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A STUDY OF THE DENTITION OF THE ANCIENT INHABITANTS OF ALACA HÖYÜK

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I have already described the teeth of some individuals from Alaca Höyük (Nos. II, III, VIII, IX, Al. H. M. II and Al. F. No. 1) in my various papers on the skulls from this site, excavated under the auspices of the Turkish Historical Society (See Şenyürek, 1950 a, 1951 a and b). However, as the teeth already described by me represent only a part of the material and as most of the teeth from this site are relatively well-preserved, I have considered it useful to study all the available teeth from Alaca Höyük preserved in the Alaca Höyük Museum and in the Department of Anthropology of the University of Ankara.

The material studied is shown in Table 1, together with the periods :

TABLE 1

Alaca Höyük Material Studied

Period	Number of Individuals
Chalcolithic Age	4
Copper Age	11
Early Bronze Age	1
Period not exactly known	1
TOTAL	17

The teeth studied belong to the Chalcolithic, Copper and Early Bronze Ages, that is, they date roughly from the latter part of the fourth millenium B. C. to the end the third millenium B. C.[1] As seen from Table 1 the material from Alaca Höyük is too small to warrant generalizations regarding the dentition of the Chalcolithic, Copper and Early Bronze Age inhabitants of Anatolia. I have already decided to study the dentition of all the available remains of the ancient inhabitants of Anatolia, from the various sites and periods and it will be only then possible to reach any conclusions about the ancient Anatolians in general. As this larger study has not yet been undertaken,[2] my attention in the present paper will be confined mainly to the dentition of the ancient inhabitants of Alaca Höyük.

As for the method of measurements, the length (mesio-distal diameter of the crown) has been measured as the maximum dimension in the case of incisors, canines and premolars, while in the molar teeth it has been taken between the contact faces according to the method of Hrdlicka (see Hrdlicka, 1924, p. 110). On the other hand, I have measured the breadths (bucco-lingual diameter of the crown) in all the teeth studied as the maximum bucco-lingual diameter, as is customary. In all the canines, premolars and molars studied by me, the crown height has been measured on the buccal faces of the teeth. In the case of the upper molars this measurement is taken on the paracone, while in the lower molars it is measured on the protoconid.

In Tables 11 - 28, the permanent teeth from Alaca Höyük are compared with those of some ancient Anatolians (the teeth from Maşat Höyük, Karahöyük, Büyük Güllücek and Polatlı) already studied by me (see Şenyürek, 1946, 1949 a, 1950b and 1951c). The measurements of non-Anatolian groups used for comparison have been taken from the studies of Black (1902), Campbell (1925), Drennan (1929), Shaw (1931), Nelson (1938), v. d. Broek (1939) and Pedersen (1949).

[1] For the dates of these periods see Özgüç, 1945.

[2] I would like to point out here that I have already studied the pulp cavities and the attrition of the molars of the ancient Anatolians from the various periods (see Şenyürek, 1949 b and c).

Note — Since the above lines were written I have completed the morphological study of the permanent lower molars of the Chalcolithic-Copper Age Anatolians (see Şenyürek, 1952).

The robustness values, height-length and height-breadth indices of the modern groups taken from the literature have been calculated by me from the average measurements[3]. In Tables 11-27, I have also listed for comparison the measurements and indices of a mixed series composed of Whites, ancient Egyptians, American Indians, Negroes and Melanesians which I had measured at Peabody Museum of Harvard University. To distinguish this mixed series, which has already been published in some of my previous papers (Şenyürek, 1940, 1941a and 1946), I have called it "Homo sapiens". I had also measured at Harvard University the length, breadth, trigonid and talonid breadths of the lower molars of a small series of ancient Egyptians, mostly from the time of the Middle Kingdom, and of some Medieval Icelanders. The measurements of these groups are listed in Tables 24-26. Again at Peabody Museum of Harvard University, I have taken the trigonid and talonid breadths of a small series from the Pecos Pueblo. A larger collection of teeth from this site has already been studied by Nelson (1938). But this author gives only the maximum breadths of the lower molars and does not deal with the trigonid and talonid breadths separately. The trigonid and talonid breadths of the lower molars of Pecos Indians I have measured are listed in Table 26. A comparison of these Pecos figures with the breadth measurements given by Nelson (see Table 24), shows that the larger one of the trigonid or talonid breadths I have taken come quite close to the maximum breadths given by Nelson, especially in the case of the first and second lower molars.

The Deciduous Teeth from Alaca Höyük

There are only five skulls from Alaca Höyük with some of the milk teeth preserved. In four of these the first molars had not yet erupted or completed their process of eruption. In the fifth skull (Al. F. No. 1) the deciduous dentition is represented by only the right and left second lower milk molars, all the other deciduous teeth having already been shed and replaced by permanent dentition. In the upper jaw of this individual the left second permanent molar had already erupted, while the right second permanent molar and the wisdom

[3] It should be noted that Pedersen (1949) has given the robustness values of the East Greenland Eskimo teeth.

teeth had not yet erupted. In the lower jaw all the permanent teeth with the exceptions of second permanent premolars and wisdom teeth had erupted (see Şenyürek, 1951b, pp. 48-49). That is, in this individual the second milk molars had not yet been shed. In Tables 2-7 are given the measurements of all the milk teeth from Alaca Höyük that have been preserved, with the exception of the lower second milk molar of Al. F. No. 1 which has not been measured. Some comparative measurements are listed in Tables 8-10.

The milk incisors of only one individual (No. Al. 15) are preserved. These milk incisors are not shovel-shaped and they do not have median ridges on their lingual surfaces. In all the incisors, upper and lower, the lingual tubercle is represented by a moderate swelling, which, however, is not sharply differentiated from the lingual surface. In all the deciduous incisors, both upper and lower, the tip of the root is bent buccalwards.

The milk canines are preserved in only two skulls. The upper canines are caniniform and the pointed portion of the crown, the part where the mesial and distal margins of the crown converge to form the tip, is relatively higher than in the permanent canines. This is a primitive feature in the milk canines as has been pointed out by Remane (1927). In one of the upper canines (No. 15) there is a well-developed median ridge on the lingual surface of the crown and a small but distinct lingual tubercle [4]. These features are lacking in the other milk canine (No. VIII), in which the lingual tubercle is represented by only a moderate swelling which is not differentiated from the lingual surface.

One of the lower canines (No. VIII) is somewhat worn, but that of the other individual (No. 15) is well-preserved. Again in this individual the lower canine is more caniniform than is usually the case with the permanent lower canines, although the tip is relatively somewhat lower than that of the deciduous upper canine. In the lower canines there is no median ridge on the lingual surface and no distinct lingual tubercle.

The crown indices of the upper and lower milk canines from Alaca Höyük are, unlike the permanent canines, under 100, as is also the

[4] For the development of ridges on incisors, canines and other teeth see Hrdlicka, 1921.

case in the other groups listed in Table 9. The height-length and height-breadth indices of the lower deciduous canine of one individual (No. 15) are higher than those of the upper milk canine of the same individual, although the height indices of both the upper and lower milk canines are far below those of the permanent upper and lower canines from this site.

The first upper milk molar is preserved in four skulls. In all of them it has only three cusps, two being on the buccal and one on the lingual side, as is usually the case in modern man (see Tomes, 1923, pp. 24-25). All of the first upper milk molars from Alaca Höyük have three separate roots.

The upper second deciduous molar is preserved in three skulls. In all of them this tooth possesses four well-developed cusps. The hypocone is well-developed in all of these teeth. Also the crista obliqua and the oblique groove separating the hypocone from the protocone are well-formed in all the upper second deciduous molars from Alaca Höyük. In the upper second deciduous molars of two indiviuals there is a Carabelli pit [5] on the protocone, but no Carabelli cusp. In the third skull, however, on both the right and left upper second deciduous molar there is a well-developed and distinct Carabelli cusp. The enamel margin on the buccal and lingual sides of these teeth shows types 1, 2 and 3 of Pedersen and Thyssen [6], that

[5] This formation has been called "Carabellische grübchen" by Gorjanovic-Kramberger and "Carabelli pit" by Weidenreich. See Gorjanovic-Kramberger, 1907, p. 120, and Weidenreich, 1937, p. 75.

[6] The earlier and basic work on enamel margin by Pedersen and Thyssen (1942), cited by Pedersen (1949, p. 74 and p. 240) is unfortunately unavailable to me. However, in his excellent study of the teeth of East Greenland Eskimos Pedersen (1949) gives a clear description of six types. Pedersen (1949, p. 74) describes these types as follows :

"*Type 1 is that in which the enamel margin is a curve, more or less convex in the direction of the occlusal surface. No enamel extension.*

Type 2 is that in which the enamel margin is concave in the direction of the occlusal surface. No enamel extension.

Type 3 is that in which the enamel margin is straight. No enamel extension.

Type 4 is that in which the enamel streams in the direction of the bifurcation, forming a small triangle which divides the enamel margin into mesial and distal halves which are more or less curved. The height of the enamel extension does not exceed about 1 ½ millimeters.

Type 5 is that in which the enamel extension is more pronounced than in the previous type, but does not extend beyond the roots.

Type 6 is that in which the enamel extension continues in between the roots."

is, there is no enamel extension in any one of them. In two individuals this tooth has three separate roots, but in the third skull (No. VIII) the disto-buccal and lingual roots are fused to the vicinity of the tip of the roots.

The first lower milk molar is preserved in three skulls. In all of them it has four main cusps, two being on the buccal and two on the lingual side, as is usually the case in recent man (see Tomes, 1923, p. 26). The first lower deciduous molars from Alaca Höyük have two separate roots.

The second lower milk molar is preserved in five skulls. This tooth has five well-developed cusps, as is usually the case in recent man (see Tomes, 1923, p. 27). The mesoconid (hypoconulid) is well-developed in all the specimens, and median or lateral in position. The occlusal surface of some of the teeth is sparsely but coarsely wrinkled. The enamel margin on the buccal and lingual surfaces show types 2 and 3 of Pedersen and Thyssen(1942) without enamel extension. However, on the lingual surface of one tooth there is a slight degree of enamel extension corresponding to Pedersen and Thyssen's type 4. The second deciduous molars from Alaca possess two separate roots.

The Permanent Teeth From Alaca Höyük

The Incisors:

The upper central incisor is preserved in eight skulls from Alaca Höyük. In one of the incisors (Al. H. M I of Early Bronze Age) the crown is worn down to the root, so that no observations could be made on the morphology of the crown. Two of the seven available upper central incisors exhibit a slight degree of shovel-shape, first described by Hrdlicka (1920). The teeth of two individuals possess a median ridge on the lingual surface. As for the other Anatolian teeth already studied, a tooth from Polatlı Höyük (Şenyürek, 1951 c, p. 64), and one from Maşat Höyük (Şenyürek, 1946, p. 245) exhibit a slight degree of shovel-shape, while another individual from the latter site (Şenyürek, 1946, p. 249) possesses a moderate degree of shovel-shape. These teeth from Maşat and Polatlı Höyüks do not possess ridges on the lingual surface. In none of the teeth from Alaca, Maşat and Polatlı Höyüks is there a distinct lingual tubercle forming a separate cuspule.

As can be seen from Table 11, the teeth from Alaca Höyük are not larger than those of recent Whites. The four relatively well-developed teeth from the Copper Age have an average robustness value almost equal to that of recent Whites, while a tooth from the Chalcolithic level is even smaller. The crown index of the upper central incisors from Alaca Höyük are of moderate development, although the teeth from this site tend to have higher crown indices than the average of recent Whites and than those from Maşat Höyük and Polatlı Höyük.

I have measured the root heights of the incisors, canines and the single-rooted premolars on the buccal side according to the method adopted by Shaw (1931) and Nelson (1938). The root heights of the three upper central incisors from Alaca Höyük exceed the average of the recent Whites.

The upper lateral incisor is preserved in 7 skulls, of which, however, one (Al. H. M. I) is worn down to the root. Four of the teeth of 6 individuals exhibit a slight degree of shovel-shape. Teeth of two individuals possess a distinct lingual tubercle (see Figs. 5 and 15), while one has a median ridge on the lingual surface. A tooth from Polatlı and one from Maşat Höyük show respectively slight and moderate degrees of shovel-shape. Thus it is clear from this small series at our disposal that slight and moderate degrees of shovel-shape occurred in the upper incisors of some ancient Anatolians[7]. In the tooth from Polatlı there is a small but distinct lingual tubercle but no median ridge. In the specimen from Maşat Höyük there is no distinct lingual tubercle and again no median ridge.

It is of interest to note here that in one skull from the Copper Age of Alaca Höyük (No. 9), the right upper lateral incisor is congenitally missing (see Şenyürek, 1951 a, p. 256), while the left upper lateral incisor is present (see Fig. 7). The congenital absence of an

[7] In his study of the skulls from Alişar Höyük Krogman (1937, pp. 215-216) describes the upper incisors of skull No. cX18 of Chalcolithic period and those of eX3 of Copper Age as "*slightly shovel-shaped*". Also, a high proportion of the skulls from Troy and western Anatolia, ranging in time from Troy I to late Roman times, listed in his table VI, are marked by Angel (1951) as having slightly or moderately shovel-shaped incisors. From these and from the material studied by me it appears that the incidence of shovel-shaped incisors was probably not too infrequent among the ancient inhabitants of Anatolia.

upper lateral incisor in such a small series must, however, be considered as a chance occurrence, and must not mislead one to suppose that congenitally missing upper lateral incisors were rather frequent among the ancient Anatolians. For it is well-known that the congenitally missing upper lateral incisors occur very rarely in recent man, irrespective of race[8].

It can be seen from Table 12 that the three relatively well-preserved upper lateral incisors from the Copper Age of Alaca Höyük are of moderate size. The upper lateral incisors from Alaca Höyük exceed in size the average of recent Whites, which seem to have smaller upper lateral incisors than even Bushmen which usually have smaller teeth than the recent Whites. It would thus appear that the upper lateral incisors of the Whites tend to be further reduced than that of other races listed in Table 12. The average crown index of the upper lateral incisors of three individuals from the Copper Age are very near the average of recent Whites and some other groups. The root heights of three individuals from Alaca Höyük run from moderate to small, one being above and the others below the average of recent Whites.

The lower central and lateral incisors are preserved in six skulls from Alaca Höyük. These teeth are not shovel-shaped. They do not possess a distinct lingual tubercle and none of them has a median ridge on the lingual surface. The teeth from Büyük Güllücek, Maşat and Polatlı Höyüks are similar to those from Alaca Höyük in these features.

It can be seen from Table 13 that the average robustness value of the lower central incisors of two individuals from the Copper Age of Alaca Höyük is quite near that of the recent Whites, being slightly larger than in the latter. In the crown index, the lower central incisors from Alaca Höyük are near the average of recent Whites. In root height one individual exceeds the average of recent Whites, while the other is lower.

The relatively well-preserved lower lateral incisors of three individuals from Alaca Höyük are slightly smaller than the average of recent Whites (Table 14), but do not differ from the average of

[8] For the figures on absent upper lateral incisors see Hrdlicka, 1921, Ashley-Montagu, 1940, and Dahlberg, 1951.

some other groups. In the crown index the teeth from Alaca Höyük come quite near to the average of recent Whites. In root height the lower lateral incisors from Alaca Höyük exceed the average of recent Whites.

The Canines :

The permanent upper canines are preserved in seven skulls from Alaca Höyük. In two individuals, in whom the tip is not worn (see Fig. 15), the tip portion of the crown is well-pointed, that is caniniform. In two individuals there is a moderate but distinct lingual tubercle (see Fig. 15) and in four specimens there is a median ridge on the lingual surface. The upper canines are not shovel-shaped. As for the comparative Anatolian material, in the worn tooth from Büyük Güllücek there is no distinct lingual tubercle and median ridge. In one of the teeth from Maşat Höyük (No. 7) there is a small but distinct lingual tubercle which is lacking in the other specimen. On the other hand, Maşat No. 7 is devoid of a median ridge, which is present in the other specimen (No.3). In the tooth from Polatlı Höyük there is a small and distinct lingual tubercle and a median ridge on the lingual surface of the crown. The teeth from Maşat Höyük and that from Polatlı Höyük are equipped with a pointed tip. None of these teeth is shovel-shaped.

A worn upper canine from Alaca Höyük is larger than the average of recent Whites, while most of the other upper canines from this site tend to be somewhat smaller than the average of recent Whites (Table 15).

In the crown index the well-preserved teeth from Alaca Höyük agree with some of the recent groups listed in Table 15, and slightly exceed the average of recent Whites. In height-length and in height-breadth indices the teeth from Alaca Höyük, Maşat Höyük and Polatlı Höyük exceed most of the recent groups listed. Among the latter only the Japanese and in height-length index one Efé Pygmy [9]

[9] As can be seen from the very good drawings of v. d. Broek (1939), the upper canine of this Efé pygmy is somewhat worn, effecting the height measurements. Thus, when it was fresh the height-length index was no doubt higher than it is now. In this Efé pygmy the height-breadth index is very low, which is due not only to wear but also the largeness of its breadth in which this pygmy equals the average of the Australian natives which have the largest teeth among the recent hominids. So even in its fresh state, the height-breadth index of the upper canine of this pygmy was probably relatively low.

come close to the Anatolian figures, while the others have lower height-length and height-breadth indices. It is probable that some of the teeth measured by Drennan (1929), Shaw (1931) and Nelson (1938) were worn, effecting the height measurements. But still this difference cannot all be attributed to wear in other groups; as in the Homo sapiens group measured by me the teeth were unworn or little worn. In other words, it appears that in height indices the upper canines from Alaca, Maşat and Polatlı Höyüks tend to be more primitive than those of most recent groups listed.

In root height one upper canine from Alaca Höyük is near the average of recent Whites, while the other one has a very short root.

The lower permanent canine is preserved in seven skulls from Alaca Höyük. In these teeth the lingual tubercle is not distinct and only three individuals possess a median ridge on the lingual surface of the crown. The lingual surface of only one lower canine approaches the shovel-shape, although it is a pointed tooth. In the lower canines from Büyük Güllücek, Maşat Höyük and Polatlı Höyük, also, there is no distinct lingual tubercle, and among these only one individual from Maşat Höyük (No. 3) possesses a slight median ridge on the lingual surface of the crown, the others being devoid of such a ridge.

Two of the lower canines from Alaca Höyük are fresh and one is little worn. In two of these (Nos. II and III) the tip portion of the crown is pointed, that is caniniform (see Figs. 16, 19A and 20). In an unworn lower canine found together with the teeth of No. Al. J. M. I from the Chalcolithic period of Alaca Höyük, however the tip portion of the crown approaches that of an incisor. In this lower canine (see Figs. 17, 19B and 20) the mesial and distal margins of the crown, instead of forming a pointed tip at the tip portion of the crown, rise gently toward the middle and culminate in a very small tip. A form approaching this is also seen in the lower canine of Maşat No. 3 (see Figs. 18, 19 c and 20). In this tooth, at the top of the crown, the mesial and distal margins run horizontally toward the middle, where there is a distinct tip. This tip is now somewhat worn, but there is no doubt that originally it was larger than that of Alaca Höyük No. Al. J. M. I. From this small series at my disposal it is clear that among the ancient inhabitants of Anatolia there was a tendency in at least some individuals to have inci-

siform lower canines, approaching that of *Sinanthropus pekinensis*, while in other individuals the lower canines were equipped with a relatively pointed tip portion, as is a characteristic of recent man in general.

It has been noted that the lower canines of some individuals studied recalls that of *Sinanthropus pekinensis*. The late Professor Weidenreich (1937, p. 31) describes the cutting edge of the lower canines of Sinanthropus pekinensis as follows : "*The cutting edge is furthermore remarkable by its special shape. It does not taper as a whole to the tip but instead courses horizontally, except its middle which is marked by a small pointed elevation continuing downward into the more or less distinct median ridges of the buccal and lingual surfaces....*" But further on Weidenreich (1937, p. 33) adds : "*In reality, the lower canine of hominids originally was much more like an incisor than a true canine, the tapering point in recent man having been acquired as a consequence of the process of reduction which transformed the primary large and stout fangs into an ordinary small and slender tooth.*" However, as I stated before, the presence of a pointed lower canine in *Plesianthropus transvaalensis* Broom shows that the ancestors of Sinanthropus and hominids in general had a caniniform lower canine, with a well-pointed tip, and not an incisiform tooth (see Şenyürek, 1941 a, p. 296).

