



Janus

The Newsletter
of the
North Carolina
Fossil
Club

1992 Number 3

Calendar - Fall, 1992

September

- 12 ♠ Texasgulf Phosphate Mine, Aurora, NC
Contact: Mike Hogan (919) 942-2877
- 17 ♥ Martin-Marietta Quarry, Rocky Point, NC
Contact: John Timmerman (919) 452-0943
- 27 ♦ Green's Mill Run, Greenville, NC
Contact: Becky/Frank Hyne (919) 752-3284

October

- 10 Martin-Marietta Quarry, Castle Hayne, NC
Contact: John Timmerman (919) 452-0943
- 25 ♣ Giant Cement Quarry, Harleyville, SC
Contact: Mike Hogan (919) 942-2877

November

- 7 Fossil Fair, Museum of Life and Science
Contact: Mike Hogan (919) 942-2877
- 14 Martin-Marietta Quarry, Belgrade, NC
Contact: Richard Tellekamp (919) 347-6361

December

- 12 Martin-Marietta Quarry, Cross, SC
Contact: Rita McDaniel (803) 238-1083

January

- 9 Lower Neuse River, Arapahoe, NC
Contact: Thelma Bennett (919) 249-1574

♠ The Texasgulf trip is available to members only (and only 15 positions are available to non-North Carolina residents). You must make a reservation. Members who did not go to Texasgulf on the Spring 1992 trip may call 8:00 AM - 9:00 PM beginning August 29. Members who went on the Texasgulf trip last spring may call 8:00

All trips begin at 9:00 AM at the entrance to the site unless noted otherwise. Contact the trip coordinator in advance to let him/her know you are coming so you can be notified of a change in schedule. If you have reserved a place and later change your plans it is imperative that you notify him/her.

At the very best we are a minor nuisance to the people who operate the mines and quarries we visit. Please do your best to be considerate.

Some places expect collectors to wear hard hats and will not admit you unless you have one. It would help us get to know one another if you would put your name on your hard hat.

AM - 9:00 PM beginning on September 5. If you have an **orange** hard hat bring it; the supply at Texasgulf is running low.

♥ Note Thursday date: we can visit here only when the quarry is working. Hard hats required.

♦ The Green's Mill Run trip is limited to 15 persons. Contact Becky or Frank for reservation. Note Sunday date.

♣ There are 20 positions available for the Giant Cement Quarry at Harleyville, SC. Contact Mike Hogan for reservation. We are allowed admittance only at 8:00 AM and 10:00 AM. Note that this is a Sunday trip. Bring a hard hat just in case.

It seems silly for me to sing the praises of the **Texasgulf Phosphate Mine** - we all know that it is one of the premier fossil collecting sites in the world. There were lots of LARGE *C. megalodon* teeth found here last spring, and this remains your best chance for finding one. You must realize though that on a given trip only a small percentage of collectors will be successful. There are lots of other things to find: teeth from many species of shark; whale, porpoise, and seal parts; hundreds of invertebrates; amber; an occasional land mammal tooth; etc., etc. The list could go on practically

forever Early in the fall it can be quite hot in the pit - bring plenty of portable liquids.

The **Martin-Marietta Quarry** at Rocky Point continues to produce an infrequent *C. auriculatis* tooth and it (and the Giant Cement Quarry in Harleyville, SC) is probably the best place to find one of these scarce fossils. It is an excellent

location for Eocene echinoids, as well as the Cretaceous *Hardouinias*. Three very special *Linthia* echnoids to look for here are *L. harmatuki*, *L. wilmingtongensis*, and *L. hanoverensis*. *Periarchus lyelli* sand dollars are common as are *Echinolampas appendiculata* and *Eurhodia rugosa* sea urchins.

Green's Mill Run is always an interesting place for the fossil collector. How could such an innocent little urban creek be so full of shark teeth? This is your best place to find good specimens of *Carcharodon carcharias* and *Squalicorax pristodontus* teeth. Not as good specimens of *C. megalodon*, mako and sand shark teeth are also found. Occasionally, someone turns up something exotic. You search by screening material from the creek bottom. You will need a ¼" mesh sieve, a long-handled shovel, and waders or sturdy shoes that can get wet.

