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Osteological preparation protocol by enzymatic maceration

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Protocol status: In development
We are still developing and optimizing this protocol

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Disclaimer

However, some improvements can be considered to optimize the process, particularly regarding maceration time.
Indeed, it has been observed that, depending on the skeletal portion and the fat content of the samples, soft tissue decomposition is not always complete at the end of the protocol.
Although some bones appear perfectly clean on the surface and have a dry texture to the touch, internal fat sometimes remains that has not been completely removed. This fat, trapped in the bone structure, tends to migrate to the surface over time, potentially compromising the quality of the initial cleaning.
To mitigate this phenomenon, it is recommended to extend the maceration time to ensure thorough degreasing, regardless of the type of bone being treated. Furthermore, it would be useful to weigh the material before preparation, particularly to compare the difference in mass before and after, as well as the proportion of enzymes in the material.
The enzymes used during the cleaning process remain active after being placed in the incubator. If they are not deactivated, they can continue to act on residual organic matter, posing a risk to bone preservation.
With this in mind, rinsing the specimens in an ethanol bath is strongly recommended at the end of the protocol. Ethanol will neutralize residual enzymes and ensure better sample stability over the medium and long term.

Abstract

The following protocol is part of my Master's thesis in Archaeology and Archaeology Sciences speciality in Quaternary, Prehistory, and Paleontology.
It involves cleaning bone remains from experimental archaeology for the purpose of preservation and the study of taphonomic traces.
The goal is to obtain defatted hard animal remains composed solely of connective tissue.

Guidelines

The amount of pancreatin used was 1g and 2g, the temperatures tested were 35°, 40°C and 45°C and the experiment was repeated twice for each combination (N=12). Here the enzymes are in 0.4g capsules we removed them from their capsules.

Materials

- [PPE:] gloves, mask, safety glasses, apron/gown.
- Scalpel
- Pliers
- Plastic or stainless steel container suitable for the remainder
- Oven (here 60×55×35cm with two shelves separated by 24cm)
- Sorbonne
- Pancreatin

Safety warnings

The smell of decomposition is strong, we can advise you to put Vivks Vaporub ointment near your nose and wear personal protective equipment.

Ethics statement

All bones used were acquired from domestic or harmful species, in accordance with decree R427-6 of the Environmental Code.

Before start

It is necessary to locate the experimental marks before beginning.
The bones should be at room temperature.
If there is any soft tissue that can be detached without damaging the rest, it should be removed.

Preparation of bone remains

1 Defrost bone remains in a sorbonne if they are not at room temperature.

2 Carefully remove superficial soft tissue with a scalpel, in order to avoid leaving parasitic traces that could be interpreted as experimental.

Preparing replicas

3 Place the bones in the containers and cover them with warm water.

4 Add 1g of enzymes to six of the containers and 2g of enzymes to the other six.

5 Cover the containers with cling film to prevent water from evaporating.

Sorbonne

3d

6 Place two containers of 1g of enzymes and two containers of 2g of enzymes in the sorbonne at 35°C.

7 Maintain temperatures for 48 hours.

3d

8 Check every 6 hours, if necessary remove the supernatant and suspended parts, in order to remove the degradable materials available to the enzymes already separated from the bone residue.

Replicas

4d

9 Repeat the previous steps at 40°C and 45°C.

4d

Drying

3d

10 Dry under the sorbonne as much as necessary.

3d

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