

## THE LONGEVITY OF THE CHALCOLITHIC AND COPPER AGE INHABITANTS OF ANATOLIA<sup>1</sup>

MUZAFFER SÜLEYMAN ŞENYÜREK, Ph.D.

*Professor of Anthropology, University of Ankara*

In a previous paper I showed that the duration of life of the ancient inhabitants of Anatolia from the Chalcolithic to the end of the Byzantine period at Alishar Höyük, that is roughly from the fourth millennium B.C. to the 11th century A.D., was relatively brief (Şenyürek, '47). This study has further corroborated the conclusions reached by Vallois ('37) in his excellent study on the longevity of the fossil hominids, that their duration of life was relatively short, because of their precarious and rugged existence, and that the increase in the average longevity of modern man has taken place relatively recently.<sup>2</sup>

<sup>1</sup> This is the fuller text of a report read in the XXII. International Congress of Orientalists held in Istanbul, September 15-22, 1951.

<sup>2</sup> Vallois ('37, p. 525) states: "*La brève durée de la vie des Hommes fossiles ressort en effet de tous ces chiffres. Sur 187 sujets d'âge déterminable, plus d'un tiers (55% chez les Hommes de Néanderthal, 34,3% chez ceux du Paléolithique supérieur, 37% chez les Mésolithiques) ont succombé avant 20 ans, la grande majorité des restants (40% chez les Hommes de Néanderthal, 53,9% chez les Paléolithiques supérieurs, 58,5% chez les Mésolithiques) est morte entre 20 et 40 ans. Au delà de cette limite, il ne reste que 16 sujets, dont la presque totalité (avec les proportions relatives pour les trois séries: 5%, 10,8% et 1,5%) avait succombé entre 40 et 50 ans. Trois seulement avaient dépassé 50 ans: l'Homme d'Obercassel, un des sujets d'Hoëdic, un de ceux de Montardit. Encore ne s'agissait-il pas de vieillards à proprement parler, car, sur tous trois, des segments assez importants des sutures étaient encore ouverts: majeure partie de la coronale et partie de la lambdoïde sur le premier, majeure partie de la lambdoïde sur le second, portion de la coronale et de la sagittale sur le troisième.*" Further on Vallois ('37, p. 531) adds: "*Une dernière question serait enfin la recherche de la cause de la mortalité si précoce de nos ancêtres. Il paraît tout naturel d'y voir une conséquence du mode de vie très primitif qu'ils devaient mener. Les peuples paléolithiques et mésolithiques, qui s'adonnaient uniquement à la chasse et à la cueillette, se trouvaient par là exposés à maints dangers et à maintes privations: leur vie rude et précaire ne devait guère permettre la survie des individus affaiblis par l'âge. Ce n'est qu'avec la découverte de l'agriculture, qui à entraîné une existence sédentaire et la possibilité de constituer des réserves alimentaires, que les sujets âgés se sont trouvés à même de subsister. Encore ce que nous avons vu plus haut montre-t-il que, même à des époques où la vie agricole était largement développée, comme à l'âge du Bronze ou dans*

Since the publication of my paper, not only new material from the Chalcolithic and Copper Age periods has come to light, but also I have been able to find skulls from the already published sites that could not be located at that time and some additional crania in the collections of skulls examined then.<sup>3</sup> Since that time, the reports of Krogman ('49) on the skulls from Chatal Höyük and Tell Al-Judah and of Angel ('51) on the skeletons from Troy have come out. Because of this additional material<sup>4</sup> and a larger series, I have considered it worthwhile to restudy the duration of life of the Chalcolithic and Copper Age inhabitants of Anatolia. The skulls studied by the writer are listed in Table I and those taken from the literature in Table 2. Among the material listed in Table 1, the ages of all the skulls have been studied by the writer. In this study only those skulls, complete or fragmentary, whose ages could be determined fairly accurately have been included and those which were not suitable for a reliable age estimate have been eliminated.

The method of age determination employed is the same as in my previous study ('47). In this earlier study I had stated ('47, pp. 56-57):

*"The age was determined by means of the stages of eruption of the teeth and the union of sutures, excepting 2 specimens where epiphyses were also used. Observations were made both ecto- and endocranially in the majority of the cases. At first the age was determined on the basis of the ectocranial closure, for which a summary of Martin's ('28) data given by Vallois ('37 fig. 1 and table 1) was utilized. Afterwards the data were studied in relation to the endocranial figures of Todd and Lyon ('24), which were also applied to the few cases where the*

*L'Égypte romaine, le nombre des vieillards était bien plus faible que de nos jours. Ce n'est vraiment que depuis le dernier siècle, et sous l'influence du brusque accroissement de bien-être dû à l'épanouissement de la civilisation occidentale, qu'en Europe du moins, l'âge moyen de la vie s'est notablement allongé."*

<sup>3</sup> Compare Table 1 with Şenyürek, 1947, Table 1.

<sup>4</sup> One of the Kusura skulls (No. V. 94.76), included in my study of 1947, has now been eliminated from the Copper Age series as in a recent letter Prof. W. Lamb kindly informed me that she now places this skull at 2000—1900 B.C. Thus it falls out of the limit of Copper Age. Dr. Lamb further informs me that she considers the Kusura skull No. V. 94.26 as dating from the last phase of Copper Age. This skull, representing a woman in her early twenties, has been retained in the present study.



*ectocranial surface alone was observed. Both methods of assessing age yielded the same general result, namely, that the ancient Anatolians died relatively young. In the ensuing tables all the figures given are those obtained by Todd and Lyon's method. No corrections have been made for individuals where only the ectocranial surface was observed (to these also endocranial figures have been applied), as they were in their early twenties, excepting 2 which were definitely old."*

In the new additions to the series, I have observed both the ectocranial and the endocranial suture closure. The age estimates of these are based on the eruption stages of the teeth and on the state of suture closure, on the endocranial aspect of the crania.

