NORTH CAROLINA FOSSIL CLUB

Janus

The Newsletter of the North Carolina Fossil Club

1991 Number 4

Fall Trip Reports

Sixteen members and guests made the first trip of the fall to **Green's Mill Run** in Greenville. It was a good trip for everyone and there were several pleasing finds: Bill Gilmore's daughter Amy found a large dermal scute from a ray and Bill found a very nice *C. carcharias* and a mako tooth; Ron Keil found two mosasaur teeth in very good condition (one huge) and many *C. carcharias* teeth; Ron's guest, Gay Williams, found a very rare *Parotodus benedeni* (false mako) tooth; John Timmerman got a BIG (2½") *C. carcharias* and an alligator tooth; Pete Paris found a beautiful and large tiger shark (*Galeocerdo cuvier*) tooth.

It was a cool and BRIGHT day at the Texasgulf phosphate pit at **Aurora**. There were several very good finds: a 5¾" *C. megalodon* tooth (unfortunately broken), a 2" *C. carcharias* tooth (rare), a beautiful symphyseal tooth (extremely rare) and several upper teeth from the cow shark *Notorynchus primigenius*, an upper tooth from the cow shark *Hexanchus griseus* (rare), a bramble shark (*Echinorhinus*) tooth, a shark's rostral node (snout), 6 associated fish vertebra, and several associated seal arm - flipper bones were some that I was aware of. By far the most spectacular find was a large (4" - 5") canine tooth from a bear (???). It was in perfect condition with black enamel covering almost half it's total length.

The trip to the **Becker Sand and Gravel Pit** had to be cancelled since the weak economy has forced the company to close the pit, at least temporarily. There may be a later opportunity to visit this site for petrified wood.

October 12th was a beautiful day at the **Martin Marietta Quarry at Belgrade.** Twenty six members and guests had a very nice dig, most finding a variety of fossils. This was the first trip to Belgrade for many and beginner's luck prevailed. The top find for the day was by John Beitz's daughter, Lisa, with a 4⅞" long by 4¾" wide *Carcharodon megalodon* (Great White Shark) tooth, a wonderful find indeed. As soon as Lisa comes back to earth she'll be a regular club member for sure.

The following members and guests found:

- Beth Bateman - a little bit of everything.
- Linda Beddard - Mastodon tooth fragment, a nice size snaggle tooth, and a variety of other fossils.
- Teddy Devereux - 1½" alligator tooth and a 1¾" *C. megalodon* tooth (most beautiful colors).
- Lisa Beitz - see above.
- Cris Johnson - *C. megalodon* tooth, 4" × 3½".
- JoAnn Parnell - a variety of fossils.
- John Beitz - a variety of fossils.
- Christine Gilmore - 1" diameter alligator tooth.
- Trent Bishop - whale ear bone.
- Bill Little - two nice alligator teeth and a saw fish rostral tooth.

Since we are able to drive close to the digging site, everything is close at hand, a bonus at this quarry. Another plus was having Bill Little's camper with its built-in bathroom close at hand. Thanks, Bill, from everyone. As always, a good time was had by all. **Richard Tellekamp**

Originally, about 15 members planned to go to the **Giant Cement Company Quarry at Harleyville, SC** but the final count from the NCFC was 9 members and guests and about 120 others - I don't believe I've seen so many fossil collectors in one place at one time before. The quarry is devoted to a soft, very light gray limestone deposit which carries Eocene marine fossils. Overlaying the limestone is a Pleistocene river bed. This has the Eocene fossils mixed with huge variety of Pleistocene land mammal and reptile remains. Tiny frog and snake vertebra are easily found (if you look very closely). Armodilla and turtle shell fragments and very rarely whole shells are present. Bison, deer, and horse teeth, mink jaws, rabbit bones, wolf skulls, etc., have all been found. Eocene fossils include some truly spectacular *Carcharodon auriculatis* teeth. Also present are teeth from the tiny (and very rare) cow shark *Hexanchus agassizi.*

Unfortunately, there had been very little rain for several weeks preceding our visit and good things were very hard to find. Joy Pierce and I found very little except for snake vertebra, frog parts, and very small shark teeth; others were luckier. Karen Anijar's son Josh had a nice turtle vertebra; Sarah and Joe Milkovits found snake vertebra and frog bones, a catfish spine, a fragment of the rostrum of the fish *Cylindracanthus acus*, fish vetebra, small shark teeth, and parrot fish mouth parts; Nancy and John Timmerman found a nice horse molar and 3 *C. auriculatis* teeth; Rita McDaniel got a large 2⅞" *C. auriculatis* tooth. I was not sorry I went but I don't think I would do it again unless there was substantial rain beforehand.

The same lack of rain was a real problem at the **Martin Marietta Quarry at Castle Hayne**. A thick layer of damp dust covered all new material. About 25 persons were present, including 8 or so whom Vince took on a Museum sponsered trip. Looking in the older spoil piles proved very productive for John Beitz, JoAnn Parnell and their two teen-agers. They found 2 large alligator teeth (and a couple of smaller ones), a large *C. auriculatis* tooth (unfortunately broken), many other shark teeth, a saw fish tooth, and a large tooth from the Cretaceous fish *Enchodus*. Bill Gilmore and his daughters Courtney and Amy found a mother lode of echinoids. John Timmerman found two of the scarce Cretaceous echinoids *Hardouinia kellumi* and several of the smaller *Hardouinia mortonis*. Pete Paris found two of the strongly ellipsoidal *Eurhodia rugosa* echinoids. I found a huge heart urchin (badly encrusted with matrix), a *Hardouinia mortonis,* and a piece of the lower jaw (with two teeth) of a young black bear *Ursus americanus*, unfortunately not a fossil.

