

THE FOSSILS OF PORICY BROOK

INTRODUCTION

The Poricy Brook Fossil Beds are well known to fossil collectors in the Northeast. The Fossil Beds are located in Poricy Park, Middletown, New Jersey, where the brook flows under Middletown-Lincroft Road.

The fossils in Poricy Brook date from the Cretaceous period of the Mesozoic era. The Cretaceous period lasted from 145 to 65 million years ago. Dinosaurs were at their peak, but among the Tyrannosaurus Rex, Triceratops, and the Hadrosaurs, the first mammals and birds appeared. The tree ferns, ginkgos, and pines were joined by flowering plants like oaks, magnolias, and grass.

North America and Europe split apart at Greenland. What is now the northeast United States was warmer and more humid because it was closer to the equator and the entire planet was warmer. The Rocky Mountains formed, and the middle of America, from the Arctic to the Gulf of Mexico, was a sea. The uplands of the northeast were being eroded and washed into the ocean, leaving behind few remains of land animals. Thus the best fossil record of the Cretaceous period in the northeastern U.S. is in the sediments of the ocean floor that lie buried under New Jersey.

During the Cretaceous period, the area of Poricy Brook and the rest of the Atlantic coastal plain was shallow ocean. When the ocean animals died, they were buried in the bottom. Their soft parts decayed, but their hard parts, like bones, teeth, and shells, were preserved. Over the millions of years during the Cretaceous period, the level of the ocean rose and fell to form different layers of deposits with the remains of different animals. The layer that is exposed by the cutting action of Poricy Brook is called the Navesink formation, and is approximately 72 million years old.

The Navesink marl is colored by green glauconite, an iron mineral, and is rich in lime from the sea shells. In the 1800s the marl was mined locally for use as fertilizer because of its high lime content. Glauconite is currently used in water softeners.

Although fossils of many different kinds of animals ranging from dinosaurs to worms have been found in the Poricy Brook Fossil Beds, most of the fossils are of shellfish. The groups of animals represented as fossils are:

Invertebrates

bivalves: clams, oysters, etc. (Bivalvia)
ancient squids (Cephalopoda)
moss animals (Bryozoa)
sea lilies, sea urchins (Echinodermata)
sponges (Porifera)

snails (Gastropoda)
lamp shells (Brachiopoda)
crabs (Arthropoda)
sea worms (Annelida)

Vertebrates

sharks (Selachii)
reptiles, dinosaurs (Reptilia)

bony fishes (Pisces)

THE FOSSILS

Fossils are any recognizable remains of things that lived in geologically ancient times. The most popular concept of fossils is that of things turned to stone. However, that is only one of many ways fossils may be preserved. Most of the fossils of Poricy Brook are the original seashells, shark's teeth, etc., that have been preserved in the greensand and clay of the Navesink marl for 72 million years. Some of the more delicate shells have been dissolved, and all that remains are internal casts that filled the insides of the shells before they were dissolved. Those delicate shells that remained whole while buried quickly break when exposed; however, they leave collectable impressions in the clay.

Vertebrate fossils are rare. They may be either teeth or bone fragments. The bone fragments look much like waterlogged wood, but have a distinctive grain pattern.

The following is a discussion of some of the fossils that have been found.

Bivalves, animals with two shells, are the most noticeable and abundant fossils. The common large, heavy, smooth shells are *Pyncnodonte (Gryphea) convexa*. Another large shell is *Exogyra costata*. In both these species of oysters, one shell is cup shaped and the other is flat. The delicately ribbed shell of a *Spondylus (Dianchora) echinata* may sometimes be found attached to the inside of one of the large shells. The oyster *Agerostrea mesenterica* is a narrow, crescent-shaped shell with sharp, tooth-like ripples. It is hinged at one narrow end. The fragile scallops (*Pecten*) and *Lima pelagica* are rarely found, and then usually only as impressions in the marl or as shell fragments.

Snail fossils are rare and are usually internal casts because the snail shells were not preserved. The internal casts are typically shiny black and show what the insides of the shells looked like, but often indicate the shape of the outside also. Fossils of several different families may be found.

