite populations of Anatolia. *Belleten*, No. 19, pp. 219-235 and 237-253, 1941; Kansu, Ş. A. and Tunakan, S.: Türk Tarih Kurumu Alaca-Höyük kazılarında (1936-1944) Bakır Çağı yerleşme katlarından çıkarılan iskeletletlerin antropolojik incelenmesi. *Belleten*, No. 36, pp. 411-422, 1945.

[2] See: Koşay, H. Z.: Türk Tarih Kurumu tarafından yapılan Alaca Höyük hafriyatı. 1936 daki çalışmalara ve keşiflere ait ilk rapor, p. 69, Ankara, 1938.

pronounced sagittal crest on os frontale, nevertheless, suggest that a boy is being dealt with here.

This skull (Table 1) is brachycephalic, orthocephalic and tapeinocranic. In norma verticalis the form of the skull is pentagonoid. The brow ridges are not yet developed and the forehead is vertical, as in children. The metopic suture is completely closed. The frontal eminences are, again as in children, strongly developed. The temporal fullness and the parietal eminences are pronounced. In norma lateralis the occiput is well curved. In this skull there is a lambdoid flattening of moderate degree, but there is no plano-occipital flattening.

The facial, mandibular and dental measurements of this individual are shown in tables 1-7. The sutura infraorbitalis is preserved in both orbits, in both their facial and orbital aspects. The anterior and lateral projection of the zygomatic bone is weak. The sill of the nasal opening shows the infantile form. The canine fossa is shallow.

The first upper molar possesses four cusps. In this tooth the hypocone is well-developed. On both the right and left upper first molar a well developed Carabelli cusp is observed, which is somewhat better developed on the left than on the right side. The first lower permanent molar has five cusps. The hypoconulid is well-developed in this tooth. This tooth shows the plus pattern of Dr. Milo Hellman[3]. The masticating surfaces of both the upper and lower first molars show scarce but coarse wrinkles.

This skull, according to all the available evidence, represents an individual belonging to the Alpine racial type.

Alaca Höyük No. III (Figs. 4, 5, 6 and 7):

In this individual, represented by a calva and broken upper and lower jaw fragments, all the permanent teeth, with the exception of the second and third permanent molars, had erupted. The second molars, which have just begun to erupt, are, in both the upper and lower jaws, still within their sockets. This skull, thus, represents a child of approximately eleven years of age. The

[3] Helmann, M.: Racial characters in human dentition. Proceedings of the American Philosophical Society, 68, No. 2, 1928.

relatively small size of the permanent teeth suggest that this skull belongs to a girl.

This skull has been crushed and distorted. In norma verticalis the left side of the occiput bulges more than the right side (Fig. 4). On the left side of the calva, in norma lateralis, it is seen that the temporal bone has been pushed backward and rotated (Fig. 5). On the left side, the tympanic and mastoid parts of os temporale have been pushed to a still greater extent backward and downward (Figs. 6 and 7). Thus the measurements taken on this skull are only approximate.

The maximum length (202 ?? mm) and width (170 ? mm) measurements of this skull are very large [4]. The skull appears to be brachycephalic. The auricular height-length index is orthocephalic and the auricular height-breadth index is tapeinocranic.

In norma verticalis the form of the skull is pentagonoid. As the anterior portion of the os frontale is broken, it is not possible to determine whether the metopic suture was partially open or not. But the fact that the metopic suture is obliterated on a piece of the frontal bone at the bregma region, shows that it was at least partially closed. The temporal fullness is of medium degree and the parietal eminences are pronounced. The mastoid process is small and the supramastoid crest is very weak. In norma lateralis, the occiput is strongly curved. Though a moderate lambdoid flattening is observed in this skull, there is no plano-occipital flattening. There are no wormian bones in the coronal and sagittal sutures; but on the left half of the os occipitale, an oblique accessory suture descending from a place near lambda to the asterion region cuts off a large piece of this bone (See Figs. 4 and 7). Furthermore, on the right side, at the place