The **Fossil Fair**, held at the **N. C. State Museum of Natural Sciences** was a resounding success. There were hundreds of people who came, many with small children. The kids got a "passport": a sheet of paper with places for 8 stamps. Each exhibitor had an ink pad and rubber stamp depicting some kind of dinosaur and would stamp the "passport" when the kid visited his/her table. When all 8 places were stamped the kid got to pick out a shark tooth to keep.

Who was there? Frank and Becky Hyne with their traveling museum; Mike Hogan with the world's largest collection of cow shark teeth, including a modern *Notorynchus* jaw; Thelma and Rick Bennett with the neat stuff they fish out of the lower Neuse River; P. Ruffin Tucker with the oldest fossil by far: a faint Precambrian impression in a rock from the Carolina Slate Belt in Stanly County, NC that looked vaguely like a large trilobite; Trish Kohler with her mixture of Florida and Aurora things, including the huge tooth she found last spring; Sarah and Joe Milkovits with a nice hodge podge nicely displayed; Doug Meier with a huge collection of shark teeth and some hadrosaur material. The Smithsonian had 4 people down: Dave Bohaska, Ralph Eshelman, Jerry McDonald, and Bob Purdy who were kept busy with identification.

Eleven club members led by Becky and Frank Hyne visited the **Martin Marietta Quarry at Jamestown**. Frank found a HUGE *Linthia harmatuki* echinoid (it must have been 6" in diameter) and Becky found one only slightly smaller. Both were encrusted with limestone but were impressive nonetheless. Pieces of crab carapaces (a curious type with ridges) and other parts were common; Becky and Vince each found a complete one and John Timmerman found a complete one with a smooth carapace. I found a large (at least compared with those I've seen at Castle Hayne) *Eurhodia* echinoid. These are the shallow, very narrow, elliptical type which are usually damaged. We also found many small echinoids (pea size) and a few small shark teeth. Sam Schmidt found a 3" *auriculatis* (broken).

Tom Burns led 12 members and guests on the last NCFC trip of 1991 to the **Old Egypt Coal Mine**. This Triassic site has phytosaur remains and the group found 12-14 teeth. About 1:00 in the afternoon they went to the Pomona clay pit to look for plant fossils; unfortunately, few were found.

Don't forget the trip to the **Lower Neuse River** scheduled for January 18, 1992. Contact Thelma Bennett (919) 249-1574 for details.

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Quiz (Answers on page 6)

1. What is the largest shark that ever lived?
2. What is the largest animal that ever lived?
3. What is the earliest shark anywhere?
4. What is the earliest white shark whose teeth are found in North Carolina?
5. What is the earliest shark whose teeth are found in North Carolina?

Wyoming Fishing Trip

Becky and I hunted for Eocene fossilized fish, leaves, and insects in the Green River Formation of Wyoming and Utah this summer. For years we have collected at Bonanza, Utah which is not even a town - no store or gasoline station - just a processing plant for gilsonite (asphalt). We have had real good luck finding leaves and insects that are wonderfully well preserved. The site was Lake Uinta, the longest lasting of the three lakes which persisted for 17 million years from the Late Paleocene to the Late Eocene. The tools needed are pry bars and shale splitting tools down to single edged razor blades. Splitting rejected slabs that have weathered is very productive and much less work than levering up large thick slabs from a hole. An insecticide is a must; we were eaten alive by gnats that bite without your being much aware of it at the time. The next day and for days thereafter we had bite marks that drove us crazy with itching. Our ears looked like a wrestler's cauliflower ears.

Then back through the Uinta Mountains by scenic Flaming Gorge, west to Kemmerer, Utah (pronounced Kemmer) to Carl and Shirley Ulrich's quarry to look in the Lake Gosiute site for fish. This lake lasted from the Early Eocene to Middle Eocene. We worked the split fish layer with tools furnished by Mr. Ulrich. When we had enough fossils by his standards he said we had more than $70 worth and to pack up. He then squared the slabs with a saw. We had a number of *Diplomystus* and one *Amphiplaga*.

The next day we hunted at the Warfield quarry where we were left to ourselves in a large working area where the overburden had been removed. It is back-breaking work: levering up thick slabs and splitting them. Many of the fish were broken by lateral cracks which ruined them for specimens. We worked most of a long day and could have worked longer if we hadn't worn ourselves out. They don't square the slabs so you take them "as is".

The charge at Ullrich's is $35 per person for a limited time (until he thinks you've got your money's worth). The charge at Warfield's is $25 per person for as long as you last. We enjoyed Warfield's more and found more and larger fish there. Neither quarry will let you keep any really rare fossil. We did not find any we had to leave. As usual, Becky ended up with the best find: a large slab with 5 fish and perhaps more as we clean it up. The fish are about 4½" long and are *Diplomystus* and *Priscacara*. **Frank Hyne**

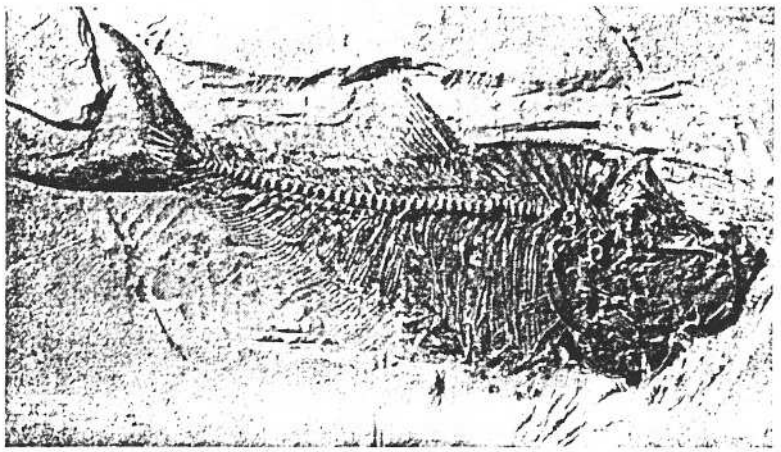

Fig. 1. *Diplomystus dcnatus* Cope. Cat. No. 1541 Y. P. M. 1/5 nat. size.

