

Analysis of the early childhood from Spanish Bronze Age. Cerro de la Encantada Site.

Francisco Robles Rodríguez

Armando González Martín

Víctor González Cañas

Unidad de Antropología.
Departamento de Biología (UAM).
28049 Madrid.

INTRODUCTION

The populations of the Spanish Bronze Age have been very well studied. We have been allowed to know how the inhabitants from the Iberian Peninsula were by that time through the works of Fuste (1957), Garralda (1974) and Turbón (1977).

However, we unknown the characteristics of the infant population. The burial from Encantada let us study the early childhood in the Bronze Age populations from this area.

The Cerro de la Encantada burial (photo 1) is situated on the hill which is called in the same way, and belongs to the council of Granátula de Calatrava (Ciudad Real). Its geographical guidelines are 38° 49' latitude N and 0° 2' 45'' length W. This assent dates from the Bronze age ($C^{14} = 1380-1340$ a.C.) located in Campo de Calatrava, about 6 km. N from the present river bed of Jabalón river.

Part of the settlement structures found in the Encantada site has been indentified as a temple (Sanchez 1982).

The adult remains are distributed along the hill, buried in pits, while the children are all placed in the same area, and with different types of burials (photos 2, 3). One of them was done into pottery (pithoi) which has preserved these fragile remains from destruction.

MATERIALS AND METHODS

The total population consists of 38 individuals; 28 of them have been dated and sexed. Other 10 adult individuals are too damaged and it has been impossible to determine age and sex. The juvenile population is compound of 9 individuals aged from 8 foetal months to 5 years.

The individual ages have been calculated following the W.E.A. recommendations, by using the dental eruption for people under 18 years and the synostosis of cranial sutures, dental attrition and the changes in the pubic symphyseal face for the rest of the people.

The lengths from the long bones have been measured according to Fazekas' technique (1978) in the infant remains. Due to the great fragility of these remains, some of the long bones are damaged, therefore we have calculated linear regressions to estimate the measures of the incompletely bones, being increased the sample size.

The life table was performed in order to know same demographical data from this population, taking into account that the obtained results can be falsified due to the small sample size.

To compare our individuals we have used the Indian Knoll population (Sundick, 1978) and the Hispano-Moslem population (Robles, 1992). The choice of these populations has been motivated by its high sample size, the temporal proximity of the first one and the mediterranean characteristis of the second population.

The age groups used for this comparisons are the ones proposed by Sundick (1978):

- Stage 1.- Birth - 6 mo.
- 2.- 6 mo. - 15 mo.
- 3.- 15 mo. - 24 mo.
- 4.- 24 mo. - 30 mo.
- 5.- 30 mo. - 42 mo.
- 6.- 42 mo. - 54 mo.
- 7.- 4 1/2 yrs. - 5 1/2 yr.

RESULTS AND DISCUSSION

The table 1 shows the measures of the long bones from this infant population:

TABLE 1. MEASURES OF THE LONG BONES
ENCANTADA POPULATION.

Nº INDV.	AGE	L. HUMERUS	L. RADIUS	L. Ulna	L. FEMUR	L. TIBIA
8	30 - 42 mo.	113	87	95	146	122
19	4 1/2- 5 1/2 yrs.	156	119	133	205	170
26	24 - 30 mo.	106	79	89 *	135 *	112 *
27	30 - 42 mo.	-	-	-	-	-
41	15 - 24 mo.	-	-	-	-	-
44	6 - 15 mo.	80	61	66	94	77
46	0 - 6 mo.	65	50	57	75	63
47	6 - 15 mo.	-	-	-	-	-
49	foetal	53 *	41	49	58	51
51	15 - 24 mo.	92	81	71	114	93
52	0 - 6 mo.	-	-	-	-	-

* * These measures have been estimated by linear regressions from the other long bones.

The life table shows the demographical characteristics of this population (it cannot be made for separated sexes due to the small sample size).

Table II - LIFE TABLE FROM ENCANTADA POPULATION.

EDAD	N	d(x)	l(x)	q(x)	L(x)	T(x)	E(x)
00-04	8	28.57	100	0.2857	428.57	2455.365	24.55
05-09	1	3.57	71.43	0.0500	348.21	2026.790	28.38
10-14	1	3.57	67.86	0.0526	330.36	1678.575	24.74
15-19	0	0.00	64.29	0.0000	321.43	1348.210	20.97
20-24	3	10.71	64.29	0.1667	294.64	1026.790	15.97
25-29	3	10.71	53.57	0.2000	241.07	732.145	13.67
30-34	4	14.29	42.86	0.3333	178.57	491.070	11.46
35-39	1	3.57	28.57	0.1250	133.93	312.500	10.94
40-44	2	7.14	25.00	0.2857	107.14	178.575	7.14
45-49	2	7.14	17.86	0.4000	71.43	71.435	4.00
> 50	3	10.71	10.71	1.0000			

N - Number of individuals.

d_x - Percentage of deaths.

l_x - Number of survivors.

q_x - Probability of death.

L_x - Total number of years lived.

T_x - Total number of years lived after life time.

E_x - Life expectancy.

The distribution by age and sex of this population (fig. 1) shows that the number of infants is high; it is also remarkable a second peak in the 20 - 35 aged group, which is represented mostly by female. The probability of death for the first group is as high as the latest age group (fig. 2).

The life expectancy of the first age group (E^o) is 24.55 yr., and the mortality rate is 40.8 %/oo. The E^o calculated by Garralda for people under 10 yr. from the Mediterranean Bronze Age population ($E^o = 30.68$), and the Mezőcsat Bronze Age (Acsadi, 1970) population ($E^o = 28.97$) result to be bigger than the one from our population.

We observed that once passed the first age group, \exists a life expectancy increases over 28 yr. (fig. 3). It is due to the vulnerability of the first age group individuals.

The figures 4 to 9 show the comparisons among the long bones of the studied population. It is noticeable that, for Encantada individuals, the observed measures are always smaller than the comparison populations'. The difference is specially notable in the 15 - 24 months age group. The growth of the long bones in our population is slower in younger ages. Their measures increase rapidly in comparison with the I. Knoll and Hispano-Moslem

individuals over 36 months. It is since this age when it is caused the biggest increase of the life expectancy. The values for the individual number 19 (4 ½ yr. - 5 ½ yr.) are very similar to the values from the other populations.

Part of the differences found among these populations can be explained by diseases which affected to the growth of our individuals. We have been able to determined in some of them environmental stress indicators due to undernourish and infections. We observe the following ones:

- Harris' lines.- They appear as lines or bandes of increased radiopacity in the radiography in the long bones end diaphysis. It is considered as indicator of periods of interrupted growth (Martin, 1985).

The individual number 51 (stage 3, 15 - 24 months) shows these bandes of dense bone in the tibial proximal end (photo 4).

- Porotic hyperostosis.- It is caused by the increase of the production of red blood cells (Martin, 1985).

There are three individuals clearly affected, numbers 27 (stage 5, 30 - 42 months), 44 (stage 2, 6 - 15 months) and 45 (stage 1, 0 - 6 months) (photo 5).

These individuals probably suffered from an iron deficiency (Czerny's anemia), which is more common in neonatal individuals.

Apart from that, the individual number 44 shows the following characteristics :

- Deformation of the craneal vault at parietal level.

