

Dissolution of Organic Remains in Nitric Acid



University of New Haven

HENRY C. LEE COLLEGE OF
CRIMINAL JUSTICE AND FORENSIC SCIENCES

Department of Forensic Science

Brianna Hill and R. Christopher O'Brien, Ph.D.

University of New Haven

Department of Forensic Science

Center for Wildlife Forensic Research

Introduction

There are several documented cases in which people dissolve bodies in acid to avoid personal identification of the body. A recent documented incident took place in 2016, when ISIS dissolved twenty-five people in a vat of nitric acid (MailOnline). However, there is little published research on this topic. Mazza et al (2005) determined that nitric acid dissolved teeth the most quickly out of a group of acids. These cases and experiments can be classified as studies of forensic taphonomy.

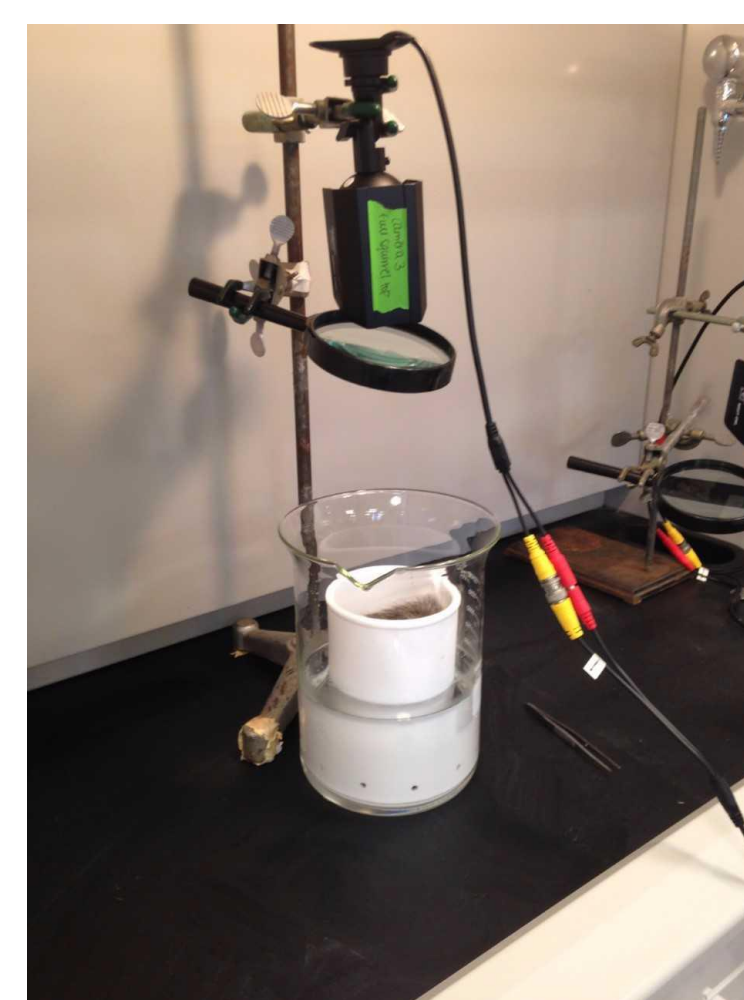
While taphonomy is the study of decay over time, forensic taphonomy focuses on the effects of the environment on the decay. This research study put a process that scientists have conflicting theories about into a harsh environment, nitric acid, to observe the effects.

