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Taphonomic Considerations for the Analysis of Parasites from Archaeological Contexts

Johnica J. Morrow

University of Nebraska-Lincoln, Johnica.Morrow@sdsmt.edu

Dario Piombino-Mascali

University of Vilnius, dario.piombino@mf.vu.lt

Karl J. Reinhard

University of Nebraska-Lincoln, kreinhard1@mac.com

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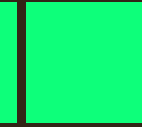
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TAPHONOMIC CONSIDERATIONS FOR THE ANALYSIS OF PARASITES FROM ARCHAEOLOGICAL CONTEXTS

J.J. Morrow¹, D. Piombino-Mascoli², & K.J. Reinhard¹

¹University of Nebraska-Lincoln ²University of Vilnius

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

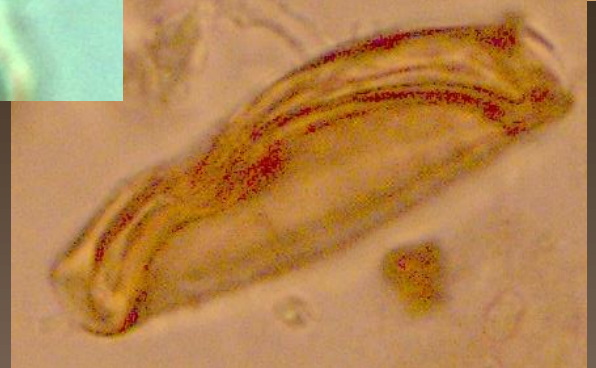
❖ An array of ever-evolving methods

The Role of Taphonomy

❖ Differential Preservation

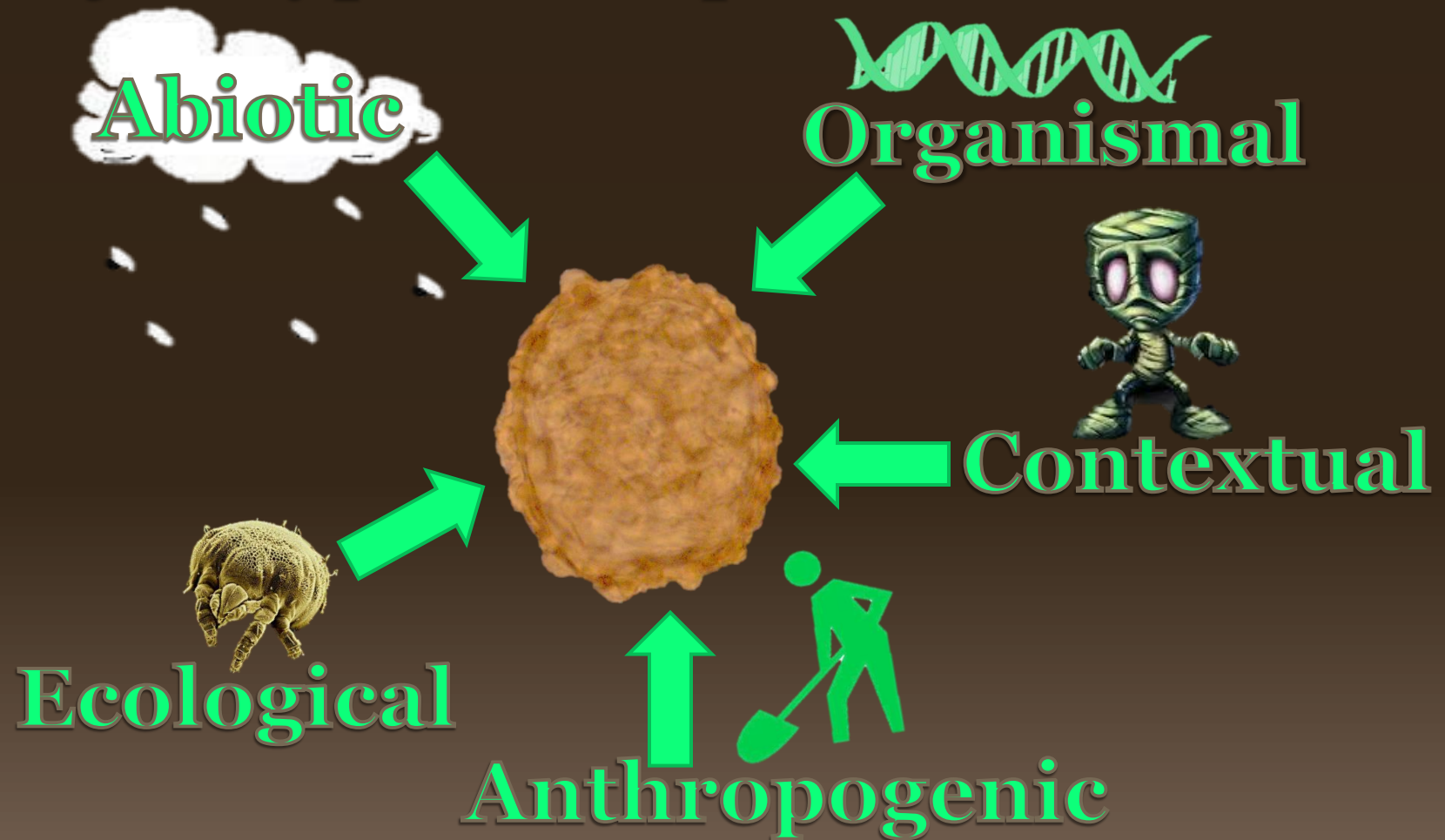
❖ Not all materials are created equal

❖ Vital to data interpretation



The Role of Taphonomy

❖ Major Types of Taphonomic Factors



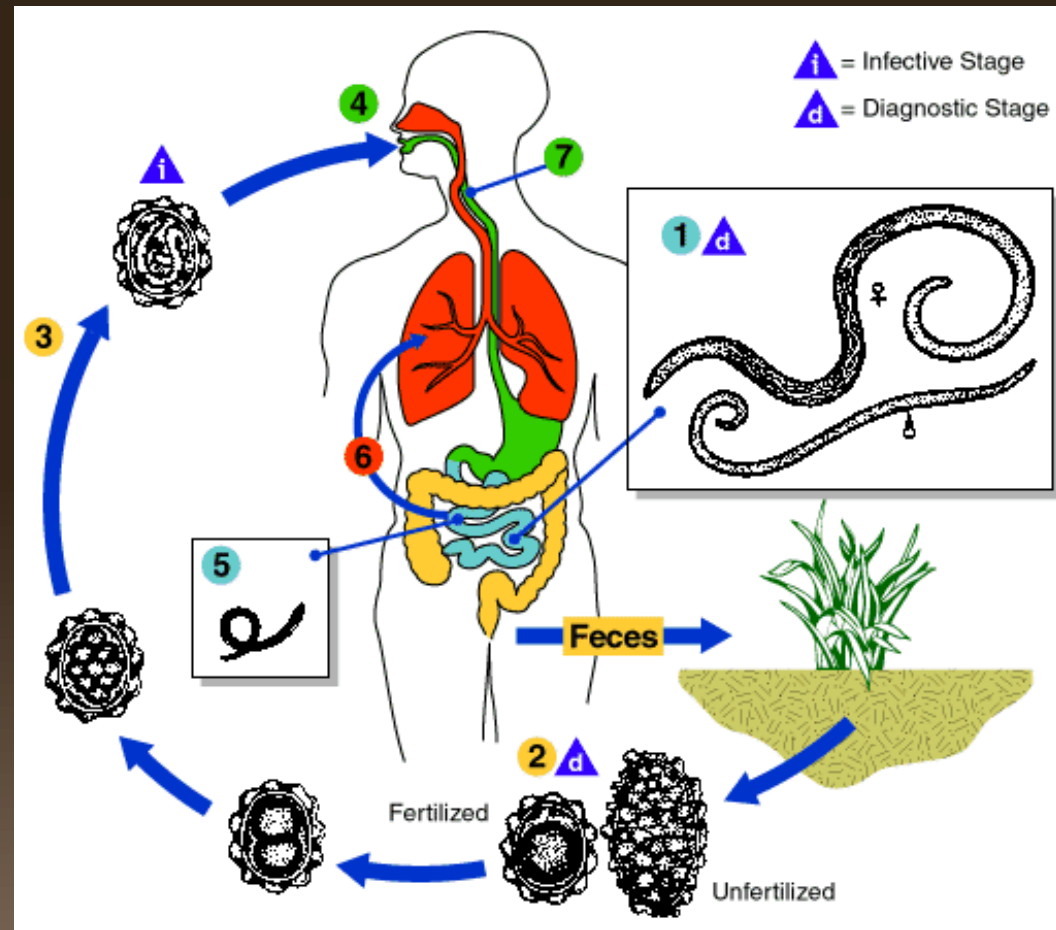
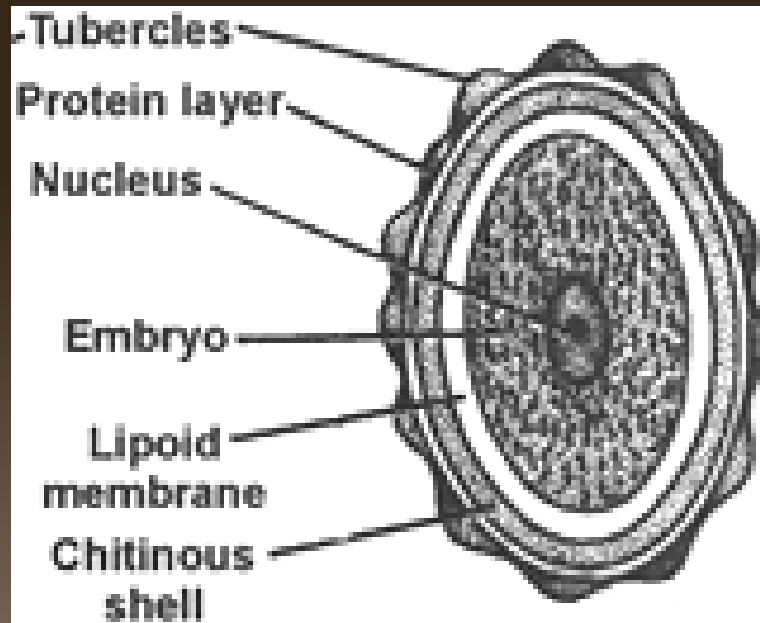
Differential Preservation: Abiotic Factors