As for the age findings on the Chalcolithic and Copper Age inhabitants of Anatolia up till now, Angel ('39) described a skull from Babaköy as that of a middle-aged man of 50 years or less of age and Ehrich ('40) gave the ages of five skulls from the Early Cemetery at Gözülü Kule (Tarsus), four as 7-12 and one as 13-17 years of age. Kansu and Tunakan ('45) gave the ages of 5 skulls from the Copper Age of Alaca Höyük, four as under 20 and one as older. In my study of the skulls from the copper Age stratum of Maşat Höyük (Şenyürek, '46) I gave the ages of 3 skulls as under 20 and two as older. Although there is no indication that the latter two individuals had passed middle age, they are not included in this series as they are too fragmentary for a reliable age estimate (Şenyürek, '47, p. 59). In this study (Şenyürek, '46, p. 250) I also gave a preliminary account of my study on the duration of life of the skulls from the Chalcolithic, Copper, Hittite and Phrygian periods, including the material in the Department of Anthropology of the University of Ankara that had been discovered up to the end of 1945, and concluded that "*a great majority of these represent young or middle aged individuals and that they had died at a relatively early age.*" Afterwards this series was further enlarged by the addition of skulls from the Medo-Persian-Hellenistic and Roman-Byzantine periods, which was, as stated before, published in 1947 (Şenyürek, '47).

In their study of 1946, Kansu and Tunakan ('46) give the ages of 8 skulls from the Chalcolithic, Copper and Bronze Ages and the Hittite period from Alaca Höyük.<sup>5</sup> All the crania described from

<sup>5</sup> See also Kansu and Tunakan, 1948, p. 778 and Şenyürek, 1951b, pp. 48-49.

Alaca Höyük by Kansu and Tunakan ('45 and '46) were also studied by me ('46 and '47) and are included in my larger Alaca series. Subsequently, in connection with my study on the attrition of molars and its progress with age, read before the Third International Congress of Anthropological and Ethnological Sciences in 1948, and published in 1949 I had further occasion to refer to the longevity of the ancient inhabitants of Anatolia (Şenyürek, '49 a). In his excellent report on the skulls from Chatal Höyük and Tell Al-Judaidah published in 1949, Krogman ('49) gives the ages and age groups of 7 skulls. Of these he describes one as 3½ years, three as infant II (7-14 years), one as juvenile (14-21 years), one as 35-40 and another one as 45 years of age. Furthermore, he lists 8 skulls as adults, but these are not included in the present study as their age groups are not given. Subsequently, in two papers published in 1950 ('50 a and '50 b) I gave the ages of three skulls from Alaca Höyük and one from Büyük Güllücek. In 1951 Angel ('51) published his exhaustive study on the skulls from Troy, dating from Troy I to Troy IX and from the late Roman period. In this report Angel has also given the age groups of the skulls found earlier at Troy and Hanai Tepe, studied by Virchow (1882), and of the skull from Yortan Kelembö, originally described by Houzé ('03). Of Angel's series only those skulls dating from the periods of Troy I to Troy IV are incorporated in the present study.<sup>6</sup> Of the fifteen skulls, Angel describes one as a foetus (?), three as newborn, one as 8 years of age, one 11 years, one as 12-13 years, one as sub-adult, six as young adult and one as middle-aged.

In two recent papers ('51 a and b), I have also discussed the ages of one Chalcolithic and 4 Copper Age skulls from Anatolia.<sup>7</sup> In another paper ('51 c) I give the age of a skull from the earliest period of Polatlı as 13-15 years, and of one skull from the earlier part of the Copper Age as adult and a late Hittite period skull as about 30 years of age.

<sup>6</sup> For the duration of Chalcolithic period and Copper Age and for the correlation of Troy periods with those of other Anatolian sites see Özgüç, 1945.

<sup>7</sup> Among the Chalcolithic-Copper Age skulls only two cases of premature suture closure have been encountered and they both date from the Copper Age. For this see Şenyürek, 1947 and 1951 a.



Age distribution of deaths among the 76 Chalcolithic and Copper Age skulls from Anatolia studied by the writer are listed in Table 3, while in Table 4 the material studied by Ehrich, Krogman and Angel<sup>8</sup> has been added to this series, bringing the total to 104.

From an examination of Table 4 it is seen that the incidence of child death amounts to 31.7% in the Chalcolithic-Copper Age series. Krogman ('37) has given the age at death in the children, subadults and adults of the large Alishar series from the Chalcolithic to Turkish period. His Chalcolithic and Copper Age data is listed in Table 5. It is most unfortunate that Krogman has not subdivided the older individuals into age groups and has grouped them all as adults. In Krogman's series 66.6% of the Chalcolithic skeletons, 19.5% of the Copper Age material and 29.31% of the combined Chalcolithic and Copper Age series consist of children.

It is observed that the incidence of child mortality in Krogman's Copper Age series is quite low. Indeed, it is lower than that of the Alishar series from other periods (See Krogman, '37, Table 1 and Şenyürek, '47, Table 5). As I pointed out before ('47, p. 60) the child mortality in the Copper Age was probably higher than that indicated in my Table 4 and in Krogman's series (Table 5). Indeed, in dealing with skeletal material it must be kept in mind that the skeletons of children, especially those of the newborn and of infants when the incidence of death is particularly high, are more liable to disintegrate in the ground than those of the adults and also that the excavators may fail to find or to record them unless they are particularly interested in this subject. A glance at Table 6 will suffice to show that in lower Austria between 1829 and 1900 the percentages of infant mortality respectively were 50.7 and 44.3, which are higher than in the Chalcolithic-Copper Age series from Anatolia and higher than in most period groups of Krogman from Alishar Höyük (See Krogman, '37, table 1 and Şenyürek, '47, Table 5), with the exception of his figure for the Chalcolithic material and that it is only when we come to the lower Austrian series for 1927 that the infant mortality decreases to 15.4%, which is lower than the figure for Chalcolithic-Copper Age Anatolians and all period series from Alishar

<sup>8</sup> Angel's ('51) subadult group has been placed at 13-20, his young adult group in 21-40 and middle-aged adult group in the 41-60 years category.