If you want Eocene echinoids then the place to go is the **Martin-Marietta Quarry at Castle Hayne** (along with its sister quarry across the river at Rocky Point). The two quarries have similar species but there are differences. Castle Hayne seems to have many more Eocene and Cretaceous shark teeth (mostly small) but *C. auriculatis* teeth are more easily found at Rocky point. Vince Schneider found a particularly fine crow shark tooth (*Squalicorax pristodontus*) here last spring.

The **Giant Cement Quarry near Harleyville, SC** proved to be fairly productive for us last spring (in contrast to the Fall, 1991 trip). Pleistocene marsh-river sediments overlay Eocene marine deposits. The Pleistocene remains include a mixture of land and fresh water animals such as wolf, mink, beaver, turtle, snake, etc. Last spring Jack Gollahon found a piece of tapir jaw with 3 teeth in place. The Eocene material is comprised mostly of shark teeth with the prizes being rare but beautiful *C. auriculatis* teeth and tiny teeth of the cow shark *Hexanchus agassizi*.

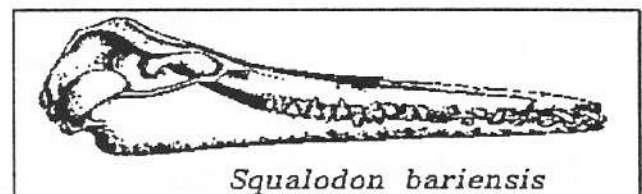
We always have a good time at the **Martin-Marietta Quarry at Belgrade**, thanks in large part to hosts Richard Tellekamp and Bill Little. The fossils here seem to be primarily reworked Miocene with large *C. megalodon* teeth popping up occasionally. Large alligator and sawfish rostral teeth are fairly common as are turtle shell

fragments. There are scarce *C. auriculatis* teeth and pieces of Pleistocene elephant teeth.

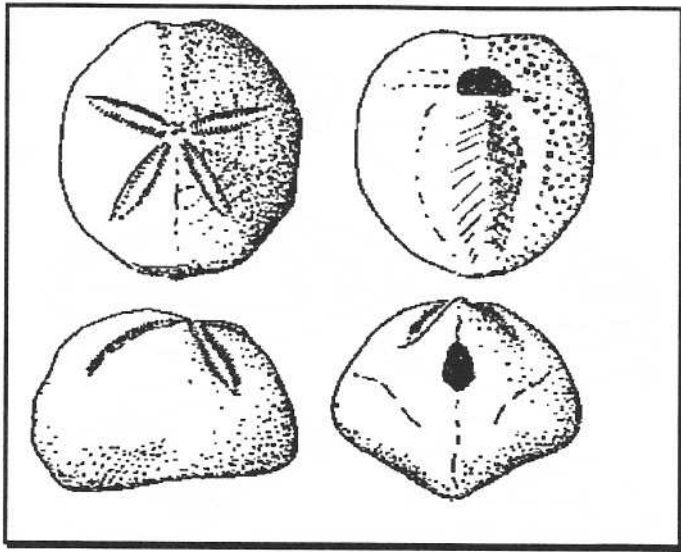
The NCFC has not visited the **Martin-Marietta Quarry near Cross, SC** since I have been a member but Mike Hogan, Keith Kepley, and I were guests of the Grand Strand Fossil Club when it collected there late this spring. This quarry is very different from any of the other Martin-Marietta limestone pits I have been to. First, it is gigantic, seeming to rival the Texasgulf phosphate mine in size. The fossil mix is most like that in the New Bern Quarry with Eocene and Miocene marine material with an occasional Pleistocene land mammal tooth thrown in. It differs from New Bern by the quantity and variety of fossils - it is much richer. If you have always been frustrated by the large *Ecphora* fragments you find at Texasgulf visit this quarry - you have an excellent chance of finding a whole one.

Pay careful attention to the included map for finding this quarry. Route 59 (County Line Road) is not on the South Carolina map I have. Coming from the north on I 95 exit on SC 6 at Santee and proceed east. A few miles beyond Eutawville look for a sign indicating a change of counties from Orangeburg to Berkeley. Route 59 (unmarked) is the road to the right at this sign. The quarry is on the east side of Route 59 a couple of miles south of the intersection. From Raleigh the trip takes about 4 hours. We will probably have to park outside the quarry and walk in so bring portable liquids.

