

# ANTHROPOLOGICAL ANALYSIS OF THE ÖKÜZİNİ HUMAN REMAINS

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Öküzini cave is situated near Yağca village, 32 kilometers northeast of Antalya and not far from Karain cave. It was first excavated by Prof. I. Kılıç Kökten in 1956 (Şenyürek 1958). The excavations, which were interrupted for some time, were taken over by Prof. Yalçinkaya, head of the Department of Prehistory, Ankara University, under the auspices of the Museum of Antalya (Yalçinkaya 1993) and are ongoing.

The importance of the Öküzini cave lies in its being the first necropole cave in Anatolia (Yalçinkaya, pers. comm.). The burial area is approximately 9 m<sup>2</sup> and is situated in the 6<sup>th</sup> level, area no. 1 (Yalçinkaya *et al.* 1998). This layer corresponds to the Neolithic and Chalcolithic phases. Professor Yalçinkaya thinks that the burials found in Öküzini may belong to the earliest levels of the Chalcolithic phase. The large blocks of limestone which have fallen from the ceiling of the cave seem to have seriously damaged the burials. Öküzini cave is also known to have been the shelter for herdsmen and their cattle as well as for wild animals nearby and this also accounts for the serious alterations observed on the skeletons. Finally, treasure hunters seem to have contributed as well to the poor conservation of the burials.

The existence of the burials in Öküzini cave was first pointed out during Kökten's excavations, and the well conserved skeleton of a young woman unearthed in 1956 was consigned to Şenyürek (1958) to be analyzed.

## MATERIAL AND METHODS

Prof. Yalçinkaya and her students discovered four *in situ* burials between the 1994 and 1997<sup>1</sup> field seasons. one individual was found in 1994, one in 1996 and two in 1997. Several burials lost their *in situ* position due to external factors and many isolated bones and teeth were consigned to our

laboratory along with the *in situ* skeletons<sup>2</sup> (See Appendix). All of individuals of Öküzini, including that analyzed by Şenyürek, are listed below:

- 1) OK'56: Female (analyzed by Şenyürek)
- 2) OK'94. No. 1: Male
- 3) OK'96. No. 2 (H6a): Female
- 4) OK'97. No. 3 (M3G7bd): Female
- 5) OK'97. No. 4 (G11-bd M4): Female

As the appendix confirms, the burials were highly affected by external factors and unfortunately the long interruption after the first discovery in 1956 is partly responsible for this situation. A number much higher than five could have been achieved if it were not for this interruption.

*Sex and age determinations:* For the estimation of sex, we have taken the pelvis and some morphological particularities of the skull into account as well as the general aspect of the long bones, taking into consideration the degree of sexual differentiation of the skeletal series we were examining. The works and suggestions of various researchers (Ferembach 1974; Ferembach *et al.* 1979; Brothwell 1981; Bass 1987; Ubelaker 1989) helped us in sex determination. As for the age estimation at death, we have taken into account, for the adults, the stages of pubic symphyseal metamorphosis (Gilbert and McKern 1973) and the changes caused in the sternal extremities of the ribs (Loth and Yıcan 1989). In helping to determine the age at death, we also noted the degree of closure of the cranial sutures (Masset 1982) as well as the epiphyseal union of the long bones (Brothwell 1981 and Bass 1987).

We have used the technique proposed by Ferembach (1974) in measuring the cranial and long bones; and that by Lefebvre (1973) for the mesio-distal and bucco-lingual diameters of the tooth crowns. The measurements and indices for

<sup>1</sup> Gülfem Uysal, a research assistant of our department to whom I am indebted for her contribution in the discovery of the skeletons and for the information gathered on burial conditions, assisted in the excavations during the 1997 field season.

<sup>2</sup> I hereby thank Professor Yalçinkaya who was so kind to consign to our laboratory the skeletal remains found during the excavations, as well as her hardworking crew.

the skulls, teeth and long bones of the Öküzini humans are listed in Tables 1, 2 and 3.

We have used the criteria proposed by Brothwell (1981) in determining the degree of wearing of the molars and that by Bouville *et al.* (1983) for the premolars, incisors and canines.

## THE SKELETAL REMAINS

### *OK'94. Sk. No. 1*

Excavated during the 1994 field season. Primary burial in hocker position. Individual was laid on his right and the hand was placed under his head. The burial being quite near to the surface, it was slightly damaged post-mortem. The use of the cave as a shelter for animals must largely be responsible for this situation. Next to the pelvis were found a cup, a broken stone idol and many beads which are thought to be burial gifts.

The preservation conditions of the skeleton are mediocre. On the skull, the facial and basal parts are missing. The mandible is well preserved except for the left mandibular condyle and the gonion. Two holes, one large and the other small, were observed on the right parietal bone, which were due not to pathological causes, but to postmortem environmental conditions. Nearly all the skeletal bones were found. The scapula and sacrum were broken post-mortem.

Anatomical details of the cranial, pelvic and long bones show that the skeleton belongs to a male. The sternal extremities of the costas and the facies symphysialis of the pubic bone indicate that individual was dead at the age of 35-40.

### *OK'95 Sk. No. 2*

Discovered during the 1995 field season and excavated in 1996. Primary burial in hocker position. It was buried in the northwest-southeast direction, the head directed towards the entrance of the cave. It was laid on the right side. The ground on which the dead was placed was paved with flat stones and another flat stone was placed under the head. The hands were at the level of the head. The burial was encircled with a stone wall. A large pot with handles filled with burnt acorns of oak was placed near the feet of the person, presumably as a burial gift.

