Environmental reconstruction: bioarchaeological evidence
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Faunal Remains Main Approaches to Reconstruction

- marker species reconstruction
  - relies on ecological preferences of species present.
  - To what extent does sample represent a single biotic community?
- relative abundance of different taxa
  - especially useful for examining changes through time.
  - To what extent might changes in representation represent changing cultural preferences instead of environmental availability?
- The Bergmann Effect: Body size as a reflection of climate change
  - Requires detailed modern data. Must rule other sources of size change, such as island dwarfing or domestication.
- Stable isotopes extracted from bones or teeth
  - These data should reflect the proportion of C-3 (normal, including temperate grasses and virtually broadleaf taxa, shrubs, etc.) and C-4 plants (prevalent in savanna grasses and sedges) in the animal’s diet

Plant Macro-remains Types of remains and preservational modes:

- On-site (Archaeobotany)
  - Seeds (charred)
  - Wood charcoal
  - Desiccated macros (including seeds, leaves, etc.)

- Off-site (Quaternary Palaeobotany)
  - Water-logged sequences (including leaves, seeds, wood)
    - Preserved in bogs, swamps. Can include in situ preservation (e.g. submerged forests) or sedimentary sequences (e.g. preserved in former oxbow ponds, peat bog sequences etc.).

Notes on taphonomy: seeds are resilient and can be transported long distance by water. They may therefore deposited at some distance from where they were produced, requiring consideration of sedimentary regimes. Leaves, on the other hand, are fragile and become increasingly fragmented with transport distance. Thus large, intact (and more readily identifiable) leaf fragments tend to reflect local deposition from the immediate flora.
Plant Micro-remains Types of remains and preservational modes:

**Discrete, specific microfossils**
NB: usually one form per species (although it may not be possible to distinguish related species, or even genera within the same family in some cases)

- **Pollen and spores** (Pollenology)
  Pollen from conifers and flowering plants (Gymnosperms and Angiosperms)
  Spores from ferns, mosses, fungi

  Some phytoplankton types provide information on aquatic environments, such as salinity or ocean depth, including
  - **Diatoms** (taxonomic Class Bacillariophyceae)
    Unicellular, aquatic algae with silicaceous exoskeletons

- **Dinoflagellates** (taxonomic Division Pyrrhophyta)
  Unicellular ‘red’ algae, with cellulose armor plates.
  Certain dinoflagellates are an important component of corals

**Disarticulated, non-specific morphotypes**
NB: Numerous forms produced in a given plant and species, extensive sharing of forms between different species, including distantly related ones, occasional morphotypes are more taxonomically diagnostic, especially when still articulated (therefore reflecting epidermal cell patterns).

- **Phytoliths** (also called plant opals)
- **Articulated phytoliths** (multiple silicified cells attached, sometimes called spodograms)

**Sampling for Microremains**
Processing is done in the laboratory with chemical extraction. Bulk sediment samples, either from on-site archaeological contexts/strata, or off-site from coring of natural sedimentary deposits, e.g. bogs, lake beds, etc. Sample sizes are small (e.g. 50mL), with only a fraction processes at one time. For non-sealed (e.g. core) samples, caution must be taken to avoid to minimise contamination by windborne particles, e.g. through immediate samples of freshly cleaned sections.

**Further readings: Selected Bibliography**

Some archaeozoological case studies studies


Kurten, B. 1960 Chronology and faunal evolution of the earlier European glaciations, *Commentationes Biologicae* 21: 3-62


For Wood Identification/ Wood charcoal studies:


Fahn, A., E. Werker and P. Baas 1986. *Wood Anatomy and Identification of Trees and Shrubs from Israel and Adjacent Regions*. Jerusalem: Israel Academy of Sciences and Humanities


For leaf remains, the basic approach is leaf architecture, which is discussed in the references below. Detailed identification guides have not yet been published although there are scattered descriptions of particular families botanical and palaeobotanical literature. Hickey is meant to be producing a detailed book covering all flowering plant families in the near future. Similarly, the use of venation patterns to systematically identify leafy material in archaeobotany has only been employed sporadically. For an example of the use of this and related approaches (epidermal cell patterns), see Tomlinson.


Pollen


For some images of pollen on the Web:
Pollen catalogue of the British isles (University of Uppsala):
http://www.kv.geo.uu.se/pc-intro.html
http://www.geo.arizona.edu/palynology/sit_mnt0.html


For images of selected diatoms, see these web sites:
http://www.calacademy.org/research/diatoms/
http://www.bgsu.edu/departments/biology/algae/index.html
http://www.indiana.edu/~diatom/diatom.html

Phytoliths


For images of phytoliths, try these websites
http://reled.byu.edu/ascript/tball/index2.html
http://www.southalabama.edu/geography/fearn/phyto.htm