AN EXAMINATION OF SOME HUMAN SKELETAL REMAINS FROM THE SARDİS EXCAVATIONS

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The material which forms the subject of this article was obtained in the course of the excavations undertaken at Sardis by the American Exploration of Sardis team directed by Professor G.M.A. Hanfmann, of the Fogg Art Museum of Harvard University [1]. Professor Hanfmann, who has been working at Sardis since 1958, had arranged with Professor Muzaffer Şenyürek, Chairman of the Division of Palaeoanthropology of the University of Ankara, for the human skeletal remains to be examined by him [2]. After his death in September 1961, I entered into an agreement with Professor Hanfmann to continue Professor Şenyürek's work on this material and it was thereafter sent to me [3]. I should like to record here my grateful thanks to Professor Hanfmann for allowing me the opportunity of examining this valuable material.

The work of cleaning and repairing the bones has been begun and this article will deal with those skulls and long bones which I have been

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1 — For Sardis excavations see Hanfmann 1960. Excavations at Sardis 1959. Bulletin of the American Schools of Oriental Research No. 157 pp. 8—43. Hanfmann, 1961. The Third Campaign at Sardis (1960) Bulletin of the American Schools of Oriental Research No. 162 pp. 8—49. Hanfmann and von Saldern 1961. Exploration of Sardis. The News Bulletin, Institute of International Education. pp. 1—5. Hanfmann, 1962. The Fourth Campaign at Sardis 1961. Bulletin of the American Schools of Oriental Research pp. 1—57. Hanfmann 1963. Bulletin of the American School of Oriental Research pp. 1—65. Hanfmann 1962. Excavations at Sardis. A Short Guide pp. 3—15.

2 — Hanfmann, 1962. The fourth Campaign at Sardis 1961. Bulletin of the American Schools of Oriental Research p. 3.

3 — Hanfmann, 1963. The fifth Campaign at Sardis 1962. Bulletin of the American School of Oriental Research p. 4.

able to examine [4]. Before describing these, the following is a very brief account of the location of Sardis and its history.

The site of the ancient city is situated about 65 miles from İzmir, the nearest modern town being Salihli. The excavations show that the earliest remains so far discovered date back to about 1300 B.C. [5] It was as the capital of Lydia that Sardis became renowned in the first millennium B.C. The Lydians spoke a language related to that of the Hittites and they were also responsible for the introduction of the first known system of coinage. Their last and most famous king, Croesus, reputed to be the richest in the world, was finally defeated in 547 B.C. by the Persian king Cyrus and Sardis continued under Persian domination until captured in 334 B.C. by Alexander the Great. Thereafter his successors, the Seleucid kings, turned Sardis into a Greek city, and to this period belong the graves termed "Hellenistic" which have come to light during the excavations. From 133 B.C. Sardis came under Roman rule and it increased in size until the fourth century A.D. During this time the Christian religion had spread to the area. The city remained an important one until in about 615 A.D. during the reign of the Byzantine Emperor Heraklios it was conquered by King Khosroes II of Persia. Sardis remained one of the last Byzantine fortresses until it was conquered by the Turks early in the 14th century [6].

This brief history of Sardis indicates that the area was under the rule of many different conquerors and the population of the city was therefore mixed from time to time with outsiders. For this reason an examination of the human skeletal remains from different periods should yield interesting information about the physical characteristics of the populations and their relationships with other races who lived at the same time in various parts of Anatolia.

At the end of each season from 1958/63, the Sardis Archaeological Expedition sent all the skeletal material, both animal and human, to the Palaeoanthropology Division of the University of Ankara. At the request of the Director of the Expedition, I separated the animal from the human

4 — The bones from the excavations were extremely well packed and arrived at the Institute in good condition. I am very grateful to Mrs. E. H. Kohler for the care with which they were collected.

5 — Hanfmann, 1962. A Short Guide to the Excavations at Sardis, p. 4.

6 — Hanfmann, 1962. A Short Guide to the Excavations at Sardis, p. 7.

bones and the former were del ivered to Professor Sabri Doğuer, of the Anatomy Department of the Veterinary Faculty, for identification.

According to the reports made on the site of the excavation by Mrs. E. H. Kohler, the human bones came chiefly from the graves of the Lydian, Hellenistic, Roman and Byzantine periods and mainly from the latter period [7]. Many others were, however, also collected from various localities in the excavations. Some of them were well preserved, although most were in small pieces, in spite of the fact that they had been very carefully collected. According to Mrs. Kohler, there was nothing in the graves to prove the sex or age of the individual but in some cases it was possible to estimate the sex by material found in them.