Höyük (See Krogman '37, table 1 and Şenyürek, '47, Table 5). In view of this too recent decrease in infant mortality and the much higher percentages in the 19 th century Austrian series, I consider it probable that, as I pointed out before (Şenyürek, '47, p. 60) the actual child mortality in the Chalcolithic and Copper Age periods may have been considerably higher than those in Table 4, though not necessarily as high as the figure for the Chalcolithic period in Krogman's series (Table 5).

An examination of Table 4 shows that 78.8 % of the Chalcolithic-Copper Age skulls represent individuals who were under 40 years of age at the time of death. Only 21.1 % of the Chalcolithic-Copper Age skulls belong to individuals who had passed the age of 40 when they died. But among these the old ones, over 60 years of age were very rare. Only 3.8 % of the Chalcolithic-Copper Age skulls represent individuals over 60 years of age. That is, as I pointed out before (Şenyürek, '47, p. 61), for the whole of the ancient inhabitants of Anatolia (from Chalcolithic to 11th century A.D.), in the Chalcolithic and Copper Age inhabitants of Anatolia it appears also that the death at a relatively early age was the norm and that their average longevity was shorter than that of the civilized man of today. However, as I stated before (Şenyürek, '47, p. 61), this does not mean that these ancient Anatolians did not possess the potentiality of reaching old age. Indeed, the presence of old individuals, although rare, does indicate that they had the potentiality. However, their living conditions were apparently such that most of them perished before reaching the age of 40 and only a few succeeded in living beyond sixty.

As I pointed out before (Şenyürek, '47, p. 63), some differences are observed in the series from the various Chalcolithic-Copper Age Anatolian sites. For instance, to give an example, in the Alaca Höyük series, the percentage of individuals under 40 years of age is higher than in the Tilkitepe series from Eastern Anatolia. But as the series from the different sites are still small, I consider it impossible for the present to draw any definite conclusions from such differences, as these differences may very well be the result of the smallness of the various series.

As for the comparative figures, age distribution of deaths among



various peoples, ancient and recent, are listed in Table 6. In this table the figures for the Bronze Age people of Austria (Aunjetitz period) and the percentages of recent Austrians have been taken from Franz and Winkler ('36) and those of the Egyptians of the Roman period derived from Spiegelberg's study of the mummies, have been calculated from the figures given by Pearson (1901—1902). The data for the ancient Greeks and the peoples of ancient Rome and her territories, probably dating from the first three or four or six centuries A.D., are subtracted from the sepulchral inscriptions and have been respectively calculated from the figures given by Richardson ('33) and MacDonell ('13).

From this table it is observed that only 3.8% of the Chalcolithic-Copper Age series, 5.7 % of the total Anatolian series, 7.3 % of the Bronze Age Austrians, 10.1 % of the ancient Greeks, 9.9 % of the ancient Egyptians, 4.6 % of the ancient Romans and 15.2 % of the ancient people of Hispania and Lusitania consist of individuals over 60 years of age.<sup>9</sup> On the other hand, it is seen that more than two-thirds of the individuals in the Chalcolithic-Copper, total Anatolian, Bronze Age Austrian, ancient Greek, ancient Egyptian, ancient

<sup>9</sup> It will be noted among the peoples of the African territories of ancient Rome (Table 6) the percentage of the aged individuals is considerably high and that in this regard they differ conspicuously not only from the peoples of ancient Rome and the peoples of the territories of Hispania and Lusitania and ancient Greeks but also from all the other ancient peoples listed. Therefore, it will be worthwhile to refer briefly to the question of the great number of aged individuals among the African territories of ancient Rome.

The percentages of centenarians among the various ancient peoples are listed below :

	Number of Centenarians	Percentage
Ancient Greeks (From Richardson, 1933)	3	0.15 %
Peoples of ancient Rome (Calculated from MacDonell, 1913)	7	0.08 %
Peoples from the territories of Hispania and Lusitania of ancient Rome (Calculated from MacDonell, 1913)	10	0.5 %
Peoples from the African territories of ancient Rome (Calculated from MacDonell, 1913)	317	2.96 %

Roman series and of that from Hispania and Lusitania represent individuals who had died before reaching the age of 40.<sup>9</sup>

A scrutiny of the figures for ancient Greeks, based on skeletons dating from Neolithic to the Byzantine period, given by Angel ('47), shows also that among these the old individuals are very rare indeed. In Angel's series the percentages of old men vary from 0 to 9.6 in various periods, and among the females the old individuals are present in only the classical period series where the percentage is merely 3.7 (See Angel, '47, Table 1). In this study Angel ('47, p. 23) concludes: "*From the third millenium B.C. to classical times (650-150 B.C.), longevity in ancient Greece increased slightly but significantly, as shown by study of skeletal remains*".

The account given above clearly shows that in all of the ancient peoples mentioned most of the the individuals had died relatively

From this list is it seen that in the high percentage of centenarians the peoples of African territories of ancient Rome greatly differ from other peoples listed. Regarding the proportion of authentic centenarians in the modern civilized populations Hooton (Hooton, '46, pp. 271 and 272) states: "*The United States Life Tables calculate the number of 100,000 born alive surviving at each age, the rate of mortality per 1,000 at each age, and the average expectancy of life at each age. In the 1929-31 table, the number surviving to the exact age of 100 is 29. However, the proportion of centenarians in the population is probably much smaller than the calculations in such tables show. A painstaking study of the records of nearly a million persons by T.E Young revealed satisfactory evidence of only 30 persons who had lived 100 years or more. Of these, 21 were women and 9 were men. The oldest person whom Young was able to discover was about a month and a half short of 111 years. It therefore appears that authentic centenarians are very rare indeed, although reputed centenarians are common.*"

Although I see no valid reason for supposing that among the ancient Metal Age peoples some sturdy individuals could not have lived to be one hundred years old or more, still in view of the relative rarity of the authentic centenarians among the recent civilized peoples and the conspicuous divergence of the peoples of the African territories of ancient Rome from the ancient Greeks and from other peoples of ancient Roman Empire in this respect it is difficult to accept the percentage of the centenarians and indeed the high percentage of aged individuals among the peoples of African territories of ancient Rome as being correct. In this connection it is also worthwhile to note that according to both MacDonell ('13) and Todd ('27, p. 485) in at least a number of cases of the peoples of ancient Roman Empire the precise ages were probably not known and that Todd ('27, p. 485) has already questioned the authenticity of the large number of centenarians especially among the peoples of the African territories of ancient Rome studied by MacDonell ('13).



young and that the really aged persons were comparatively rare. In this connection it is also worthwhile to recall the conclusion of the late Todd ('27) who had studied the ages at death of the skeletons of some ancient populations and of some recent primitives. In this interesting study Todd ('27, p. 495) stated: "*The chief difference between these peoples and civilized populations of today is the apparent fact that the peak of old age death is a comparatively modern achievement resulting from greater safety and improved conditions of living*".