It is clear that in *Homo sapiens*, in at least some individuals, there is a tendency to have incisiform lower canines. It is also apparent that, as is shown by the lower canines of Sinanthropus, this tendency must have appeared rather early in the course of evolution of the hominids. But still it appears that this tendency had developed further in *Sinanthropus pekinensis*, who must be considered specialized in this respect, than in recent man. In short, it appears that *Sinanthropus pekinensis* had overshot the stage represented by Neanderthal man [10] and recent man in having early acquired a more incisiform lower canine than in these later forms.

[10] As is pointed out by Weidenreich, in Krapina Neanderthals the lower canine possesses a pointed tip as in recent man (see Weidenreich, 1937, p. 33 and plate VI, Fig. 58). For the Ehringsdorf and Le Moustier specimens Weidenreich (1937, p. 33) states: "*H. Virchow pointed out the appearance of the cutting edge in particular. Like most of the other authors he had expected the Ehringsdorf mandible to be equipped with a long and well-pointed canine and was very surprised that instead he found the mesial part of the edge forming a horizontal line (Fig. 57). According to the same author the canine*

The lower canines from Alaca Höyük are not larger than the average of recent Whites and quite a number of them tend to be smaller (Table 16). In the crown index the relatively well-preserved teeth from Alaca Höyük come near the average of some recent groups, but fall short of the recent Whites and Japanese. In height-length index the two teeth from the Copper Age stratum of Alaca Höyük exceed all the groups listed with the only exception of two teeth from Maşat Höyük which surpass them. A tooth from the Chalcolithic level of Alaca Höyük is surpassed in this index by the teeth from the Copper Age stratum of this site and by those from Maşat Höyük and Polatlı Höyük, but still exceeds most of the recent groups listed with the exception of the Japanese and the writer's Homo sapiens group. In the height-breadth index the teeth from Alaca Höyük and one from Polatlı Höyük exceed all the other groups listed. Again it appears that some of the teeth taken from the literature were probably worn.

In root height, one lower canine from Alaca Höyük and one from Büyük Güllücek do not differ from the average of recent Whites.

The Premolars :

The upper first premolars are preserved in eight skulls from Alaca Höyük. However, in one of these (No. Al. H. M I of Early Bonze Age) the crown is badly worn. In all the available upper first premolars from Alaca Höyük the lingual cusp is narrower, mesio-distally, than the buccal cusp, as is usually the case in recent man in general (see Tomes, 1923, p.12). The same is also true for the upper first premolars from Büyük Güllücek, Maşat Höyük and Polatlı Höyük.

Out of the six upper first premolars from Alaca Höyük where the roots could be observed, only two have a single root while four individuals possess double roots. In the latter, however, the tip of the roots are free only in the apical third of the total root height. In both skulls from Maşat Höyük the upper first premolar is equipped

of Le Moustier exhibits exactly the same structures as the Ehringsdorf child and with it proves that we are dealing in both cases not with accidental and individual variations but with a peculiarity characterizing the Neanderthal group.

The pictures and descriptions of the Neanderthal canines show very impressively that they represent intermediary forms between Sinanthropus and recent man, although they approach the latter more than the former, especially the Krapina canines."

with double roots. In one individual (Maşat No. 7) the two roots are free in the apical half of the total root height, while in the other individual (Maşat No. 3) the roots are free only in the apical third, which is also true for the skull from Polatlı Höyük. In the skull from Büyük Güllücek on the left side the two roots are fused with a notch only at the apex showing separation, while in the right upper first premolar the root is single. It is thus seen that in this small series from Alaca Höyük, Büyük Güllücek, Maşat Höyük and Polatlı Höyük there is a relatively high incidence of upper first premolars with bifurcated roots. However, among these skulls there are no cases with three roots, which occurs very rarely in recent man.

According to Campbell (1925, p. 16) one root occurs in 31%, two partly bifurcated roots in 13 % and two roots in 56 % of the Australian aborigines. The figures for the Bantu and Pecos Indians are listed in the following table which has been compiled from those of Shaw (1931) and Nelson (1938).

Number of Roots in the Upper First Premolars of Bantu and Pecos Indians

	One	Two (Partly fused)	Two	Three (Partly fused)	Three
Bantu (Shaw, 1931)	17.4 %	17.4 %	59.9 %	—	6.1 %
Pecos Indians (Nelson, 1938)	66.6 %	19.7 %	11.4 %	1.5 %	0.8 %

Pedersen (1949, p.159) makes the following statement for this condition in the Whites : "*In Europeans according to Fabian* (81, *p. 68*) *one root is present on 33.05 per cent of P1 supp. Roots bifid at apex occur in 15.95 per cent, roots bifid to a more pronounced degree in 50.64 per cent and three roots in 0.86 per cent of cases.*

Visser (*348, p. 186*) *examined 3,213 Dutch upper first bicuspids. He found 56 per cent with one root, 30 per cent with two separated roots. More or less fusion of roots occurred in 12 per cent, and three roots in approximately 3 per cent of cases.*" On the Other hand, according to Pedersen (1949, p. 159), in East Greenland Eskimos there are no cases of two separate roots, while individuals with roots bifurcated near the tip are quite rare. According to this writer, only five (5.05%) of the 99

skulls observed and 9% of the X-rayed material show bifurcated roots. Indeed, Pedersen (1949, p. 159) rightly concludes : "*Even disregarding what may have been meant by 'partially fused' or 'partly fused' roots, etc. by different students, we safely arrive at the conclusion that the East Greenland Eskimo exhibits an astonishingly high incidence of one-rooted P1 supp. In fact, this incidence seems to surpass anything so far reported for a human group.*" However, I would like to add that, as it is seen from the comparative figures listed, among the Pecos Indians the percentage of upper first premolars with one root is considerably higher than in Bantus, Australian aborigines and Whites. It appears thus that among at least some tribes of the American Indians there is a tendency to have a single root in the upper first premolar and that this tendency seems to have been carried to an extreme in the East Greenland Eskimos.

It appears from Table 17 that the upper first premolars from Alaca Höyük, as well as one specimen from Büyük Güllücek, are not only smaller than those from Maşat and Polatlı Höyüks, but are also smaller than the averages of all the recent groups listed. Therefore it appears that among the ancient inhabitants of Alaca Höyük there was a tendency to have reduced upper first premolar crowns, which is also true for a skull from Büyük Güllücek. As can be seen from Table 17, in the upper first premolars from Alaca Höyük the crown index is of moderate magnitude, being slightly higher than that of recent Whites. In the height-length and height-breadth indices the few teeth from Alaca Höyük exceed most of the recent groups listed, with the exception of the writer's mixed Homo sapiens group in the height-length index and the Japanese in height-length and height-breadth indices. It would appear that the upper first premolars from Alaca Höyük tended to be high, although they are exceeded in this by two specimens from Maşat Höyük. However, I would like to point out here that some recent groups studied by other writers showing low height indices, such as the Bushman tribe, probably contained individuals with worn teeth. In root height [11],

[11] In case of one-rooted premolars the root height has been measured on the buccal side while in case of two-rooted teeth the heights of the external and internal roots were measured respectively on the buccal and lingual sides, and then averaged, according to the method adopted by Shaw (1931) and Nelson (1938).

one upper first premolar from Alaca Höyük is slightly below and one above the average of recent Whites. One individual from Büyük Güllücek also is slightly above the average of recent Whites, although the difference is not much.

The upper second premolars are preserved in 9 skulls from Alaca Höyük. In one of these (No. Al. H. M. I) the crown is again badly worn, and only the roots could be observed. In all the upper second premolars the lingual cusp is nearer in length (mesio-distal diameter), to the buccal cusp, as is usual in recent man (see Tomes, 1923, p.13). The same is also true for the upper second premolars from Büyük Güllücek, Maşat Höyük and Polatlı Höyük.

In the ten skulls observed from Alaca Höyük [12] the root is single. The upper second premolars from Büyük Güllücek and Polatlı Höyük also have a single root. On the other hand, in the two individuals from Maşat Höyük this tooth has two roots. In one individual (No. 7) from this site the two roots are free in the apical half of the root height, while in the other individual (No. 3) the free portion of the roots occurs in the apical third. Thus we see that the incidence of double roots in the upper second premolars from various Anatolian sites is less than in the upper first premolars, as is usual in recent man in general.

Regarding the condition of the roots in recent man in general, according to Campbell (1925, p. 16) one root occurs in 82.8%, partly bifurcated roots in 7.5% and two roots in 9.7% of the Australian aborigines. The corresponding figures for the Bantu and Pecos Indians, taken from Shaw (1931) and Nelson (1938) are shown below :

Number of Roots in the Upper Second Premolars of Bantus and Pecos Indians

	One	Two (Partly fused	Two	Three (Partly fused	Three
Bantu (Shaw, 1931)	40.8%	18.4%	37.2%	—	3.6%
Pecos Indians (Nelson, 1938)	88.9%	8.8%	1.7%	0.6%	—

Pedersen (1949, p. 157) states for the condition of the roots in the Whites : "*In Europeans, according to Fabian (81, p. 68) one root is*

[12] The condition of the root of one individual has been determined from the socket, as the tooth itself is now missing.

found on 81.89 per cent of P2 supp. Roots carrying bifurcations at apices occur in 11.42 per cent, more pronounced bifurcations in 6.68 per cent. Visser (348, p. 186) examined 4,100 upper second bicuspids[1]*). He found 91.1 per cent with one root, 3.5 per cent with two separated roots. More or less fusion of roots occurred on 5.1 per cent, and three separated roots on 0.3 per cent of P2 supp. According to Visser, both Hillebrand and Taylor report much higher percentages of P2 supp. with separated roots.*" For the Eskimos Pedersen (1949, p. 157) states : "*Out of 97 P2 supp., one only had a bifid root. On the X-ray series, out of 224 P2 supp. which could be estimated with a fair degree of certainty, 4 only (1.8 per cent), had bifid roots.*" Pedersen (1949, p. 157) further states : "*Thus in the East Greenland Eskimo, one-rooted upper second premolars seem to occur in a higher proportion of cases than in most other racial groups on record. However, the enormous material of Visser shows a similar high incidence of one-rooted P2 supp. Real two-rooted upper second bicuspids (let alone three-rooted specimens) were absent in the Eskimo material studied by the present writer.*" It appears thus that one-rooted upper second premolars are most often seen in Eskimos and then to a lesser extent in American Indians, Whites and Australian aborigines. From the account given it appears that the smallest percentage of one-rooted upper second premolars are found in Bantu, to which reference shall be made later.

As can be seen from Table 18 the upper second premolars from Alaca Höyük are again smaller than the corresponding teeth from Maşat Höyük and Polatlı Höyük, and are also smaller than the averages of most recent races, with the only exception of Bushmen. One tooth from Büyük Güllücek is even smaller than those from Alaca Höyük and falls slightly below the average of Bushmen, who are well-known to have the smallest teeth among the recent races. It is seen that in the upper second premolars from Alaca Höyük and Büyük Güllücek there is a tendency for reduction in size. The crown indices of the upper second premolars from Alaca Höyük tend to be of moderate magnitude, although they appear to be higher than the average of recent Whites. In height-length index the teeth from Alaca Höyük exceed all the groups listed with the exception of two teeth from Maşat Höyük. In height-breadth index they surpass most of the groups listed, with exception of two teeth frum Maşat Höyük, Japanese and Bantu. It is again noted that in the Bushman and Bantus, measured by Drennan (1929) the height indices are very

low. It is probable that in these series as well as in some other series taken from the literature some of the teeth were worn.

In root height one tooth from Alaca Höyük is below and another one above the average of recent Whites. A tooth from Büyük Güllücek falls slightly short of the average root height of the recent Whites.

The lower first premolars are preserved in ten skulls from Alaca Höyük, in one of which (No. Al. H. M I) the crown is badly worn. The size of the lingual cusp is very variable and in most cases it is a very small rudimentary cusp. In a few of the specimens this cusp is relatively well-developed. The same variation is seen in the small series from Büyük Güllücek, Maşat Höyük and Polatlı Höyük, but in this series the better-developed lingual cusps are in the majority.

Out of eight skulls from Alaca Höyük where the roots have been observed, seven have only a single root. In the eighth specimen however (No. III, Fig. 22) there is a deep vertical fold on the mesial surface of the root coming from the buccal side and a deep vertical groove internal to it. Thus the root is separated into two by this fold and vertical groove on the mesial side, while there is no separation on the distal side. As the tip portion of this tooth had not yet formed, it is not known whether the tip was notched or not. As for the other Anatolian teeth studied, in the specimens from Büyük Güllücek, Polatlı Höyük and in one specimen from Maşat Höyük (No. 3) there is only one root. On the other hand, in the lower first premolar of Maşat No. 7 again there is the same vertical fold described above and a deep groove internal to it in the lower half of the mesial surface of the root, separating the root into two on the mesial side, while there is no separation on the distal surface. The tip of this root is notched, corresponding to the two incipient root branches (see Fig. 23). The root of the lower first premolar of Maşat No. 7 closely parallels that of Alaca No. III and the two represent the so-called "abnormal root" described by Tomes. Tomes (1923, pp. 508-509) describes this as follows : "*There is a form of abnormal root which is met with in the first lower premolar of man of sufficient frequency of occurrence to obviously have some significance. It consists in the outer border of the root towards its apex being folded forwards and inwards, so as to present an approximation to a double root at the end. The author has collected eighteen examples of this, and in two it has gone to the extent of a second small anterior root being completely formed.*

Thus there is as a comparatively common abnormality a tendency to the formation of two roots, one anterior and the other posterior, and in every single instance it is the posterior root which is fully developed, and the anterior root is tending to be formed as a smaller root, on the outside quite level with the other, but not extending inwards in the direction of its width to nearly the same extent as the posterior root. In fact, it is trying to parallel the state of things which is constant in most anthropoid apes, and is hardly explicable on any other hypothesis than that it is a reversion, for in a reduced dentition like that of a xanthocroic man it is not conceivable that there should be a tendency to the development of a second root to the first premolar as a commencement of a new order of things.,,

Among the Bantus according to Shaw, (1931, table XXVI) 63% have only one root, while 36.9% show Tomes' abnormal root. According to Nelson (1938, table 12b), among the Pecos Indians one root occurs in 89.9 % and Tomes' abnormal root in 10.1%. For the condition of the roots in Whites, Pedersen (1949, p. 165) states : "*M. De Terra (313, p. 240) reported 84 per cent of P1 inff. to have one root. Visser (Amsterdam) examined 2,369 P1 inff. (349, p. 22), 75.6 per cent of which had one conical root. 23 per cent showed marked mesio-lingual grooves, and 0.7 per cent had marked mesio-lingual as well as facial grooves. Another 0.7 per cent exhibited two separated roots. Hjelmman (128, p. 99) says of Finnish P1 inff., 'in 6 von 128 Fällen trug der erste untere Backenzahn eine unvollständig geteilte Wurzel.' Kajava (159, p. 42) gives the following account of his findings in skulls of Finnish Lapps, 'Die Alveole des ersten unteren Prämolaren war einmal durch ein Kamm unvollständig zweigeteilt; ausserdem beobachtete ich 5 mal entweder eine zweiästige Wurzel oder eine Alveole mit zwei Ausläufern. Sonst war der Zahn regelmässig einwurzelig, ohne Längsfurche*'". For the Eskimos Pedersen (1949, p. 165) states: "*Out of 74 p1 inff. in the skull material one only, showed division of the root.*" From this Pedersen (1949, P. 166) concludes : "*Hence it is borne out that the East Greenland Eskimo is less prone to have divisions of mandibular first premolar roots than are several other racial groups dealt with in dental literature.*"

From the account given it is clear that the highest frequency of Tomes' abnormal root occurs in Bantu and probably the lowest incidence in East Greenland Eskimo, as also pointed out by Pedersen (1949). Although, the series studied by me is too small to give correct percentages, still it appears probable that Tomes' abnormal root

occurred more frequently in the ancient inhabitants of Alaca Höyük and Anatolia than in recent Whites.

As can be seen from Table 19, the lower first premolars from Alaca Höyük are not only smaller than those from Büyük Güllücek, Maşat Höyük and Polatlı Höyük, but also smaller than in all the recent races listed, including the Bushman. Here again it is apparent that among the ancient inhabitants of Alaca Höyük there was a tendency to have strongly reduced premolars. In the crown index the lower first premolars from Alaca Höyük approach some recent groups, although they tend to have lower indices than the average of the recent Whites. In height-length and height-breadth indices the teeth from Alaca Höyük exceed without exception all the recent groups listed. As for the other Anatolian teeth from other sites, the teeth from Alaca Höyük are exceeded only by a tooth from Büyük Güllücek in height-length and by one from Polatlı Höyük in height-breadth index. Again some of the recent groups taken from the literature have very low height indices. It is probable that some of these series taken from the literature contained some worn lower first premolars

In root height, the two lower first premolars from Alaca Höyük are near the average of recent Whites, while a specimen from Büyük Güllücek is equal to the average of the latter group.

The lower second premolars are preserved in nine skulls from Alaca Höyük, in one of which (No. Al. H. M I) the crown is worn down to the root. In eight skulls where the roots could be observed, there is only one root. The same is also true for the lower second premolars from Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük.

In the recent racial groups, according to Shaw, (1931, table XXVI) one root occurs in 91.6% and Tomes' abnormal root in 8.4% of the Bantus. According to Nelson (1938, table 12b) 95.8% of the Pecos Indians possess only one root and 4.2% show Tomes' abnormal root. On the other hand, all the East Greenland Eskimos studied by Pedersen (1949, p. 163) have only one root. For the recent Whites Pedersen (1949, p. 163) states: "*M. De Terra (313, p. 240) observed one-rooted P2 inff. in 95 per cent of cases. Visser (Amsterdam) studied 2,089 P2 inff. (349, p. 22): One conical root was found in 97 per cent, marked mesio-lingual grooves in 0.9 per cent, mesio-lingual and facial grooves*

in 2 per cent. Two roots were present on one specimen and three roots were seen on two specimens. Hjelmman (128, p. 99) and Kajava (159, p. 42) did not find two-rooted or bifurcated P2 inff. in Finns or Lapps, respectively." In this respect the lower second premolars from Alaca Höyük are quite modern. At any rate, there seems to be very little variation in the root number of the lower second premolars of recent Whites, the usual number being one.

It appears that Bantus exceed other recent groups listed in the frequency of Tomes' abnormal root. Unfortunately Campbell (1925) does not record the number of roots in the lower premolars of the Australian aborigines, and only gives figures for the upper premolars. However, it is clear that in the frequency of multiple roots in the upper premolars Bantus exceed Australian aborigines and other recent races. Similarly, in its lower premolars Bantu shows a higher frequency of Tomes' abnormal root than in other recent races, for which we have figures. For the Bantu, Shaw (1931, p. 117) states : "*The upper first premolar teeth almost invariably exhibit two distinct and well-formed roots, while, in some cases, three roots are present, as in the anthropoids. Lower premolar teeth with folded or 'U' shaped roots are frequently met with.*" However, I would like to add to this that, as far as our present knowledge goes, in having a higher frequency of multiple roots, the upper and lower premolars of Bantu are more primitive in general than those of other races, while those of the East Greenland Eskimos seem to be the most advanced.