From the 1958, 1959, 1960 and 1961 seasons there emerged nine complete crania which it was possible to measure, and the results obtained are given in Table A below. Of the long bones 19 tibia and 12 femurs were sound. 43 broken femurs were repaired and from some of the measurements indices were calculated. In addition 23 broken tibia were repaired and it was possible to take measurements on them.

As regards the long bones from the 1962 excavations, there were 11 whole femurs, together with 12 broken femurs of which the pieces were all located. There were 21 incomplete femurs. In addition 19 whole tibia were found and five more were completed from broken pieces. There were also fragments from 17 incomplete tibia.

Of the nine skulls measured, one belonged to an infant, one to a juvenile, three to adults and four to mature individuals: five are female and four male and it can be seen by reference to the table to which period the skeletons belong.

The length of the skulls measured varies from 162 .00 mm. to 186.00 mm. and the width from 130.00 mm. to 151.00 mm. The indices obtained on two of the skulls, one infant and one juvenile, were 80 .24 and 80.18 respectively. These two indices, according to Garson's (1883) classification, are within the limits of brachycrania. One cannot say more than that these two skulls do not have high brachycranium, but in the adult state these

7 — The period to which the skeletons examined belong has been classified according to the material coming from the tombs. Among these the date of one individual is doubtful. The femur shows bullet holes and therefore this individual must have come to Sardis later. The skull does not show Byzantine characteristics, the occipital being flat. The individual was probably one of the invaders of Sardis.

indices would of course change and it is not possible to say in what category they would be included. Only one adult is brachycranial (Table A) This person has a flat occipital and is the individual mentioned in Note 7.

In the other individuals the indices show variations between 73 .53 76. 70. Two male and one female are in the dolichocranic category. In the crania of three females an index of 75 .80 – 76 .60 has been established. These therefore come within the mesocranic category. The male skulls are more dolichocranic than the female.

TABLE A

Sardis Skulls

Cranial Index and Length–Width Measurements

Year	Period	Tomb No.	Age	Sex	Index	Length mm.	Width mm.
1960	Byzantine	—	6–7	♂	80 .24	162 .00	130 .00
1961	Roman	61 .35	8–10	♀	80 .18	166 .50	133 .50
1960	"House of Bronzes"	61 .5	60	♀	76 .70	176 .00	135 .00
1961	Roman	61 .36	14–15	♀	76 .43	174 .00	133 .00
1960	"House of Bronzes"	61 .7	45	♀	75 .80	171 .30	130 .00
1961	Early Chr istian	61 .14	50	♀	74 .04	183 .00	135 .50
1960	Roman	—	65	♂	73 .65	186 .00	137 .00
1958	"City Gate"	V.20	18–20	♂	73 .53	179 .50	132 .00
1961	Byzantine	61 .28	35	♂	80 .67	173 .00	150 .00

The cranial length–height index has been obtained from only four individuals. They come from Tomb No. 61.35 8–10 years ♀ Orthocranic; Tomb No 61 .14 50 years ♀ Chamaeocranic; 6–7 years ♂ Orthocranic. and 65 years ♂ Chamaeocranic. The index shows that the skulls are low compared with the length.

The cranial breadth–height index was obtained from five individuals, three of which were in the Topeinocranic category and two in the Metriocranic category. The skulls were not very high compared with their width. It was possible to establish the total facial index in only one individual, which was in the Euryprosopic category, that is, the face was not very long compared with the width. The upper facial index was established in three individuals, who were inclued in the Mesene category, that is the face is of

average height, or in other words, it is comparatively short. In the majority of the skulls of dolichocephal and mesocephal type belonging to the Chalcolithic and Copper Ages in Anatolia, the face is in the Mesene category [8]. The nasal index was established in three individuals. Of these two were of Leptorrhin type and one of Mesorrhin type, that is the nose is comparatively thin and long, and of average length respectively.

The minimum frontal diameter in only one individual is 106 mm. In the other eight individuals it varies from 83 .50 mm. to 97 .50 mm. Of the nine skulls seven are of Eurymetopic type, and the other two are of Stenometopic and Metriometopic type respectively. The transverse fronto–parietal index varies between 62 .546 and 73 .863.

When the orbital index is examined, it can be seen that from the measurements taken on four individuals they are in the Hypsiconch category. The index varies between 85 .365 and 92 .647. This means that in these individuals the maximum orbital breadth of the eye sockets is more developek than the maximum orbital length.