- ❖ 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

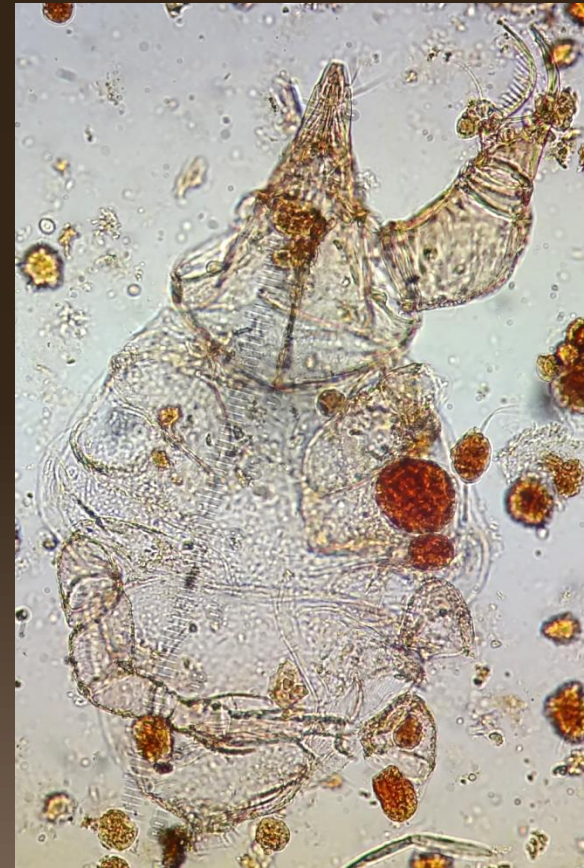
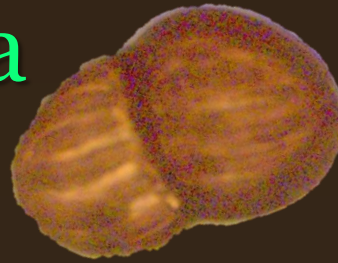
Differential Preservation: Ecological Factors

