



## Summer Calendar

### June

6 **Quarry Trip-** Belgrade Quarry.

### July

20 **NCFC Meeting-** NCMNS, 11 West Jones Street, Raleigh. 1:30 pm, Level A conference room and via zoom. Check email for details.

## **President's Message**

Greetings NCFC members! We are well into this year, and so far, there have been a lot of positive experiences going on. We started out with great speakers at our first two meetings, and have had amazing amounts of outreach happening, reaching a total of 3,117 people in just three months! That is truly impressive and shows the great work being done by many of our members! Trip reports so far have been positive as well, even with some weather challenges. Our picnic in April was well attended, we had some great weather, delicious food, good fellowship, and netted \$976.50 in the silent auction. This will be a big help for our Grant Committee. Our May meeting was lots of fun, with several great displays showcasing the fossils from Castle Hayne, Belgrade, Fountain, Holden Beach, Old Dock, and Greens Mill Run, with some wonderfully creative "Quarryscapes" designed by Ramona to show the differences in the limestone deposits for Fountain, Clark's, and Onslow Quarries. It was a nice change of pace, and gave new members a chance to see what treasures await in the various sites we visit. We will continue having some small displays at future meetings for sites not yet covered. We have The NC Fossil Festival at Aurora next week, which will be another opportunity to see some great displays of fossils from these same sites.

We do have a few bits of business to address in the near future. The Board will be meeting in the near future to get plans in place for our November Fossil Fair. Be sure to watch for information on this very important club event. We will forward information to the membership as soon as we work out the details.

It is once again time for a Nominating Committee to be appointed, as July is when their work will begin. This is a

very important job, and three people are needed. Please keep in mind this is a short-term volunteer position that can offer some benefit in return. Remember, volunteering to help the club gives you an advantage for trip selection compared to members who do not volunteer by being placed in a higher pool.

This seems like a good time to review the selection procedure. We have "The Officer's Pool" and "The Volunteer's Pool" and "The Member's Pool". Since Officers and Volunteers keep things running and make the club activities possible, these groups have a slight advantage for trip slots, and are put back in the pool if not chosen in their first tier. They may still not be selected, but their chances are a little greater. While we are still under restrictions by the quarries limiting us to 20 slots per trip, this is one way to get a slight advantage. I have also had a recent conversation with a member that was disappointed they were not able to go with their partner on a trip, as they were selected for different trips. While the board understands this can be a disappointment, with the limited number of slots available the board felt that giving members two slots then limits the chances of other members to be selected even more. Some trips had over 70 people sign up for the 18 slots (as 2 are taken by the quarry-required trip leaders). The Board spent a lot of time considering this problem, but could not find a perfect solution. Random selection still seems the fairest way. It is up to the Trip Leaders if they want to work with members wishing to trade slots so they can go together. We do not want to make this too much work for anyone. We can hope that in the future we might be able to get more slots for trips. In the meantime, we will continue with the procedure we have in place.

As time goes on, there are always changes, some good, some disappointing. I want to make sure to let everyone know that in July, the City of Raleigh is changing their parking rules and will be charging for weekend parking in all of downtown. I wanted to make sure everyone was aware of this, as it will be in effect the next time we meet.

To close on a more positive note, we have a lot to celebrate from our first five months of 2025, and we will keep moving forward with the positive impacts we make in the community. I look forward to seeing you at the next event.

Terry Denny  
President, NC Fossil Club

**Photos of finds from recent NCFC trips that include Cretaceous, Eocene, and Oligocene deposits  
Spring 2025**

Photos by Jordan Brown, Dominique M. Joos de ter Beerst and Eric Sadorf



**Most of the fossils on this page are from the Oligocene River Bend Formation. The dark tooth on the lower right is a Cretaceous tooth that was reworked into the Eocene Castle Hayne Formation.**

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**The crocodile tooth, fish and shark teeth on this page are from the Cretaceous Peedee Formation. The echinoids are from the Eocene Castle Hayne Formation.**



# NCFC Picnic and Silent Auction

April 5, 2025

The silent auction netted \$976.50 for our grants.