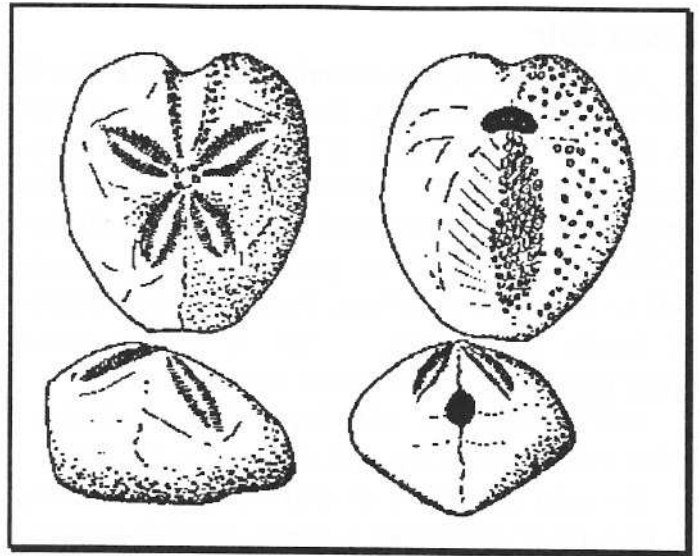
It may seem strange to go fishing for fossils in the **Neuse River** in January but the winter storms and tides remove some of the sand which normally covers the deposits. Expect to find horse teeth (and other Pleistocene mammal remains) and shark teeth (several years ago I found a very nice 4½" *C. megalodon* tooth just a little upstream from where we'll hunt). Your leader, Thelma Bennett, is very knowledgeable about the area, having hunted it for years. The water will be quite **COLD**; be sure to bring waders.



