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A NOTE ON THE LONG BONES OF CHALCOLITHIC AGE FROM ŞEYH HÖYÜK

MUZAFFER ŞENYÜREK, Ph. D.

Professor of Anthropology and Chairman of the Division of Palaeoanthropology
University of Ankara

The skeletons from building layer IX of Şeyh Höyük (Tell Esh Sheikh), which are of Chalcolithic Age, were previously studied by me and Tunakan. [1] In this earlier study the long bones of these skeletons, which are contemporaneous with the Tell Halaf culture, were described only briefly. [2] As during the course of a recent survey on the Chalcolithic skeletons from Anatolia, [3] I observed the presence of some archaic traits in these skeletons, I decided to restudy and redescribe them.

THE MATERIAL

The long bones from this site in the Hatay, in southern Anatolia, belong to six individuals, which were, in the earlier study,[4] marked with capital letters from A to F.

Skeleton A : This adult male is represented by right and left humeri, right and left ulnae, fragment of a right radius, right and left femurs and right and left tibiae.

Skeleton B: This adult male is represented by a fragment of a left humerus, fragment of a right ulna, right and left femurs and right and left tibiae.

Skeleton C: This adult female is represented by right and left humeri, right and left ulnae, right and left radii, right and left femurs, an intact left tibia and a right tibia lacking malleolus medialis.

[1] Şenyürek and Tunakan, 1951.
[2] Ibid., p. 442.
[3] Şenyürek, 1954b, p. 522.
[4] See Şenyürek and Tunakan 1951, p. 439 and Tables 3-4.

Skeleton D: This adult female is represented by a left humerus, right and left ulnae, right and left femurs, left tibia and a right tibia of which the distal extremity is broken.

Skeleton E: This young adult female is represented by a right humerus, right and left femurs and upper parts of right and left tibiae.

Skeleton F: This subadult individual, in which the epiphyses of the long bones were still open, is represented by fragments of right radius, right and left femurs, and left tibia, which are all broken.

In addition to the above there are three clavicles, which I have numbered from 1 to 3 and a sacrum.

STUDY OF THE LONG BONES

Of the three clavicles available one (No. 1) belongs to a male individual and the other two (Nos. 2 and 3)) to females. The maximum lengths of these clavicles are as follows:

	Maximum length
No. 1 (right)	153.00 mm.
No. 2 (right)	127.00 mm.
No. 3 (left)	131.00 mm.
Female average	129.00 mm.

The clavicle of the male individual is long, while the lengths of the female specimens range from short to medium.[5]

The measurements of the long bones of the free upper and lower extremities are listed in tables 1-5. The lengths of these long bones, with the only exception of the radii of a female individual (individual C), fall in the range of variation of the Naqada series from Egypt listed by Martin.[6] The maximum length of the radius of individual C falls below the minimum of the females of Naqada series (203 mm.),[7] that is, it is rather short.

The humerus of one male individual (A) is more robust than those of the females. Regarding the olecranon fossa it was stated be-

[5] For the classification of the lengths of male and female clavicles see: Olivier, 1951, pp. 122 and 124.

[6] Martin, 1928, pp. 1100, 1112, 1133 and 1157. The femur length of the Naqada series given by Martin (1928, p. 1133) is the length in natural position.

[7] Martin, 1928, p. 1109.

fore: "*In only one of the humeri we have studied, a small perforation is observed in the Olecranon fossa.*" [8] This refers to the right humerus of individual E.

The ulna of one male individual (A) is again more robust than those of the females. The radii of one female individual (individual C) exhibits a higher length-thickness index than the recent races, fossil man from Combe-Capelle and the two Neanderthal specimens listed by Martin, [9] but this is apparently the result of the short length of these radii from Şeyh Höyük.

The femurs of the male individuals, in absolute measurements, are much more massive than those of the females (see figs. 1 and 2). The same is also true of the length-thickness index, robusticity index and the robusticity index of caput femoris of the femurs of male individuals as compared with those of the female individuals D and E. The femur of the female individual C in length-thickness index and robusticity index of caput femoris exceeds both males and in robusticity index surpasses male individual B and comes close to A. The high robusticity indices of the femur of this female individual are in part a consequence of its very short length (bicondylar length), which is just above the minimum for the femurs of females in the Naqada series (376 mm.). [10]

A common character and a peculiarity of the femurs of both males and females from Şeyh Höyük is the possession of an absolutely and relatively short neck (collum femoris). [11] The index of collum femoris length in all femurs of the five adult individuals from Şeyh Höyük is much lower than the figures for recent man, Cro-Magnon man and Neanderthal man given by Martin.[12] The index of the cross-section of the collum is, on the average, somewhat higher than the few average figures for recent man (Bajuars, Negroes and Paltacalo Indians), cited by Martin.[13]

[8] Şenyürek and Tunakan, 1951, p. 442.

[9] Martin, 1928, p. 1109.

[10] Ibid., p. 1133.

[11] See also Şenyürek and Tunakan, 1951, p. 442. In this earlier study the collum lengths had not been measured. The measurements have clearly shown that all of these femurs are short necked.

[12] Martin, 1928, p. 1150. According to Martin (1928, p. 1150) the minimum index of collum femoris length in modern French skeletons is 14.8, which is considerably higher than the maximum in Şeyh Höyük series.

[13] Martin, 1928, p. 1150.

The torsion angle of the femurs of males and females from Şeyh Höyük exceed, on the average, all the means for recent man listed by Martin, with the only exception of Maoris (39° 7).[14] They exceed the figures for Neanderthal man quoted by Martin[15] and fall somewhat below that of Cro-magnon man (35°).[16] It appears that in this feature the Şeyh Höyük femurs are quite primitive. The femur of the subadult individual displays an even larger angle than those of the adults.

