Topics

- Types of plant remains
- Preservation
- Recovery
- Identification and analysis
- Research
Taphonomy: studying the process by which organisms become artifacts

Available for Use
Present at Site
Utilization
Deposition
Preservation
Recovery
Identification
Analysis

Knowledge about the what people were doing in the past!
How do plant remains end up in the ground?

Available for Use
Present at Site
Utilization
Deposition
Preservation
Recovery
Identification
Analysis

Pathways specific to each plant

Processing wheat
Types of Plant Materials

- Microbotanical
  - Pollen
  - Phytoliths
  - Starch grains

- Macrobotanical
  - Rachis
  - Seeds
  - Nutshell
  - Wood
Fig. 3.1 Characteristic Features of (A) Maize Starch, (B) Rice Starch, (C) Wheat Starch, (D) Potato Starch.
Sampling for Microbotanical Remains

Column Sample

Sediment Core
To Truly Know an Ancient Society, One Must Analyze Its Feces
By Sarah Laskow  JANUARY 28, 2016

Food Processing Residue

Dental calculus

Archeological digs, like any work environment, can get tedious. Even scientists need to have fun. In the 1960s, at one of Vaughn Bryant’s first digs, workers would collect “dozens of flat, cow patty-shaped human coprolites”—hunks of ancient human fecal matter—through the course of the morning. After lunch, those coprolites would be used as entertainment.

The game was to see how far the patties could be thrown, frisbee-like, from the site. “As each coprolite sailed out over the canyon the crowd would cheer or launch, depending on how far the thermal updrafts carried each coprolite,” Bryant writes, “it was great sport.”
Macrobotanical Remains

Available for Use
Present at Site
Utilization
Deposition
Preservation
Recovery
Identification
Analysis
Macrobotanical Materials: Preservation

- Frozen
- Waterlogged
- Desiccated
- Mineralized
- Carbonized
Ötzi the Iceman: preserved in the ice for 5300 years

Ötzi, the glacier mummy, is displayed in the South Tyrol Museum of Archaeology in Bolzano, Italy together with his clothing and equipment.
Waterlogged, mineralized

celery

Mineralized Hackberry (CaCO₃)

coriander
Huaca Prieta, Peru

These ancient corn cobs date roughly from 6,500-4,000 years ago. A is Proto-Confite Morocho race; B, Confite Chavinense maize race; and C is Proto-Alazan maize race.

Credit: Tom D. Dillehay
Carbonization: pyrolysis of plant material, producing charcoal (carbon + tar + ash)
Carbonization: How?

- Intentional burning
  - Fuel
  - Trash
- Unintentional burning
  - Structure fires
  - Cooking spills/roasting fails
Factors Affecting Carbonization

- Temperature, oxygen
- Qualities of material
  - Density
  - Water and oil content

<table>
<thead>
<tr>
<th></th>
<th>Carbohydrates</th>
<th>Fat</th>
<th>Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acorn</td>
<td>42%</td>
<td>51%</td>
<td>5%</td>
</tr>
<tr>
<td>Hickory</td>
<td>11%</td>
<td>81%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Preservation of Carbonized Materials

- After deposition and carbonization, condition affected by
  - Soil acidity
  - Temperature
Field Methods: Recovery

- Available for Use
- Present at Site
- Utilization
- Deposition
- Preservation
- Recovery
- Identification
- Analysis
Recovery Goals

- Limit breakage of carbonized materials
- Good separation of carbonized materials from other artifacts
- Retain tiny seeds like tobacco and poppy
- Avoid contamination
Sampling

- Get coverage of all different types of contexts
  - Clarify formation processes
  - Identify rare species
- Sampling strategies
  - Blanket
  - Interval
  - Probabilistic
Taking Samples in the Field

- Block sample vs. grab sample
- Don’t screen
- Don’t dry before flotation
FLOTATION: SMAP

Flotation sample

“SMAP-type machine”

Carbonized material “light fraction”

Artifacts, rocks, and sand “heavy fraction”

Very fine sand, other particles “sludge”
FLOTATION: FLOTE-TECH
Lab Methods: Identification
2 mm
1.4 – 2 mm
0.7 – 1.4 mm
“dust”
Biases in Identification

- Materials with distinctive patterned textures easier to identify, even when fragmentary
- Smaller seeds less likely to break
**Passiflora incarnata** L. - Maypops (passionflower; maypops)

**Rubus spp.** - Blackberry, raspberry, dewberry, bramble
*Vitis* sp. – grape

*Phytolacca americana*, pokeweed
Carya sp. Hickory nutshell

Prunus persica, peach
*Chenopodium berlandieri*,
(goosefoot, lambs quarter)

*Zea mays*, corn cupule
Making Sense of Data: Analysis

- Available for Use
- Present at Site
- Utilization
- Deposition
- Preservation
- Recovery
- Identification
- Analysis
Interpreting Archaeobotanical Data

- **Problem**: Counts of different species more related to preservation factors than use
- **Solution**: Use proportions of one material type relative to another
Other Means of Standardization

- Divide by volume of sample
- Divide by weight of carbonized material
- Ubiquity
Examples of Research Topics

- What was the environment like in the past, and how did people impact the environment?
- How, where, and why were certain plants domesticated? How and why were introduced plant foods adopted?
- What role did feasting play in past societies? How were staple plant foods stored, and who owned and controlled these stores?
Extent of Catawba Indian Nation, 1755 to 2014
Nassaw and Weyapee
Charraw Town
<table>
<thead>
<tr>
<th>Vine/Shrub Fruit</th>
<th>Nassaw-Weyapee</th>
<th>Charraw Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maypop</td>
<td>66</td>
<td>191</td>
</tr>
<tr>
<td>Grape</td>
<td>22</td>
<td>55</td>
</tr>
<tr>
<td>Blackberry/Raspberry</td>
<td>92</td>
<td>27</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>180/2358</strong></td>
<td><strong>273/1666</strong></td>
</tr>
</tbody>
</table>

![Map showing locations of Nassaw-Weyapee and Charraw Town.](image-url)
Upland Old Field
transition to shrub-scrub and then to
Mature Climax Forest

<table>
<thead>
<tr>
<th>bare field</th>
<th>annual weeds</th>
<th>broomsedge</th>
<th>woody shrubs</th>
<th>sweetgum</th>
<th>pine/sweetgum</th>
<th>oak</th>
<th>oak/hickory/poplar shortleaf pine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years:</td>
<td>0</td>
<td>3</td>
<td>110</td>
<td>15-20</td>
<td>40-50</td>
<td>170-80</td>
<td></td>
</tr>
</tbody>
</table>

(Offered image of a diagram showing stages of vegetation from bare field to mature forest, with approximate years for each vegetation stage.)
Gourds and squashes (Cucurbita spp.) adapted to megafaunal extinction and ecological anachronism through domestication

Logan Kistler\textsuperscript{a, b, c, 1}, Lee A. Newsom\textsuperscript{a, d}, Timothy M. Ryan\textsuperscript{a, e}, Andrew C. Clarke\textsuperscript{f}, Bruce D. Smith\textsuperscript{g, h}, and George H. Perry\textsuperscript{a, b, 1}
Conclusion: Take-Away Points

- Plant materials can help answer many different types of questions, not just about what people ate
  - Site formation processes
  - Fuel use and environmental impact
  - Community organization
- Importance of sampling
  - Design sampling strategies in accordance with site type, materials present, and research questions