The total Anatolian, ancient Austrian, ancient Greek, ancient Egyptian series and those from Hispania-Lusitania and Africa differ from the Chalcolithic-Copper Age series in showing lower child mortality. The same is also true for the series of ancient Greek skeletons published by Angel ('47, Table 1). In Table 6 in only the ancient Roman series the child mortality exceeds that of the Chalcolithic-Copper Age series. The paucity of infants in the Egyptian series has also been noted by Pearson ('01-'02). For this Vallois ('37, p. 529) states: "*Les résultats sont plus confus pour les sujets jeunes, surtout ceux de moins de 14 ans, mais Franz et Winkler on fait remarquer que leurs chiffres, pour ceux-ci, étaient probablement beaucoup trop faibles: Il semble qu'un grand nombre d'enfants morts en bas âge avaient été enterrés en dehors des champs de sépulture examinés. La même cause explique-t-elle le petit nombre relatif des enfants parmi les momies égyptiennes? Il est impossible de répondre.*" However, as I pointed out before, no matter what the explanation for these figures may be, it is probable that in all these ancient peoples the actual infant mortality was higher than indicated by the available figures.

This new study has further corroborated the conclusions of Todd ('27) and of Vallois ('37), in that the average longevity of the Chalcolithic and Copper Age inhabitants of Anatolia appear to be relatively briefer than that of the civilized peoples of today.

The sex difference in the age at death among the 57 Chalcolithic and Copper Age Anatolians studied by the writer are listed in Table 7. In Table 8 the skulls studied by Ehrich, Krogman and Angel have been added to the series, bringing the total to 69. From an examination of these tables it is seen that in the 13-20 and 21-40 year groups, the percentages of females are higher than those of the males. That is, it appears that in the earlier periods of life the female mortality

was higher than that of the males. On the other hand, in 41-60 years group and in ages over 60 the percentages of males in the Chalcolithic-Copper Age series exceed those of the females.

Sex differences in the age at death among the various ancient peoples are shown in Table 9. An examination of this table also shows that in all the groups listed the percentages of females under 40 years of age are higher than those of the males. On the other hand, in age groups over 40, with the exception of 61-X years group of the total Anatolian series and of Bronze Age Austrians, the percentages of males usually exceed those of the females. Regarding the situation encountered in the fossil hominids, Vallois ('37, pp. 529-530) makes the following statement: "*Un autre problème découle de l'examen des tableaux II à IV: celui des différences sexuelles de mortalité. Il semble en effet que, dans tous ces groupes fossiles, l'homme mourait plus tard que la femme. Ainsi, chez les Néanderthaliens (tableau II), les quatre sujets ayant plus de 30 ans sont tous des hommes; pour les races du Paléolithique supérieur (tableau III), sur onze sujets de sexe connu ayant dépassé 40 ans, dix sont des hommes; pour celles du Mésolithique (tableau IV), les trois sujets de plus de 40 ans sont tous aussi des hommes. D'un autre côté, on observe une proportion exactement inverse, quand on considère les morts de 21 à 30 ans.*" Similarly an examination of Angel's figures (Angel, '47, Table 1), shows that among the skeletons of ancient Greeks from the Neolithic to Byzantine period, the percentages of women are higher than those of the males in all periods, while in older age groups the percentages of males exceed those of the females.

It was stated above that in the total Anatolian and in the Bronze Age Austrian series, the female mortality exceeded that of the males in 61-X years group. But as this situation does not occur in the other series listed, it is difficult to consider the relative preponderance of the women in the old age group of the total Anatolian and Bronze Age Austrian series as a definite sign that after safely reaching maturity proportionately more women than men succeeded in attaining old age, as this may arise from the scantiness of the material. However, irrespective of the variation in the old age groups of the total Anatolian and Bronze Age Austrian series, the figures indicate that among all the ancient peoples listed female mortality was heavier than that of the males in the earlier periods of life.



I have also calculated the average age at death of the males and females, by taking into consideration individuals over 13 years of age and the results obtained are listed in Tables 10 and 11. The average age at death of 34 males in the Chalcolithic-Copper Age Anatolian series is 35.85 years and that of the 23 females is 27.91 years. A glance at Table 11 shows that among all the ancient peoples listed the average age at death of the females is lower than that of the males.<sup>10</sup> According to the figures given by Angel ('47, Table 3) among the ancient Greek skeletons also the average age at death of the males is higher than that of the females in all the periods from Neolithic to Byzantine time. Angel ('47, p. 21) makes the following statement on the expectation of life of the two sexes: "*Such selective factors almost certainly increase the sex difference in age at death. But the epigraphic data published by MacDonnell (15) agree with Greek skeletal material in suggesting that in ancient civilizations female life expectancy was lower than the male rather than greater as is true today.*"

The higher percentage of female mortality in the earlier periods of life has also been noted by Franz and Winkler ('36) among the Bronze Age inhabitants of Austria and by Vallois ('37) among the ancient Egyptians. Franz and Winkler ('37) have attributed this apparent sex difference mainly to the childbearing function of the females. On the other hand, Vallois ('37), while accepting this explanation, also thinks that the slower rate of sutural union in the females may also have something to do with this situation. For this Vallois ('37, pp. 530-531) states: "*On peut alors se demander si la différence indiquée par les tableaux existe réellement. Ne serait-ce pas une apparence, due à ce que le crâne féminin se synostoserait moins vite? Todd et Lyon ne mentionnent pas de différence sexuelle dans leurs séries de Noirs et de Blancs, mais, pour les Européens, Schwalbe et Frédéric déclarent avoir constaté un retard de soudure chez la femme, et ce doit être un fait vraiment général, car Bolk le signale aussi pour les Anthropoïdes et divers Catarchiniens. À âges réels égaux, un crâne féminin paraîtrait ainsi plus jeune qu'un*

<sup>10</sup> An examination of Table 11 clearly shows that in the average age at death of the males and females, the peoples of the African territories of ancient Rome again conspicuously diverge from those of all the other ancient peoples listed in this table, which is no doubt a consequence of the relatively large number of aged individuals in MacDonnell's ('13) African series (For this see footnote 9).