- Tibial diaphysis curvature (photo 6).

Both pathologies are symptoms of rickets (Ortner, 1985).

Therefore, we think that this disease in this individual could be caused by any chronic intestinal disorder, which occurs during infancy and early childhood (4 months to 2 - 3 years) (Zimmerman, 1982).

- Enamel hypoplasia.- It is another classical nutritional stress indicator. It appears as transversal lines in the dental enamel (el-Najjar, 1978).

The individual number 8 (stage 5, 30 - 42 months) shows strongly these lines in the upper left central permanent incisor, which had not yet erupted, and it is placed into maxilla. We can infer that the stress stage suffered by this individual was shown a few time before its death (photo 7).

We observe in two individuals (numbers 8 and 26) the permanence of the fontanella major until advanced ages. This could be another indicator of the environmental stress.

CONCLUSIONS.

The high infant mortality rate, the low life expectancy and the low skeletal development in the age group 0 - 4 years, are the indicators of the environmental limitations suffered by this population during the early infance.

All pathologies founded in this individuals are related with environmental stress situations (undernourish, infection and intestinal disorders).

The existence a foetus of eight lunar months found separated from his mother could be an indicator of the problems in the women reproductive stages. These problems could explain the high number of women founded in these stages.

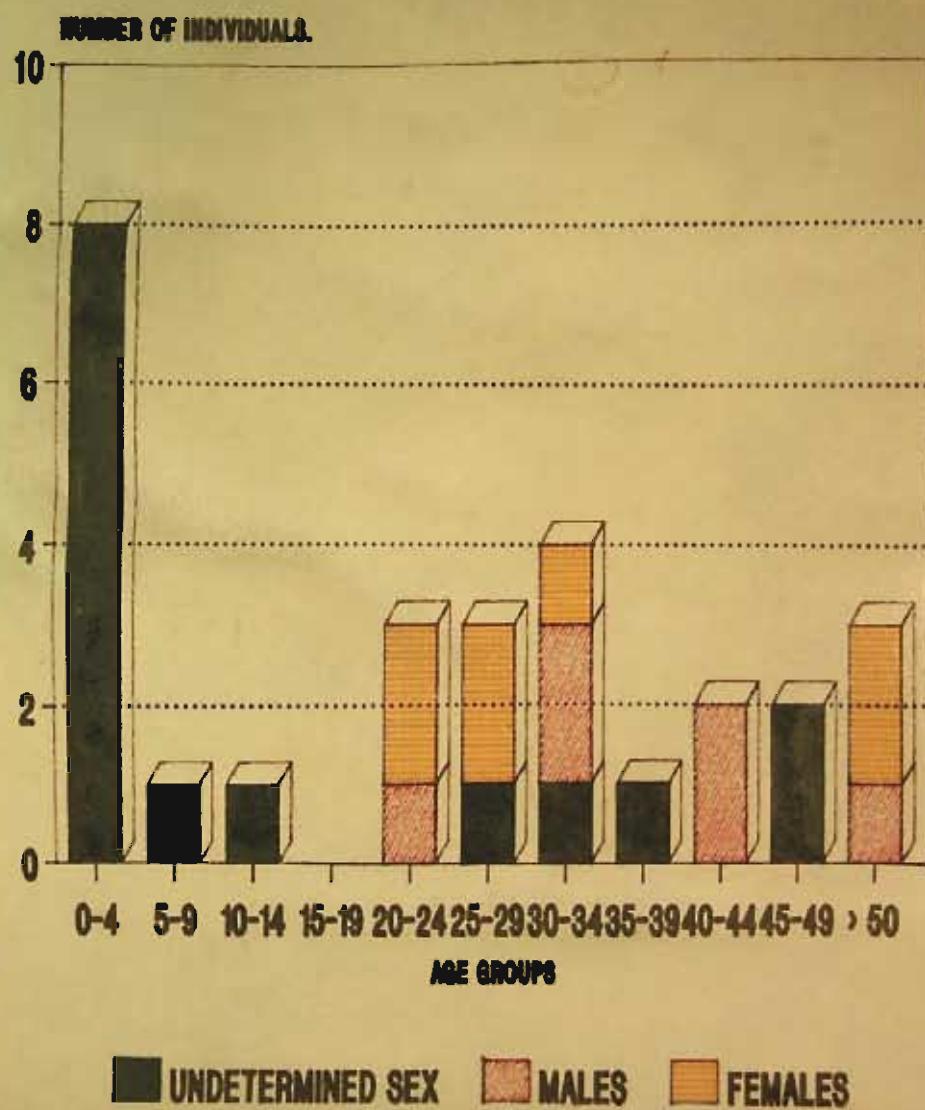
Future studies in the adult population about the indicators of environmental stress and the diseases that those individuals could have, will confirm our conclusions.

REFERENCES.

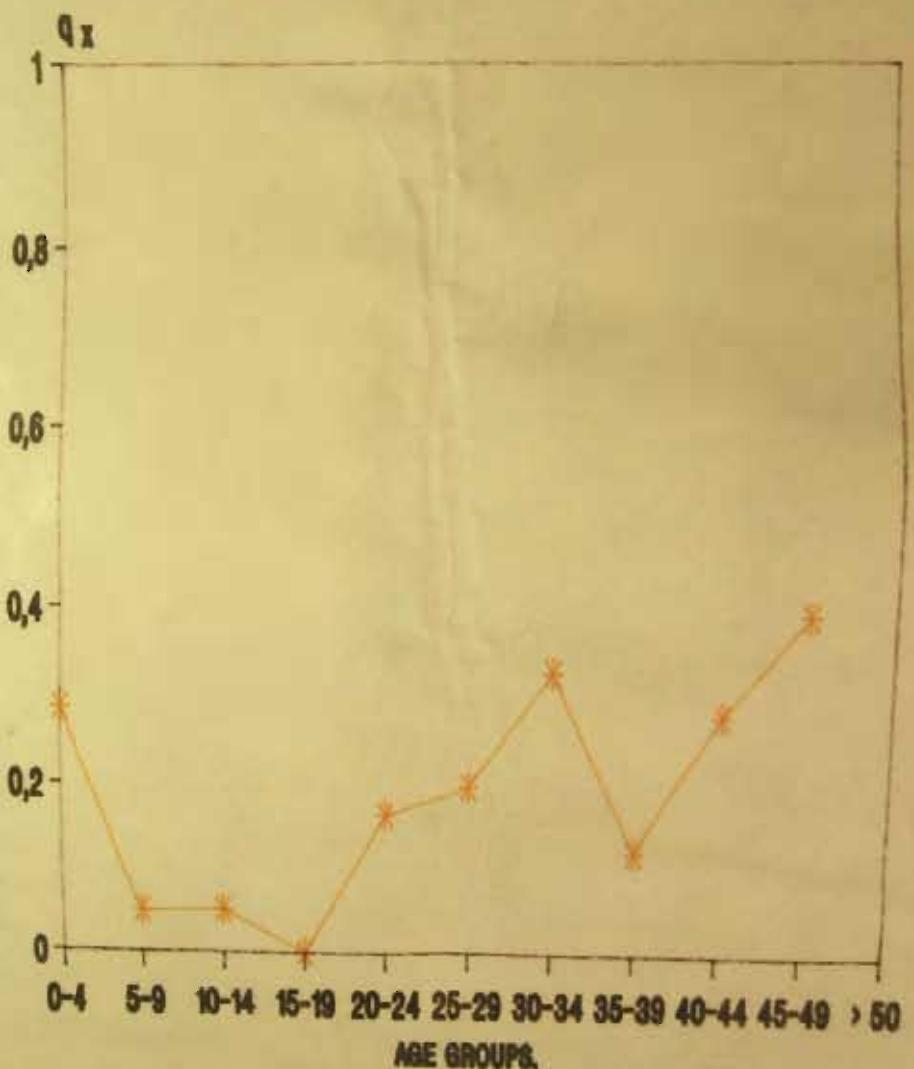
- Acsádi, G.Y. and Nemereskéri, J. 1970. History of Human Life Span and Mortality. Akadémiai Kiadó. Budapest.
- Brothwell, D.R. 1972. Digging up bones. Trustees of the British Museum. London 2d ed.
- El Najjar, M.Y.; Pesanti, M. and Ozebek, L. 1978. Prevalence and possible etiology of dental enamel Hypoplasia. Am. J. Phys. Anthropol., 48: 185-192.
- Pacekas, I.G. and Kósa, F. 1978. Forensic fetal osteology. Akademial Kiadó. Budapest.
- Fusté, M. 1957. Estudio antropológico de los pobladores Neo-Eneolíticos de la región valenciana. Publicaciones del Servicio de Investigaciones Prehistóricas. Serie de trabajos varios, nº 20. 128 pags.
- Garralda, M.D. 1974. Estudio antropológico de la población del Neolítico y Bronce I en la Península Ibérica. Tesis doctoral. Universidad Complutense de Madrid.
- Johnston, F.E. and Zimmer, L.O. 1989. Assessment of growth and age in the immature skeleton. Reconstruction of life from the skeleton. Iscan, M.Y. eds. Pp: 11-21.
- Krogman, W.M. and Iscan, M.Y. 1986. The human skeleton in forensic medicine. Springfield, IL.; Charles C Thomas Publ.
- Martin, R. and Saller, K. 1957. Lehrbuch der Anthropologie. Gustav Fischer, Editor. Stuttgart.
- Martin, D.; Goodman, A. and Armelagos, G. 1985. Skeletal pathologies as indicators of quality and quality of diet. The analysis of prehistoric diets. Gilbert, R. and Mielke, J. Editors Pp: 227 - 270.

