

Rates of Body Decomposition in Three Burial Environments

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INTRODUCTION & SIGNIFICANCE

Research Topic: The effect of ground material on the rates of decomposition of buried house mice *mus Musculus*

Aim: Observe and measure differences in decomposition rates based on the material (medium-grade gravel, sand, soil) mice were buried in over staged intervals of 8 days, 16 days and 24 days.

Significance: Determining PMI is crucial in homicide, suicide and unwitnessed deaths (Byers 2011). Decomposition rates are strongly included by abiotic factors including, humidity, temperature, oxygen exposure and access to buried remains (Meyer et al, 2013). These factors vary significantly throughout climates and seasons. Provide insight into below ground decomposition rates in the fall in Cascadia.

Hypotheses:

- Mice buried in the soil condition will decompose at a faster rate than mice buried in both the gravel and the sand condition.
- Mice buried in the gravel condition will decompose at a slower rate than the mice buried in the soil condition, but will decompose at a faster rate than mice buried in the sand condition.
- Mice buried in the sand condition will decompose slower than mice buried in the gravel condition and mice buried in the sand condition.

MATERIALS

Specimens

- 12 frozen mice purchased from Pets West in Broadmead Village.

Materials.

- 12, 750 ml containers purchased from Wal-Mart. Holes were drilled in the bottom of each container to allow for drainage during rainfall.
- Sterile nitrate gloves, face masks and closed-toed shoes were worn at all times around the specimen.
- Chicken wire was purchased and place over buried mice containers to reduce risk of scavenging.
- Bricks were used to secure down chicken wire.
- SF-400 digital scale to weigh mice
- Garden soil – from a local garden in Oak Bay
- Play Sand purchased from Home Depot
- Medium-grade gravel purchased from Gravel-Mart



Fig. 1 – Day 1, preparations of the specimens

METHODS

Containers were filled half way with ground material. The specimens were each placed in a container and precautions were made so they did not touch the sides. The specimens were then completely covered in the ground material.

On day 8, day 16, and day 24 of the experiment, a mouse from each condition was uncovered and exposed by slowly removing the material with our hands. Taphonomic results were documented.

The specimen's head, appendages (limbs and tails) and body was examined separately as decomposition occurs at different rates in different parts of the body.

Examined for coloration, location of soft tissue decay, evidence of insect activity, skin slippage, mummification, skeletonization. Specimens were examined for bloating, shrinkage from putrefaction and autolysis and to see if they were leaking fluids.



Fig. 2 – Where the specimens were placed for the duration of the study

DAY 8 RESULTS

Soil: No visible signs of soft tissue decomposition. Autolysis of internal organs was evident; small patch of skin slippage on lower left torso.

Sand: No visible soft tissue decomposition. Autolysis of internal organs was evident as was livor mortis. Dorsal portion of specimen appeared grey while the ventral portion turned a deep purple.

Gravel: No visible soft tissue decomposition. Autolysis was most advanced in this specimen. Leakage of fluid was evident.



Fig. 3 – Mouse in Day 8 Soil condition



Fig. 4 – Mouse in Day 8 Sand condition



Fig. 5 – Mouse in Day 8 Gravel condition

DAY 16 RESULTS

Soil: Specimen was stained brown from the soil. Autolysis was more advanced than in the previous week. Shrinkage was noticeable in the appendages and the left hind leg was partially disarticulated.

Sand: Livor mortis was once again present. Fluid was seeping out of the body. Right hind leg was partially disarticulated. Bloating of the tail was evident.

Gravel: Extremely bloated and very wet. Both hind legs were partially disarticulated. Fluid was seeping out of natural orifices.