The Porion–Bregma height–length index shows that two skulls can be included in the Orthocranic category, while five are Hypsicranic. Most of these metric characteristics conform to the cranial and facial measurements of the Mediterranean type.

After a careful examination of the calvaria from the Sardis excavations, the main characteristics may be summarised as follows: the calvarium is long, moderately broad and moderately high. The face is of moderate length, there is a comparatively narrow nasal aperture and the orbit is of moderate height. From the measurements and indices obtained, the Sardis calvarium approaches the measurements given by Krogman for the Mediterranean type [9].

Şenyürek's researches on the ancient inhabitants of Anatolia have established the existence in Anatolia of a primitive Euro–African type earlier than the Mediterranean type [10]. In the Anatolian Chalcolithic and Copper Ages, skulls of the Mediterranean type form the majority [11].

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8 — Şenyürek, 1941. Table III.

9 — Krogman, 1949. Belleten, Vol. XIII, No. 51.

10 — Şenyürek, 1954. p. 16.

11 — Şenyürek, 1941. p. 221. According to Şenyürek, there are two types of dolichocephal skull in the Chalcolithic and Copper Ages. The first is the Mediterranean type and the second the Euro—African type. The orbits of this second type are more strongly pronounced, the forehead is receding and the skull is scaphoid.

The craniological evidence at present suggests that the great majority of the Sardis people were probably dolichocranic and mesocranic, but this result is based on a very small series. It will without doubt be very useful to establish in what proportion these types are found among the Sardis people. It should be possible to discover the physical characteristics of populations which lived in the Early Iron Age, Lydian, Hellenistic, Roman and Byzantine times, to com pare them with those of people who lived in other parts of Anatolia and to understand their generic relationships. To clarify these questions it is necessary to increase the number of skulls.

The morphological and biometric characteristics of the skulls show that the people who lived at Sardis were mainly of the Mediterranean type. The fact that the brachycranic type of infant and juvenile skull is not represented in the adults and that these characteristics are very weak confirms this theory. At present the indices of the skulls of the Sardis people are closer to those of Anatolian Chalcolithic, Copper and Bronze Age people. These characteristics will be compared in greater detail in the studies which I shall undertake in the future.

The really important thing is that the long and narrow skulls seen in the races of ancient Anatolia can also be observed in the Sardis people. In this connection it is very necessary to establish the period to which the skeletons from the excavations belong. Above all it is clear as a result of anthropological researches [12] that brachycephalisation increased in Anatolia in a very clear way after the Hittites.

It has been observed that in Anatolia the Mediterranean type continued into the Byzantine period, and the Sardis skeletons confirm this opinion. If the series of skeletons from Sardis can be increased, it should be possible to establish important anthropological characteristics in the populations which lived in this area, as well as their genetic relationships.

As regards the stature of the Sardis people, the first information concerning this is provided by measurements obtained from the graves, but only in those excavated in 1961 and 1962 were the stature measurements taken. The majority of these measurements belong to people of the Byzantine period. The stature measurements obtained on male individuals from 15 graves varied from 151 cms. to 175 cms. and the average stature was 164.40 cms. The stature measurements obtained from 13 graves of female

12 — Şenyürek, 1941. p. 227.
Kansu, 1939. pp. 127—131.

individuals varied from 147 cms. to 172 cms. and the average stature was 157.15 cms. The difference between the average male and female stature was therefore 6.25 cms. It was possible to take the stature measurements on 12 individuals whose sex was not known and this varied from 150 cms. to 172 cms. with an average of 160.58 cms.

These averages are very close to those which I have found by applying the formulae of Breitinger (1937), Trotter and Gleser (1952) and Telka (1950). The stature obtained from five complete femurs beloging to male individuals (from the 196c and 1961 Sardis excavations) varied between 163. 51 cms. and 170 cms. The average height of these five individuals was 167.71 cms. In addition, by using the formulae given by Manouvrier (1892), Pearson (1899), Breitinger (1937), Telka (1950), Dupertuis and Haddon (1951) and Trotter and Gleser (1952), it can be seen that the stature varied in these individuals from 163.64 cms. to 168.88 cms (see Table D below). The average stature of these five males has been established as 167.00 cms. This average is only 2.60 cms. more than the average stature obtained from the graves.

Among the skeletons from the Sardis 1961 and 1959 excavations were five female femurs which were measured and the stature established according to the formulae of the above-mentioned authors with the exception of Breitinger. The stature measurements calculated from these female femurs varied from 143.01 cms. to 158. 61 cms. and the average was 154.95 cms. (see Table E below). This average stature is 2.20 cms. smaller than that obtained from the graves. The average height obtained from the measurements on seven female tibia was 158.59 cms. This is very close to the average stature obtained from the women's graves, the difference being only 1.44 cms. It can be observed that there is a close relationship between the stature measurements obtained from the graves and those which have emerged from the measurements of the long bones.