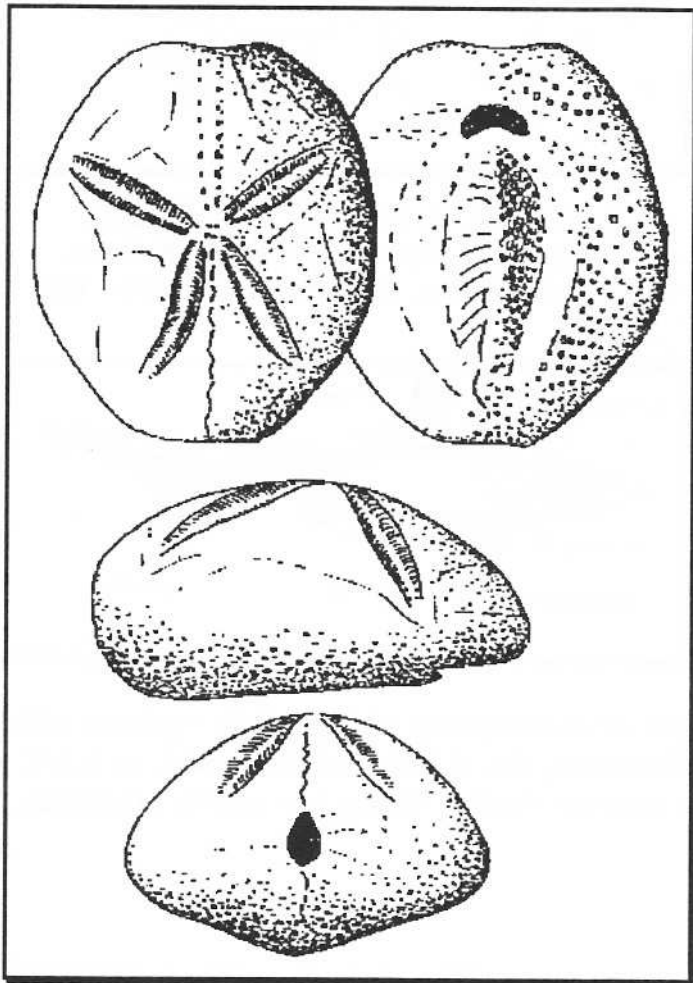
Squalodon bariensis



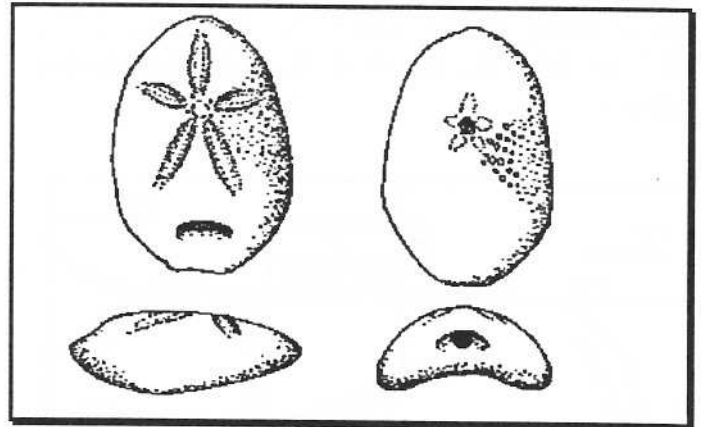
Linthia wilmingtonensis
45 mm



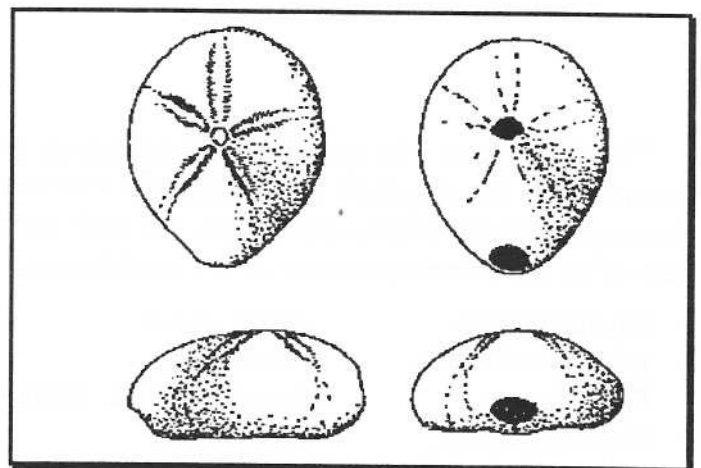
Linthia hanoverensis
40 mm



Linthia harmatuki
90 mm



Eurhodia rugosa depressa
30 mm



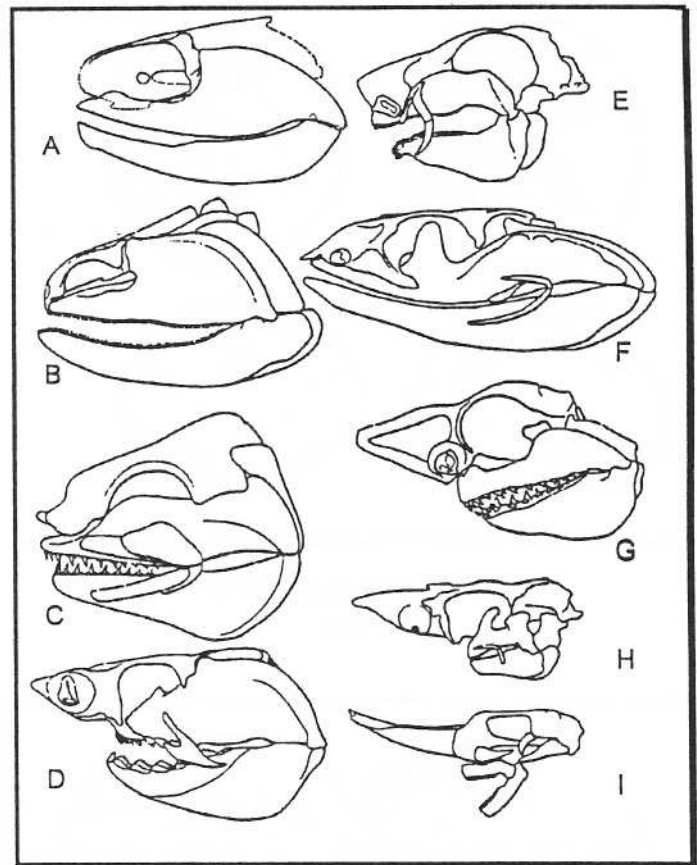
Echinolampas appendiculata
35 mm

Fossil Fair

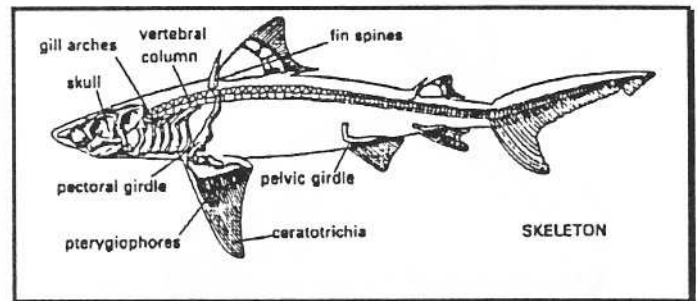
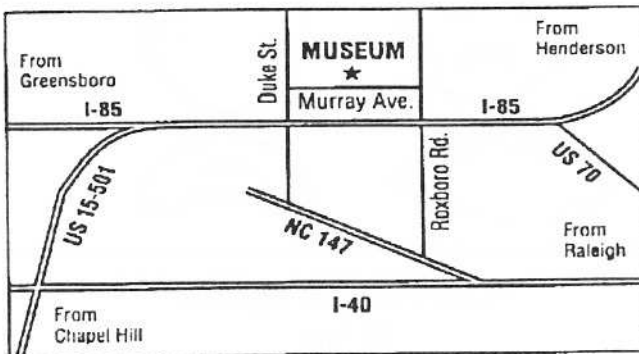
As indicated on the calendar, this year's Fossil Fair will be on Saturday, November 7 from 10:00 to 5:00 at the Museum of Life and Science in Durham (see map). Paleontologists from the Smithsonian will be on hand to identify fossils for NCFC members and the general public. There will be children's activities, door prizes and plenty of fossils on display. This is also a good opportunity to see what others have collected.

NCFC members will have free admission: bring your membership card (if you can find it).

We need volunteers to: exhibit their collection, to give other exhibitors a break (exhibit sitting), help with the children's activities, gofer, donate door prizes (these don't need to be your best specimen