[4] As the anterior part and the glabella region of the frontal bone are broken, the maximum skull length could not be measured directly. The piece of glabella has been restored according to the lateral part of the margo orbitalis superior of the right orbit which has been preserved and the length has been measured on this restoration. As the left parietal eminence region is broken, the exact width measurement also could not be taken. The width shown in Table 8 has been calculated from the right half of the skull which is more intact. The porion-bregma height also has been measured on this side.

of junction of the parietomastoid and squamosal sutures there is the trace of a small wormian bone, which has been lost.

The mandibular measurements that could be taken and the dental measurements are shown in Tables 9 - 11. The upper incisors, especially the second incisor, show the shovel-shape, described by Dr. Hrdlicka [5]. The first upper molar has four cusps. The hypocone of this tooth is well-developed. Although the second upper molar, also, has four cusps, its hypocone is greatly reduced. The form of this tooth, from the occlusal view, approaches the triangular shape.

As for the mandibular teeth, the incisors have been lost after death. The lingual surface of the lower canine approaches somowhat the shovel-shape. The first lower molar has five cusps. The hypoconulid of this tooth is well-developed. This lower molar still exhibits the primitive Dryopithecus pattern. The second lower molar also has five cusps. Though the hypoconulid of this tooth is still well-developed, it is somewhat smaller than that of the first lower molar. The second lower molar shows the plus pattern of Dr. Helmann. The right and left lower wisdom teeth, which are still at an early stage of development, also exhibit five cusps and the plus pattern.

In a former study [6] I demonstrated the presence of both the brachycephalic and dolichocephalic elements amongst the Copper Age inhabitants of Alaca Höyük. In the same study I reached the conclusion that the brachycephals represented the invaders and the aristocrats, while the dolichocephals represented the native population of Anatolia. The individual No. III is, from the viewpoint of morphological type, apparently not different from the roundheaded inhabitants of Alaca Höyük, but differs from them in having a very large skull. Although this individual may perhaps not be considered as a typically hydrocephalic specimen, no doubt remains that it at the least shows a tendency in the direction of hydrocephaly.

[5] Hrdlicka, A.: Shovel-shaped teeth. American Journal of Physical Anthropology, 3, 1928.

[6] Şenyürek, M. S.: op. cit., 1941.

Alaca Höyük No. II (Figs. 8, 9 and 10):

As I restored the facial part of this skull which had been previously partially described [7], it will be worthwhile to describe it again briefly [8].

In this individual, with the exception of the wisdom teeth, all the permanent teeth had erupted. The condition of the epiphyses of the long bones also gives an idea about the age of this individual [9]. According to the condition of epiphyses this skeleton represents an individual of approximately 17 years of age. The relatively large size of the teeth, some features of the skull and two fragments of os ilium show that this skeleton belongs to a male individual.

This skull is mesocephalic, orthocephalic and tapeinocranic (see Table 12). The fronto-parietal index representing the minimum frontal diameter as a percentage of the maximum skull width is metriometopic; that is, the forehead is moderately wide.

In norma verticalis the form of the skull is ovoid. The muscularity of the skull is of submedium degree. The forehead is of medium height and of medium slope. The brow ridges are of submedium development. The frontal eminences are of medium size. The postorbital constriction is of submedium extent. The metopic suture is completely closed [10]. In the parietal region the sagittal elevation is of submedium degree. The mastoid process and the supramastoid crest are of submedium development. In norma lateralis, the occiput is well curved and protuberant. Though a moderate degree of lambdoid flattening is observed in the occipital region, there is no plano-occipital flattening.

[7] Şenyürek, op. cit., 1941; Kansu, Ş. A. and Tunakan. S., op. cit., 1945.

[8] A recording error in the length measurement of this skull has been corrected here.

