Your net will not bring up the elepha
tine mammoth, 50-foot shark, or
million-year-old tree--but nets ha
raised their fossils.

RARE FOSSILS DREDGED OFF ATLANTIC COAST

By Roland L. Wigley*

During the past 2 years, 5 rare fossils of plants and animals of considerable scientific importance have been collected by commercial fishermen in offshore waters of Massachusetts, New York, and Virginia (fig. 1). These specimens were dredged from the ocean bottom during regular fishing operations with otter trawls or scallop dredges and brought into port by alert and inquisitive fishermen. John V. M
honey, BCF representative in New Bedfo
Mass., forwarded the specimens to the auth
at the Biological Laboratory, Woods Ho
Mass. Some of the fossils were loaned by t
owners for a short period of time for examin
tion; others were donated for analysis or d
posited in the Smithsonian Institution, Was
ington, D. C. Persons finding similar spec
mens should send them to scientific institu
tions.

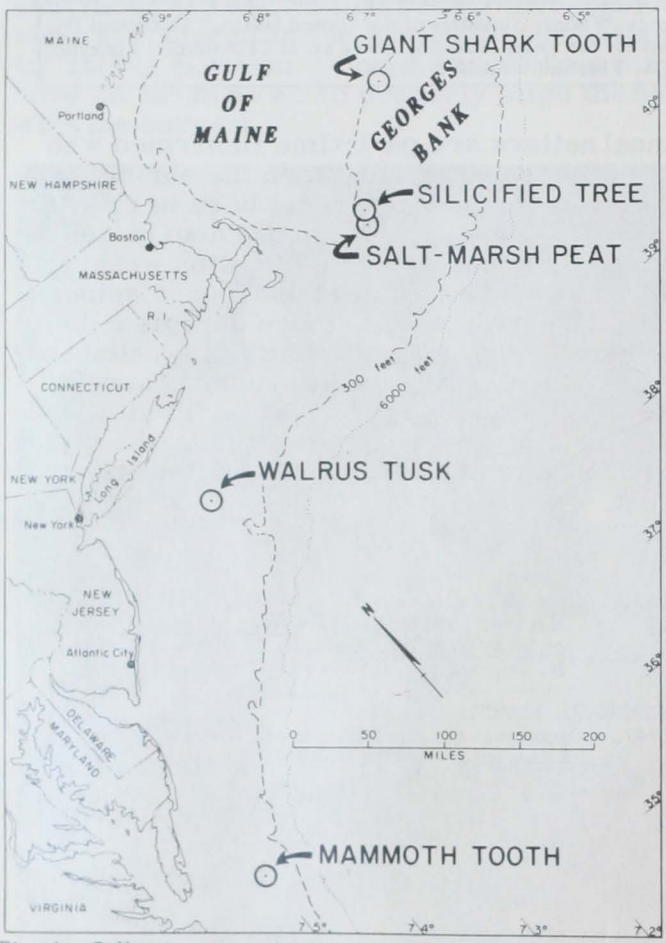

Fig. 1 - Collection sites of fossils recently found off northeastern coast of United States.

GIANT SHARK TOOTH

A fossil shark tooth 4 inches long and 4
inches wide at the base (fig. 2) was dredged b

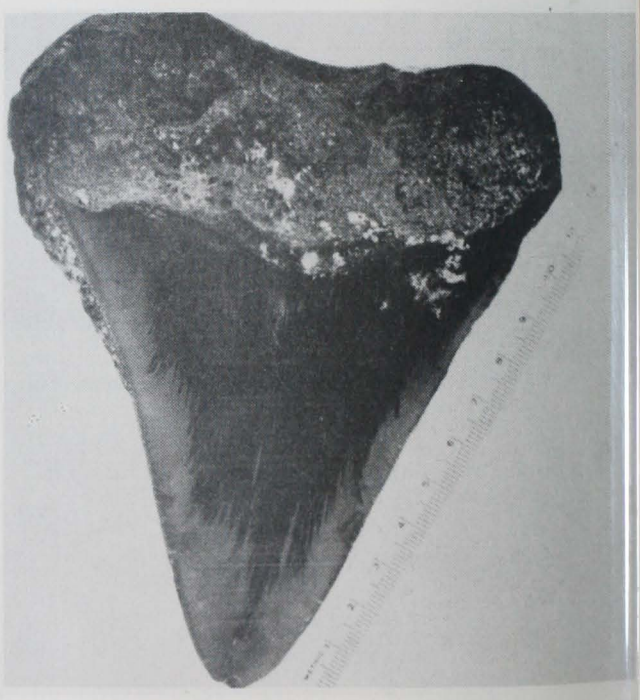

Fig. 2 - Fossil tooth from the giant shark Carcharodon megalodo
an extinct species.