- Navarro, J. 1984. El cementerio Islámico de San Nicolás: Aspectos Arqueológicos. Memoria preliminar. Actas I Congreso Español de Arqueología Medieval. Zaragoza, pp: 7-37.
- Ortner, D. J. and Putschar, W. G. J. 1985. Identification of Pathological Conditions in Human Skeletal Remains. Smithsonian Institution Press. Washington.
- Robles, F.J., Gonzalez, V.M., Perez-Juana, A., Esteban,C; Gonzalez, A., Magan, L. 1992. Development and growth at Hispano-Moslem subadult's population. Journal of Human Ecology, vol. 2, nº 3-4. Universidad Autónoma de Madrid, Spain.
- Sanchez Mesequer, J.; Fernandez, A.; Galan, C.; Poyato, C.; Romero, H. 1982. El Oficio y la Encantada: Dos ejemplos de culto en la Edad del Bronce en la Península Ibérica. XVI Congreso Nacional de Murcia. Zaragoza.
- Sundick, R.I. 1978. Human skeletal growth and age determination. Homo 29: 228-249.
- Turbón, D. 1977. La población catalana en la Edad del Bronce. Estudio antropológico. Tesis doctoral. Universidad de Barcelona.
- Ubelaker, D.H. 1978. Human Skeletal Remains. Manual of Archeology 2. Taxacum ,Washington.
- W.E.A., 1980. Recommendations for age and sex diagnoses of skeletons. J. of Hum. Evol., 9: 517 - 549.
- Zimmerman, M.R. and Kelley, M.A. 1982. Atlas of Paleopathology. New York: Praeger.

**FIG.1 DISTRIBUTION BY AGE AND SEX
ENCANTADA POPULATION.**



**FIG.2. PROBABILITY OF DEATH
FROM ENCANTADA POPULATION.**



**FIG.3. LIFE EXPECTANCY
FROM ENCANTADA POPULATION.**

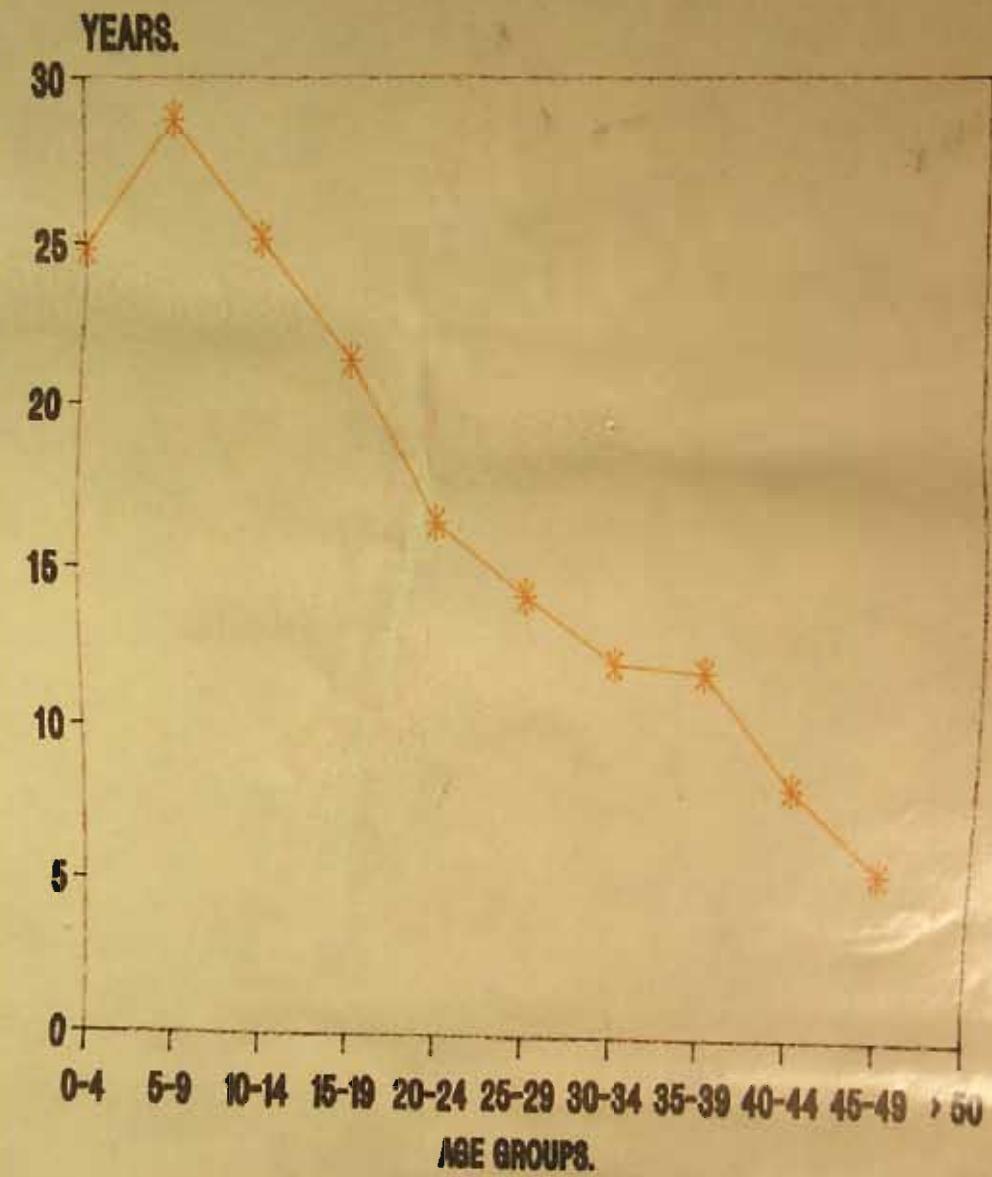


FIG.4. HUMERUS.
A comparison between populations.