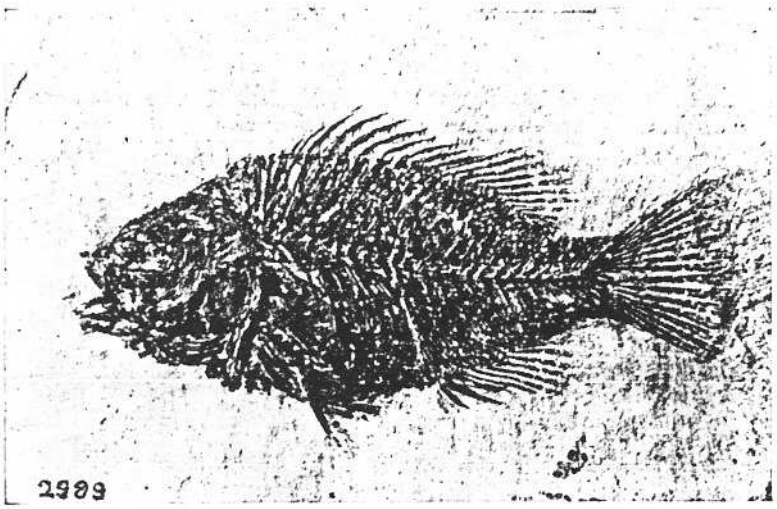

Fig. 7. *Priscacara oxyprion* Cope. Cat. No. 2989 Y. P. M. 4/7 nat. size.

Help Wanted

Dr. Lyle D. Campbell, Professor of Geology at the University of South Carolina at Spartenburg (Zip 29303) has asked for assistance with two research projects. The first is concerned with the gastropod *Fasciolaria elegans*. Do any of you know of any sites where this species occurs other than the Martin Marietta Quarry at New Bern and the Tarheel, NC site mentioned in *Fossil Collecting in North Carolina*? (See Plate 9 for a photograph.) He is also studying the moldic fauna of the Carolinas and would like to obtain your duplicate specimens of limestone molds, particularly any from Aurora that are associated with the large scallop *Chesapecten septenarius*. In return, he will provide you with identifications. Be sure to give locality data. Here is an opportunity to gain some good will from the professional community. Take advantage of it.

Elementary Metrics of Shark Tooth Size

Dr. B. W. Kent

The first joke I remember hearing as a small child was about a discussion between two fishermen. The first commented that the local fish were very large. Upon inquiry by the second fisherman, the first responded that just the day before he had captured a six-inch fish after a Herculean struggle. Six inches didn't seem a particularly large fish to the second fisherman, until the first pointed out that it was six inches measured between the eyes!

Although this method of measuring fish is rather unusual, it pales in comparison to some of the methods used to measure fossil shark teeth. Among shark tooth collectors, stating the best method for measuring a tooth is akin to making a controversial point in religion or politics. Unfortunately,the resulting discussions rarely go beyond a rudimentary examination of the relative advantages and disadvantages of the various methods. Conceptual aspects of size are almost never a topic of discussion.

From the outset it must noted that "size" is a very ambiguous term. A trivial example using nine dice will suffice. Take eight of the dice and stack them together to form a cube. The resulting cube has four dice on each face and is two dice in height, in width, and in length. Compare the remaining die (which is a cube) to the larger cube that you made. The larger cube is twice as high as one die. But it has four times as much surface area (the die has six exposed faces to twenty-four for the cube: $24 \div 6 = 4$). Further, the larger cube has a volume and weight eight times greater than the die. It is obvious that the cube constructed from eight dice is larger than the lone die. But how much larger? Twice as large? Four times? Eight times? The answer is "all of the above"! The larger cube is twice as tall, has a four-fold larger surface area, and an eight-fold larger volume. It all depends upon how you choose to define "size."

From this simple example it is clear that there are three basic metrics. Linear metrics are based on the length of a single line (e.g. - the height of a cube). Squared metrics are based on areas such as the surface area of a cube. Finally, cubic metrics are based on three-dimensional attributes, like volume or weight. All are legitimate measures of size. You simply have to state the type of metric being used.

Unfortunately, shark's teeth are not cubes. For shark teeth, the situation is still murkier, since both size and shape can change. Because of this complexity, metrics based on orthogonal measurements (height, length, and width) are less appropriate than for cubes or other solid objects consisting of flat surfaces. Linear, squared, and cubic metrics certainly exist for shark's teeth, but the complex, curved surfaces of teeth make reliable measurements more difficult. What we need to determine is which tooth metrics are most useful.

A good metric should have four attributes: accuracy, precision, relevance, and simplicity. Accuracy is how closely the measurement reflects the actual size of the object. A metric that is inaccurate has a large systematic error (*i.e.*, it consistently underestimates or overestimates) and gives a biased estimate of size. Accurate metrics are unbiased.

Precision is the property of giving nearly identical estimates each time a measurement is made. Metrics with low precision produce measurements that have a large random error: that is, they vary widely with the estimates scattered both above and below the true size.