As can be seen from Table 20, the lower second premolars from Alaca Höyük are not only smaller, on the average, than the corresponding teeth from Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük, but are also smaller than the averages of most recent groups. The average robustness values of the Chalcolithic and Copper Age lower second premolars from Alaca Höyük are slightly smaller than the average of Bushman tribe, but those from the Copper Age slightly exceed the average of three South African Bushmen, whereas the two teeth from the Chalcolithic Age are even smaller than these. Thus again, it is observed that among the ancient inhabitants of Alaca Höyük there was a strong tendency for the reduction of the size of the crown of the premolars.

In the crown index, the lower second premolars from Alaca Höyük do not differ much from some recent groups, while in the height-

length and height-breadth indices they exceed all the recent groups listed. However, in height-length index the mixed Homo sapiens group measured by me comes near to the average of Alaca Höyük. Again it appears that some groups taken from the literature probably contained worn specimens. As for the ancient Anatolian teeth from the other sites, the teeth from Büyük Güllücek and Polatlı Höyük exceed those from Alaca Höyük in height-length index, while a tooth from Maşat Höyük has a lower index. On the other hand, in height-breadth index the teeth from Alaca Höyük exceed those from other Anatolian sites already studied.

In the height of the root, one tooth from the Chalcolithic stratum of Alaca Höyük falls far short of the average of recent Whites, but a lower second premolar from Büyük Güllücek comes near to the average of recent Whites in root height.

The average robustness values of the premolars of anthropoids which I had measured in the United States in 1938-1939 and in 1946-1947 at the Museum of Comparative Zoology and Peabody Museum of Harvard University, American Museum of Natural History in New York City and in the United States National Museum in Washington, D. C., are shown below :

	P^3	P^4	P_3	P_4
Hylobates	(16) 23.08	(16) 22.09	(17) 27.36	(15) 20.14
Pongo	(14) 119.82	(14) 113.29	(14) 122.40	(15) 108.73
Pan	(15) 80.23	(15) 70.16	(13) 83.01	(13) 61.58
Gorilla	(14) 198.63	(14) 177.46	(14) 208.25	(14) 156.02

From the figures given it is seen that among the living anthropoids the succession of the size of the premolars from the largest to the smallest is as follows : $P_3>P^3>P^4>P_4$. That is, in the living anthropoids the lower first premolar is the largest and the lower second premolar is the smallest tooth in the premolar series. This is no doubt the primitive condition for the hominids. When the average robustness values of the premolars of recent hominids listed in Tables 17-20 are studied, it is seen that with few exceptions the prevailing combination in the size succession of premolars is as follows : $P^3>P^4>P_4>P_3$. That is, in most of the recent races listed the upper first premolar has come to be the largest and the lower first premolar the smallest tooth of the premolar series. This means

that in the course of evolution of the hominids, the lower first premolar has been reduced much more than the other premolars and has thus come to be the smallest tooth in the premolar series. The combination $P^3>P^4>P_4>P_3$ occurs in the following series of recent man: Australian aborigines, Pecos Indians, Eskimos, Bantus, Kaffirs, Bushmen, recent Whites and the writer's mixed Homo sapiens group.

Exceptions to this rule are observed in the Japanese and one Efé pygmy on the one hand and some ancient Anatolians on the other; the two groups, however, showing different tendencies. In the Japanese and one Efé pygmy the succession is as follows : $P^3>P^4>P_3>P_4$. In these, the lower first premolar, although reduced, is still larger than the lower second premolar. That is, in this respect the Japanese and one Efé pygmy appear to be more primitive than other human races listed. On the other hand, among all the ancient Anatolians studied the lower first premolar is the smallest tooth in the premolar series and in this respect these ancient Anatolians agree with the norm of recent man. However differences are observed in the succession of other premolars, which will be discussed presently.

The averages of Anatolian premolars given in Tables 17-20 do not in all cases belong to the same individuals, as in some skulls one or more premolars were missing and thus could not be measured. The first and second upper and lower premolars are preserved in 7 individuals from Alaca Höyük, one individual from Maşat Höyük, one from Büyük Güllücek and in one from Polatlı Höyük. When the size of the premolars of these ten individuals are considered, the following combinations are found :

Combinations	Frequency
Type I = $P^3>P^4>P_4>P_3$	3
Type II = $P^4>P^3>P_4>P_3$	2
Type III = $P^3>P_4>P^4>P_3$	2
Type IV = $P^4>P_4>P^3>P_3$	1
Type V = $P_4>P^3>P^4>P_3$	1
Type VI = $P_4>P^4>P^3>P_3$	1

Of these, only Type I corresponds to the norm in recent man in general. The other types observed differ from this norm and there is a tendency for the lower second premolar to be the largest tooth in the premolar series. These divergent combinations in the ancient Anatolians studied represent an advanced stage in the evolution of human premolars.

The Upper Molars :

The upper first molars are preserved in eleven skulls from Alaca Höyük, in two of which the crown is badly worn. In all these teeth the shape of the crown, in occlusal view, is rhomboidal with paracone projecting more in the buccal direction than the metacone. All the upper first molars from Alaca Höyük possess four well-formed cusps. The hypocone is usually a well-developed, large cusp. The crista obliqua and the oblique groove separating the hypocone from the protocone are usually well-formed. In all these features the teeth from Büyük Güllücek, Maşat Höyük and Polatlı Höyük do not differ from those from Alaca Höyük.

In three specimens from Alaca Höyük the chewing surface of the crown is sparsely but coarsely wrinkled. As the teeth from other Anatolian sites studied are slightly worn, it could not be determined whether they had any wrinkling.

Out of the nine specimens from Alaca Höyük observed, in four there is no Carabelli pit or Carabelli cusp. One specimen shows only a Carabelli pit and four specimens possess a Carabelli cusp. In three of these the Carabelli cusp is well-formed, while in one it is an incipient cusp in the form of a scale. As for the other Anatolian teeth, in the specimens from Büyük Güllücek, Polatlı Höyük and in one specimen from Maşat Höyük (No. 3) there is no Carabelli pit or Carabelli cusp. In the other specimen from Maşat Höyük (No. 7) there is only a fissure on the lingual surface of the protocone.

The shape of the enamel margin was observed on both the buccal and lingual surfaces of the upper molars. The types of Pedersen and Thyssen (1942) observed on the right and left upper first molars are listed below :

	Buccal Side						Lingual Side					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Alaca Höyük (Chalcolithic-Copper Age)	1	9	1	6	—	—	1	3	13	—	—	—
Other Anatolian sites (Büyük Güllücek, Maşat Höyük and Polatlı Höyük)	—	3	2	2	—	—	3	1	3	—	—	—

The upper first molars from Alaca Höyük, Büyük Güllücek, Maşat Höyük and Polatlı Höyük all have three separate roots.

An interesting feature is seen in the mesial part of the chewing surface of the crown of the upper first molar of Alaca No. 15 (see Fig. 24). As can be seen from an examination of this photograph of this tooth, three slight wrinkles starting from the mesial margin converge toward the middle of the crown, thus forming a triangular area. The feature under consideration is more pronounced on the left than on the right upper first molar (see Figs. 24 and 25). The same feature is clearly seen also in the upper first molar of a Copper Age child from Ahlatlıbel (Ahlatlıbel, No. 15, Fig. 2). In this tooth, two conspicuous wrinkles form a triangular area in the mesial part of the chewing surface. A trace of such a triangular area is also perceptible in the upper first molar of Alaca No. VIII (see Fig. 26). This triangular area observed in some of these ancient Anatolians recalls a characteristic feature of Sinanthropus upper molars which was described by Weidenreich (1937, p. 62) as follows : "*Real longitudinal furrows are lacking. Instead of the latter there is a V-shaped groove in the mesial moiety demarkating a triangular field the base of which is formed by the mesial edge crowning the mesial wall, with its apex coming near to the center of the transversal furrow where the paracone and the protocone meet.*"

The feature observed in some of these ancient Anatolians appears to be a remnant of the characteristic feature of *Sinanthropus pekinensis*, from which they only differ in that the wrinkles forming this triangular area are fewer than in the Peking Man [13]. It thus appears that a characteristic feature of *Sinanthropus pekinensis* had survived in a slightly modified degree in some ancient Anatolians.

[13] See Weidenreich, 1937, plate XIV, Figs. 113 and 114.

The upper first molars from Alaca Höyük are slightly smaller than the average of recent Whites (Table 21). In crown index the upper first molars from Alaca Höyük do not differ much from the average of recent Whites and some other recent groups. In height-length index the Alaca Höyük teeth exceed all the other groups listed. In height-breadth index, also, they exceed most of the recent groups. In this index, only a tooth from Polatlı Höyük and Japanese exceed the average of two teeth from the Copper Age stratum of Alaca Höyük but fall short of a tooth from the Chalcolithic period of this site.

In root height, which is the average of the two buccal roots and of the lingual root, measured respectively on the buccal and lingual sides according to the method adopted by Shaw (1931) and Nelson (1938), one specimen from Alaca Höyük is almost identical with the average of recent Whites, while a tooth from Büyük Güllücek also comes near to it.

The upper second molars are preserved in ten skulls from Alaca Höyük, in one of which (No. Al. H. M I) the crown is badly worn. The shape of the crown comes near to the rhomboidal form in only three of these teeth with the paracone projecting slightly in the buccal direction, while in the remainder it makes a distinct approach toward a triangular form.

Out of the ten skulls, in only three the upper second molar has four cusps on both sides, while in two it has four cusps on one side and three cusps on the other side. The remainder of the upper second molars have only three cusps. In these the hypocone has completely disappeared. Even in the upper second molars with four cusps the hypocone is usually reduced and is much smaller than that of the upper first molars.

As for the other Anatolian teeth, in the skull from Büyük Güllücek the shape of the crown approaches a triangular form. In the upper second molar of this individual the hypocone is much reduced and is fused with the protocone, being however still more distinct on the left than on the right side (see Şenyürek, 1950 b, p. 298). In one of the specimens from Maşat Höyük (No. 3), the upper second molar approaches the rhomoboidal shape with four cusps, but the hypocone is relatively reduced and is smaller than that of the upper first molar. In the other specimen from Maşat Höyük (No.

7), the crown approaches a triangular shape and has only three main cusps. The hypocone of this specimen has atrophied, the process of disappearance of this cusp being more advanced on the left than on the right side (Şenyürek, 1946, p. 249). On the other hand, an upper second molar from Polatlı Höyük still has four cusps, but the hypocone is again relatively reduced being smaller than the corresponding cusp of the upper first molar. [14]

Probably, in correlation with the reduction of the hypocone, in most of the upper second molars from Alaca Höyük the crista obliqua is reduced in size and in two individuals, on one side only, it is altogether lost. In only a few specimens from Alaca Höyük is crista obliqua moderately developed. The crista obliqua is moderately developed in one individual from Maşat Höyük (No. 3) and in one from Polatlı Höyük (No. 2), but is reduced again in the upper second molars from Büyük Güllücek and in the other specimen from Maşat Höyük (No. 7). Thus it appears that in the morphology of the crown, the upper second molars from Alaca Höyük and those from other Anatolian sites already studied are quite advanced.

In two specimens from Alaca Höyük the chewing surface of the crown of upper second molars are sparsely but coarsely wrinkled. In one specimen the distal margin of the crown is distinctly crenulated. As for the other Anatolian teeth : as one from Büyük Güllücek is slightly worn, it cannot be determined whether it had any wrinkling or not. An upper second molar from Maşat Höyük (No. 3) and one from Polatlı Höyük are devoid of wrinkles, but in the other specimen from Maşat Höyük (No. 7), the surface is sparsely wrinkled.

Out of the nine skulls from Alaca Höyük, in only one the upper second molars had a Carabelli pit (see Fig. 6), while in another (No. Al. F. I), to which reference will be made below, there was a Carabelli cusp on the left side and a crescent-shaped ridge on the right side. There is no Carabelli pit or Carabelli cusp in any one of the upper second molars from Büyük Güllücek, Maşat Höyük and Polatlı Höyük.

[14] As for the other published ancient Anatolian crania, Krogman (1937, p. 215) describes the teeth of skull No. eX16 from the Chalcolithic period of Alişar Höyük as follows: "*The teeth are small, little worn, and the upper second permanent molar is tricuspid (two buccal and one lingual)*".

Pedersen and Thyssen's (1942) types of enamel margin for both the right and left upper molars are shown below :

	Buccal Side						Lingual Side					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Alaca Höyük (Chalcolithic, Copper Age and Early Bronze Age)	—	3	2	8	2	—	—	5	9	—	—	—
Other Anatolian Sites (Büyük Güllücek, Maşat Höyük and Polatlı Höyük)	—	4	1	2	—	—	—	5	1	1	—	—

In one individual from Alaca Höyük (No. Al.F. 1) conspicuous differences were observed between the upper right and left second molars, which I had described (Şenyürek, 1951 b, p. 50) in a previous paper as follows : "*In the left second upper molar a vertical fissure divides the protocone into two. Thus the tip of the protocone is bifurcated. On the other hand, on the right side the protocone is single and normal. The left second upper molar possesses a well-formed Carabelli cusp. On the other hand, there is no Carabelli cusp in the right second upper molar. On the lingual side of the protocone of this tooth there exists a crescent-shaped fold. It is probable that this fold, or ridge, is a remnant of the cingulum. In the left second upper molar there is an oblique ridge (crista obliqua) between the protocone and metacone. On the right side this oblique ridge has atrophied.*"

Out of the seven skulls from Alaca Höyük where observations were made, in 5 specimens there are three separate roots. In one specimen the three roots are fused. In another one there are three separate roots on the right side, while on the left side the two buccal roots have fused. In all of the upper second molars from Büyük Güllücek, Maşat Höyük and Polatlı Höyük there are three separate roots.

The upper second molars from Alaca Höyük are of moderate size, although they are somewhat larger than the average of recent Whites (Table 22). In the crown index they do not differ from some recent groups, but appear to have lower indices than the average of recent Whites. In the height-length index the upper second molars from Alaca Höyük, Büyük Güllücek, Maşat Höyük and Polatlı Höyük exceed all the recent groups listed, with the only exception of

the writer's Homo sapiens group which is only second to a tooth from Polatlı Höyük, which has a very high index. In the height-breadth index the average of five teeth from the Copper Age of Alaca Höyük exceed all the other groups listed, including the other Anatolian teeth. On the other hand, the two teeth from the Chalcolithic stratum of this site have lower indices than those from the Copper Age of Alaca Höyük, the other Anatolian teeth, Japanese, Pecos Indians and the writer's Homo sapiens group, but exceed the other recent groups listed.

In root height, one tooth from the Chalcolithic period of Alaca Höyük comes quite near to the average of recent Whites, while a tooth from Büyük Güllücek has a lower height.

The upper third molars are preserved in four skulls from Alaca Höyük. In three of these the crown possesses a triangular shape with only three cusps, while in the fourth skull the crown approaches a triangular form with four cusps (see Fig. 8). However, as can be seen from this photograph of this specimen the hypocone is a much reduced, tiny cusp, being, especially on the left side, in the form of a scale on the disto-lingual corner of the crown. As for the other Anatolian teeth : in a specimen from Büyük Güllücek and in an unerupted germ from Maşat Höyük (No. 3) the crown exhibits a triangular form, with only three cusps, the hypocone having disappeared. In the germ of an upper third molar from Polatlı Höyük (No. 2), on the other hand, there are four cusps, but the hypocone is reduced, being much smaller than that of the upper second molar.

In two of the upper third molars from Alaca Höyük the metacone is strongly reduced giving the tooth an almost bicuspid appearance. The same is also true for the tooth from Büyük Güllücek [15].

Probably in correlation with the disappearance of the hypocone, in the upper third molars from Alaca Höyük the crista obliqua is lost, the same also being true for the wisdom teeth from Büyük Güllücek and Maşat Höyük (No. 3). However, the crista obliqua is preserved in a tooth from Polatlı Höyük which also has four cusps.

Thus, it appears that in the morphology of the crown the upper

[15] In this connection it may also be noted that Krogman (1937, p. 216) describes the upper third molar of skull dX 38 from the Hittite stratum of Alişar Höyük as follows : "*the upper third permanent molars are almost bicuspid.*"

third molars from Alaca Höyük and most of those from other Anatolian sites already studied are quite advanced.

In the three unworn upper third molars from Alaca Höyük the crown is sparsely wrinkled. The same is also true for a tooth from Maşat Höyük (No. 3) and one from Polatlı (No. 2). There is no Carabelli pit or Carabelli cusp in any one of the upper third molars from Alaca Höyük, Büyük Güllücek, Maşat Höyük and Polatlı Höyük.

Pedersen and Thyssen's (1942) types of enamel margin of right and left upper third molars are listed in the following table :

	Buccal Side						Lingual Side					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Alaca Höyük (Chalcolithic Copper Age)	—	2	4	—	—	—	—	2	2	2	—	—
Other Anatolian Sites (Büyük Güllücek, Maşat Höyük and Polatlı Höyük)	—	3	—	—	—	—	—	2	3	—	—	—

The roots were observed in three skulls from Alaca Höyük [16]. One of these possesses three separate roots, while the other two have only two roots. In the skull from Büyük Güllücek, the right upper third molar has only one root, while the left upper wisdom tooth has two roots. In this specimen the disto-buccal root has fused with the lingual root.

The upper third molars from Alaca Höyük are larger than the average of recent Whites. They exceed in size the wisdom teeth from Büyük Güllücek and Maşat Höyük, but are smaller than that from Polatlı Höyük. Thus, the upper third molars from Alaca Höyük are more primitive than that of the recent Whites in size, although they are quite advanced in cusp number and are smaller than the upper second molars. In crown index the two teeth from the Copper Age stratum of Alaca Höyük agree with the average of recent Whites, while the average of two teeth from the Chalcolithic level of this

[16] In one instance the condition of the roots was determined from the socket, as the tooth is missing.

site exceed in this respect not only all the other Anatolian teeth but also the averages of most of the recent groups listed, with the only exception of one Efé pygmy which has a very high index.

In height-length index the upper third molars from Alaca Höyük exceed that from Maşat Höyük, but are surpassed by those from Büyük Güllücek and Polatlı Höyük. In this index the teeth from Alaca Höyük exceed the averages of most of the recent groups listed, with the exception of one Efé pygmy and the writer's Homo sapiens group. In height-breadth index, the upper third molars from Alaca Höyük do not differ much from the averages of some recent groups, but are distinctly surpassed by the teeth from Büyük Güllücek, Polatlı Höyük, Japanese and the writer's Homo sapiens group.

In root height, one tooth from Alaca Höyük exceeds the average of recent Whites, while one from Büyük Güllücek comes near to the latter.

In the fossil anthropoids and in Plesianthropus and Paranthropus, the upper second molar is the longest as well as the largest tooth in the upper molar series, which is no doubt the primitive condition for the hominids (see Şenyürek, 1941 a, p. 207). From an examination of Tables 21-23, it will be seen that in the upper molars from Alaca Höyük both the length and robustness value decrease from the first toward the third molar, which is an advanced condition seen in most of the recent groups of man (see Tables 21-23). Among the skulls from Alaca Höyük in only one individual (No. Al. F. 1), in whom the wisdom teeth had not yet erupted, the upper second molar is larger but still shorter than the upper first molar. Discounting the skull from Büyük Güllücek, in which the the upper first molar is worn, in only one case (Polatlı No. 2) among the other Anatolian skulls is the upper second molar larger, but still shorter, than the first molar. Therefore, we see that traces of the primitive condition are retained in only two skulls from these Anatolian sites, all the others showing the advanced stage characteristic of most of the recent races. In the upper molars from Alaca Höyük and other Anatolian sites, already studied, the same progression from before backwards is seen also in the number of cusps and the size of hypocone, which decrease from the first toward the third molar, the upper first molar being, as had been correctly stated by Sir Arthur Keith (1913), the

most primitive tooth in the upper molar series of recent man. The same, as stated by Sir Arthur Keith (1913), is also true for the lower first molar.