*masculin, ce qui expliquerait la moindre fréquence des femmes dans les catégories les plus âgées. Ceci ne s'oppose d'ailleurs pas à l'explication émise par Franz et Winkler, et il est très possible que les deux motifs aient joué simultanément.*" But in this connection it should be noted that females have a higher percentage in also the 13-20 years group, where the age is primarily determined not by the sutures but by the eruption stages of the teeth or by the state of union of the epiphyses. Furthermore, this sexual difference is not only observed in the skeletal material but is also found in the epigraphic data, that is among the peoples of ancient Rome and of the territories of ancient Rome studied by MacDonell (See also Angel, '47, p. 21). Also regarding the modern civilized peoples Scheinfeld ('44, p. 186) makes the following interesting statements: "*From birth all the way through to the end of the road there is now not a single point among the American Whites at which the male death rate is not higher than that of the female. For all ages collectively the female death rate is about 25 per cent lower than the male's. Even during women's childbearing periods, when formerly their mortality exceeded that of males, their death rate among Whites is now 20 to 30 per cent lower. Among Negroes, the death rate of the female is now higher only in the age group of fifteen to nineteen years.*" In view of these, as I stated before ('47, p. 65), in my opinion although the slower rate of synostosis of the sutures may to some extent be involved in individuals over 20 years of age, the observed percentage differences between the sexes in the 13-20 and 21-40 years groups of ancient peoples, corresponding in general to the childbearing period, must largely be attributed to the hazards of childbearing at the time of pregnancy or delivery.

#### SUMMARY AND CONCLUSION

It appears that the average longevity of the Chalcolithic and Copper Age inhabitants of Anatolia was briefer than that of the modern civilized peoples. Although they had the potentiality of living to be old, it appears that most of these Chalcolithic and Copper Age peoples died before the age of 40 and only a few amongst them succeeded in living beyond sixty.



Among the Chalcolithic and Copper Age inhabitants of Anatolia the female mortality in the earlier periods of life appears to have been relatively higher than that of the males. Although the slower rate of synostosis of the sutures in females may also to some extent be involved in individuals over 20 years of age, the observed percentage differences between the sexes in the 13-20 and 21-40 years groups of the Chalcolithic-Copper Age inhabitants of Anatolia, corresponding in general to the childbearing period, must largely and primarily be attributed to the hazards of childbearing.

## LITERATURE CITED

- Angel, J.L. 1939. *The Babaköy skeleton*. Archiv für Orientforschung, Vol. XIII, Heft 1/2, pp. 28-32.
- Angel, J. L. 1947. *The length of life in ancient Greece*. Journal of Gerontology, Vol. 2, No. 1, pp. 18-24.
- Angel, J. L. 1951. *Troy. The human remains*. Supplementary Monograph 1. Princeton University Press for University of Cincinnati.
- Ehrich, R. W. 1940. *Preliminary notes on Tarsus crania*. American Journal of Archaeology, Vol. XLIV, No. 1, pp. 87-92.
- Franz, L. und Winkler, W. 1936. *Die Sterblichkeit in der frühen Bronzezeit Niederösterreichs*. Zeitschrift für Rassenkunde, Vol. 4, pp. 157-163.
- Hooton, E. A. 1946. *Up from the ape*. New York.
- Houzé, M. 1903. *Les ossements humains d'Yortan Kelembö*. Bulletin de la Société d'Anthropologie de Bruxelles, Vol. XXI, pp. CVI - CXVI.
- Kansu, Ş. A. and Tunakan, S. 1945. *Türk Tarih Kurumu Alaca-Hüyük Kazılarında (1936-1944) Bakırçağı yerleşme katlarından çıkarılan iskeletlerin antropolojik incelenmesi*. Belleten, Vol. IX, No. 36 (October), pp. 411-422.
- Kansu, Ş. A. and Tunakan, S. 1946. *Alaca-Hüyük 1943-1945 kazılarında çıkarılan Kalkolitik, Bakır ve Tunç çağlarına ait halkın antropolojisi (Sur l'anthropologie de la populations des Âges Chalcolithique, du Cuivre et du Bronze mis au jour lors des fouilles d'Alacahöyük 1943-1945)*. Belleten, Vol. X, No. 40 (October), pp. 539-555.
- Kansu, Ş. A. and Tunakan, S. 1948. *Karaoğlan höyüğünden çıkarılan Eti, Frik ve Klâsik devir iskeletlerinin antropolojik incelenmesi (Etude anthropologique des squelettes datant des époques Hittites et Phrygienne et de l'Âge Classique, provenant des fouilles du höyük de Karaoğlan, 1937-1938)*. Belleten, Vol. XII, No. 48 (October), pp. 759-778.
- Kökten, K., Özgüç, N. and Özgüç, T. 1945. *1940 ve 1941 yılında Türk Tarih Kurumu adına yapılan Samsun bölgesi kazıları hakkında ilk kısa rapor*. Belleten, Vol. IX, No. 35 (July), pp. 361-400.