but should be something you wouldn't mind having yourself). If you are willing to do any of these, please call Mike Hogan (919-242-2877) or Trish Kohler (919-383-6328) before they call you.



Shark Skulls. A: *Cladodus*, B: *Xenacanthus*, C: *Hybodus*, D: *Hepranchias*, E: *Heterodontus*, F: *Chlamydoselachus*, G: *Isurus*, H: *Squalus*, I: *Raja*



The diagram on the opposite page represents the Orders of contemporary sharks. It is reprinted with permission of the copyright holder from the FAO Species Catalogue, Vol. 4, *Sharks of the World*, by L.J.V. Compagno. Below I have associated each with some of its common sharks. With a few notable exceptions, most of us are primarily interested in Lamniformes.

- | | |
|----------------------|---|
| ◆ Squatiniformes | Angel sharks |
| ◆ Pristiophoriformes | Saw sharks |
| ◆ Squaliformes | Bramble sharks, Dogfishes |
| ◆ Hexanchiformes | Cow sharks |
| ◆ Carcharhiniformes | Tiger, Requiem sharks; Hammerheads |
| ◆ Lamniformes | White, Mackerel, Snaggletooth sharks; Mako; Megamouth |
| ◆ Orectolobiformes | Nurse, Zebra, Carpet, Whale sharks; Wobbegongs |
| ◆ Heterodontiformes | Horn sharks |

