

# Unique within his group: High incidence of chipping enamel may reflect an specialized behavior in the El Sidrón Neandertal group.

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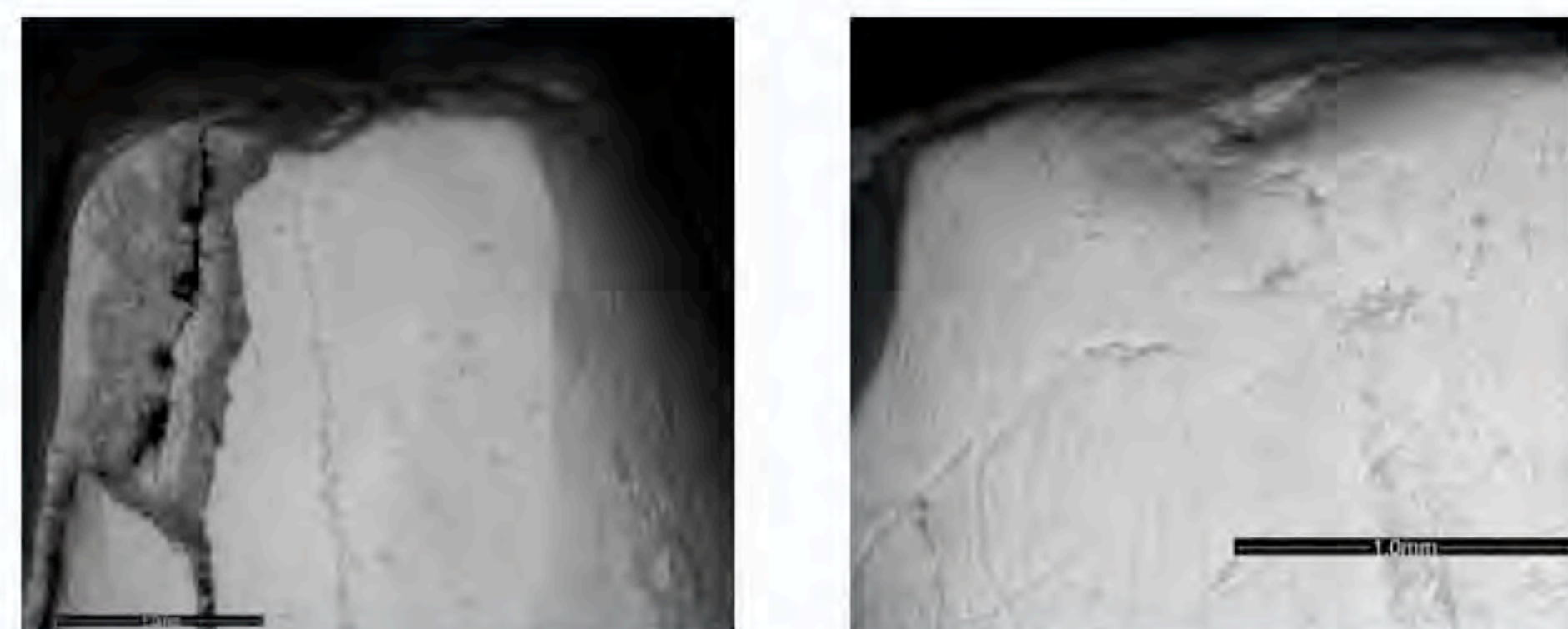
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## Introduction and Aim

Dental Chippings are irregular *ante mortem* fractures affecting the enamel, or both the enamel and dentin, due to shock or pressure. When the fractures are located on the incisal edge on incisors and canines, the etiology is related with non-masticatory activities (Gould, 1968; Molnar, 1972; Belcastro *et al.*, 2004; Scott and Winn, 2011; among others).



**Figure 1:** Differences between the *postmortem* fractures (on the left), with sharp and well-defined edges, and the characteristic *ante mortem* chipping with an eroded and smooth appearance, since it remained in functional occlusion for some time before individuals death.

