

A CRANIOLOGICAL STUDY OF THE COPPER AGE AND HITTITE POPULATIONS OF ANATOLIA

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This study is based on the skulls found at Hisarlık, Babaköy, Kusura, Ahlatlıbel, Alişar, Alacahöyük, Arslantepe, Tilkitepe and Dündartepe [1]. The descriptions of many of these skeletons have already been published by professor Dr. Şevket Aziz Kansu [2]. This new study, on the other hand, is an attempt at synthesis. In this connection I like to express my gratitude to our learned Professor Dr. Şevket Aziz Kansu for his interest in this work and for making valuable suggestions.

I believe that these skulls, coming from different sections of Anatolia, are sufficient to give us an idea about the anthropological history of ancient Anatolia. The majority of these skeletons are preserved in our museum. I made morphological observations on all the skulls present and measured a part of them. Measurements of the other skulls have been taken from the publications of various authors. In this study the fragmentary skulls which did not permit the taking of correct measurements have been eliminated. As we have only a part of the Alişar crania in our museum, their measurements and those of the Hisarlık skulls have been taken from the report of Dr. Krogman (1937). The measurements of the Babaköy skull were taken from Mr. Angel's report, while those of the Ahlatlıbel, Kusura, two Alacahöyük and Arslantepe skulls were taken from the reports of Professor Şevket Aziz Kansu (1937-1939).

[1] The skeletons from Tilkitepe will soon be published by Professor Şevket Aziz Kansu I am very grateful to him for allowing me to measure these and the unpublished Alacahöyük crania before the end of his researches.

Kılıç Kökten and Tahsin Özgüç have found the skull of a 6-7 years old child in the copper age stratum of Dündartepe. (Samsun) This child is dolichocephalic and resembles the other copper age crania of Anatolia.

[2] See the bibliography.

The general averages of all the skulls found at various Anatolian sites are tabulated in tables I and II. However, in this study the separate treatment of the skulls with the cranial index of 80 or more has been preferred. Since, for the discussion of the armenoid race problem, it was necessary to treat these brachycephalic skulls separately, it was thought advisable to present them in separate tables. Thus the peoples of these periods have been separated into two groups: [1] those with a cranial index of less than 80 (Tables III and V), [2] those with a cranial index of 80 or more (Tables IV and VI).

THE CHALCOLITHIC AND COPPER AGE SKULLS

Group I (Table III)

The chalcolithic and copper age skulls of Anatolia are predominantly dolichocephalic and mesocephalic. The average cranial indices of the skulls found at the various sites are quite near to each other. That is, in this respect the population was quite homogeneous.

The height-length index, however, is variable. The Babaköy and Alishar skulls are hypsicephalic, and those from Ahlatlıbel and the copper age of Tilkitepe are orthocephalic, while those from Kusura and the chalcolithic of Tilkitepe are chamaecephalic. On the other hand, in the auricular height-length index the majority is in the orthocephalic group. In the height-breadth index the skulls from Babaköy, Alishar and Ahlatlıbel are acrocephalic, those from Tilkitepe metriocephalic, while the skulls from Kusura are tapeinocephalic. As for the auricular height-breadth index the majority is in the metriocephalic group.

The majority of the population is mesēn, with the exception of the Alishar copper age skulls which are leptēn. The orbital index is variable. The Alishar chalcolithic skulls are hypsiconch, those from Babaköy, Alishar copper age and Alacahöyük mesoconch; and those from Kusura and the copper age of Tilkitepe are chamaeconch. The skull from Babaköy is leptorrhine, while those from Tilkitepe, Alacahöyük and Alishar chalcolithic are mesorrhine. The Alishar copper age and Kusura skulls are slightly chamaerrhine, but they do not possess any other negroid features.

The majority of the chalcolithic and copper age skulls of Anatolia are non-muscular and are of the modern type. However, the skull from Babaköy (Angel, 1939) and those from Tilkitepe are very muscular, and of rugged appearance with strong brow ridges. Hence, we can distinguish two dolichocephalic types in the chalcolithic and copper age populations of Anatolia. The first dolichocephalic type, which includes the majority of the skulls, represents the Mediterranean race. On the other hand, the skulls from Tilkitepe and Babaköy belong to the Eurafrikan type, which represents a more primitive variety of the dolichocephals. In this second variety the brow ridges are strong, the forehead is receding, the skull is scaphoid and the muscle markings are heavy.

As has been demonstrated by Professor Buxton (1931) the same two dolichocephalic strains were also present among the population of ancient Mesopotamia. From amongst the skulls from Kish Professor Buxton differentiated three types. Two of these types are dolichocephalic and one brachycephalic. In the first dolichocephalic variety the skull is large, the forehead is receding and the brow ridges are heavy. This represents the Eurafrikan type of Sergi. The second dolichocephalic type is smaller, with rounder contours and weaker musculature. These more gracile skulls represent the Mediterranean race.