- Krogman, W. M. 1937. *Cranial types from Alişar Hüyük and their relations to other racial types, ancient and modern, of Europe and Western Asia*. In *Von der Osten's Alishar Hüyük, seasons of 1930—1932*, part III. OIP, Vol. XXX, Researches in Anatolia, Vol. IX. Chicago, pp. 213-293.
- Krogman, W. M. 1949. *Ancient cranial types at Chatal Hüyük and Tell Al-Judaidah, Syria, from the late fifth millenium B.C. to the mid-seventh century, A. D.* Belleten, Vol. XIII, No. 51 (July), pp. 407-477.
- Lloyd, S. and Gökçe, N. 1951. *Excavations at Polatlı. A new investigation of second and third millenium stratigraphy in Anatolia*. Anatolian Studies, Vol. 1, pp. 21-62.
- MacDonell, W. R. 1913. *On the expectation of life in ancient Rome, and in the provinces of Hispania and Lusitania, and Africa*. Biometrika, Vol. IX, parts III and IV, pp. 366-380.
- Martin, R. 1928. *Lehrbuch der Anthropologie*. Jena.
- Osten, Von Der, H.H. 1937. *The Alishar Hüyük, seasons of 1930—1932*. Part III, OIP, Vol. XXX, Researches in Anatolia, Vol. IX. Chicago.
- Özgüç, T. 1945. *Öntarihte Anadolu Kronolojisi*. Belleten, Vol. IX, No. 35 (July), pp. 341-360.
- Pearl, R. 1921. *The biology of death*. The Scientific Monthly, Vol. XII, Nos. 3, 4, 5, 6 and Vol. XIII, Nos. 1, 2 and 3.
- Pearson, K. 1901—1902. *On the change in expectation of life in man during a period of circa 2000 years*. Biometrika, Vol. 1, pp. 261-264.
- Richardson, B.E. 1933. *Old age among the ancient Greeks*. The Johns Hopkins University Studies in Archaeology, No. 6. Baltimore.
- Scheinfeld, A. 1944. *Women and men*. New York.
- Şenyürek, M.S. 1941. *Anadolu Bakır Çağı ve Eti sekencesinin kraniyolojik tetkiki (A craniological study of the Copper Age and Hittite populations of Anatolia)*. Belleten, Vol. V, No. 19 (July), pp. 219-253.
- Şenyürek, M.S. 1946. *Türk Tarih Kurumu adına yapılan Maşat Höyük kazısından çıkarılan kafataslarının tetkiki (Study of the skulls from Maşat Höyük, excavated under the auspices of the Turkish Historical Society)*. Belleten, Vol. X, No. 38 (April), pp. 231-254.
- Şenyürek, M.S. 1947. *A note on the duration of life of the ancient inhabitants of Anatolia*. American Journal of Physical Anthropology, Vol. 5, N. S., No. 1 (March), pp. 55-66.
- Şenyürek, M.S. 1949 (a). *Anadolu'nun eski sakinlerinde büyük azı dişlerinin aşınması (The attrition of molars in the ancient inhabitants of Anatolia)*. Belleten, Vol. XIII, No. 50 (April), pp. 229-244.
- Şenyürek, M.S. 1949 (b). *Truva civarında Kumtepe'de bulunmuş olan iskeletlere dair bir not (A note on the skeletons from Kumtepe, in the vicinity of Troy)*. Ankara Üniversitesi, Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculté de Langue, d'Histoire et de Géographie, Université d'Ankara), Vol. 7, No. 2 (June), pp. 295-304.
- Şenyürek, M.S. 1950 (a). *Alaca Höyük'de bulunan üç kafatasına dair bir not (A note on three skulls from Alaca Höyük)*. Belleten, Vol. XIV, No. 53 (January), pp. 57-84.



- Şenyürek, M.S. 1950 (b). *Büyük Güllücek'de bulunan Kalkolitik çağa ait bir muharibin iskeletinin tetkiki (Study of the skeleton of a Chalcolithic Age warrior from Büyük Güllücek)*. Ankara Üniversitesi, Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculté de Langue, d'Histoire et de Géographie, Université d'Ankara), Vol. VIII, No. 3 (September), pp. 269-310.
- Şenyürek, M.S. 1951 (a). *Two cases of premature suture closure among the ancient inhabitants of Anatolia*. Belleten, Vol. XV, No. 58 (April), pp. 247-262.
- Şenyürek, M.S. 1951 (b). *A note on the human skeletons in the Alaca Höyük Museum*. Ankara Üniversitesi, Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculté de Langue, d'Histoire et de Géographie, Université d'Ankara), Vol. IX, No. 1-2 (March-June), pp. 43-61.
- Şenyürek, M.S. 1951 (c). *A study of the human skulls from Polatlı Hüyük*. Anatolian Studies, Vol. 1, pp. 63-71.
- Todd, T.W. and Lyon, D.W. 1924. *Endocranial suture closure. Its progress and age relationship. Part I. Adult males of white stock*. American Journal of Physical Anthropology, Vol. VII, pp. 325-384.
- Todd, T.W. and Lyon, D.W. 1925 (a). *Cranial suture closure. Its progress and age relationship. Part II. Ectocranial closure in adult males of white stock*. American Journal of Physical Anthropology, Vol. VIII, pp. 23-45.
- Todd, T.W. and Lyon, D.W. 1925 (b). *Suture closure. Its progress and age relationship. Part III. Endocranial closure in adult males of negro stock*. American Journal of Physical Anthropology, Vol. VIII, pp. 47-71.
- Todd, T.W. and Lyon, D.W. 1925 (c). *Suture closure. Its progress and age relationship. Part IV. Ectocranial closure in adult males of negro stock*. American Journal of Physical Anthropology, Vol. VIII, pp. 149-168.
- Todd, T.W. 1927. *Skeletal records of mortality*. The Scientific Monthly, Vol. XXIV, pp. 481-496.
- Vallois, H.V. 1937. *La durée de la vie chez l'homme fossile*. L'Anthropologie, Vol. 47, Nos. 5-6, pp. 499-532.
- Virchow, R. 1882. *Alttojanische Gräber und Schädel*. Physikalische Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin. Abh. II, pp. 1-133.