TABLE B

Estimated Stature of male skeletons from the Sardis excavations obtained from the Tibia according to the formulae of the authors named.

Author		1961 Tomb 61 .36 R. ♂ 1	1961 Tomb 61 .36 L. ♂ 2	1961 Tomb 61 .24 R. ♂ 3	1960 Box 11 R. ♂ 4	1959 Pit 2 L. ♂ 5	1960 Box 4 R. ♂ 6	1959 Pit 2 R. ♂ 7
Manouvrier	1892	151 .00	151 .00	158 .50	160 .50	155 .10	158 .50	155 .10
Breitinger	1937	159 .00	158 .00	163 .00	164 .00	161 .00	162 .00	160 .00
Pearson	1899	153 .98	152 .79	158 .73	160 .16	156 .59	158 .26	155 .88
Trotter and Gleser	1952	158 .50	157 .24	163 .54	165 .05	161 .27	163 .04	160 .52
Telka	1950	159 .95	158 .90	164 .15	165 .41	162 .94	164 .00	161 .67
Dupertuis and Haddon	1951	157 .51	156 .31	162 .29	163 .70	160 .14	161 .82	159 .47
Average M		156 .66	155 .70	161 .70	163 .16	160 .91	161 .27	160 .73

TABLE C

Estimated Stature of female skeletons from the Sardis excavations obtained from the Tibia according to the formulae of the authors named.

Author		1961 Tomb 61 .32 L. ♀ 1	1961 Tomb 61 .28 R. ♀ 2	1961 Tomb 61 .34 L. ♀ 3	1961 Tomb 61 .51 R. ♀ 4	1961 Tomb 61 .33 R. ♀ 5	1959 T. of Lintel L. ♀ 6	1959 T. of Lintel R. ♀ 7
Manouvrier	1892	154 .80	156 .20	156 .20	150 .80	159 .20	159 .20	159 .20
Pearson	1899	153 .56	159 .68	155 .54	150 .44	158 .34	158 .27	158 .03
Trotter and Gleser	1952	158 .68	160 .42	161 .00	155 .20	164 .53	164 .48	164 .19
Telka	1950	157 .56	158 .76	159 .00	155 .28	163 .00	161 .36	161 .17
Dupertuis and Haddon	1951	157 .42	159 .02	159 .45	154 .38	162 .56	162 .49	162 .24
Average M1		156 .29	158 .86	158 .23	153 .22	161 .52	160 .93	160 .93

TABLE D

Estimated Stature of male skeletons from the Sardis excavations obtained from the Femurs according to the formulae of the authors named.

Author		1961 Tomb 61 .24 R. ♂	1961 Tomb 61 .28 R. ♂	1961 Tomb 61 .28 L. ♂	1960 Box 4 L. ♂	1960 Box10 L. ♂
		1	2	3	4	5
Manouvrier	1892	160 .40	166 .60	166 .60	164 .60	166 .60
Breitinger	1937	165 .00	169 .00	170 .00	167 .00	168 .00
Pearson	1899	161 .95	166 .03	166 .03	164 .59	165 .34
Trotter and Gleser	1952	163 .51	169 .93	169 .93	166 .84	167 .79
Telka	1950	163 .94	169 .61	169 .61	166 .88	167 .72
Dupertuis and Haddon	1951	165 .09	171 .14	171 .14	168 .23	169 .12
Average M1		163 .64	168 .71	168 .88	166 .35	167 .42

TABLE E

Estimated Stature of female skeletons from the Sardis excavations obtained from the Femurs according to the formulae of the authors named

		1961 Tomb 61 .14 R. ♀	1961 Tomb 61 .34 R. ♀	1961 Tomb 63 .32 L. ♀	1961 Tomb 61 .33 L. ♀	1959 Tomb of Lintel R. ♀
		1	2	3	4	5
Manouvrier	1892	138 .00	156 .20	156 .20	161 .40	161 .40
Pearson	1937	142 .86	155 .31	154 .84	155 .11	155 .31
Trotter and Gleser	1952	143 .02	158 .82	158 .23	158 .58	158 .82
Telka	1950	146 .36	157 .88	157 .44	157 .70	157 .88
Dupertuis and Haddon	1951	144 .82	159 .65	159 .09	159 .42	159 .65
Average M1		143 .01	157 .57	157 .16	158 .44	158 .61

SUMMARY

The human bones which form the subject of this article come chiefly from the graves of the Lydian, Hellenistic, Roman and Byzantine periods, and mainly from the latter. The results obtained from an examination of some of the skulls and long bones are dealt with.