[9] The lower epiphysis of humerus, of which the proximal end is missing, has been fused with the diaphysis. The medial epicondyle only is still separate. The upper epiphysis of the ulna is closed, but its lower epiphysis was still open. The upper epiphysis of radius is partly closed. The distal end of this bone is broken. On the femur the caput femoris, the trochanter major and the distal epiphysis were still not united with the diaphysis. On os ilium, the ossification center forming the crista iliaca had still not fused with this bone.

[10] Only in the glabella region weak traces of this suture. already closed, are noticed.

The upper facial index is leptēn; that is the face is long relative to its width (see table 12). The orbital index is chamaeconchic; that is, the orbit is low in relation to its breadth. The nasal index is leptorrhine. In other words, the nose is relatively narrow.

The anterior and lateral projections of the zygomatic bones are of medium degree. In this skull the sutura infraorbitalis has disappeared. The nasal spine is of submedium development. The sill of apertura pyriformis is sharp. The canine fossa is of medium depth.

The measurements of the upper and lower jaws are listed in tables 13-14 and those of the teeth in tables 15-16. The incisors of this individual are not shovel-shaped. The first upper molar has four cusps. In this tooth the hypocone is well developed. On the other hand, the second upper molar has only three cusps. In this tooth the hypocone has disappeared. The form of the masticating surface of this tooth thus approaches the triangular shape. There is no Carabelli cusp in the upper molars. The first lower molar, which has five cusps, exhibits the plus pattern. The second lower molar has only four cusps. In this tooth the hypoconulid has disappeared. This molar also shows Dr. Hellman's plus pattern. There are slight wrinkles over the masticating surfaces of the upper and lower second molars.

Though there are long bones appertaining to this skeleton, unfortunately one or two ends of these bones are broken. The approximate statures, calculated from these restored bones, according to Pearson's formulae[11], are listed below[12]:

	Stature
81.306 + 1.880 Femur =	161.20 ?
70.641 + 2.894 Humerus =	158.47 ?
78.664 + 2.376 Tibia =	161.23 ?
71.272 + 1.159 (Femur + Tibia) =	160.80 ?
Average =	160.42 ?

[11] Martin, R.: Lehrbuch der Anthropologie, vol. 2, p. 1070, 1928.

Thus, the stature of this individual appears to be about 160 centimeters. That is, this individual is at the lower boundary of the medium stature category accepted for males. In this connection, however, it must be kept in mind that an approximately 17 years old individual is being dealt with here.

In a former study [13], I demonstrated that the majority of the Chalcolithic and Copper Age populations of Anatolia were dolichocephals of Eurafrican and Mediterranean types and that the brachycephals were in the minority in these periods. The fact that the individual under consideration (Alaca höyük No. II) is relatively young and has not yet completed his development, makes it difficult to determine with certainty to which one of the two longheaded types, that were present in the Copper Age times in Anatolia, he belonged. However, this individual appears to come closer to the Mediterranean racial type.

[12] The maximum length measurements of the long bones are listed below:

Humerus (right and left)	= 303.50 mm. ?
Ulna (left)	= 243.00 mm. ?
Femur (right and left)	= 425.00 mm. ?
Tibia (left)	= 347.50 mm. ?

[13] Şenyürek: op. cit. 1941.

TABLE: 1

Measurements of Alaca Höyük No. VIII: The Skull.

Glabello-occipital length	161.00
Maximum width	140.00
Porion-bregma height	98.00
Bizygomatic diameter	96.00
Nasion-prosthion length	48.50
Orbit width (Dacryon-ectoconchion)	35.00
Orbit height	30.50
Nasal length	32.50
Nasal width	19.00
Cranial index	86.95
Po-b-length index	60.86
Po-b-breadth index	70.00
Upper facial index	50.52
Orbital index	87.14
Nasal index	53.52

TABLE: 2

Measurements of Alaca Höyük No. VIII: The Maxilla.