The skeleton is in better condition than individual No. 1. The cranium is well preserved, except for the facial parts and the base. Almost all the bones were found, though some in fragmentary condition. The cranium and the other parts of the skeleton were calcified while underground, due to the water penetrating through the cave walls. We have cleaned this inorganic formation with 50% diluted ascectic acid, paying attention not to damage

the bones.

According to the anatomical details of the cranium and the post-cranial structures, the skeletal remains belong to a female. The metric values of the cranium and the skeleton are also indicative of this interpretation (Tables 1 and 3). The morphological alterations on the sternal extremes of the ribs and the pubic symphyseal face indicate that this female was dead at the age of 30-35.

### *OK'97 G7 bd M3. No. 3*

Found in a pit 20 cm deep and of dimensions 90x55 cm. It had been laid on its right and was in hocker position when discovered. It was laid in the direction south-southwest and north-northeast. The burial was placed between the stone walls of the burials on its west and north and the original wall of the burial on its east. It was encircled by a stone wall. As Professor Yalçinkaya observed (1998), this encircling wall is in part common with the burial of individual no. 2 unearthed in 1996. The researcher thus thinks that the two individuals may have been buried at the same time. Since it is near the surface, the upper and lower extremities of the skeleton are partly damaged and it has lost its *in situ* position. It has the best preserved cranium (Fig. 1a,b) which Öküzini cave has yielded to date, with the exception of the one found by Şenyürek during the 1956 season. A small pot was found beside the burial, presumably a burial gift. Another small pot and a grinding stone were discovered outside the burial circle (Yalçinkaya 1998).

The anatomical details of the cranium and the remains of the skeleton suggest a female. The sternal extremities of the ribs, the epiphysal closure of the clavícula, the M3 root formation, the lack of any sign of closure in the cranial suture and the aspect of the synchondrosis sphenooccipitalis indicate that this individual was dead at the age of 19-20.

### *OK'97 G11-bd M4*

Excavated from burial no. 5. Individual was laid on her back in a north-south direction on a ground paved with flat stones; the arms flexed at the elbows. The face looks eastwards. This specimen was buried in a pit of 20 cm depth and of 72x60 cm dimensions. Surrounding it were pieces of charcoal and lots of animal skeletal remains. Rockfall has greatly disturbed the skeletal remains. A pot with handles was associated with the skeleton, presumably a burial gift. In addition, two pots containing burnt oak acorns were placed above the head and below the feet.

It may be worth noting that no bones of

the lower limbs were found, including the sacrum and the pelvic bones. Gülfem Uysal, research assistant in our Department of Anthropology, has stated that lower extremities were searched over an area of 50x50 cm. in a depth of 10 cm. but no bone was found. The absence of these bones at first suggest a handicapped person; but this assumption is invalidated by the lack of any sign of trauma on the last lumbar vertebra and the distal parts of the preserved leg bones as well as the presence of the left patella at the level of the right elbow. Taking into account that the skeleton was quite near the surface, it seems to us more logical to consider that the lower parts of individual were dismembered and carried by the scavengers post-mortem. Their tooth marks were observed on the proximal and distal ends of the left femur belonging to individual no. 3.

The specimen may be identified as a female. The costochondral junction of the ribs, the nearly closing of the long bone epiphyses and the root calcification of the M3 teeth suggest an age of 17 or 18.

## ANTHROPOLOGICAL ANALYSIS

### *Crania*

The top view of Öküzini skulls, including the one found in 1956, displays an ovoid shape (Olivier 1960). The glabella is similar to schema 2 of Martin in two individuals (OK'94. No.1 and OK'95. No.2) and schema 3 in one (OK'97. No.3). The occipital bone displays a normal curvature. No plano-occipitalie is observed in any of individuals. There are no prelambdaic and postbregmatic depressions. However, Şenyürek (1958) reports a slight postbregmatic depression in individual he examined. The linea temporalis and linea nuchae superior and inferior have developed normally. In all individuals, inion is similar to schema 1 of Broca (Ferembach 1974). The foramina parietal is formed only on the right side in individual no. 1 and on both sides in individual no. 2. The metopic suture is closed in all the crania. Wormian bones on the lambda sutures were observed only on two (OK'97. No. 4 and OK'56) of the five Öküzini individuals. On individuals no. 2 and 3, whose orbits are well preserved, the supra-orbital foramen is found on the right orbit and incisura supra orbitalia on the left side. Nasal bone is slightly curved on the profile of individual no. 2 and straight on individual no. 3.

The inferior border of the mandible in individual no. 1 is similar to schema IV of Keiter whereas that of no. 2 corresponds to schema VIII (Ferembach 1974). The extroversion of the gonion

is observed on individuals no. 1 and no. 2 as well as on that examined by Şenyürek, but is absent on nos. 3 and 4. The mentale region, when viewed from the top, is similar to schema no. 1 (Ferembach 1974). The foramen mentale is single on both sides in all of the Öküzini individuals and is aligned with P1-P2 or P2 (skeleton no. 2). When the mandibles of individual no. 1 and that examined by Şenyürek are examined from the side, the marked depression on the basal margin just in front of gonion is easily observable. This region is not preserved in the other individuals. The masseter and pterygoideus muscles display a slight or mediocre development. The menton region, examined from the top, is similar to schema 1 in male no. 1 and of schema 3 in female no. 2 and the female examined by Şenyürek (Ferembach 1974). The incisura semilunaris well preserved in skeleton no. 1 is similar to schema no. 1 of Schultz (Ferembach 1974). The torus palatinus is formed along the median line of the hard palate on individual no.2. Such exostoses may be observed in various frequencies in every society and are not considered as particular to any racial group (Moorrees 1957). No torus palatinus are observed on the upper jaws of the other Öküzini individuals, including the one examined by Şenyürek.

