

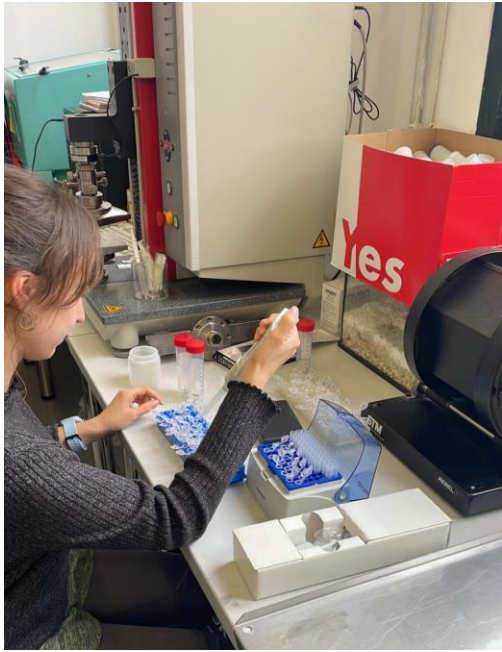
Experiments in the lab and monitored nature:  
two viewpoints to understand past and present  
taphonomy and a source of neotaphonomic  
collections

Y. Fernández-Jalvo, S. García-Morato,  
A. Gutiérrez, A. Macho-Callejo

Neotaphonomic collections and associated data: Definition, Management,  
Training, Conservation

17<sup>TH</sup> -18<sup>TH</sup> OCTOBER - PARIS MNHN





**Neotaphonomic collections** allow us to understand taphonomic processes in the past. The identification of diagnostic features recorded on the bone surfaces as well as its histology and chemical composition allow us to extrapolate and identify these processes in fossil sites and forensic contexts. These collections are basic to build a new source of information and may be compared with other collections plus comparison between modern and fossil specimens.



Laboratorio de Ensayos Ambientales y Taponómicos  
Laboratory of Environmental Analyses & Taphonomy

#### VISIT OUR WEB

<https://www.mncn.csic.es/en/investigaci%C3%B3n/servicios-cientifico-tecnicos/laboratory-environmental-analyses-and-taphonomy-leat>



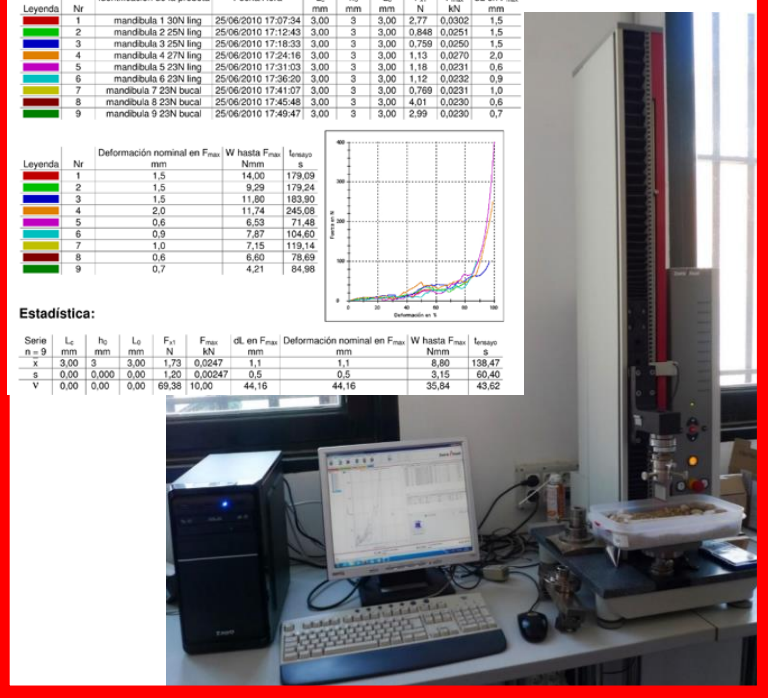
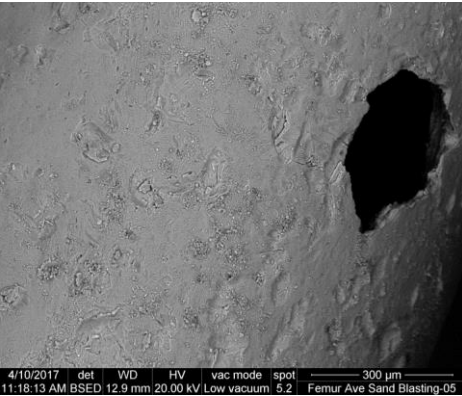
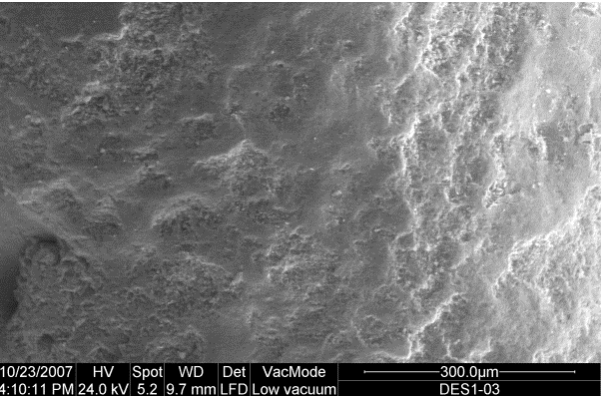
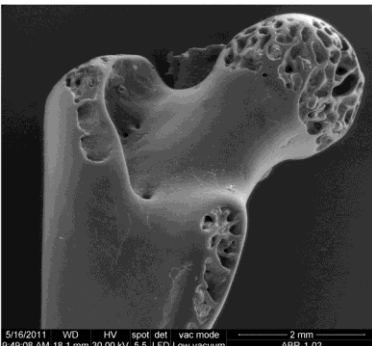
At the Laboratory of Environmental Analyses and Taphonomy (LeaT\_MNCN-CSIC) in combination to the Experimental Field Station of La Higuera (Toledo\_MNCN-CSIC) and pellet/bone collections we can reproduce controlled environmental conditions to obtain diagnostic traits of specific agents.