TABLE 1  
Skulls Studied by the Writer

Sites	Period	Number of Individuals
Ahlatlıbel	Copper	4
Alaca Höyük	Chalcolithic	5
	Copper	12
Alişar Höyük	Copper	2
Büyük Güllücek	Chalcolithic	1
Kumtepe	Chalcolithic	4
Kusura	Late Chalcolithic ?	1
	Copper	3
Maşat Höyük	Copper	3
Polatlı	Level I Early Copper <sup>1</sup>	1
Sites around Samsun (Dündartepe, Kaledoruğu and Tekeköy)	Copper	25
Tilkitepe	Chalcolithic	6
	Copper	4
	Chalcolithic or Copper	2
Yümüktepe (Mersin)	Chalcolithic	3
TOTAL		76

<sup>1</sup> See Llyod, S. and Gökçe, N. : Excavations at Polatlı. A new investigation of second and third millenium stratigraphy in Anatolia. *Anatolian Studies*, Vol. 1, 1951, p. 25 and p. 53.



TABLE 2  
MATERIAL COMPILED FROM THE LITERATURE

Gözlükule (Tarsus) (Ehrich, 1940)	Chatal Höyük and Tell Al-Judaidah <sup>1</sup> (Krogman, 1949)		Troy <sup>2</sup> (Angel, 1951)				Babakóy (Angel, 1939 and 1951)	Yortan Keleambo (Angel, 1951)	Hanai tepe (Angel, 1951)	
	Phases		Troy I	Troy II	Troy III ?	Troy III-IV				Troy IV
	B	B or C								
Early Cemetery (Chalcolithic ?)	1	2	4	4	2	1	1	Troy II	Troy II-III ? (Layer B)	
5			5 <sup>3</sup>			1	1	Troy II	1	

<sup>1</sup> Data compiled from Krogman, 1949, pp. 411-416, and Tables IV, V and VI. Some of these belong to material not examined by Krogman (See his Table III and IV).

<sup>2</sup> Taken from the text of Angel, 1951, pp. 5-12. Only those specimens whose ages are stated in numbers, or given as newborn, subadult, young adult and middle-aged adult have been taken. Those specimens of Angel designated as only adult have been omitted.

<sup>3</sup> One is designated as "foetus?". See Angel, 1951, p. 6.

TABLE 3

DISTRIBUTION OF DEATHS ACCORDING TO AGE AMONG THE CHALCOLITHIC AND COPPER AGE INHABITANTS OF ANATOLIA, STUDIED BY THE WRITER. BOTH SEXES

	0-12 yrs.	13-20 yrs.	21-40 yrs.	41-60 yrs.	61-X yrs.	Number of Individuals
Chalcolithic- Copper	18 (23.6%)	10 (13.1%)	29 (38.1%)	15 (19.7%)	1 (5.2%)	76

TABLE 4

DISTRIBUTION OF DEATHS ACCORDING TO AGE AMONG THE CHALCOLITHIC AND COPPER AGE INHABITANTS OF ANATOLIA. THIS SERIES INCLUDES THE 76 SPECIMENS STUDIED BY THE WRITER AND THOSE BY EHRICH (1940), KROGMAN (1949) AND ANGEL (1939 AND 1951)

	0-12 yrs.	13-20 yrs.	21-40 yrs.	41-60 yrs.	61-X yrs.	Number of Individuals
Chalcolithic- Copper	33 (31.7%)	13 (12.5%)	36 (34.6%)	18 (17.3%)	4 (3.8%)	104

TABLE 5

AGE GROUPS OF SKELETONS FROM ALIŞAR HÖYÜK. (ADAPTED FROM KROGMAN, 1937).<sup>1</sup> BOTH SEXES

Period	Birth-14 yrs.	14-21 yrs.	Adult	Number of Individuals
Chalcolithic	8 (66.6 %)	1 (8.3 %)	3 (25.0 %)	12
Copper	9 (19.5 %)	3 (6.5 %)	34 (73.9 %)	46
Total Chalcolithic- Copper	17 (29.3 %)	4 (6.8 %)	37 (63.7 %)	58

<sup>1</sup> Krogman's (1937, Table 1) 0-7 and 7-14 groups have been combined here.



TABLE 6  
DISTRIBUTION OF DEATHS ACCORDING TO AGE AMONG VARIOUS PEOPLES,  
ANCIENT AND RECENT (BOTH SEXES)

	0-12 yrs.	13-20 yrs.	21-40 yrs.	41-60 yrs.	61-X yrs.	Number of Individuals
Chalcolithic and Copper Age Anatolians (Data from Table 4)	33 (31.7%)	13 (12.5%)	36 (34.6%)	18 (17.3%)	4 (3.8%)	104
Ancient Anatolians, from Chalcolithic to 11th Century A.D. (Şenyürek, 1947, Table 4)	25 (20.4%)	16 (13.1%)	50 (40.9%)	24 (19.6%)	7 (5.7%)	122
Ancient Inhabitants of Austria (Bronze Age). (From Franz and Winkler, 1936) <sup>1</sup>	19 (6.9%)	47 (17.2%)	109 (39.9%)	78 (28.6%)	20 (7.3%)	273
Ancient Greeks, from literary evidence (Calcu- lated from Richardson, 1933)	380 (18.7%)	474 (23.4%)	685 (33.8%)	277 (13.6%)	206 (10.1%)	2022
Ancient Egyptians (Roman Period)(Calculated from Pearson, 1901—1902)	28 (19.8%)	20 (14.1%)	56 (39.7%)	23 (16.3%)	14 (9.9%)	141
Peoples of Ancient Rome (Calculated from MacDonell, 1913)	3074 (38.1%)	1611 (19.9%)	2428 (30.0%)	579 (7.1%)	373 (4.6%)	8065
Peoples from the territories of Hispania and Lusitania of Ancient Rome (Calculated from MacDonell, 1913).	188 (9.4%)	329 (16.4%)	775 (38.8%)	399 (19.9%)	305 (15.2%)	1996
Peoples from the African territories of Ancient Rome (Calculated from MacDonell, 1913).	1064 (9.9%)	1006 (9.4%)	3047 (28.4%)	2105 (19.6%)	3475 (32.4%)	10697
Lower Austria (1829) (From Franz and Winkler, 1936). <sup>1</sup>	50.7 %	3.3 %	12.2 %	12.8 %	21.0 %	—
Lower Austria (1857) (From Franz and Winkler, 1936). <sup>1</sup>	48.3 %	3.2 %	14.3 %	15.2 %	19.0 %	—
Lower Austria (1900) (From Franz and Winkler, 1936). <sup>1</sup>	44.3 %	2.0 %	12.1 %	15.7 %	25.9 %	—
Lower Austria (1927) (From Franz and Winkler, 1936). <sup>1</sup>	15.4 %	2.7 %	11.9 %	22.6 %	47.4 %	—

<sup>1</sup> It must be pointed out here that in Franz and Winkler's ('36) tables the first two age groups are: 0-14 and 14-20 years.