Relevance is a property that is easily overlooked, but is extremely important. A metric can be highly accurate and precise, but nevertheless worthless if it lacks relevance. A relevant metric produces an estimate that is meaningful to the quality being measured. For example, many collectors mistakenly believe that the color of a fossil tooth is related to its age, with darker teeth being older than younger teeth. But this is demonstrably not true, making color an irrelevant metric of age. A further complication arises because the most relevant metric may not be the one that most closely estimates actual size. Whether we like to admit it or not, size is largely subjective. Our perceptions of size may, in some cases, lead us to conclusions that are diametrically opposed to conclusions based on measurements. In the context of fossil shark's teeth, the most relevant metric may be the one that most closely approximates our subjective perception of size.

The final attribute of a good metric, simplicity, is not as vital as the previous three. While the first three are directly related to the quality of size estimates, simplicity is concerned with convenience. All other things being equal, a simple technique is preferable to a complex one.

Having discussed measurement in general terms, it's now time to get down to specific cases and examine the various methods of measuring shark teeth in light of the attributes of a good metric.

Cubic Metrics

Since shark's teeth are three-dimensional objects, there is little room for argument that cubic metrics are the most reliable available. Unfortunately, cubic metrics on shark teeth are more difficult than some other techniques discussed below.

There are two basic cubic metrics used on shark teeth: weight and volume. Weight is used by many collectors and has some attractive features. First, weight can be determined rapidly with a balance or scale. Postal or diet scales are readily available and adequate for this purpose. However, there can be some problems with the accuracy and precision on inexpensive scales. There is also a more fundamental problem. Teeth vary greatly in degree of mineralization, and this can affect the weight. Heavily mineralized teeth, where internal pores have been largely filled, weigh more than less heavily mineralized teeth of the same overall size. As a consequence, teeth that are small, but heavily mineralized can weigh appreciably more than some obviously larger teeth. Further, there appears to be no easy method of compensating for this problem.

The second cubic metric, volume, is more difficult to measure, but avoids the problem of differential mineralization. The easiest way to determine the volume is by water displacement:

1. Soak the tooth in water overnight to displace air from internal pores. This step is critical as any air remaining in the tooth can cause the volume measured to be less than the actual volume.

2. Fill a large conical graduate about half full of water and record the exact volume.

3. Remove the tooth from its water bath. Carefully shake off any excess water and slowly immerse the tooth in the graduate. The tooth must be completely immersed. As the hand is withdrawn, attempt to shake any water clinging to the hand back into the graduate.

4. Read the new volume. The difference between the two water volumes is the volume of the tooth.

5. Remove the tooth and allow to dry.

6. Repeat for other pre-soaked teeth, if desired. Be certain to record the initial volume of water in the graduate before each tooth is added, since water may have been lost during the removal of the previous tooth.

This is the simplest method for obtaining volume by displacement. This technique suffers from several problems. First, it is far from simple. It is elaborate, messy, and time-consuming. Second, the pharmaceutical graduates that are best suited to this technique are expensive: the smallest is currently about $35, while the ones needed for the largest teeth retail for nearly $100. Finally, there are also problems with precision on larger teeth. There are modified displacement techniques that use less expensive equipment, but they are generally more elaborate and time-consuming.

In summary, cubic metrics probably give the most appropriate measure of actual tooth size. But cubic metrics, such as volume, can be difficult to measure. And it is not clear that most collectors have a clear conception of volume as a tooth metric.

Squared Metrics

If cubic metrics are difficult to obtain, squared metrics are almost impossible. Finding the surface area, with all of the attendant curves, dips, and bumps usually present on a tooth is a task too formidable for most paleontologists. The silhouette area (the area of an image of the tooth projected onto a flat plane) is somewhat easier to obtain but is still more tedious than the measurement of volume.

Several years ago, I started using a simplified squared metric based on the height and width of a tooth. We have come to refer to it as the "triangular area." It is calculated:

$$\text{Triangular Area} = \frac{\text{height} \times \text{width}}{2}$$

This is simply the formula for the area of a triangle which approximates the shape of each tooth. This metric would be only an interesting digression from the more widely used linear metrics discussed below, except that in terms of human perceptions it may be the most relevant technique discussed in this article.

Linear Metrics

Linear metrics are the most widely used for measuring shark teeth. While there are a number of different linear metrics, only two, height (the vertical distance between the tip of the crown and a line connecting the tips of the two root lobes) and slant height (the straight line distance between the tip of the crown and the tip of the anterior root lobe) are frequently used. Some collectors also use width (distance across the widest region of the tooth) when measuring broad posterior teeth. All three of these measurements are relatively rapid and simple. In this regard, they are much easier to use than either cubic or squared metrics. They also are conceptually easier to grasp.

Choosing between the three measurements is more difficult than might initially be expected. Height and slant height both have enthusiastic proponents. My personal preference has changed over the past few years from using height to using slant height. The reason is simple enough. For anterior teeth, height is a reasonable estimate of size. But for lateral and posterior teeth it consistently underestimates the size of the tooth (as determined by either volume or triangular area). This is due to the plain fact that for most species the teeth become lower and broader as you move posteriorly in the jaw. Because of the pattern, height exhibits a strong bias in determining the size of lateral and posterior teeth, and is consequently inaccurate. Width exhibits a reverse bias against anterior teeth and is similarly inaccurate. Slant height, on the other hand, incorporates both height and width estimates into a single measurement. When measuring anterior teeth, the height component predominates. On lateral and posterior teeth the width component of slant height exerts more influence. As a result, it seems to be the least biased of the three linear metrics discussed.