Methodology

70 % Nitric Acid

Squirrel, chipmunk,
rabbit

Constituents of body:
muscle, bone, teeth



Results & Discussion

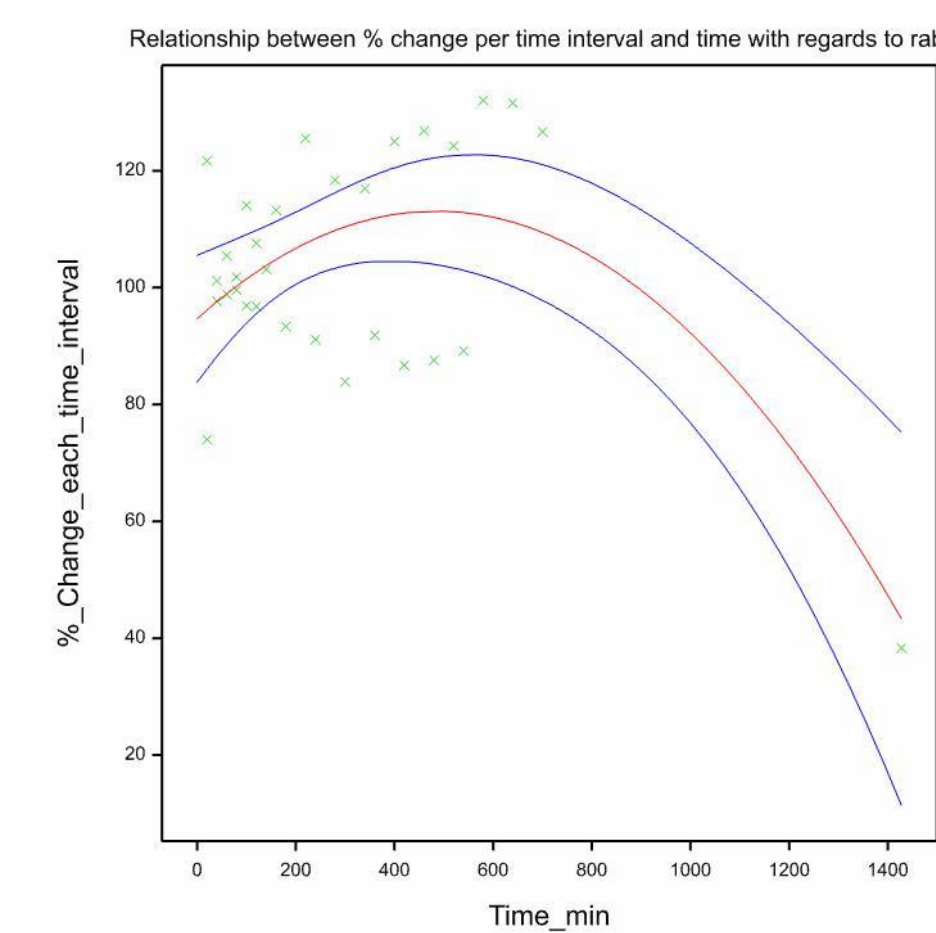


Figure 1:
Differences in
means of % change
and time for rabbit

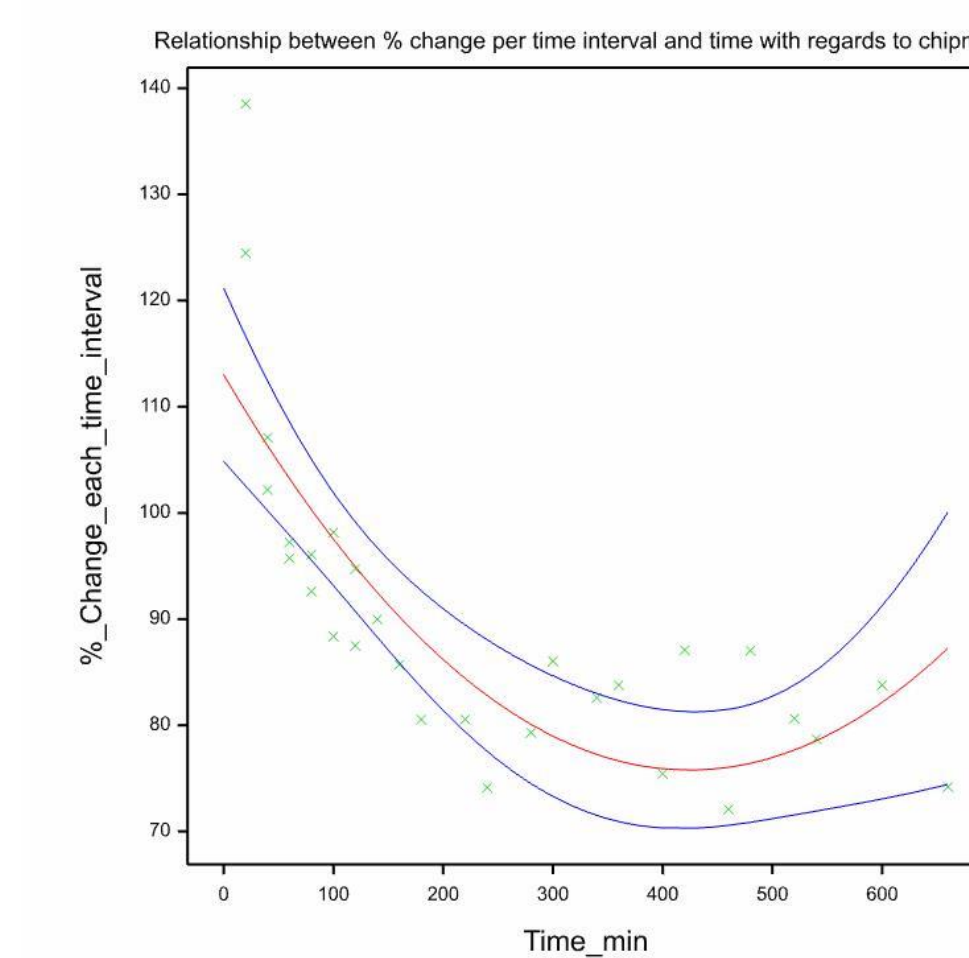


Figure 2: Differences
in means of % change