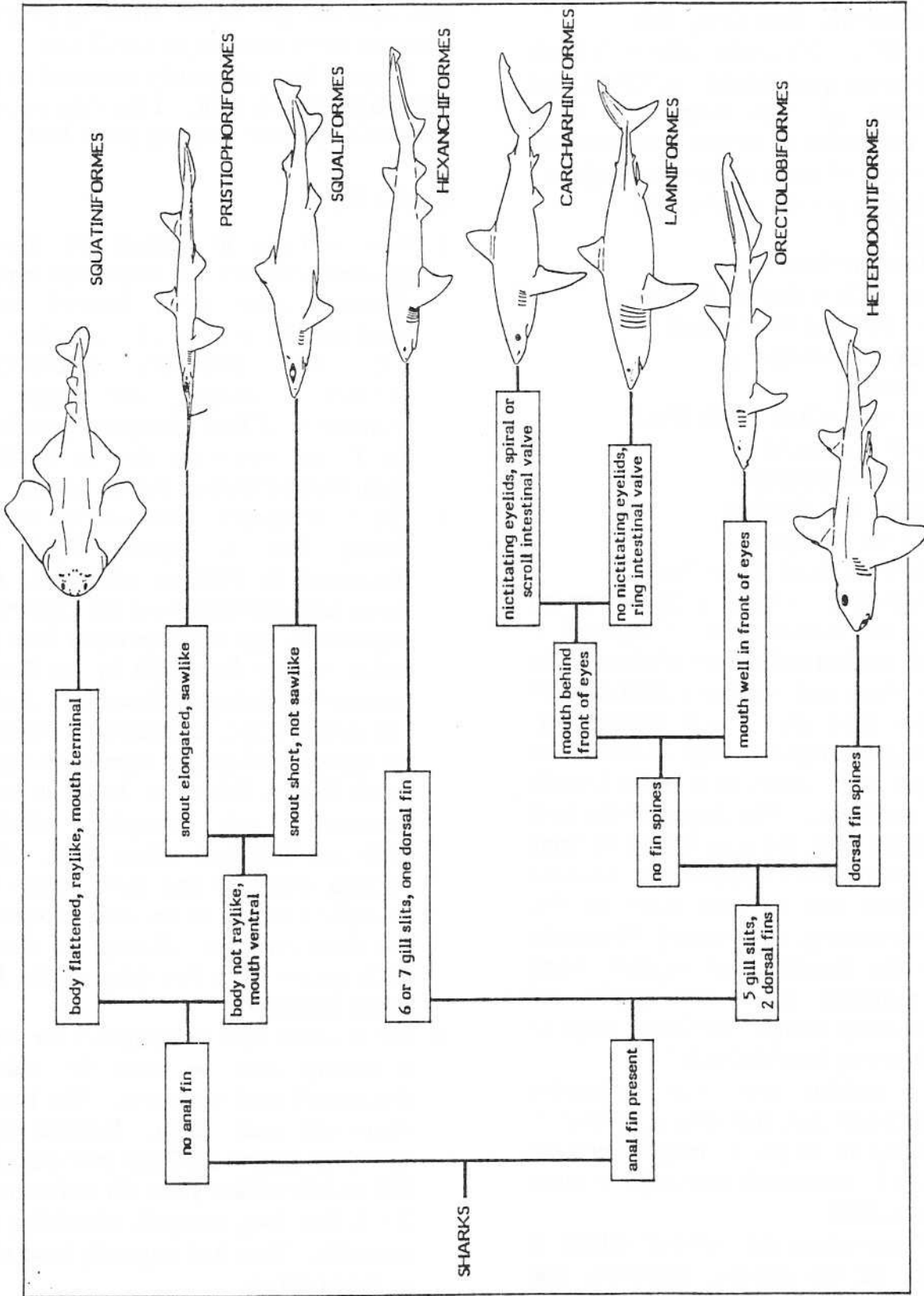


Fig. 1 Higher Classification of sharks (Orders)

Fossil Literature

◆ *Great White Shark*

Richard Ellis and John McCosker

xvi + 270 pages, many illustrations

Harper Collins Publishers in collaboration with Stanford University, New York, 1991

This large (9" × 12") coffee table style book with many stunning photographs, paintings, and drawings contains as much information about *Carcharodon carcharias* as anyone could possibly want. At the risk of using up too much space I feel that I must give you the chapter titles:

1. Introduction
2. Close and Distant Relatives
3. Megalodon: A Giant Ancient Relative
4. The Size of the Great White Shark
5. Morphology and Biology . . .
6. Food and Feeding
7. Distribution of the Great White Shark
8. The White Shark Attacks
9. Fishing for the White Shark
10. The White Shark in Captivity
11. The Predator as Protagonist
12. Can We Save the Great White Shark?

I found chapters 2 - 4 the most fascinating (all are interesting and well-written). Chapter 1 is concerned with modern and extinct relatives of the modern white shark and contains a discussion of the evolutionary questions. A very striking side-by-side pair of photographs on page 31 each show 6 teeth, 3 upper and 3 lower, from *Isurus hastalis* and from *C. carcharias*. The shapes of the teeth are practically the same, the only difference being serrations on the edges of *C. carcharias*. Ellis and McCosker choose not to take sides in this evolutionary controversy, wryly stating "We prefer not to enter this nomenclatural wrangle, being content to recognize that white sharks and Megalodon probably occupy proximate twigs of the same evolutionary bramble bush."

