

Piecing Together The Past: Reconstructing The Mandible of A Cetothere

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Introduction

Fourteen million years ago, a type of early baleen whale, known today as a cetothere, swam through the Miocene oceans off the coast of places like Japan and the east coast of America. Cetotheres, like modern baleen whales, had no teeth. Instead, fringed, horn-like baleen lined their mouths. These whales would force water through the baleen, filtering out their food which was probably plankton. Cetotheres were fairly small, compared to modern day baleen whales like the Blue Whale or Humpback Whale, measuring only about five meters in length¹.

For whatever reason, one of these whales died off the coast of modern day Maryland and its body sank to the sea floor. Sand and silt slowly covered the whale, preserving some of the bones. This sand and silt lithified, becoming the Drumcliff Member of the Choptank Formation of the Chesapeake Group.¹ This layer of rock is currently exposed along the Chesapeake Bay in areas such as Calvert Cliffs and Chesapeake Beach. These rocks are known for their Miocene fossils, including marine mammals, sharks, gastropods, and mollusks.

Unfortunately, the right mandible (Figure 1) of this one individual was crushed into many pieces (Figure 2), probably by the weight of the overlying sediment. It was given to me to be reconstructed.



Figure 1. Cetothere skull (mandible highlighted in blue).²

Public Relations

Education is a major goal of the museum as well as a large part of my work. I would often open the window of FossilLab which was right in front of my work bench so that visitors could ask me questions about the museum and my work and so I could explain in detail what I was doing. I feel that this not only helped to provide more information but also made people's visits to the museum more enjoyable.

The Museum and FossilLab

I did my work as an intern in the Paleobiology Department at the Smithsonian's National Museum of Natural History. This museum is well known for its specimens, from the Hope Diamond to Hatcher, the Triceratops. While the cetothere mandible I worked on and myself were not such integral parts of the museum, we were both featured just as prominently in FossilLab.

My project was supervised by Steve Jabo, the FossilLab coordinator. FossilLab is the preparation lab on the exhibit floor. The walls of FossilLab are glass so that visitors to the museum can observe the processes that take place between when a fossil is found and when it is put in an exhibit or in the collections.

Materials and Methods

To reconstruct the mandible, I used a butvar and acetone mixture as glue and hardener. I also used pure acetone along with various brushes and picks to clean off sand and plaster from the cast it was transported in. Each contact point between pieces was cleaned before glue was applied. As the glue dried, the pieces were placed in the "sandbox". The sandbox is filled with garnet sand to reduce dust. The sand is covered with a piece of tin foil and each fossil is nestled in, creating a sort of temporary mold, keeping them in place as the glue dried. Acetone was also used to dissolve dried glue when a piece had to be adjusted.

The finished product was comprised of over fifty pieces. It measured over three feet, nine inches long (115 cm) (Figure 3).



Here, I am gluing two pieces of bone together in the early stages of reconstruction

Conclusions and Future Work

I have always wanted to be a paleontologist and my work here has only helped to fuel my passion for the history of life on this planet. Preparatory work is one of many aspects of Paleobiology and, while I greatly enjoyed it, it just made me realize how much I want to get involved in the other parts of this science. I want to get out in the field as well as do research. This project brought to mind so many questions that I know will also be asked by anyone who comes to study this fossil. What was this whale's life and death like? What can this particular jaw tell us about cetotheres? What implications do cetotheres have for baleen whale evolution and the evolution of life as a whole?

The remainder of my work at the Smithsonian will include the cleaning of the outer surface of the bone and the application of hardener. Once this is done, I will make a padded cradle for the fossil for it to go into the collections. Once in the collections, it is then available for study by anyone interested in cetotheres or baleen whales in general.



Figure 2.
Mandible of cetothere as it was when I received it.



Figure 3.
Mandible after every piece was glued, nine weeks later.

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References

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- Smithsonian icon from www.si.edu, Coopercoerasa img. from <http://www.pml.umd.edu/~cshapiro/whale>

Special thanks to Nancy for being a fantastic specimen. Enjoy your new home in the collections!