The Lower Molars :

The lower first molars are preserved in 12 skulls from Alaca Höyük. In one of these however the crown is badly worn down to the neck. Out of the eleven individuals, ten possess five cusps in the lower first molar. In these the mesoconid (hypoconulid) is a well-developed cusp. In one individual this tooth has four cusps, the mesoconid having disappeared. As for the other Anatolian teeth, there are five cusps with a well-developed mesoconid, in the lower first molars from Büyük Güllücek, Maşat Höyük, Polatlı Höyük and in a post-Hitite period skull from Karahöyük [17]. In one individual from Alaca Höyük, the first lower molar possesses a seventh cusp which is located between the metaconid and entoconid.

The first lower molars of the majority of the skulls from Alaca Höyük and other Anatolian sites studied in this report show a modified form of Dryopithecus pattern [18], described by Gregory (1916 and 1920-1921). The first lower molars of three individuals show Milo Hellman's (1928) plus pattern, while in a fourth skull the pattern deviates from this type.[19] In this fourth skull (Alaca Höyük No. 15), on both the right and left first lower molar, there is a small contact surface between the protoconid and entoconid, separating the hypoconid from the metaconid. In a former

[17] In this tooth studied before (Şenyürek, 1949 a, p. 17) the distal part of the crown is worn. The tooth looks like 4-cusped, but a closer study has convinced me that it probably had a small hypoconulid in addition to the four main cusps.

[18] The first lower molars of Maşat No. 7, Karahöyük No. 2 and Alaca Höyük No. VIII described before (Şenyürek, 1946, p. 249; 1949 a, p. 17; 1950 a, p. 72) as showing plus-pattern, have been reclassified as Dryopithecus pattern as in all of them a slight contact exists between the hypoconid and metaconid (see Fig. 3).

[19] As for the other published Anatolian crania, Krogman (1937, p. 216) describes the lower molars of skull No. eX 3 from the Copper Age of Alişar Höyük as follows: "*The teeth are small, all erupted, and show second-degree wear; they illustrate very well the essentially human plus-shape pattern.*" In his later study on the crania of various periods from Chatal Höyük and Tell Al-Judaidah Krogman (1949, p. 428) says : "*The crown pattern of the teeth is typically human; it is a five-cusped modified Dryopithecus pattern on lower Ml and a four-cusped (plus-shaped) pattern for the other molars.*"

study, I had observed this plan in the second and third lower molars of another skull from Alaca Höyük (see Şenyürek, 1951b, p. 47).

This plan, involving contact between protoconid and entoconid, has already been noted by the late Franz Weidenreich in one Sinanthropus specimen and in the third lower molar of Heidelberg man (see Weidenreich, 1937, pp. 93-96). Weidenreich (1937, p. 93) describes this as follows: "*The pattern formed by these cusps is neither a Dryopithecus pattern nor a plus pattern because of the extensive contact between protoconid and entoconid*". I propose to call this deviant plan, which is different from Milo Hellman's (1928) plus pattern, protoconid-entoconid connection.

In three individuals from Alaca Höyük with unworn lower first molars the chewing surface of the crown is sparsely but coarsely wrinkled (see Fig. 27). As the teeth from the other Anatolian sites are slightly worn, it cannot be determined whether they had any wrinkling or not.

Pedersen and Thyssen's (1942) types of enamel margin in the lower first molars of right and left sides from Alaca Höyük and other Anatolian sites are listed below :

	Buccal Side						Lingual Side					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Alaca Höyük (Chalcolithic-Copper Age)	—	9	1	4	—	—	—	5	5	4	—	—
Other Anatolian sites (Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük)	—	7	2	2	—	—	—	2	7	2	—	—

In all the lower first molars from Alaca Höyük, Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük there are two separate roots.

In size lower first molars from Alaca Höyük are not only smaller than those of most of the other Anatolians already studied, but are also smaller than the average of recent Whites, ancient Egyptians and ancient Icelanders (Table 25). In crown index, the lower first molars from Alaca Höyük do not differ much from the

averages of some recent groups, although they have a slightly higher index than the average of recent Whites. But in this index they are exeeded by the ancient Egyptians and ancient Icelanders (Table 25).

In the lower molars from Alaca Höyük the talonid breadths are slightly narrower than the trigonid breadths, giving a trigonid-talonid index [20] just below 100 (Table 26). In height-length and height-breadth indices, the available teeth from Alaca Höyük exceed those from other Anatolians sites already studied as well as the writer's Homo sapiens group (Table 27). In root height, which is the average of two roots measured on the lingual side according to the method of Shaw (1931) and Nelson (1938), the two available teeth exceed the averages of all the recent groups listed in Table 28.

The lower second molars are preserved in nine skulls from Alaca Höyük. Among these only one individual possesses five cusps, with a relatively well-developed mesoconid (hypoconulid). In one individual there are five cusps on the left side, with a reduced mesoconid, and four cusps on the right side. In the remaining seven individuals the lower second molars have only four cusps. In these the mesoconid has fully disappeared. As for the other ancient Anatolians studied, the skulls from Büyük Güllücek, Maşat Höyük, Karahöyük and one from Polatlı Höyük (No. 2) have only four cusps. In another skull from the Hittite stratum of Polatlı Höyük (No. 4) the surface of the crown is worn, but this individual also may have had four cusps (Şenyürek, 1951 c, p. 68). Thus, in cusp number the lower second molars from Alaca Höyük and other Anatolian sites already studied appear to be quite modern.

The majority of the second lower molars from Alaca Höyük, Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük show Milo Hellman's (1928) plus pattern. In only one individual (right second lower molar of Alaca Höyük skull No. Al. H. M. I) Dryopithecus pattern with four cusps is present. In another individual (Alaca Höyük skull No. Al. H. M. II) the left second lower molar shows Milo Hellman's (1928) plus pattern, while the right second lower molar exhibits protoconid-entoconid connection (Şenyürek, 1951b, p. 47).

[20] This index was first used by the late Davidson Black, 1927.

In four individuals from Alaca Höyük with unworn or slightly worn lower second molars, the surface of the crown is slightly wrinkled, which is also true for one individual from Maşat Höyük (No. 7) and one from Polatlı Höyük (No. 2).

Pedersen and Thyssen's (1942) types of enamel margin in the right and left lower second molars from Alaca Höyük and other Anatolian sites studied are shown in the following table :

	Buccal Side						Lingual Side					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Alaca Höyük (Chalcolithic, Copper Age and Early Bronze Age)	—	2	—	9	—	—	—	—	9	2	—	—
Other Anatolia Sites (Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük)	—	3	4	5	—	—	—	2	9	2	—	—

All the lower second molars from Alaca Höyük and those from the other Anatolian sites studied have two separate roots.

The lower second molars from Alaca Höyük are not only smaller than most of the corresponding teeth from the other Anatolian sites examined, but they are also smaller than the average of recent Whites. However, in size they do not differ much from the average of ancient Egyptians and ancient Icelanders (Table 25). In crown index, the lower second molars from Alaca Höyük have lower indices than the averages of most of the recent groups listed. The crown indices of the lower second molars from Alaca Höyük tend to be lower than those of Büyük Güllücek, Maşat Höyük, Karahöyük and one from Polatlı Höyük, but a Copper Age specimen from the latter site has even a smaller index. Thus it appears that the lower second molars from Alaca Höyük tend to be relatively narrow.

In the lower second molars from Alaca Höyük, the trigonid and talonid breadths are quite near each other, although in most cases the talonid breadth is slightly smaller (Table 26). In height-length and height-breadth indices the lower second molars from Alaca Höyük exceed those from Maşat and Polatlı Höyüks and the writer's Homo sapiens group (Table 27).

In root height, one specimen from Alaca Höyük exceeds the averages of most of the recent groups listed, with the only exception of Auralian aborigines (Table 28).

The lower third molars are preserved in eight skulls from Alaca Höyük, in two of which this tooth had not yet erupted. In one individual the lower third molar possesses six cusps, the sixth cusp being as large as the mesoconid. Two individuals possess five and three individuals possess four cusps. One individual exhibits 5 cusps on the left and 4 cusps on the right side. In one individual, on both the right and left side, this tooth has only three cusps left. As for the other Anatolian skulls, one from Büyük Güllücek and one from Maşat Höyük (No. 7) possess five cusps, while one from Maşat Höyük (No. 3) and one from Polatlı Höyük exhibit only four cusps.

The third lower molars of three skulls from Alaca Höyük exhibit Milo Hellman's (1928) plus pattern, one possesses Dryopithecus pattern, while three show protoconid-entoconid connection. The skulls from Maşat Höyük and Büyük Güllücek exhibit plus pattern.

In four unworn or slightly worn lower third molars from Alaca Höyük the surface of the crown is slightly wrinkled, the same also being true for the third lower molars from Büyük Güllücek and Maşat Höyük. On the other hand, as the tooth from Polatlı Höyük is somewhat worn, it cannot be determined whether it had any wrinkling.

Pedersen and Thyssen's (1942) types of enamel margin in the right and left third lower molars from Alaca Höyük and other Anatolian sites studied are listed below :

	Buccal Side						Lingual Side					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Alaca Höyük (Chalcolithic, Copper Age and Early Bronze Age)	—	2	3	2	—	—	—	—	5	2	—	—
Other Anatolian Sites (Büyük Güllücek, Maşat Höyük, Polatlı Höyük and Karahöyük)	—	3	2	—	—	—	—	1	6	—	—	—

In one third lower molar from Alaca Höyük (see Fig. 13), on the buccal surface of protoconid there is a triangular depression bordered by a ridge or swelling, which is no doubt a remnant of the cingulum seen in Sinanthropus [21].

In four individuals from Alaca Höyük, the lower third molar has two separate roots. In four individuals [22] the two roots are fused. In the teeth from Büyük Güllücek and Karahöyük there are two separate roots, while in the skull from Polatlı Höyük (No. 4) on the left side there are two separate roots, which are fused on the right side.

One lower third molar from the Chalcolithic stratum of Alaca Höyük is very large, exceeding the average robustness values of all the recent groups listed, with the only exception of the Australian aborigines (Table 25). On the other hand, the third lower molars from the Copper Age and Early Bronze Age stratum of this site are smaller than the averages of recent Whites, ancient Egyptians and ancient Icelanders. The third lower molars from Maşat Höyük are larger than those from the Copper Age and Early Bronze Age strata of Alaca Höyük, while those from Büyük Güllücek and Polatlı Höyük are even smaller. In crown index the lower third molars from Alaca Höyük do not differ much from some White groups, recent and ancient (Table 25).

In the two teeth from the Chalcolithic and Early Bronze Age strata of Alaca Höyük the talonid breadth is narrower than the trigonid breadth, while in the teeth from the Copper Age of this site the two breadths are nearly equal, the talonid breadth being only slightly broader than the trigonid breadth (Table 26). In height-length index the available Copper Age teeth from Alaca Höyük exceed those from Maşat Höyük but are surpassed by that from Büyük Güllücek and by the writer's Homo sapiens group. In height-breadth index the teeth from Alaca Höyük exceed those from Maşat Höyük and only very slightly the writer's Homo sapiens group, and are again surpassed by the corresponding tooth from Büyük Güllücek (Table 27). In root height, the lower third molars from Alaca Höyük conspicuously exceed the average of recent Whites.

[21] For the cingulum in Sinanthropus see Weidenreich, 1937, p. 77 and plate XVII, fig. 140.

[22] In one case the condition of the roots is inferred from the socket as the tooth is missing.

As for the relation of the three lower molars, it will be seen from an examination of Tables 24 and 25 that in most of the teeth from Alaca Höyük and from the other Anatolian sites studied both the length and robustness value decrease from the first toward the third lower molar, as in the advanced forms of recent man. In this small series of ancient Anatolians there are only three exceptions to this rule. In one specimen from the Chalcolithic period of Alaca Höyük (No. Al.J.M I), in whom the first lower molar had been lost before death, the third lower molar is both longer and larger than the second lower molar. The second specimen is from Karahöyük, in whom the second lower molar exceeds the first in length and size. The third specimen is from the Hittite stratum of Polatlı Höyük, in which on the right side the lower second molar is slightly longer but smaller than the first molar, while on the left side the first molar exceeds the second in length and size (Şenyürek, 1951 c, p. 68). Thus, while most of these ancient Anatolians show the advanced stage in relation of length and size of the three lower molars, a few still retain traces of the primitive condition.

In a former study, I pointed out that in the anthropoid apes the trigonid-talonid index of the lower third molar is usually considerably lower than that of the lower second molar, while in man the indices of the two teeth are near each other on the average and that in some instances the third lower molar may even exceed the second in this index (see Şenyürek, 1941 a, p. 298). The average trigonid-talonid indices of some anthropoids I measured in 1938-1939 and in 1946-1947, in the United States, are shown below, together with the averages of the Anatolian skulls from Alaca Höyük and other Anatolian sites, in whom both the second and third lower molars were present :

	Second Lower Molar	Third Lower Molar
Hylobates	(18) 100.84	(14) 95.19
Pongo	(15) 97.63	(9) 92.60
Pan	(20) 98.62	(12) 94.98
Gorilla	(16) 96.71	(14) 91.27
Total Anatolian (Alaca Höyük, Büyük Güllücek, Maşat Höyük, and Polatlı Höyük)	(9) 98.99	(9) 98.80

From this table it will be seen that in the total Anatolian group the average trigonid-talonid index of the third lower molar is quite near that of the second lower molar, as is usually the case in other groups of Homo sapiens (for these see Table 26) and unlike that of the apes. In this small series of ancient Anatolians, there are only three cases (Alaca Höyük No. Al. H. M. I of Early Bronze Age, Maşat Höyük No. 7 and Polatlı Höyük No. 4) in which the trigonid-talonid index of the lower third molar is lower than that of the second molar. Out of the remaining six skulls : in five the trigonid-talonid index of the third lower molar exceeds that of the second, while in one the indices of the two teeth are equal. Thus, while in this small series of ancient Anatolians most of the skulls show the advanced stage, a few still retain a trace of the primitive condition.

The Pulp Cavities :

As the occurrence of taurodontism in the ancient Anatolians has already been discussed (Şenyürek, 1949 b), I will only briefly refer to this subject here. The skiagrams of the lower teeth, both deciduous and permanent molars, from Alaca Höyük and other Anatolian sites considered in this report are shown in Figs. 30-48. From these skiagrams it will be seen that the size of the pulp cavities is considerably variable. In the first lower molars of Alaca Höyük Nos. II and Al. F. I, in that of Maşat No. 3 and in the second lower molars of Alaca Höyük Nos. II, Al. H. M. II, especially on the left side, and in the second lower molar of Polatlı No. 2 the pulp cavities are roomier than those of the other corresponding teeth shown. Again in Alaca Höyük Nos. Al. H. M. II and 5 and in the skull from Büyük Güllücek the pulp chambers of the third lower molars are larger than those of the other specimens. While most of the teeth from Alaca Höyük and from other sites studied in this report are cynodont, a few show a moderate degree of taurodontism.

The Bite :

Out of the eight skulls from Alaca Höyük, in seven the bite is of the over-bite type. This is also true for the skulls from Büyük Güllücek, Maşat Höyük and Polatlı Höyük [23]. In only one skull from

[23] As for the other published Anatolian crania, Krogman (1937, p. 215) describes the teeth of skull No. cX18 from the Chalcolithic period of Alişar Höyük

Alaca Höyük (No. Al.H.M I) there is edge-to-edge bite, which is probably a result of the heavy wear on the teeth of this individual.

Çrowding and Malplaced Teeth :

In one skull from Alaca Höyük the lower incisors are slightly crowded. In the skull from Büyük Güllücek slight crowding also is seen in the lower front teeth. In the mandible of a skull from Alaca Höyük the lower second premolar has rotated about its axis (Şenyürek, 1951 a, p. 257). In the mandible of the skull from Büyük Güllücek the right canine has rotated about its axis, while the corresponding tooth on the left side is normal (Şenyürek, 1950b, p. 299). It is seen thus that slight cases of crowding and some malplaced teeth are present in some of the skulls from Alaca Höyük and other Anatolian sites studied [24].

The Attrition :

As I stated in a previous study (Şenyürek, 1949 c, p. 238), dealing with the attrition of molars in relation to age in the ancient inhabitants of Anatolia, the classification of attrition used is adapted from that of Broca (1875 - 1879), which is also employed by other writers, viz., Campbell (1925), Drennan (1929), Shaw (1931), and Nelson (1938). In this previous study I described (Şenyürek, 1949 c, p. 238) the stages of attrition as follows :

"*I- No attrition. The cusps are sharp.*
II- Only the enamel is abraded and no dentine is exposed.
III- The cusps have been worn down to the extent of exposing some islands of dentine.

as follows : "*The dentition is completely adult and shows second-degree wear; the bite is edge-to-edge.*" In his study of Chatal Höyük and Tell Al-Judaidah crania, Krogman (1949, p. 428) states : "*The bite tends to incisor edge-to-edge in the Alpine, over-bite in the Eurafrican, and probably edge-to-edge in the Mediterranean.*" In his study of Troy skeletons, Angel (1951) lists the type of bite in crania from Troy I period to late Roman times in his table VI. Out of the 18 ancient Anatolian crania Angel (1951) lists 16 as showing over-bite and only two as exhibiting edge-to-edge bite. (The skull from Antiparos listed by Angel is not included in these figures).

[24] As for the other published Anatolian crania, in his study of the Chatal Höyük and Tell Al-Judaidah crania Krogman (1949, p. 428) says : "*Several anterior teeth (canines and incisors) were rotated on their axes, but no severe malocclusion was observed.*"

IV- The height of the crown is further reduced and the dentine is completely exposed.

V- The wear has extended to the neck, the crown being entirely worn off.„

A glance at Tables 29 and 30 will show that most of the upper and lower first molars from Alaca Höyük and from the other sites considered in this report exhibit degree III and only a few degrees IV or V. Most of the upper and lower second molars show degrees II and III, and only one (an upper second molar) possesses degree IV. The upper and lower third molars exhibit only degrees II and III. Thus, it is seen that most of the molars from Alaca Höyük and other Anatolian sites considered in this paper, are, with only a few exceptions, only slightly or moderately worn.

Pathology :

Out of the ten individuals above 13 years of age from Alaca Höyük, four show one or more carious teeth. One skull has one and another several abcesses at the roots of the teeth. In the latter case, a mandible devoid of the teeth (No. grave 1), several teeth had been lost before death. Out of the ten skulls from Alaca Höyük, four also show signs of pyorrhea alveolaris.

As for the other Anatolian skulls studied in this report, there are no caries in Maşat Nos. 3 and 7, Polatlı No. 2 and in the teeth of the skull from Büyük Güllücek. On the other hand, in another mandible from Maşat Höyük (No. 4) there are caries in some teeth (Şenyürek, 1946, p. 246). In a mandible from Karahöyük, with the exception of the right last premolar and the right three molars, all the teeth were lost before death, and a large part of the crown of the third molar has been destroyed by an extensive carie. The first and second lower molars of this individual show deep erosions at the neck region on the buccal side (Şenyürek, 1949 a, p. 17).

In a mandible from the Hittite stratum of Polatlı Höyük (No. 4) there is a large abcess under the left lower second molar (Şenyürek, 1951 c, p. 68). There are signs of pyorrhea alveolaris in the jaws from Büyük Güllücek, Karahöyük and one (No. 4) from the Hittite period of Polatlı Höyük, while those from Maşat Höyük and the other individual from Polatlı Höyük (No. 2) are free of this disease.

In two skulls from Alaca Höyük there are defects in the enamel of some molars. In one skull the defect exists in the left upper second molar, while in the other one it occurs in right and left upper first molar and the left lower first molar.

From the small series available it would appear that carious teeth and pyorrhea were probably not infrequent in the ancient inhabitants of Alaca Höyük and the other Anatolian sites studied in this report [25].