The skulls from Al-Ubaid and Ur, described by Sir Arthur Keith (1927), and those found at Yorgantepe (Ehrich, 1938) are mostly of the Eurafrikan type.

From Kish Professor Buxton has distinguished a third type. This is a brachycephalic skull with flattened occiput and represents the armenoid race. These are, however, in the minority as only four out of the 36 skulls belong to this type. As we shall see later the armenoid race was not represented among the ancient Anatolian crania, at least among those that have been studied.

Group II (Table IV)

The round headed skulls from the chalcolithic and copper ages of Anatolia are only moderately brachycephalic. In all of these skulls the occiput is rounded and there is no occipital flattening. These skulls are clearly of the alpine type.

In this connection the consideration of the skulls from Alacahöyük is worthwhile. The two brachycephalic skulls from Alacahöyük which have been published by Professor Şevket Aziz Kansu (1937) were found in the «Kings' Graves». Lately, however, I measured four new skulls from Alacahöyük. Of these new skulls, found in the city of Alacahöyük proper and believed to have been killed under falling stones, one is brachycephalic and the others are dolichocephalic and mesocephalic. These dolichocephalic and mesocephalic skulls resemble the copper age skulls found in other Anatolian sites (Table III). Thus they appear to belong to the native copper age population of Anatolia, while the brachycephalic skulls from this site probably represent the aristocrats and the invaders.

Von Luschan [3] has stated that the earliest inhabitants of Anatolia were the brachycephals of the armenoid type and that the dolichocephals arrived later. Eugen Fischer [4] is also of the opinion that down to 1500 B. C. the dominant element of the Anatolian population was the brachycephals of the armenoid type.

About 84 % of the chalcolithic and copper age skulls of Anatolia are dolichocephalic and mesocephalic. This goes to show that the opinion of Von Luschan and that of Eugen Fischer is incorrect. In these periods the brachycephalic skulls were of rare occurrence and probably belonged to the invaders. This study has shown that the dominant element among the earliest known inhabitants of Anatolia was dolichocephalic and mesocephalic.

THE SKULLS OF THE BRONZE AND HITTITE PERIODS

The following statements are based on a study of the skulls found at Alişar, Kusura, and Arslantepe. The measurements of the skulls of Hisarlık III, a period which is according to Dr. Von der Osten (1937) roughly contemporary of the Bronze and Hittite periods, have also been added to the tables.

Out of the thirty-two chalcolithic and copper age adult skulls

[3] Luschan, Von F. 1911. The early inhabitants of Western Asia. The Journal of the Royal Anthropological Institute of Great Britain and Ireland.

[4] Fischer, E, 1923. «Spezielle anthropologie: Rassenlehre,» Anthropologie, unter Leitung Von G. Schwalbe und E. Fischer «Die Kultur der Gegenwart» Hrsg. Von F. Hinneberg, 3 Teil. 5 Abt. (Leipzig und Berlin). (Cited by Krogman, 1937).

only five (about 16 %) are brachycephalic [5]. On the contrary, among the Bronze and Hittite period crania, inclusive of Hisarlık III which was outside of the boundaries of the Hittite empire, 42% of the skulls are brachycephalic. However, among the peoples of the Hittite empire proper, as represented by the skulls from Alişar, Kusura, and Arslantepe and excluding Hisarlık skulls, 50% of the crania are brachycephalic.

These figures indicate that the Hittites were predominantly brachycephalic invaders (also compare the average cranial indices of the copper age and Hittite skulls from Alişar and Kusura in tables I and II). Now we shall study these skulls, as before, by dividing them into two groups.

Group I (Table V)

This group is dolichocephalic and mesocephalic. These skulls are basically of the same type that had prevailed in the copper age. However, they were slightly modified by the infusion of the new Hittite blood. We can regard these dolichocephalic and mesocephalic people of the Hittite period as the descendents of the copper age population. Thus, this anthropological evidence suggests that the Hittites did not annihilate the earlier population of Anatolia but, on the contrary, mixed with them and tried to assimilate them.

Group II (Table VI)

The average cranial index of the brachycephalic skulls from the various sites is 82 - 83. In the height-length index they are orthocephalic and hypsicephalic, while in the auricular height-length index they are in the hypsicephalic group. In the height-breadth index these skulls are tapeinocephalic and metriocephalic, which indices are also true for the auricular height-breadth index. The nasal index is variable, but the majority is mesorrhine and chamaerrhine. The upper facial index is euryēn and mesēn and the orbital index is variable.