❖ Interactions with decomposers

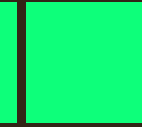
❖ Fungi & Bacteria

❖ 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

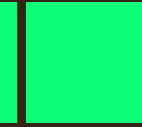
❖ **Florence, Italy**

- ❖ Medici family members' embalming jars

Case #1: Vilnius, Lithuania



Case #1: Vilnius, Lithuania



❖ **Abiotic Considerations:**

- ❖ Aridity; Low temperatures; Changes to airflow

❖ **Organismal Considerations:**

- ❖ Under-developed parasite eggs; Coinfection

❖ **Contextual Considerations:**

- ❖ Spontaneous historic mummies

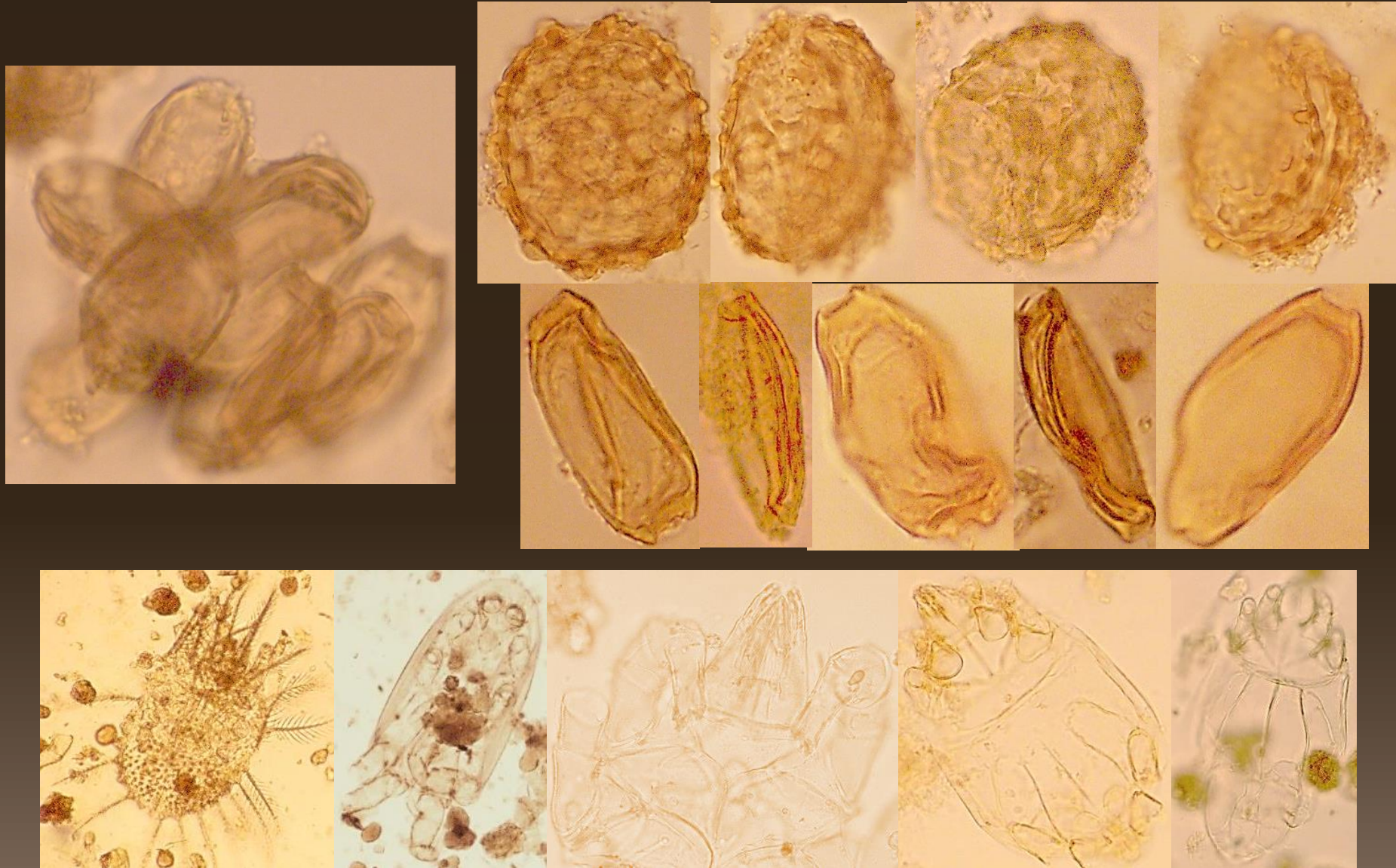
❖ **Anthropogenic Considerations:**

- ❖ 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

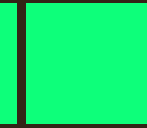
❖ **Anthropogenic Considerations:**

- ❖ Coffin types; Sanitation practices & treatments

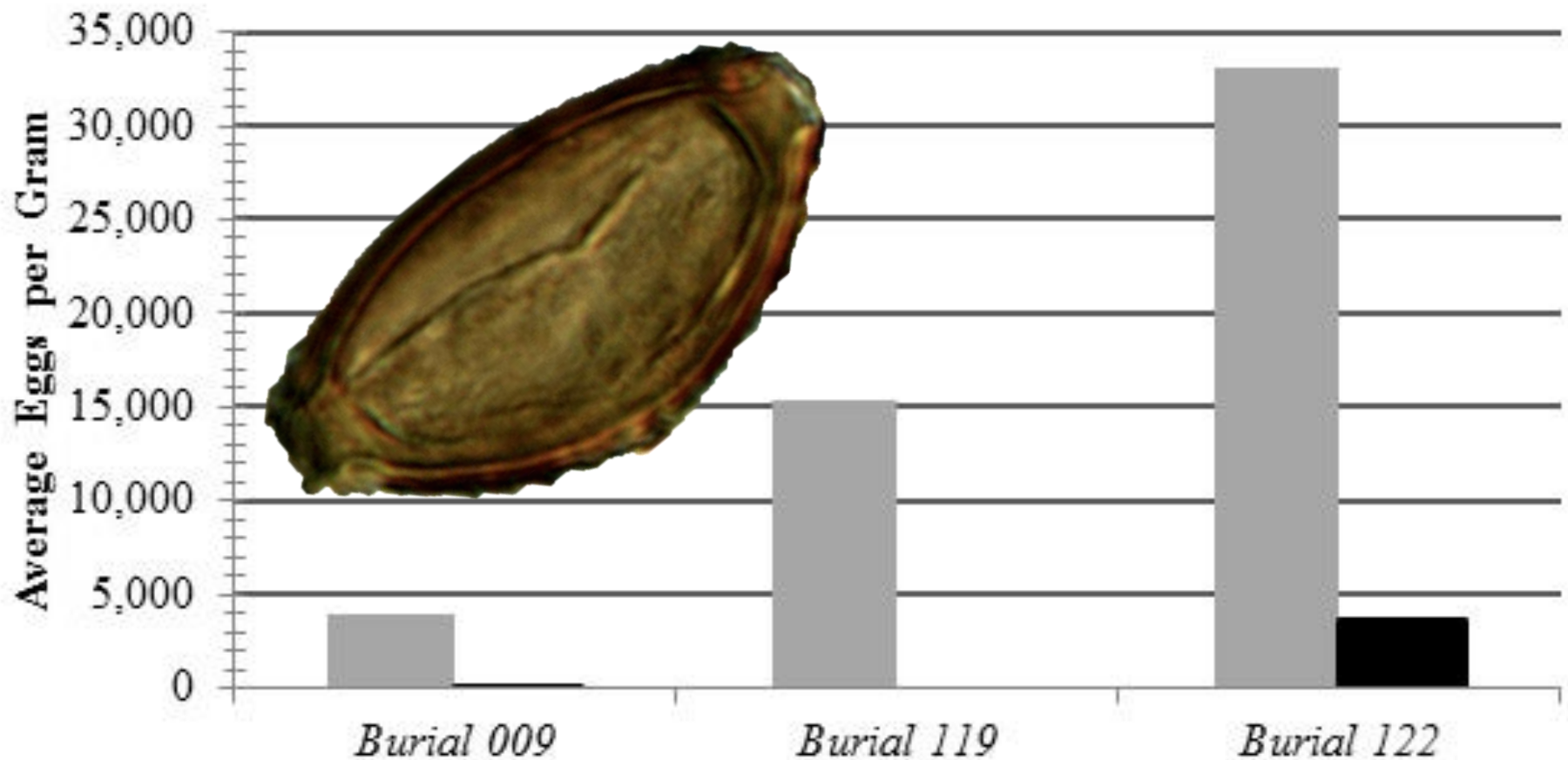
❖ **Ecological Considerations:**

- ❖ Exposure to some decomposers (fungi & bacteria), but protection from others (flies and beetles)

Case #2: Nivelles, Belgium



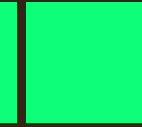
Parasite Eggs per Gram in Nivelles Burials