## Three large fossiliferous rocks from North Carolina's Coastal Plain delivered to Appalachian State University (ASU), Boone, NC

Submitted by James Bain

On April 23<sup>rd</sup> -24<sup>th</sup>, 2025, David Sanderson moved three slabs ~308-miles from Castle Hayne to Boone and donated them to ASU's Fred Webb, Jr, Outdoor Geology Laboratory/Interactive Rock Garden,. App State's geology Professor, AB Heckert, PhD, has worked for years to develop this popular public display.

Members of the North Carolina Fossil Club have contributed to earlier development of ASU's Webb Garden. They helped to fund the construction of the bronze statue of the NC Triassic reptile, "Archie the Aetosaur" (*Gorgetosuchus pekinensis*), and they donated a colorful specimen of coniferous "rainbow petrified wood", nominally *Araucarioxylon arizonicum*, from the Triassic of Northern Arizona, which is now displayed next to Archie. Children love Archie.

Specimens that David delivered included both the Cretaceous Peedee Formation and the Eocene Castle Hayne Limestone. The leadership team at the Martin Marietta Materials (MMM) quarry near Castle Hayne, North Carolina, was cooperative and generous. Floods on the Northeast Cape Fear River, which borders the MMM quarry at Castle Hayne, and flooding from Hurricane Helene at ASU's Webb Garden delayed initial progress on this effort.

The smallest of those three rocks weighs about 1,300 pounds. Once the slabs are displayed at Boone, with interpretive signage, they will be of educational interest.

-Students of groundwater hydrology will learn that these porous limestones harbor important aquifers under North Carolina's Coastal Plain, namely the Peedee Aquifer and the Castle Hayne Aquifer.

-Students of geochemistry will note that with our changing climate, ocean acidification challenges mineralization of mollusk shells—dissolution of the aragonite seashells in the Eocene material, leaving behind "ghost impressions," sends a warning.

-All of that aside, children will no doubt enjoy climbing on the big, fossil-rich rocks, since North Carolina's Appalachian Mountains are largely devoid of macrofossils. Doctor Heckert notes that these "... are the first rocks from the Coastal Plain in the rock garden, and they have by far the most, and most prismatic, fossils in the rock garden. Paleontology class will never be the same!"

Kudos to David and his helpers, to the good people at Martin Marietta Materials, and to the scientists and grounds crew at App State who helped to make this a reality.



## New Genus and Species of Mayfly in Cretaceous Amber

submitted by Victor Krynicki

Mayflies are well known to fly fishermen, and many others have heard of these insects without being familiar with any of their defining details. Mayfly development goes through stages, beginning as aquatic nymphs that can live for several years in freshwater sites and ending in flying, sexually mature adults. In huge numbers, mayflies “hatch” as adults from spring to fall, and live very short lives thereafter.

While their name includes “fly,” these insects are unrelated to the biologic order Diptera or “true flies,” which have two wings. Common dipteran insects include crane, sand, horse, fruit, and house flies as well as midges and gnats. In contrast, mayflies belong to the order Ephemeroptera and have four wings: a pair of main wings and a pair of hind wings. Compared to true flies, mayflies have an ancestral or primitive structure: they have long tail extensions and roughly triangular wings that cannot fold over their abdomen but instead are held upright while at rest. These features are believed to be typical of the first flying insects. Mayflies have compound eyes, with males’ eyes being large compared to those of females.

Biologists have subclassified mayflies into several families that each have distinguishing features. One of these is the family Baetidae, which are among the smallest mayflies. There are about 1000 existing Baetidae species, and now a new extinct genus and species has been found in North Carolina Late Cretaceous amber.



**Adult mayfly (image generated by Google Gemini app on 5/14/2025).**



***Petracloeon carolinensis* (new genus and species) in amber.**

The newly described female Cretaceous mayfly has been named *Petracloeon carolinensis* (new genus and species) and is a 1.9 mm female Baetidae. Identification and classification are based on many small features and microstructures, such as wing venation, sutures between sections of the external skeleton (the exoskeleton), form and number of leg segments, and so forth.