The shaft-neck angle (collo-diaphyseal angle) of the femurs of males is much smaller than those of the females, as is also true for other groups of recent man listed by Martin.[17] However, the sex difference in the Şeyh Höyük series appears to be greater than in these groups of recent man.[18] The average collo-diaphyseal angle of the males is much lower than the minimum average value for recent man (121° 2) and than that of Cro-Magnon man (126°), given by Martin.[19] The average collo-diaphyseal angle of the males indeed comes close to the average figures for Neanderthal man.[20] The average collo-diaphyseal angle of the femurs of females is in the lower range of averages of recent man, listed by Martin.[21] It appears that in having relatively low collo-diaphyseal angles the femurs from Şeyh Höyük are again primitive.

The platymeria indices of the males are lower than those of the females. The two males are hyperplatymeric, which is also true for one female (D), while the other two females and the subadult individual are platymeric.[22] In having platymeria the femurs of Şeyh Höyük skeletons resemble those of Cro-Magnon man[23] and of some

[14] Ibid., p. 1141.

[15] Ibid., p. 1141.

[16] Ibid., p. 1141. It may be mentioned here that the torsion angle of individual A is identical with the figure for Cro-Magnon man.

[17] Ibid., p. 1144.

[18] See ibid., p. 1144.

[19] Ibid., pp. 1143-1144.

[20] See ibid., p. 1144.

[21] Ibid., p. 1143.

[22] See also Şenyürek and Tunakan 1951, p. 442.

[23] See Verneau, 1906, pp. 108-109; Martin, 1928, p. 1139; Boule and Vallois, 1952, pp. 309 and 312.

For platymeria in some other early peoples see, among other publications,

modern primitive peoples.[24] In this feature the Şeyh Höyük femurs differ from that of Combe-Capelle man which is, according to the figures given by Klaatsch (right 86.21, left 86.67), eurymeric.[25]

In all femurs index pilastricus exceeds 100, that is there is some degree of pilaster formation.[26] The pilaster formation is weak in individuals C, E and F, moderate in B and D and strong in A. Diaphysis-epicondyle breadth index in femurs of all adult individuals exceeds those of Anau specimens, measured by Mollison.[27] This index of the subadult individual is lower than those of the adult specimens and Anau examples.

When viewed from the front, it is seen that in Şeyh Höyük femurs the difference in height between the highest point of caput femoris and that of trochanter major is very little indeed (fig. 3). In this feature the femurs from Şeyh Höyük come close to those of Combe - Capelle man,[28] the male of Cro - Magnon type from Grotte des Enfants,[29] specimen No. 1 from Barma Grande[30] and the Grimaldi woman.[31] In this feature the femurs from Şeyh Höyük are quite primitive. On the other hand, the lower extremities of Şeyh Höyük femurs, in relation to the diaphysis, are not, in front view, as flaring as in those of the fossil forms enumerated above. That is, in this feature the Şeyh Höyük specimens are more advanced, although some of them still exhibit faint suggestions of their original primitive form.[32]

Vallois (1930), Arambourg, Boule, Vallois and Verneau (1934) and Péquart (M. and St. - Just), Boule and Vallois (1937).

[24] See Martin, 1928, p. 1139.

[25] Klaatsch and Hauser, 1910, table 8.

[26] See Şenyürek and Tunakan, 1951, p. 442.

[27] Mollison, 1908, p. 465.

[28] See Klaatsch and Hauser, 1910, pl. XXXV, figs. 5-6.

[29] See Verneau, 1906, pl. X, fig. 1.

[30] See ibid., pl. X, fig. 2.

[31] See ibid., pl. X, fig. 4. The difference in height between the highest point of caput femoris and trochanter major is also small in a femur of Afalou people depicted by Boule, Vallois and Verneau (in Arambourg, Boule, Vallois and Verneau, 1934, pl. XXII, fig. 5) and in a specimen from Téviec, figured by Boule and Vallois (in Marthe and St-Just Péquart, Boule and Vallois, 1937, pl. XIX, fig. 4). On the other hand the top of caput femoris is much higher than the top of trochanter major in Montardit I of Mesolithic period, depicted by Sawtell (1931, pl. 5), as in advanced forms of man.

[32] For the configuration of the lower extremity of the femur in primitive and advanced men see Mollison, 1908, p. 453, and Martin, 1928, pp. 1151-1152.

In all femurs the crista hypotrochanterica is usually weak. The fossa hypotrochanterica is well marked in individuals A and F and varies from very slight to moderate in the others. Individuals A, B and C display a small trochanter tertius. This formation is not developed in individuals D, E and F.[33] The femur of individual C is nearly straight, while those of the others exhibit usually a slight degree of bowing.

From the account given above it is clear that the femurs from Şeyh Höyük have retained some archaic traits.

The tibiae of the males are, in absolute dimensions, more massive than those of the females. In length-thickness index also, on the average, the males exceed the females. But again, as in the case of femur, the length-thickness index of the female individual C is higher than that of male individual B, being approximately half way between that of the latter and the male individual A.

In index cnemicus, only the tibia of individual B is platycnemic, C and D are mesocnemic, while those of A, E and F are eurycnemic. [34] Some degree of retroversion of the head is characteristic of all these tibiae, but it is strong in only individual C and weak in others. [35] The tibiae belonging to individuals A,B,C and D exhibit pronounced torsion. [36] The shaft of the tibia of individual C, in medial view shows a strong degree of bowing which is a primitive feature. The same trait is present but weaker in the other tibiae (figs. 4-5). The right and left tibiae of individuals A and B and the left tibiae of individuals C and D possess a small squatting facet on the lateral part of the anterior surface of the lower extremity.[37]

Although they lack platycnemia in most cases, it is still seen that the tibiae from Şeyh Höyük have retained some primitive traits.

[33] See also Şenyürek and Tunakan, 1951, p. 442.

[34] See ibid.

[35] Ibid.