We examine the frequencies of this trait on 11 Neandertals from El Sidrón cave (Rosas *et al.*, 2012) in order to infer behavioral attributes to this group.

## Materials

- More than 2400 skeletal remains (~49 kya) belonging to a MNI of 13 Neandertals have been recovered up to this years field-season (Rosas *et al.*, 2012; Wood *et al.*, 2013).
- 75 permanent and 4 deciduous maxillary and mandibular teeth (Fig. 1) assessed to 7 adults, 3 adolescents, and 1 juvenile (Lalueza-Fox *et al.*, 2011; Rosas *et al.*, 2012).

## Methods

Size and location of the affected areas (mesial, distal, buccal) have been recorded according to Belcastro *et al.*, (2004) scale:

- Stage 1: A small fracture (less than 0.5 mm involving a thin layer of enamel).
- Stage 2: Implies an increase in the quantity of enamel affected (around 1 mm).
- Stage 3: A large fracture involving both enamel and dentine (more than 1 mm) that eventually could destroy the tooth.

## Results

- All the El Sidrón individuals present dental chipping (see Table 1).

INDIVIDUAL	MAXILLARY DENTITION						TOTAL CHIPPING	MANDIBULAR DENTITION						TOTAL CHIPPING
	LC	LI2	LI1	RI1	RI2	RC		LC	LI2	LI1	RI1	RI2	RC	
ADULT 1	1B	1D	1M 1B	1M 1B	1M 1B	1B	9	1M	1M 1D		1M	0	0	4
ADULT 2	0	1M 1D	1M 2B 1D	9X1B 2X2B	2M 5X1B 2D	2X2M 2X1B	27		0		1B	1B		2
ADULT 3	0	2B			1B	0	2				1M 1D	2X1M		4
ADULT 4	1B		1M 2X1D			1M	5	1M	1B	1M	1B 2D	1M	0	6
ADULT 5	0	1B	0	0	0	1B	2	1M	1M 2D	1D	1D	2M 2D		7
ADULT 6	1D		1M 1D				3	1B	1M 1D		1M 1B 1D			5
ADULT 7				1M 1D	1D		3					1M 1B 1D		3
ADOLESCENT 1	0					0	0				1M	1D		2
ADOLESCENT 2			1B	2X1B	1M		4					2X1B	2X1B	4
ADOLESCENT 3	2X1B	2X1B	1B				5	0						0
JUVENILE 1			2X1D	2X1D		1B 2B	6	1B		2B	1B	2X1B 1D	1D	6