At this point we will consider one particular skull. The skull No. b×43 from the Hittite period of Alişar is of importance. The top of this skull is flat and the nasal bones are flat and broad as

[5] The brachycephalic child's skull from Kusura (No. 94. 26) shown in fig. 5 has not been counted.

in the negroes. The nose is chamaerhine, the nasal index being 55. Also there is a considerable degree of alveolar prognathism. This skull differs from the usual Hittite crania and belongs to a negroid individual [6]. However, as is indicated by the cranial index (cranial ind. 81. 9), some Hittite blood was present in this individual.

From historical documents we know that Hittites maintained close relations with the Egyptians. From a letter found at Boğazköy we learn that Hittites employed negroe slaves [7]. Professor Landsberger believes that this letter, written in the Akkadian language and in cuneiform writing, was sent by Ramses II to Hattusil. In this letter it is stated that some male negroe slaves and some (more than two) female negroe slaves have been sent. Thus the presence of a negroid skull among the Hittites is easily understood. We can regard this young negroid skull as that of the son of a negroe slave.

ARMENOID RACE PROBLEM

Since the time of Von Luschan (1911) many writers have claimed that the Hittites were of the armenoid race. Von Luschan derived his conclusion mainly from an examination of the Hittite pictures. Till now many writers have been under the influence of this conclusion of von Luschan's. Therefore, it is worthwhile to discuss this problem in some detail.

Von Luschan was the first to distinguish and to describe the armenoid race. The skulls of the armenoid type are hyperbrachycephalic and hypsicephalic, with flattened occiputs which is a characteristic of this race. However, since the term « armenoid » is the name of an ethnic group, its application to a race has been the cause of a great deal of confusion. For instance, even Dr. Krogman, who has written a remarkably good report on the Ali-

[6] Professor Şevket Aziz Kansu also has distinguished a negroid skull among the Alişar crania. Şevket Aziz Kansu, 1934. Deuxième contribution à l'étude craniologique des Etis (Hittites). Türk Antropoloji Mecmuası (Revue Turque d'Anthropologie). No. 15-16.

[7] Keilschrifturkunden aus Boghazkoï. Heft III, No. 52, P. 23, 1922. I would like to express my thanks to my colleague Prof. Landsberger of the Sumerology department of this university for notifying me of the presence of this letter. The tablet containing this letter is broken and now we possess only a part of it. The text of the letter copied above was translated for me by Professor Landsberger.

gar skulls, has fallen into this error. Dr. Krogman, after stating that the Ottoman population of Alişar was of the armenoid type, infers that this population was Armenian (Krogman, 1937, p. 276). I must however point out that the fact that a skull is of the armenoid type does not mean that this man was of Armenian nationality, as the armenoid race is present among a number of Near Eastern nationalities.

Certain other writers have termed this type the Anatolian race. This term implies that this race originated in Anatolia or is confined to it. As we shall see below there is no evidence to show that the armenoid race originated in Anatolia. Therefore, this name, Anatolian, may cause some confusions and is also not suitable. Some other writers have called this race the «Hittite type». Names such as alarodic, Western Asiatic type, etc., have also been used. However, it is not our intention to dwell on these terms further. Though it may cause confusion, since most of the writers still prefer the name armenoid, we shall continue to employ this term.

We have seen that the chalcolithic and copper age crania of Anatolia were predominantly dolichocephalic and mesocephalic. Not one of the few brachycephalic skulls found in the strata of these periods is hyperbrachycephalic. They are only moderately brachycephalic. Furthermore, in these skulls the occiput is rounded and there is no plano-occipital flattening in any one of them (figs. 4 and 5). These skulls are clearly of the alpine type and are not armenoid.

It was previously inferred that the Hittites were predominantly brachycephalic invaders. These Hittite skulls also are only moderately brachycephalic and their occiputs are rounded (figs. 7 and 8). That is, the Hittite brachycephals also belong to the alpine type. Therefore, it is incorrect to call the armenoid race the «Hittite type».

These skulls indicate that the armenoid race did not originate in Anatolia. But it may be asked whether it did not originate in eastern Anatolia. The skulls found at Tilkitepe enlighten us in this respect. The chalcolithic and copper age skulls from Tilkitepe are dolichocephalic and mesocephalic. However, from the chalcolithic period we have a brachycephalic skull. The cranial index of this skull is 82.32 and the occiput is not flattened (fig. 4). This brachycephalic skull is also of the alpine type and is

not armenoid. Thus, it appears that this race did not originate in Eastern Anatolia either.

