H71 Deep Coastal Marine Taphonomy: Interim Results From an Ongoing Experimental Investigation of Decomposition in the Saanich Inlet, British Columbia

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After attending this presentation, attendees will understand the effect of deep coastal marine submergence on carcass decomposition and the abiotic and biotic factors which impact it.

This presentation will impact the forensic science community by showing some of the myriad factors which can affect the breakdown of a carcass in the marine environment as well as recognize some of the artifacts created by animal feeding.

Marine decomposition is a little investigated area within taphonomy. The nature and speed of decomposition, the mechanisms by which decomposition occur, and skeletal survival and dispersal patterns have been the subject of an ongoing marine based high-resolution study of located at a coastal deep sea site within the Saanich Inlet, BC. The study is supported by the VENUS (Victoria Experimental Network Under the Sea) underwater observatory and allows for real time observation using a number of remotely controlled cameras and sensors.

Methods: The initial study deposited three pigs at three differing time intervals onto the sea floor in the Saanich Inlet. The inlet is a deep water fjord with a maximum depth of 230 m and is separated from the Strait of Georgia by a sill, which restricts the flow of water into and out of the inlet. This results in the inlet being anoxic for the majority of the year. The site of the first two carcass placements was at a depth of 94 m and the third was approximately 65 m away at a depth of 99 m. The placement sites were fine silt with cobble, over rock. Each carcass was freshly killed, and weighed approximately 26 kg. A remotely operated video and still digital camera, with an array of lights, mounted on a tripod, was placed at the site a day earlier by ROPOS (Remote Operated Platform for Oceanic Science), and then the weighted carcass was positioned optimally under the camera remotely, by ROPOS. The camera site was close to an array of sensors measuring the physical conditions of the water, including a Seabird and a Falmouth CTD measuring conductivity, temperature, and depth at 1 and 60 second intervals, a gas tension device, an oxygen optode and a Sea-Tech Transmissometer. Data from these instruments can be downloaded at www.venus.uvic.ca. Three carcasses were placed over time, in August and September. The method of observation and data collection was undertaken by real time digital video feed, with desk top control of cameras, and sensor data of salinity, pressure, temperature and oxygen levels.

Results: The results from our ongoing study to date, indicate that there is a key interplay between four key organisms, Dungeness crabs (*Cancer magister* Dana), three spot shrimp (*Pandalus platyceros* Brandt), squat lobsters (*Munida quadrispin*a Benedict, Family Galatheidae), the amphipod *Orchomenella obtusa* Sars (Family Lysianassidae) and dissolved oxygen levels. Low dissolved oxygen levels did not prevent faunal colonization, even at levels considered below tolerance level, indicating that the carcass provided a very valuable resource. Fauna remained at the carcass, rapidly skeletonizing it, even when oxygen levels dropped to 0.2 mL/L. However, when a carcass was placed at the site during a time of extremely low oxygen levels, larger scavengers such as *Cancer magister,* were not attracted and smaller scavengers, such as squat lobsters, could not break the skin, leaving the carcass intact for months.

Decomposition was seen to slow due to reduced faunal activity in borderline hypoxic levels and to be fully inhibited during hypoxic conditions. However, as soon as oxygen levels increased, a recommencement of faunal activity would reassert itself. This interplay with environmental conditions resulted in the pig carcasses skeletonizing at differing rates. Hence, we conclude, that oxygen is an important co- factor in skeletonization rates in concert with the dominant fauna at this experimental site.

Faunal diversity was much less than at shallower depths in nearby waters although actual numbers were much higher and carcasses were skeletonized much faster, despite lower water temperatures and lower dissolved oxygen levels[1].

Conclusions This study has shown that decomposition and taphonomic changes in the marine environment are very variable and depend greatly on the abiotic and biotic factors of the surrounding area, in particular, oxygen levels. As long as scavengers are originally attracted to a carcass during times of adequate oxygen levels, they will remain despite drops to near anoxic levels. However, if the carcass is deployed during a period of very low dissolved oxygen, larger scavengers are unable to colonize. This is an ongoing study. **Reference:**

[1] Anderson GS, Hobischak NR. Decomposition of Carrion in the Marine Environment in British Columbia, Canada. Int J Legal Med. 2004;118(4):206-9.

Marine, Taphonomy, Oxygen

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