Summary and Conclusion

Some of the upper permanent incisors from Alaca Höyük, especially the upper lateral incisors, show a slight and rarely a moderate degree of shovel-shape. The upper permanent canines from Alaca Höyük are caniniform with a pointed tip portion. On the other hand, the lower permanent canines from Alaca Höyük are quite

[25] Krogman (1949) also finds a relatively high incidence of caries and pyorrhea among the skulls from Chatal Höyük and Tell Al-Judaidah dating from various periods. For these Krogman (1949, p. 429) states : "*In going over the palate, mandible, and teeth (many of which were received separately and had to be identified) attention was paid not only to active carious lesions, but also to evidence of exfoliation due to dental disease. Pyorrhea, apical abscesses, and other inflammatory processes were noted. If the sum total of these observations be briefed, the fact emerges that among the male Mediterranean crania only 2 of 5 mouths were free from dental pathology, especially carious teeth; among the female Mediterraneans the ratio was 1:4, among the male Eurafricans 2:7, the male Alpines 0:5, the female Alpines 2:7, the male Armenoids 0:2, the female Armenoid 1:1. If the entire series be considered, only 7 crania of 31 had dentitions wholly free from disease—a percentage of less than 25. And this where the average age is about 40 years! Where dental disease is present, the number of teeth lost during life by disease or actively carious at the time of death ranges from two to a completely edentulous condition, with an average frequency of five diseased teeth per individual. In three instances apical abscesses penetrated the maxillary sinuses. In general the maxillary teeth were more prone to disease than the mandibular. The molars were by far the most frequently affected teeth, with upper and lower Ml and upper M2 well in advance of the others. In their dental pathology if in nothing else the Amouq crania are 'modern'.*,,

In his study of the skulls from Troy, Angel (1951) also gives the incidences of caries and abcesses in the skulls ranging in time from Troy I to late Roman times in his table VI. According to this list of Angel (1951, table VI), 8 out of 19 ancient Anatolian skulls show some caries, while 5 out of 18 have abcesses (the skulls from Thermi and from the island of Antiparos listed by Angel are not included in these figures). On the other hand, for the Alişar crania Krogman (1937, p. 216) too briefly states : "*It is worthy of note that in none of the skulls was there a trace of dental disease.*"

variable. Of these some are caniniform with a pointed tip, but in one the form of the tip portion of the crown approaches that of an incisor. This form is also approached by a lower canine from Maşat Höyük. It is evident that in *Homo sapiens* there is a tendency in at least some individuals to have incisiform lower canines, which tendency, as is shown by the lower canines of *Sinanthropus pekinensis*, appears to have started rather early in the course of evolution of the hominids. But it appears that this tendency had been carried farther in *Sinanthropus pekinensis* than in *Homo sapiens*, in whom, in most cases, the lower canine is still provided with a pointed tip. *Sinanthropus pekinensis* must thus be considered precociously specialized in the form of the tip portion of its lower permanent canine.

The crown of the upper and lower premolars from Alaca Höyük are strongly and distinctly reduced in size. However, from the small series studied it would appear that the frequency of bifurcated roots in the upper and lower first premolars of the ancient inhabitants of Alaca Höyük was probably high.

In the upper and lower permanent molars from Alaca Höyük, in most cases, both the length and size decrease from the first toward the third molar, as in the advanced forms of recent man. In cusp number the upper molars from this site are quite advanced. But in a few first upper molars a trace of the characteristic triangular area seen in *Sinanthropus pekinensis* [26] is still retained. The first lower molars from Alaca Höyük in most cases show Dryopithecus pattern and more rarely plus pattern and protoconid-entoconid connection. On the other hand, most of the second and third lower molars from Alaca Höyük exhibit plus pattern and more rarely protoconid-entoconid connection and Dryopithecus pattern. On the whole, in crown pattern the lower molars from this site are quite advanced. In some unworn upper and lower molars from Alaca Höyük the chewing surface of the crown is sparsely but sometimes distinctly wrinkled, which is the retention of a primitive character seen in Sinanthropus and Neanderthal man [27]. Some of the upper and lower molars from Alaca Höyük show a slight degree of enamel

[26] For this see Weidenreich, 1937, p. 62.

[27] For a discussion of the phylogenetic significance of wrinkles see Weidenreich, 1937, pp. 100-103.

extension corresponding to Pedersen and Thyssen's (1942) type 4(see fig. 29). Pedersen and Thyssen's (1942) type 5 with more pronounced enamel extension occurs very rarely.

In size some of the permanent teeth from Alaca Höyük are smaller and some larger than the average of recent Whites, and in some cases the sizes are nearly equal. However, the ancient inhabitants of Alaca Höyük had, as pointed out above, a strong tendency to have reduced premolars. On the whole, the crowns of the permanent teeth from Alaca Höyük tend to be relatively high.

While most of the teeth from Alaca Höyük are cynodont, a few show a moderate degree of taurodontism. Among the ancient inhabitants of Alaca Höyük the usual form of bite was of the over-bite type. Caries and pyorrhea alveolaris seem to have occurred rather frequently among the ancient inhabitants of Alaca Höyük.

LITERATURE CITED

ABEL, W. 1933. Zähne und Kiefer in ihren Wechselbeziehungen bei Buschmännern, Hottentotten, Negern und deren Bastarden. Zeitschrift für Morphologie und Anthropologie, Band XXXI, Heft 3, pp. 314-361.

ANGEL, J. L. 1939. The Babaköy skeleton. Archiv für Orientforschung, Vol. XIII, Heft 1-2, pp. 28-32.

ANGEL, J. L. 1951. Troy. The human remains. Supplementary Monograph 1. Princeton University Press for University of Cincinnati.

ARIK, R. O. 1937. Türk Tarih Kurumu tarafından yapılan Alaca Höyük hafriyatı. 1935 deki çalışmalara ve keşiflere ait ilk rapor. Ankara.

ASHLEY-MONTAGU, M. F. 1940. The significance of the variability of the upper lateral incisor teeth in man. Human Biology, Vol. 12, No. 3, pp. 323-358.

BLACK, D. 1927. On a lower molar hominid tooth from the Choukoutien deposit. Palaeontologia Sinica, Series D, Vol. VII, Fascicle 1.

BLACK, G. V. 1902. Dental Anatomy. Philadelphia (cited by Campbell, 1925; Drennan, 1929; Shaw, 1931; Nelson, 1938; Pedersen, 1949).

BROCA, P. 1875. Instructions craniologiques et craniométriques. Mémoires de la Société d'Anthropologie de Paris, II, 2. série, Paris.

BROCA, P. 1879. Instructions générales pour les recherches anthropologiques, à fair sur la vivant. Paris.

v. d. BROEK, A. J. P. 1939. Das Skelett einer weiblichen Efé-Pygmäe. Zeitschrift für Morphologie und Anthropologie, Band XXXVIII, Heft 1, pp. 122-169.

CAMPBELL, T. D. 1925. Dentition and palate of the Australian aboriginal. University of Adelaide. Publications under the Keith Sheridan Foundation, No. 1. Adelaide.

DAHLBERG, A. A. 1945. The changing dentition of man. The Journal of the American Dental Association, Vol. 32, pp. 676-690 (Reprinted in Yearbook of Physical Anthropology, New York, 1945).

DAHLBERG, A. A. 1951. The dentition of the American Indian. In : The Papers on the Physical Anthropology of the American Indian, delivered at the fourth Viking Fund Summer Seminar in Physical Anthropology. Held at the Viking Fund, September, 1949. New York, pp. 138-176.

DRENNAN, M. R. 1929. The dentition of a Bushman tribe. Annals of the South African Museum, Vol. XXIV, pp. 61-87.

GORJANOVIC-KRAMBERGER, K. 1907. Die Kronen und Wurzeln der Mahlzähne des Homo primigenius und ihre genetische Bedeutung. Anatomischer Anzeiger, Vol. 31, pp. 97-134.

GREGORY, W. K. 1916. Studies on the evolution of the Primates. Bulletin of American Museum of Natural History, Vol. XXXV, pp. 239-355.

GREGORY, W. K. 1920-1921. The origin and evolution of the human dentition. A Palaeontological Review. The Journal of Dental Research, Vol. II, Nos. 1, 2, 3 and 4 (1920) and Vol. III, No. 1 (1921).

HELLMAN, M. 1928. Racial characters in human dentition. Part I. A racial distribution of the Dryopithecus pattern and its modifications in the lower molar teeth of man. Proceedings of the American Philosophical Society, Vol. LXVII, pp. 157-174.

HRDLICKA, A. 1920. Shovel-shaped teeth. American Journal of Physical Anthropology, Vol. 3, pp. 429-465.

HRDLICKA, A. 1921. Further studies of tooth morphology. American Journal of Physical Anthropology, Vol. IV, No. 2, pp. 141-176.

HRDLICKA, A. 1924. New data on the teeth of early man and certain fossil European apes. American Journal of Physical Anthropology, Vol. VII, No. 1, pp. 109-132.

KEITH, SIR A. 1913. Problems relating to the teeth of the earlier forms of prehistoric man. Proceedings of the Royal Society of Medicine, Part III, Odontological Section, pp. 103-119.

KOŞAY, H. Z. 1938. Türk Tarih Kurumu tarafından yapılan Alaca Höyük hafriyatı. 1936'daki çalışmalara ve keşiflere ait ilk rapor. Ankara.

KOŞAY, H. Z. 1951. Türk Tarih Kurumu tarafından yapılan Alaca Höyük kazısı. 1937-1939 'daki çalışmalara ve keşiflere ait ilk rapor (Les fouilles d'Alaca Höyük, entreprises par la Société d'Histoire Turque. Rapport preliminaire sur les travaux en 1937-1939). Ankara.

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, 1937, 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, Ankara, pp. 407-477.

LEIGH, R. W. 1937. Dental morphology and pathology of pre-Spanish Peru. American Journal of Physical Anthropology, Vol. XXII, No. 2, pp. 267-296.

NELSON, C. T. 1938. The teeth of the Indians of Pecos Pueblo. American Journal of Physical Anthropology, Vol. XXIII, No. 3, pp. 261-293.

ÖZGÜÇ, T. 1945. Öntarihte Anadolu Kronolojisi. Belleten, Vol. IX, No. 35, Ankara, pp 341-360.

PEDERSEN, P. O. AND THYSSEN, H. 1942. Den cervicale Emaljerands Forlob hos Eskimoer. Odontologisk Tidskrift, 50, pp. 444-492. (Cited by Pedersen, 1949).

PEDERSEN, P. O. 1949. The East Greenland Eskimo dentition. Numerical variations and Anatomy. A contribution to comparative ethnic odontography. Kobenhavn.

REMANE, A. 1927. Studien über die Phylogenie des menschlichen Eckzahns. Zeitschrift für Anatomie und Entwicklungsgeschichte, Band 82, Heft 415, pp. 391-481.

SHAW, J. C. M. 1931. The teeth, the bony palate and the mandible in Bantu races of South Africa (with a foreword by Sir Arthur Keith). London.

ŞENYÜREK, M. S. 1940. Fossil man in Tangier. Papers of the Peabody Museum of American Archaeology and Ethnology. Harvard University, Vol. XVI, No. 3, Cambridge, Massachusetts.

ŞENYÜREK, M. S. 1941 (a). The dentition of Plesianthropus and Paranthropus. Annals of the Transvaal Museum, Vol. XX, Part 3, pp. 293-302.

ŞENYÜREK, M. S. 1941 (b). Anadolu Bakır Çağı ve Eti sekenesinin kraniyolojik tetkiki (A craniological study of the Copper Age and Hittite populations of Anatolia). Belleten, Vol. V, No. 19, Ankara, 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, Ankara, pp. 231-254.

ŞENYÜREK, M. S. 1949 (a). Türk Tarih Kurumu adına yapılan Karahöyük kazısından çıkarılan kafataslarının tetkiki (Study of the skulls from Karahöyük, excavated under the auspices of the Turkish Historical Society). Belleten, Vol. XIII, No. 49, Ankara, pp. 1-20.

ŞENYÜREK, M. S. 1949 (b). Anadolu'nun eski sakinlerinde taurodontism (The occurrence of taurodontism in the ancient inhabitants of Anatolia). Belleten, Vol. XIII, No. 50, Ankara, pp. 215-227.

ŞENYÜREK, M. S. 1949 (c). Anadolu'nun eski sakinlerinde büyük azı dişlerinin aşınması (The attrition of molars in the ancient inhabitants of Anatolia). Belleten, Vol. XIII, No. 50, Ankara, pp. 229-244.

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, Ankara, 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, 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, Ankara, 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, Nos. 1-2, pp. 43-61.

ŞENYÜREK, M. S. 1951 (c). A Study of the human skulls from Polatlı Hüyük. Anatolian Studies, Vol. 1, pp. 63-71.

ŞENYÜREK, M. S. 1951 (d). Fluctuation of the cranial index in Anatolia, from the fourth millenium B. C. to 1200 B. C. Belleten, Vol. XV, No. 60, Ankara, pp. 593-632.

ŞENYÜREK, M. S. 1951 (e). Trigonid - talonid height relation indices of the permanent lower molars of Primates. 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. 4, pp. 459 - 474.

ŞENYÜREK, M. S. 1952. The dentition of the Chalcolithic and Copper Age inhabitants of Anatolia. Part I. A morphological Study of the permanent lower molars of the Chalcolithic and Copper Age inhabitants of Anatolia. Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculté de langue, d'Histoire et de Géographie, Université d'Ankara), Vol. X, No. 1-2, pp. 57 - 77.

TOMES, SIR C. S. (Edited by Tims, H. W. M. and Henry, C. B.). 1923. A manual of dental anatomy. Human and comparative. London.

WEIDENREICH, F. 1937. The dentition of Sinanthropus pekinensis : A comparative odontography of the hominids. Palaeontologia Sinica, New Series D, No. 1 (Whole Series No. 101), Peiping.

EXPLANATION OF THE PLATES

(FIGS. 1 - 48)

Fig. 1- Left upper teeth of Alaca Höyük No. 15 (di^2, dc^1, dm^1 and dm^2). Period: Chalcolithic.

Fig. 2- Right upper teeth of Ahlatlıbel No. 15 (dm^1, dm^2, and permanent M^1). Period : Copper Age.

Fig. 3- Lower deciduous teeth of Alaca Höyük No. 15. Period : Chalcolithic.

Fig. 4- Lower teeth of Alaca Höyük No. VIII (Deciduous teeth and right and left permanent first molars). Period : Copper Age.

Fig. 5- Right upper permanent teeth of Alaca Höyük No. III. Period : Copper Age.
Fig. 6- Upper permanent teeth of Alaca Höyük No. II. Period : Copper Age.
Fig. 7- Upper permanent teeth of Alaca Höyük No. 9. Period : Copper Age.
Fig. 8- Upper permanent teeth of Alaca Höyük No. XVI. Period : Copper Age.
Fig. 9- Upper permanent teeth of Alaca Höyük No. XVIII. Period: Copper Age.
Fig. 10- Lower permanent teeth of Alaca Höyük No. II. Period : Copper Age.
Fig. 11- Lower permanent teeth of Alaca Höyük No. XVIII. Period : Copper Age.
Fig. 12- Mandible and lower permanent teeth of Alaca Höyük No. II. Period : Copper Age.
Fig. 13- Mandible and lower permanent teeth of Alaca Höyük No. 5. Period : Copper Age.
Fig. 14- Mandible and lower permanent teeth of Alaca Höyük No. VII. Period : Copper Age.
Fig. 15- Right upper permanent teeth of Alaca Höyük No. III (I^1, I^2, C^1). Period: Copper Age.
Fif. 16- Lingual side of the right lower permanent canine of Alaca Höyük No. III. Period : Copper Age.
Fig. 17- Lingual side of the right lower canine of Alaca Höyük No. Al. J. M. I. Period : Chalcolithic.
Fig. 18- Buccal side of the right lower canine of Maşat Höyük No. 3. Period : Copper Age.
Fig. 19- Lingual sides of the right lower permanent canines from Alaca Höyük (Nos. III and Al. J. M I) and Maşat Höyük (No. 3). A : Alaca Höyük No. III; B: Alaca Höyük No. Al. J. M. I; C : Maşat Höyük No. 3.
Fig. 20- Right lower permanent canines from Alaca Höyük (Nos. III and Al. J. M I) and Maşat Höyük (No. 3).
Fig. 21- Mesial sides of the right upper first and second premolars of Alaca Höyük No. III (first premolar has a bifurcated root). Period : Copper Age.
Fig. 22- Mesial side of the right lower first premolar of Alaca Höyük No. III. Period : Copper Age.
Fig. 23- Mesial side of the left lower first premolar of Maşat Höyük No. 7. Period : Copper Age.
Fig. 24- Left upper permanent first molar of Alaca Höyük No. 15. Period: Chalcolithic.
Fig. 25- Right upper permanent first molar of Alaca Höyük No. 15. Period: Chalcolithic.
Fig. 26- Right upper permanent first molar of Alaca Höyük No. VIII. Period : Copper Age.
Fig. 27- Left lower permanent first molar of Alaca Höyük No. VIII. Period: Copper Age.
Fig. 28- Right lower permanent second molar of Alaca Höyük No. III. Period : Copper Age.
Fig. 29- Buccal side of the right lower permanent second molar of Alaca Höyük No. III. Period: Copper Age.

Fig. 30- Lower teeth of Alaca Höyük No. VIII. Period : Copper Age.
Fig. 31- Lower teeth of the skull from the place where the "Hittite iron" was found.
Fig. 32- Lower permanent teeth of Alaca Höyük No. III. Period : Copper Age.
Fig. 33- Lower teeth of Alaca Höyük Al. F. No. 1 (Deciduous second molar and the permanent first and second molars). Period : Copper Age.
Fig. 34- Lower permanent teeth of Alaca Höyük No. II. Period : Copper Age.
Fig. 35- Right lower permanent teeth of Alaca Höyük No. Al. H. M II. Period : Chalcolithic.
Fig. 36- Left lower permanent teeth of Alaca Höyük No. Al. H. M. II. Period : Chalcolithic.
Fig. 37- Lower permanent teeth of Alaca Höyük No. 9. Period : Copper Age.
Fig. 38- Lower permanent teeth of Alaca Höyük No. 5. Period : Copper Age.
Fig. 39- Lower permanent teeth of Alaca Höyük No. VII. Period : Copper Age.
Fig. 40- Right lower permanent first molar of Alaca Höyük No. Al. J. M I. Period: Chalcolithic.
Fig. 41- Lower permanent teeth of Alaca Höyük No. XVIII. Period : Copper Age.
Fig. 42- Lower permanent teeth of Alaca Höyük No. Al. H. M I. Period : Early Bronze.
Fig. 43- Left lower permanent first molar of Maşat Höyük No. 3. Period : Copper Age.
Fig. 44- Lower permanent teeth of Maşat Höyük No. 7. Period : Copper Age.
Fif. 45- Lower teeth of Alaca Höyük No. 15 (Deciduous molars. Permanent teeth still unerupted). Period : Chalcolithic.
Fig. 46- Lower permanent teeth of Polatlı Höyük No. 2. Period : Early Copper Age.
Fig. 47- Lower permanent teeth of the skull from Büyük Güllücek. Period: Chalcolithic.
Fig. 48- Lower permanent teeth of Polatlı Höyük No. 4. Period : Hittite.

TABLE 2

Measurements of the Deciduous Teeth from the Chalcolithic Period of Alaca Höyük (The teeth of skull No. 15)

Maxillary Teeth	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value [1]	Crown Index [2]	Height-Length Index [3]	Height-Breadth Index [4]
First incisor	6.5	5.1	—	8.9	33.15	78.46	—	—
Second incisor	5.5	4.8	—	8.8	26.40	87.27	—	—
Canine	6.8	6.3	7.2	—	42.84	92.64	105.88	114.28
First milk molar	7.3	8.0	5.8	—	58.40	109.58	79.45	72.50
Second milk molar	8.8	9.8	6.2	—	86.24	111.36	70.45	63.26

[1] Robustness value = Length × breadth.