Palate-external length	39.00
Palate-external width	53.00
External palatal index	135.89

TABLE: 3

Measurements of Alaca Höyük No. VIII: The Mandible.

Bicondylar width	104.00 ??
Bigonial width	77.00
Bimental width (Distance between the two foramina mentalia)	37.00
Condylo-symphyseal length	73.00 ?
Height of corpus (at the level of foramen mentale)	20.00
Thickness of corpus (at the level of foramen mentale)	11.00
Symphysis length	24.00
Height of ascending raums (From Gonion to the highest point of the condyle)	37.00
Height of ascending ramus (projected)	31.00
Minimum breadth of ascending ramus	25.00
Mandibular index	70.19
Breadth index	74.03
Index of ascending ramus	67.56
Height-thickness index of the corpus	55.00

Table: 4

Measurements of Alaca Höyük No. VIII: Milk teeth

Maxillary teeth	Length	Breadth	Height (Crown)	Robustness value [1]	Crown index [2]
Canine	6.4	5.4	——	34.56	84.37
First milk molar	7.2	8.3	5.5+	59.76	115.27
Second milk molar	9.1	10.3	6.0+	93.73	113.18

1 — Robustness value = length x breadth.

2 — Crown index = $\frac{\text{breadth x 100.}}{\text{length}}$

TABLE: 5

Measurements of Alaca Höyük No. VIII : Milk Teeth

Mandibular teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Robustness Value	Crown Index	Trigonid-Talonid Index[1]
Canine	5.7	5.3	—	—	—	30.21	92.98	—
First milk molar	8.0	7.1	7.1	7.0	6.2 +	56.80	88.75	98.59
Second milk molar	10.4	9.2	9.1	9.2	5.6 +	95.68	88.46	101.09

1 — Trigonid — talonid index $= \frac{\text{talonid breadth X 100}}{\text{trigonid breadth}}$

TABLE: 6

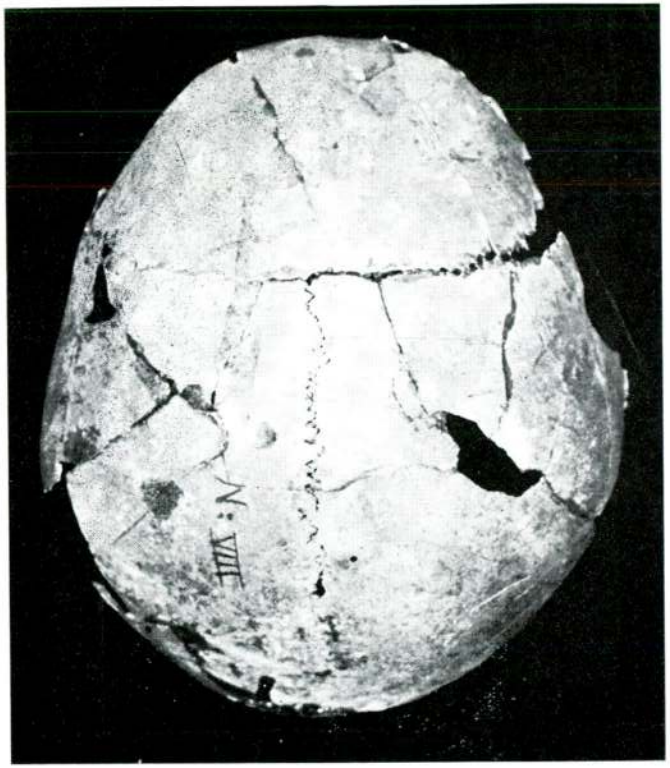
Measurements of Alaca Höyük No. VIII: The Permanent Teeth

Maxillary teeth	Length	Breadth	Height (Crown)	Robustness Value	Crown Index
M^1	10.4	12.2	7.6	126.88	117.30