[36] In tibia of individual E only the upper parts of the bone are preserved, while in the left tibia of individual F both the upper and lower ends are missing. Thus no observations could be made on these tibiae for torsion.

[37] See also Şenyürek and Tunakan, 1951, p. 442. The lower end of right tibia of individual D is broken and in the right tibia of individual C the distal end of the anterior surface of lower extremity is damaged. Thus, no observations could be made on these tibiae for the squatting facets.

THE STATURE

The statures calculated from Dupertuis and Hadden's general formulae [38] are listed in Table 6 and the average statures of the individuals and sexes in Table 7. In the earlier study, the statures were calculated from Pearson's formulae, separately for the bones of right and left sides. [39] To prevent repetition this table is not reproduced here, but instead the averages of the individuals and sexes obtained from Pearson's formulae are recorded in Table 7. [40]

Regarding the use of formulae, Dupertuis and Hadden state: "*It is thus suggested that the general rule for the use of formulae in a particular situation be that when the long bone is shorter than Pearson's mean for the bone, his formula be used; when it is longer than our mean, ours be used; and when it falls between these means, the general formula be employed.*" [41] When the maximum lengths of long bones from Şeyh Höyük [42] are compared with the means of Whites measured by Dupertuis and Hadden [43] and the means of Pearson, recorded by these authors, [44] it is observed that the bones of Skeleton A perhaps give a better stature estimate with Dupertuis and Hadden's general formulae and the skeletons B and C with those of Pearson. On the other hand, the humerus of individual D is longer than the mean of Whites in Dupertuis and Hadden's series, while her femur and tibia are shorter than the means of Pearson. The humerus of individual E is longer than Pearson's and shorter than that of the Whites in Dupertuis and Hadden's series, while her femur is below Pearson's average. However, these two skeletons, viz., D and E, yield a stature in medium category according to both Pearson's and Dupertuis and Hadden's formulae.

From this it may be stated that the female individual C is short, while individuals D and E are in the medium stature category accepted for females. The male individual B is in the medium stature category, while the male individual A is tall. [45]

[38] Dupertuis and Hadden, 1951, table 20.

[39] Şenyürek and Tunakan, 1951, table 5.

[40] For these see table 7, footnote 1.

[41] Dupertuis and Hadden, 1951, p. 51.

[42] For the maximum lengths of bones of right and left sides of the Şeyh Höyük skeletons see Şenyürek and Tunakan, 1951, table 3.

[43] Dupertuis and Hadden, 1951, table 7.

[44] Ibid., table 8.

[45] See also Şenyürek and Tunakan, 1951, p. 442.

PROPORTIONS OF THE LONG BONES

The proportions of the long bones of Şeyh Höyük skeletons are listed in Table 8 and they are contrasted with those of other peoples in Table 9.

The humero-clavicular index of the male individual from Şeyh Höyük [46] is within the range of variation of Central European males, is near to that of the male of Cro-Magnon type from Grotte des Enfants, but falls below the Afalou average. Although the one male clavicle from Şeyh Höyük is relatively long, still the humero-clavicular index obtained from it does not differ much from the averages of the males of some peoples listed by Martin[47] and Matiegka.[48] On the other hand, the humero-clavicular index of the females from Şeyh Höyük is quite low. That is, the clavicles of the females are relatively short.

The humero-radial index of one female individual (C) from Şeyh Höyük is shorter than that of Negroes, and comes close to the averages of the Whites listed. In this index the female individual from Şeyh Höyük falls far below the early forms of man listed (Cro-Magnon man, Grimaldi individuals, Afalou, Téviec and Mugem series).[49] Thus in this index the one female from Şeyh Höyük is quite modern and is like the recent Europeans.

In the intermembral index $\left(\frac{\text{Humerus}+\text{Radius} \times 100}{\text{Femur} + \text{Tibia}}\right)$ the one female from Şeyh Höyük (C) comes near the averages of modern Whites and Negroes listed. In this index she exceeds the Grimaldi

[46] The index of the males is obtained from one clavicle and the average of right and left humeri belonging probably to one individual. The index of the females is obtained from the averages of two clavicles and humeri of three individuals.

[47] Martin, 1928, p.1098.

[48] Matiegka, 1940, table 2.

[49] The minimum humero-radial indices in some early human series are as follows:

Afalou (Boule, Vallois and Verneau *in* Arambourg, Boule, Vallois and Verneau, 1934, p. 182)..... 76.0

Téviec (Boule and Vallois, *in* M. and St. - Just Péquart, Boule and Vallois, 1937, p. 155)..... ..... 72.4

Mugem (Vallois, 1930, table IV)..... 76.7

In the humero-radial index one female from Şeyh Höyük also falls below the averages of ancient racial types from Greece, listed by Angel (1946, table 3).

individuals and the male of Cro - Magnon type from Grotte des Enfants, but does not differ much from the averages of Afalou and Téviec series.

In the femoro-tibial index the female individual D comes close to the averages of the female Whites and falls below the average of the female Negroes given by Dupertuis and Hadden. [50] That is this female individual resembles the modern White females in this index. On the other hand, in femoro-tibial index the female individual C exceeds the averages of both the female and male Whites. In this index she also surpasses the average of female Negroes and comes close to the average of the male Negroes, given by Dupertuis and Hadden.[51] In this index this individual comes near to some of the early peoples listed, her index coming very close to the average of the females in Mugem series from Portugal.[52] Thus, unlike her humero-radial index, in femoro-tibial index this female individual has retained a rather archaic condition.