There is a scarce fossil record of this family of mayflies, so this is an important find in filling in gaps in knowledge. The few previous Cretaceous specimens have come from Lebanese and Asian amber. This is the first specimen of Baetidae from the Cretaceous of North or South America, and this amber inclusion expands the known distribution range of these mayflies in the Cretaceous. The specimen supports the origin of this family before the breakup of supercontinent Pangea beginning in the Jurassic. It also underscores the importance of North Carolina amber in filling in gaps in insect evolution and worldwide distribution of extinct insect species.

For further information, see:

Sroka P, Gattolliat J-L. The first mayfly (Ephemeroptera, Baetidae) from Late Cretaceous amber of North Carolina, USA. Fossil Record 28 (1) 2025, 125-132. DOI 10.3897/fr.28.143974

A few photos from the 2025 NC Fossil Festival  
Held Saturday May 24 at Aurora, NC



## FOSSILS IN THE NEWS

### **An apex carnivore was ‘king of the ancient Egyptian forest’ then mysteriously went extinct. A fossil could offer clues**

By Taylor Nicioli, CNN

<https://www.cnn.com/2025/02/17/science/hyaenodonta-fossil-discovery-bastetodon-skull/index.html>



**A 30 million-year-old nearly complete skull fossil found in Egypt has revealed a newfound species of hyaenodonta, an ancient apex carnivore.** Courtesy Hesham Sallam

CNN- With sharp catlike teeth and a doglike body, ancient carnivores called hyaenodonts were once at the top of the food chain, but the entire lineage was wiped out about 25 million years ago, leaving prehistorians to grapple with what caused the apex predator to go extinct.

Now, an international team of paleontologists has found a new piece of the puzzle — a nearly complete skull of a previously unidentified species of hyaenodonta. The discovery could bring scientists one step closer to understanding these ferocious beasts and their evolutionary history.

The fossil, which was unearthed in the Fayum Depression of Egypt’s Western Desert, is the most complete skull of the hyaenodonta subfamily Hyainailourinae to be found in Africa. The skull dates back to the early Oligocene Epoch around 30 million years ago, according to a study published Monday in the *Journal of Vertebrate Paleontology*.

When the study authors uncovered the skull in 2020, they shouted excitedly as they realized their rare find, recalled lead author Shorouq Al-Ashqar, a doctoral student at Mansoura University Vertebrate Paleontology Center and a research assistant at American University in Cairo.

“It was an amazing moment ...,” Ashqar said. “This skull is important to us, not only because it’s complete and three dimensional, and actually it’s a beautiful one, but also it provides us with new traits to know more about this extinct group of carnivorous animals.”

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The skull, pictured here with lead study author Shorouq Al-Ashqar, belongs to a previously unidentified species that was named *Bastetodon syrtos* as a nod to the cat-headed ancient Egyptian goddess Bastet. Courtesy Hesham Sallam

The researchers named the leopard-size species *Bastetodon syrtos* as a nod to the cat-headed ancient Egyptian goddess Bastet because of the species' unique shorter snout compared with other hyaenodonts, according to the study. Combined with sharp, knifelike teeth, the snout would have given the creature an extremely powerful bite, according to Ashqar.

“We can frankly say that *Bastetodon* was the king of the ancient Egyptian forest,” Ashqar said.

The fossil provides a rare glimpse into a time of global environmental changes and faunal turnover, when some species go extinct while new ones are introduced due to varying changes in the habitat. Those changes helped determine the cat and dog predators seen today, researchers said.

### **Ancient apex carnivores**

Hyaenodonta fossils have been found across North America, Europe, Asia and Africa. Some were as big as rhinos, while others resembled small weasels.

During the Oligocene period, the Fayum Depression was a lush, tropical rainforest. *Bastetodon* would have preyed on primates such as *Aegyptopithecus*, an ancient relative of humans, as well as early hippos and elephants.