According to the cephalic index (Table 1), the male no. 1 of Öküzini is mesocephalic, while the others, including the female examined by Şenyürek, are dolicocephalic. For the fronto-parietal index, individuals no. 1 and 2 are stenometopic, no. 3 is metriometopic and the female examined by Şenyürek is eurymetopic. All the Öküzini individuals display divergent frontal bone according to the frontal index. The skull according to height-length index is chamaecrane in individual no. 1, and orthocrane in individuals no. 1 and 2, as well as the one examined by Şenyürek. When the height-breadth index is taken into account, individuals no. 1 and 2 are tapinocrane and individual no. 3 and that examined by Şenyürek are metriocrane. The frontal, according to the frontal-sagittal index is orthomethope in all the Öküzini individuals. For estimating the cranial capacity we adopted the formula proposed by Olivier (Demoulin and Olivier 1976) and have found a value of 1422.1 cc. in individual no.1, of 123.6 cc. in individual no. 2 and of 1313.1 cc. in individual no. 3. Şenyürek had found a capacity of 1275.6 cc. in the Öküzini female, according to Pearson's formula.

All the Öküzini individuals, including the one examined by Şenyürek, are of the Mediterranean racial type. Şenyürek assigns the female skeleton found in 1956 to the Eurafican variety of this race. The ones we have examined

seem to be the gracile type of the Mediterranean race.

### *Post-cranial remains*

Foramen olecrani is not observed on the humerus of the Öküzini skeletons we have examined, though it was reported by Şenyürek (1958) in the young adult female. The tuberositas deltoidea is preserved in individual no. 2 and displays a very slight development. The crista musculus supinator on the ulnae displays a normal development. The olecranon and processus coronoideus of the ulna are not separated by a sulcus. This particularity is included in type no. 3 of Ferembach (1974). The linea aspera on the femur displays a slight development. The 3<sup>rd</sup> trochanter on the femur of individual no. 1 has developed into an independent tubercle. On the other Öküzini individuals, the 3<sup>rd</sup> trochanter is not formed. The patella is preserved only in female no. 4 (found in 1997); but no patella bipartita is seen in this individual. Individual no. 3 disposes an incisura supra scapulae instead of the foramen on the scapula.

The ulna is, according to the platoleni index, eurolenial (normal) in individuals no. 1 and 3; platoleni (flattening) in individual no. 2. The femur is normal according to the index of platymeria. The linea aspera displays a weak development according to the plastric index. The tibia displays a platycynemic structure according to the cynemic index in all the Öküzini individuals.

### *Stature*

The height estimates we have obtained from the Öküzini individuals and the formulae according to which they are computed are given below:

OK'94 No. 1 male: 165.3 cm. according to Pearson; 169.2 cm. according to Trotter-Gleser. The average stature is 167.2 cm. The maximal length of the femur was taken into account.

OK'97 No. 3 female: 153.6 cm. according to Pearson (using the humerus and the radius); 160.08 cm. according to Trotter-Gleser (using the radius, ulna and the humerus). The average stature is 156.8 cm.

OK'97 No. 4 female: 156 cm. according to the Trotter-Gleser formula and 148.7cm according to the Pearson's formula. The average stature is 152.3 cm. The humerus and radius bones were used.

The female examined by Şenyürek according to Pearson's formula is found to have an average height of 152.6 cm.

### *Teeth*

On individual no. 1, a total of 10 teeth are present in their alveolar bone, their distribution being 4 incisors and 1 left canine on the maxilla and 1 first, 1 second premolars, 2 first molars and 1 second molar on the mandible. On individual no. 2, 16 teeth are preserved in their alveolar bone; 8 (1 central and 1 lateral incisors, 1 first premolar, 1 first, 2 second and 2 third molars) being on the maxilla and 8 (1 central and 2 lateral incisors, 2 canines, 2 first premolars, 1 second premolar) on the mandible. On individual no. 3, all the teeth with the exception of the lower M3 which was lost post-mortem, are in their alveolar bone. On individual no. 4, there are 7 teeth on the right side (all are preserved except the I2) and 4 teeth on the left side of the maxilla (I1, I2, M1, M2), 7 teeth on the right side (all are preserved except the I2) and 7 teeth on the left side of the mandible (all are preserved except the M3), for a total of 25 teeth preserved in their alveolar bone.

Mesial and distal enamel ridges on the lingual surfaces of the lower incisors of male no. 1 are very slight. The basal ridges have not developed. The marginal enamel ridges on the lingual surfaces of the upper lateral incisors of individual no. 3 are easily noticeable and palpated. We cannot say anything about the degree of development of the lingual marginal ridges and their shovel-shape because of the progressive wear of the upper lateral incisors of individual no. 2. Foramen caecum is observed on the basal parts of the upper lateral incisors of individual no. 3. Because of her early death, the morphological details of the masticatory surface on the teeth of individual no. 4 may be clearly observed. The upper incisors of this individual do not display a shovel-shape. Şenyürek also states that he did not observe the shovel shape in the incisors of the female he examined.