In femoro-tibial index the males from Şeyh Höyük, on the average and also individually, exceed the females. In the femoro-tibial index the males from Şeyh Höyük surpass the means of both the modern Whites and Negroes, of both sexes, listed, their average coming close to the index of the male of Cro-Magnon type from Grotte des Enfants, who possesses a relatively long tibia.[53]

In the femoro-tibial index the male individuals from Şeyh Höyük, and to a lesser extent female individual C, approach the Upper Palaeolithic as well as the Mesolithic men listed,[54] which usually exhibit a relatively high femoro-tibial index. It is thus seen that in femoro-tibial index some individuals from Şeyh Höyük have retained a rather archaic proportion.

[50] Dupertuis and Hadden, 1951, table 11.

[51] Ibid.

[52] According to Vallois the average femoro-tibial index of the females in Mugem series is 83.1 (Vallois, 1930, table IV).

[53] See Verneau, 1906, pp. 64-65 and Boule and Vallois, 1952, p. 309.

[54] According to Klaatsch the femoro-tibial index of Combe-Capelle man is 90.48 (Klaatsch and Hauser, 1910, p. 335). The same index in Montardit male of Mesolithic Age is, according to Sawtell (1931, p. 227), 84.77, which also is a relatively high figure.

Regarding the date of the Mugem series of Portugal (listed in table 9) Coon (1939, p. 63) states: "*The safest dating for this site is immediately pre-Neolithic, if not early Neolithic, in the third millenium B. C.*"

SEX RATIO

Regarding the sex differences in Upper Palaeolithic man from Europe, Coon states: "*In these skulls the males are easily distinguished from the females, for there is a greater difference between the sexes than is usual among more recent groups of man. The same is true of long bones and stature. This implies, of course, a stronger development of secondary sexual characteristics.*"[55] On the same subject Gates also states: "*Morant's conclusion that the Upper Paleolithic population of Europe (including the Chancelade skull) showed no more biometric variation than a single race, was supported by Bonin (1935a), both as regards skull characters and long bones. He confirms that the Upper Paleolithic type is surprisingly uniform as measured by statistical constants. He also shows that the males and females differ greatly in stature, the mean stature for males being 173 cm. and for females 155 cm. This gives a sex-ratio of 1:1.116, whereas in ten modern races it is only 1:1.0813. The skulls are also easier to sex than in modern populations.*" [56]

The sex ratios in the maximum lengths of the long bones of the Şeyh Höyük skeletons are listed in Table 10 and they are contrasted with the sex ratios in other peoples in Table 11. From Table 11 it is seen that the sex ratios in the bones[57] of the Şeyh Höyük skeletons are, in most cases, greater than in modern Whites and Negroes and much bigger than in the Afalou and Téviec series[58].

The same relatively big sex difference is also brought out by the sex ratio in stature. The sex ratio obtained from the average statures of males and females from Şeyh Höyük, calculated from Dupertuis and Hadden's formulae, is 1:1.097. The sex ratio in statures calculated

[55] Coon, 1939, p. 31.

[56] Gates, 1948, p. 258. Unfortunately the paper of von Bonin referred to by Gates (1948, p. 258) has been inaccessible to me.

[57] The sex ratio of the clavicles from Şeyh Höyük is 118.60, which is also a high figure. The sex ratios I have calculated from the average length of clavicles in males and females of various peoples (Negroes, Japanese, Fuegians, Ainos, Bretons, Neolithic peoples of Chamblandes and Naqada series) listed by Martin (1928, p. 1098) are much less than in the Şeyh Höyük series, their averages ranging from 105.67 to 112.21

[58] The sex ratios for Afalou and Téviec series have been calculated by me from the average measurements of long bones given by respectively Boule, Vallois and Verneau (*in* Arambourg, Boule, Vallois and Verneau, 1934) and Boule and Vallois (*in* Marthe and St. - Just Péquart, Boule and Vallois, 1937).

from Pearson's formulae is 1:1.098. These figures show that the sex ratio in Şeyh Höyük skeletons is greater than in modern man,[59] although it falls below the average figure for Upper Palaeolithic man, given by Gates[60]. That is, although the sex ratio in stature is still relatively high, it is somewhat reduced as compared with that of the Upper Palaeolithic man of Europe.

The relatively high sex difference observed in the long bones and statures of Şeyh Höyük skeletons appears to represent the retention of a primitive condition, which was characteristic of Upper Palaeolithic Man of Europe.

CONCLUSION

In an earlier study on the Chalcolithic skulls from Yümüktepe I showed that skull No. iii from this site came, in most of its traits, close to the skull of Combe-Capelle form of Upper Palaeolithic Man from the Lower Aurignacian of Dordogne in France.[61] In this study I concluded: "*The morphological as well as metric comparison between the Combe-Capelle skull of Upper Palaeolithic Age and the Yümüktepe skull of Chalcolithic date clearly shows that the rugged and primitive Eurafrican type, as already pointed out by Fleure and Buxton and Rice is a modified descendant of the Upper Palaeolithic Combe-Capelle type.*"[62] In view of this it is also of interest to note that the Chalcolithic skeletons from Şeyh Höyük have retained some archaic features, which are characteristic of the Cro-Magnon race or the Upper Paleeolithic Man.

It is true that the series from Şeyh Höyük is a small one and they are separated from Upper Palaeolithic period in time. But still the primitive traits observed in their long bones, taken as a whole, indicate that some of the characteristics of the Upper Palaeolithic Man have continued, sometimes in a modified state, in the skeletons of the Chalcolithic Age inhabitants of Şeyh Höyük.

[59] According to Dupertuis and Hadden, the sex ratio in their modern White series is 107.4, in Negroes 107.4 and in Pearson's series 108.3 (Dupertuis and Hadden, 1951, p. 27).

[60] Gates, 1948, p. 258.

[61] Şenyürek, 1954a, pp. 10-11.