Chapter 3 contains some very impressive photographs and drawings, including a photograph of what might be the largest *C. megalodon* tooth yet found: a 6.8" (measured vertically) monster found in Peru in 1987.

Chapter 4 chronicles the authors' efforts at tracking down all the rumors, anecdotes, and stories of giant white sharks to attempt to discover true sizes. One of these, the "Port Fairey giant"

reported to be 36.5 feet long and whose jaws reside in the British Museum, turns out to be a misprint (it should have been listed at 16.5 feet). Another, the 29 foot, 3 inch Azores giant, seems to evaporate on careful scrutiny. The chapter concludes that the largest white sharks accurately measured range between 19 and 21 feet.

I hope I have adequately conveyed to you my enthusiasm for this book. I see only one problem between it and you: it costs a paltry \$50!

In the News

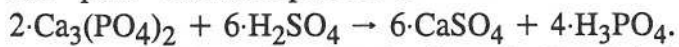
- ◆ New evidence to support the theory that *Tyrannosaurus rex* and other large carnivorous dinosaurs were warm blooded has been developed by a team of researchers led by N.C. State University geochemist Bill Showers. Analyzing the oxygen isotope composition of bone phosphate gave indication the *T. rex* was more akin to contemporary warm blooded animals than to reptiles.
- ◆ The *T. rex* skeleton known as Sue seems to be sinking into a gigantic legal morass. Discovered in 1990 on what U.S. Attorney Kevin Schieffer claims was the Cheyenne River Reservation, Sue was purchased from a Sioux Indian rancher for \$5000 by the Black Hills Institute of Geological Research. Last spring FBI agents acting at Schieffer's behest seized the remains and placed them in storage at the South Dakota School of Mines to await the protracted legal wrangling which will determine their final resting place. Extensive editorial comment and news stories indicate Schieffer's action to be very unpopular with just about everyone. Perhaps we should heed Shakespeare: "The first thing we do, let's kill all the lawyers."
- ◆ Bones which were misidentified for more than a century may be from the oldest (yet discovered) land vertebrate. The bones were discovered near Elgin, Scotland by local naturalists before 1850 are now thought to be 367 to 370 million years old and came from a 3 - 4 foot long tetrapod, resembling a small crocodile. They had originally been identified as fish bones (!).

Texasgulf

During the Eocene a shallow ocean covered much of eastern North Carolina. Marine life then consisted largely of invertebrates. Mollusks, corals, echinoids and the like lived and died in countless numbers, their remains settling to the ocean floor to build up a layer of material which later became compacted and cemented together and which we today call the Castle Hayne Formation. About 37,000,000 years ago a major climactic change cooled the oceans several degrees and many of the invertebrate species did not survive. For 20,000,000 years the oceans were much less populous. In the region south of what is today the mouth of the Pamlico River a cold ocean current, supersaturated with calcium phosphate, mixed with warm bay waters rich with microorganisms. These acted as nuclei, causing the calcium phosphate to come out of solution to form hundreds of millions of tons of nodules which were deposited on the sea bottom.

In 1963 Texasgulf started mining on 1200 acres of land on the south bank of the Pamlico River near the small North Carolina town of Aurora. Today the plant is a major economic resource for Beaufort County, employing about 1200 persons and spending about \$120,000,000 annually in North Carolina.

As the deposit of calcium phosphate is today about 100 feet underground, considerable effort and expense is necessary to recover it. The overburden is removed in two stages; the first 40 feet is moved with bucket wheel excavators and the last 60 feet is taken out with draglines. The 35 - 40 feet of ore is then removed with huge draglines, washed with high pressure water which pulverizes the nodules, and the water-ore slurry is then pumped to the plant for processing. There, screening removes the larger impurities and the quartz sand is floated out. The remaining phosphate sand is then processed with sulfuric acid to produce phosphoric acid and other byproducts. The "pure" chemical process is