TABLE 7

DISTRIBUTION OF DEATHS ACCORDING TO SEX AMONG THE CHALCOLITHIC AND COPPER AGE INHABITANTS OF ANATOLIA, STUDIED BY THE WRITER

		13-20 yrs. <sup>1</sup>	21-40 yrs.	41-60 yrs.	61-X yrs.	Number of Individuals
Chalcolithic- Copper	♂	3 (8.8 %)	17 (50.0 %)	11 (32.3 %)	3 (8.8 %)	34
	♀ +	6 (26.0 %)	12 (52.1 %)	4 (17.3 %)	1 (4.3 %)	23

1 A specimen of indeterminate sex in 13-20 years group in previous tables has been left out here.

TABLE 8

DISTRIBUTION OF DEATHS ACCORDING TO AGE AND SEX, AMONG THE CHALCOLITHIC AND COPPER AGE INHABITANTS OF ANATOLIA. THIS SERIES INCLUDES 57 SPECIMENS STUDIED BY THE WRITER AND THOSE STUDIED BY EHRICH (1940), KROGMAN (1949) AND ANGEL (1939 AND 1951)

		13-20 yrs. <sup>1</sup>	21-40 yrs.	41-60 yrs.	61-X yrs.	Number of Individuals
Chalcolithic- Copper	♂	4 (9.5 %)	21 (50.0 %)	14 (33.3 %)	3 (7.1 %)	42
	♀ +	7 (25.9 %)	15 (55.5 %)	4 (14.8 %)	1 (3.7 %)	27

1 A juvenile specimen of unknown sex in Krogman's series (See Krogman, 1949, Table IV) included in previous tables has been omitted here.



TABLE 9

DISTRIBUTION OF DEATHS ACCORDING TO SEX AMONG VARIOUS ANCIENT PEOPLES

		13-20 yrs.	21-40 yrs.	41-60 yrs.	61-X yrs.	Number of Individuals
Chalcolithic and Copper Age Inhabitants of Anatolia (Data from Table 8)	♂	4 (9.5%)	21 (50.0%)	14 (33.3%)	3 (7.1%)	42
	♀	7 (25.9%)	15 (55.5%)	4 (14.8%)	1 (3.7%)	27
Ancient Anatolians, from Chalcolithic to 11th Century A.D. (Şenyürek, 1947, Table 6)	♂	4 (6.8%)	31 (53.4%)	19 (32.7%)	4 (6.8%)	58
	♀	9 (28.1%)	17 (53.1%)	3 (9.3%)	3 (9.3%)	32
Ancient Inhabitants of Austria (Bronze Age) (From Franz and Winkler, 1936).	♂	12 (10.0%)	45 (37.5%)	54 (45.0%)	9 (7.5%)	120
	♀	28 (25.9%)	57 (52.7%)	14 (12.9%)	9 (8.3%)	108
Ancient Egyptians (Roman Period) (Calculated from Pearson, 1901 - 1902).	♂	8 (12.3%)	27 (41.5%)	18 (27.6%)	12 (18.4%)	65
	♀	12 (25.0%)	29 (60.4%)	5 (10.4%)	2 (4.1%)	48
Peoples of Ancient Rome (Calculated from MacDonell, 1913).	♂	817 (30.4%)	1233 (45.9%)	367 (13.6%)	269 (10.0%)	2686
	♀	794 (34.4%)	1195 (51.8%)	212 (9.1%)	104 (4.5%)	2305
Peoples from the territories of Hispania and Lusitania of Ancient Rome (Calculated from MacDonell, 1913).	♂	178 (17.4%)	394 (38.6%)	231 (22.6%)	216 (21.1%)	1019
	♀	151 (19.1%)	381 (48.2%)	168 (21.2%)	89 (11.2%)	789
Peoples from the African territories of Ancient Rome (Calculated from MacDonell, 1913)	♂	566 (10.0%)	1640 (29.2%)	1262 (22.4%)	2144 (38.2%)	5612
	♀	440 (10.9%)	1407 (34.9%)	843 (20.9%)	1331 (33.1%)	4021

TABLE 10

SEX DIFFERENCE IN THE AVERAGE AGE AT DEATH AMONG THE  
CHALCOLITHIC AND COPPER AGE INHABITANTS OF ANATOLIA, STUDIED  
BY THE WRITER

		Number of Individuals	Average Age at Death
Chalcolithic-Copper	♂	34	35.85 yrs.
	♀ +	23	27.91 yrs.

TABLE 11

SEX DIFFERENCE IN THE AVERAGE AGE AT DEATH AMONG THE VARIOUS  
ANCIENT PEOPLES

		Number of Individuals	Average Age at Death.
Chalcolithic-Copper Age Inhabitants of Anatolia (Data from Table 10)	♂	34	35.85 yrs.
	♀ +	23	27.91 yrs.
Ancient Anatolians from Chalcolithic to 11 th Century A.D. (Şenyürek, 1947, p. 64)	♂	58	35 yrs.
	♀ +	32	28 yrs.
Ancient Egyptians (Roman Period) (Calculated from Pearson, 1901-1902)	♂	65	41.90 yrs.
	♀ +	48	30.58 yrs.
Peoples of Ancient Rome (Calculated from MacDonell, 1913)	♂	2686	33.40 yrs.
	♀ +	2305	28.61 yrs.
Peoples from the Territories of Hispania and Lusitania of Ancient Rome (Calculated from MacDonell, 1913)	♂	1019	42.38 yrs.
	♀ +	789	37.19 yrs.
Peoples from the African Territories of Ancient Rome (Calculated from MacDonell, 1913)	♂	5612	52.46 yrs.
	♀ +	4021	49.61 yrs.