[62] Ibid., p. 11. In a subsequent study on the long bones from Yümüktepe, in reference to stature, I further stated (Şenyürek, 1954b, p. 522): "*Thus this additional evidence further enhances the resemblance between this individual and the Combe-Capelle form of the Upper Palaeolithic Man.*"

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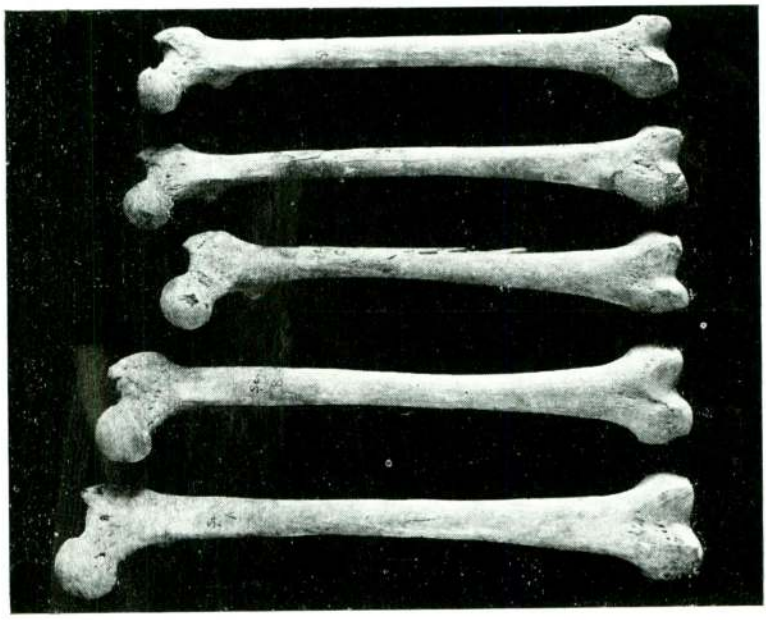