One of the two isolated teeth not belonging to individual no. 1 is a lateral upper incisor and has been given to us with the field designation of OK'94 H6b/1; the other is referred to as OK'95 17A/2. The importance of these two stems from the prominence of the marginal enamel ridges and their marked shovel shapes. In this aspect, they remind one of the upper lateral incisors of the Byblos Chalcolithic people (Özbek 1978). These ridges on the lingual surfaces of the upper incisors are in general more prominent on the laterals than on the centrals (Scott and Turner II 1997).

The lower P2 in individuals no. 3 and 4 display double cusps (buccal and lingual). The occlusal surface of the upper first molars in all

Öküzini individuals have 4 cusps. Hypocones are well developed. No trace of the cusp of Carabelli is detected. The upper first molar of the female examined by Şenyürek also lacks this trait. The hypocone shows a gradual reduction from the first to third molars. Şenyürek (1958) also observed this diminishing process in the young Öküzini female. On individual no. 2, the hypocone has totally disappeared on the M3 and the crown has assumed a triangle-like shape. The same property is observed by Şenyürek (1958) on the individual he examined. This structure occurring on the upper molars is totally modern (Özbek 1976). On individual no. 4, though four cusps are observed, both on M2 and M3, the hypocone and the metacone display a tendency of reduction. The reduced metacone is also indicated by Şenyürek (1958) on the young adult of Öküzini. On individual no. 3, the lower M1 has 4 cusps and displays a Y4 plan. On individual no. 4, the chewing surface of the M1 displays a Y5 plan and a connection of md=hd is present. The hypoconulide is in a disto-buccal position. On the lower M2, a +4 plan on the right and a Y4 plan on the left are distinguished. On individual no. 3, 4 cusps are present on the lower M2 and 5 on the M3. The existence of 5 cusps also characterizes individual no. 4. The hypoconulide is much reduced in these individuals. The third molars have made their normal eruption on the upper and lower jaws. Thus, no mention of hypodontia can be made.

The wearing facets of the teeth on the upper and lower jaws of individual no. 1 suggest an occlusion of the labiodontic type.

## **PATHOLOGY**

### *Skulls*

No obvious pathological lesion or traumatic injury was observed on the crania of individuals no. 1, 2 and 4. As for individual no. 3, cribra orbitalia of the trabecular type is formed on the left and right orbital vaults. In addition, on the squama part of the occipital, near the lambda sutures of the left and right parietals, a slight porotic formation is observed. Concerning the same specimen, no diploic thickening is visible on the cranial bones where porotic formations are formed. We think that these lesions observed on the young adult Öküzini female no. 3 may be due to anemia which is caused by iron deficiency (Steinbock 1976).

### *Teeth*

*Attrition:* In the lower incisors of individual no. 1,

the dentine is totally exposed and corresponds, in general, to score no. 5 of Brothwell. The dentine is also exposed on the lower left canine (score no. 5 of Brothwell). The degree of wear on the upper right P1 corresponds to 5++. The upper M1s correspond to scores 2 or 3, while the upper M2 is similar to score 1 of Brothwell. It may be stated that the anterior teeth preserved on maxilla and mandible are heavily worn when the age of individual is considered (Table : 4). In individual no. 2, the maxillar incisors correspond to the score 5 of Brothwell; the P2 is similar to score 4; the M1 and M2 correspond to the score 2, and the M3 to the score 1. Taking into account the difference in the intensity of wear between the M2 and M3, we may state that the rate and the extent of wear of the teeth of the Öküzini female is not excessive. In the mandible, the incisors correspond to score 5; the canines to 4+; the P1s to 3 and P2s to 2+. When the teeth of the lower and upper jaws are evaluated together, it may be stated that the wear is normal for the age of individual. The wear in individual no. 3 is slight when the age is taken into consideration. Since it is a young adult, the wear is generally slight in individual no. 4. The wear stades for the Öküzini teeth according to Brothwell (1981) and Bouville *et al.* (1983) are given in Table 4.

The isolated deciduous maxillary central incisor found in the soil filling during the 1997 field season (ref. H12d AH4/GHO) is worn up to the neck and the pulp is totally exposed. A typical wear *en cuvette* is in question. One thinks that the tooth might have been used for a purpose other than feeding. An obvious notch is seen on the mesial corner of the isolated maxillar left central incisor belonging to another individual which was unearthed in the same layer (Fig. 2). This notching area, which displays marked traces of wear, seems to have been formed during the lifetime of the individual. The general aspect of the worn incisor suggests that it might have resulted from an extra-masticatory function. The researchers evaluate such task-related wear among cultural behaviors (Milner and Larsen 1991). The description of this type of notching observed by Larsen and Thomas (Milner and Larsen 1991) on the mesial corner of a maxillar right central incisor belonging to a female discovered in a prehistoric settlement on the coastal side of Georgia, U.S., is the same as that of Öküzini. The researchers explain these erosions on the anterior teeth by the habit working on fishing nets or fibrous plants while holding them between the teeth. On the other hand, Scott and Turner II (1997), who have observed similar notches on the maxillary incisors of the Eastern Asian Goldi population, account for such tooth modifications as

due to the habit of pipe smoking.

