# San Diego Natural History Museum

# Borderfield State Park Fossils

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## Introduction

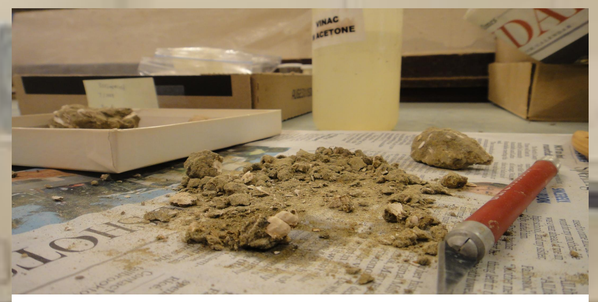
The San Diego Natural History Museum's paleontology department often comes across fossil finds throughout the county through its PaleoServices branch, participating in city and state construction projects in order to excavate precious fossil material that would have otherwise been lost. In July 2008, part of the sandstone bluffs of Borderfield State Park were to be demolished for construction of the international border fence. Just before this, several volunteers and staff paleontologists from the Natural History Museum, led by Dr. Tom Deméré and Scott Rugh, worked to salvage as many fossils as possible from the construction site. Two years later, many of these specimens have yet to be prepared due to the increasing amount of work the department is experiencing.

The purpose of my internship is to help complete this project alongside other volunteers and staff, gaining experience in the field of paleontology through preparing these fossils for storage and future research.

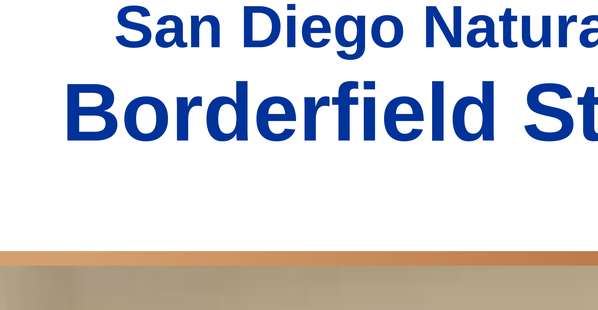
All of the fossils I am working on are Pliocene-age marine animals estimated to be about 3.2 million years old. The Pliocene was a relatively recent epoch, spanning from 5.4 to 2.5 million years ago, and because of this, its fossil record contains many animals similar to present day fauna. The climate during this time period was much warmer than today's, and as a result, much of what we see in modern southern California was submerged at the time, and therefore the fossils in the area are almost entirely composed of invertebrates that lived on the continental shelf under nearly 200 feet of water.

## Methods

❖The only materials needed to prepare the fossils are an X-acto knife, a brush, cyanoacrylate glue for the occasional broken pieces, and Vinac B-25 in acetone, a special "glue" that works well to preserve these kinds of fossils by soaking into the pores and cracks, preserving and strengthening them from within.




❖Many of the specimens are made of a porous calcium carbonate such as aragonite, making them quite fragile. As sediment is carefully scraped away, several coats of Vinac B-25 in acetone are applied to these specimens in order to strengthen them.



❖After larger specimens are completed, the soft sandstone matrix is gathered and screened through sieves of various sizes in order to find microfossils, which make up the vast majority of fossils found in this project.

❖Each microfossil worthy of preservation is painstakingly picked out of the resulting number piles with the aid of a microscope.

*One of many storage cabinets in the collections room*

❖The fossils are to be identified and numbered, and are then stored in the department's collections room. They will remain here, where they will be available to scientists for future research.

## Results

The fossils found are incredibly varied, including:

- *Anadara trilineata ,* a clam that is one of the most common animals found at Borderfield
- Brachiopod from the genus *Glottidia*
- *Turitella cooperi*, a spiral, cone-shaped snail
- *Dentalium neohexagonum*, a small tusk-shaped snail
- *Ostrea vespertina,* a small oyster
- *Swiftopecten Parmeleei*, a scallop
- *Foraminifera*, small single-celled animals from the kingdom *Protista*
- Pincers and shell pieces of various crab species
- *Carcharodon carcharius (great white shark) tooth*
- *Otoliths,* the ear bones of various fish
- Several fish vertebrae, only a few millimeters in size




As work continues, it is hoped that these fossils will become useful for future generations to study, improving our understanding of the many species that occurred in the fossil beds of the area.

*One of the first Carcharodon carcharias (great white shark) teeth obtained from this project, literally found from the bottom of a bucket. The great white has remained relatively unchanged since the Pliocene.*


*The majority of fossils found require a microscope to properly see. Specimens in this picture include sea urchin spines (a), fish vertebra (b) and otolith (c), bryozoans(d), a crab pincer (e), Terebra martini (f), and Acila castrensis(g).*

## Conclusion

Through this internship I have gained experience in fossil preparation, animal classification, invertebrate anatomy and taxonomy, and participating in a working environment. Though the progress is naturally slow, and the project will take several years to complete, it is a very rewarding experience, and I hope to continue volunteering and learn more about fossil preparation and the science of paleontology.

## Acknowledgements

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