It is clear that the armenoid race did not originate in Anatolia. Thus, we find ourselves able to confirm the opinion of Dr. Krogman (1937) in this respect.

From the study of Fürst [8] we learn that the earliest inhabitants of Cyprus were not armenoid and that the peoples of the armenoid type landed on this island between 2000 and 1500 B. C. Professor Buxton differentiated four armenoid skulls from among the 36 crania found at Kish. The date of these skulls is approximately 3000 B. C. This shows that even at this date the armenoid race was already present beyond the borders of Anatolia. Professor Vallois (1935) sees armenoid influence in the skulls found at Tepe-Djemshidi and tepe-Bad-hora in Iran. These skulls date back to 2000 - 1000 B. C. The three skulls, however, from Tepe-Giyan briefly reported by Vallois (1935) are dolichocephalic. Friederichs and Müller (1933) also report two armenoid skulls from Harappa in the Indus valley.

Thus we know that in ancient times the armenoid race was present outside of Anatolia. On the other hand, there are no armenoid skulls in the Anatolian copper age and Hittite strata. Of course, it is not impossible that peoples of the armenoid type may have lived as small minorities in some parts of Anatolia in the Hittite period. But the Hittites were not of this race, nor did this race originate in Anatolia. If the armenoid race had originated in Anatolia at least some of the skulls examined should have been of this type.

As it was the case in Europe, in Anatolia also the earliest brachycephals were of the alpine race, and that the armenoids arrived later than the alpiners. Since the skulls of the armenoid type are not present in the chalcolithic, the copper age and the Hittite strata of Anatolia, we must look for the place of origin of this race further east, as was suggested by Dr. Ariëns Kappers (1934) and by Dr. Krogman (1937).

SUMMARY

The majority of the chalcolithic and copper age population of Anatolia were dolichocephalic and mesocephalic. The basic popu-

[8] Fürst, C. M. «Zur Kenntnis der Anthropologie der Prähistorischen Bevölkerung der Insel Cyprien». Lunds universitets Arsskrift, n. f. Avd. 2, Bd. XXIX, no. 6 (Lund, 1933). (cited by Krogman, 1937).

lation of the copper age appears to be a continuation of the chalcolithic people. There does not appear to have been a change in the racial make-up of Anatolia between these periods. In these periods the brachycephals were rare and probably belonged to the invaders [9]. This study indicates that the earliest inhabitants of Anatolia were dolichocephalic and that brachycephals came in later.

From the studies of prehistoric crania in Europe we know that the dolichocephals preceded the arrival of the brachycephals. Thus, it is probable that in Anatolia also the populations of the periods preceding the chalcolithic age were dolichocephalic. But by this we do not mean that there were no brachycephalic individuals present in the earlier periods of Anatolia. Indeed the skull found at Kumtepe, which is said to be neolithic, is brachycephalic (Prof. Şevket Aziz Kansu, 1937). By this what we mean is that the greatest majority of the people were dolichocephalic in the earlier periods too.

The evidence indicates that about 2000 B. C. a new invasion took place in Anatolia. This was made by the Hittites who were predominantly of alpine stock. The craniological evidence, however, suggests that the Hittite invaders did not annihilate the native population they found in Anatolia, but on the contrary mixed with them and tried to assimilate them.

A few brachycephalic skulls from the chalcolithic and the copper ages also are of the alpine race. But the Hittites represent a new and a more extensive alpine invasion. In the Hittite period, in the sites examined, the number of the brachycephals had increased. For instance, in Alişar there were no brachycephals in the copper age, but they were present in the Hittite period of this city. Though we have not sufficient evidence to be sure, from the situation at Alişar it would appear possible that populations of the Bronze and Hittite periods may have been of the same stock.

This study has also shed some light on the problem of the origin of the armenoid race. The craniological evidence indicates that this race did not originate in Anatolia and that its place of origin must be looked for further east.

[9] It appears that in the copper age there was a small invasion bringing these brachycephals into Anatolia. But this invasion in the copper age does not seem to have affected the racial make-up of Anatolia so much as the Hittite invasion.