**Caries:** 3 out of 10 teeth of the upper and lower jaws (upper P2, upper left and right M1s) of individual no. 1 had developed caries. The crown of the upper P2 is totally lost; the carious lesion had progressed up to the root and the pulp is largely exposed. The keeping of this tooth with pulpal inflammation in the mouth must have been a very painful situation for individual and this suggests to us that tooth extraction was unknown at this period. Furthermore, X-rays of the mandible in lateral view show no residues of the apex and this is indicative of the absence of tooth-extracting practices (Nelson *et al.* 1999). On the buccal surface of the upper right M1, the caries developed into a cavity involving partly the neck. The length of this cavity is 5.83 mm. and its width is 3.37 mm. The beginning of a caries may be observed on the occlusal surface of the same tooth. Also there is a slight trace of caries on the crown of the upper left M1. No signs of carious lesion were found on the teeth of individuals no. 2 and 4. On skeleton no.3, the lower right M3 displays a moderate caries on the occlusal surface. The distal surface of the maxillar left P1 disposes a caries in the form of a cavity near the neck; the pulp is exposed. The caries of the P1 has spread towards the root and a slight carious lesion has started on the mesial surface of the P2.

**Ante-mortem tooth loss:** The most striking pathological condition of male no. 1 is the high number of ante-mortem tooth losses (Fig. 3a,b). 11 teeth (P1, P2, M1, M2 and M3 on the left; C, P1, P2, M1, M2 and M3 on the right) of the mandible and 9 teeth (I1, I2, C, P1, P2 on the left; I1, I2, C and M2 on the right) of the maxilla were lost, making a total of 20 teeth during the lifetime of individual. For this reason, the alveolar resorption is progressed considerably on the level of the lost teeth, suggesting that individual lived quite a long time after the loss of his teeth. Advanced caries or a periodontal disease may account for the ante-mortem tooth loss of this individual. Şenyürek (1958) also explains the 4 ante-mortem tooth losses he has observed on the Öküzini female by caries and points out that the individual must have suffered very much from her teeth despite her young age.

In an age as early as the Chalcolithic, for a middle-aged individual (Sk. no.1) the losing of the majority of his teeth long before his death must have seriously hindered the masticatory function. We thus infer that nutritional patterns were negatively affected by this. As a result of having to chew with the palate for a long time, the mandible must have been affected considerably. Thus, the height which is 34 mm at the level of symphysis,

diminished to 17.6 mm at the level where the posterior teeth are lost. Because the cheek teeth were lost at an early age, the masticatory function was largely assumed by the anterior teeth exhibiting in turn their extreme wear, considering the young age of individual.

Concerning female no. 2, 3 teeth (P1, P2 and M1) of the upper and 6 teeth (M1, M2 and M3 of both right and left sides) of the lower jaws were lost ante-mortem. We cannot say much about the M2 and M3, because the part corresponding to these teeth on the upper jaw is broken. The upper P1 is inclined towards the distal side and has formed a contact surface with the M1 to close gap formed by the missing maxillar P2. The left and right molars of the mandible are thought to have been lost long before the death of individual. The alveolar bones of the missing teeth are totally resorbed. This apparent resorption may easily be observed by the X rays. No apical remains of the lost teeth could be detected in the alveolar region of the skeleton no. 1 and this suggests that no tooth extraction was being practiced. The ante-mortem tooth loss may be due to caries and/or periodontitis. The Öküzini female must have continued to chew with her palate for a long time as her mandibular mass is visibly diminished, to the point that the mandibular height is reduced to 17.7 mm on the left side and 15.3 mm on the right. No ante-mortem tooth loss is observed in individuals no. 3 and 4.

**Hypoplasia:** This enamel defect is not detected in individuals no. 2 and 4 but is observed in the form of a band on the upper right and left canines of individual no. 3. By measuring the distance from the middle point of the hypoplastic line to the CEJ on the canine (4.3 mm.) and adapting the value obtained to the regression equation developed by Philip Walker (Goodman and Rose 1991), which is based on the Massler chronology, we found that the enamel defect seems to have been formed approximately at the age of 4-4.5. Thus, the Öküzini individual must have had a chronic infectious disease in his childhood. This negatively affects the activity of the ameloblast cells in the process of the formation of tooth enamel.

**Calculus:** It is observed slightly on the buccal surface near the neck on the lower canine of individual no. 1 and on the right and left sides of the lingual surfaces of the lower I1 and I2 of individual no. 3.

**Periodontitis:** It is not observed on the jaws of individuals no. 1 and 4. The periodontal disease and alveolar bone loss are more prominent in the mandible. The osteitic formation is easily detectable on the upper and lower alveolar bones,

particularly at the level of upper and lower canines. The AC-CEJ (alveolar crest-cemento-enamel junction) dimensions of the teeth still in their alveoles are given in the Table 5. Furthermore, the AC-CEJ distances of the preserved teeth of the upper and lower jaws of individual no. 3 were measured (listed in the same table). It may be inferred that a periodontal disease affects the alveolar bones at the level of maxillar and mandibular central incisors, the upper canine, the lower first premolar, the lower first molar and the upper second molar (Fig.4).

### *Post-cranial remains*

Slight marginal osteophytes are formed on the upper and lower joint surfaces of the thoracic and lumbar vertebrae of individual no. 1. These are generally arthritic changes that develop after the age of 30 (Ubelaker 1989). They become more prominent with increased daily physical activity of individual. The exostoses on the patellae are also striking.