Fig. 2

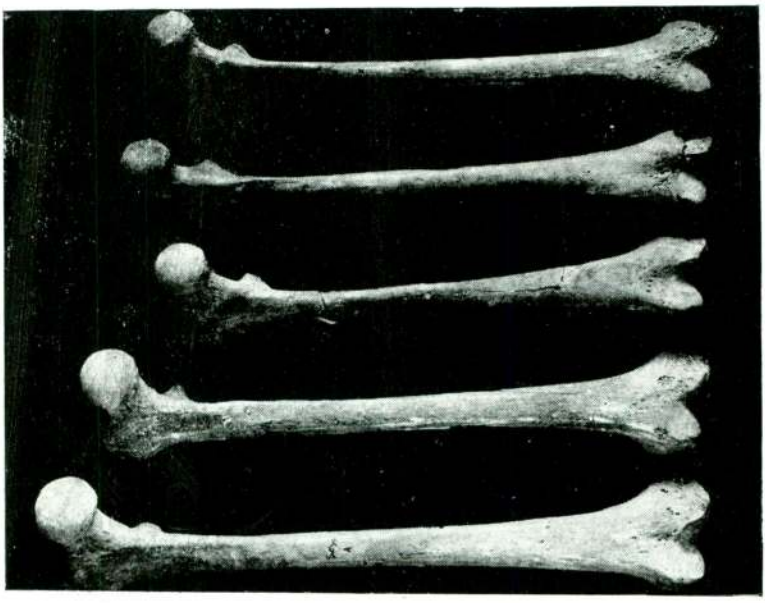

Fig. 1

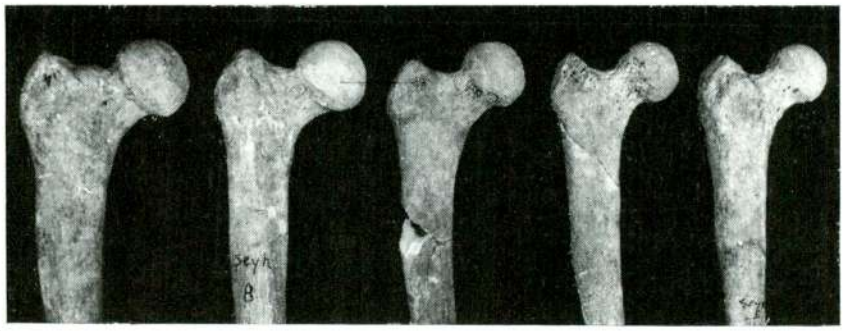

Fig. 3

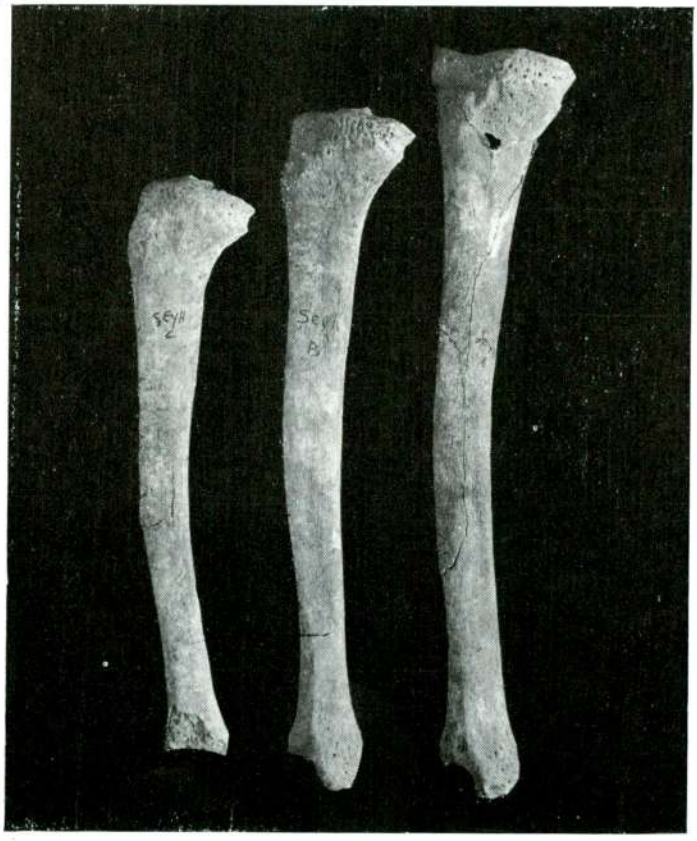

Fig. 4

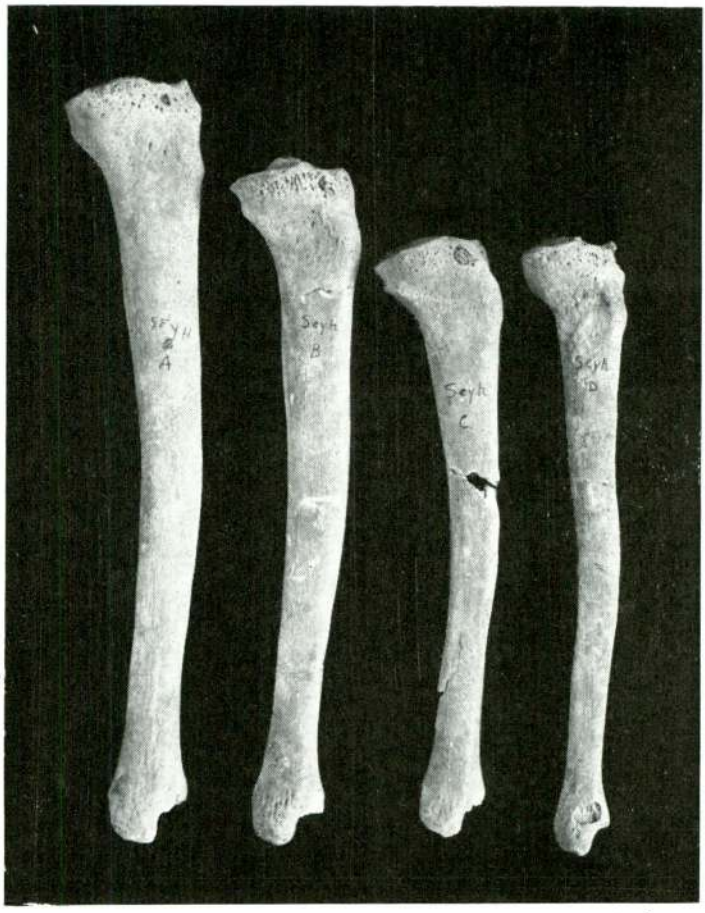

Fig. 5

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EXPLANATION OF THE FIGURES

Fig. 1: The right femurs from Şeyh Höyük (individuals A, B, C, D and E).

Fig. 2: The left femurs from Şeyh Höyük (individuals A, B, C, D and E).

Fig. 3: The upper parts of the right femurs from Şeyh Höyük (individuals A, B, C, D and E).

Fig. 4: The right tibiae from Şeyh Höyük, seen from the medial side (individuals A, B and C).

Fig. 5: The left tibiae from Şeyh Höyük, seen from the medial side (individuals A, B, C and D).

TABLE 1

Humerus

Measurements of the Humeri of Chalcolithic Age from Şeyh Höyük [1]

	A (male)	B (male)	Average of males	C (female)	D (female)	E (female)	Average of females
a. Maximum length (Martin 1)	327.50	—	327.50	277.50	310.00 [left]	301.00 [right]	296.16
b. Minimum circumference (Martin 7)	68.00	—	68.00	56.00	59.00	53.00	56.00
Length-thickness index $\left(\frac{b \times 100}{a}\right)$	20.76	—	20.76	20.18	19.03	17.60	18.93

1 In this study all measurements, with the only exception of stature, are given in millimeters. Stature is given in centimeters. Figures in parentheses refer to the number of measurements in Martin, 1928. In this and the following tables the measurements of the bones marked as right or left, refer to the side indicated. The other figures are the averages of right and left sides.

TABLE 2
Ulna
Measurements of the Ulnae of Chalcolithic Age from Şeyh Höyük

	A (male)	B (male)	Average of males	C (female)	D (female)	E (female)	Average of females
a. Maximum length (Martin 1)	286.00	—	286.00	219.75	252.00	—	235.87
b. Physiological length (Martin 2)	251.50	—	251.50	189.00	221.00	—	205.00
c. Minimum circumference (Martin 3)	42.00	—	42.00	29.00	33.00	—	31.25
Length-thickness index $\left(\frac{c \times 100}{b}\right)$	16.69	—	16.69	15.60	14.93	—	15.26

TABLE 3
Radius
Measurements of the Radii of Chalcolithic Age from Şeyh Höyük

	C (Female)	F (Subadult)
a. Maximum length (Martin 1)	199.50	—
b. Physiological length (Martin 2)	186.00	—
c. Minimum circumference (Martin 3)	39.50	34.00 (left)
Length-thickness index $\left(\frac{c \times 100}{b}\right)$	21.23	—