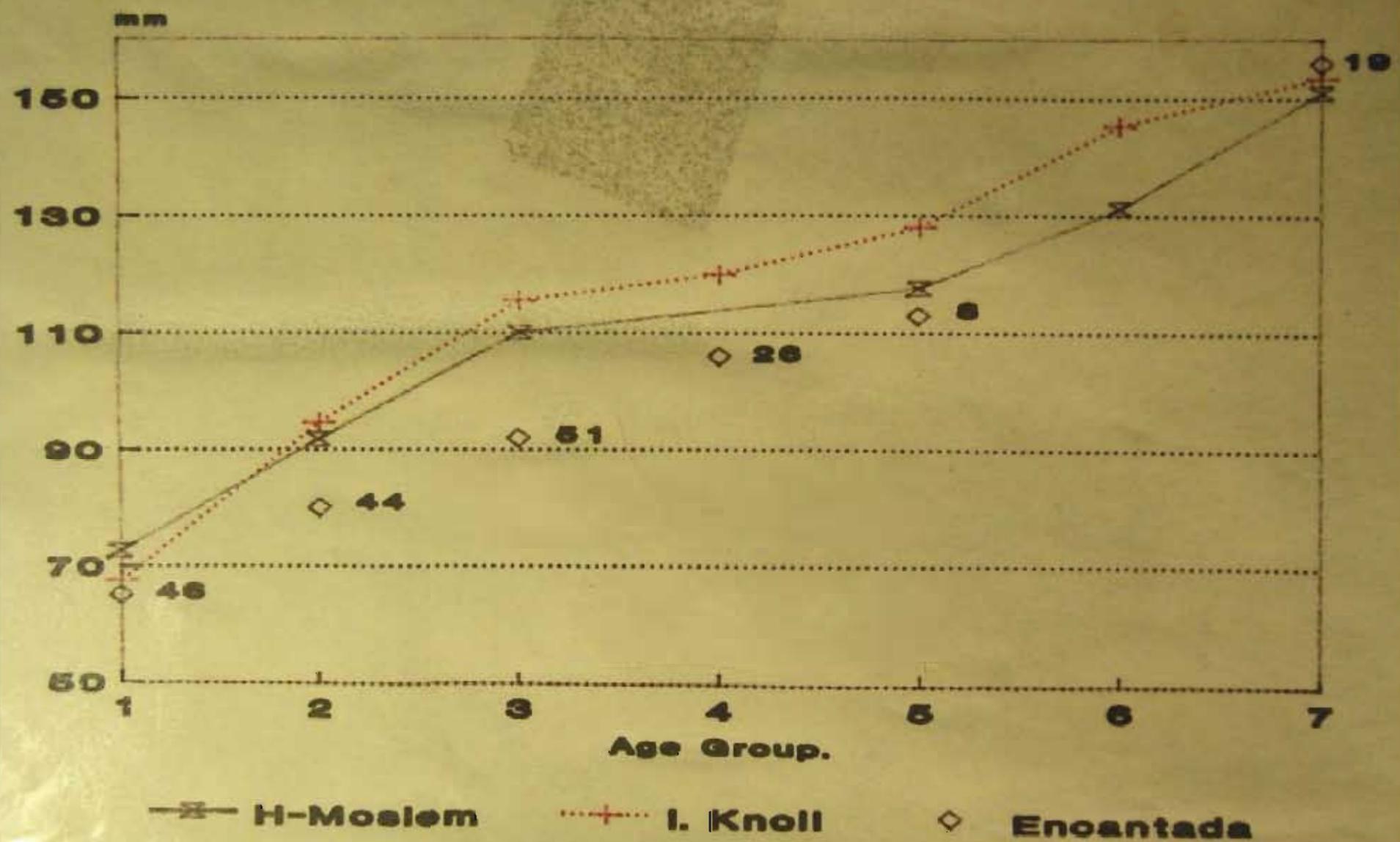


FIG. 5. ULNA.
A comparison between populations.