**mncn** Museo Nacional de Ciencias Naturales  
About us Visit us Collections Research Communication  
Home / Investigación / Scientific Technical Services / THE LABORATORY OF ENVIRONMENTAL ANALYSES

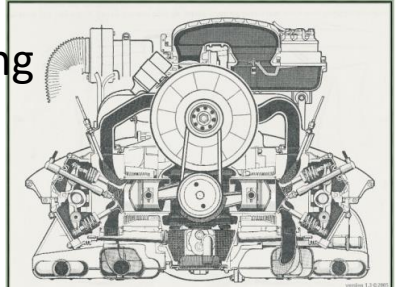




# Lab experiments are accelerated in time and environmental/mechanical conditions



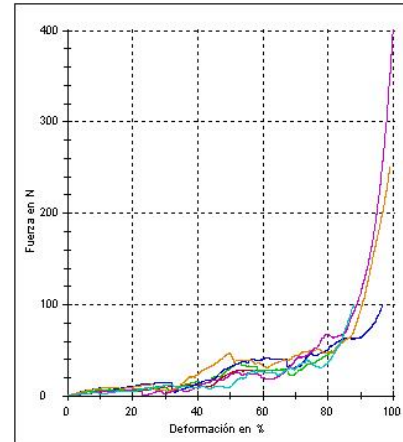
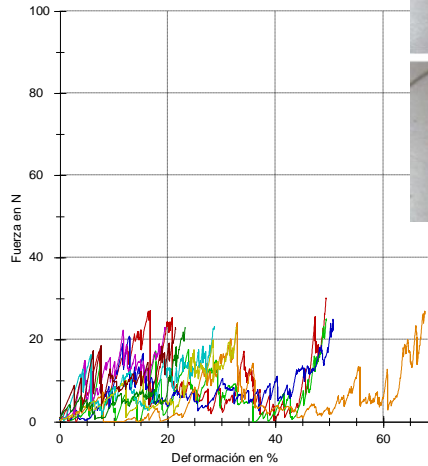
Fossils in the making



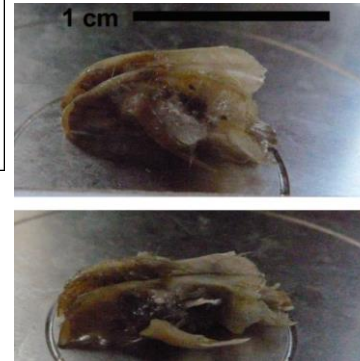


# Compression/abrasion experiments

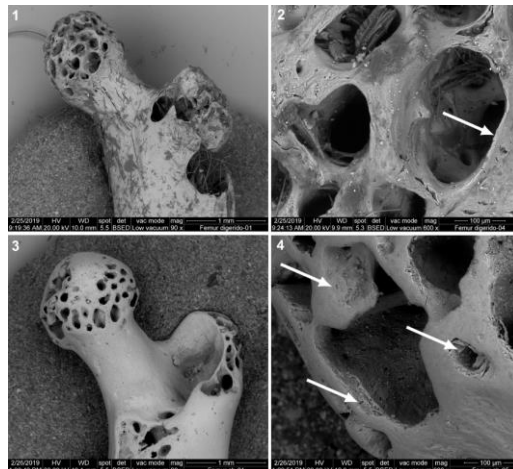
Dry conditions



Wet conditions



Bone response under identical forces, either dry or wet conditions with different types of water (basic to acid pH) and different substrates (clay-gravel).



FOSSIL BONE



MODERN EXPERIMENTALLY COMPRESSED BONE





# Publications compression



## Compressive marks from gravel substrate on vertebrate remains: a preliminary experimental study

M.D. Marín-Monfort<sup>a,\*</sup>, M.D. Pesquero<sup>a,b</sup>, Y. Fernández-Jalvo<sup>a</sup>

<sup>a</sup>Museo Nacional de Ciencias Naturales-CSIC, Paleobiología, C/ José Gutiérrez Abascal 2, 28006 Madrid, Spain  
<sup>b</sup>Fundación Conjunto Paleontológico de Teruel-Dinópolis, Avda. Sagunto s/n, 44002 Teruel, Spain



Published: 21 May 2021

## Compression and digestion as agents of vertebral deformation in Sciaenidae, Merlucidae and Gadidae remains: an experimental study to interpret archaeological assemblages

Romina Frontini<sup>✉</sup>, Eufrosia Roselló-Izquierdo, Arturo Morales-Muñiz, Christiane Denys, Émilie Guillaud, Yolanda Fernández-Jalvo & María Dolores Pesquero-Fernández

*Journal of Archaeological Method and Theory* (2021) | [Cite this article](#)



Contents lists available at [ScienceDirect](#)

Quaternary International

journal homepage: [www.elsevier.com/locate/quaint](#)



## Very human bears: Wild brown bear neo-taphonomic signature and its equifinality problems in archaeological contexts

Jordi Rosell<sup>a,b,\*</sup>, Ruth Blasco<sup>c</sup>, Maite Arilla<sup>a,b</sup>, Yolanda Fernández-Jalvo<sup>d</sup>



Article

## Understanding the Impact of Trampling on Rodent Bones

Yolanda Fernández-Jalvo<sup>1,\*</sup>, Lucía Rueda<sup>1,2</sup>, Fernando Julian Fernández<sup>3</sup>, Sara García-Morato<sup>1,4</sup>, María Dolores Marín-Monfort<sup>1,5,6</sup>, Claudia Ines Montalvo<sup>7</sup>, Rodrigo Tomassini<sup>6</sup>, Michael Chazan<sup>8,9</sup>, Liora K. Horwitz<sup>10</sup> and Peter Andrews<sup>11</sup>

- <sup>1</sup> Museo Nacional de Ciencias Naturales (CSIC), José Gutiérrez Abascal, 2, 28006 Madrid, Spain; lucia.rueda.dominguez@gmail.com (L.R.); sagarc16@ucm.es (S.G.M.); dores@mmn.csic.es (M.D.M.-M.)
- <sup>2</sup> Sciences de la Vie et de l'Environnement Université de Rennes 1, 35000 Rennes, France
- <sup>3</sup> CONICET-Grupo de Estudios en Arqueometría, Facultad de Ingeniería, Universidad de Buenos Aires (UBA), Av. Paseo Colón 850 (CP C1063ACV), Ciudad Autónoma de Buenos Aires 1063, Argentina; fernandez2177@yahoo.com.ar
- <sup>4</sup> Facultad de Ciencias Geológicas, Departamento de Geodinámica, Estratigrafía y Paleontología, Universidad Complutense de Madrid, José Antonio Novais 12, 28040 Madrid, Spain
- <sup>5</sup> Departamento de Botánica y Geología, Universidad de Valencia, Burjassot, Valencia, 28006 Madrid, Spain

*Archaeological and Anthropological Sciences* (2021) 13: 215  
<https://doi.org/10.1007/s12520-021-01466-2>

### ORIGINAL PAPER



## Evaluation of size-related salmonid fish vertebrae deformation due to compression: an experimental approach

Arturo Morales Muñiz<sup>1</sup>, Romina Frontini<sup>2</sup>, Yolanda Fernández-Jalvo<sup>3</sup>, Eufrosia Roselló-Izquierdo<sup>1</sup>, María Dolores Pesquero-Fernández<sup>3</sup>, Alicia B. Hernández<sup>4</sup>, Liliana A. García<sup>5</sup>

Received: 20 August 2021 / Accepted: 20 October 2021 / Published online: 10 November 2021  
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### Abstract





# Publications abrasion



Lethaia

AN INTERNATIONAL JOURNAL OF PALAEOLOGY AND STRATIGRAPHY

## Digestion versus abrasion features in rodent bones

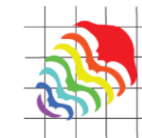
YOLANDA FERNÁNDEZ-JALVO, PETER ANDREWS, PALOMA SEVILLA AND VIRGINIA REQUEJO

LETHAIA



Fernández-Jalvo, Y., Andrews, P., Sevilla, P. & Requejo, V. 2014: Digestion vs. abrasion features in rodent bones. *Lethaia*, Vol. 47, pp. 323–336.

