

# Tooth wear and evidence of non-masticatory dental use in Late Neolithic individuals exhumed from the artificial cave of Baútas (Lisbon, Portugal)

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## INTRODUCTION

Recent reanalysis of the human remains unearthed from the artificial cave of Baútas (Lisbon, Portugal), included the analysis of the dental remains to assess information about tooth wear patterns and non-masticatory behaviour of these Late Neolithic individuals. Presently, the human bones recovered from this hypogeum are curated in the National Museum of Archaeology (Lisbon) and consists of a commingled bone assemblage. The reassessment of the osteological collection revealed a provisional minimal number of 38 individuals based on long bones, value that will be exceeded with the analysis of dental remains.

The aim of this work is to present the preliminary results from the analysis of diverse dental lesions, such as chipping, notches and interproximal grooving of the permanent loose teeth from this collection. The obtained results will be discuss in terms of dietary habits and possible non-dietary tooth use behaviours in daily activities of these prehistoric individuals.

## MATERIAL AND METHODS

The dental remains from these individuals were recovered mainly as loose ones. In total, around 620 teeth were analysed. These were examined macroscopically and with hand lens. Wear patterns were recorded according to Smith (1984) adapted by Silva (1996), unusual wear were noted following the recommendations of Molnar (1972), chipping and notching were scored according to Bonfiglioli et al. (2004). The number of chips per tooth was recorded as suggested by Belcalstro et al. 2007. Interproximal grooves were registered following Molnar (2011) and Ungar et al. (2001).

## RESULTS

Table 1 summarised the occurrence of dental chipping, notching and interproximal grooving by tooth class of the present sample.

Figure 1: Geographic location of the artificial cave of Baútas.



Figure 2: Upper left central upper incisor (2009.44.1523) displaying small chip on its medial-labial corner.

Chipping affects 12.4% of the teeth (77/622). Anterior upper (Fig. 2) and anterior lower teeth present similar frequency of chipping (17.4% and 17.0%), as well as, the posterior ones (upper – 7.1%; lower – 8.6%).

Statistically significance was found between the frequency of chipping in upper anterior teeth versus lower anterior teeth ( $\chi^2=5.5407$ ;  $p=0.1858$ ) and posterior upper teeth and posterior lower teeth ( $\chi^2=4.1041$ ;  $p=0.42779$ ).

With exception of three teeth, all chips were of small size (Fig.3 and Fig.4).