Conclusions

In this discussion of tooth size and how to measure it, we have examined the various metrics with the aim of determining the usefulness and reliability of each. Because size is an ambiguous term, a variety of metrics legitimately can be used. But before any final conclusions can be drawn, the subjective aspects of tooth size must be considered. Human subjectivity is a major factor in determining the relevance of different metrics: a metric that selects one tooth as larger than another, while humans looking at the same teeth consistently conclude the opposite, is irrelevant.

Two years ago, I designed an experiment to test how humans actually assess the size of teeth. For each trial, I selected six similarly-sized, but differently-shaped teeth of a single species (either *Isurus hastalis* or *Procarcharodon megalodon*). For each tooth I determined volume, triangular are, height, width, and slant height. Each metric was then used to predict the largest tooth in each assemblage. Volunteers were then given the teeth and asked to select the largest tooth. The most relevant metric would be the one that had the highest percentage of correct predictions of the largest tooth (as determined by volume, the technically most accurate metric in this instance), since it most closely reflected the human perception of size. The results:

Metric	% Correct
Volume	64%
Triangular Area	83%
Height	37%
Width	40%
Slant Height	79%

These results are interesting in several respects. First, although volume is undoubtedly the most objective metric for determining the size of a three-dimensional object. It is only the third most reliable for the subjectively largest tooth. It was the definitive metric only when one tooth in the set of six was substantially thicker than the others. Lesser differences in thickness were ignored. Second, triangular area, although a derived metric, is the most successful of all those examined. This suggests that the perceived surface area is the single

most important subjective criterion for determining size. Finally, of the linear metrics, the most surprising result is the abysmal success of tooth height and tooth width in predicting the largest tooth. But since the trials always included anterior, lateral, and posterior teeth, the positional bias of these two metrics substantially reduced their success. Slant height, however, was a close second to triangular area. The incorporation of both height and width components into slant height effectively insulates it from the pronounced biases of these two metrics.

For critical research applications, none of the simple metrics discussed here are really adequate. The more complex morphometric analyses used in research generally require the use of computers and sophisticated statistical programs. But for the more basic needs of the collector, some of the metrics discussed here are suitable:

- Triangular area is the best predictor of size as perceived by humans. Consequently, it is highly relevant. It also appears to be reasonably precise. Unfortunately, it is not particularly simple, and it appears to be somewhat biased against posterior teeth.
- The slant height of a tooth is almost as good of a predictor of size as triangular area, and is much easier with which to work. It also exhibits high accuracy and precision.
- Volume, height, and width all have major defects. The technique for measuring volume is too complex, and there appears to be problems with precision using the equipment available to amateur collectors. Volume is also only a moderately relevant predictor of subjective size. Both height and width are simple and precise. But both are inaccurate due to strong positional biases. Both height and width are relatively poor predictors of subjective size and as such have low relevance.

Which metric is "best?" It's still a very subjective decision, but at least now collectors can disagree a little more objectively. And if all else fails, you can always fall back to the oldest metric of all: "Nice tooth!" That's really what it's all about anyway.

♦ **Dr. Bretton W. Kent** is Professor of Zoology, University of Maryland. He is about to publish *Fossil Sharks of Chesapeake Bay*. If you are lucky enough to own a copy of his preliminary book, *Fossil Sharks of Maryland - An Illustrated Guide*, then you will be excited at the prospect of its being expanded and brought up-to-date. He told me that there was the possibility that fossil clubs could obtain bulk orders at reduced rates. There should be more information in the next issue of *Janus*.

Answers to Quiz

1. The modern whale shark, *Rhincodon typus*.
2. The modern blue whale, *Balaenoptera musculus*.
3. *Cladoselache*, 400,000,000 years ago.
4. *Carcharodon auriculatis*.
5. There are several early Eocene candidates: *Cretolamna*, *Odontaspis*, *Scapanorhynchus*, or *Squalicorax*.

The Stages of Fossil Hunting

My involvement with many of my hobbies appears to go through 5 stages and fossil hunting seems to naturally be divided thusly:

1. You want to find a fossil, any fossil. This stage lasts until you visit a place where they are common, say Aurora. I will always remember my first visit there. When the bus stopped I could see right under the window a scallop shell the size of a dinner plate. Wow! One visit to a place like that and you instantly find yourself in the second stage.

2. You want to find as many fossils as possible. You run around, picking up everything in sight and by the end of the day you stagger out so loaded down you can barely move. But you're happy and so pleased with yourself - until you get back to the bus and someone has a shark tooth as big as your hand. Before you leave you've moved on to the next stage.

3. You absolutely, positively **must** have one of those big teeth. Unfortunately, this stage can persist for a long time. Each time you go to Aurora you arrive full of hope and anticipation. You end the day dejected and forlorn - you just got back to the bus and at least 15 people have 4"+ teeth and the best you've got is a lousy 2" mako. Eventually you find the tooth or you give up. Next you want a real challenge.

4. You want to find something truly rare. After all, 4"+ *Carcharodon megalodon* teeth can't be all that uncommon - 15 people (other than yourself) find one every time you go to Aurora. You get very knowledgeable in very narrow, precisely defined areas. You go around mumbling about esoterica. And you search for things like the 2nd upper lateral tooth from a *Hexanchus griseus*. Ironically, you might now find the 4"+ *C. megalodon* but it doesn't impress you all that much anymore. This is the most frustrating of the 5 stages because you set standards for yourself that only Becky Hyne could accomplish. Finally, this too passes.

