

BOWHEAD WHALE SKELETON CLEANING

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UAMN Photo by: Roger Topp—Aren Gunderson

The bowhead whale skeleton specimen (UAM:Mamm:15988), now on display in the museum's lobby, was first harvested in Utqiagvik, AK, in September 1963. The initial cleaning was done by nature as the carcass sat at the harvest site for two years prior to its collection for archival in 1965. Bacterial rot and scavengers had removed almost all the flesh, leaving some hard dried tissue between many vertebrae, and a dry, but oil saturated, sticky skeleton.

The skull came to the museum in 1969 and was washed with soap and water and a pressure washer to clean it for exhibit. It sat on exhibit in the museum from 1980 until 2020. The skull dripped oil (about 1-5 drops per year) while on display and had a sticky surface

where oil had settled. To clean it for this exhibit we moved it onto a custom-built cart and wheeled it outside the museum. On some hot summer days in August, 2020, we hosed the skull with hot water and scrubbed it thoroughly with Dawn dish soap. We let it sit warm and soapy for a couple hours then rinsed and repeated this process three times a day for six days over two weeks. Once the process was started, we kept the skull wet so as to limit the expansion and contraction of the bone that occurs when getting wet and drying. The rinse water was clearly clouded with oil and oil dripped from a few locations between washings. I assume the hot water warmed the oil, allowing it to flow through the skull. As the skull dried after the final rinse, it dripped oil for about 2 weeks and has since stopped dripping, hopefully for good.

The skeleton was never cleaned after it arrived at the museum in 1965. The bones were kept in various storage conditions, mostly outside in shipping containers, and suffered decades of freeze-thaw cycles before they were brought indoors in 2014. While this exhibit was in the early stages of fundraising, I tested our cleaning process with the dirtiest, oiliest vertebra. My experience cleaning whale bones had me fairly confident that our standard practice of maceration would get the bones tissue and oil-free. It would just be a matter of time.

Maceration is the process of cleaning bones through bacterial digestion. Put a skeleton in water, let it sit for months and allow bacteria to digest all the tissue and oil on (and in) the bones. I put the test vertebra in a tank with a rotten beaked whale skull. Those sat at room temperature submerged in water and untouched for nine months. After removing the vertebra from the rotten slurry, I washed it with soap and hot water then submerged it in hot soapy water for three days. This allowed the soap to penetrate the bone to extract any oil and bacteria left inside. I washed the bone again, then submerged it in plain water for three days. This removed the soap from inside the bone. I rinsed and brushed the bone one last time, and set it out to dry. This proved successful in that the bone was clean in appearance and touch, and odor free.

To do this with the rest of the bowhead whale skeleton, we purchased a custom-made tank that is 7.5 feet long, 4 feet wide, and 3 feet deep. Maceration works best when the bacteria are happy—this means warm water and plenty of oxygen. The test bone did not have oxygenated water or heat. Our new tank was outfitted with heat trace to maintain the temperature from 95-105 degrees F. We submerged four aquarium bubblers into the tank to provide oxygen.

The bones were prepped for maceration with aluminum tags secured with plastic zip ties to label each bone. The original collector had nailed tags into the bones. These nails were removed because the iron



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would rust and stain the bones. The tank was filled with warm water and a piece of rotten sperm whale jaw was added to provide the right bacteria (most marine mammals that need to be macerated already have plenty of bacteria on them but since these bones were so dry for so long, I wanted to inoculate the tank with good active bacteria).

I would periodically check the bones to see that the smell was right and the tissue was disappearing. Once all the tissue was gone, I let them soak another month to be certain the remaining oil would be digested. After 4 months I drained the tank and

filled it with clean water, then drained it again to rinse the bones and remove the bacterial slurry that results from this process. As with the test vertebra, I washed the bones with dish soap then put them back in the clean tank to soak in hot soapy water for three days. I then rinsed, washed, and rinsed the bones again before setting them in a tank of clean water. After three or four days, I rinsed the bones and set them out to dry.

The timing of the events in this process are not strictly important. If the bones soaked for too long in any step, no damage would be done to robust adult bones. However, if using maceration on juvenile specimens, the cartilage will be consumed and every unfused suture will fall apart into a puzzle that may never be put back together—correctly.



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