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Table I
Chalcolithic and Copper Age Skulls

| | BARAÖY | EİSARLIK | | ALİŞAR | | | | KUSUR . [*] (Copper) | | | | ALACAHOYÜK (Copper) | | TILKITEPE | | | |
|---------------------------|---------|----------|------|--------------|--------|-------|-------|-------------------------|--------|--------|-------|------------------------|--------------|-----------|--------|------|------|
| | | II | | Chalcolithic | Copper | | | ♂(2) | ♀(1) | ♂(4) | ♂(3) | ♀(3) | Chalcolithic | | Copper | | |
| | | ♀(1) | ♂(1) | | ♀(1) | ♂(6) | ♀(1) | | | | | | ♂(2) | ♀(1) | ♂(2) | ♀(2) | ♂(3) |
| | | | | ♂(1) | | | | ♀(1) | | | | | | | | | |
| g · op | 183 | 180.5 | 179 | 182.1 | 177 | 189 | 177 | 190 | 180 | 171.66 | 191 | 179 | 183.66 | 181 | | | |
| eu · eu | 133 | 149 | 130 | 135 | 137 | 141 | 128 | 141.5 | 144.66 | 135.33 | 137.5 | 140.33 | 137.33 | 140 | | | |
| Ba · b | 140 | — | — | 136.4 | — | 124 | — | 147 | — | — | 131 | — | 129.5 | — | | | |
| Po · b | 121 | 116 | 107 | 112.8 | 107 | 114 | — | 117 | 109.5 | 107 | 112 | 105 | 110 | 110 | | | |
| Min - frontal | 95 | — | 94 | 91.3 | 93.5 | 92.5 | 91 | 95.6 | 94.33 | 97.75 | 99 | 95.16 | 101 | 93.5 | | | |
| Zy - Zy | (126) | — | 124 | 124.4 | 113 | 132 | — | — | — | 116 | 129 | 118 | 128 | — | | | |
| Ba · na | 105? | — | — | 102.9 | — | 98 | — | — | — | — | 97 | — | 100.5 | — | | | |
| Ba · pr | (100)?? | — | — | 91 | — | 98 | — | — | — | — | 85 | — | 97.5 | — | | | |
| Na · pr | (69) | — | 66 | 69.6 | — | 70 | — | — | — | 63 | 65 | — | 65.5 | — | | | |
| Orbit width | 39? | 38 | 38 | 38.9 | 37 | 42 | — | — | — | 37 | — | — | 38.25 | — | | | |
| Orbit height | 33 | 29 | 35 | 33.7 | 31 | 32 | — | — | — | 31 | — | — | 31 | — | | | |
| Nasal height | (50) | 48? | 46 | 48.8 | — | 46 | — | — | — | 46 | — | — | 49.5 | — | | | |
| Nasal width | (23)?? | 23.3 | 22 | 24.9 | — | 24 | — | — | — | 22 | — | — | 23.75 | — | | | |
| Max. alv. width | (63)?? | — | 58 | 60.3 | — | 64 | — | — | — | — | — | — | 66 | — | | | |
| Max. alv. length | (59)??? | — | — | 51.5 | — | 55 | — | — | — | — | — | — | 59 | — | | | |
| Cranial index | 72.6 | 82.5 | 72.6 | 74.2 | 77.4 | 74.6 | 72.32 | 74.18 | 80.43 | 78.84 | 72.02 | 78.38 | 74.9 | 77.34 | | | |
| Height - length index | 76.5 | — | — | 75.1 | — | 64.92 | — | 73.05 | — | — | 69.68 | — | 72.07 | — | | | |
| Height · Breadth index | 105.2 | — | — | 100.3 | — | 86.71 | — | 101.43 | — | — | 93.57 | — | 94.52 | — | | | |
| Po · b - length index | 66.1 | 64.2 | 59.8 | 62 | 60.5 | 60.32 | — | 61.32 | 60.69 | 61.88 | 59.57 | 58.88 | 59.91 | 60.77 | | | |
| Po · b - breadth index | 90.9 | 77.85 | 82.3 | 83.6 | 78.1 | 80.86 | — | 82.68 | 76.35 | 80.76 | 80 | 77.93 | 80.08 | 78.57 | | | |
| Orbital index | 84.6? | 76.3 | 92.1 | 87.1 | 83.8 | 76.19 | — | — | — | 83.78 | — | — | 81.07 | — | | | |
| Nasal index | 46?? | 48.5 | 47.8 | 51.3 | — | 52.17 | — | — | — | 47.82 | — | — | 48.02 | — | | | |
| Tr. cranio · facial index | (94.7) | — | 95.4 | 92.2 | 82.5 | 92.3 | — | — | — | 47.82 | — | — | 48.02 | — | | | |
| Upper facial index | 54.7 | — | 53.2 | 56 | — | 53.03 | — | — | — | 84.05 | 92.14 | 86.76 | 93.19 | — | | | |
| Zygo · frontal index | 75.3 | — | 75.8 | 73.5 | 82.7 | 72.72 | — | — | — | 82.31 | 76.74 | — | 78.34 | — | | | |

[*] When prof. Şevket Aziz Kansu had written his report (1939) on the Kusura skeletons the period to which the skull No. 94.76 belonged was unknown and consequently in his report it was marked with a question mark. Subsequently, however, from a letter of Miss Lamb, written to professor Şevket Aziz Kansu, it was learned that it belonged to the copper age. The measurements of this skull have been added to the copper age series.