A healed and well aligned fracture is observed on a fragment of rib found on the surface within the same field season (Fig. 5). An apparent and complete callus formation is seen on the region of the trauma but since the piece was quite small, we could not determine to which rib it belongs. No abnormal formation, trauma or pathological lesion was identified on the post-cranial remains of individual no. 2.

A slight periostitis is formed on the posterior surface near the proximal end of the right humerus of specimen no. 3. Traumatic and pathological formations are observed on the preserved fragments of the four ribs. The fracture on one rib which was exposed to a trauma was completely healed and an apparent callus was formed. The rib fractures which are less frequent than those of the limbs in ancient human populations are generally explained by wounds caused by sharp weapons such as arrows. Interpersonal fights have also been invoked by various researchers to account for rib fractures (Roberts and Manchester 1995). On the pieces belonging to the three ribs of the same individual, a bulge that stretches in the form of a regular horizontal band on the inner and outer surfaces attracts attention. The cortical thickening on the broken part seems to indicate that these formations continued on the missing fragment of the ribs. We were unable to account for the etiology of this pathological formation in the literature known to us. May they be lesions caused in the ribs by a chronic infection involving the lungs? Or are they formations developed as a result of a specific or

nonspecific infection? It is difficult to determine. It is not to be forgotten that the same individual displays the cribra orbitalia and porotic formation in the cranium. A chronic infectious disease during a phase in his lifetime may have negatively affected his organism and caused the cribra orbitalia and porotic formation in the cranium while causing local pathological lesions in the skeleton. A slight periosteal lesion on the middle of the right humerus of individual no. 4 is also noteworthy.

### **CONCLUDING REMARKS**

Öküzini cave is situated in Yağca village, 32 kilometers northeast of Antalya not far from the Karain cave. The excavations, interrupted in 1956, were taken over by Prof. Yalçinkaya, from the Ankara University under the auspices of the Museum of Antalya. Öküzini cave is the first sample of intramural burials in Anatolia. The cave, which was partly used as a settlement and partly as a burial ground, has so far yielded 4 *in situ* specimens (dated to the Chalcolithic age) during the 1994-1997 field seasons.

The Öküzini individuals displaying a dolicocephalic structure belong to the Mediterranean racial type. The stature of a male examined is 167.2 cm; and the two females are respectively 152.3 cm and 156.8 cm. Dental and periodontal diseases have been observed on the Öküzini individuals. The rate of caries is 7.3%, which is considered relatively high for that period (Özbek 1995); 6 out of 82 permanent teeth were decayed. Şenyürek (1958) also observed carious lesions on the teeth of the young female he has examined. It may be inferred from these observations that the diet of the Öküzini inhabitants was rich in COH. These people, who must have suffered greatly from toothache during a great part of their lives because of the decays up to the roots and the pulpal exposure causing apical infection, were presumably ignorant of the techniques of tooth extraction. In individuals no.1 and 2 the high number of antemortem tooth loss draws attention; particularly, male no.1 lost a total of 20 teeth during his lifetime, which could have caused a serious problem of nutrition for a middle aged individual. Caries and/or periodontal diseases may account for the antemortem tooth loss in Öküzini.

Anemia caused by the iron-deficiency, healed rib fractures or pathological lesions such as those observed on the ribs of a young female dead at the approximate age of 19 or 20 (OK'97 No. 3) are worthy of note; it is quite probable that these bony lesions were due to specific or nonspecific

infections. Taking into consideration the traces of inflammation on the right arm of the same young female and the lesions on the cranium due to iron-deficiency anemia, it may safely be inferred that this Öküzini female was not in a healthy condition.

The Öküzini excavations continue to yield anthropologically significant skeletal remains. We believe that the human skeletons which we expect to be unearthed during forthcoming excavations will provide us with new clues which will help us achieve a deeper understanding of the lifestyle of the Öküzini population.

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	ÖK'94 No:1	ÖK'95 No:2	ÖK'97 No:3
Maximum cranial length	188.0	181	179
Maximum cranial breadth	143	129.5	134
Po-Br. height (r)	128	115	124
Po-Br. height (l)	120	118	124
Po- Br. projection height	110	105	111
Po-Po breadth	128	104.5	104
Ba-Na. length	-	-	107
Frontal chord	112	98	107
Frontal arc	129	122	127
Parietal chord	113	109	113
Parietal arc	127	132	130
Occipital chord	107	-	-
Occipital arc	134	-	-
Maximum horizontal perimeter	545	507	516
Transverse biporial arc	306	317	-
Maksimum frontal breadth	128	115	116



Minimum frontal breadth	84	85	92
Biasterrionic breadth	91	89	106
Bizygomatic breadth	145	-	-
Nasal height	-	44	48
Nasal breadth	-	18	26
Orbit breadth	-	-	42
Orbit height	-	-	34
Upper facial height	-	-	65
Total facial height	-	-	110
Maximum projective mand. length	-	-	95.5
Bigonial breadth	-	86	85
Bicondylar breadth	-	-	109
Minimum ramus breadth	30.1	24	28
Foramen mentalia breadth	-	38	39
Ramus height	-	-	56
Symphysial height	33.8	-	29
M1-M2 height	-	-	26
M1-M2 thickness	-	-	16
P1-P2 height	-	22	28
P1-P2 thickness	-	4	12
Gonial angle	-	-	118°
Menton angle	-	-	74°
P1-M3 length (maxilla)	-	21.5	39.9
P1-M3 length (mandible)	-	-	43.7
M1-M3 length (maxilla)	-	21.5	26.5
M1-M3 length (mandible)	-	-	30.4
Cephalic index	76.06	71.5	74.8
Fronto-parietal index	58.7	65.6	68.6
Frontal index	65.6	73.9	79.3
Po-Br. height/length index	58.5	58	62
Po-Br. height/breadth index	76.9	81	82.8
Fronto-sagittal index	86.8	80.3	84.2
Parieto-sagittal index	88.9	82.5	86.9
Occipito-sagittal index	79.8	-	-
Transversal facial-cranial index	101	-	-
Nasal index	-	40.9	54.1
Orbit index	-	-	80.9
Mandible length/breadth. index	-	-	112.3

*Table 1.* Measurements (mm) and indices of Öküzini skulls.