**Table 1:** Dental chipping scoring by tooth in El Sidrón cave. M: mesial; B: buccal; D: distal; 5X: scored five times.

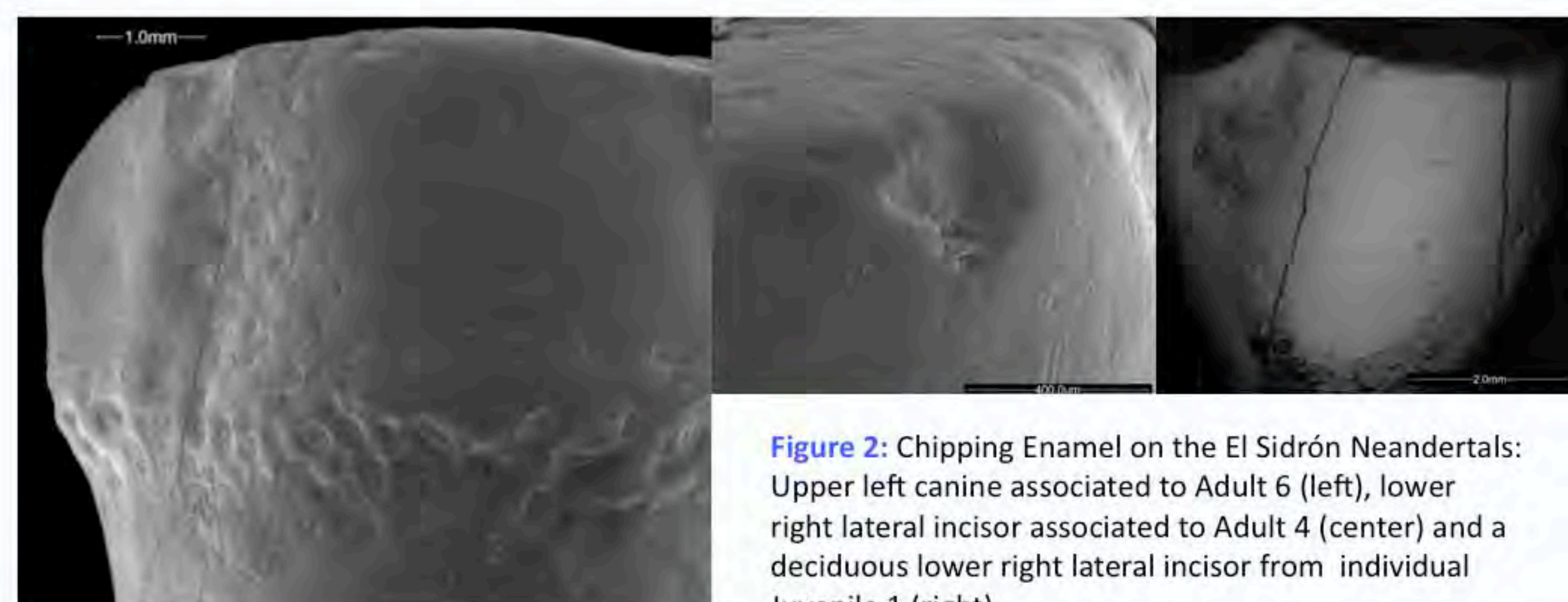
## Acknowledgements

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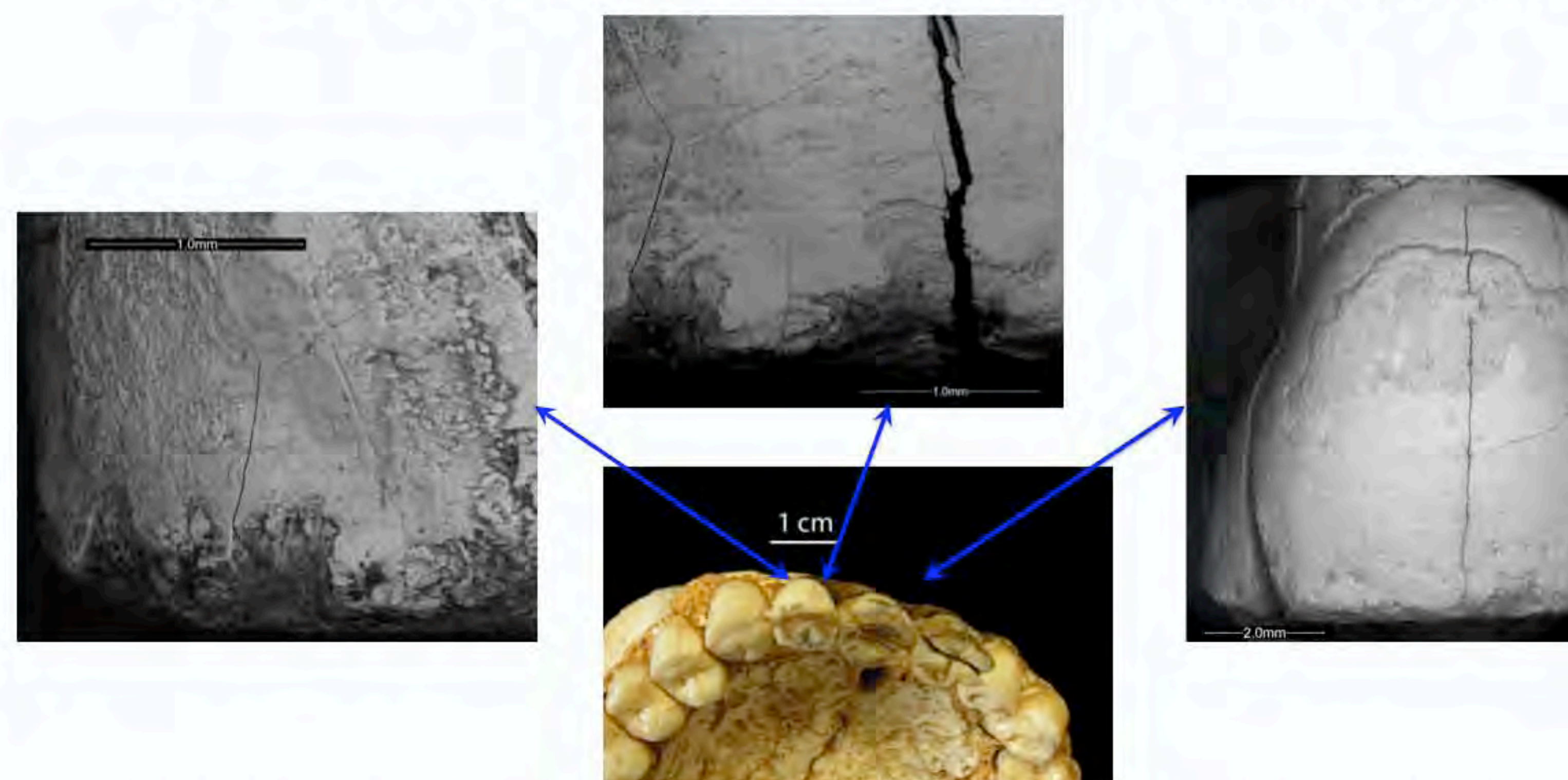
## Results