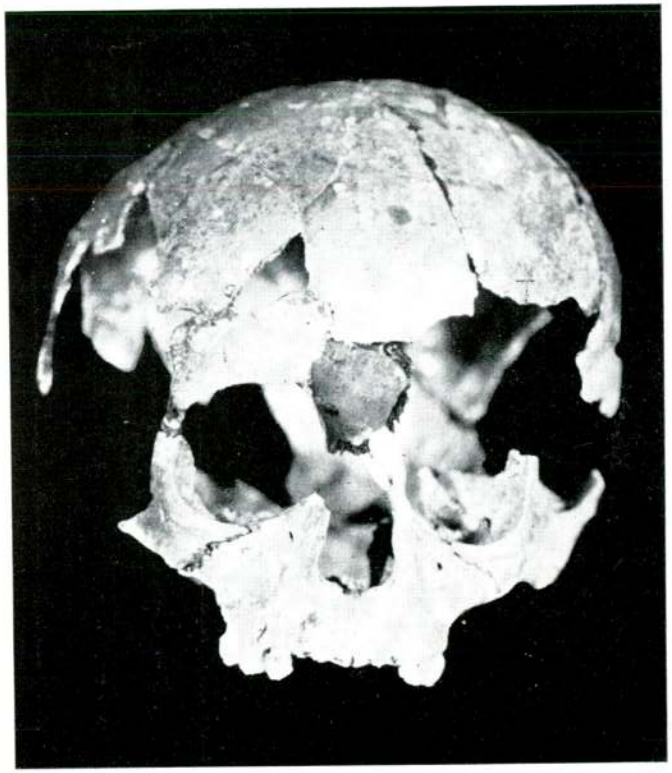
TABLE: 7

Measurements of Alaca Höyük No. VIII: The Permanent Teeth

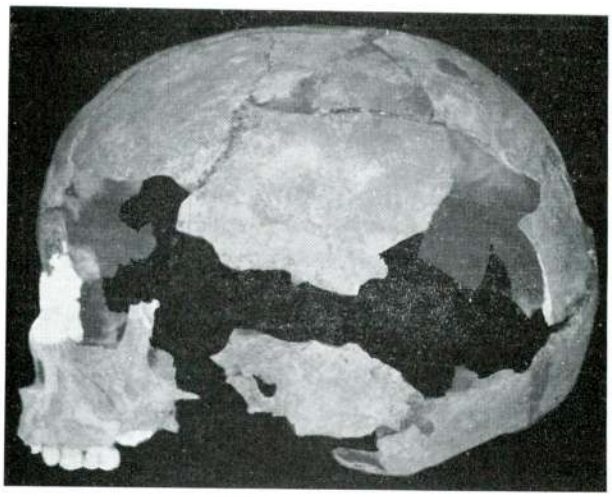
Mandibular teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Robustness Value	Crown Index	Trigonid-Talonid Index
M_1	11.4	10.2	10.2	10.2	8.1	116.28	89.47	100.00



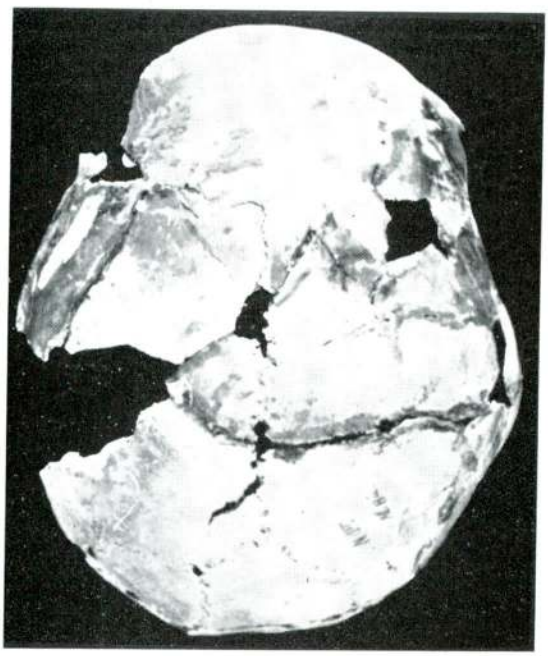
Res. 1 — Alaca-Höyük No. VIII Kafatasının yukarı lan görünüşü.
Fig. 1 — The skull of Alaca-Höyük No. VIII in norma verticalis.