[2] Crown index = $\frac{\text{Breadth} \times 100}{\text{Length}}$

[3] Height-length index = $\frac{\text{Height (crown)} \times 100}{\text{Length}}$

[4] Height-breadth index = $\frac{\text{Height (crown)} \times 100}{\text{Breadth}}$

TABLE 3

Measurements of the Deciduous Teeth from the Chalcolithic Period of Alaca Höyük (The Teeth of Skull No. 15)

Mandibular Teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Height (Root)	Robust-ness Value	Crown Index	Trigonid - Talonid Index [1]	Height-Length Index	Height-Breadth Index
1st Incisor	4.3	3.7	---	—	—	7.6	15.91	86.04	—	—	—
2nd Incisor	4.7	4.5	—	—	—	8.7	19.15	95.74	—	—	—
Canine	6.0	5.7	—	—	7.7	—	34.20	95.00	—	128.33	135.08
1st Milk Molar	8.3	6.9	6.9	6.4	6.4	—	57.27	83.13	92.75	77.10	92.75
2nd Milk Molar	9.6	8.4	8.4	8.2	6.1	—	80.64	87.50	97.61	63.54	72.61

1. Trigonid-talonid index $= \frac{\text{Talonid Breadth} \times 100}{\text{Trigonid Breadth}}$

TABLE 4

Measurements of the Deciduous Teeth from the Copper Age of Alaca Höyük (Two individuals)

Maxillary Teeth	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Canine	6.4	5.4	—	11.5	34.56	84.37	—	—
First milk molar	7.25*	8.2*	5.2*	—	59.44*	113.11*	71.75*	63.37*
Second milk molar	9.1	10.3	6.0+	—	93.73	113.18	65.93	58.25

* Those measurements shown with an asterisk belong to two individuals. All other measurements belong to only one individual (No. VIII).

TABLE 5

Measurements of the Deciduous Teeth from the Copper Age of Alaca Höyük (Two Individuals)

Mandibular Teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Trigonid-Talonid Index	Height-Length Index	Height-Breadth Index
Canine	5.7	5.3	—	—	—	10.8	30.21	92.98	—	—	—
1st Milk Molar	8.0	7.1	7.1	7.0	6.2+	—	56.80	88.75	98.59	77.50	87.32
2nd Milk Molar	9.9*	8.7*	8.65*	8.6*	5.6	—	86.38*	87.84*	99.32*	53.84	60.86

* These measurements belong to two individuals. All other measurements belong to only one individual (No. VIII).

TABLE 6

Measurements of the Deciduous Teeth of Unknown Date from Alaca Höyük (One individual) [1]

Maxillary Teeth	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
First milk molar	7.0	8.7	5.9	—	60.90	124.28	84.28	67.81
Second milk molar	8.8	10.1	5.7	—	88.88	114.77	64.77	56.43

[1] The milk teeth listed in tables 6 and 7 belong to a dolichocephalic skull which is preserved in a box at the Alaca Höyük Museum together with the remains of a new-born or at the most a couple of months old infant. The note accompanying these remains states that they are from the place where "the Hittite iron" was found. However, I have not yet been able to learn whether the bones of these two individuals had been found together and from which level or levels they were derived. See Şenyürek : 1951 a, p. 250 and 1951 b, p. 43.

TABLE 7

Measurements of the Deciduous Teeth of Unknown Date from Alaca Höyük (One Individual)

Mandibular Teeth	Length	Breadth	Trigonid Breadth	Talonid Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Trigonid-Talonid Index	Height-Length Index	Height-Breadth Index
1st Milk Molar	7.9	6.8	6.8	6.5	6.0	—	53.72	86.07	95.58	75.94	88.23
2nd Milk Molar	10.0	8.5	8.5	8.5	5.5	—	85.00	85.00	100.00	55.00	64.70

TABLE 8

Measurements of Milk Incisors

		Length	Breadth	Robustness Value	Crown Index
Alaca Höyük	dI^1	6.5 (1)	5.1 (1)	33.15	78.46
	dI^2	5.5 (1)	4.8 (1)	26.40	87.27
	dI_1	4.3 (1)	3.7 (1)	15.91	86.04
	dI_2	4.7 (1)	4.5 (1)	19.15	95.74
Australian Aborigines (Campbell, 1925)	dI^1	7.8 (7)	5.6 (7)	43.68	71.79
	dI^2	6.0 (7)	5.3 (7)	31.80	88.33
	dI_1	4.7 (4)	4.4 (4)	20.68	93.61
	dI_2	5.4 (8)	4.7 (8)	25.38	87.03
Bushmen, Hottentots and Negroes (Abel, 1933)	dI^1	6.6 (15)	5.1 (15)	33.66	77.27
	dI^2	5.5 (18)	4.7 (18)	25.85	85.45
	dI_1	4.0 (14)	3.8 (16)	15.20	95.00
	dI_2	4.6 (20)	4.1 (20)	18.86	89.13

TABLE 9

Measurements of Milk Canines

		Length	Breadth	Robustness Value	Crown Index
Alaca Höyük	dc^1	6.6 (2)	5.85 (2)	38.70	88.50
	dc_1	5.85 (2)	5.5 (2)	32.20	93.99
Australian Aborigines (Campbell, 1925)	dc^1	7.5 (12)	6.6 (10)	49.50	88.00
	dc_1	6.4 (10)	6.2 (8)	39.68	96.87
Bushmen, Hottentots and Negroes (Abel, 1933)	dc^1	6.6 (23)	5.8 (23)	38.28	87.87
	dc_1	6.0 (22)	5.3 (22)	31.80	88.33
Man (Remane, 1927)	dc^1	—	—	—	85.8 (11)
	cd_1	—	—	—	—

TABLE 10

Measurements of Milk Molars

		Length	Breadth	Robustness Value	Crown Index
Alaca Höyük	dm^1	7.2 (4)	8.27 (4)	59.54	115.02
	dm^2	8.9 (3)	10.06 (3)	89.61	113.10
	dm_1	8.06 (3)	6.93 (3)	55.93	85.98
	dm_2	9.85 (4)	8.57 (4)	84.60	87.04
Australian Aborigines (Campbell, 1925)	dm^1	8.0 (25)	9.7 (30)	77.60	121.25
	dm^2	9.7 (39)	11.0 (41)	106.70	113.40
	dm_1	9.1 (21)	8.0 (21)	72.80	87.91
	dm_2	11.7 (20)	10.1 (19)	118.17	86.32
Bushmen, Hottentots and Negroes (Abel, 1933)	dm^1	7.8 (23)	8.4 (23)	65.52	107.69
	dm^2	9.1 (20)	9.8 (20)	89.18	107.69
	dm_1	8.4 (20)	7.0 (20)	58.80	83.33
	dm_2	10.6 (20)	9.0 (20)	95.40	84.90

TABLE 11

Measurements of the Permanent Upper Central Incisors [1]

	Length	Breadth	Height (Root)	Robust-ness Value	Crown Index
Alaca Höyük. Chalcolithic Age	8.4 (1)	6.6 (1)	—	55.44	78.57
Alaca Höyük. Chalcolithic Age	(8.4) (1)	6.7 (1)	13.1 (1)	(56.28)	(79.76)
Alaca Höyük. Copper Age	8.72 (4)	7.22 (4)	13.2 (2)	63.02	82.84
Alaca Höyük. Copper Age	8.2 (1)	6.9 (1)	—	(56.58)	(84.14)
Maşat. Copper Age (Şenyürek, 1946)	9.2 (2)	7.05 (2)	—	65.01	76.76
Polatlı No. 2. Early Copper Age (Şenyürek, 1951c)	8.6 (1)	6.7 (1)	—	57.62	77.90
Australian aborigines (Campbell, 1925)	9.37 (56)	7.9 (93)	14.6 (18)	74.02	84.00
Japanese (Campbell, 1925, and Drennan, 1929)	8.4	7.4	11.3	62.16	88.1
Pecos Indians (Nelson, 1938)	8.67 (105)	7.30 (105)	12.88	63.29	84.42
Bantu (Shaw, 1931)	8.9 (66)	7.1 (66)	13.4 (66)	63.19	77.1
Bantu (Drennan, 1929)	9.1 (3)	7.0 (3)	13.5 (3)	63.7	77.1
Kaffirs (Drennan, 1929)	8.7 (5)	7.0 (5)	—	60.9	80.4
South African Bushmen (Drennan, 1929)	7.8 (4)	6.4 (4)	—	49.92	82.5
Bushmen Tribe (Drennan, 1929)	8.3 (25)	6.5 (27)	12.5 (19)	53.95	78.4
Efé Pygmy (v. d. Broek, 1939)	8.2 (1)	7.3 (1)	14.8 (1)	59.86	89.02
Recent Whites (Black, 1902) [2]	9.0	7.0	12.0	63.0	77.8
Homo sapiens (Şenyürek)	8.34 (15)	7.31 (15)	—	61.08	87.72

[1] The figures in brackets, in case of the ancient Anatolians and other series studied by me, refer to the number of individuals. The measurements of the worn teeth of ancient Anatolians also have been placed in brackets.

[2] The figures for the recent Whites given in tables 11-28 are after Black (1902), quoted by Campbell (1925), Drennan (1929), Shaw (1931) and Nelson (1938).

TABLE 12

Measurements of the Permanent Upper Lateral Incisors

	Length	Breadth	Height (Root)	Robust-ness Value	Crown Index
Alaca Höyük. Chalcolithic Age	(6.0) (1)	6.4 (1)	13.5 (1)	(38.40)	(106.66)
Alaca Höyük. Copper Age	6.90 (3)	6.46 (3)	12.25 (2)	44.66	93.78
Alaca Höyük. Copper Age	(6.35) (2)	6.35 (2)	—	(40.30)	(100.04)
Maşat. Copper Age (Şenyürek, 1946)	6.6 (1)	6.2 (1)	—	40.92	93.93
Polatlı. Early Copper Age (Şenyürek, 1951 c)	6.3 (1)	6.1 (1)	—	38.43	96.82
Australian aborigines (Campbell, 1925)	7.65 (78)	6.91 (126)	15.6 (15)	52.86	89.6
Japanese (Campbell, 1925 and Drennan, 1929)	7.0	6.5	11.7	45.50	92.9
Pecos Indians (Nelson, 1938)	7.06 (84)	6.46 (84)	12.49	45.60	91.18
Bantu (Shaw, 1931)	7.2 (66)	6.4 (66)	13.6 (66)	46.08	88.6
Bantu (Drennan, 1929)	6.8 (4)	6.0 (4)	13.5 (2)	40.80	88.1
Kaffirs (Drennan, 1929)	7.1 (7)	6.6 (7)	—	46.86	92.4
South African Bushmen (Drennan, 1929)	6.9 (4)	6.1 (4)	—	42.09	89.1
Bushman Tribe (Drennan, 1929)	6.7 (24)	6.0 (26)	12.5 (18)	40.20	89.1
Efé Pygmy (v. d. Broek, 1939)	6.3 (1)	6.2 (1)	14.3 (1)	39.06	96.82
Recent Whites. (Black, 1902)	6.4	6.0	13.0	38.40	93.8
Homo sapiens (Şenyürek)	7.04 (15)	6.55 (15)	—	46.57	93.30

TABLE 13

Measurements of the Permanent Lower Central Incisors

	Length	Breadth	Height (Root)	Robust-ness Value	Crown Index
Alaca Höyük. Chalcolithic Age	(4.9) (1)	5.3 (1)	12.8 (1)	(25.97)	(108.16)
Alaca Höyük. Copper Age	5.45 (2)	6.10 (2)	11.2 (1)	33.29	111.85
Alaca Höyük. Copper Age	(4.93) (3)	6.0 (3)	—	(29.71)	(121.46)
Büyük Güllücek. Chalcolithic (Şenyürek, 1950)	(4.6) (1)	6.2 (1)	—	(28.52)	(134.78)
Maşat. Copper Age (Şenyürek, 1946)	5.6 (1)	5.6 (1)	—	31.36	100.00
Polatlı. Early Copper Age (Şenyürek, 1951 c)	5.2 (1)	6.0 (1)	—	31.20	115.38
Australian aborigines (Campbell, 1925)	6.0 (43)	6.3 (77)	13.4 (4)	37.80	105.0
Japanese (Campbell, 1925 and Drennan, 1929)	5.4	5.8	9.7	31.32	107.4
Pecos Indians (Nelson, 1938)	5.52 (84)	5.87 (84)	11.92	32.40	106.30
Bantu (Shaw, 1931)	5.9 (62)	6.0 (62)	12.4 (62)	34.40	111.5
Bantu (Drennan, 1929)	5.4 (4)	5.6 (4)	12.8 (4)	28.56	108.4
Kaffirs (Drennan, 1929)	5.4 (4)	5.9 (5)	—	31.86	108.7
South African Bushmen (Drennan, 1929)	5.1 (4)	5.4 (4)	—	27.54	104.9
Bushmen Tribe (Drennan, 1929)	5.0 (22)	5.2 (22)	12.0 (22)	26.00	104.6
Efé Pygmy (v. d. Broek, 1939)	5.0 (1)	5.2 (1)	11.7 (1)	26.0	104.0
Recent Whites (Black, 1902)	5.4	6.0	11.8	32.4	111.1
Homo sapiens (Şenyürek).	5.25 (16)	5.85 (16)	—	30.84	111.42

TABLE 14

Measurements of the Permanent Lower Lateral Incisors

	Length	Breadth	Height (Root)	Robustness Value	Crown Index
Alaca Höyük. Chalcolithic Age	(5.4) (1)	6.1 (1)	14.6 (1)	(32.94)	(112.96)
Alaca Höyük. Copper Age	5.37 (3)	6.3 (3)	13.3 (2)	35.77	108.74
Alaca Höyük. Copper Age	(5.7) (2)	6.3 (2)	13.3 (1)	(35.93)	(110.49)
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	(5.7) (1)	6.7 (1)	—	(38.19)	(117.54)
Maşat. Copper Age (Şenyürek, 1946)	6.3 (1)	5.8 (1)	—	36.54	92.06
Polatlı. Early Copper Age (Şenyürek, 1951c)	6.3 (1)	6.2 (1)	15.4 (1)	39.06	98.41
Australian aborigines (Campbell, 1925)	6.7 (51)	6.6 (92)	14.7 (8)	44.22	98.5
Japanese (Campbell, 1925, and Drennan, 1929)	6.0	6.3	11.6	37.80	105.0
Pecos Indians (Nelson, 1938)	6.14 (74)	6.06 (74)	12.40	37.20	98.93
Bantu (Shaw, 1931)	6.0 (62)	6.0 (62)	13.2 (62)	36.00	103.3
Bantu (Drennan, 1929)	5.9 (5)	6.0 (5)	13.7 (5)	35.40	102.60
Kaffirs (Drennan, 1929)	5.6 (8)	6.0 (8)	—	33.60	106.4
South African Bushmen (Drennan, 1929)	5.6 (4)	5.6 (4)	—	31.36	101.3
Bushman Tribe (Drennan, 1929)	5.6 (24)	5.6 (23)	13.4 (24)	31.36	99.6
Efé Pygmy (v. d. Broek, 1939)	5.6 (1)	6.0 (1)	13.4 (1)	33.60	107.14
Recent Whites (Black, 1902)	5.9	6.4	12.7	37.76	108.5
Homo sapiens (Şenyürek)	6.08 (16)	6.15 (16)	—	37.45	101.71

TABLE 15

Measurements of the Permanent Upper Canines

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	7.4 (1)	8.0 (1)	—	12.7 (1)	59.20	108.10	—	—
Alaca Höyük. Copper Age	7.48 (5)	8.14 (5)	10.53 (3)	17.5 (1)	59.74	108.90	136.81	127.45
Alaca Höyük. Copper Age	(7.6) (1)	8.6	—	—	(65.36)	(113.15)	—	—
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	7.4 (1)	8.3	—	16.2 (1)	61.42	112.16	—	—
Maşat. Copper Age (Şenyürek, 1946)	7.95 (2)	8.7 (2)	11.9 (2)	—	69.18	109.44	149.73	136.79
Polatlı. Early CopperAge (Şenyürek, 1951c)	8.2 (1)	8.3 (1)	11.0 (1)	—	68.06	101.21	134.14	132.53
Australian aborigines (Campbell, 1925)	8.43 (116)	9.0 (159)	—	19.95 (41)	75.87	107.1	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	7.9	8.6	11.0	15.4	67.94	108.9	139.24	127.90
Pecos Indians (Nelson, 1938)	8.05 (86)	8.36 (86)	9.63 (86)	15.46	67.29	104.0	119.62	115.19
East Greenland Eskimos (Pedersen, 1949)	7.8 (16)	8.4 (21)	—	16.3 (8)	65.8 (16)	106.2 (16)	—	—
Bantu (Shaw, 1931)	7.6 (66)	8.2 (66)	9.9 (66)	17.3 (66)	62.32	108.1	130.26	120.73
Bantu (Drennan, 1929)	7.6 (5)	8.1 (5)	9.1	16.1 (5)	61.56	107.3	119.73	112.34
Kaffirs (Drennan, 1929)	7.6 (7)	8.5 (7)	—	—	64.60	112.8	—	—
South African Bushmen (Drennan, 1929)	6.9 (8)	7.4 (8)	—	—	52.06	107.7	—	—
Bushman Tribe (Drennan, 1929)	7.5 (26)	7.8 (26)	7.9	16.3 (20)	58.50	104.1	101.33	101.28
Efé Pygmy (v. d. Broek, 1939)	7.0 (1)	9.0 (1)	(9.4) (1)	18.5 (1)	63.00	128.57	(134.28)	(104.44)
Recent Whites (Black, 1902)	7.6	8.0	—	17.3	60.80	105.3	—	—
Homo sapiens (Şenyürek)	7.89 (17)	8.53 (17)	10.16 (15)	—	67.67	108.18	128.58	118.92

TABLE 16

Measurements of the Permanent Lower Canines

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	7.1 (2)	7.7 (2)	11.7 (1)	15.4 (1)	54.72	108.89	153.94	150.00
Alaca Höyük. Copper Age	6.65 (4)	7.22 (4)	11.35 (2)	—	48.16	108.78	161.06	152.22
Alaca Höyük. Copper Age	(6.7) (1)	8.1	—	—	(54.27)	(120.89)	—	—
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	6.9 (1)	7.6	—	15.3 (1)	52.44	110.14	—	—
Maşat. Copper Age (Şenyürek, 1946)	7.0 (2)	8.05 (2)	11.65 (2)	—	56.36	115.17	167.64	144.71
Polatlı. Early Copper Age (Şenyürek, 1951c)	7.1 (1)	7.6 (1)	11.4 (1)	—	53.96	107.04	160.56	150.00
Australian aborigines (Campbell, 1925)	7.6 (88)	8.3 (120)	—	18.1 (17)	63.08	109.2	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	6.8	7.9	10.9	13.6	53.72	116.2	160.29	137.97
Pecos Indians (Nelson. 1938)	7.27 (94)	7.71 (94)	10.55 (94)	15.26	56.05	106.3	145.11	149.80
East Greenland Eskimos (Pedersen, 1949)	7.1 (7)	7.8 (14)	—	16.6 (12)	52.5 (7)	103.2 (7)	—	—
Bantu (Shaw, 1931)	7.3 (62)	8.0 (62)	10.9 (62)	17.0 (62)	58.40	102.7	149.31	137.50
Bantu (Drennan, 1929)	7.2 (6)	7.4 (6)	9.4	16.1 (5)	53.28	102.9	130.55	127.02
Kaffirs (Drennan, 1929)	6.9 (9)	7.8 (9)	—	—	53.82	112.0	—	—
South African Bushmen (Drennan, 1929)	6.5 (5)	7.0 (5)	—	—	45.50	107.8	—	—
Bushman Tribe (Drennan, 1929)	6.8 (29)	7.0 (28)	8.3	15.3 (26)	47.60	103.7	122.05	118.71
Efé Pygmy (v. d. Broek, 1939)	6.8 (1)	7.0 (1)	(10.4) (1)	17.0 (1)	47.60	102.94	152.94	148.57
Recent Whites (Black, 1902)	6.9	7.9	—	15.3	54.51	114.5	—	—
Homo sapiens (Şenyürek)	6.99 (17)	7.85 (17)	10.65 (13)	—	55.21	112.65	154.35	136.53