Table II
Skulls of Bronze and Hittite periods

| | HİSARLIK III | | ALİŞAR | | KUSURA (Hittite) ♂ (2) | ARSLANTEPE (Hittite) ♂ (1) |
|----------------------------|--------------|----------|-----------------|-------|------------------------------|----------------------------------|
| | ♂ (2) | ♀ (1) | Hittite | | | |
| | | | Bronze ♂ (2) | ♂ (8) | | |
| g · op | 192 | 188 | 180.5 | 182.9 | 176.5 | — |
| eu · eu | 136.7 | 134 | 142.5 | 144.6 | 141 | — |
| Ba · b | — | — | 136 | 125.9 | 136.5 | — |
| Po · b | 110 | 111 | 116 | 113.4 | 119 | — |
| Min - frontal | — | — | 100.5 | 99.8 | 94.5 | — |
| Zy - Zy | — | — | 135.5 | 129.8 | 135? [*] | — |
| Ba · na | — | — | 95 | 103.7 | 103.5 | — |
| Ba · pr | — | — | 84 | 98.6 | 99 | — |
| Na · pr | 105 | — | 60 | 68.6 | 69.5 | — |
| Orbit width | 38 | — | 36 | 40.1 | 41 | — |
| Orbit height | 30 | — | 34 | 32.6 | 33 | — |
| Nasal height | 48 | — | 49 | 52.3 | 48 | — |
| Nasal width | 24.5 | — | 26 | 26.1 | 24 | — |
| Max. alv. width | — | — | 53 | 61.9 | 64 | — |
| Max. alv. length | — | — | 46 | 50.8 | 43 | — |
| Cranial index | 71.2 | — | 79.1 | 79.2 | 79.87 | 82.08 |
| Height - length index | — | 71.3 | 77.7 | 68.1 | 77.3 | — |
| Height - Breadth index | — | — | 93.2 | 87.1 | 96.97 | — |
| Po · b - length index | 58.7 | 57 | 64.3 | 62 | 61.6 | 66.49 |
| Po · b - breadth index | 80.5 | 82.83 | 81.5 | 78.4 | 84.52 | 80.13 |
| Orbital index | 78.9 | — | 94.4 | 81.4 | 79.27 | — |
| Nasal index | 50.9 | — | 53.1 | 50.2 | 52.42 | — |
| Tr. cranium - facial index | — | — | 95.1 | 89.7 | 91.2 | — |
| Upper facial index | — | — | 43.8 | 52.9 | 54.81 [*] | — |
| Zygo · frontal index | — | — | 74.2 | 77.9 | 70.37 [*] | — |

[*] Writer's addition.

Table III
Chalcolithic and Copper Age Skulls
Group I (Dolichocephalic and Mesocephalic skulls)