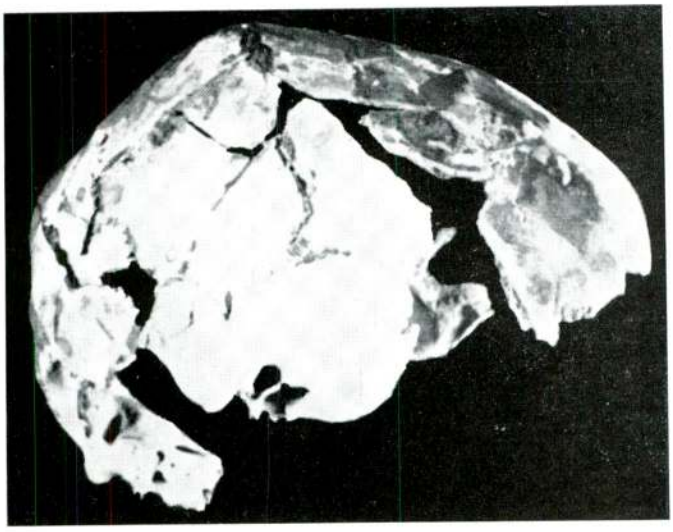
Res. 2 — Alaca-Höyük No. VIII Kafatasının önden görünüşü.
Fig. 2 — The skull of Alaca-Höyük No. VIII in norma frontalis.



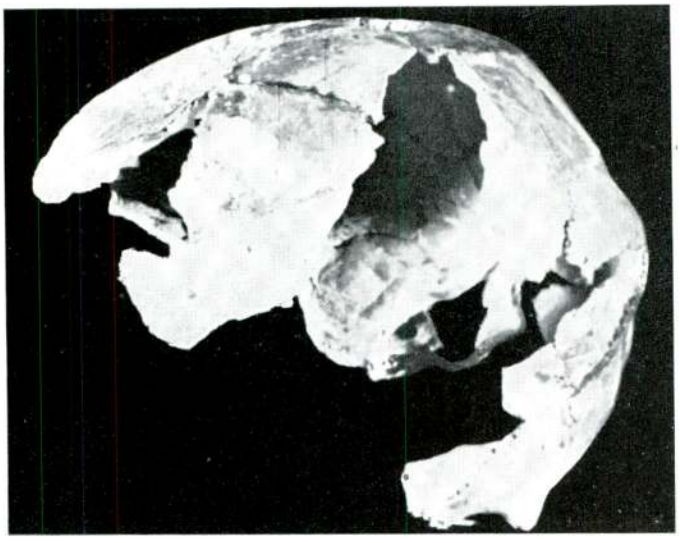
Res. 3 — Alaca-Höyük No. VIII Kafatasının yandan görünüşü.
Fig. 3 — The skull of Alaca-Höyük No. VIII in norma lateralis.