TABLE 17

Measurements of the Permanent Upper First Premolars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	6.65 (2)	8.6 (2)	—	12.15 (1)	57.19	129.38	—	—
Alaca Höyük. Copper Age	6.60 (6)	8.55 (6)	8.03 (3)	13.8 (1)	56.61	129.71	114.20	89.90
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	6.7 (1)	8.5 (1)	7.5 (1)	12.80 (1)	56.95	126.86	111.94	88.23
Maşat. Copper Age (Şenyürek, 1946)	7.2 (2)	9.35 (2)	8.6 (2)	—	67.32	129.93	119.49	91.97
Polatlı. Early Copper Age (Şenyürek, 1951c)	7.4 (1)	9.3 (1)	8.2 (1)	—	68.82	125.67	110.81	88.17
Australian aborigines (Campbell, 1925)	7.81 (124)	10.3 (163)	—	16.27 (35)	80.44	132.1	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	7.3	9.5	8.8	12.2	69.35	130.1	120.54	92.63
Pecos Indians (Nelson, 1938)	7.43 (82)	9.89 (82)	7.95 (82)	12.95	73.48	133.1	106.99	80.38
East Greenland Eskimos (Pedersen, 1949)	7.5 (15)	9.2 (20)	—	13.1 (19)	68.7 (15)	122.9 (15)	—	—
Bantu (Shaw, 1931)	7.2 (62)	9.0 (62)	7.9 (62)	13.9 (62)	64.80	132.4	109.72	87.77
Bantu (Drennan, 1929)	6.9 (5)	9.1 (5)	7.1	14.9 (3)	62.79	131.2	102.89	78.02
Kaffirs (Drennan, 1929)	7.1 (8)	9.5 (8)	—	—	67.45	134.4	—	—
South African Bushmen (Drennan, 1929)	6.6 (8)	8.7 (8)	—	—	57.42	132.5	—	—
Bushman Tribe (Drennan, 1929)	6.8 (27)	8.6 (25)	6.6	14.5 (17)	58.48	126.9	97.05	76.74
Efé Pygmy (v. d. Broek, 1939)	7.2 (1)	10.0 (1)	8.0 (1)	14.5 (1)	72.00	138.88	111.11	80.00
Recent Whites (Black, 1902)	7.2	9.1	—	12.4	65.52	126.4	—	—
Homo sapiens (Şenyürek)	6.96 (19)	9.37 (19)	8.06 (18)	—	65.31	134.91	115.61	85.66

TABLE 18

Measurements of the Permanent Upper Second Premolars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	6.5 (2)	8.95 (2)	—	11.75 (1)	58.16	137.75	—	—
Alaca Höyük. Copper Age	6.41 (6)	8.83 (6)	7.56 (3)	15.4 (1)	56.73	137.75	114.89	83.10
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	6.2 (1)	8.8 (1)	—	13.3 (1)	54.56	141.93	—	—
Maşat. Copper Age (Şenyürek, 1946)	7.2 (2)	9.75 (2)	8.4 (2)	—	70.24	135.56	117.09	86.23
Polatlı. Early Copper Age (Şenyürek, 1951c)	7.0 (1)	9.2 (1)	7.5 (1)	—	64.40	131.42	107.14	81.52
Australian aborigines (Campbell, 1925)	7.2 (89)	10.14 (168)	—	16.88 (36)	73.00	140.3	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	7.0	9.3	7.8	12.9	65.10	132.9	111.42	83.87
Pecos Indians (Nelson, 1938)	7.01 (88)	9.18 (88)	7.60 (88)	13.27	64.35	130.4	108.41	82.78
East Greenland Eskimos (Pedersen, 1949)	6.8 (17)	9.2 (21)	—	13.6 (18)	61.5 (17)	130.8 (17)	—	—
Bantu (Shaw, 1931)	7.0 (87)	9.1 (87)	7.7 (87)	14.6 (87)	63.70	135.8	110.00	84.61
Bantu (Drennan, 1929)	6.7 (5)	9.1 (5)	6.5	14.6 (2)	60.97	136.8	97.01	71.42
Kaffirs (Drennan, 1929)	6.7 (8)	8.9 (8)	—	—	65.66	146.4	—	—
South African Bushmen (Drennan, 1929)	6.3 (8)	8.7 (8)	—	—	54.81	138.2	—	—
Bushman Tribe (Drennan, 1929)	6.5 (28)	8.5 (26)	6.3	14.8 (15)	55.26	131.1	96.92	74.11
Efé Pygmy (v. d. Broek, 1939)	7.0 (1)	9.8 (1)	7.0 (1)	14.6 (1)	68.60	140.00	100.00	71.42
Recent Whites (Black, 1902)	6.8	8.8	—	14.0	59.84	129.4	—	—
Homo sapiens (Şenyürek)	6.73 (19)	9.37 (19)	7.47 (17)	—	63.27	139.43	111.22	79.33

TABLE 19

Measurements of the Permanent Lower First Premolars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	6.6 (2)	7.4 (2)	—	13.9 (1)	48.76	112.40	—	—
Alaca Höyük. Copper Age	6.67 (7)	7.20 (7)	8.7 (3)	14.3 (1)	48.10	107.91	126.31	115.44
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	6.9 (1)	7.7 (1)	8.8 (1)	14.0 (1)	53.13	111.59	127.53	114.28
Maşat. Copper Age (Şenyürek, 1946)	7.3 (2)	7.75 (2)	8.4 (2)	—	56.58	106.22	115.11	108.38
Polatlı. Early Copper Age (Şenyürek, 1951c)	7.3 (1)	7.6 (1)	9.1 (1)	—	55.48	104.10	124.65	119.73
Polatlı. Hittite Period (Şenyürek, 1951c)	7.2 (1)	8.4 (1)	—	—	60.48	116.66	—	—
Australian aborigines (Campbell, 1925)	7.6 (93)	8.8 (120)	—	16.3 (23)	66.88	115.8	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	7.6	8.3	9.3	12.2	63.08	109.2	122.36	112.04
Pecos Indians (Nelson, 1938)	7.15 (105)	7.91 (105)	7.56 (105)	13.39	59.32	110.5	105.73	95.57
East Greenland Eskimos (Pedersen, 1949)	7.1 (12)	7.7 (15)	—	13.5 (9)	54.7 (12)	108.6 (12)	—	—
Bantu (Shaw, 1931)	7.1 (62)	8.2 (62)	7.7 (62)	15.0 (62)	58.22	109.6	108.45	93.90
Bantu (Drennan, 1929)	7.3 (5)	7.9 (5)	7.0	15.0 (5)	57.67	109.0	95.89	89.88
Kaffirs (Drennan, 1929)	7.1 (8)	8.1 (8)	—	—	57.51	114.4	—	—
South African Bushmen (Drennan, 1929)	6.9 (6)	7.3 (6)	—	—	50.37	106.0	—	—
Bushman Tribe (Drennan, 1929)	6.9 (27)	7.6 (26)	6.2	14.1 (26)	52.44	110.0	89.85	81.57
Efé Pygmy (v. d. Broek, 1939)	7.5 (1)	8.6 (1)	8.0 (1)	14.0 (1)	64.50	114.66	106.66	93.02
Recent Whites (Black, 1902)	6.9	7.9	—	14.0	54.51	114.5	—	—
Homo sapiens (Şenyürek)	6.86 (21)	7.93 (21)	8.18 (18)	—	54.57	115.69	119.49	104.22

TABLE 20

Measurements of the Permanent Lower Second Premolars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	6.70 (2)	7.80 (2)	—	12.90 (1)	52.24	116.48	—	—
Alaca Höyük. Copper Age	6.90 (6)	7.76 (6)	7.95 (2)	—	53.67	112.49	111.88	100.56
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	7.0 (1)	8.2 (1)	8.1 (1)	14.1 (1)	57.40	117.14	115.71	99.51
Maşat. Copper Age (Şenyürek, 1946)	7.6 (1)	8.2 (1)	7.9 (1)	—	62.32	107.89	103.94	96.34
Polatlı. Early Copper Age (Şenyürek, 1951c)	7.6 (1)	8.8 (1)	8.6 (1)	—	66.88	115.78	113.15	97.72
Polatlı. Hittite Period (Şenyürek, 1951c)	7.8 (1)	9.0 (1)	—	—	70.20	115.38	—	—
Karahöyük. Post-Hittite Period (Şenyürek, 1949a)	7.1 (1)	8.5 (1)	—	—	60.35	119.71	—	—
Australian aborigines (Campbell, 1925)	7.7 (79)	8.9 (109)	—	16.5 (16)	68.53	115.6	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	7.3	8.2	8.0	12.8	59.86	112.3	109.58	97.56
Pecos Indians (Nelson, 1938)	7.42 (91)	8.42 (91)	7.41 (91)	14.51	62.47	113.7	99.86	88.00
East Greenland Eskimos (Pedersen, 1949)	7.1 (19)	8.2 (24)	—	13.2 (18)	57.9 (19)	115.7	—	—
Bantu (Shaw, 1931)	7.2 (62)	8.1 (62)	7.2 (62)	15.2 (62)	58.32	115.3	100.00	88.88
Bantu (Drennan, 1929)	7.1 (5)	8.2 (5)	6.3	15.3 (5)	58.22	115.6	88.73	76.82
Kaffirs (Drennan, 1929)	7.2 (9)	8.3 (9)	—	—	59.76	116.00	—	—
South African Bushmen (Drennan, 1929)	6.8 (3)	7.8 (3)	—	—	53.04	114.8	—	—
Bushman Tribe (Drennan, 1929)	7.0 (30)	7.8 (30)	5.9	14.8 (27)	54.60	110.8	84.28	75.64
Efé Pygmy (v. d. Broek, 1939)	7.0 (1)	9.0 (1)	6.8 (1)	14.7 (1)	63.00	128.57	97.14	75.55
Recent Whites (Black, 1902)	7.1	8.0	—	14.4	56.80	112.7	—	—
Homo sapiens (Şenyürek)	7.03 (21)	8.32 (21)	7.66 (17)	—	58.78	118.15	110.04	92.46

TABLE 21

Measurements of the Permanent Upper First Molars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	10.13 (3)	11.33 (3)	7.1 (1)	13.26 (1)	115.05	110.23	73.95	67.61
Alaca Höyük. Copper Age	10.25 (7)	11.47 (7)	7.2 (2)	—	117.73	111.88	69.86	61.23
Alaca Höyük. Copper Age	(9.4) (1)	11.3 (1)	—	—	(106.22)	(120.21)	—	—
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	10.2 (1)	11.6 (1)	—	12.46 (1)	118.32	113.72	—	—
Maşat. Copper Age (Şenyürek, 1946)	10.6 (2)	11.80 (2)	6.9 (2)	—	125.22	111.23	65.09	58.63
Polatlı. Early Copper Age (Şenyürek, 1951c)	10.1 (1)	10.8 (1)	7.0 (1)	—	109.08	106.93	69.30	64.81
Australian aborigines (Campbell, 1925)	11.43 (198)	12.84 (255)	—	13.5 (5)	146.76	112.3	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	10.7	11.3	7.0	13.2	120.91	105.6	65.42	61.94
Pecos Indians (Nelson, 1938)	10.74 (67)	11.54 (67)	7.02 (67)	13.22	123.93	107.6	65.36	60.83
East Greenland Eskimos (Pedersen, 1949)	10.7 (57)	11.6 (60)	—	12.7 (13)	124.6 (57)	108.8 (57)	—	—
Bantu (Shaw, 1931)	10.3 (91)	11.0 (91)	6.5 (91)	13.5 (91)	113.30	108.8	63.10	59.09
Bantu (Drennan, 1929)	10.2 (7)	11.0 (7)	6.4	12.5 (5)	112.20	107.7	62.74	58.18
Kaffirs (Drennan, 1929)	10.1 (8)	11.4 (8)	—	—	115.14	113.1	—	—
South African Bushmen (Drennan, 1929)	9.6 (18)	10.7 (18)	—	—	102.72	111.9	—	—
Bushman Tribe (Drennan, 1929)	9.9 (33)	10.6 (33)	6.0	11.6 (15)	104.94	107.2	60.60	56.60
Efé Pygmy (v. d. Broek, 1939)	10.6 (1)	11.6 (1)	6.4 (1)	12.0 (1)	122.96	109.43	60.37	55.17
Recent Whites (Black, 1902)	10.7	11.8	—	13.2	126.26	110.3	—	—
Homo sapiens (Şenyürek)	10.45 (20)	11.63 (20)	6.92 (20)	—	121.75	111.34	66.52	59.57

TABLE 22

Measurements of the Permanent Upper Second Molars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	9.5 (2)	11.42 (2)	6.8 (2)	13.16 (1)	108.62	120.37	71.61	59.50
Alaca Höyük. Copper Age	9.75 (7)	11.30 (7)	7.36 (5)	—	110.31	115.90	74.56	65.22
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	10.2 (1)	11.8 (1)	7.3 (1)	11.33 (1)	120.36	115.68	71.56	61.86
Maşat. Copper Age (Şenyürek, 1946)	10.1 (2)	11.85 (2)	7.25 (2)	—	119.88	117.23	71.82	61.34
Polatlı. Early Copper Age (Şenyürek, 1951c)	9.6 (1)	11.6 (1)	7.4 (1)	—	111.36	120.83	77.08	63.79
Australian aborigines (Campbell, 1925)	10.93 (168)	13.1 (241)	—	13.6 (15)	143.18	120.2	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	9.9	11.1	6.9	13.1	109.89	112.1	69.69	62.16
Pecos Indians (Nelson, 1938)	9.94 (79)	11.24 (79)	6.73 (79)	12.90	111.72	111.7	67.70	59.87
East Greenland Eskimos (Pedersen, 1949)	10.2 (55)	11.5 (55)	—	12.3 (31)	117.7 (55)	113.4 (55)	—	—
Bantu (Shaw, 1931)	10.0 (91)	11.5 (91)	6.5 (91)	12.5 (91)	115.00	118.0	65.00	56.52
Bantu (Drennan, 1929)	10.0 (7)	11.6 (7)	6.3	10.0 (1)	116.00	115.9	63.00	54.31
Kaffirs (Drennan, 1929)	10.2 (9)	11.7 (9)	—	—	119.34	114.6	—	—
South African Bushmen (Drennan, 1929)	9.6 (18)	10.8 (18)	—	—	103.68	111.6	—	—
Bushman Tribe (Drennan, 1929)	9.7 (30)	10.6 (30)	5.8	12.6 (14)	102.82	110.2	59.79	54.71
Efé Pygmy (v. d. Broek, 1939)	10.2 (1)	12.0 (1)	7.0 (1)	12.0 (1)	122.40	117.64	68.62	58.33
Recent Whites (Black, 1902)	9.2	11.5	—	13.0	105.80	125.0	—	—
Homo sapiens (Şenyürek)	9.54 (20)	11.52 (20)	7.17 (19)	—	110.23	121.03	75.21	62.07

TABLE 23

Measurements of the Permanent Upper Third Molars

	Length	Breadth	Height (Crown)	Height (Root)	Robustness Value	Crown Index	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	8.5 (2)	11.1 (2)	6.15 (2)	12.15 (1)	94.23	131.81	72.98	55.39
Alaca Höyük. Copper Age	9.05 (2)	11.15 (2)	6.6 (2)	—	100.92	123.19	72.93	59.30
Büyük Güllücek. Chalcolithic (Şenyürek, 1950b)	7.3 (1)	8.5 (1)	5.7 (1)	11.25 (1)	62.05	116.43	78.08	67.05
Maşat. Copper Age (Şenyürek, 1946)	8.3 (1)	10.4 (1)	5.8 (1)	—	86.32	125.30	69.87	55.76
Polatlı. Early Copper Age (Şenyürek, 1951c)	9.4 (1)	11.1 (1)	7.2 (1)	—	104.34	118.08	76.59	64.86
Australian aborigines (Campbell, 1925)	10.03 (142)	12.33 (193)	—	13.93 (22)	123.66	113.0	—	—
Japanese (Campbell, 1925, and Drennan, 1929)	8.9	10.6	6.4	10.5	94.34	119.1	71.91	60.37
Pecos Indians (Nelson, 1938)	9.36 (84)	10.57 (84)	6.18 (84)	12.20	98.93	113.1	66.02	58.46
East Greenland Eskimos (Pedersen, 1949)	9.6 (35)	11.1 (35)	—	12.0 (19)	107.3	117.2	—	—
Bantu (Shaw, 1931)	9.5 (80)	11.0 (80)	6.0 (80)	11.5 (80)	104.50	119.6	63.15	54.54
Bantu (Drennan, 1929)	9.0 (7)	11.0 (7)	5.0	12.6 (2)	99.00	122.7	55.55	45.45
Kaffirs (Drennan, 1929)	9.5 (6)	11.5 (6)	—	—	109.25	120.6	—	—
South African Bushmen (Drennan, 1929)	8.0 (13)	10.4 (13)	—	—	83.20	130.0	—	—
Bushman Tribe (Drennan, 1929)	8.2 (26)	10.3 (26)	5.4	12.6 (10)	84.46	125.7	65.85	52.42
Efé Pygmy (v. d. Broek, 1939)	7.6 (1)	11.0 (1)	6.4 (1)	12.0 (1)	83.60	144.73	84.21	58.18
Recent Whites (Black, 1902)	8.6	10.6	—	11.4	91.16	123.3	—	—
Homo sapiens (Şenyürek)	8.63 (12)	10.96 (12)	6.98 (11)	—	95.12	127.08	80.72	63.93

TABLE 24

Measurements of the Permanent Lower Molars

	First Lower Molar		Second Lower Molar		Third Lower Molar	
	Length	Breadth	Length	Breadth	Length	Breadth
Alaca Höyük. Chalcolithic Age	10.50 (2)	9.80 (2)	10.90 (2)	9.70 (2)	11.60 (1)	10.90 (1)
Alaca Höyük. Copper Age	10.93 (9)	10.07 (9)	10.68 (6)	9.66 (6)	10.02 (4)	9.17 (4)
Alaca Höyük. Early Bronze Age	—	—	10.9 (1)	9.9 (1)	10.1 (1)	9.4 (1)
Büyük Güllücek. Chalcolithic Age (Şenyürek, 1950b)	11.7 (1)	11.0 (1)	11.2 (1)	10.3 (1)	9.4 (1)	9.2 (1)
Maşat Höyük. Copper Age (Şenyürek, 1946)	11.3 (2)	10.7 (2)	11.05 (2)	10.25 (2)	10.45 (2)	9.55 (2)
Polatlı. Early Copper Age (Şenyürek, 1951 c)	11.4 (1)	9.9 (1)	11.1 (1)	9.6 (1)	—	—
Polatlı. Hittite period (Şenyürek, 1951 c)	11.4 (1)	11.5 (1)	11.3 (1)	11.2 (1)	8.9 (1)	9.3 (1)
Karahöyük. Post-Hittite Period (Şenyürek, 1949a)	10.5 (1)	10.5 (1)	10.9 (1)	10.2 (1)	—	—
Australian aborigines (Campbell, 1925)	12.3 (139)	11.9 (186)	12.5 (152)	11.7 (184)	11.9 (136)	11.1 (152)
Japanese (Campbell, 1925, and Drennan, 1929)	11.5	10.7	11.1	10.2	10.5	9.8
Pecos Indians (Nelson, 1938)	11.96 (67)	10.74 (67)	11.41 (62)	10.47 (62)	11.13 (62)	10.10 (62)
East Greenland Eskimos (Pedersen, 1949)	11.8 (29)	11.3 (33)	11.4 (34)	10.9 (35)	11.4 (27)	10.8 (27)
Bantu (Shaw, 1931)	11.0 (83)	10.5 (73)	11.0 (83)	10.3 (72)	11.1 (66)	10.4 (65)
Bantu (Drennan, 1929)	11.0 (6)	10.3 (6)	11.1 (7)	10.3 (7)	11.2 (8)	10.4 (8)
Kaffirs (Drennan, 1929)	11.3 (7)	10.6 (7)	11.0 (7)	10.6 (7)	11.4 (5)	10.7 (5)
South African Bushmen (Drennan, 1929)	10.3 (10)	9.9 (10)	10.4 (11)	9.8 (11)	9.2 (10)	9.2 (10)
Bushman Tribe (Drennan, 1929)	10.9 (33)	10.2 (33)	10.6 (32)	10.1 (32)	9.9 (33)	9.6 (33)
Efé Pygmy (v. d. Broek, 1939)	11.0 (1)	10.5 (1)	11.3 (1)	10.0 (1)	10.0 (1)	8.8 (1)
Recent Whites (Black, 1902)	11.2	10.3	10.7	10.1	10.7	9.8
Ancient Egyptians (Şenyürek)	10.70 (11)	10.45 (11)	10.40 (11)	10.21 (11)	10.35 (9)	9.83 (9)
Ancient Icelanders (Şenyürek)	10.95 (10)	10.32 (10)	10.47 (9)	9.81 (9)	10.38 (5)	9.68 (5)
Homo sapiens (Şenyürek)	11.05 (22)	10.68 (22)	10.49 (23)	10.27 (23)	10.16 (13)	9.94 (13)

