



H2 I Like Your Shoes: The Utility of Barnacles (Crustacea: Cirripedia) in Forensic Investigations in a Marine Environment

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After attending this presentation, attendees will understand that barnacles are potentially useful when human remains are found in the sea by allowing estimation of the overall duration of the time spent in the water and hence contributing to the determination of the minimum time since death.

This presentation will impact the forensic science community by reviewing the first study involving the identification, colonization, and the growth rate of barnacles associated with shoes placed in a marine environment. This data will be useful in cases in which human remains and their garments are found in the sea.

Estimating the minimum Postmortem Interval (minPMI) is a necessary part of a forensic investigation. MinPMI can be estimated using forensic entomology, the scientific discipline that considers insects and other arthropods in legal investigations. In an aquatic environment, insects as well as crustaceans have the potential to provide data regarding the time the remains spent in water, Floating Time (FT), and Post Mortem Submersion Interval (PMSI), and this can also assist in determining the minPMI.

Barnacles (Crustacea: Cirripedia) are common crustaceans that colonize hard substrates in marine environments and they can often be found in association with human and animal remains floating in the sea. Barnacles are typically found colonizing shoes. Barnacles can colonize both floating remains and submerged remains and their growth rate is dependent on the water temperature. Despite their potential to be indicative of the FT and/or PMSI, at present, research is depleting and only a few case studies have considered it for this purpose.

This study is focused on the barnacle colonization of different type of shoes (plastic/sporty vs leather/elegant) placed in the sea (Boston Harbor, Boston, MA). The objectives of this study are: (1) identification of barnacle species of barnacles that colonize shoes; (2) identification of the settlement preferences of the barnacles associated with the shoes; and, (3) identification of the growth rate of the barnacles associated with the shoes.

In the experiment setup, 64 plastic shoes and 64 leather shoes were placed in the harbor at the same depth (-8/-10 meters), in early March 2016 and remained untouched for one month to allow for colonization to occur. Data loggers were placed with the shoes to record temperature throughout the course of the study. Four of each shoe type were removed every two weeks from April 2016 to October 2016 inclusive. Once the shoes were removed from the water, they were photographed and the barnacle colonization was documented. Individual barnacles from each shoe were sampled and measured to determine species, age as well as the overall colonization density, and settlement preference. Growth rates were calculated based on barnacles sampled from each sampling period correlated with the temperature data. Preliminary results to date reveal that barnacles can colonize both plastic and leather shoes, but also that leather shoes show a higher colonization density.

The results of this study will help determine whether barnacles provide accurate estimations of the time spent in water by the different type of shoes, expanding the field of forensic science and giving examiners more tools in the ever-difficult task of estimating FT, PMSI, and minPMI.



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Barnacles, minPMI, PMSI

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