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 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.

VISIT OUR WEB

At the Laboratory of Environmental Analyses and Taphonomy (LeaT_MNCN-CSIC) in combination to the Experimental Field Station of La Higueruela (Toledo_MNCN-CSIC) and pellet/bone collections we can reproduce controlled environmental conditions to obtain diagnostic traits of specific agents.
Lab experiments are accelerated in time and environmental/mechanical conditions.
Compression/abrasion experiments

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

Dry conditions

Wet conditions

FOSSIL BONE

MODERN EXPERIMENTALLY COMPRESSED BONE
Publications compression

Understanding the Impact of Trampling on Rodent Bones
Yolanda Fernández-Jalvo1,2,3, Lucía Barda1,2,3, Fernando Julian Fernández1,2, Sara García-Morante1,2, María Dolores Mileo-Monfort1,2, Rosario Tomás1,2, Michael Chazan1,2, Lisa K. Horwitz1,2 and Peter Andrews1,2

Compressive marks from gravel substrate on vertebrate remains: a preliminary experimental study
M.D. Marín-Monfort1,*, M.D. Pesquero1,*, Y. Fernández-Jalvo4

Compression and digestion as agents of vertebral deformation in Sciaenidae, Merluccidae and Gadidae remains: an experimental study to interpret archaeological assemblages
Romina Frontini3, Eufrazia Roselló-Izquierdo4, Arnau Morales-Maria, Christiane Denys, Émile Guillaud, Yolanda Fernández-Jalvo1 & María Dolores Pesquero-Fernández

Evaluation of size-related salmonid fish vertebrae deformation due to compression: an experimental approach
Arturo Morales-Muniz1,2, Romina Frontini3, Eufrazia Roselló-Izquierdo1, Yolanda Fernández-Jalvo1, María Dolores Pesquero-Fernández3, Alicia B. Hernández2, Liliana A. García2

Very human bears: Wild brown bear neo-taphonomic signature and its equifinality problems in archaeological contexts
Jordi Rosell2,3, Ruth Blasco2, Maite Arill3,4, Yolanda Fernández-Jalvo1,4
Digestion versus abrasion features in rodent bones
YOLANDA FERNÁNDEZ-JALVO, PETER ANDREWS, PALOMA SEVILLA AND VIRGINIA REQUEJO


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...

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 sizershape selection, bone

Characterization of recent marks produced on fossil bone surface during subligic and trophic processes and their influence on taphonomic studies
M.D. Marin-Monfort a,b,∗, M. Suter b,c, Y. Fernández-Jalvo a
All experiments in lab need validation by monitoring the nature

GLOBAL WEATHERING PROJECT

LA HIGUERUELA EXPERIMENTAL FIELD STATION

Taphonomic field station

PhD Project

Buried

Subaerial

Aquatic

Historical Biology
An international journal of paleobiology

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

Alba Macho-Calero, Sara García-Morato, Aida Gubírez, Dores Marin-Monfort & Yolanda Fernández-Jalvo

To cite this article: Alba Macho-Calero, Sara García-Morato, Aida Gubírez, 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: 10.1080/08912963.2023.2261305

To link to this article: https://doi.org/10.1080/08912963.2023.2261305
The taphonomic station GLOBAL WEATHERING PROJECT

All experiments in lab need validation by monitoring the nature A

A buried subaerial aquatic PhD Project

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

Alba Macho-Callejo, Sara García-Morato, Aída Gutiérrez, Dorés Marin-Monfort & Yolanda Fernández-Jalvo

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ACADEMIC FORMATION

ARCHEO-PALAEONTOLOGICAL RESEARCH

JAE-INTRO GRANT-2022

- Colour gradient
- Burial
- Oxidising-reducing conditions

Penélope Reyes

Historical Biology
An International Journal of Paleobiology

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

Penélope I. Martínez de Los Reyes, Aída Gutiérrez, Alba Macho-Callejo, Sara García-Morato, Marta Moreno-García & Yolanda Fernández-Javo (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 cite this article: Penélope I. Martínez de Los Reyes, Aída Gutiérrez, Alba Macho-Callejo, Sara García-Morato, Marta Moreno-García & Yolanda Fernández-Javo (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
Students from the University (Complutense and Autonoma) come to the LeaT to do volunteer work opening pellets, photographing or lab assistance to gain experience.
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.
To study material resistance of dental implants and prosthesis to compression

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

Lemon and coffee effect in dental prosthesis
“Programa Investigo” project of the Regional Community of Madrid and the LeaT-MNCN-CSIC.

Ageing of materials in climatic chamber

- Microplastics
- Colour changes
- Morphological modifications

L’Oreal recycled and non-recycled packaging

Environmentally friendly soaps and recycled packaging “Jabones Beltrán”

UNYQ prosthetic materials
To analyse the marks and polish produced by a three-week abrasion test on rhino teeth.
Taxonomic identification of *Meriones* affected by digestion of diurnal and nocturnal raptors
To analyse compression fractures in human teeth. Are there differences with high temperature fractures?
THERMAL TEST

February and July, 2022-2023

Compression → Binocular microscope → THERMAL BRKG. & SHRINKAGE

15’

100°C
300°C
600°C
900°C
1200°C

Forensic taphonomy
Sandra López-Lázaro
Pat Smith

FORENSIC RESEARCH

✓ 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: Atapuerca (Burgos), Maranchón (Guadalajara)
- Nº of pellets: 40 and sediment under the nest.
- Habitat: Open woodlands and shrubland

Short eared owl (Asio otus)
- Location: Alfranca (Zaragoza), Fuenlabrada (Madrid)
- Nº of pellets: 153
- Habitat: Pine forests near water courses.

Tawny owl (Strix aluco)
- Location: Moraleja de En medio (Madrid)
- Nº of pellets: 36
- Habitat: Pine forest near pellets.

Little owl (Athene noctua)
- Location: Villafáñila (Zamora), Calamocha (Zaragoza)
- Nº of pellets: 70
- Habitat: Wetland (Villafáñila) and crops near a water course (Calamocha).

Barn owl (Tyto alba)
- Location: Alburquerque (Badajoz)
- Nº of pellets: 10
- Habitat: Mixture of shrubland and open woodland of oaks.
Lab and field experiments as well as specimens monitored/collected from nature need to be stored, curated and be well organized.
What information is included in the LeaT’s taphonomic collection database?

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
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[Buttons: DELETE, SEARCH, NEW ENTRY]
EXPLICATION: HOW YOU SHOULD FILL THE DATA?

To do a new entry in database:
1º Go to "NEW ENTRY SHEET"
2º Fill up the fields with sample information.
3º Click in "NREY 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.

To do a new entry:
1º Click in "DELETE" to eliminate all fields.
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**ANALYSIS**

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- **TAPHOSYSTEM**
- **ORIGIN**
- **SAMPLE TYPE**

**DATA BASE**

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- **COORDINATE**
- **PAPER**
- **MORE INFO**
- **STORAGE CABINET**
- **REMARKS**
- **ANALYSIS**
Taphonomic collection

Fossil: F
Monitoring: M
Experimental: E

Taphonomic alteration:
L: Linear marks

Labels:
1.1
1.2
1.3
1.4

Cabinet nº1
Tray nº2
ONCE THE EUROPEAN SYNTHESYS 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