Can the Presence and Proportion of Bacterial Communities Be Used to Estimate Post-Mortem Interval?
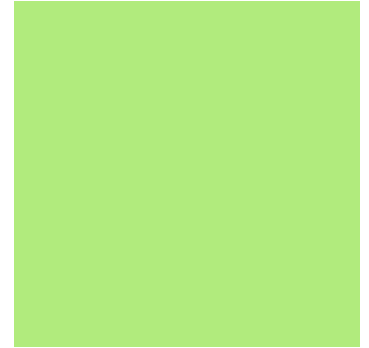## A Critical Analysis

Alexa Golemo

Post-mortem Interval

- Time that has occurred since death

- Importance to forensic and legal cases

- Division of decomposition into phases

  - Fresh ➔Bloat ➔Active decay ➔Advanced decay ➔Dry

- Unreliability of methods

Current Research

- Abundance of bacteria present
  - Changing availability of nutrients
  - Similarities in patterns of family level but not phylum
    - Phylum *Proteobacteria*
    - Family *Moraxelleceae* and *Enterobaceriaceae*
    - Impact of culture-dependent vs. culture-independent methods
  - Rupturing of abdominal cavity
    - Change from anaerobic to aerobic
    - Variability
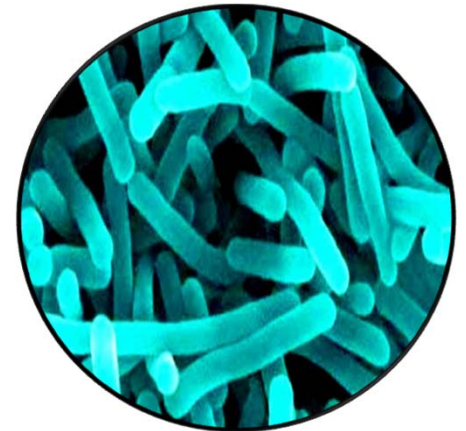
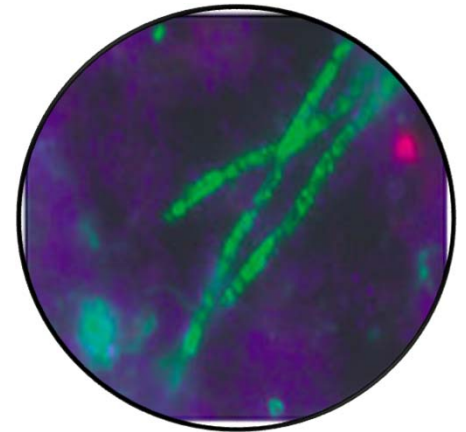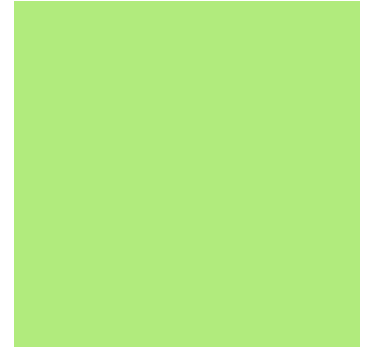# Current Research
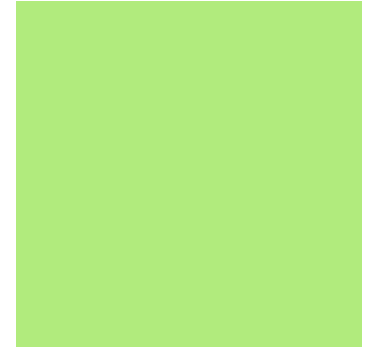
- Variables impacting rate and structure of decomposition
  - Internal and external
  - Buried body
    - Slowed rate
  - Clothing
    - Slowed rate
  - Emaciation
    - Increased rate

Joseph Stromberg

Current Research

- Comparison with grave soil microbes

  - Microbiome of skin and soil

  - Late stages of decomposition

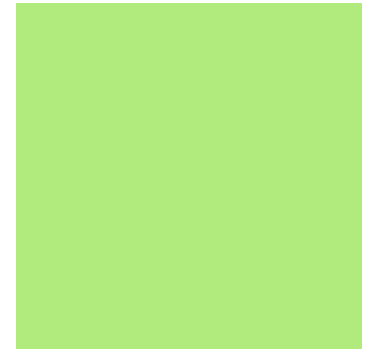 - Diversity of bacteria within surrounding soil