The origin of most fossil small mammal assemblages is predation by avian or mammalian predators. Bone corrosion by gastric juices observed in these fossils is direct evidence of digestion, and traits of digestion indicate the type of predator involved. However, certain features observed in digested bones, such as rounding and polishing, are similar to the rounding and polishing produced by other processes, particularly



**Palaeontologia Electronica**  
palaeo-electronica.org

## Rolling bones: A preliminary study of micromammal abrasion on different initial taphonomic stages

Sara García-Morato, María Dolores Marin-Monfort, and Yolanda Fernández-Jalvo

### ABSTRACT

The identification of transport process is key to interpret the palaeoecology, the dating and the site formation. Apart from dispersal and size/shape selection, bone

Quaternary International 481 (2018) 3–13



Disponible en ligne sur [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

Geobios 41 (2008) 157–181

GEOBIOS

<http://france.elsevier.com/direct/GEOBIO>

Original article

Experimental taphonomy in museums: Preparation protocols for skeletons and fossil vertebrates under the scanning electron microscopy

Yolanda Fernández-Jalvo <sup>a,\*</sup>, María Dolores Marín Monfort <sup>b,c</sup>



Contents lists available at [ScienceDirect](http://ScienceDirect.com)

Quaternary International

journal homepage: [www.elsevier.com/locate/quaint](http://www.elsevier.com/locate/quaint)



Characterization of recent marks produced on fossil bone surface during sullegic and trephic processes and their influence on taphonomic studies

M.D. Marín-Monfort <sup>a,b,\*</sup>, M. Suñer <sup>b,c</sup>, Y. Fernández-Jalvo <sup>a</sup>





# All experiments in lab need validation by monitoring the nature

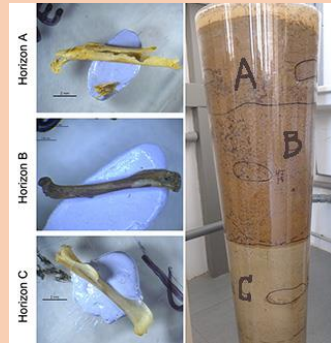
GLOBAL WEATHERING PROJECT



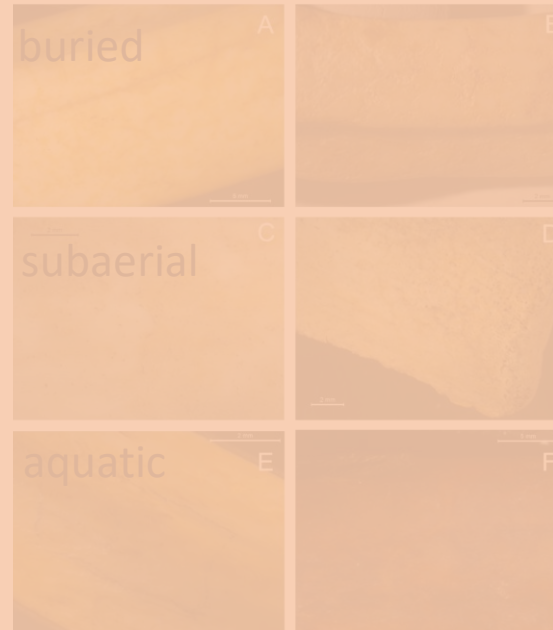
Taphonomic field station



## LA HIGUERUELA EXPERIMENTAL FIELD STATION



PhD Project



Publication



# ACADEMIC FORMATION

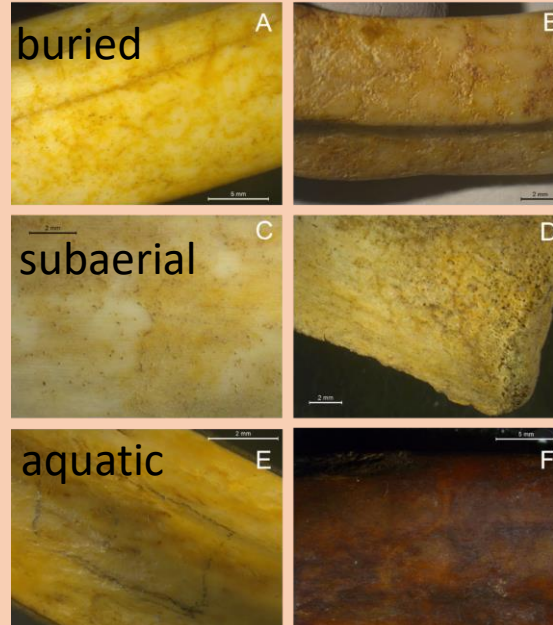
## GLOBAL WEATHERING PROJECT



## LA HIGUERUELA EXPERIMENTAL FIELD STATION



## PhD Project



Historical Biology  
An International Journal of Paleobiology

Historical Biology  
An International Journal of Paleobiology

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/ghbi20>

Put down roots and find the plant!: preliminary results of root etching and its implications

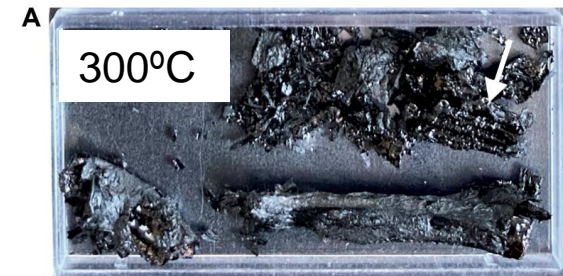
**Alba Macho-Callejo** Sara García-Morato, Aida Gutiérrez, Dores Marin-Monfort & Yolanda Fernández-Jalvo

To cite this article: Alba Macho-Callejo, Sara García-Morato, Aida Gutiérrez, Dores Marin-Monfort & Yolanda Fernández-Jalvo (06 Oct 2023): Put down roots and find the plant!: preliminary results of root etching and its implications, Historical Biology, DOI: 10.1080/08912963.2023.2263865

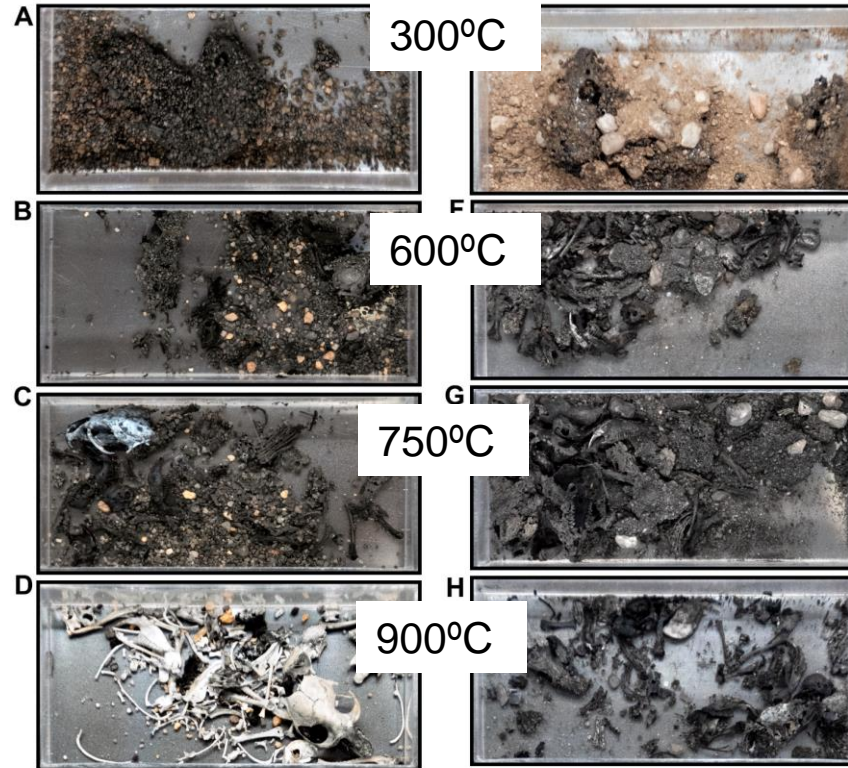
To link to this article: <https://doi.org/10.1080/08912963.2023.2263865>