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

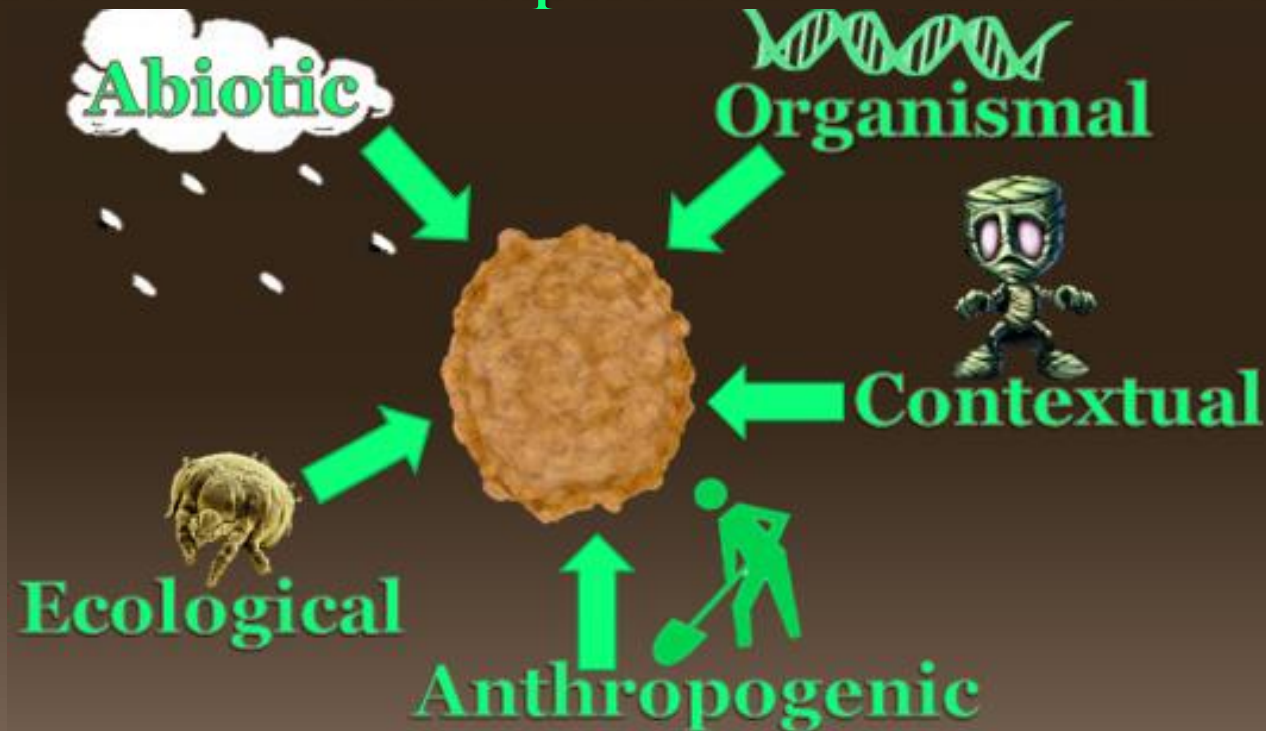


Problems with Interpretation

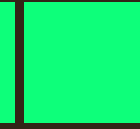
- ❖ Failure to consider taphonomic factors can result in skewed data interpretations
 - ❖ Artificially high or low count data
 - ❖ Physical preservation environment
 - ❖ Chemical preservation environment
 - ❖ Ecological preservation environment
 - ❖ Miscounting of damaged microfossils
 - ❖ Misidentification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