ÖK'97 G7-bd M3				ÖK'97 G11-bd M4			ÖK'95 H6a Sk.2			ÖK'94 No:1		
MD	VL	Index		MD	VL	Index	MD	VL	Index	MD	VL	Index
<b>MANDIBULAR DENTITION</b>												
I1	5.29	5.99	31.68	5.87	6.45	37.86	-	-	-	50.1	6.29	31.51
I2	5.92	6.93	41.02	7.17	6.51	46.67	6.26	6.11	-	5.70	6.49	36.99
C	6.30	7.57	47.69	6.58	8.58	56.45	6.28	7.29	-	-	-	-
P1	6.56	7.71	50.57	6.77	7.58	51.31	6.20	7.21	-	-	-	-
P2	5.63	7.72	43.46	6.61	7.82	51.69	6.76	7.66	-	-	-	-
M1	9.51	10.52	100.04	12.07	10.75	129.75	-	-	-	-	-	-
M2	9.78	10.07	98.48	10.45	10.01	104.60	-	-	-	-	-	-
M3	9.36	9.20	86.11	10.52	9.79	102.99	-	-	-	-	-	-
<b>MAXILLARY DENTITION</b>												
I1	8.30	7.49	62.16	9.06	7.15	64.77	-	-	-	-	-	-
I2	6.25	-	-	7.49	6.59	49.35	-	-	-	-	-	-
C	7.45	8.11	60.41	7.70	8.89	68.53	-	-	-	-	-	-
P1	6.55	9.30	60.91	6.91	8.84	61.08	-	-	-	-	-	-
P2	6.33	8.54	54.05	6.11	9.02	55.11	-	-	-	-	-	-
M1	8.82	10.70	94.37	10.59	11.91	126.12	9.38	10.39	97.45	-	-	-
M2	8.38	9.94	83.29	9.77	10.96	107.07	8.86	10.30	91.25	9.76	11.42	111.45
M3	7.16	9.80	70.16	7.64	9.72	74.26	8.66	9.78	84.69	8.30	10.20	84.66

*Table 2.* Mesio-distal and bucco-lingual crown diameters and robustness index in Öküzini specimens.

	ÖK' 94 No:1	ÖK' 97 G7bd No:3	ÖK' 96 No:2
<b>Humerus</b>			
Max. length	-	298	280
Max. diam.	-	18	10.5
Min. diam.	-	14	5
Min. perim..	65	54	50
<b>Radius</b>			
Max. length	244	223	201
Ant-post. diam.	9	9	1.7
Transv. diam.	5.5	12	6.5
Min. perim..	-	37	39
<b>Ulna</b>			
Max. length.	268	243	220.5
Sig. ant.-post.diam.	15	20	10
Sig. transv. diam.	14	18	7
Diaphys. ant.post.diam.	9	13.5	3
Diaphys. transv. diam.	5.5	10	5.7
Min. perim.	39	35	31
<b>Femur</b>			
Max. length	447	-	396
Diaphys. ant-post. diam.	20	-	16
Diaphys. transv. diam.	18.5	-	17
Ant.-post.diam. under troch.	22	-	19
Transv. diam. under troch.	30	-	24
Min. perim.1/2	87	-	81
<b>Tibia</b>			
Max. length.	-	-	324
.Ant.-post.diam. foram. nutri.	31	-	21.5
Trans. diam. foram. nutri.	18	-	13
Min. perim..	85	-	70
<b>Fibula</b>			
Max. length	-	-	316
Min. perim.	-	-	35

**Table 3.** Measurements (mm) and indexes of the long bones from Öküzini.

	ÖK'94 No:1		ÖK'95 No:2		ÖK'97 No:3		ÖK'97 No:4	
	Man	Max	Man	Max	Man	Max	Man	Max
<b>I1</b>	5	-	5	5	2	1	2	1
<b>I2</b>	4+	-	5	5	1	1	1	1
<b>C</b>	5	-	4+	-	1	1	1	1
<b>P1</b>	-	5++	3	-	1	1	1	2
<b>P2</b>	-	-	2+	4	1	1	1	2
<b>M1</b>	-	3-	-	2	2	3	1	2
<b>M2</b>	-	1	-	2	1	1	1	1
<b>M3</b>	-	-	-	1	1	1	-	-

**Table 4.** Wear scores of the permanent teeth in Öküzini Specimens.  
(after Brothwell [1981] and Bouwille *et al.* [1983]).