TABLE 4
Femur
Measurements of the Femurs of Chalcolithic Age from Şeyh Höyük

	A (male)	B (male)	Average of males	C (female)	D (female)	E (female)	Average of females	F (subadult)
a. Maximum length (Martin 1)	458.00	427.50	422.75	378.50	406.00	391.50	392.00	—
b. Length in natural position (Martin 2)	453.50	422.75	438.12	376.50	403.50	386.50	388.83	—
c. Caput femoris: vertical diameter (Martin 18)	48.00	43.30	45.65	40.70	36.80	36.40	37.96	—
d. Caput femoris: sagittal diameter (Martin 19)	46.30	41.55	43.92	39.60	36.20	35.70	37.16	—
e. Collum femoris: length (Martin 14c)	41.30	41.55	41.44	37.50	34.80	37.80	36.70	44.00
f. Collum femoris: vertical diameter (Martin 15)	34.60	32.60	33.60	30.60	26.85	26.00	27.81	33.30
g. Collum femoris: sagittal diameter (Martin 16)	28.60	26.80	27.70	23.90	23.50	23.50	23.63	28.50
h. Upper breadth of femur (Martin 13)	98.50	89.80	94.15	84.80	76.25	77.00	79.35	—
i. Breadth of subtrochanteric part of diaphysis (Martin 9)	39.25	34.00	36.62	29.75	29.50	27.00	28.75	27.75
j. Antero-posterior diameter of subtrochanteric part of diaphysis (Martin 10)	26.50	23.25	24.87	23.00	21.00	21.50	21.83	21.25
k. Antero-posterior diameter in middle of diaphysis (Martin 8)	34.25	28.00	31.12	25.80	25.50	24.50	25.26	24.10
l. Breadth (lateral) in middle of diaphysis (Martin 7)	27.00	25.10	26.05	23.80	22.00	22.75	22.85	21.60

TABLE 4 (Continued)

Measurements of the Femurs of Chalcolithic Age from Şeyh Höyük

	A (male)	B (male)	Average of males	C (female)	D (female)	E (female)	Average of females	F (subadult)
m. Circumference in middle of diaphysis (Martin 8)	95.00	83.50	89.25	78.00	73.00	73.00	74.66	72.00
n. Epicondyle breadth (Martin 21)	79.50	74.25	76.87	69.00 (right)	64.50 (left)	62.50 (right)	65.33	74.50
o. Torsion angle (Martin 28)	35°	26°	30°5	28° (right)	30° (left)	30° (right)	29°33	38°
p. Neck-shaft angle (Martin 29)	117°	116°	116°5	123°	119°	124°	122°	125°
Length - thickness index $\left(\frac{m \times 100}{b}\right)$	20.97	19.75	20.36	20.71	18.09	18.88	19.22	—
Robusticity index $\left(\frac{k+l \times 100}{b}\right)$	13.50	12.56	13.03	13.17	11.77	12.22	12.38	—
Index platymericus $\left(\frac{j \times 100}{i}\right)$	67.51	68.38	67.94	77.31	71.18	79.62	76.03	76.57
Index pilastricus $\left(\frac{k \times 100}{l}\right)$	126.85	111.55	119.20	108.40	115.90	107.69	110.66	111.57
Robusticity indexof caput femoris $\left(\frac{c+d \times 100}{b}\right)$	20.79	20.07	20.43	21.32	18.09	18.65	19.35	—
Index of collum femoris length $\left(\frac{e \times 100}{b}\right)$	9.10	9.85	9.47	9.96	8.62	9.78	9.45	—
Index of cross-section of collum femoris $\left(\frac{g \times 100}{f}\right)$	82.94	82.20	82.57	78.10	87.52	90.38	85.33	85.58
Diaphysis-Epicondyle breadth index $\left(\frac{lx100}{n}\right)$	33.96	33.80	33.88	34.78*	34.12**	35.20***	34.70	28.99

* Calculated from the right femur (Mid-breadth 24.00 mm.).

** Mid-breadth in right and left sides is 22.00 mm.

*** Calculated from the right femur (Mid-breadth 22.00 mm.).

TABLE 5
Tibia
Measurements of the Tibiae of Chalcolithic Age from Şeyh Höyük

	A (male)	B (male)	Average of males	C (female)	D (female)	E (female)	Average of females	F (Subadult)
a. Maximum length (Martin 1)	392.00	356.00	374.00	314.00 (left)	323.00 (left)	—	318.50	—
b. Antero-posterior diameter at foramen nutricium (Martin 8 a)	39.00	36.50	37.75	33.00	27.50	27.25	29.25	32.00 (left)
c. Breadth (lateral) measurement at foramen nutricium (Martin 9 a)	28.00	21.00	24.50	23.00	19.00	19.75	20.58	23.00 (left)
d. Antero-posterior diameter at middle of diaphysis (Martin 8)	33.00	32.10	32.55	27.00	25.00	—	26.00	—
e. Breadth (lateral) measurement at middle of diaphysis (Martin 9)	27.20	19.50	23.35	19.10	17.80	—	18.45	—
f. Minimum circumference (Martin 10b)	87.00	76.00 (right)	80.50	67.00	62.00	—	64.50	69.00 (left)
Length-thickness index $\left(\frac{f \times 100}{a}\right)$	22.19	20.84*	21.51	21.65**	19.19	—	20.42	—
Index cnemicus $\left(\frac{c \times 100}{b}\right)$	71.79	57.53	64.66	69.69	68.72	72.47	70.29	71.87
Middle index $\left(\frac{e \times 100}{d}\right)$	82.42	60.74	71.58	70.74	71.20	—	70.97	—

* Calculated from the maximum length of right side (355.00 mm.)
** Calculated from the minimum circumference of left side (68.00 mm.).

TABLE 6

The Calculated Statures (According to Dupertuis and Hadden's formulae)

The Formulae[1]	A (male)	B (male)	C (female)	D (female)	E (female)
male = 73.570 + 2.970 humerus female=64.977+3.144 humerus	170.83	—	152.22	162.44*	159.61*
female=73.502 + 3.876 radius	—	—	150.82	—	—
male = 69.089 + 2.238 femur female=61.412+2.317 femur	171.58	166.63	149.11	155.48	152.12
male = 81.688 + 2.392 tibia female = 72.572 + 2.533 tibia	175.45	166.84	152.10*	154.38*	—
female = 55.729 + 1.984 (humerus + radius)	—	—	150.36	—	—
male = 69.294 + 1.225 (femur + tibia) female = 65.213 + 1.233 (femur + tibia)	173.41	165.27	150.65**	155.09	—
AVERAGES :	172.81	166.24	150.87	156.84	155.86

1 Dupertuis and Hadden, 1951, table 20.

* The figures marked with an asterisk refer to statures calculated from bones of one side only.