5. You want to find a fossil.

Election and Membership Renewal

It is time to elect a new president and 4 members of the Board. The nominating committee, consisting of Allison Chambers (chair), Mike Hogan, and Trish Kohler, has produced a list of six members who are willing to accept the responsibilities of being on the Board. The ballot is on the last page, together with the form for membership renewal. You can send them in together to Trish, just separate them on the dotted line. To be counted, the ballot must be returned by January 31, 1992. Renewal of membership can be done anytime but you won't receive *Janus* until you renew.

Fossil Literature

♦ *Time Magazine*, in their special Christmas Books section in the December 16, 1991 issue, gives recognition to *Fossils* by Niles Eldredge and Murray Alcosser (Abrams, $60). The very brief review includes phrases such as "astonishing photographs" and "lively text", so you may want to check it out.

Vince and Judy Schneider

Cooperation? Couple feel it in their bones

By CAROL BLANEY
Staff writer

Vince and Judy Schneider complement each other. He knows bones, she knows stones, and together they stalk dinosaurs and fossil fish.

While holding down full-time jobs, doing other volunteer work and caring for two children, the Schneiders volunteer dozens of hours each month, working on the fossils they've bagged and building up the research collection at the N.C. Museum of Natural Sciences.

"They're very enthusiastic collectors and very affable people," said Bob W. Purdy, a fossil fish specialist at the Smithsonian Institution, who has worked with the couple.

There's more to their work than the hunt.

With the help of Judy and other volunteers, Vince, a research associate in paleontology, has rescued the museum's fossil collection from storage. The N.C. Museums Council honored him for his efforts last year.

"Without Vince's work, there certainly wouldn't be a dinosaur program," said Roberta L. Maser, executive director of the N.C. Museum of Natural Sciences Society, a private, non-profit group that raises money for special exhibits. "He's just willing to do anything to move the project forward."

Vince, who has worked at the museum since 1979, spends lunch hours, evenings and weekends recruiting museum volunteers, fielding questions from novice fossil hunters and identifying bones, some no bigger than a baby's fingernail.

"Vince is really kind of a wizard," said Jesse P. Perry, curator of public programs at the museum. "You give him almost any bone and he can tell you what it is."

Usually reserved, Vince becomes animated when talking fossils.

"They're like a huge jigsaw puzzle, but somebody stole half the pieces and stepped on the rest," said Vince, 40, a compactly built, mustachioed man.

He runs the museum's fossil lab, a windowed room where visitors stop to watch Judy and other volunteers prepare bones for study.

Judy, 36, said she enjoys the work but has to laugh at the questions.

"Sometimes they ask if they're real," said Judy, a petite woman, as she poked a pick at a big bone encased in plaster. The chipping made a "chink-chink" like a dentist cleaning teeth. She didn't cringe.

"Would I be sitting here doing this with a fake dinosaur bone?" she said.

The Schneiders met in a Hillsborough Street bar 12 years ago and spent their first day together digging fish fossils in an eastern North Carolina phosphate mine.

Judy got hooked on the bones and on Vince, and they married in 1982. Later, she earned a geology degree from N.C. State University.

Unable to find a job studying fossils, Judy now works as a nurse at Rex Hospital. But her previous training still comes in handy. She can identify fossils and fossil-bearing rocks on expeditions like the one the couple just returned from.

The Schneiders and other museum volunteers spent 10 days on a shadeless Wyoming hillside, gently brushing dirt from a 500-pound femur and other bones. The thighbone may belong to a newly discovered species of cetiosaur, a bulky, plant-munching dinosaur that lived 165 million years ago.

After gently wrapping the big bone in burlap and plaster, the team lugged it almost a mile to a waiting truck. The femur is the museum's now and may one day be pieced together with other bones to make a whole dinosaur for display.

But that dream may be a long time coming. Setting up the display would require a full-time fossil expert, and there's no money budgeted for that now.

The museum didn't even have a part-time paleontologist in 1976, when Vince asked for help to identify some fossil bones he had found. So he set out to learn fossils himself.

Armed with a biology degree from the State University of New York at Plattsburgh and 15 years of experience as a fisheries expert with the state Division of Environmental Management, he tore modern fish apart to compare them with ancient ones.

Then he started to work on the museum's collection of fossils. It consisted mostly of disorganized stacks of boxes, many with unlabeled bones.

Most of the 20,000 chunks of ancient bone and shell that the volunteers have now cataloged are not on display at the museum. They're housed in a room a few blocks away — fodder for research on the creatures that thrived in the prehistoric North Carolina ocean.

In the high-ceiling vault of the research room, Vince fingered otoliths, "ear bones" of fossilized fish, and bones from a 40-foot-long crocodile dead for 60 million years.

"Bones speak to me," he said, half-jokingly.

Besides working for the museum, Vince is president of the N.C. Fossil Club, which hunts fossils near Aurora and other spots in the eastern part of the state. Judy, a longtime member of the group, edited its newsletter for years.

The club's biggest event is an annual "Fossil Fair," where members display their finds, and scientists from the Smithsonian Institution come down to identify them.

Beyond the bones, the Schneiders have found time to serve their church, the Sacred Heart Cathedral in Raleigh. Judy volunteers at Raleigh's Open-Door Clinic, which offers free treatment to the uninsured. Vince heads the social ministries committee, which works with the homeless.

They have two children, and they take turns driving Emily, 7, to soccer practice, and Jeff, 5, to a speech therapist. Whoever gets to their Garner home first starts dinner, and one of them moves the fossils.

"Sometimes we do have to clear bones off the table to eat," Judy said.