TABLE 25

Robustness Values and Crown Indices of Permanent Lower Molars

	First Lower Molar		Second Lower Molar		Third Lower Molar	
	Robustness Value	Crown Index	Robustness Value	Crown Index	Robustness Value	Crown Index
Alaca Höyük. Chalcolithic Age	103.05	93.40	105.93	89.00	126.44	93.96
Alaca Höyük. Copper Age	110.30	92.27	103.36	90.57	92.46	91.92
Alaca Höyük. Early Bronze Age	—	—	107.91	90.82	94.94	93.06
Büyük Güllücek. Chalcolithic Age (Şenyürek, 1950b)	128.70	94.01	115.36	91.96	86.48	97.87
Maşat. Copper Age (Şenyürek, 1946)	121.03	94.71	113.32	92.75	99.88	91.35
Polatlı. Early Copper Age (Şenyürek, 1951c)	112.86	86.84	106.56	86.48	—	—
Polatlı. Hittite Period (Şenyürek, 1951 c)	131.10	100.87	126.56	99.11	82.77	104.49
Karahöyük. Post-Hittite Period (Şenyürek, 1949a)	110.25	100.00	111.18	93.57	—	—
Australian aborigines (Campbell, 1925)	146.37	96.7	146.25	93.6	132.09	93.3
Japanese (Campbell, 1925, and Drennan, 1929)	123.05	93.0	113.22	91.9	102.90	93.3
Pecos Indians (Nelson, 1938)	128.45	90.45	119.46	91.55	112.41	90.71
East Greenland Eskimos (Pedersen, 1949)	134.30	96.0	124.5	96.0	123.1	95.2
Bantu (Shaw, 1931)	115.5	94.5	113.3	93.6	115.44	91.2
Bantu (Drennan, 1929)	113.3	93.9	114.33	93.0	116.48	92.5
Kaffirs (Drennan, 1929)	119.78	93.6	116.60	96.4	121.98	93.9
South African Bushmen (Drennan, 1929)	101.97	95.6	101.92	95.0	84.64	99.5
Bushman Tribe (Drennan, 1929)	111.18	93.7	107.06	94.8	95.04	97.0
Efé Pygmy (v. d. Broek, 1939)	115.50	95.45	113.00	88.49	88.00	88.00
Recent Whites (Black, 1902)	115.36	91.9	108.07	94.4	104.86	91.6
Ancient Egyptians (Şenyürek)	112.02	97.72	106.26	98.2	102.16	95.24
Ancient Icelanders (Şenyürek)	113.36	94.30	103.09	93.92	100.88	93.49
Homo sapiens (Şenyürek)	118.32	96.75	108.10	98.05	101.49	97.16

TABLE 26

Trigonid-Talonid Indices of the Permanent Lower Molars

	First Lower Molar			Second Lower Molar			Third Lower Molar		
	Trigonid Breadth	Talonid Breadth	Trigonid-Talonid Index	Trigonid Breadth	Talonid Breadth	Trigonid-Talonid Index	Trigonid Breadth	Talonid Breadth	Trigonid-Talonid Index
Alaca Höyük. Chalcolithic	9.8 (2)	9.75 (2)	99.47	9.6 (2)	9.6 (2)	100·10	10.90 (1)	10.80 (1)	99.08
Alaca Höyük. Copper Age	10.01 (9)	9.96 (9)	99.51	9.63 (6)	9.60 (6)	99.67	8.97 (4)	9.00 (4)	100.24
Alaca Höyük. Early Bronze Age	—	—	—	9.90 (1)	9.60 (1)	96.96	9.40 (1)	8.8 (1)	93.61
Büyük Güllücek. Chalcolithic (Şenyürek, 1950 b)	11.00 (1)	10.70 (1)	97.27	10.3 (1)	10.2 (1)	99.02	9.0 (1)	9.2 (1)	102.22
Maşat. Copper Age (Şenyürek, 1946)	10.70 (2)	10.50 (2)	98.12	10.25 (2)	9.80 (2)	95.57	9.55 (2)	9.1 (2)	95.25
Polatlı. Early Copper Age (Şenyürek, 1951 c)	9.7 (1)	9.9 (1)	102.06	9.6 (1)	9.5 (1)	98.95	—	—	—
Polatlı. Hittite period (Şenyürek, 1951 c)	11.0 (1)	11.5 (1)	104.54	10.8 (1)	11.2 (1)	103.70	9.3 (1)	8.8 (1)	94.62
Karahöyük. Post-Hittite (Şenyürek, 1949 a)	10.5 (1)	10.2 (1)	97.14	10.2 (1)	9.8 (1)	96.07	—	—	—
Pecos Indians (Şenyürek)	10.82 (15)	10.89 (15)	100.6	10.39 (15)	10.49 (15)	100.93	9.87 (8)	10.05 (8)	101.74
Ancient Egyptians (Şenyürek)	10.30 (11)	10.41 (11)	101.17	10.18 (11)	10.0 (11)	98.24	9.8 (9)	9.63 (9)	98.38
Ancient Icelanders (Şenyürek)	10.19 (10)	10.31 (10)	101.24	9.7 (8)	9.63 (8)	99.25	9.62 (5)	9.64 (5)	100.22
Homo sapiens (Şenyürek)	10.59 (22)	10.58 (22)	99.87	10.22 (23)	10.1 (23)	98.77	9.91 (13)	9.74 (13)	98.21

TABLE 27

Height and Height Indices of the Permanent Lower Molars

	First Lower Molar			Second Lower Molar			Third Lower Molar		
	Height (Crown)	Height-Length Index	Height-Breadth Index	Height (Crown)	Height-Length Index	Height-Breadth Index	Height (Crown)	Height-Length Index	Height-Breadth Index
Alaca Höyük. Chalcolithic Age	8.1 (1)	81.00 (1)	85.26 (1)	—	—	—	—	—	—
Alaca Höyük. Copper Age	7.6 (2)	69.01 (2)	76.30 (2)	7.50 (4)	70.60 (4)	77.71 (4)	6.55 (2)	62.66 (2)	70.83 (2)
Büyük Güllücek. Chalcolithic Age (Şenyürek, 1950b)	—	—	—	—	—	—	6.8 (1)	72.34 (1)	73.91 (1)
Maşat. Copper Age (Şenyürek, 1946)	6.25 + (2)	55.42 (2)	58.49 (2)	6.75 (2)	61.24 (2)	66.04 (2)	6.1 (2)	58.31 (2)	63.80 (2)
Polatlı. Early Copper Age (Şenyürek, 1951c)	6.5 + (1)	57.01 (1)	65.65 (1)	7.3 (1)	65.76 (1)	76.04 (1)	—	—	—
Homo sapiens (Şenyürek)	7.0 (17)	62.89 (17)	65.24 (17)	7.23 (20)	69.18 (20)	70.20 (20)	6.97 (11)	68.68 (11)	70.09 (11)

TABLE 28

Root Heights of the Permanent Lower Molars (Lingual Heights)

	First Lower Molar	Second Lower Molar	Third Lower Molar
Alaca Höyük. Chalcolithic Age	—	—	12.65 (1)
Alaca Höyük. Copper Age	14.40 (2)	14.05 (1)	13.15 (1)
Alaca Höyük. Early Bronze Age	—	—	15.50 (1)
Australian aborigines (Campbell, 1925)	14.2 (7)	15.0 (8)	14.0 (6)
Japanese (Campbell, 1925, and Drennan, 1929)	12.1	11.3	10.5
Pecos Indians (Nelson, 1938)	13.60	13.77	12.59
East Greenland Eskimos (Pedersen, 1949)	13.2 (23)	12.5 (21)	11.7 (8)
Bantu (Shaw, 1931)	13.5 (62)	13.5 (62)	12.0 (62)
Bantu (Drennan, 1929)	13.0 (4)	12.9 (4)	13.3 (7)
Bushman Tribe (Drennan, 1929)	12.4 (27)	13.1 (22)	12.5 (21)
Efé Pygmy (v. d. Broek, 1939)	12.5 (1)	12.0 (1)	12.8 (1)
Recent Whites (Black, 1902)	13.2	12.9	11.8

TABLE 29

Distribution of Attrition in the Upper Permanent Molars from Alaca Höyük and other Anatolian Sites Studied

	M^1					M^2					M^3				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
Alaca Höyük (Chalcolithic, Copper Age and Early Bronze Age)	—	1	7	1	1	1	5	2	1	—	—	2	1	—	—
Other Anatolian Sites (Büyük Güllücek, Maşat Höyük and PolatlıHöyük)	—	1	3	—	—	—	3	1	—	—	—	1	—	—	—

TABEE 30

Distribution of Attrition in the Lower Permanent Molars from Alaca Höyük and other Anatolian Sites Studied

	M_1					M_2					M_3				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
Alaca Höyük (Chalcolithic, Copper Age and Early Bronze Age)	—	—	7	1	1	—	3	5	—	—	—	3	2	—	—
Other Anatolian Sites(Büyük Güllücek, Maşat Höyük and Polatlı Höyük)	—	—	5	1	—	—	3	2	—	—	—	1	1	—	—

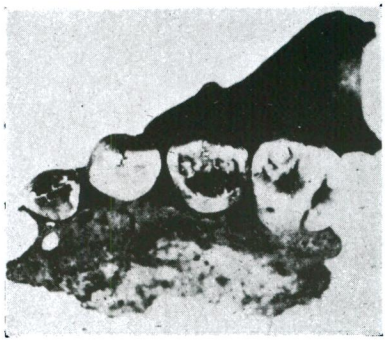
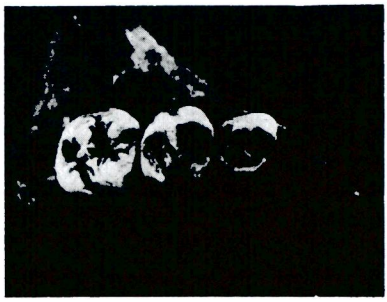


Fig. 1



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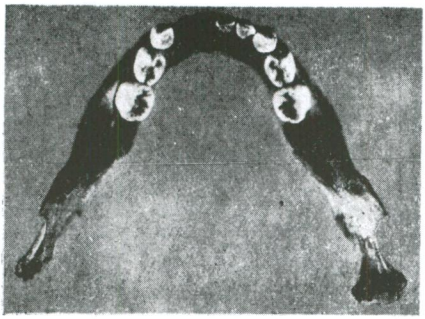


Fig. 3

Fig. 4

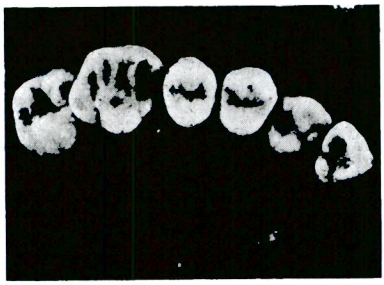
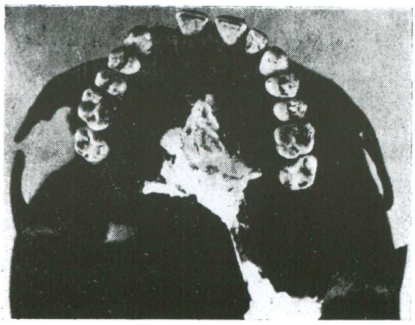


Fig. 5



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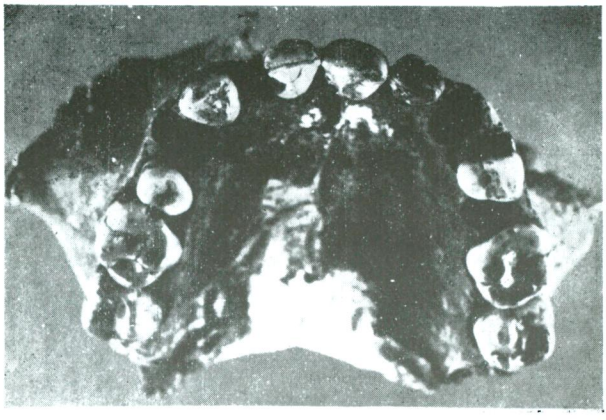
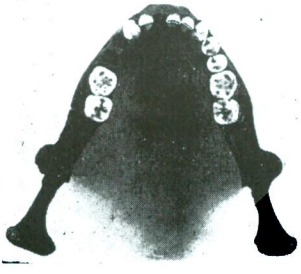


Fig. 7

Fig. 8

Fig. 9



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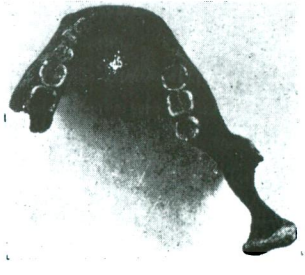
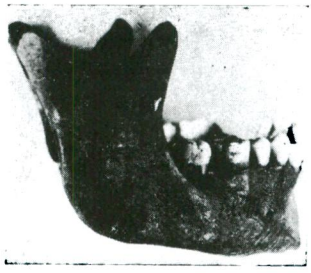


Fig. 11



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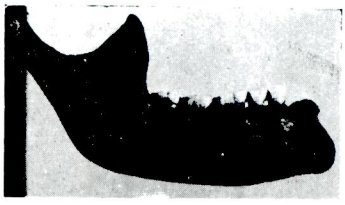

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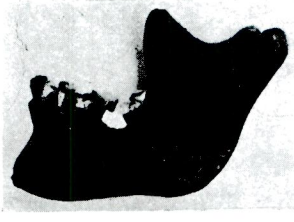

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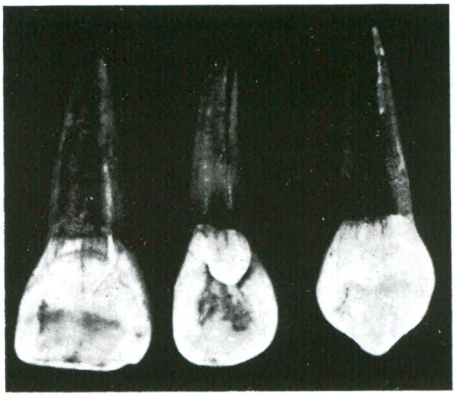


Fig. 15

Fig. 16

Fig. 17

Fig. 18

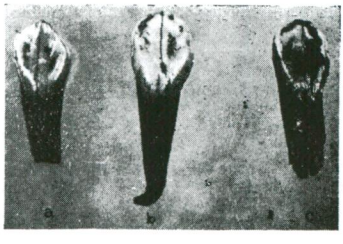


Fig. 19

Buccal Side

Buccal Side

Buccal Side

Lingual Side

Lingual Side

Lingual Side

Mesial Side
Right Lower Canine of
Alaca-Höyük No. 111

Distal Side
Right Lower Canine of
Maşat No. 3

Mesial Side
Right Lower Canine of
Alaca-Höyük No.
Al. J. MI

Fig. 20

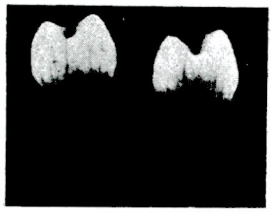


Fig. 21

Fig. 22

Fig. 23

Fig. 24

Fig. 25

Fig. 26

Fig. 27

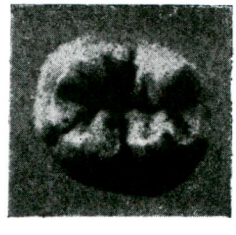


Fig. 28

Fig. 29

Fig. 30

Fig. 31

Fig. 32

Fig. 33

Fig. 34

Fig. 35

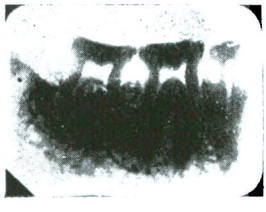


Fig. 36

Fig. 37

Fig. 38

Fig. 39

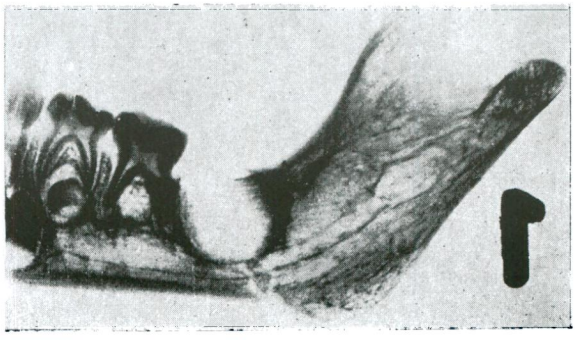
Fig. 40

Fig. 41

Fig. 42

Fig. 43

Fig. 44



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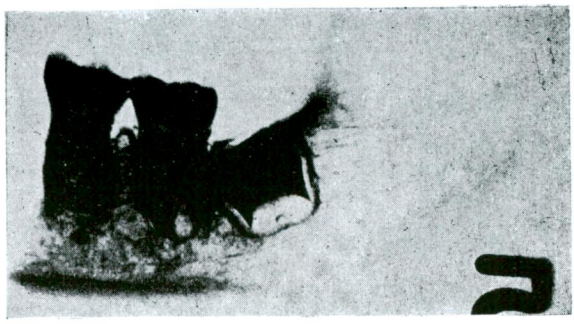

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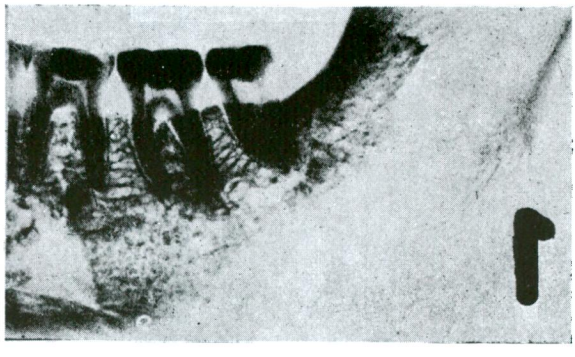

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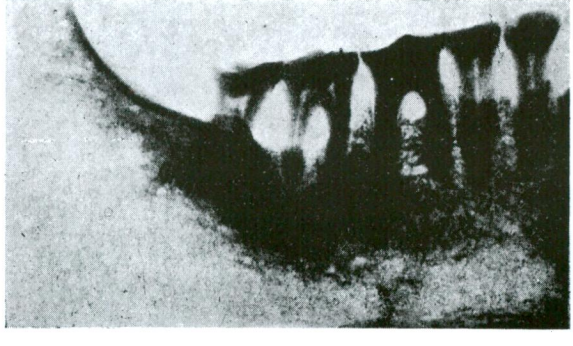

Fig. 48