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Photo Credit: R.K. Brigham and R.B. Theroux.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 774

Timothy Furtado, a fisherman aboard the commercial dragger Explorer, September 14, 1966 from the northeastern part of Georges Bank--42°02' north latitude and 67°27' west longitude. Water depth here is 20 fathoms (120 feet).

This tooth is from the giant shark, Carcharodon megalodon, now extinct. These sharks, voracious predators, lived during the Miocene Epoch, about 20 million years ago, and were 40 to 50 feet long. They are close relatives of the Maneater Shark (White Shark) now common in tropical and temperate seas.

The tooth has a generally smooth surface with a minutely serrated cutting edge. It is light brown along the distal margins, grading to dark brown and black in the central and basal portions of both inner and outer faces. The inner face is very slightly concave; the outer face is slightly convex. Original compounds of which the tooth was formed have been phosphatized, and a phosphorite concretion is attached to the tooth's base. The concretion is only of moderate size at the base and inner face, but on the outer face it extends more than half way from base to apex.

SALT-MARSH PEAT

One of the largest samples dredged from the ocean bottom and brought in for identification consisted of several chunks of salt-marsh peat (fig. 3) found by Norman Lepire, skipper of the Ruth Lea, a scalloper operating out of New Bedford, Mass. Several bushels of peat were dredged during fishing for sea scallops (Placopecten magellanicus) at a depth of 32 fathoms (192 feet) east of Massachusetts along the western end of Georges Bank, one of New England's most famous fishing grounds. Location of the peat deposit, determined from Loran-A bearings, is 41°09.3' north latitude and 68°43.2' west longitude, which places it at the northern end of a large submarine sand wave. Judging from the dredge's action, the peat probably occurs in small patches in an