| | BABADÖY ♂(1) | ALİŞAR | | KUSURA (Copper) | | AFLATLIBEL (Copper) | | ALACARÖYÜK (Copper) | | TILKITEPE | | | |
|---------------------------|-----------------|----------------------|----------------|--------------------|-------|------------------------|--------|------------------------|-------|--------------|-------|--------|-------|
| | | Chalcolithic ♀(1) | Copper ♂(6) | ♀(1) | ♂(2) | ♀(1) | ♂(4) | ♂(1) | ♀(2) | Chalcolithic | | Copper | |
| | | | | | | | | | | ♂(2) | ♀(2) | ♂(2) | ♀(2) |
| g - op | 183 | 179 | 182.1 | 177 | 189 | 177 | 190 | 185 | 173 | 191 | 178 | 183.66 | 181 |
| eu - eu | 133 | 130 | 135 | 137 | 141 | 128 | 141.5 | 140 | 132.5 | 137.5 | 136 | 137.33 | 140 |
| Ba - b | 140 | — | 136.4 | — | 124 | — | 147 | 140 | — | 131 | — | 129.5 | — |
| Po - b | 121 | 107 | 112.8 | 107 | 114 | 91 | 117 | 110 | 107 | 112 | 105 | 110 | 110 |
| Min - frontal | 35 | 94 | 91.3 | 93.5 | 92.5 | — | 95.6 | 96 | 95.5 | 99 | 94.25 | 101 | 93.5 |
| Zy - Zy | (126) | 124 | 124.4 | 113 | 132 | — | — | — | 116 | 129 | 118 | 128 | — |
| Ba - na | 105? | — | 102.9 | — | 98 | — | — | — | — | 97 | — | 100.5 | — |
| Ba - pr | (100)?? | — | 91 | — | 98 | — | — | — | — | 85 | — | 97.5 | — |
| Na - pr | (69) | 66 | 69.6 | — | 70 | — | — | — | 63 | 65 | — | 65.5 | — |
| Orbit width | (39)? | 38 | 38.9 | 37 | 42 | — | — | — | 37 | — | — | 38.25 | — |
| Orbit height | 33 | 35 | 33.7 | 31 | 32 | — | — | — | 31 | — | — | 31 | — |
| Nasal height | (50) | 46 | 48.8 | — | 46 | — | — | — | 46 | — | — | 49.5 | — |
| Nasal width | (23)?? | 22 | 24.9 | — | 24 | — | — | — | 22 | — | — | 23.75 | — |
| Max. alv. width | (63)?? | 58 | 60.3 | — | 64 | — | — | — | — | — | — | 66 | — |
| Max. alv. length | (59)??? | — | 51.5 | — | 55 | — | — | — | — | — | — | 59 | — |
| Cranial index | 72.6 | 72.6 | 74.2 | 77.4 | 74.6 | 72.32 | 74.18 | 75.67 | 76.57 | 72.02 | 76.41 | 74.9 | 77.34 |
| Height - length index | 76.5 | — | 75.1 | — | 64.92 | — | 73.05 | — | — | 69.68 | — | 72.07 | — |
| Height - Breadth index | 105.2 | — | 100.3 | — | 86.71 | — | 101.43 | — | — | 93.57 | — | 94.52 | — |
| Po - b - length index | 66.1 | 59.8 | 62 | 60.5 | 60.32 | — | 61.32 | 59.45 | 61.83 | 59.57 | 58.98 | 59.91 | 60.77 |
| Po - b - breadth index | 90.9 | 82.3 | 83.6 | 78.1 | 80.86 | — | 82.68 | 78.57 | 80.76 | 80 | 77.20 | 80.08 | 78.57 |
| Orbital index | 84.6? | 92.1 | 87.1 | 83.8 | 76.19 | — | — | — | 83.78 | — | — | 81.07 | — |
| Nasal index | 46??? | 47.8 | 51.3 | — | 52.17 | — | — | — | — | — | — | 48.02 | — |
| Tr. cranio - facial index | (94.7) | 95.4 | 92.2 | 82.5 | 92.3 | — | — | — | 84.05 | 92.14 | 86.76 | 93.19 | — |
| Upper facial index | 54.7 | 53.2 | 56 | — | 53.03 | — | — | — | 54.31 | 50.38 | — | 50.73 | — |
| Zygo - frontal index | 75.3 | 75.8 | 73.5 | 82.7 | 72.22 | — | — | — | 82.31 | 76.74 | — | 78.34 | — |

Table IV
Chalcolithic and Copper Age skulls
Group II (Brachycephalic skulls)

| | HİSARLIK II ♀ (1) | ALACAHÖYÜK (Copper) No. IV ♂ | ALACAHÖYÜK (Copper) No. XVI ♂ | ALACAHÖYÜK (Copper) No. XX ♀ | TİLKİTEPE Chalcolithic No. 34 ♀ |
|------------------------|-------------------------|---------------------------------------|--|---------------------------------------|--|
| g - op | 180.5 | 176 | 179 | 169 | 181 |
| eu · eu | 149 | 147 | 147 | 141 | 149 |
| Ba · b | — | — | — | — | — |
| Po · b | 116 | 109 | — | — | — |
| Min - frontal | — | 95 | 92 | 100 | 97 |
| Orbit width | 38 | — | — | — | — |
| Orbit height | 29 | — | — | — | — |
| Nasal height | 48? | — | — | — | — |
| Nasal width | 23.3 | — | — | — | — |
| Cranial index | 82.5 | 83.52 | 82.1 | 83.4 | 82.32 |
| Po · b · length index | 64.2 | 61.93 | — | — | — |
| Po · b · breadth index | 77.85 | 74.14 | — | — | — |
| Orbital index | 76.3 | — | — | — | — |
| Nasal index | 48.5 | — | — | — | — |

