



## Physical Anthropology Section – 2010

### H72 An Experimental Study of Putrefaction and Decomposition in Aqueous Environments

Kristen E. Greenwald, MA\*, 32 10th Street, Hermosa Beach, CA 90254

After attending this presentation attendees will have a better understanding of the stages of decomposition in both salt and fresh water environments, helping them to determine a more accurate postmortem interval for submerged corpses.

This presentation will impact the forensic community by serving as a controlled experiment recording the postmortem changes that occur during decomposition in aquatic environments during two seasons in Southern California. The majority of previous research conducted on decomposition in aquatic environments is primarily based on case studies, thus making this research invaluable for aquatic death investigations.

Understanding the process of putrefaction and decomposition in all types of environments is crucial for both forensic anthropologists and law enforcement officials. Although the relationship between decomposition and postmortem interval has been well studied, actual controlled studies of the physical disturbances occurring as a result of decomposition of corpses in aqueous environments is rare. This represents an unfortunate lapse in research, because many forensic cases are recovered from marine, riverine, or lacustrine environments. Such cases tend to create considerable taphonomic difficulties, because the majority of forensic remains found in water are inextricably bound to their hydraulic behavior as carcasses, their loss of soft tissue and subsequent disarticulation, and the taphonomic environment in which these processes occur.

To document differences in the stages of the decomposition process in salt versus fresh water, a controlled experiment was designed to mimic a submerged corpse in a forensic setting. Four adult swine (*Sus scrofa*), purchased and euthanized at the Meat Science Facility at California State Polytechnic University in Pomona, California, were used for the experiment. The swine were placed in four separate seventy-five gallon tanks. Tanks A and C were filled with saltwater obtained from a depth of ten feet off the coast in San Pedro, California. Tanks B and D were filled with freshwater from Lake Cahuilla in La Quinta, California. To account for the seasonal difference in California, the water in tanks A and B were chilled to pre-calculated temperatures that mimic California's winter water temperatures while Tanks C and D were chilled to mimic California's summer water temperatures. Data collected included visual observations and photographs made twice a day for the first four weeks and then once a day for the remaining six weeks of the study. The presence or absence of insect activity was also noted.

At the end of the seventy-five day experiment significant differences in the stages of decomposition were observed between the saltwater and freshwater carcasses. In both the winter and summer carcasses in saltwater, the decomposition process was significantly slower than in the freshwater carcasses.

- Pig A (Saltwater/Winter): The specimen in this tank was the most expressive of the impact of saltwater on the rate of decomposition. By day four of the study, the specimen showed very minor bloating in the abdominal region. On day twenty of the study, a bulge in the abdomen split exposing a minor section of the intestines. Deflation began on day forty-five. Complete skeletonization did not occur during the duration of the study.
- Pig B (Freshwater/Winter): Minor bloating began on day four of the study and the abdomen split revealing a large section of the intestines on day twenty. Deflation of the carcass began on day thirty-two. Complete skeletonization did not occur during the duration of the study.
- Pig C (Saltwater/Summer): On day four of the experiment, the specimen began bloating slightly. By day eight, the abdominal region had opened exposing the intestines. Dead flies were found floating on the surface of the water on day twenty-four and deflation of the carcass began on day forty-two. Complete skeletonization did not occur during the duration of the study.
- Pig D (Freshwater/Summer): The bloat stage began on day three and continued for the majority of the experiment. The bloat was so severe that the carcass nearly fell out of the tank. On day seven of the study, the abdomen split completely, exposing the intestines and stomach. By day twenty-seven of the study, deflation of the abdomen and upper torso began. On day twenty-eight, skin slippage appeared on the exposed surface of the carcass. On day sixty of the experiment, disarticulation began and continued until the end of the study. Complete skeletonization of the carcass did not occur during the duration of the study.

In addition to providing preliminary insight into the impact of saltwater and freshwater on decomposition, this study may be used as a catalyst for further study into aquatic decomposition and more specifically the stages of saltwater decomposition in comparison to freshwater decomposition.

#### **Decomposition, Aquatic, Putrefaction**