

The Protocol for the Preparation of Burned Identified Skeletons of the CEI/XXI Collection

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Introduction

Burned identified skeletons from the CEI/XXI Collection [1] are pioneeringly being assembled at the Department of Life Sciences of the University of Coimbra with the objective of adding more information about how the skeleton reacts in contact with heat. The protocol for the preparation of skeletons was designed to enhance this aspect and includes a comprehensive checklist of all the steps involved in the process. Expectantly, this will improve the analysis of burned human remains from virtually any context, ancient or modern.

Protocol

A. Skeleton selection and pre-burning documentation

Skeletons selected for burning must avoid bone lesions, pseudopathologies, unusual morphologies and any abnormalities unless such characteristics are part of a specific research goal.

- The inventory of every bone and teeth is carried out.
- Only bilateral bones are experimentally burned. Therefore, only one antimer is subjected to heat so that an unburned counterpart may be used for comparison in future researches.
- Photos of each bone that will be subjected to burning are taken. All photos contain an identification number and scale;

B. Pre-burned analysis

- Pathological change, trauma, and developing anomalies are recorded;
- All bones are weighted and measured;
- Bone samples are taken for vibrational spectroscopic analyses. Samples are kept in eppendorf tubes and labeled.

C. Burning procedure

Combustion parameters are video recorded to allow the investigation of heat-induced changes in function of:

- Maximum temperature (400°C to 900 °C);
- Duration (75 min to 195 min);

D. Post-Burned Analysis

After the burning process, heat-induced changes in the human skeleton are analyzed by repeating the procedures described in point C.

E. Preservation, Labeling and Storage

In order to preserve, label and store adequately the burned human skeleton, the following steps are carried out:

- Preservative is applied on all bones, with exception of phalanges since future research may require unconsolidated bone samples;
- Each bone is labeled in non-joint surfaces with a smooth area free of lesions.
- Each skeleton is kept in a plastic container which has a sponge layer in its base to protect the bones against abrasion/friction.

UNBURNED				BURNED			
WEIGHT (g)	LEFT	RIGHT	TOTAL	WEIGHT (g)	HALF TO BE BURNED →	WEIGHT (g)	BURNED HALF
Skull			669,30	669,30			
Mandible			69,27	69,27			
Hyoid			0,00	0,00			
CRANIUM	0,00	0,00	738,57	738,57			
Vertebral Column			222,22	222,22			
Ribs	76,31	64,94	22,42	163,67			
Sternum			12,99	12,99			
TRUNK	76,31	64,94	257,63	398,88			
Clavicle	15,35			15,35			
Scapula	45,71	49,07		94,78			
Humerus	93,32	104,01		197,33			
Radius	29,56	31,95		61,51			
Ulna	39,41	39,63		79,04			
Hand	20,70	25,42		46,12			
UPPER LIMB	244,05	250,08	0,00	494,13			
Hip Bone	128,30	130,31		258,61			
Femur	276,98	304,16		581,14			

OSTEOMETRY							
CATALOG KEY	SEX	AGE	INHUMINATION	EXHUMINATION	INTERVAL	MAX. TEMPERATURE	DURATION
CEI XXI S1	Male	70	08.01.2000	02.02.2006	73	900	126
HEDC		100	100	100	100	100	100
RADIUS	Max L	Max head D	M-L midshaft D	A-P midshaft D			
Left	434		16,29	12,18			
Right	434		16,21	12,54			
Burned Side							
HEDC	100	RDIV/OI		100			
ULNA	Max L	Physiol. L	Max B Olecranon	Min B Olecranon	Min Circumfer	A-P shaft D	M-L shaft D
Left	247	245			19,75	38	
Right	218				19,66	40	
Burned Side							
HEDC	100	RDIV/OI		RDIV/OI	100	RDIV/OI	RDIV/OI
METACARPALS	MC1 L	MC2 L	MC3 L	MC4 L	MC5 L		
Left	45,85	45,47	64,99	54,62	51,16		
Right		64,75	64,47	54,75	51,16		
Burned Side							
HEDC	RDIV/OI		100	100	100	100	
ICARIM	Anterior H	Anterior R	Ice R				



A) Chart of the weight and measurements performed pre- and post-burning;
B) Comparison of burned and unburned antimeres;
C) (Left) Ceramic kiln where bones are burned. (Right) Storage box where the burned bones are preserved.

Final comments

Our current protocol was developed to maximize post-burning preservation and to study many variables known to be associated with heat-induced changes. This protocol allows minimizing errors in data collection, which is carried out by several people, and expediting the preparation of skeletons for prospective research. It has also been providing us a substantial body of knowledge regarding the nature of heat-induced changes in bone, thus expectantly contributing for the development of more suitable anthropological techniques.



This poster will be available on www.hotresearch.wix.com/main

References:

[1] Ferreira, M.T., Vicente, R., Navega, D., Gonçalves, D., Curate, F., Cunha, E., 2014. A new forensic collection housed at the University of Coimbra, Portugal: The 21st century identified skeletal collection. *Forensic Science International*, 245: 202-e1