Staff photo by John Rottet

Vince and Judy Schneider have a bone to pick, but it's a dinosaur bone and they have no quarrel with the work at the N.C. Museum of Natural Sciences

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Contributors to the N.C. Museum of Natural Sciences

The following members donated specimens to the N.C. Museum of Natural Sciences during 1991.

Vince and Judy Schneider	1667 pieces, mostly fish and echinoids
Frank and Becky Hyne	1010 pieces, mostly fish and echinoids
John Pittman	A piece of wahoo jaw
Jan Pittman	Bird bone
Mike Hogan	7 fish bones
Richard Tellekamp	7 fish bones
Sam Schmidt	182 pieces, mostly fish and echinoids
Wayne Morgan	57 fish bones
Thelma Bennett	929 fish bones
Richard Chandler	168 fish bones
John Timmerman	20 echinoids and 1 fish bone
Tom Burns	Box of Triassic bone fragments
Doug Meier	325 pieces of Cretaceous material

Staff photos by Jim Bounds

A Pteronodon dinosaur in the State Fair exhibit gets a close look from, from left, Gerald Allen, Timmy Allen, 13, and Chrystal Allen, 11; they are from Dunn

Tyrannosaur wrecks competition

Fat rat, biggest gator humbled by beasts' monstrous popularity

By TREVA JONES
Staff writer

Forget the 100-pound rat. And the world's biggest alligator.

The hottest animal attraction at this year's State Fair is a collection of reptiles that have been dead for hundreds of millions of years.

Dinosaurs Alive! is packing them in at the Fairgrounds, even with a $3 admission fee.

The traveling exhibit, which features 12 model dinosaurs at one-half to three-fourths actual size, drew 17,000 visitors the first three days of the fair, and they were lined up again Monday to see and hear the lifelike monsters.

"I think it's great," said Gerald Allen of Dunn, who accompanied his niece and nephew through the exhibit. "They look very real. The movements, the eye movements, the coordination. They really look authentic."

Chrystal Allen, 11, said she was fascinated with the creatures because of their size and because they lived so many millions of years ago.

"I know all my dinosaurs," said her brother, Timmy, 13. "We studied them last year."

Gordon D. Krogh, a fair visitor from Wisconsin, tried to explain why dinosaurs are "in" these days.

"They're not anywhere around anymore," he said. "You can't see them in a zoo. You know they were here."

When Jan Walker of Eden brought her 6-year-old son, Steve, through the exhibit, it was hard to tell who was having more fun.

"He loves dinosaurs and I do, too," Mrs. Walker said. "I don't know why. I've always been infatuated with them, and he is, too. He knows the meat-eaters and the plant-eaters."

Those who don't know their carnivores from their herbivores are in luck, as are children who are too young to read because signs at the base of each creature have symbols designating one or the other. A steak on a plate means the creature was a meat-eater, while plants show it was a vegetarian.

The creatures not only move, they rumble and roar and shriek. Each dinosaur, from Tyrannosaurus to Triceratops, has recorded sounds based on what scientists think they sounded like.

The robotic models are covered with man-made hide in what scientists think is the correct color, and are highlighted with spotlights in the dimness of the geodesic dome where they are exhibited.

Dinosaurs Alive! is presented by the North Carolina Museum of Natural Sciences Society, the museum's statewide support group. Roberta Mazur, the society's director, said the traveling exhibit is changed from one location to the next, depending on space available.

At the N.C. State Fair, the exhibit has 12 dinosaurs and a "hands-on" area where visitors may rub different dinosaurs or "dig" at a fossil table. A small, cutaway model of one dinosaur shows the mechanics that make it work. By pushing different buttons, visitors can move its head, tail or body.

The purpose of the exhibit is to interest people in coming to the museum in downtown Raleigh near the Capitol, and to raise funds for it, Ms. Mazur said. Proceeds from the $3 admission will benefit the museum.

Most people interviewed Monday said it was well worth the $3 admission cost, but one visitor had a complaint.

"I'm just appalled that the children have to pay," said Elinor Ezzell of Mount Olive. She said the price of admission was no problem for her and her grandchildren, but many children might not be able to pay.

"I think it's ridiculous for the state of North Carolina to sponsor this with taxpayers' money and then charge an entry fee," she said.

Ms. Mazur said no taxpayer money was used for the exhibit. Burroughs Wellcome Co. made a $10,000 cash contribution to help underwrite expenses and other sponsors provided cash or in-kind services.

Reprinted with permission from the News and Observer of Raleigh, NC

1.6 MILLION YEARS OLD/ Smithsonian scientists confirm findings

Remains of giant sloth found

By ANDREA SHAW
Staff Writer

What looks like a bear, is 12 feet tall, has a tail and is probably Wilmington's oldest resident?

Scientists call him *eremotherium mirabile*. To the lay person, he's the ground sloth.

Remains of the giant bear-like creature were found last week in the Burnt Mill drainage pond being built off Randall Parkway.

Scientists from the Smithsonian Institution in Washington visited the site last Wednesday, confirmed the findings and collected a thigh bone, foot bones, three large claws, vertebrae, ribs and teeth. They took the bones to Washington for testing.

"They are pretty rare," said Dave Bohaska of the Smithsonian Institution. "We don't know how many of the bones are still there, but it is a pretty significant find."

The ground sloth is believed to be about 1.6 million years old, Mr. Bohaska said. Scientists plan to conduct tests on the bones to determine the exact age.

Remains of *eremotherium mirabile* were first discovered on Skidaway Island, Ga., in 1842. The animals, which were the size of elephants, grew 18 to 20 feet in length and weighed nearly three tons. Although ground sloths were able to stand on their hind legs, they sluggishly and clumsily moved about on all fours, feeding on leaves, grass and herbs.

