Taphonomic Considerations for the Analysis of Parasites from Archaeological Contexts

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TAPHONOMIC CONSIDERATIONS FOR THE ANALYSIS OF PARASITES FROM ARCHAEOLOGICAL CONTEXTS

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What is Archaeoparasitology?

“A multi-disciplinary field within paleopathology that looks at parasites in archaeological contexts.”
– Reinhard & Araújo, 2008

- Various contexts
  - Coprolites, sediments, mummies, etc.
- Spans space and time
- An array of ever-evolving methods
The Role of Taphonomy

- Differential Preservation
- Not all materials are created equal
- Vital to data interpretation
The Role of Taphonomy

- Major Types of Taphonomic Factors

  - Abiotic
  - Organismal
  - Contextual
  - Ecological
  - Anthropogenic
Differential Preservation: Abiotic Factors

- Natural soil pH
- Soil moisture content
- Humidity
- Ambient temperature
- Weather patterns
- Chemical degradation
Differential Preservation: Organismal Factors

- Structural differences in eggs
- Lifecycles
- Fecundity
Differential Preservation: Contextual Factors

- Challenges with source materials
- Keep things in context
  - Archaeological, Environmental, Cultural, Geographic, & Temporal
Differential Preservation: Anthropogenic Factors

- Treatments in Life
  - Sanitation Issues
  - Medical Technologies
  - Pharmacopeias

- Treatments After Death
  - Preparations, Rituals, & Disposal
  - Curation & Relocation
Differential Preservation: Ecological Factors

- Interactions with decomposers
  - Fungi & Bacteria
  - Flies & Beetles
  - Mites
The Role of Taphonomy

- Taphonomic Challenges of 3 Cases
  - Vilnius, Lithuania
    - Historic mummies from beneath a church
  - Nivelles, Belgium
    - Coprolites from Medieval burials
  - Florence, Italy
    - Medici family members’ embalming jars
Case #1: Vilnius, Lithuania
Case #1: Vilnius, Lithuania

- **Abiotic Considerations:**
  - Aridity; Low temperatures; Changes to airflow

- **Organisinal Considerations:**
  - Under-developed parasite eggs; Coinfection

- **Contextual Considerations:**
  - Spontaneous historic mummies

- **Anthropogenic Considerations:**
  - Bombings; New window; Sanitation

- **Ecological Considerations:**
  - Decomposer mites and flies
Case #1: Vilnius, Lithuania
Case #2: Nivelles, Belgium
Case #2: Nivelles, Belgium

- **Abiotic Considerations:**
  - Water percolation; Soil conditions

- **Organismal Considerations:**
  - Compositional differences in eggs; Coinfection

- **Contextual Considerations:**
  - Skeletonized bodies & coprolites encased in coffins

- **Anthropogenic Considerations:**
  - Coffin types; Sanitation practices & treatments

- **Ecological Considerations:**
  - Exposure to some decomposers (fungi & bacteria), but protection from others (flies and beetles)
Case #2: Nivelles, Belgium

Parasite Eggs per Gram in Nivelles Burials

- Burial 009
- Burial 119
- Burial 122
Case #3: Florence, Italy
Case #3: Florence, Italy

- **Abiotic Considerations:**
  - Temperature, humidity, & chemicals inside jars

- **Organismal Considerations:**
  - Susceptibility of parasites to jar conditions

- **Contextual Considerations:**
  - Mummy preparation materials; late-sealed jars

- **Anthropogenic Considerations:**
  - Affluence of the Medici; corking of jars

- **Ecological Considerations:**
  - Decomposer mites, beetles, & flies
Case #3: Florence, Italy

1,300 mites/gram
20,574 mites/gram
Problems with Interpretation

- Failure to consider taphonomic factors can result in skewed data interpretations
  - Artificially high or low count data
    - Physical preservation environment
    - Chemical preservation environment
    - Ecological preservation environment
  - Miscounting of damaged microfossils
  - Misidentification of parasite species
Taphonomic Problem-Solving

- Examine the taphonomic factors
- Determine how these factors affect the differential preservation of the material
- Interpret data with taphonomic effects in mind
Conclusion

Considering the taphonomic factors associated with archaeological materials is a vital component in the interpretation of archaeoparasitological data.
Acknowledgments

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Questions?

There “mite” be a few!