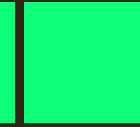
Conclusion



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

Acknowledgments

- ❖ All collaborators who worked on case-studies
- ❖ The School of Natural Resources
- ❖ Dr. Karl J. Reinhard



School of Natural Resources

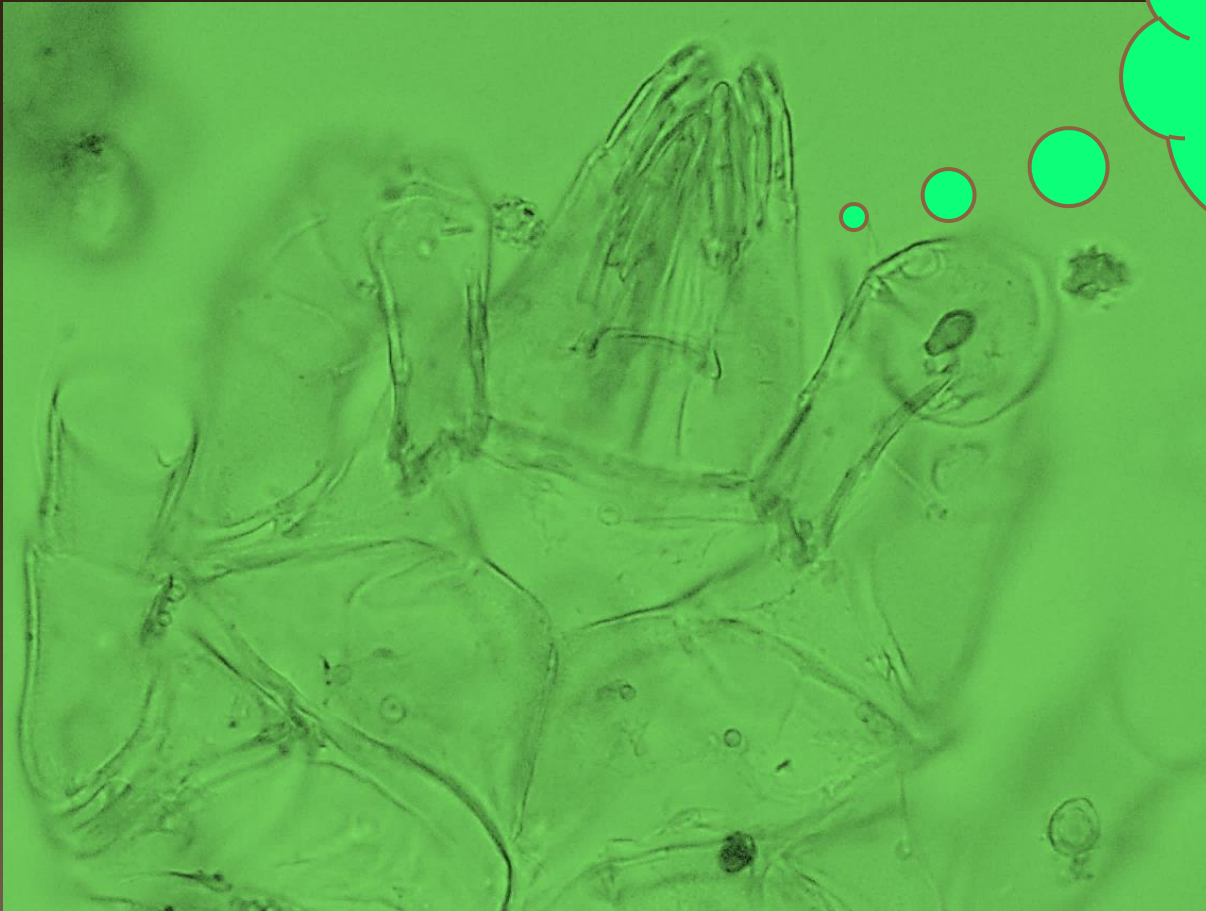


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Questions? ■



There
“mite”
be a few!