G33 The Potential Use of Aquatic Invertebrate for Postmortem Submersion Interval (PMSI) Determination

Simona Corrado, MD, Sezione di Medicina Legale, Bari, 70100, ITALY; Lucio Rositani, PhD, Laboratory of Marine Biology, Molo Pizzoli, Bari, 70100, ITALY; Maurizio Scarpa, MD, Piazza G. Cesare 11 Università di Bari, Bari, 70100, ITALY; and Francesco Introna, PhD, Section of legal Medicine - DiMIMP, Piazza Giulio Cesare n.11, Bari, 70124, ITALY*

After attending this presentation, attendees will understand that in cases in which a human body is found in aquatic environments, careful aquatic scenes investigation, review of medical records, complete autopsy with skeletal survey, marine biology, and taphonomy testing are required.

This presentation will impact the forensic science community by emphasizing the fact that although estimating postmortem interval in terrestrial environments are standardized and widely accepted in courts of law, estimating immersion interval in aquatic environments are largely unexplored. The Postmortem Submersion Interval (PMSI) in aqueous environments refers to the time period from when the body enters the water to the point of discovery, noting that the body may be totally submerged for all or part of the time period. Understanding the growth phases of aquatic plants and animals that attach themselves to submerged remains is particularly valuable information and can be used to estimate a minimum PMSI.

A case of an adult human body discovered on an Ionian coast (South Italy) in February 2009, whose soft parts were converted into adipocere with partial skeletonization and disarticulation and showed the presence of barnacle stratification on bone surfaces is presented.

Barnacles specimens collected from bone surface consisted of a body divided into two regions: (1) the peduncle (stalk); and, (2) the capitulum. The peduncle is fleshy, large, and long, and it attaches to the substrate using the first antennae. The body is compressed laterally, covered by two folds of mantle, where five thin calcareous plates are attached. The carina is a dorsal unpaired plate, which forms a central keel. Paired scuta are large, and are located at the anterior region of the body. Paired terga are short and are located at the posterior-most region

of the body. Six pairs of thoracic, biramous cirri bordered with chaetae are visible through an aperture present in the mantle cavity. In the mantle cavity, there is a short head, a thorax with six thoracic, biramous limbs, a mouth, and a long, setose penis. The length of pedunculated barnacles ranged between 0.7 and 2 cm.

These barnacles belong to the family of Lepadidae, genus Lepas, species Lepas anatifera, order peduncolate barnacles.

The *Lepas anatifera* live in tropical and subtropical waters, and after attachment to the substrate is increased by an average of 1mm/die in seabed with temperatures between 15°C and 30°C. The growth of the barnacle is blocked at temperatures below 15°C or above 30°C.

Therefore stratification found on the surface of long bones of the lower limbs of *Lepas anatifera*, require at least 20-30 days at water temperatures between 15 º C to 30º C for achieving the maximum size observed in this case (2 cm).

The average temperature estimated in the Ionian Sea in February 2009 was 10.7°C, so it can be assumed that seawater temperature along the Ionian coast drops below 15 degrees for November-March. Hence, in November 2008 the corpse was already skeletonized and already converted into adipocere since the colonization of barnacles was already present on skeletonized limbs. This data suggested the amount of time the body was in standing water was at least six months/one year prior to attachment barnacles (October 2008) and, as a consequence, the range of immersion was identified in a period between October and November 2007 and March/April 2008.

The use of aquatic invertebrate in this case suggests a new avenue of basic research that forensic investigators can apply to cases involving submersed and/or floating human remains. In fact, the study of biology of aquatic invertebrates along with a timeframe of decomposition in the aquatic environments, can provide important clues on the length of soak time, however influenced by a high number of variables can potentially influence this process (e.g., temperature, water depth, currents, tides, season, dissolved oxygen, debris, substrate type, salinity, acidity, interactions between chemical and physical processes, and micro and macrofauna activity).

Adipocere, Marine Biology, Barnacle

 ** Presenting Author*