HUMAN REMAINS

Human remains – bones, teeth, hair, nails, and other tissues constitute the most direct source of information about the experiences, cultural practices, and biological nature of ancient people. Different tissues serve as sources of various biomolecular studies to reconstruct ancient diets, health, origins, migrations, and kinship.

Bone Preservation

- Significantly affects the information obtained by biomolecular methods.
- Most biomolecular methods cannot be applied to burnt bones because the organic part of the bone is burnt out.
- Bone collagen is relatively resistant to environmental conditions and is largely available in archaeological contexts up to 100,000 years old.

Mass grave from the 12th–13th century in Veibri with the remains of ten men and burnt bones from the 4th–5th century Viimsi I stone-cist grave.

IMPORTANT OBSERVATIONS FOR FIELDWORK

Sample Collection in Fieldwork

- **Context.** It is extremely important to describe the context of the bone element being sampled during fieldwork. Bones with a clear and unambiguous context allow for significantly more meaningful analyses and interpretations.
- **Risk of sample contamination.** If it is known that the bones/teeth found during fieldwork are to be genetically analysed, gloves and a face mask should be used in the excavation to avoid contamination.
- In the laboratory, work is carried out under sterile conditions in a clean lab to avoid contamination.

The clean laboratory used for ancient DNA research at the University of Tartu.

IMPORTANT OBSERVATIONS FOR INDOOR WORK

Storage

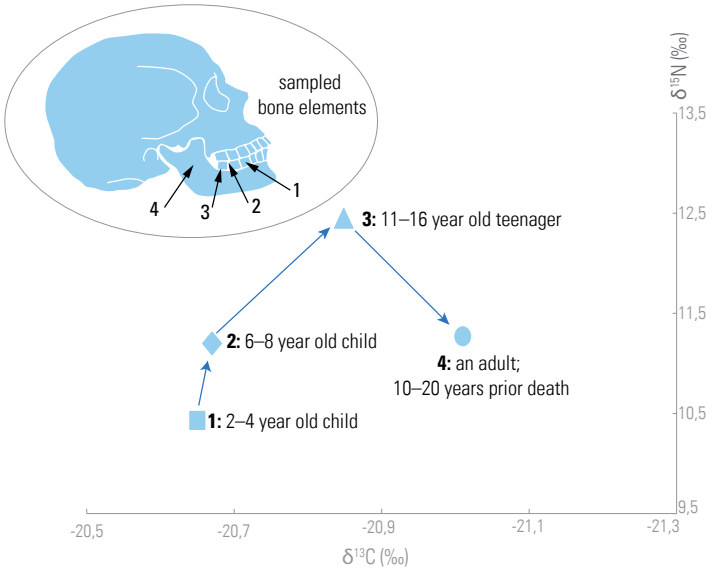
- Package the bones of one individual **separately by body parts** in ziplock bags.
- Avoid direct sunlight.
- Hair, nails, and skin finds should be placed in a freezer as soon as possible.
- If bones need to be transported with soil, use acid-free paper and foil.
- Be careful during the transport and repackaging of bones to **avoid fragmenting the material**.
- Human bones are **generally washed** (to identify features, pathologies, cut marks, etc.).
- Wash bones with cool water and sieve the remaining soil.
- **Poorly preserved, fragile, and crumbling bones should not be washed**; they should be carefully brushed to remove larger debris (use a soft brush; do not scrub with the brush!).
- Packaging should be according to how it was documented during fieldwork (i.e. by context, find number).
- Store in acid-free standard-sized bone boxes in a human remains storage facility.
- Optimum room temperature is around 21°C and humidity is 45–50%.

Bone Conservation

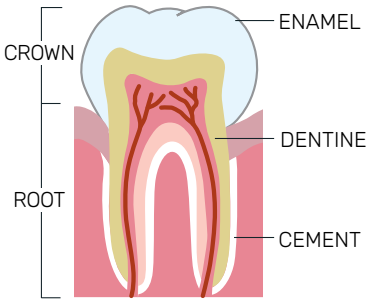
- Conservation can be a risk of contamination and a limitation for further biomolecular analyses.
- If conservation is needed, it is important that the entire conservation process is documented, and the list and recipes of used preservatives are precisely known.

Sampling

- Always think through **which research question the ordered analyses should answer**.
- Consider whether and to what extent the sample taken may interfere with further/other types of analyses.
- The sampling process must be **documented**. Note: When taking a sample from an archaeological object, ALWAYS fill out the sampling protocol: Archaeological Collections of Tallinn University and the Archaeological Collection of the University of Tartu.
- Use the best-preserved bones for sampling.
- Do not take samples from morphologically informative parts of the bones.
- Ensure that samples come from different individuals (e.g. do not take two teeth from the same individual for DNA analysis from fragmented material).
- Samples should be packaged in foil and a ziplock bag.
- If the sample is analysed in the laboratory, it is always necessary to request the return of any leftover sample.



By analysing the values of carbon and nitrogen isotopes from collagen extracted from various bone elements and teeth, we can map the dietary life histories of people from the past.



Different parts of the tooth can be used to study various aspects of past lives.

Biomolecular analyses that help obtain information about human remains.

RESEARCH QUESTION	BIOMOLECULE / METHOD	ANALYSED MATERIAL	SUITABLE BONE ELEMENT FOR ANALYSIS	SAMPLE QUANTITY
genetic origin, diseases	DNA	unburnt bone	tooth, petrous bone, hair	50–100 mg bone powder
diet, environment	C	bone collagen, hair keratin, tooth dentin	depending on the research question (temporal resolution)	bone and tooth dentin: 60–100 mg hair: 0.5–1 mg
	N			
	S			
origin, seasonality	Sr	burnt bone, tooth enamel	burnt bone, tooth enamel	7–10 mg, whole tooth (with laser ablation)
origin, seasonality	O	carbonates, phosphates	unburnt bone, tooth enamel	3–5 mg
species determination	ZooMS	bone and tooth collagen	depending on bone density, a piece of 1–2 mm that can be taken from the bone find with a scalpel, preferably from an already fragmented part, or use an already broken piece	10–30 mg

See also: www.archemy.ee

This leaflet has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101079396, and from UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee (grant agreement No. 10063975).
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