Ancient cephalopod, or belemnite, fossils are the internal guards (shell-like structures) of an extinct squid, *Belemnitella americana*. The guard is usually amber colored, due to absorption of iron.

Lamp shells, or brachiopods, look like small clam shells, but brachiopods are quite different from clams. One example is a small hole that brachiopods have near their hinges. A fleshy stalk projects through the hole to attach the brachiopod to some solid object.

Sponges are represented in Poricy Brook by a type of boring sponge, *Cliona microtuberum*. They have left behind holes or tunnels that they dissolved into the shells upon which they grew.

Moss animals, or bryozoans, resemble corals but are more complex. As fossils in Poricy Brook they usually appear as a fine net pattern on a shell. Each dot in the pattern housed a single animal. A branched form is also found.

Crabs have delicate body shells, so all that remains all fossils are the stronger leg segments and claws that have resisted being crushed.

Sea lilies (crinoids) and sea urchins are related to starfish. The sea lilies look like a flower at the end of a stem. Actually, they are more like a starfish resting upside down on a jointed column. It is the sections of the column that remain as fossils. They look like 1/16 inch beads. The sea urchin fossils are portions of the spines or internal casts of the shells. The spines look like pieces of toothpicks with lengthwise ribbing.

Some **sea worms** built limy tubes that may be found on the larger shells. Fossils of other sea worms are casts of the insides of the tunnels they made in the sea bottom.

The **shark** and **bony fish** fossils that are most commonly found are teeth. Even those are rare. Sharks have cartilaginous skeletons which are rarely preserved. The delicate skeletons of bony fish have been poorly preserved, but jawbones and vertebrae are sometimes found.

Marine **reptile** fossils, which are rare, may be unidentifiable bone fragments, teeth, turtle scutes (scales from their shells), or vertebrae. An exceptional find is one of the large teeth of a Mosasaur which was a dinosaur-like reptile that lived in the sea and was up to 35 feet long. Dinosaur fossils are extremely rare and are remains that were carried down a river and into the sea. They are difficult to tell apart from reptile remains.

COLLECTING

Some fossils may be found lying loose along the stream; however, the best way to find fossils is by sifting the sand and gravel of the stream bed. The sifting is done by digging in the stream bed, dumping the sand and gravel on a screen of 1/4 inch hardware cloth fastened to a wooden frame, and shaking the screen in the water to wash away the sand.

The most commonly found fossils are *Pyncnodonte*, sponge borings, *Agerostrea*, brachiopods, and *Exogyra*. Complete, unbroken specimens are rare except for the brachiopods and the *Agerostrea*. Examine shell fragments for other fossils that may be attached to them. This is the way to find worm tubes, bryozoans, *Spondylus*, and others.

Please do not dig in the stream banks, even though you may see holes that others have dug. This digging hastens erosion of the banks and does not yield the number of fossils that sifting does. The marl is not the soft clay it appears to be. It is very difficult to remove a fossil from it, and the attempt will most likely break the fossil. It is better to wait for nature to loosen the fossils for you. The alternating freezing and thawing of winter softens the marl and releases fossils; thus, the best time of year to find fossils is in the early spring when the water is still uncomfortably cold.

In the stream bed you may find interestingly shaped, rust-colored forms --- tubes, lumps, and other shapes. These are not fossils, but iron concretions, which are low grade iron deposits that have formed more recently underwater around branches or in cracks.

The stream continues to expose new fossils, so feel free to take home a few of your best finds. Limit yourself so that the next collector can also have the pleasure of discovering the remains of creatures

that lived at the time of the great dinosaurs, approximately 70 million years before the earliest human beings.

A collection of fossils from Poricy Brook is on display in the Poricy Park Nature Center, Oak Hill Road, Middletown, NJ.

Guided fossil collecting trips may be arranged through the Poricy Park Nature Center. Groups using the fossil beds independently are asked to notify the Nature Center to avoid overcrowding.

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