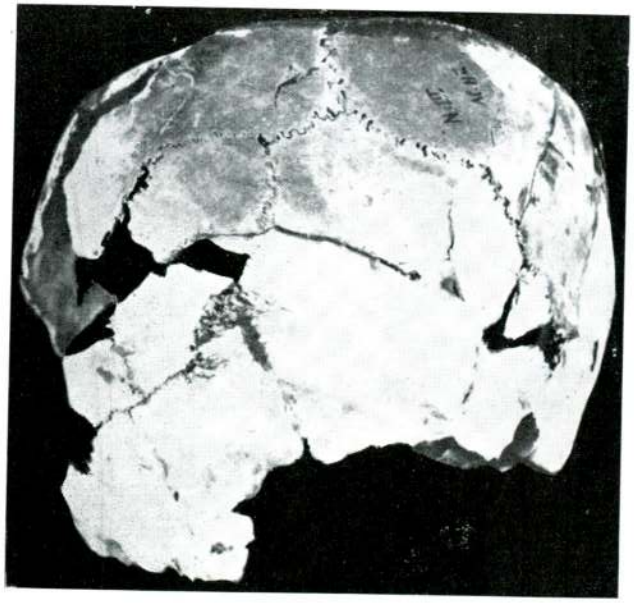
Res. 4 — Alaca-Höyük No. III Kafatasının yukarıdan görünüşü.
Fig. 4 — The skull of Alaca-Höyük No. III in norma verticalis.



Res. 5 — Alaca-Höyük No. III Kafatasının yandan görünüşü (Sağ taraf).
Fig. 5 — The skull of Alaca-Höyük No. III in norma lateralis (Right side).



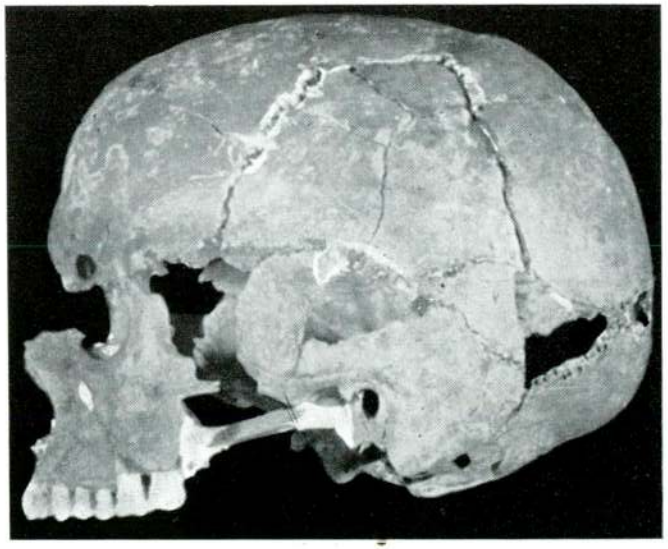
Res. 6 — Alaca-Höyük No. III Kafatasının yandan görünüşü (Sol taraf).
Fig. 6 — The skull of Alaca-Höyük No. III in norma lateralis (Left side).



Res. 7 — Alaca-Höyük No. III Kafatasının arkadan görünüşü.
Fig. 7 — The skull of Alaca-Höyük No. III in norma occipitalis.

Res. 8 — Alaca-Höyük No. II Kafatasının yukarıdan gör ünüşü.
Fig. 8 — The skull of Alaca-Höyük No. II in norma verticalis.

Res. 9 — Alaca-Höyük No. II Kafatasının önden görünüşü.
Fig. 9 — The skull of Alaca-Höyük No. II in norma frontalis.



Res. 10 — Alaca-Höyük No. II Kafatasının yandan görünüşü.
Fig. 10 — The skull of Alaca-Höyük No. II in norma lateralis.

TABLE: 8

Measurements of Alaca Höyük No. III: The Calva

Glabello-occipital length	202.00??
Maximum width	170.00?
Porion-bregma height	Right = 120.00??
Mean thickness of parietal	3.10
Cranial index	84.15??
Po-b-length index	59.40??
Po-b-breadth index	70.58??

TABLE: 9

Measurements of Alaca Höyük No. III: The Mandible.