ÖK'97 No:3			<b>I1</b>	<b>I2</b>	<b>C</b>	<b>P1</b>	<b>P2</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>
	Mand	L	3.20*	2.67	-	4.08*	2.86	2.19	2.35	
		R	3.21*	2.92	-	3.58*	2.43	3.24*		
	Max	L	3.70*	2.48	3.34*					2,77
		R	-	-	-	2.55	2.11	3.02*	4.09*	
ÖK'95 No:2	Mand	L	-	-	-					
		R	-	-	-					
	Max	L	-	-	-					
		R	-	3.0*	3.9*	3.90*	6.30*	4.90*	5.40*	2,8

\* We adopted as criteria 3+ mm in the CEJ-AC distance and osteitic aspect on the alveolar margin.

**Table 5.** Values of the AC-CEJ in Öküzini jaws.

# APPENDIX. Isolated Human Bones from Öküzini.

<b><u>1994 Excavation Season</u></b>	<b>Bones</b>
15c/1	1 foot phalanges bone
15c/3	1 foot phalanges bone
16c/1	1 hand phalanges bone
H6b/1	1 right upper second incisor
H6d/3	1 right upper canine
16c, AH:3, plan 2	1 foot phalanges bone
16a/2	1 hand phalanges, 1 metacarpal bone
H6d, AH:3, plan 2	1 metatarsal bone
<b><u>1995 Excavation Season</u></b>	
17A/2	metacarpal bones, ankle and wrist bones, left upper second incisor
H11b/4	1 hand phalanges bone
17/2	hand phalanges
<b><u>1996 Excavation Season</u></b>	
H10d/4	1 right radius
H9c/4, AH:4, GH:I	4 foot phalanges
G7b, AH:3, GH:I	costal bones, 1 left zygomatic, vertebral bones, frg. scapula bones, occipital bones (pars basilaris)
H7A, AH:5, GH:I	1 metatarsal, 1 metacarpal, 1 phalanges and frg. costal bones
H9d/4, AH:4, GH:I	1 phalanges
G8d/5	1 clavícula, 1 hand phalanges
H10d, AH:4, GH:I	1 thoracal vertebra
G7d, AH:4, GH:I	1 thoracal vertebra
H9b/4	9 metatarsal bones, 6 foot phalanges, 2 talus, 10 ankle bones, 1 metacarpal
16c/17c/17a	1 patella, 1 humerus, 4 phalanges, 1 metacarpal, 2 foot phalanges
H7a/3, AH:3, GH:I	2 hand phalanges
H9a/4, AH:4, GH:I	1 tibia (distal part)
H11a, AH:4	2 foot phalanges, 1 metacarpal, costal bones, vertebral bones
G11b, H6c, AH:3	1 upper canine, 1 vertical vertebra, 1 wrist bone, 1 hand phalanges, 1 right femur (proximal part)
GH:I, AH:4	1 hand phalanges
H8a/4, AH:4, GH:I	1 costal bone
<b><u>1997 Excavation Season</u></b>	
G8b, AH:3, GH:0	1 costal bone, 2 parietale (child), left lower molar
H12a, AH:4, GH:0	1 phalanges
H12d, AH:4, GH:0	1 metacarpal frg.
H12d, AH:4, GH:0	right upper first incisor (deciduous tooth)
H12a, AH:5, GH:I	left upper first molar (deciduous tooth), 1 humerus (trochlea; child), 1 foot phalanges
H11a, AH:5, GH:I	1 left humerus, 1 thoracal vertebra, sacrum frg., 2 hand phalanges, 1 wrist bone, 2 costal bone frg.



**Figure 1a.** Facial view of the skull no.3. ÖK'97.



**Figure 1b.** Lateral view of the skull no.3. ÖK'97



**Figure 2.** An isolated maxillary left central incisor with notching area. ÖK'96.

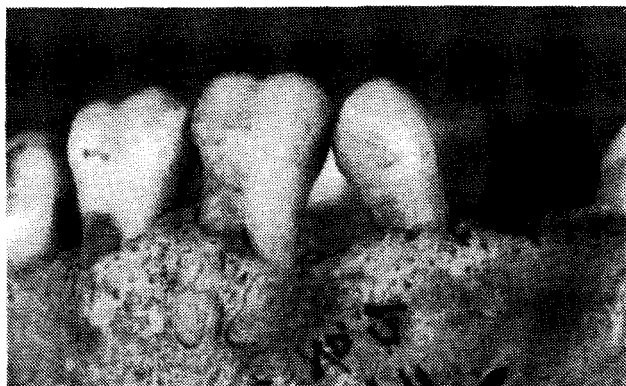


**Figure 3a.** Mandible of the specimen no.1 Antemortem tooth loss. ÖK'94.



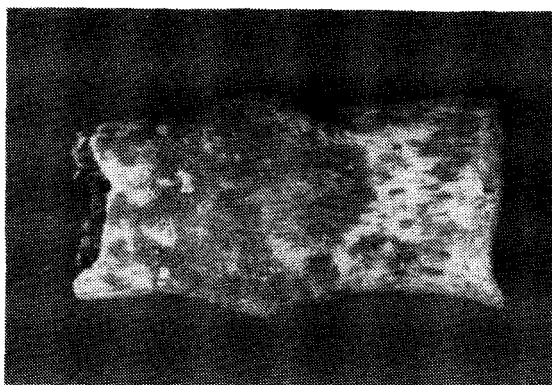
***Figure 3b.***

Mandible of the specimen no.2 Antemortem tooth loss. ÖK'96.



***Figure 4.***

Maxilla of the specimen no.2 Periodontitis. ÖK'96.



***Figure 5.***

A fragment of rib. Healed fracture with callus formation. ÖK'97.