H100 Anaerobic and Aerobic Decomposition in 55-gallon Oil Drums: A Two-Year Study on the Deliberate Concealment of Remains

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After attending this presentation, attendees will learn about the unique stages of decomposition occurring inside an above ground, man- made container used for concealment purposes. Using pigs as human models, this research focuses on both anaerobic and aerobic decay inside an above ground container and reveals how such decomposition can mimic antemortem or peri-mortemtrauma.

This presentation will impact the forensic science community by providing new criteria for estimating the postmortem interval for bodies concealed in above ground, man-made containers such as an oil drum.

Gaining insight into this under-researched decompositional context is important for forensic anthropologists involved in estimating the postmortem interval (PMI).

Numerous studies have focused on the process of decomposition, but few studies have focused on decomposition within above ground containers used for concealment purposes. Moreover, no forensic studies have focused on decomposition within 55-gallon oil drums.

For the past two years, three, one-year-old male pigs weighing 80.0, 80.8, and 84.2 pounds, respectively, have been decomposing inside 55- gallon black, metal, oil drums placed on a cattle farm in Baton Rouge, Louisiana; each drum contains one pig. Oil drums were chosen for this study because federal regulations require that oil drums have an airtight seal to prevent the leakage of chemicals and oil during transport (U.S. Department of Transportation, 49 CFR 178.540(6)).[1] Prior to the start of this study, 1-ft^2 lexan observation windows were installed in the lids of two of the three oil drums to allow observations of anaerobic decomposition. Drum A (containing pig A) was sealed at the initiation of the project. Drum B (containing pig B) was also sealed at the initiation of the project and then was opened one month later. Drum C (containing pig C) was sealed at the top but had four holes drilled in the sides to allow for insect access.

During the first six months of this study (September 22, 2008 – March 13, 2009), daily visits were made to the research site and detailed observations of the anaerobic and aerobic decomposition stages occurring inside each oil drum were recorded. A full collection effort of forensically-important insects was made during each visit; over 1,000 arthropods were collected and identified. Seasonal visits to the site have been made since March 13, 2009. A brief summary of the findings for each of the three pigs provides insight into the great variation in decomposition seen in each of the three drums.

Drum A was sealed on September 22, 2008; pig A currently is still sealed inside, and oil drum A has never been opened. The lexan window on the oil drum's lid has allowed the process of anaerobic decay to be observed. During the first two weeks after placement, pig A's intestines were forced outside of the body as a result of decompositional gases, but neither bloating nor the expected color changes of the skin occurred during the first year of concealment. Pig A gradually began to liquefy during the second year of concealment. No insects have been observed inside the oil drum.

Drum B was also sealed on September 22, 2008; pig B underwent one month of anaerobic decay prior to intentional removal of the drum's lid. During the first two weeks of placement, the pig's abdomen exploded as a result of gas pressure build up. This "explosion" was vastly different from the intestinal expulsion viewed in pig A with pig B's body tissue adhering to the drum's walls. No insects were observed inside the oil drum during the month of anaerobic decay. However, once the drum was opened, insects were immediately attracted to the exposed carrion following lid removal. Nevertheless, unlike pigs A and C, pig B gradually mummified during the five months following lid removal.

Drum C contained pig C and was sealed September 22, 2008. Prior to the pig's placement in the drum, four evenly spaced ½-inch holes were drilled into the oil drum's upper perimeter. Within 24 hours of placing pig C inside the oil drum, the pig's intestines were found resting outside of the body, though no explosion had taken place. Complete skeletonization occurred in one week; however, the liquefied remains and bones have undergone a series of taphonomic changes during the past two years. Most noticeably, the bones changed from black in color to white without ever having been removed from the oil drum or exposed directly to the sun. Two years after beginning this study, the skeleton inside this oil drum is no longer visible because the liquefied soft tissues have solidified and expanded to the top of the drum.

Finally, results from this study provide new insight into the effects anaerobic and aerobic environments have on decomposition within above ground containers used for concealment purposes. This research reveals that attempts to conceal remains can result in liquefaction of

tissues, mummification, and, under-certain conditions, postmortem explosion of soft tissue.

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Reference:

1. U.S. Department of Transportation, Research and Special Programs Administration. *Code of Federal Regulations*. Title 49, vol. 2, pt. 178, sec. 504, Standards for Steel Drums. Washington, D.C.: Government Printing Office, 1999, (49CFR178.504).http://frwebgate.access.gpo.gov/cgi- bin/getcfr.cgi?TITLE=49&Part=178&SECTION=504&YEAR=1999&TYPE=TEXT

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