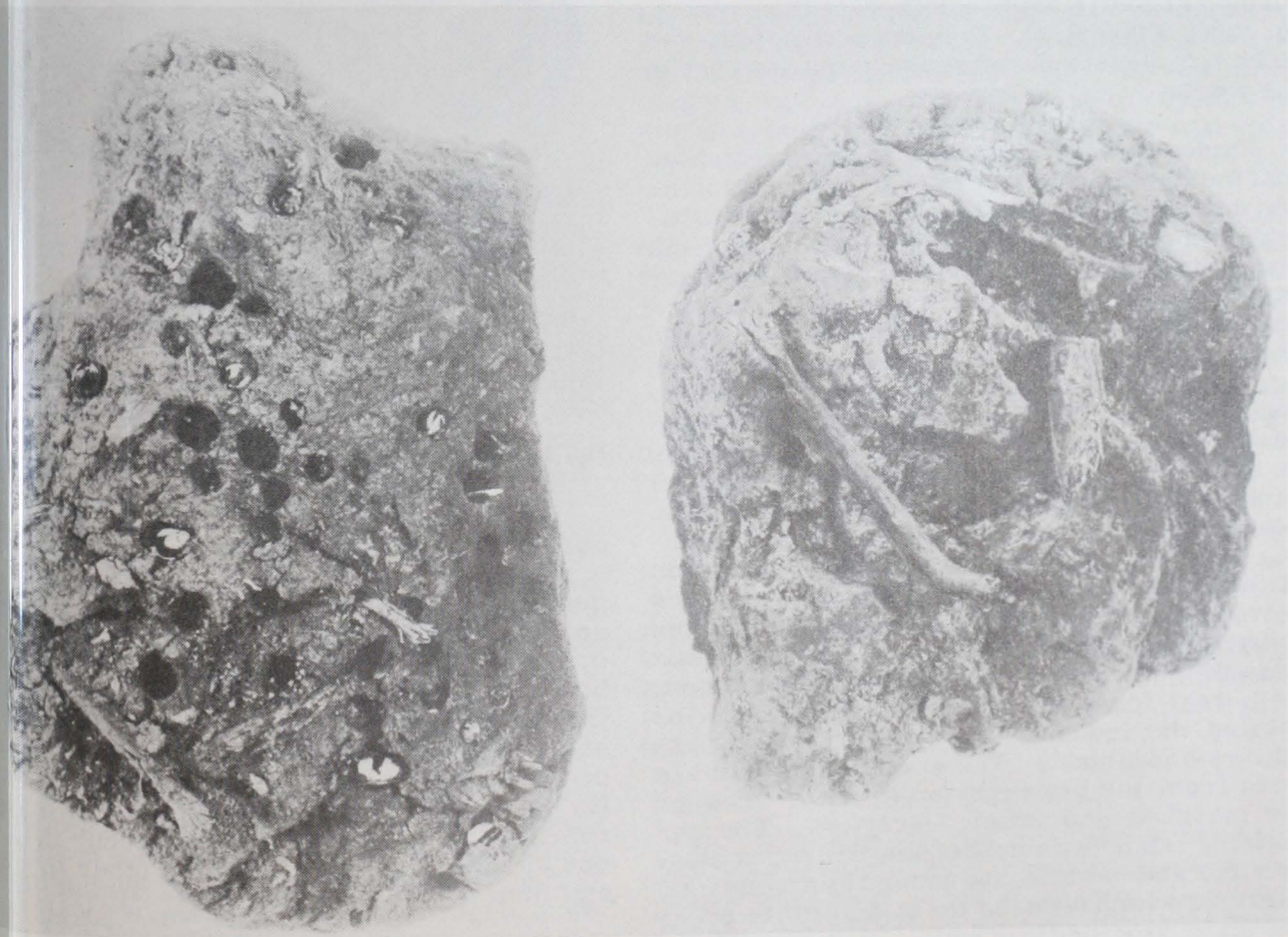

Fig. 3 - Salt-marsh peat dredged from western end of Georges Bank by the scalloper Ruth Lea. Surface of peat exposed to water (left) shows burrows, some occupied by The Rough Piddock, a species of boring clam. Note large twigs in the peat from subsurface layers (right).

area $\frac{1}{2}$ mile square. A sample of peat from this locality was studied in collaboration with Dr. K. O. Emery of the Woods Hole Oceanographic Institution and Dr. M. Rubin, U.S. Geological Survey.

This peat is a brown-colored compacted mass of plant fibers, predominantly salt-marsh grass (Spartina), containing numerous twigs of woody land plants. Twigs and pollen were mainly spruce with some pine and fir; spores were largely from peat moss (Sphagnum). Freshwater diatoms and rootlets of cedar were also present. Numerous borings contain specimens of Zirfaea crispate, a boring clam sometimes referred to as the Rough Piddock--alive at the time of the collection.

The presence of many rhizomes of salt-marsh grass is of particular interest because this grass inhabits a rather limited range between mid-tide and high-tide levels. It thus marks a past sea level rather accurately.

Radiocarbon dating showed that the peat was formed 11,000 (± 350) years before the present, or about 9,000 B. C. This deposit is believed to be the oldest submerged salt-marsh peat in the world.

Evidence from numerous sources indicates that the enormous glaciers which pushed southward across New England during the Pleistocene Epoch retreated from the Connecticut coast more than 13,500 years ago, from Martha's Vineyard 12,700 years ago, and from Boston 12,300 years ago. The sample described here indicates that 11,000 years ago sea water stood at a level 32 fathoms below present-day sea level. The area presently known as Georges Bank was then an ice-free island. It may be called St. Georges Island in keeping with the bank's earlier name--St. Georges Bank. The peat offers the first solid evidence that Georges Bank was previously an island. Elevation of the island above sea level after the glaciers retreated and the peat was forming is estimated to have been 100 feet or more. At about that time the island was covered, at least in part, by boreal forests and salt-marsh grass inhabited the lowland areas bordering the estuaries and lagoons. The continued rise in sea level from the glacier's melt-water drowned the marshes and lower elevations. The remaining island was subsequently eroded away by winds and waves accompanied by strong tidal currents which reduced the island to its present state as a shallow bank. (A technical account of this study was recently reported in an article by Emery, Wigley, and Rubin 1966.)

FOSSIL TREE

A piece of silicified tree limb (fig. 4) also dredged by the scalloper Ruth Lea from the same locality (western end of Georges Bank) where the peat was found. This specimen was originally about 18 inches long and 4 inches in cross section. The oxidized outer layer is white and has a somewhat fl structure. This layer, absent in some pla has a maximum thickness of $\frac{1}{4}$ inch. Contrasting sharply with the outer layer is a very dense well-preserved inner portion that is gray with numerous closely spaced black streaks. These features are evident on the cross-section shown in the photograph. The gray-black inner portion is about as hard as marble.

Fig. 4 - Oblique view of silicified portion of the tree Euptelea, extinct species.

Dr. Richard A. Scott of the U.S. Geologic Survey identified this specimen as a portion a dicotyledonous tree, family Eupteleacea genus Euptelea. The species is new to scienc and the Georges Bank specimen is the only rec ord so far known. It is currently being studie by Dr. Scott. His research has revealed tha the occurrence of the genus Euptelea off Mas sachusetts is the first record for this regio of the United States and the second record its occurrence in the New World. Two livin relatives of this fossil species occur in Asia one species lives in Japan, the other in Chin and India.