Current Research

- Comparison of research

  - *Gammaproteobacteria*, *Firmicutes*, and *Bacteroidetes*

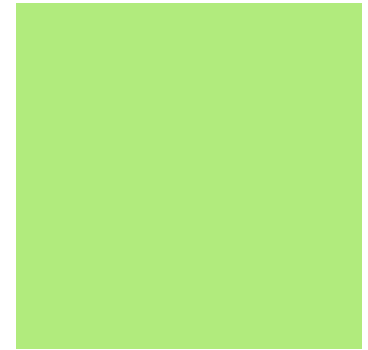 - Lack of comparable patterns found
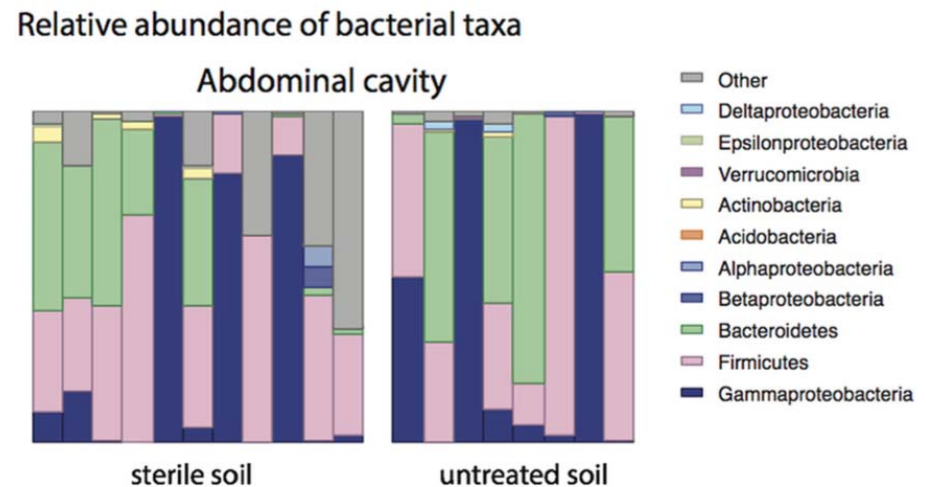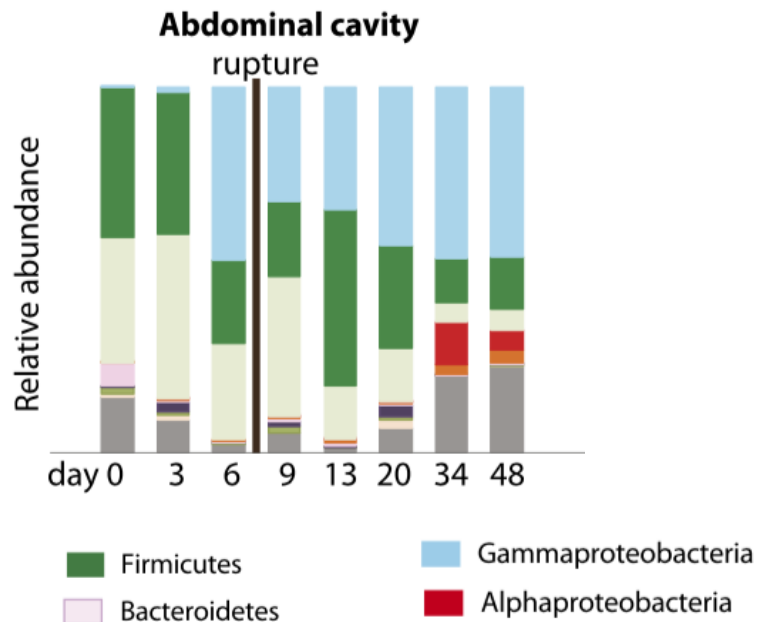
Weaknesses

- Small sample sizes

- Non-human cadavers

- Absence of likelihood ratios

- Variables impacting decomposition
  - Seasons and region

Weaknesses

- "Universal" post-mortem interval

1. **FORMULA I (PMI$_{Aerobic}$)** – Describes above ground (aerobic) human decomposition and is used to estimate the post-mortem interval. Result is in DAYS.

$$PMI_{Aerobic} = \frac{1285 \times (decomposition/100)}{0.0103 \times temperature \times humidity}$$

2. **FORMULA II (PMI$_{Anaerobic}$)** – Describes human 'burial' decomposition (anaerobic and/or below ground) and is used to estimate the post-mortem interval. Result is in DAYS.

$$PMI_{Anaerobic} = \frac{1285 \times (decomposition/100) \times 4.6 \times adipocere}{0.0103 \times temperature \times (soil\ moisture)}$$

- Stage of decomposition

- Culture-dependent methods

- Diversity of bacteria

The Future
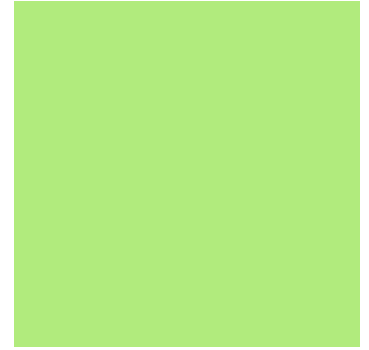
- Culture-dependent methods

- Corroboration of other methods

- Extension of timeline for post-mortem interval estimates

- Research

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