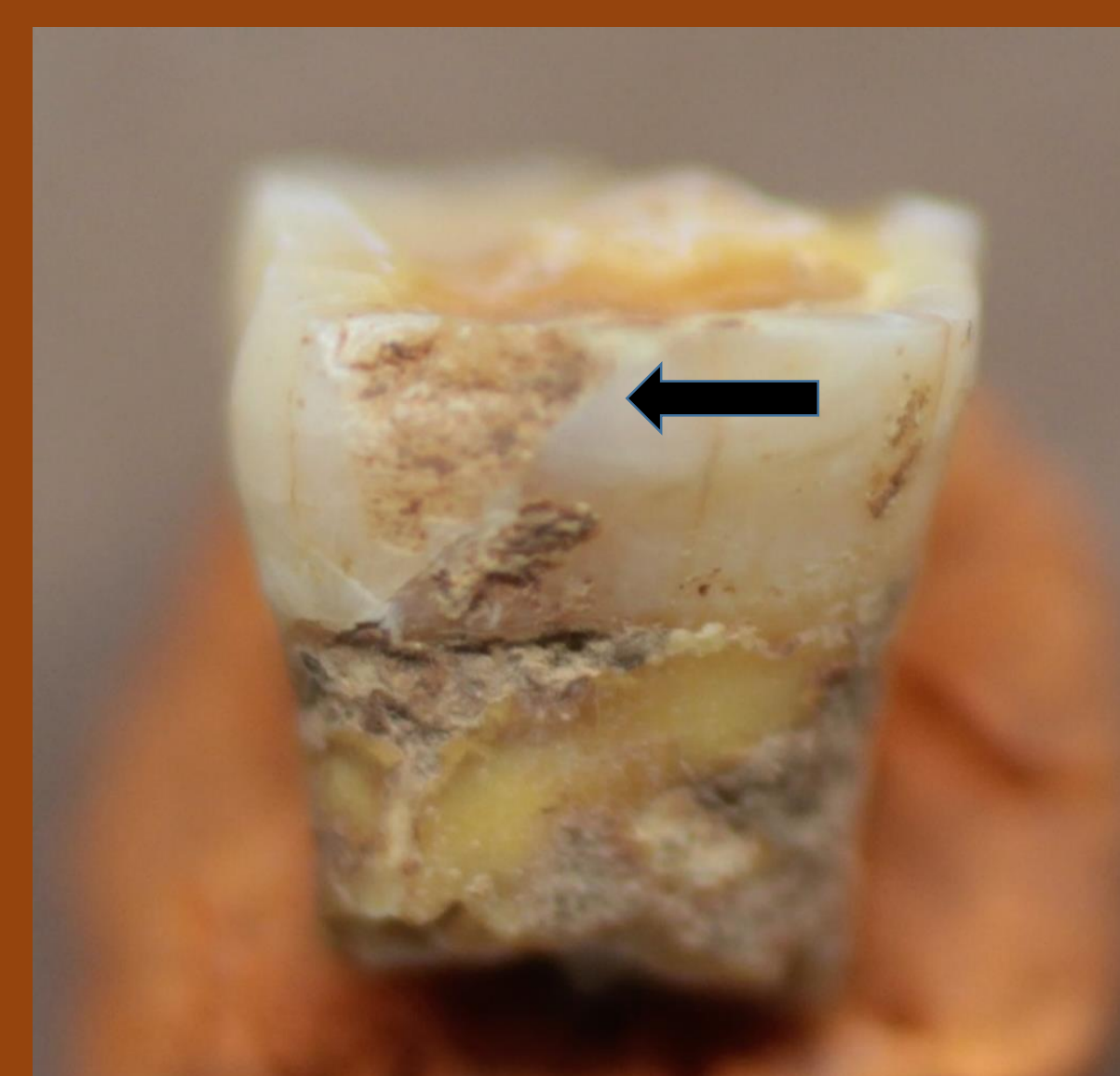


Figure 3: Lower left second molar (82011.48.983) displaying medium chip on its mesial surface.



Figure 4: Lower left second molar (2011.48.1009) displaying small chip on its mesial surface.

Notching was scored in 5.8% (9/155) of the anterior upper teeth and 2.1% (3/140) in the anterior lower teeth. The comparison of the frequency between these two groups, didn't reveal statistically significance ( $\chi^2= 2.3372$ ;  $p= 0.126319$ ). No notches were observed in posterior teeth.

Interproximal grooving was only observed in posterior teeth of both maxilla, respectively, 8.3% (10/121) and 2.7% (5/184) in upper (Fig. 5 and 6) and lower teeth, but without statistically significance ( $\chi^2= 2.5317$ ;  $p=0.111577$ ).



Figure 5 Upper right second molar (2011.48.884) with interproximal groove on its mesial surface.

Table 1: Frequency of dental chipping, notching and interproximal grooving in the Baútas sample.

	I1		I2		C		P1		P2		M1		M2		M3		T		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Maxilla																			
Chipping	13/56	23.2	5/34	14.7	9/65	13.9	6/40	15.0	3/21	14.3	7/21	33.3	2/29	6.9	6/30	20.0	51/296	17.2	
Notching	2/56	3.6	6/34	17.6	1/65	15.4	0/40	0	0/21	0	0	0	0/29	0	0/30	0	9/296	3.0	
Grooving	0/56	0.0	0/34	0	0/65	0	0/40	0	2/21	9.5	1/21	4.8	5/20	2.5	2/19	10.5	10/276	3.6	
Mandible																			
Chipping	3/37	8.1	7/41	17.0	0/62	0	6/50	12.0	3/49	6.1	2/22	9.1	5/47	10.6	0/18	0	26/326	8.0	
Notching	0/37	0	1/41	2.4	2/62	3.2	0/50	0	0/49	0	0/22	0	0/47	0	0/18	0	3/326	0.9	
Grooving	0/37	0	0/41	0	0	0	1/49	2.0	2/49	4.1	0/22	0	1/46	2.2	1/18	5.6	5/325	1.5	



Figure 6 Upper left second molar (2011.48.936) displaying interproximal grooving on its mesial surface.

## DISCUSSION

Chipping affected 12.4% teeth of the loose permanent teeth of Baútas. The most unexpected result was the similar frequency of this trauma in anterior and posterior upper teeth (17.4% and 17.0%) and between the lower anterior and posterior teeth (7.1% and 8.6%). So, it is not possible to define a dominant pattern (incisor or molar-dominant). Probably this mixed pattern is the reflex of combination of non-masticatory activities (performed with anterior teeth) and the ingestion of hard food (posterior teeth), as hard fruits.

The frequency of notching, 1,9%, is very low in this sample. This alteration is usually attribute to wear from contact with some type of object probably due to repeatedly holding or moving an object always with the same direction during the activity. The majority of the cases were observed on upper lateral incisors (n=6), predominantly on right teeth. No more inferences are for now possible. Interproximal grooving were scored only in posterior teeth (5 premolar and 10 molars) of both maxilla. Many aetiologies have been proposed, including therapeutic ones and habitual idiopathic behaviour. In Baútas sample they were found only on posterior teeth and probably related to the repetitive back-and forth movement of a foreign object for oral hygienic purposes or more likely from the attempt to alleviate pain or discomfort caused by dentoalveolar pathologies. Several molars (n ± 9) of this samples displayed cariogenic lesions near the cement–enamel junction with could explain this behaviour. In sum, several dental lesions observed in the prehistoric Baútas sample could be caused by non-masticatory activities. However, further studies are necessary to achieved the goal of understanding these dental patterns and thus, get insights into the diet and behaviours of these prehistoric populations.