** Calculated from the length of left femur (379.00 mm.).

TABLE 7

Average Statures of Şeyh Höyük Skeletons

		According to Dupertuis and Hadden's (1951) formulae	According to Pearson's formulae [1]
Males	No. A	172.81	168.60
	No. B	166.24	162.32
	Average of males	169.52	165.46
Females	No. C	150.87	147.60
	No. D	156.84	152.65
	No. E	155.86	151.68
	Average of females	154.52	150.64

1 In this table the values from Pearson's formulae are obtained by averaging the lengths of right and left bones belonging to one individual and by using the formulae corresponding to those utilized in calculating the stature from Dupertuis and Hadden's general formulae. Pearson's formulae employed are a,b,c,d,e and g, listed by Martin, 1928, pp. 1070-1071.

TABLE 8

Proportions of the Limb-bones of Chalcolithic Age from Şeyh Höyük

	Humerus (length)	Radius (length)	Humerus + Radius Length	Radius x 100 / Humerus	Femur (length in natural position)	Tibia (length)	Femur + Tibia Length	Tibia x 100 / Femur	Arm x100 / Leg
Şeyh Höyük No. A. Male.	327.50	—	—	—	453.50	392.00	845.50	86.44	—
Şeyh Höyük No. B. Male.	—	—	—	—	422.75	356.00	778.75	84.21	—
Average of Males.	327.50	—	—	—	438.12	374.00	812.12	85.32	—
Şeyh Höyük No. C. Female.	277.50	199.50	478.00	71.89	376.50	314.00 (left)	692.00*	83.06*	69.07
Şeyh Höyük No. D. Female.	311.00 (left)	—	—	—	404.00 (left)	323.00 (left)	727.00	79.95	—
Şeyh Höyük No. E. Female.	301.00 (left)	—	—	—	386.00 (left)	—	—	—	—
Average of Females.	296.16	199.50	478.00	71.89	388.83	318.50	709.50	81.50	69.07

* Calculated from the length of left femur (378.00 mm.).

TABLE 9

Proportions of the Long Bones in Various Peoples [1]

		Clavicle x 100 / Humerus	Radius x 100 / Humerus	Tibia x 100 / Femur	Arm x 100 / Leg
Grimaldi woman (Grotte des Enfants). Verneau, 1906.		—	80.07	83.87	65.66
Grimaldi adolescent (Grotte des Enfants). Verneau, 1906.		—	79.37	83.77	63.12
Cro-Magnon Man (Grotte des Enfants). Verneau, 1906.		46.03	76.44	85.54	66.05
Upper Palaeolithic Males. Matiegka, 1940.		45.54	—	—	—
Upper Palaeolithic Females. Matiegka, 1940.		48.25	—	—	—
Afalou (both sexes). Boule, Vallois and Verneau, *in* Arambourg, Boule, Vallois and Verneau, 1934.		49.9	78.5	84.1	69.7
Téviec. Boule and Vallois, *in* Marthe et Saint-Just Péquart, Boule and Vallois, 1937.		45.5	76.9	83.4	68.8
Mugem (both sexes). Vallois, 1930.		45.1	79.8	83.8	—
Şeyh Höyük	Males	46.71	—	85.32	—
	Females	43.55	71.89	81.50	69.07
Europeans. Verneau, 1906.		44.63	73.93	79.72	69.73
Whites (male) Dupertuis and Hadden, 1951.		—	74.17	81.12	—
Whites (female). Dupertuis and Hadden, 1951.		—	72.05	80.23	—
Pearson's series (males). Dupertuis and Hadden, 1951.		—	74.82	81.63	—
Pearson's series (females). Dupertuis and Hadden, 1951.		—	72.44	80.69	—
Central European White Males. Matiegka, 1940.		45.04 (42.6-49.0)	—	—	—
Central European White Females. Matiegka, 1940.		45.19 (40.9-50.2)	—	—	—
Negroes. Verneau, 1906.		46.74	79.40	81.30	68.27
Negroes (male). Dupertuis and Hadden, 1951.		—	78.03	83.44	—
Negroes (female) Dupertuis and Hadden, 1951.		—	76.45	82.71	—

[1] The figures in parentheses show the range.

TABLE 10

Sex Ratio in the Long Bones of Chalcolithic Age from Şeyh Höyük

	Average maximum length of the longbones of males	Average maximum length of the longbones of females	Sex ratio
Humerus	327.50*	296.16	110.58
Ulna	286.00*	235.87	121.25
Radius	—	199.50*	—
Femur	442.75	392.00	112.94
Tibia	374.00	318.50	117.42

* One individual.

TABLE 11

Sex Ratios in the Maximum Lengths of the Long Bones of Various Peoples

		Humerus	Ulna	Radius	Femur	Tibia
Afalou. Boule, Vallois and Verneau, *in* Arambourg Boule, Vallois ad Verneau, 1934.	Male	340.50	292.00	266.20	474.00	389.00
	Female	329.20	271.00	257.00	451.00	379.10
	Sex ratio	103.43	107.74	103.57	105.09	102.61
Téviec. Boule and Vallois, *in* Marthe et Saint-Just Péquart, Boule and Vallois, 1937.	Male	296.80	—	—	417.00	347.60
	Female	281.20	—	—	398.00	329.80
	Sex ratio	105.54	—	—	104.77	105.39
Şeyh Höyük.	Sex ratio	110.58	121.25	—	112.94	117.42
Negroes. Dupertuis and Hadden, 1951.	Sex ratio	109.5	—	111.8	108.6	109.5
Whites. Dupertuis and Hadden, 1951.	Sex ratio	108.7	—	111.9	107.3	108.6
Pearson's series, cited by Dupertuis and Hadden, 1951.	Sex ratio	110.9	—	113.5	108.7	110.1