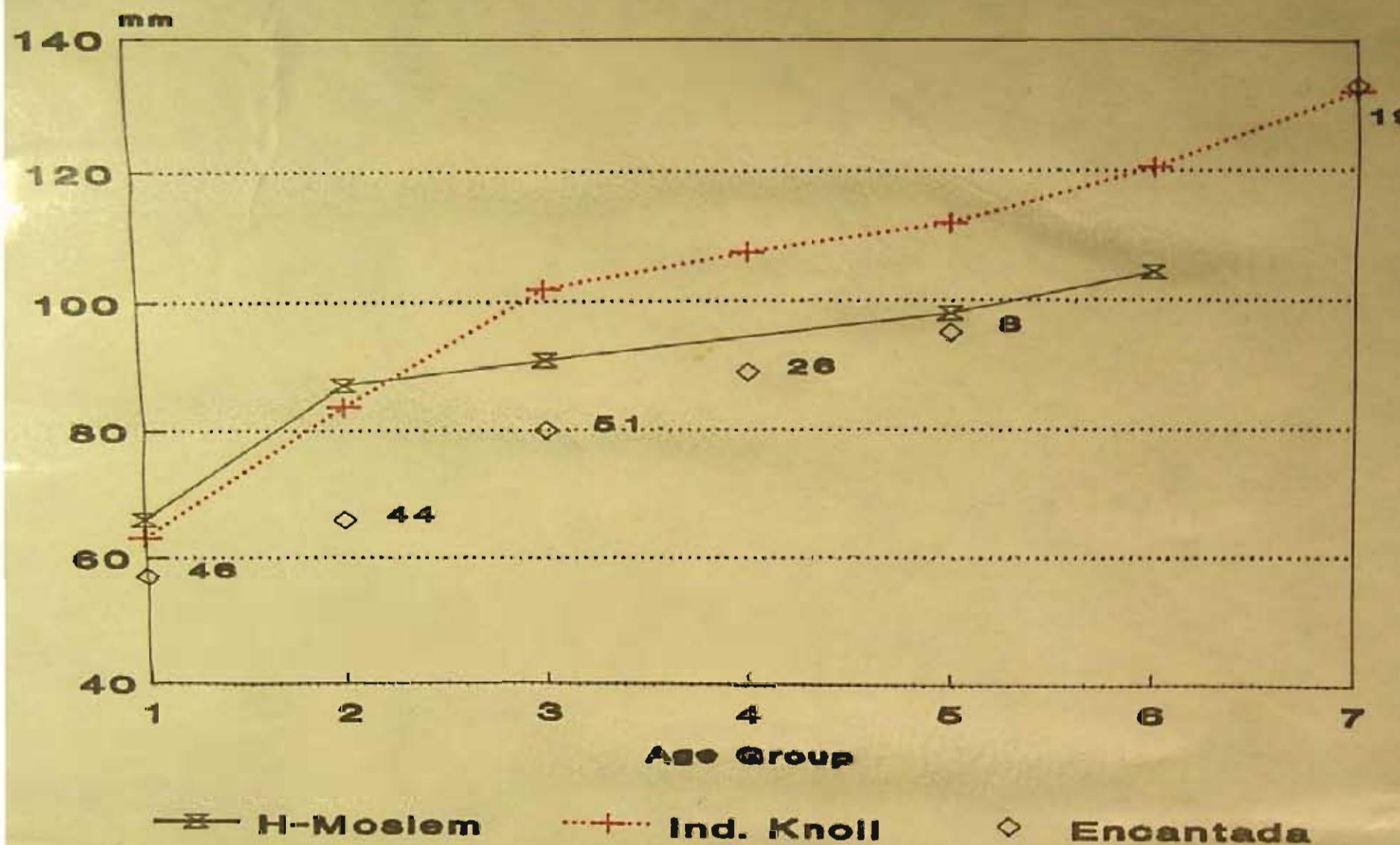


FIG. 6. RADIUS.
A comparison between populations.

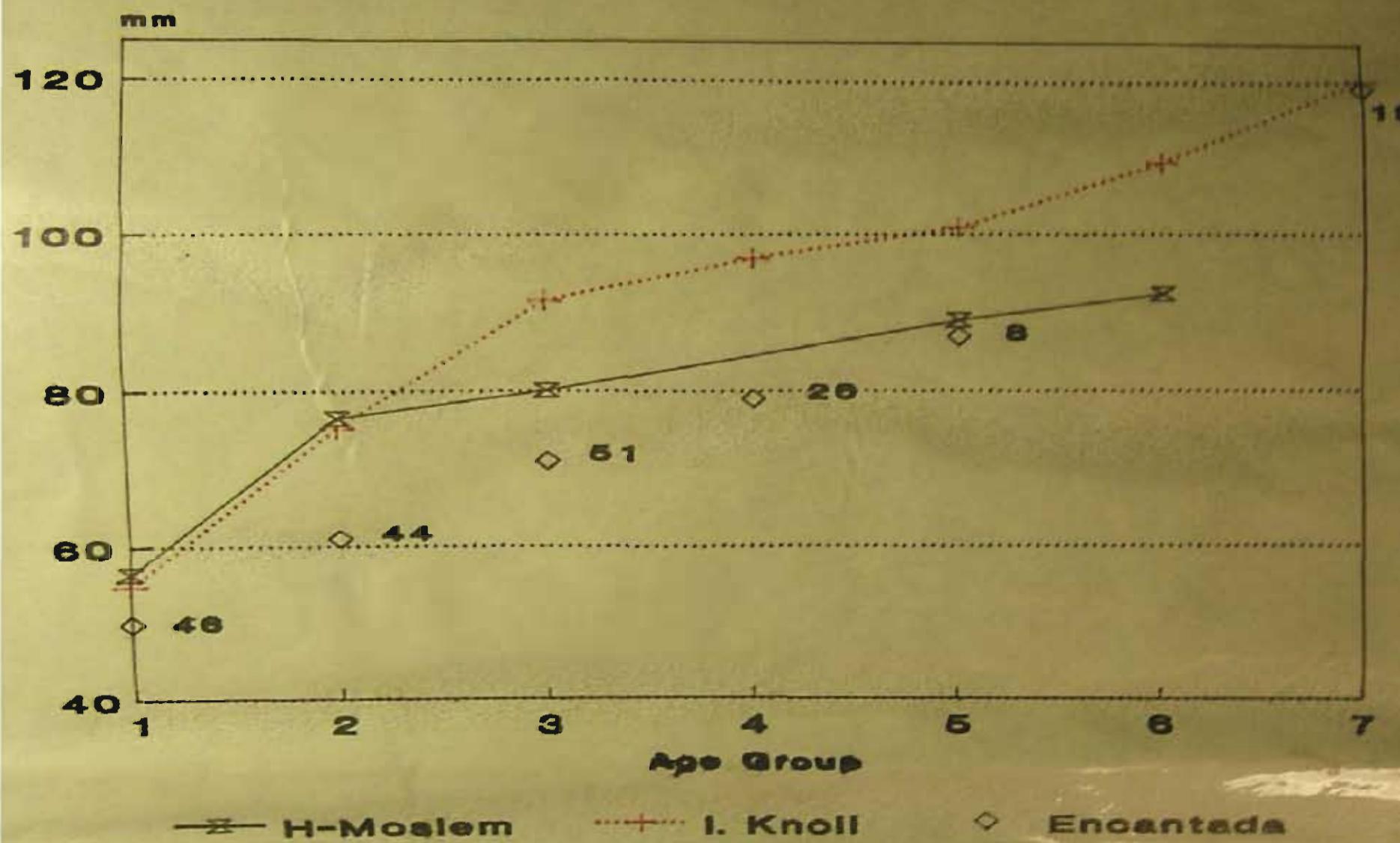
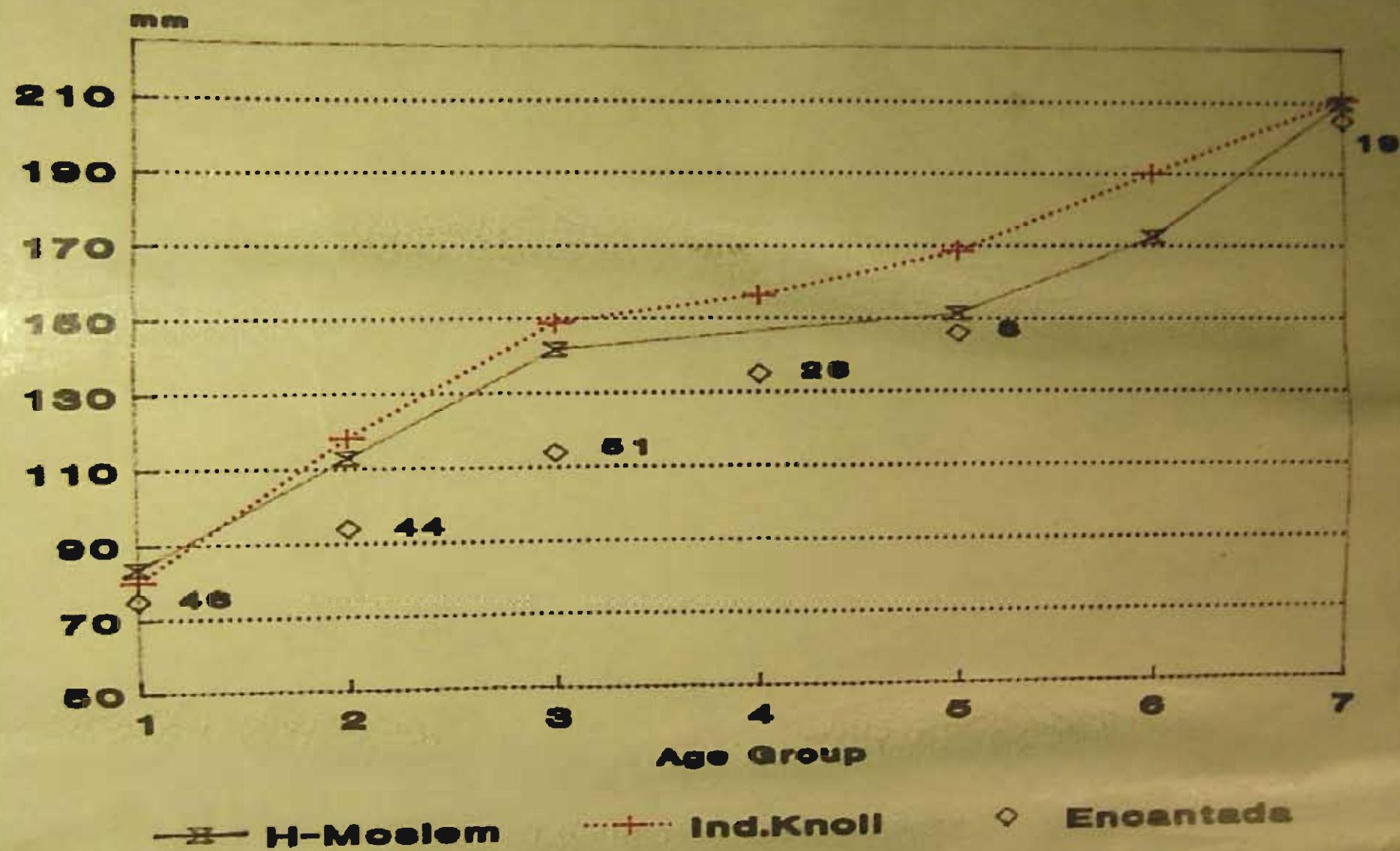