Publication





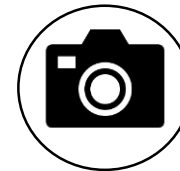
2 cm



2 cm



- ✓ Colour gradient
- ✓ Burial
- ✓ Oxidising-reducing conditions



Penélope Reyes

Historical Biology

An International Journal of Paleobiology



Historical Biology

An International Journal of Paleobiology

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/ghbi20>



Let's play with fire! Preliminary results of new experiments on animal bone of thermo-alterations

Penélope I. Martínez de Los Reyes, Aida Gutiérrez, Alba Macho-Callejo, Sara García-Morato, Marta Moreno-García & Yolanda Fernández-Jalvo

To cite this article: Penélope I. Martínez de Los Reyes, Aida Gutiérrez, Alba Macho-Callejo, Sara García-Morato, Marta Moreno-García & Yolanda Fernández-Jalvo (26 Sep 2023): Let's play with fire! Preliminary results of new experiments on animal bone of thermo-alterations, Historical Biology, DOI: 10.1080/08912963.2023.2258912

To link to this article: <https://doi.org/10.1080/08912963.2023.2258912>

Publication



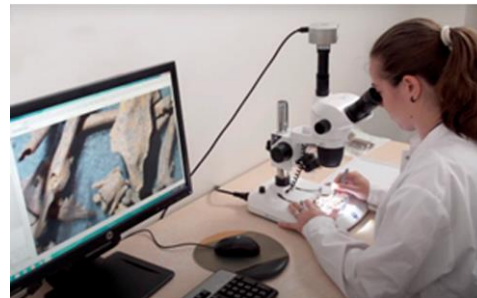
## ARCHAEO-PALAEONTOLOGICAL RESEARCH

## TRAINING STUDENTS FROM UNIVERSITIES



- ✓ Pellet collection assistance
- ✓ Count & ID skeletal elements
- ✓ Assistance to experiments
- ✓ Photographing taph-modifications
- ✓ Microscope training

Students from the University (Complutense and Autonoma) come to the LeaT to do volunteer work opening pellets, photographing or lab assistance to gain experience.







## FORENSIC RESEARCH

## Laboratory practices with students of professional training in Pathological Anatomy and Cytodiagnosis (Institute Claudio Galeno)

To analyse the earliest taphonomic modifications of bodies wrapped or not in plastic bags or cotton textile and submerged in water or buried



With meat



Defleshed

Cotton textile wrapped



Plastic bag wrapped



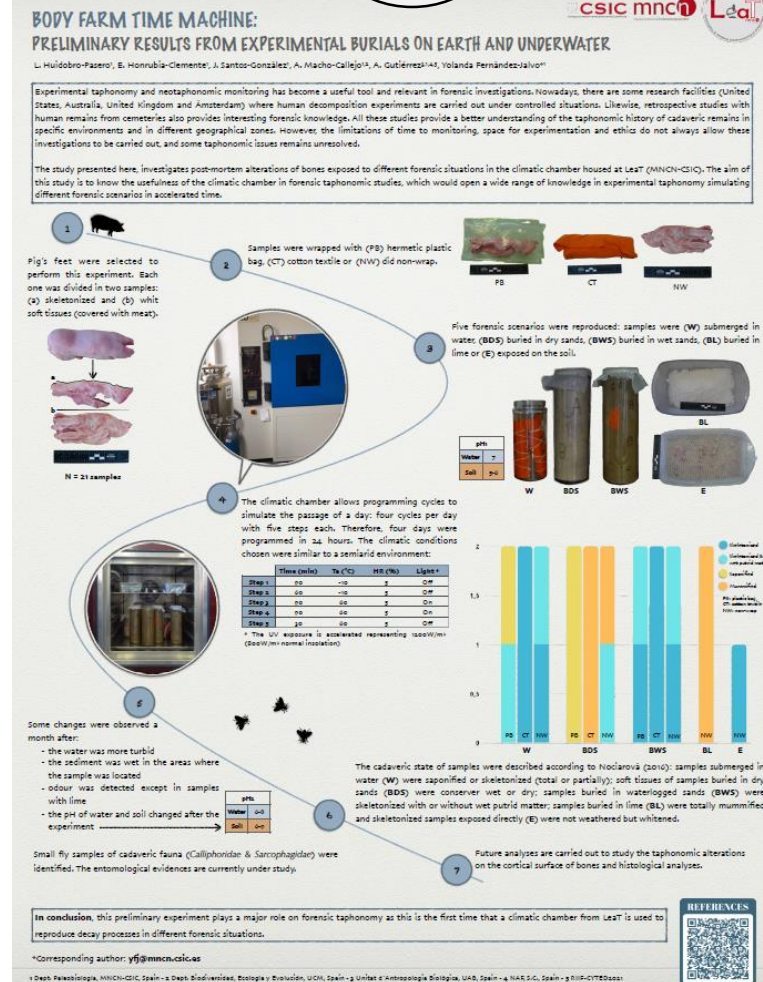
Unwrapped



Meeting congress



Paper in progress





## Programa Investigo

Financiado por la Unión Europea  
NextGenerationEU



HEALTH

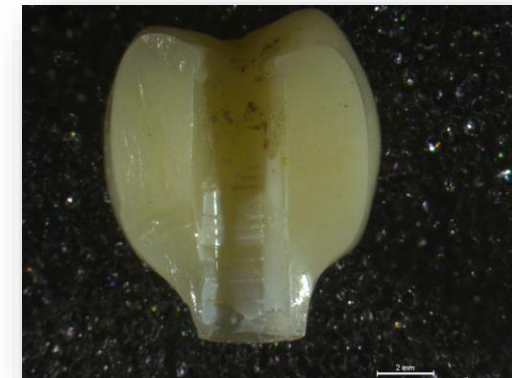
PRIVATE COMPANY

“Programa Investigo” project of the Regional Community of Madrid and the LeaT-MNCN-CSIC.

To study material resistance of dental implants and prothesis to compression



Lemon and coffee effect in dental prothesis



INFORME DE  
DE

# REPORT

Los materiales seleccionados para los ensayos de envejecimiento proceden de la empresa L'Oréal quienes trabajan con productos de cosmética y de limpieza. El interés de este estudio fue analizar el efecto que tienen los cambios rápidos de temperatura, humedad y radiación en los materiales que componen los envases de distintos productos. Además, se realizaron algunos estudios de producción de microplásticos por parte de estos envases.