This tree is believed to have lived durin the early part of the Tertiary Period, 40 to 7 million years ago, although an even older, lat

Cretaceous age is possible. After it has been thoroughly analyzed, the specimen will be placed in the permanent paleobotanical collection of the U. S. National Museum in Washington, D. C.

WALRUS TUSK

The fossilized anterior portion of a walrus skull (Odobenus rosmarus) with tusk attached (fig.) was found in April 1965 by Magnus Isaksson, master of the commercial fishing dragger Aloha. This specimen was discovered about 60 miles south of Long Island, New York--40° 04' north latitude and 72°36.3' west longitude--at a depth of 32 fathoms. The tusk, a canine tooth from the upper jaw used by the walrus for grubbing mollusks and crustaceans from the ocean bottom, is 15 inches long and 3 inches wide. The outer surface of the tusk is roughened by uneven exfoliation of a few thin flakes from the sides.

Fig. - Fossil walrus tusk attached to the anterior portion of the skull

Walruses now inhabit the open waters of the Arctic Ocean around the edge of the polar ice, moving southward in winter. Although it presently does not migrate south of Labrador in eastern North America, the southernmost recorded for this species during historic times is Massachusetts (42° N. latitude). Judging from the fossilized condition of this specimen and the geographic location from which it was recovered, this walrus probably lived during the late Pleistocene Epoch, perhaps 20 to 50 thousand years ago.

MAMMOTH TOOTH

A beautiful specimen of a fossil molar tooth (fig. 6) from a mammoth, tentatively identified as Mammuthus jeffersoni, was also collected by the Aloha's master. It was dredged June 22, 1965, during fishing operations 46 miles east of Cape Henry, Virginia. The position determined by Loran-A bearings is 36°51.5' north latitude and 75°02.0' west longitude, at a depth of 19 fathoms (114 feet).

Fig. 6 - Oblique view of a fossil molar tooth from a mammoth (Mammuthus jeffersoni).

The mammoth tooth is $12\frac{1}{2}$ inches long, 6 inches deep, about 2 to 5 inches wide, and weighs $7\frac{3}{4}$ pounds. It is widest near the middle and tapers toward each end. In cross section it is also widest midway between the top and bottom; the grinding surface and roots are narrower than the center portion. It is mostly dark brown mixed with various shades of gray. The tooth is in excellent condition. A few bryozoans occurring together near the anterior end were the only fouling organisms found living on this specimen. This limited growth indicates that, when collected, the tooth was probably buried in bottom sediments with only part of the anterior end exposed to water.

Now extinct, mammoths were large, elephant-like beasts with very long curved tusks turned upwards at the tip. They migrated to North America by way of the Alaskan-Siberian land bridge thousands of years ago. Because of their enormous body weight, they required vast quantities of food. In keeping with their dietary needs, their molar teeth were large and had broad, flattened crowns, well adapted to the grasses they ate.

Much remains to be learned about the mammoths that inhabited eastern North America. Bones, teeth, and other skeletal parts of these interesting creatures from offshore waters on the Atlantic Continental Shelf are exceedingly rare. The tooth shown in Fig. 6 is being studied by paleontologists at the Smithsonian Institution, Washington, D. C.

PREHISTORIC MAN

Approximately 10,000 to 12,000 years ago, primitive human beings inhabited much of the United States and parts of Canada. Evidence of these early cultures stems largely from fluted projectile points interbedded with charcoal and animal bones (Haynes 1964). Clovis

man is believed to have established the earliest culture, followed in time by Folsom man. Sea level during this period was as much as several hundred feet below the present level. Consequently, large expanses of coastal plain--now the Continental Shelf--were available for habitation by man before this land was submerged. Corroborating evidence suggests that prehistoric man could have inhabited areas many miles beyond the present shoreline (Emery 1966). If coastal areas were inhabited by man 10 to 12 thousand years ago, we may find fluted projectile points, teeth, mollusk shells from "kitchen middens," animal bones, or similar objects in what is now rather de water, such as Georges Bank. Evidence early human occupation of the offshore ban or other shelf areas would be exceedingly v uable to archaeologists in reconstructing history of man.

Fishermen, marine scientists, and othe whose occupation provides them with an oppo tunity to discover submarine fossils, are urg by the author to collect and send to scienti institutions objects similar to those illustra or mentioned in this paper, including any u usual ones.

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It Could Send You To The Bottom

The most recent acquisition of Woods Hole's benthic staff was a large, yellow, cylindrical crystalline mass weighing about 20 pounds. It was proudly turned in as this year's $64 question. It turned out to be TNT!

Since it had no paleontological value, it was turned over to the local Air Force explosives disposal unit.