FIG.7. FEMUR.
A comparison between populations.



**FIG.8. TIBIA.
A comparison between populations.**

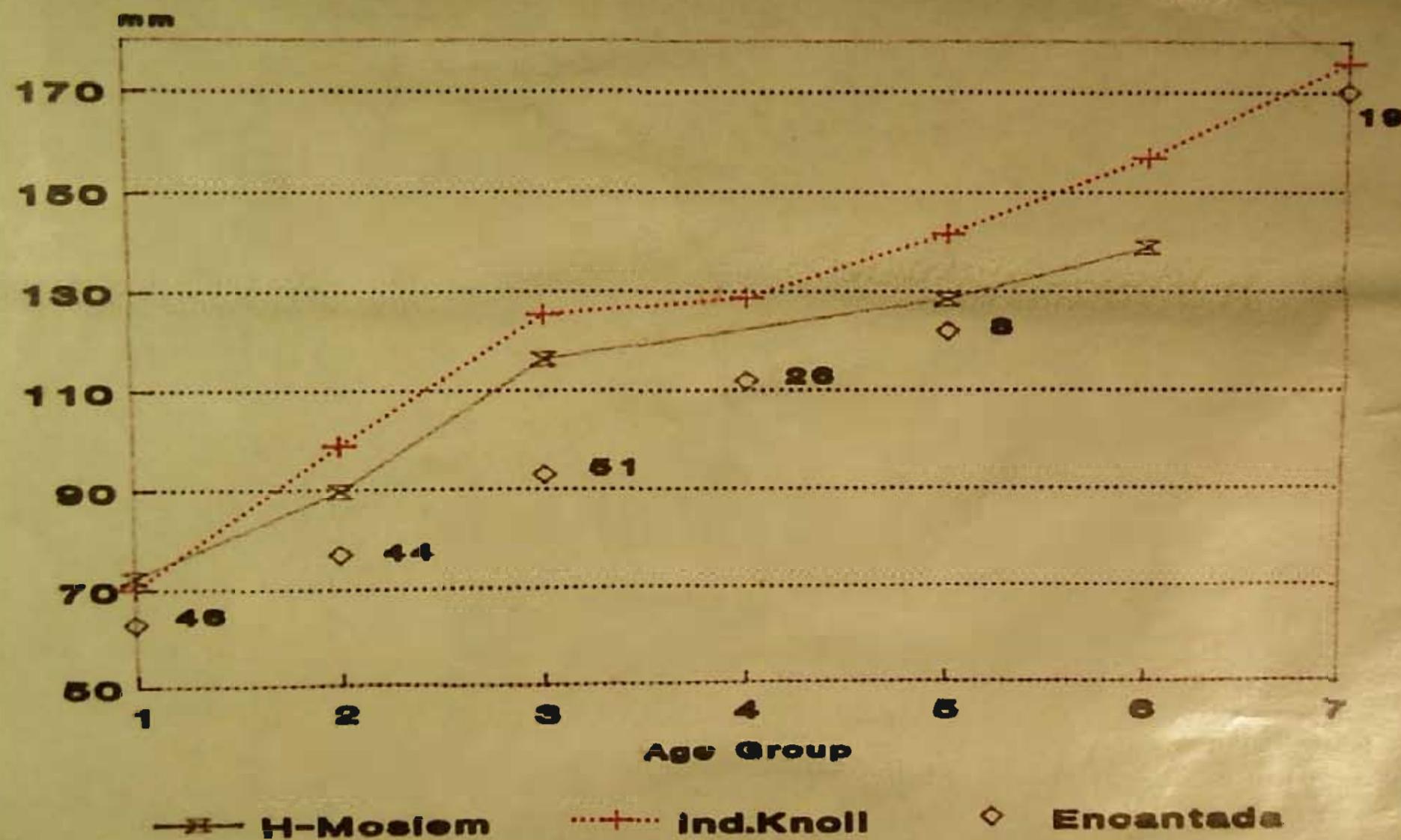




Photo 1. A general view of the Cerro de la Encantada site.



Photo 2. Inhumation in a pit (n°44)