## Programa Investigo

Financiado por la Unión Europea  
NextGenerationEU



HEALTH

PRIVATE COMPANY

“Programa Investigo” project of the Regional Community of Madrid and the LeaT-MNCN-CSIC.



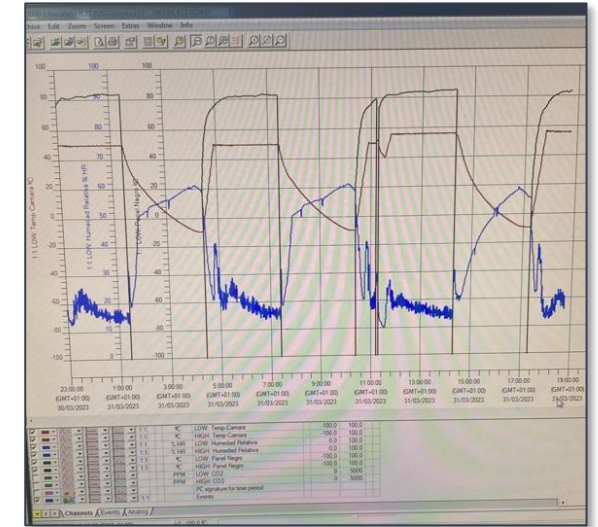
Ageing of materials in climatic chamber



L'Oréal recycled and non-recycled packaging



UNYQ prosthetic materials



Environmentally friendly soaps and recycled packaging “Jabones Beltrán”



- ✓ Microplastics
- ✓ Colour changes
- ✓ Morphological modifications



MINISTERIO  
DE CIENCIA  
E INNOVACIÓN

CSIC  
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



mncn  
MUSEO NACIONAL DE CIENCIAS NATURALES

### INFORME DE RESULTADOS ENVEJECIMIENTO CLIMÁTICO DE LOS MATERIALES

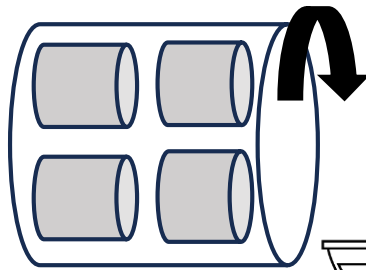
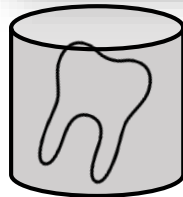
**REPORT**

Los materiales seleccionados para este estudio de envejecimiento proceden de la empresa L'Oréal quienes trabajan con productos de cosmética y de limpieza. El interés de este estudio fue analizar el efecto que tienen los cambios rápidos de temperatura, humedad y radiación en los materiales que componen los envases de distintos productos. Además, se realizaron algunos estudios de producción de microplásticos por parte de estos envases.

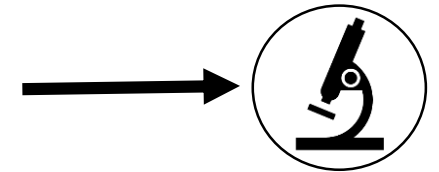




To analyse the marks and polish produced by a three-week abrasion test on rhino teeth.



24 h



MINISTERIO  
DE CIENCIA  
E INNOVACIÓN

CSIC  
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



mnch  
muséum national d'histoire naturelle

ABRASIÓN Y COMPRESIÓN DE DIENTES DE RINOCERONTE Y DE CABALLO

**REPORT**

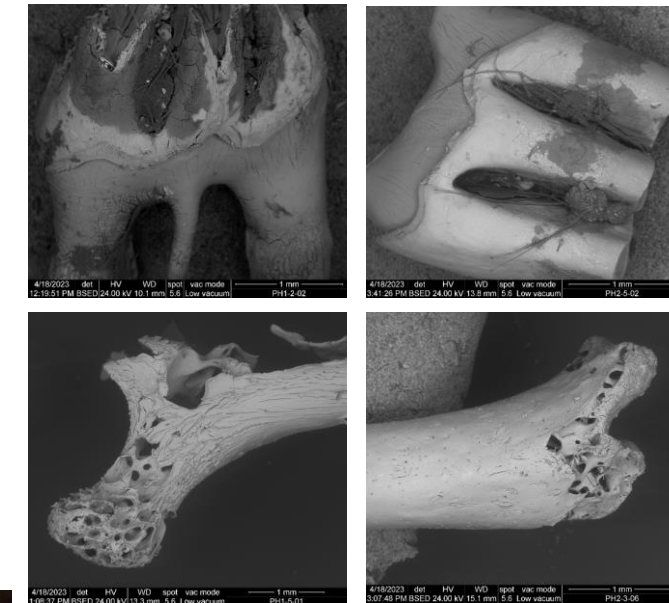
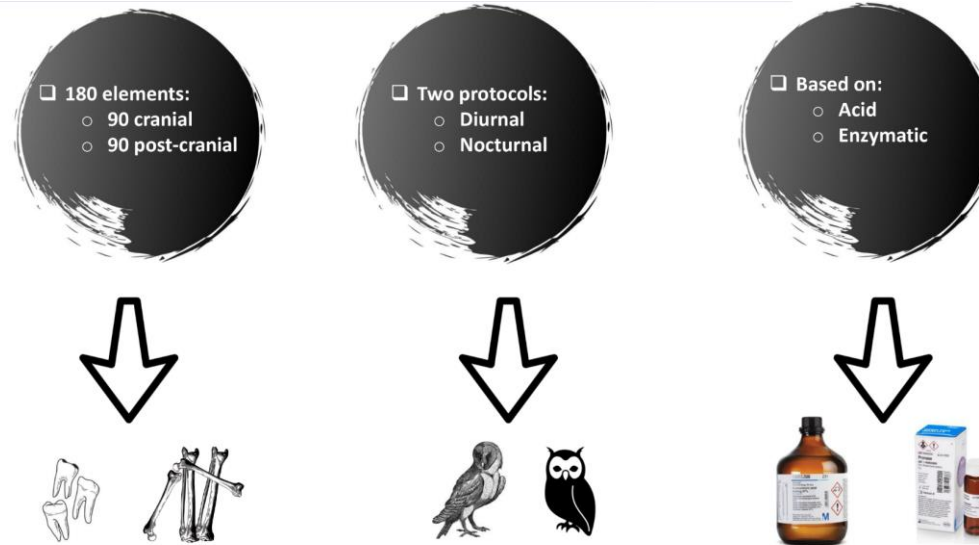
El objetivo del ensayo consistió en someter a abrasión y compresión a muestras dentales de rinoceronte y caballo. Se pretendía observar las marcas que estos procesos dejaban sobre la cara oclusal de la pieza dental.