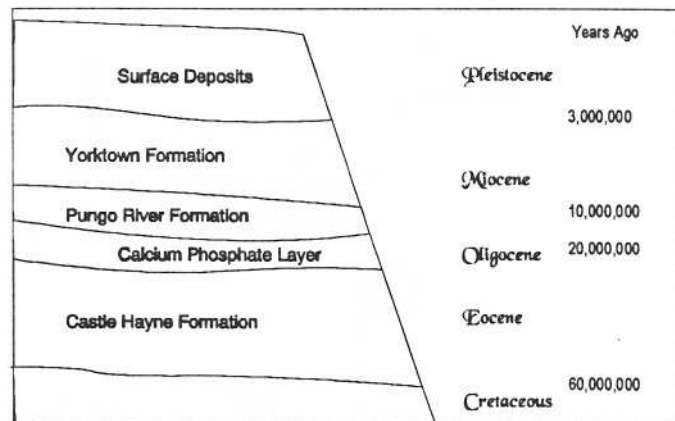


The major use for phosphoric acid (H_3PO_4) is in the manufacture of fertilizer and the plant produces 54 percent and 70 percent solutions for this purpose. Some pure phosphoric acid is

produced for the soft drink, food, and toothpaste industries. Another product is hydrofluosilicic acid used for fluoridating drinking water. Unfortunately, the resulting gypsum (CaSO_4) is too acidic to be of conventional use (plaster and wallboard). You can see large piles of it to the south of the main processing plant.

What to do with the vast quantities gypsum which remain after producing the phosphoric acid? What to do with the huge hole in the ground which remains when the draglines are through? Texasgulf discovered that the gypsum, properly mixed with the overburden sands and clays, provides a sound reclamation base for restoring the hardwood tracts and wetlands which were originally located in the mining areas. Today, more than 1600 acres are in various stages of restoration with work on another 320 acres to begin in March, 1993.

What does the future hold? Land for which Texasgulf has a permit to mine will be exhausted in 7 years. Their application for a permit to mine to the east of NC 306 is currently under review by the U.S. Army Corps of Engineers. One obstacle to the permit is the existence of wetlands in the area. It is simply not economically feasible to mine around these sensitive areas. They are faced with the classical confrontation between our concern for the environment and our need for the resources it contains. Hopefully, Texasgulf's success in reclamation and restoration will convince the relevant authorities that, in this instance at least, maybe we can accommodate both.



Depth Profile at the Texasgulf Mine

North Carolina Fossil Club, Inc.

(Founded 1977)

President	Mike Hogan	(919) 942-2877	Chapel Hill, NC
Immediate Past President	Vince Schneider	(919) 779-9338	Garner, NC
Treasurer and Membership Chairman	Trish Kohler	(919) 383-6328	Durham, NC
Secretary	John Timmerman	(919) 452-0943	Wilmington, NC
Editor, <i>Janus</i>	Richard Chandler	(919) 851-2153	Raleigh, NC
Board	Tom Burns	(919) 776-8080	Sanford, NC
	Becky Hyne	(919) 752-3284	Greenville, NC
	Jim Knowles	(919) 851-0393	Raleigh, NC
	Joe Milkovits, Jr.	(919) 876-0650	Raleigh, NC
	Sarah Milkovits	(919) 876-0650	Raleigh, NC
	Joy Pierce	(919) 489-8149	Durham, NC
	Sam Schmidt	(919) 782-2428	Raleigh, NC
	Judy Schneider	(919) 779-9338	Garner, NC



1992 Membership Application - N. C. Fossil Club

NAME(S) _____

ADDRESS _____

CITY, STATE, ZIP _____

PHONE (Include Area Code) _____

INDICATE TYPE(S) OF MEMBERSHIP(S)	INDIVIDUAL (NEW)	\$20.00	_____
	INDIVIDUAL (RENEWAL)	\$10.00	_____
	SPOUSE (NEW OR RENEWAL)	\$ 5.00	_____

SIGNATURE _____

DATE _____

Children of NCFC members who are dependent minors and living at home may accompany parents on any trip *EXCEPT* Texasgulf or where otherwise noted. Only 15 positions on the Texasgulf trip are available to members who reside outside of North Carolina.

Memberships are effective from January through December of the year (or portion of the year) of the date of application. For example, persons joining in August will need to renew their membership 5 months later in January.

MAIL TO: NC FOSSIL CLUB, P.O. BOX 2777, DURHAM, NC 27705



Whale Vertebra from Texasgulf
Showing Evidence of
Reactive Arthritis (?)

North Carolina Fossil Club
P. O. Box 2777
Durham, NC 27705