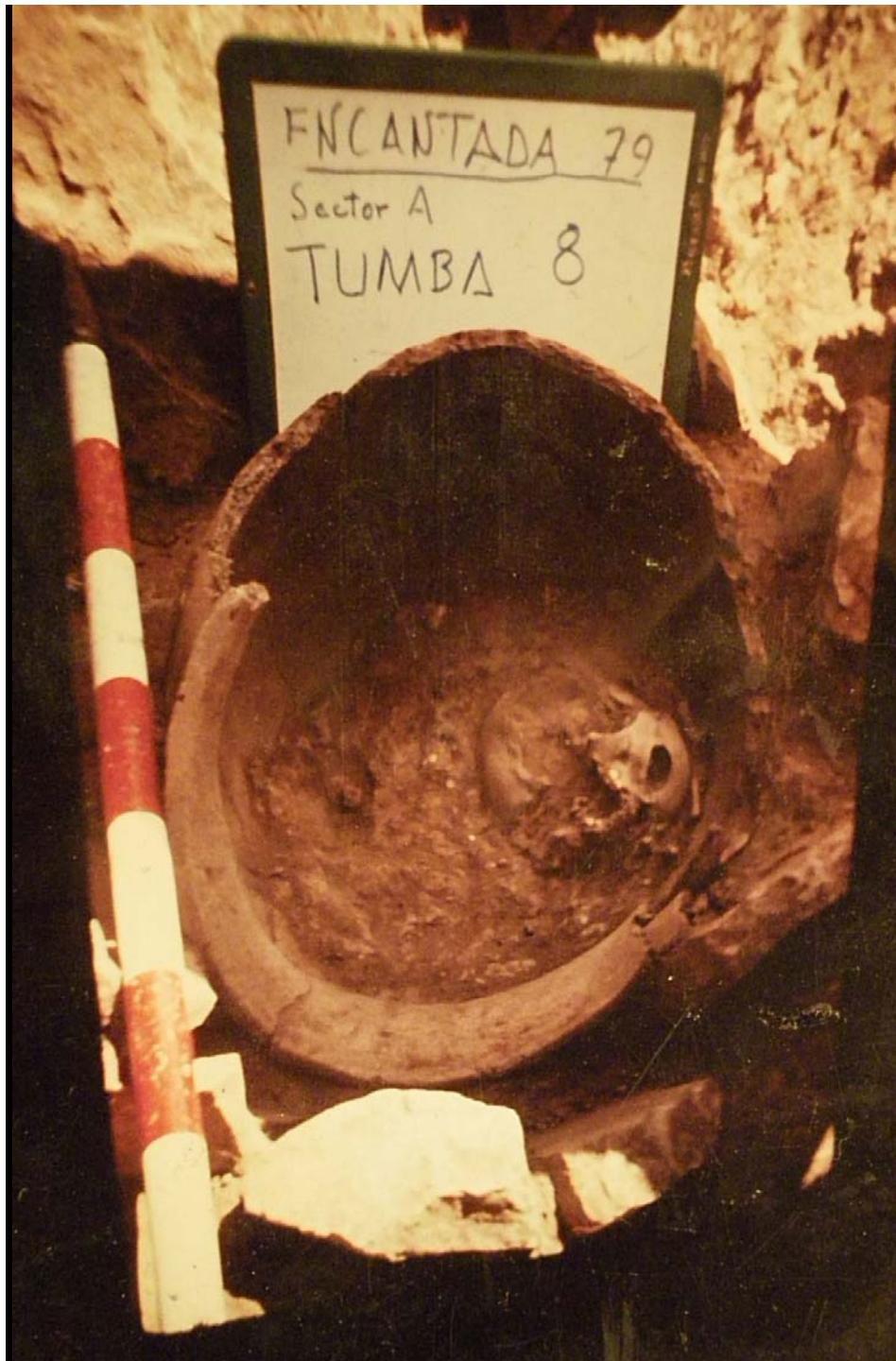


Photo 3. Inhumation into pottery (Pithoi)
(Nº 8).



Photo 4. Radiogram of the left tibia showing Harris lines (Nº 51).

Photo 5. Porotic Hyperostosis on the Frontal bone (Nº 44)

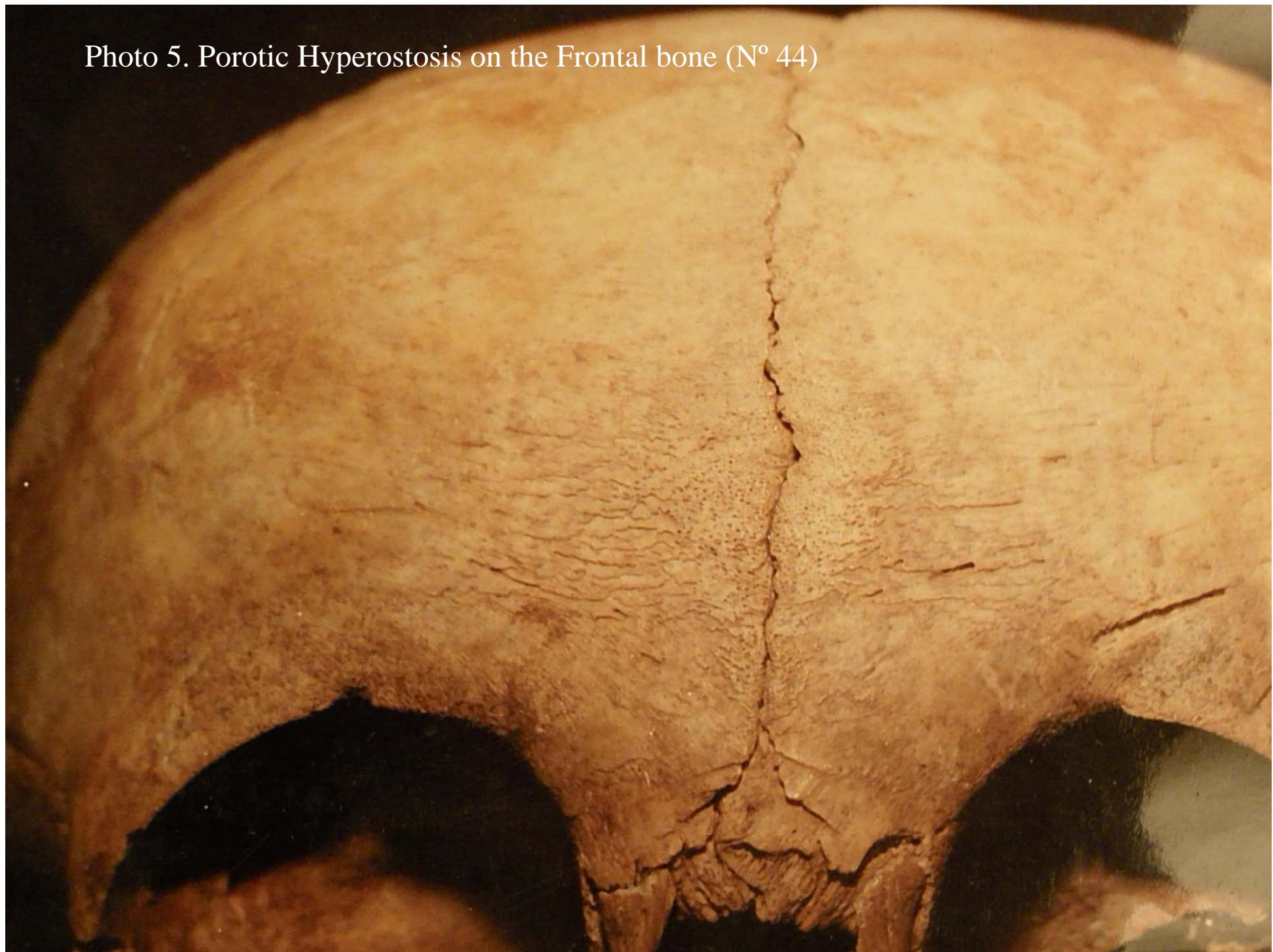


Photo 5 (bis). Porotic Hyperostosis on the Parietal bone (N° 44)