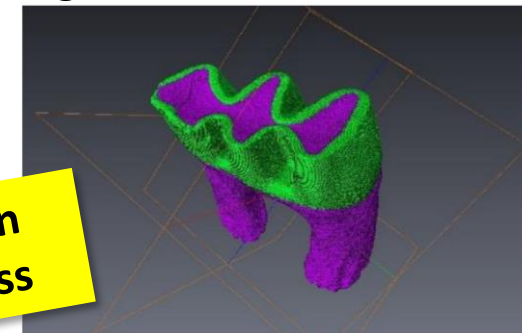




Taxonomic identification of *Meriones* affected by digestion of diurnal and nocturnal raptors



SEM images



CTScan

Paper in progress





UNIVERSIDAD  
DE CHILE

## FORENSIC RESEARCH

Forensic taphonomy researcher  
Universidad de Chile.

Sandra López-Lázaro

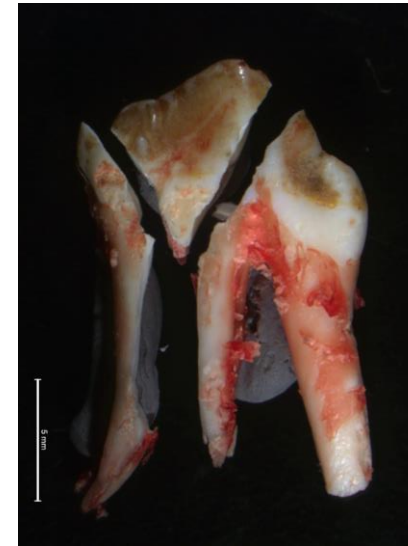
COMPRESSION

Binocular microscope

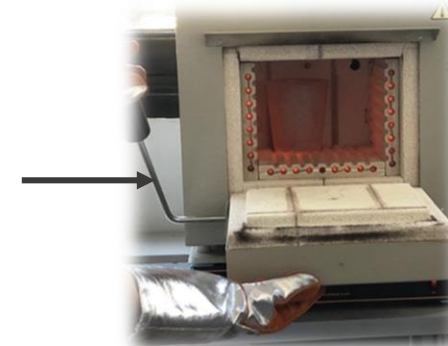
Thermal test



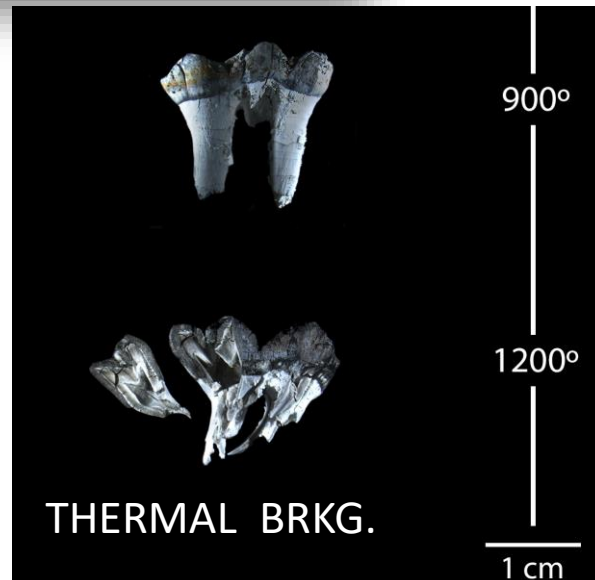
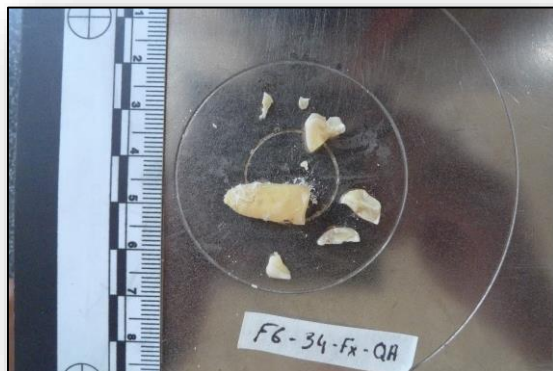
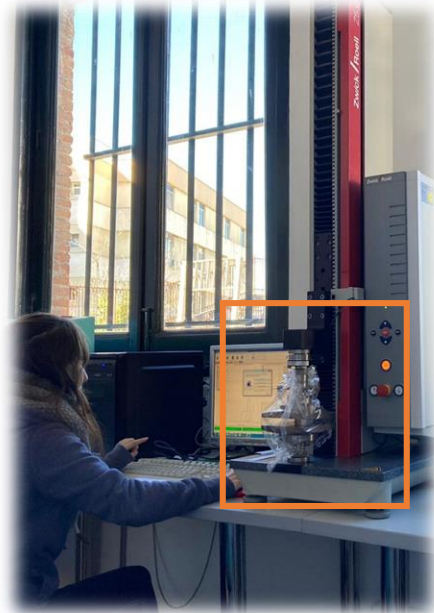
To analyse compression fractures in human teeth. Are there differences with high temperature fractures?



Compression fracture study



Paper in  
progress





# THERMAL TEST

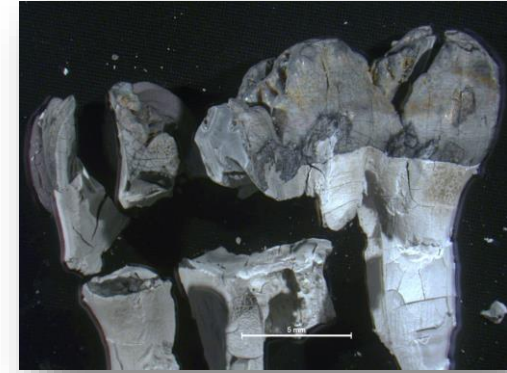
February and July, 2022-2023

האוניברסיטה העברית בירושלים  
THE HEBREW UNIVERSITY OF JERUSALEM



FORENSIC RESEARCH

Forensic taphonomy  
Sandra López-Lázaro  
Pat Smith



THERMAL BRKG.

Compression

Binocular microscope

THERMAL BRKG. &  
SHRINKAGE

15'

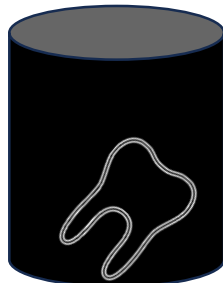
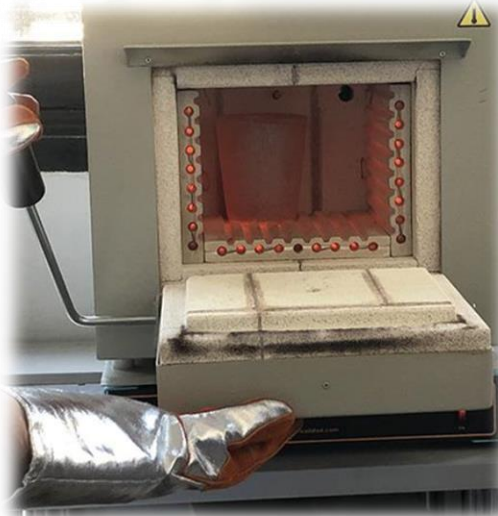
100°C

300°C

600°C

900°C

1200°C



- ✓ Colour gradient
- ✓ Cracking
- ✓ Shrinkage

Paper in  
progress





LeaT has adapted a space for analyses and consultation of experimental and monitored collections





# PELLET COLLECTION



**Kestrel (*Falco tinnunculus*)**

**Location**

- 7 Atapuerca (Burgos)
- 8 Maranchón (Guadalajara)

Nº of pellets: 40 and sediment under the nest.