Ground sloths originated in South America and moved to North America at the beginning of the Ice Age, making their homes in Georgia, South Carolina, Florida and Texas.

In addition to the recent discovery in Wilmington, the only other find this far north was a few teeth in the Neuse River, Mr. Bohaska said.

Wilmington resident Mike Young uncovered the remains of the ground sloth while doing some amateur digging at the pond. He was out of town Wednesday and could not be reached for comment.

Construction is continuing on the pond, but engineers are trying to be careful not to disturb the remaining bones. The city also posted "no trespassing" signs Wednesday and has provided some additional security to keep the curious out, said Mitzi York, assistant city manager.

'They are pretty rare. We don't know how many of the bones are still there, but it is a pretty significant find.'

Dave Bohaska, Smithsonian Institution

"It is an important scientific find, so it may be tempting for some folks to go out and do digging of their own," Ms. York said. "We want to protect the area. The Smithsonian does not believe we are likely to find another ground sloth at the site."

The city is working with the University of North Carolina at Wilmington, Cape Fear Museum and the state Museum of Natural Science in Raleigh.

"The City Council has said the priorities in this process are to preserve the remains and try to find a home as close to Wilmington as possible," Ms. York said.

The ground sloth bones could be an excellent addition to the Cape Fear Museum's collection of mounted animals and vertebrae, said museum Director Janet Seapker.

"I think it is fantastic that the City Council is committed to keeping it here," Ms. Seapker said.

A consultant working with the museum on another project should be able to give officials an idea of the costs to dig up the remains, preserve them and start an exhibit, she said.

About six partial skeletons in the country have been preserved, said Mr. Bohaska of the Smithsonian.

Meanwhile, scientists will clean the bones, preserve them and return them to the city.

The University of Toronto is studying this group of ground sloths, and scientists there may want to examine the remains, Mr. Bohaska said.

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North Carolina Fossil Club, Inc.

(Founded 1977)

Ballot for 1992 Offices

President (vote for one)

Mike Hogan	Chapel Hill, NC	________
Write-in		________

Member of the Board - 1992-1994 (vote for at most four)

Becky Hyne	Greenville, NC	________
Sarah Milkovits	Raleigh, NC	________
Joy Pierce	Durham, NC	________
JoAnne Powell	Beaufort, NC	________
Sam Schmidt	Raleigh, NC	________
Joe Zaengle	Chapel Hill, NC	________
Write-in		________
Write-in		________

MAIL TO: NC FOSSIL CLUB, P.O. BOX 2777, DURHAM, NC 27705 **BEFORE JANUARY 31, 1992**

✂ -

1992 Membership Application - N. C. Fossil Club

NAME ________________________________

ADDRESS ________________________________

CITY, STATE, ZIP ________________________________

PHONE ________________________________

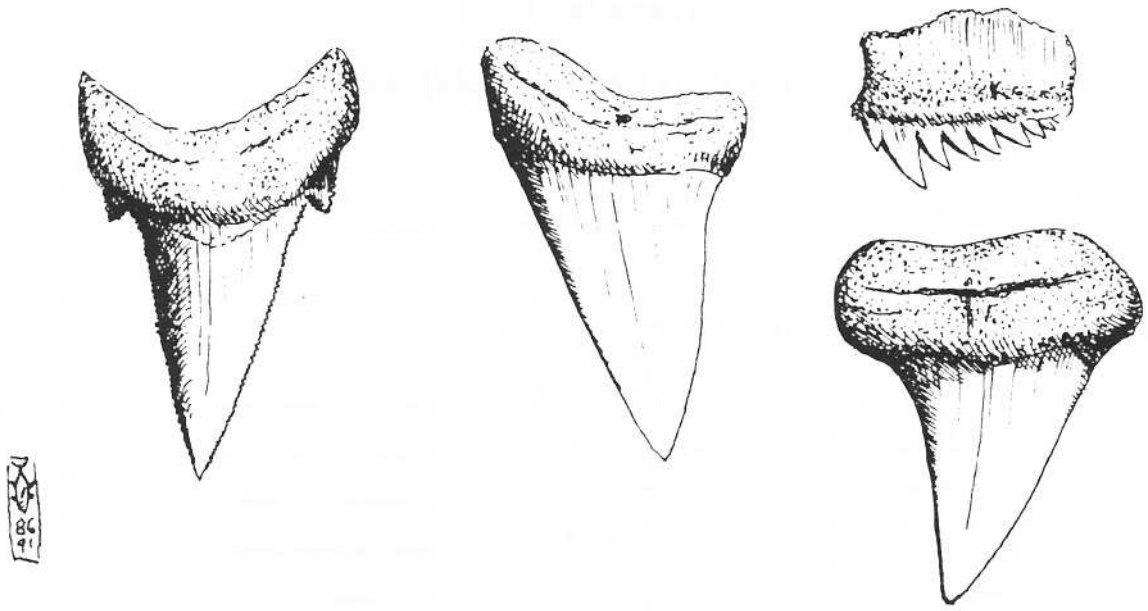
INDICATE TYPE(S) OF MEMBERSHIP(S)	**INDIVIDUAL (NEW)**	**$20.00** ________
	INDIVIDUAL (RENEWAL)	**$10.00** ________
	SPOUSE (NEW OR RENEWAL)	**$ 5.00** ________

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.

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



A shark tooth assortment, courtesy John Timmerman.
Carcharodon auriculatis, *Isusrus hastalis*, and *Notorynchus primigenius*

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