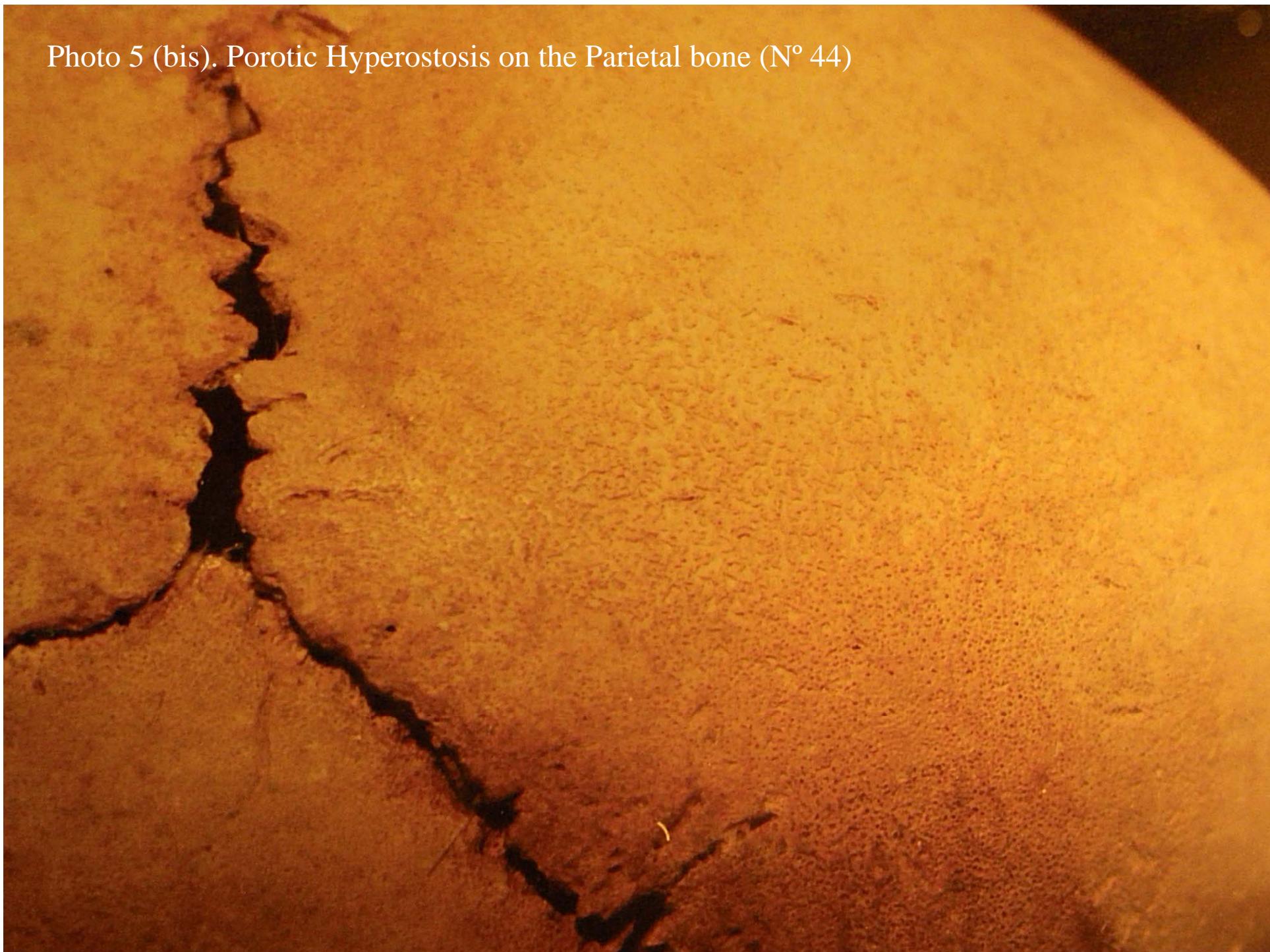




Photo 6. Curvature of the both
tibia diaphysis (Nº 44)

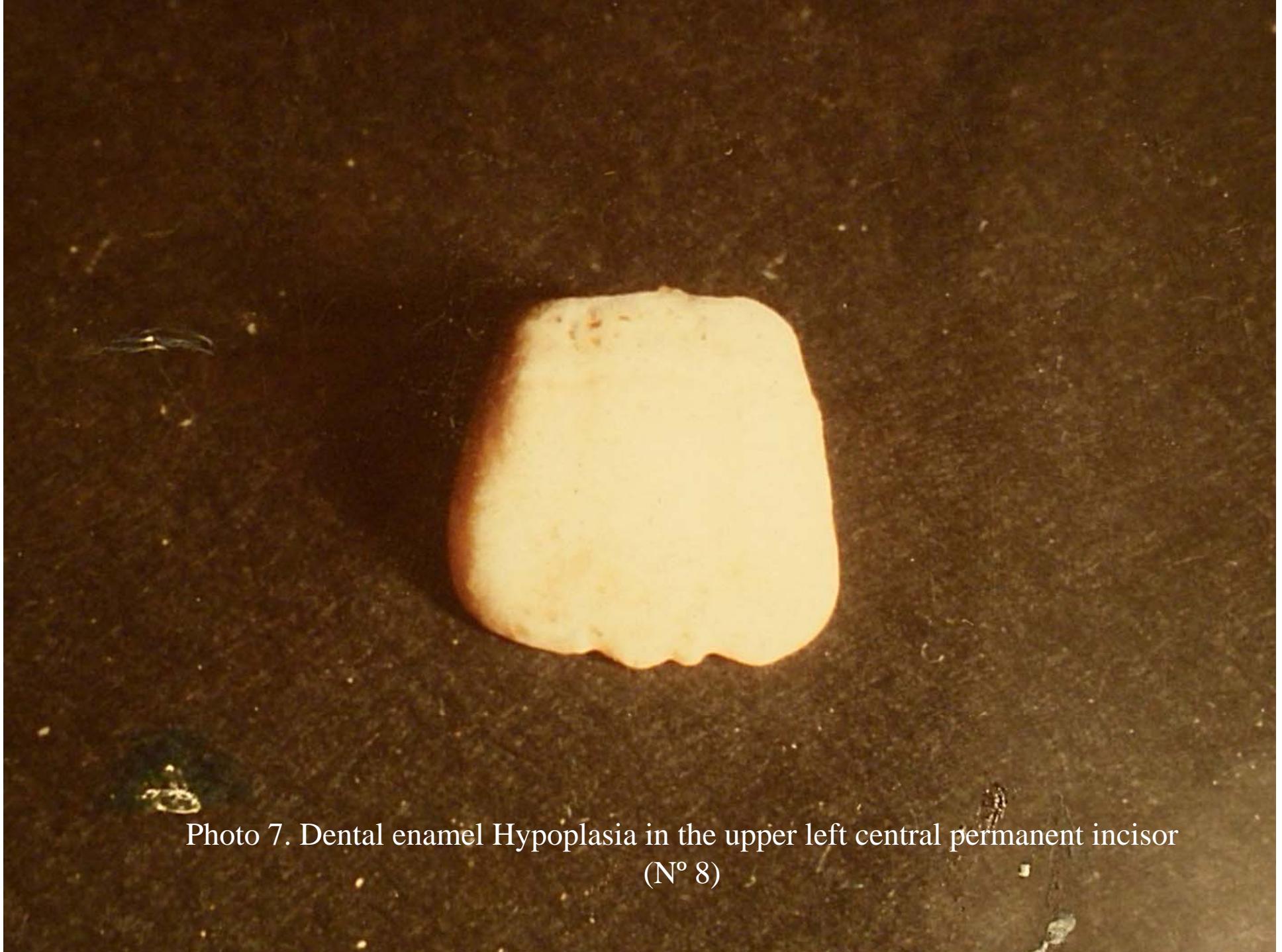


Photo 7. Dental enamel Hypoplasia in the upper left central permanent incisor
(Nº 8)