and time for
chipmunk

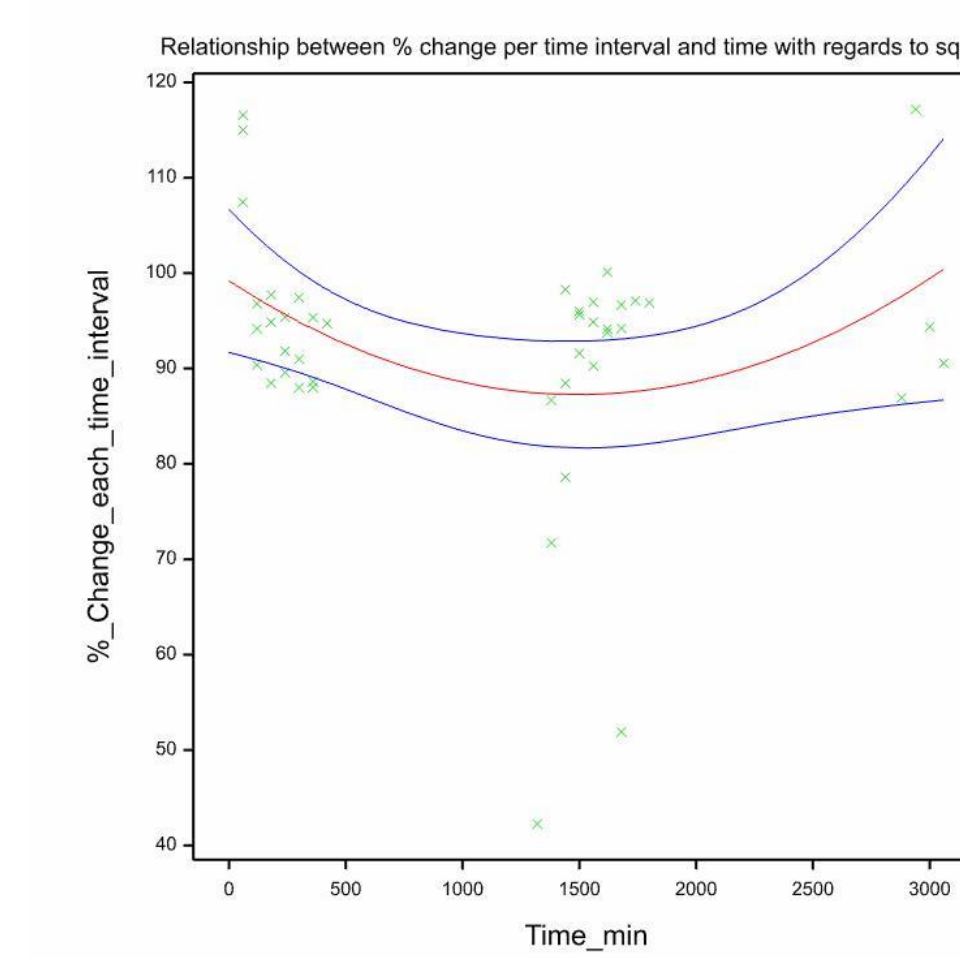


Figure 3:
Differences in
means of % change
and time for
squirrel

Figures 1-3 show that the type of animal does not affect the rate of dissolution of the remains in nitric acid, which is determined by a lack of similar trends or patterns.