The craniological evidence at present suggests that the great majority of the Sardis people were probably dolichocranic and mesocranic. Morphological and biometric characteristics of the skulls show that the people who lived at Sardis were mainly of the Mediterranean type. At present the indices of the skulls of the Sardis people resemble those of Anatolian Chalcolithic, Copper and Bronze Age populations. The examination of the Sardis bones shows that the Mediterranean type continued into the Byzantine period in Anatolia. The long and narrow skulls seen in the races of ancient Anatolia can also be observed in the Sardis people.

The stature of some of the skeletons, mainly from the Byzantine period, was obtained by actual measurement in the graves. Stature was also calculated from the measurement of tibia and femurs and there was a close relationship between these stature measurements. According to these measurements, both the Sardis men and women were probably of medium height.

LITERATURE

Breitinger, E. 1937. *Zur Berechnung der körperhöhe aus den langen Gliedmaszenkrochen.* Anthr. Anz. 14. pp. 249–274.

Dupertuis, C. W. and HADDEN, J. A. 1951. *On the reconstruction . of stature from the long bones.* American J. Phys. Anthrop. 9. pp. 15–53.

Hanfmann, G. M. A. 1960. *Excavation at Sardis* 1959. Bulletin of the American Schools of Oriental Research. No. 157, pp. 8–54.

Hanfmann, G. M. A. 1961. *The Third Campaign at Sardis* (1960) Bulletin of the American Schools of Oriental Research No. 162. pp. 8–49

Hanfmann, G. M. A. *The Fourth Campaign at Sardis* (1961). Bulletin of the American Schools of Oriental Research. pp. 1–57.

Hanfmann, G. M. A. and Von Saldern, A. 1961. *Exploration of Sardis.* The News Bulletin Institute of International Education. pp. 1–5.

Hanfmann, G. M. A. 1962. *Excavations at Sardis. A Short Guide.* pp. 3–15.

Kansu, S. A. 1939. Anadolun'nun *Irk tarihi üzerine Anthropolojik bir Tetkik* Belleten No. 9. pp. 127–131.

Krogman, W. M. 1949. *Ancient Cranial Types at Chatal Hüyük and Tell aljudaidah, Syria, from the late fifth millennium B. C. to the mid–seventh century A. D.* Belleten, Vol. XIII, No. 51. pp. 407–477.

Kurth, G. 1954. *Einige Probleme der Körperhöhenbestimmung aus den langen Gliedmaszenknochen.* Homo, 5 Band 2–4 Heft.

Kurth, G. 1954. *Ein Beitrag zur Vergleichbarkeit errechneteer Körperhöhen.* Z. Morph. Anthrop. 46. p. 317–170.

Manouvrier, L. 1892. *Determination de la taille d'apres les grands os des membres.* Soc. d'anthropol. de Paris, 2 Ser. T. 4. pp. 347–402.

Martin, R. 1928. *Lehrbuch der Anthropologie.* 2 Bonde, 2 Aufl. Fischer Jena.

Pearson, K. 1899. IV. *Mathematical contributions to the theory of Evolution V. On the reconstruction of the stature of prehistoricraces.* Philos. Tran. R. Sos. Series A. 192. pp. 169–244.

Şenyürek, M. 1941. *Anadolu Bakır çağı ve Eti Sekenesinin Kronolojik tetkiki.* Belleten No. 19, pp. 219–229.

Şenyürek, M. 1954. *A note on the skulls of Chalcolithic Age from Yümüktepe.* Belleten Vol. XVIII, No. 69. pp. 1–25.

Telka. A. 1950 *On the prediction of human stature from the long bones.* Acta Anat. 9. 103–117.

Troter M. and Glaser, G. C. 1951. a. *The effect of ageing on stature.* Am. J. Phy. Anthrop. N. S. 9; pp. 311–324.

Trotter M. and Gleser, G. C. 1951. b. *Trends in Stature of American Whites and Negroes born between* 1840 *and* 1924. Am. J. Phys. Anthrop. N. S. 9. pp. 427–440.

Trotter M. and Gleser, G. C. 1952 *Estimation of Stature from Long Bones of American Whites and Negroes.* Amer. J. Anthropol. N. S. 10. pp. 463–514.