Habitat: Open woodlands and shrubland

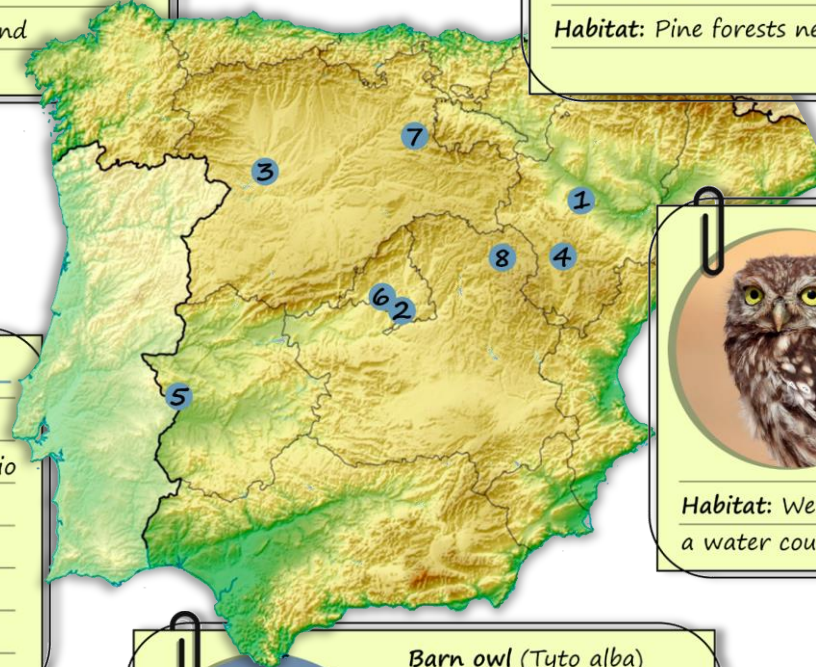
**Short eared owl (*Asio otus*)**

**Location**

- 1 Alfranca (Zaragoza)
- 2 Fuenlabrada (Madrid)

Nº of pellets: 153

Habitat: Pine forests near water courses.



**Tawny owl (*Strix aluco*)**

**Location**

- 6 Moraleja de En medio (Madrid)

Nº of pellets: 36

Habitat: Pine forest near crops.

**Little owl (*Athene noctua*)**

**Location**

- 3 Villafáfila (Zamora)
- 4 Calamocha (Zaragoza)

Nº of pellets: 70

Habitat: Wetland (Villafáfila) and crops near a water course (Calamocha).

**Barn owl (*Tyto alba*)**

**Location**

- 5 Alburquerque (Badajoz)

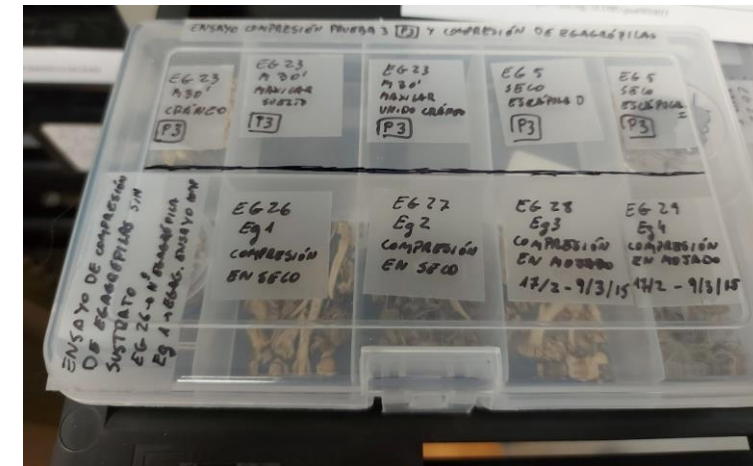
Nº of pellets: 10

Habitat: Mixture of shrubland and open woodland of oaks.



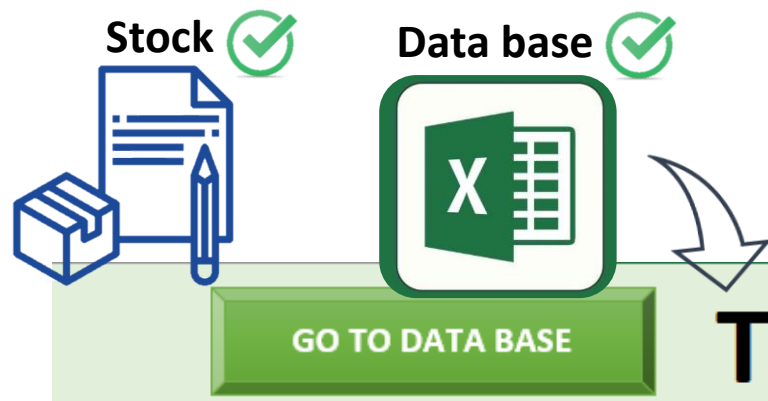
# NEOTAPHONOMIC COLLECTION

Lab and field experiments as well as specimens monitored/collected from nature need to be stored, curated and be well organized.





# TAPHONOMIC COLLECTION



What information is included in the LeaT's taphonomic collection database?

## TAPHONOMIC COLLECTION OF LEAT

LABEL		TAXA	
TAPHONOMIC ALTERATION		LOCALITY	
TAPHONOMIC AGENT		COORDINATES	
TAPHONOMIC PROCESS		PAPER	
PREDATOR		MORE INFO	
TAPHOSYSTEM		STORAGE CABINET	
ORIGIN		REMARKS	
SAMPLE TYPE		ANALYSIS	
<div>DELETE</div>		<div>SEARCH</div>	<div>NEW ENTRY</div>



# TAPHONOMIC COLLECTION

Stock 



## EXPLICATION: HOW YOU SOULD FILL THE DATA?

You can visit the data base by clicking on **GO TO DATA BASE** in the REGISTRE SHEET

### To do a new entry in data base:

- 1º Go to "NEW ENTRY SHEET"
- 2º Fill up the fields with sample information.
- 3º Click in "NREY ENTRY"

EXPLICATION

NEW ENTRY

DATA

SEARCH

NEW ENTRY

### To do a search:

- 1º Go to "NEW ENTRY SHEET"
  - 2º Which feature do you want to search for? To introduce the feature in the correct field
  - 4º Click in "SEARCH"
- Or you can use **Ctrl+B** in your keyboard, and to write a key word.

SEARCH

### To do a new entry:

- 1º Click in "DELETE" to eliminate all fields.