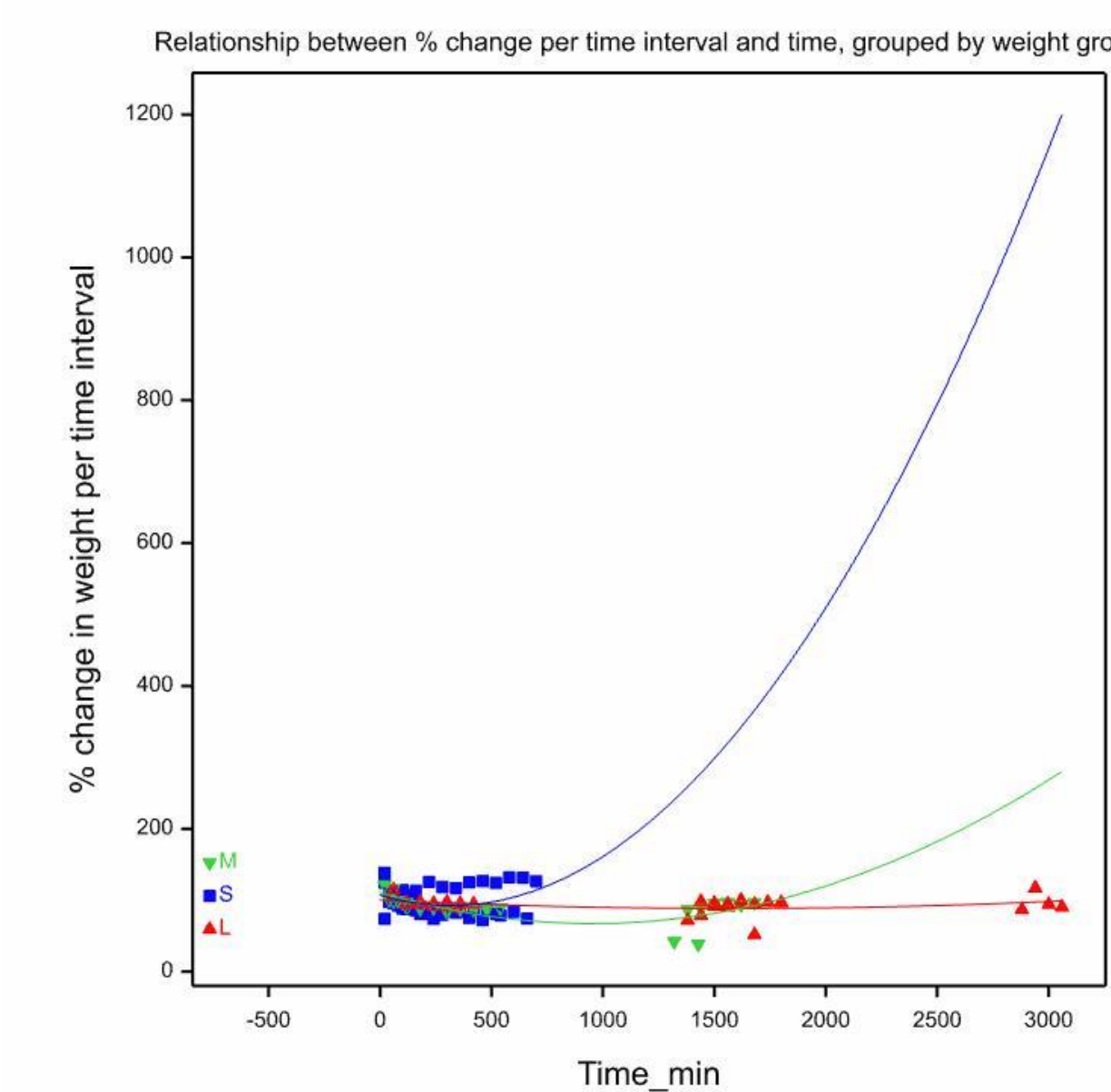


Figure 4: Statistical relationship between % change and time by weight group

Figure 4 shows that as time increases, and the weight decreases, the rate of dissolution in nitric acid increases. This indicates that initial weight affects the rate of dissolution.

Conclusion

- Material matters
- Type of animal does not matter
- Initial weight matters
- Rate of dissolution increases over time

Applications

- Proof of concept – nitric acid can dissolve organic remains completely
- Dissolution in nitric acid can be quantified using time and percent change in weight

Acknowledgements

- Maria Panepinto
- Chelsea Van Den Burg

References

MailOnline, S. M. (2016, May 23). ISIS execute 25 people by DISSOLVING them in nitric acid: 'Iraqi spies' were tied up with rope and dropped into a vat in public as a warning to others. Retrieved February 24, 2017, from <http://www.dailymail.co.uk/news/article-3598477/ISIS-execute-25-people-lowering-NITRIC-ACID-Iraqi-spies-tied-rope-dropped-vat-public-warning-others.html>

Mazza, A., Merlati, G., Savio, C., Fassina, G., Menghini, P., & Danesino, P. (2005). Observations on Dental Structures when Placed in Contact with Acids: Experimental Studies to Aid Identification Processes. *Journal of Forensic Sciences*, 50(2), 1-5. doi:10.1520/jfs2004292