Table V
Skulls of Bronze and Hittite periods
Group 1 (Dolichocephalic and Mesocephalic skulls)

| | ALİŞAR | | | KUSURA (Hittite) | HİSARLIK III | |
|---------------------------|--------------|---------|------|---------------------|--------------|-------|
| | Early Bronze | Hittite | | | ♂(2) | ♀(1) |
| | ♂(1) | ♂(5) | ♀(1) | ♂(1) | | |
| g - op | 186 | 186 | 177 | 176 | 192 | 188 |
| eu - eu | 139 | 143.2 | 140 | 135 | 136.7 | 134 |
| Ba - b | — | 124.8 | — | 136 | — | — |
| Po - b | 119 | 113.6 | 99 | 118 | 110 | 111 |
| Min - frontal | 101 | 97.6 | 98 | 94 | — | — |
| Zy - Zy | 134? | 128.2 | — | — | — | — |
| Ba - na | — | 100.6 | — | 107 | — | — |
| Ba - pr | — | 97.4 | — | 106 | — | — |
| Na - pr | — | 67.4 | — | 65 | 105 | — |
| Orbit width | — | 39.8 | — | 41 | 38 | — |
| Orbit height | — | 32.4 | — | 31 | 30 | — |
| Nasal height | — | 52.4 | — | 47 | 48 | — |
| Nasal width | — | 25.4 | — | 29 | 24.5 | — |
| Max. alv. width | — | 62.2 | — | 60 | — | — |
| Max. alv. length | — | 51 | — | 52 | — | — |
| Cranial index | 74.7 | 76.9 | 79.1 | 76.70 | 71.2 | 71.3 |
| Height - length index | — | 67.1 | — | 77.27 | — | — |
| Height - Breadth index | — | 87.2 | — | 100.74 | — | — |
| Po - b - length index | 64 | 61 | 55.9 | 67.05 | 58.7 | 57 |
| Po - b - breadth index | 85.6 | 79.3 | 70.7 | 87.41 | 80.5 | 82.83 |
| Orbital index | — | 81.4 | — | 75.61 | 78.9 | — |
| Nasal index | — | 48.6 | — | 61.70 | 50.9 | — |
| Tr. cranio - facial index | 96.4 | 89.5 | — | — | — | — |
| Upper facial index | — | 52.5 | — | — | — | — |
| Zygo - frontal index | 75.4 | 77.6 | — | — | — | — |

Table VI
Skulls of Bronze and Hittite Periods
Group II (Brachycephalic skulls)

| | ALİŞAR | | | KUSURA (Hittite) | ARSLANTEPE (Hittite) |
|----------------------------------|----------------------|---------|-------|---------------------|-------------------------|
| | Early Bronze ♂(1) | Hittite | | ♂(1) | ♂(1) |
| | | ♂(3) | ♀(2) | | |
| <i>g - op</i> | 175 | 177.7 | 173 | 177 | — |
| <i>eu - eu</i> | 146 | 147 | 141.5 | 147 | — |
| <i>Ba - b</i> | 136 | 128.5 | 121.5 | 137 | — |
| <i>Po - b</i> | 113 | 113 | 113 | 120 | — |
| <i>Min - frontal</i> | 100 | 103.3 | 96 | 95 | — |
| <i>Zy - Zy</i> | 137 | 132.3 | 125 | 135? [*] | — |
| <i>Ba - na</i> | 95 | 111.5 | 87 | 100 | — |
| <i>Ba - pr</i> | 84 | 101.5 | 77 | 92 | — |
| <i>Na - pr</i> | 60 | 70.6 | 62 | 74 | — |
| <i>Orbit width</i> | 36 | 40.6 | 37 | 41 | — |
| <i>Orbit height</i> | 34 | 33 | 33 | 34 | — |
| <i>Nasal height</i> | 49 | 52 | 48 | 51 | — |
| <i>Nasal width</i> | 26 | 27.3 | 24 | 22 | — |
| <i>Max. alv. width</i> | 53 | 61.3 | 62 | 64 | |
| <i>Max. alv. length</i> | 46 | 50.5 | 43 | 49 | — |
| <i>Cranial index</i> | 83.4 | 82.8 | 81.75 | 83.05 | 82.08 |
| <i>Height - Length index</i> | 77.7 | 70.7 | 70.4 | 77.4 | — |
| <i>Height - Breadth index</i> | 93.2 | 86.75 | 86.1 | 93.20 | — |
| <i>Po - b - length index</i> | 64.6 | 63.63 | 67.3 | 67.80 | 66.49 |
| <i>Po - b - breadth index</i> | 77.4 | 76.83 | 82.5 | 81.6 | 80.13 |
| <i>Orbital index</i> | 94.4 | 81.23 | 89.2 | 83 | — |
| <i>Nasal index</i> | 53.1 | 52.76 | 50 | 43.14 | — |
| <i>Tr. cranio - facial index</i> | 93.8 | 89.93 | 91.2 | 91.83 [*] | — |
| <i>Upper facial index</i> | 43.8 | 53.46 | 46.6 | 54.81 [*] | — |
| <i>Zygo - frontal index</i> | 73 | 78.23 | 74.4 | 70.37 [*] | — |

[*] Witer's addition.