- **Dental Chipping pattern:** appears on the incisal edge of teeth, mainly on the labial side, on 85.7% of mandibular teeth and 77.5% maxillary teeth. Chippings are at stages 1 and 2 (small, affecting only the dental enamel) (Fig. 2). 70 microfractures appear on the right dentition, whereas 41 appear on the left one.



**Figure 2:** Chipping Enamel on the El Sidrón Neandertals: Upper left canine associated to Adult 6 (left), lower right lateral incisor associated to Adult 4 (center) and a deciduous lower right lateral incisor from individual Juvenile 1 (right).

- **Only El Sidrón Adult 2** has a high incidence of this trait, affecting the incisal edge of his maxillary anterior teeth and forming an indentation or notching (Fig. 3). On the contrary, on his mandibular teeth, the presence of chipping is scarce.



**Figure 3:** Occlusal view of the maxillary dentition associated to El Sidrón Adult 2. Details of the chippings are enhanced above (ESEM images on the left and center). Indentation is perfectly visible on the incisal edge on a central incisor (Image on the right).

## Discussion and Conclusions

1. The pattern described for El Sidrón Neandertals seems to be analogous to that described for several prehistoric and historic human populations (Gould, 1968; Merbs, 1968; Turner and Cadien, 1969; Molnar, 1972; Lukacs and Pastor, 1988; Belcastro *et al.*, 2004; Scott and Winn, 2011), who used their teeth in several non-masticatory activities: the bit of a bow drill is grasped in the teeth, to prepare skins for clothing, to correct or re-sharper the stone tool cutting edge. We propose a similar etiology for the marks presented in this study.
2. El Sidrón Adult 2 (male; Lalueza-Fox *et al.*, 2011) seems to have developed an unique behavior when compared with the other Neandertals from the group: The high incidence of chipping on his maxillary dentition, in addition with the extraction of bitumen/oil shale from his dental calculus (Hardy *et al.*, 2012), suggests a task specialization in this individual. Bitumen is used as adhesive (Boëda *et al.*, 2008), for example to attached a handle to a stone tool, and using his teeth as an aid while hafting could have left Adult 2's dentition so damaged.
3. In light of the results here presented, we can conclude that teeth were part of the Neandertal tool kit, with a different pattern among the individuals from the same group that could be an indication of a particular partition of labor in this species.

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