Height of corpus at the level of foramen mentale	24.00
Thickness of corpus at the level of foramen mentale	11.50
Height-thickness index of the corpus	47.91

TABLE: 10

Measurements of Alaca Höyük No. III: The Permanent Teeth

Maxillary Teeth	Length	Breadth	Height (Crown)	Robustness Value	Crown Index
I^1	9.0	7.1	—	63.90	78.88
I^2	7.0	6.7	—	46.90	95.71
C^1	7.8	8.2	10.6	63.96	105.12
P^3	7.0	8.7	7.7	60.90	124.28
P^4	6.6	8.9	7.1	58.74	134.84
M^1	10.2	11.3	6.8	115.26	110.78
M^2	10.0	11.3	7.5	113.00	113.00

TABLE: 11

Measurements of Alaca Höyük No. III: The Permanent Teeth.

Mandibular Teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Robustness Value	Crown Index	Trigonid-Talonid Index
C_1	7.1	7.2	—	—	10.7	51.12	101.40	—
P_3	6.9	7.4	—	—	8.0	51.06	107.24	—
P_4	7.0	7.8	—	—	7.4	54.60	111.42	—
M_1	11.1	9.8	9.8	9.7	—	108.78	88.28	98.97
M_2	11.0	9.7	9.7	9.7	8.0	106.70	88.18	100.00

TABLE: 12

Measurements of Alaca Höyük No. II: The Skull.

Glabello-occipital length	183.00
Maximum width	140.00
Minimum frontal diameter	96.00
Perion-bregma height	110.00
Mean thickness of parietal	3 90
Bizygomatic diameter	121.00 ?
Nasion - prosthion length	69.50
Orbit width (Dacryon - ectoconchion)	41.00
Orbit height	32.00
Nasal length	55.50
Nasal width	24 00 ?
Cranial index	76.50
Po-b-length index	60.10
Po-b-breadth index	78.57
Fronto-parietal index	68.57
Upper facial index	57.43
Orbital index	78.04
Nasal index	43.24

TABLE: 13

Measurements of Alaca Höyük No. II: The Maxilla.

Palate-external length	48.00
Palate-external width	66.00
External palatal index	139.58

TABLE : 14

Measurements of Alaca Höyük No. II: The Mandible

Bicondylar width	108.00
Bigonial width	90.50
Bimental width (Distance between the two foramina mentalia)	44.00
Condylo-symphyseal length	103.00
Height of corpus (At the level of foramen mentale)	29.00
Thickness of corpus (At the level of foramen mentale)	10.50
Symphysis length	30.00 ?
Height of ascending ramus (From Gonion to the highest point of the Condyle)	57.00
Height of ascending ramus (Projected)	51.00
Minimum breadth of ascending ramus	30.00
Mandibular index	95.37
Breadth index	83.79
Index of ascending ramus	52.63
Height-thickness index of the corpus	36.20

TABLE : 15

Measurements of Alaca Höyük No. II: The Permanent Teeth

Maxillary Teeth	Length	Breadth	Height (Crown)	Robustness Value	Crown Index
I^1	8.7	7.2	—	62.64	82.75
I^2	6.3	6.7	—	42.21	106.34
C^1	7.8	8.5	10.6+	66.30	108.97
P^3	7.2	9.3	8.4 +	66.96	129.16
P^4	6.3	9.3	8.0+	58.59	147.61
M^1	10.3	11.4	—	117.42	110.67
M^2	9.7	11.0	7.1	106.70	113.40

TABLE : 16

Measurements of Alaca Höyük No. II: The Permanent Teeth

Mandibular Teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Robustness Value	Crown Index	Trigonid-Talonid Index
I_1	5.6	6.4	—	—	—	35.84	114.28	—
I_2	5.7	6.6	—	—	—	37.62	115.78	—
C_1	7.0	7.7	—	—	12.0+	53.90	110.00	—
P_3	7.2	7.7	—	—	8.9+	55.44	106.94	—
P_4	7.2	8.0	—	—	8.5+	57.60	111.11	—
M_1	11.6	10.6	10.4	10.6	—	122.96	91.37	101.92
M_2	11.1	10.0	10.0	9.8	7.7+	111.00	90.09	98.00