

# The Effects of Freezing on Soft Tissue Decomposition

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# Introduction

- ◉ Relates directly to Forensic Anthropology
  - › Applies physical anthropology in a legal context
- ◉ Results from decomposition experiments can be applied to real world cases
  - › Accurately estimate time of death
- ◉ Freezing has specific effects
  - › Desiccation
  - › Cell damage

# Introduction

- ◎ By studying decomposition of small mammals in a climate controlled environment, changes can be observed and applied to humans
- ◎ Jerry Payne Carrion Study
  - > Use pigs to study decomposition
  - > Practical, more efficient
  - > Specimens easier to acquire

# Hypotheses

- ◉ Freezing: expect desiccation of all specimens
  - > Changes in eye and skin tissue (qualitative)
  - > Expect a decrease in weight
  - > Expect quantitative measurements to decrease
- ◉ Thawing: expect squirrels to decompose faster than the raccoons

# Methods

- ◎ Sample:

- > 3 juvenile raccoons (range 6.5 - 8.6 lbs)
- > 8 squirrels (range 14.6 – 20.3 oz)

- ◎ Location:

- > Freezing took place in standard household freezer
- > Thawing took place outdoors (temperature not controlled)

# Freezing Protocol

- ◎ Sample preparation:
  - › Initial measurements
    - Internal temperature
    - Weight
    - Circumference measurements
  - › Bagged
  - › Frozen
    - 188 days
    - At 32° F
    - Data collected every 7 days

# Thawing Protocol

- ◎ Sample Preparation:
  - Specimens in labeled containers
  - Placed outdoors to naturally thaw



# Thawing Protocol

- ◎ Samples thawed for 7 days outdoors at varying temperatures, data collected every day
  - > Weather
    - Temperature
    - Humidity
    - Conditions
  - > Internal temperatures
  - > Pictures



# Results from Freezing

- ◉ Weight remained the same for raccoons
- ◉ Weight decreased for squirrels
  - > Average squirrel weight loss: 9.03%

# Results from Freezing

- ◉ Measurements remained the same for the raccoons
  - > Length: 0% change
  - > Neck circumference: 0% change
  - > Stomach circumference: 0% change
  - > Leg circumference: 0% change

# Results from Freezing

- ◎ Stomach circumference increased
  - › Average stomach circumference: + 9.1%
- ◎ All other measurements decreased for the squirrels
  - › Average length: - 4.12%
  - › Average neck circumference: - 3.06%
  - › Average leg circumference: - 3.05%

# Results from Freezing

- ◉ Skin desiccation on all specimens



# Decomposition Stages

- ◉ Initial decay: cell autolysis, gases build
- ◉ Putrefaction: bloat, odor, purging of fluids
- ◉ Black putrefaction: body collapses, intense odor, tissue blackens
- ◉ Butyric fermentation: fermentation, mold, drying
- ◉ Dry decay: desiccation
- ◉ Skeletonization: loss of soft tissue

# Results from Thawing

- Raccoons reached putrefaction in 7 days



- Squirrels reached black putrefaction in 7 days





# Discussion and Interpretation

- ◎ Eye and skin desiccation
  - > Both raccoons and squirrels
  - > Longer period of freezing means more desiccation
- ◎ Weight
  - > Raccoons stayed the same
  - > Squirrels lost weight
  - > Longer period of freezing means more weight loss

# Discussion and Interpretation

- ◉ Circumference measurements
  - › Raccoons stayed the same
  - › Squirrels decreased (except stomach)
  - › Raccoons are larger, therefore take more time for changes to occur
- ◉ Decomposition rate
  - › Squirrels decomposed faster than the raccoons
  - › Squirrels are smaller, changes occurred faster



# References

Payne, Jerry A.

1965 A Summer Carrion Study of the Baby Pig *Sus Scrofa* Linnaeus. *Ecology* 46(5):592-602

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