DELETE

LABEL

TAPHONOM

TAPHONOM

TAPHONOM

PREDATOR

TAPHOSYSTI

ORIGIN

SAMPLE TYP

EXPLICATION

NEW ENTRY

DATA

SEARCH





# TAPHONOMIC COLLECTION



A	B	C	D	E	F	G	H
DATA							
LABEL	TAPHONOMIC ALTERATION	TAPHONOMIC AGENT	TAPHONOMIC PROCESS	PREDATOR	TAPHOSYSTEM	ORIGIN	SAMPLE TYPE
Egagropila E5 Control (insolacion) - Mandibula	Referencia					M	Micro
Egagropila E6 Control (insolacion) - Mandibula	Referencia					M	Micro
Caja Herpeto	Meteorizacion					M	Micro
Caja 1 - control herpeto	Meteorizacion					M	Micro
E25 egagropila control (insolacion)	Meteorizacion					M	Micro
E22 egagropila control (insolacion)	Meteorizacion					M	Micro
E23 egagropila control (insolacion)	Meteorizacion					M	Micro
Polen ALDER A - 1	Ensayo climatico					E	Polen
Polen ALDER A - 2	Ensayo climatico					E	Polen
Polen ALDER A - 3	Ensayo climatico					E	Polen
Polen ALDER A - 4	Ensayo climatico					E	Polen
Polen ALDER A - 5	Ensayo climatico					E	Polen



## DATA BASE

SAMPLE TYPE	TAXA	LOCALITY	COORDINAT	PAPER	MORE INFO	STORAGE CABI	REMARKS	ANALYSIS
Micro					Bolsa con tubo en su interior con muestra. No pone fecha	1.1	In situ	
Micro					Bolsa con tubo en su interior con muestra. No pone fecha	1.1	In situ	
Micro					Muestras de micro dentro de una caja de plastico transparente dentro de caja pequeña de cartón	1.1	In situ	
Micro					Muestras de micro dentro de una caja de plastico transparente, dentro de una caja pequeña	1.1	In situ	
Micro					Bolsa que contiene metapodos, Radios, Ulnas y Mandibulas; dentro de caja Weathering	1.1	In situ	
Micro					Bolsa que contiene Radios, Mandibulas, Metapodos, Tibias, Ulnas y Costillas; dentro de caja	1.1	In situ	
Micro					Bolsa que contiene Femur y Tibias; dentro de caja Weathering	1.1	In situ	
Polen				No publicado	Polen bajo condicion climatica desierto con sol	1.2	In situ	
Polen				No publicado	Polen bajo condicion climatica desierto sin sol	1.2	In situ	
Polen				No publicado	Polen bajo condicion experimental inoculacion de CO2	1.2	In situ	
Polen				No publicado	Polen bajo condicion experimental inoculacion de CO2	1.2	In situ	
Polen				No publicado	Polen bajo condicion experimental inoculacion de CO2	1.2	In situ	
Polen				No publicado	Polen bajo condicion experimental inoculacion de CO2	1.2	In situ	
Polen				No publicado	La muestra no esta o esta desplazada	1.2	Missing	
Polen				No publicado	La muestra no esta o esta desplazada	1.2	Missing	
Polen				No publicado	Polen bajo condicion experimental inoculacion de CO2	1.2	In situ	
Polen				No publicado	Polen bajo condicion climatica experimental sol en camara	1.2	In situ	



## LABELS

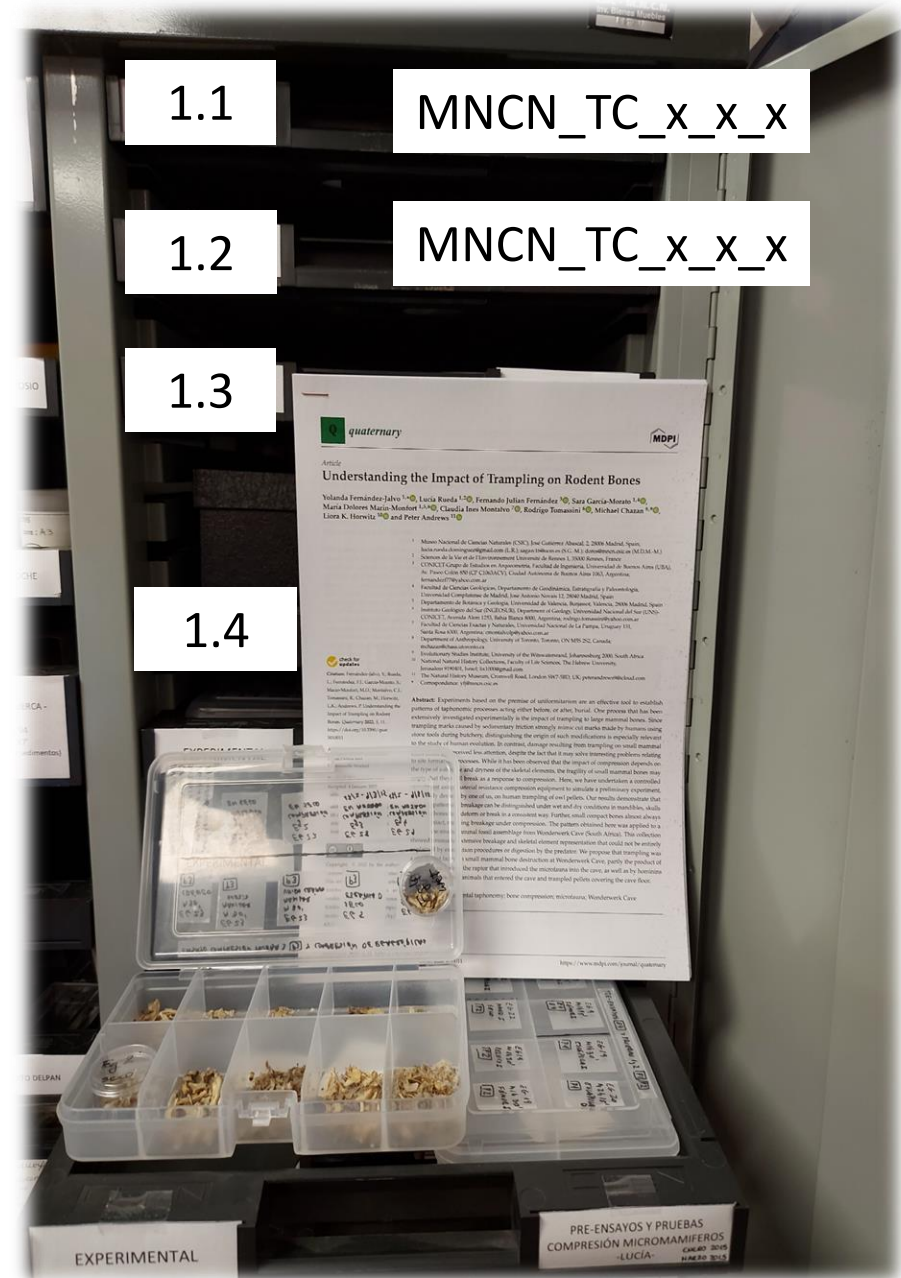
## Taphonomic collection

Fossil: F  
Monitoring: M  
Experimental: E

## TRAY AND CABINETS

1.2

## Tray nº2





# NEOTAPHONOMIC COLLECTIONS IN DISSCO

ONCE THE EUROPEAN SYNTHESES  
PROGRAM FINISHED, **DISSCO** BECOMES THE  
NEW INITIATIVE OF THE EUROPEAN  
MUSEUMS' CONSORTIUM



- The Distributed System of Scientific Collections (DiSSCo) is a new world-class Research Infrastructure (RI) for Natural Science Collections. It aims to digitally unify all European natural science assets under one European collection featuring common access, curation, policies and practices, while ensuring that all the data is easily Findable