Fig. 6 – Mouse in Day 16 Soil condition



Fig. 7 – Mouse in Day 16 Sand condition

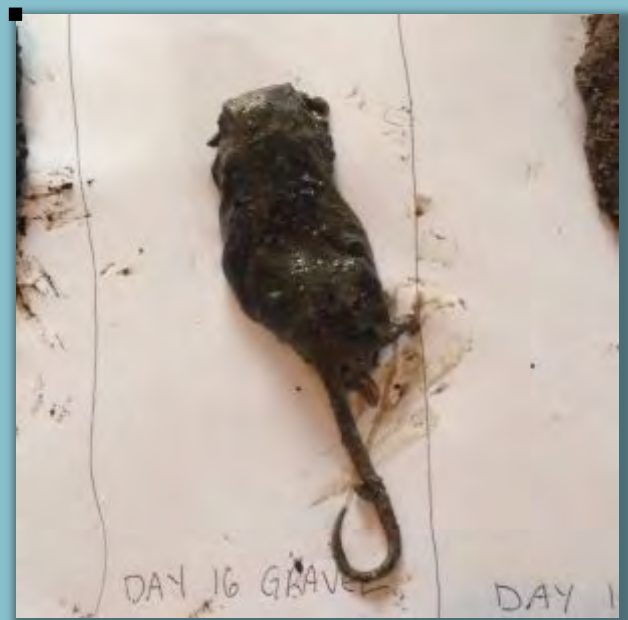


Fig. 8 – Mouse in Day 16 Gravel condition

DAY 24 RESULTS

Soil: Weed growth was observed around the specimen. Evidence of skin slippage on the back was observed as well as two small holes. White, milky fluid was leaking from the specimen. The mandible was visible and the body had shrunk significantly.

Sand: Specimen had shrunk significantly. Still no evidence of significant soft tissue decay. Autolysis was very advanced.

Gravel: nearly the entire specimen had been eaten away by maggots. Hind legs were absent. The specimen remained together by the spine.



Fig. 9 – Mouse in Day 24 Soil condition



Fig. 10 – Mouse in Day 24 Sand condition



Fig. 11 – Mouse in Day 24 Gravel condition

DATA SHEET

Below is the data sheet used to collect qualitative information on the specimens. This data sheet uses visual information in order to place decomposition along a certain time-frame.

The proposed schedule for this study:

- October 16th 2016 – specimens are buried
- October 24th 2016 – The first specimens from each condition to be exposed and examined
- November 1st 2016 – The second specimens from each condition to be exposed and examined
- November 9th 2016 – The third and final group of specimens, one from each condition to be exposed and examined.

Data Sheet:

Genus Species:

Burial Condition:

Burial Duration:

Colouration:

- head:
- torso:
- appendages:

Soft tissue decay:

- head:
- torso:
- appendages:

Evidence of insect activity:

Skeletonization:

- head:
- torso:
- appendages:

Additional Comments:

DISCUSSION AND CONCLUSION

The results obtained over the course of the study varied significantly from our initial hypotheses.

The mouse in the gravel condition decomposed at a much faster rate than the mice in both the soil and sand condition. Decomposition occurred slowest in sand as predicted. Additionally decomposition rates in all conditions were slower than anticipated.

This is largely due to a number of external factors. Such as using surface decomposition rates as a proxy, while research notes that below-surface decomposition rates is eight times slower (Tibbett and Carter, 2009). In addition, weather and access to the specimen played an important role.

There was a lack of insects present. This can be attributed to the wetter than average weather deterring insect activity. Furthermore, the wet weather caused specimens in sand and soil conditions to be encased in material limiting access to insects. Because the mouse in the gravel condition was easily accessible by insects, maggots were found on day 24 and this played a large role in the faster rate in decomposition.

The weather affected the rates of decomposition. While holes were drilled in the bottom of each container to allow adequate draining, they did not work as well as planned. Generally decomposition occurs faster in wetter environments, however when ground material is too wet, this process is slowed (Carter et al, 2010). This occurred during the day 16 uncover as there was a large storm the 3 days preceding.

Despite results not matching the hypothesis, it can still be concluded that the type of ground material a body is buried in will have an effect on the rates of decomposition. Sand will cause the specimen to desiccate at a relatively slow rate. Gravel will expose the specimen to insect activity and cause late stage decomposition and skeletonization by 3 weeks. In soil, skeletonization will begin at 3 weeks.



Fig 12. All three mice from Day 16 condition. Noticeable is the effects that weather had on the specimens

REFERENCES

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