Paleontologists uncovered the skull in 2020 in the Fayum Depression of Egypt's Western Desert. Courtesy Hesham Sallam

“I think of them as like really beefy wolverines or basically like pitbulls. They have really big heads that were just covered in muscle,” said study coauthor Dr. Matthew Borths, curator of fossils at the Duke Lemur Center Museum of Natural History at Duke University in Durham, North Carolina.

It is rare to find ancient carnivore fossils because there are fewer carnivores in an ecosystem than other animals such as herbivores. (For instance, you’re more likely to see a squirrel or a deer on a hike than a cougar, Borths said.) And often, only teeth or fragments of skulls are found, he added.

The discovery of such a complete skull allows researchers to learn concrete traits of the animal, such as how big muscle attachments were compared with the size of its teeth, the size of its brain or even the strength of its sense of smell, Borths said.

Researchers also compared the *Bastetodon* skull with the fossils of another, bigger hyaenodonta species found in Africa about 120 years ago. Dubbed Sekhmetops by the study authors, the latter group was originally thought to be related to a European group of hyaenodonts. While there were only jaws and cheekbones found of the larger species, the researchers were able to compare findings from those remains with the *Bastetodon* skull and demonstrate that both carnivores belonged to the same group of hyaenodonts that originated in Africa.

“It is rare to find such a complete specimen, preserving not just the robust teeth but also delicate aspects of cranial anatomy,” said Dr. Nancy Stevens, an anthropology professor and director of the Museum of Natural History at the University of Colorado Boulder, in an email.

“It is only with detailed analyses of specimens like this that we can explore the complex movement patterns of predators across the landscapes of the past,” said Stevens, who was not involved with the study. “This gives rise to a better understanding of the faunal dynamics around us today.”

**Paleontologists uncovered the skull in 2020 in the Fayum Depression of Egypt’s Western Desert.** Courtesy Hesham Sallam



### **Faunal turnover**

The Eocene-Oligocene boundary was a global cooling event that occurred about 34 million years ago, causing mass extinction and major faunal turnover. The hyaenodonts that survived then showed how adaptable and resilient the animals were, Borths said.

A few million years later, however, they went extinct and were replaced by the relatives of dogs, cats and hyenas. By filling in the gaps of the fossil record, paleontologists can better understand why the once successful hyaenodonts died out and how much adaptation and pressure from the environment a lineage can handle, Borths added.

“The end of the Hyaenodonta in the late Oligocene shows how climate change, competitive pressures and changes in prey availability affected carnivores,” said Dr. Cathrin Pfaff, a postdoctoral researcher and lecturer at the Institute of Palaeontology at the University of Vienna in Austria. She was not involved with the study.

“The fact that they lost out to cats and dogs in their evolution is still a mystery but might be caused by their highly specialized dentition,” Pfaff said in an email, referring to the arrangement and development of the animals’ teeth. “Because of this, such a complete find as described here brings us a step closer to solving the mystery, even (if) it is just a medium sized specimen.”

## Martin Marietta Collecting Rules

Dear NCFC Members,

Great News!

After much negotiation, Martin Marietta (MM) has granted the North Carolina Fossil Club limited access twice-yearly to five quarries (Fountain, Clark's, Onslow, Belgrade and Castle Hayne) for field trips. Our newly negotiated access is contingent on strict adherence to a revised, comprehensive set of rules designed to enhance safety. Therefore, the following new rules will immediately apply to ALL MM Quarry trips. (All field trip procedures to other sites will remain unchanged.)

1. **There will be a maximum of 20 people allowed on each trip** regardless of the quarry.
  - a. Anyone not on the approved list will be denied access.
2. **A maximum of 5 vehicles will be allowed into the quarry per trip**, all others will be left in the designated parking area. Two of these will be trip leader vehicles and the trip leader(s) will select the remaining 3 (or 4 if only one trip leader is present).
  - a. All vehicles entering the collecting areas must be high clearance and capable of carrying 3 additional passengers and their gear.
  - b. There will be 4 participants per vehicle entering the quarry.
  - c. The 5 vehicles accessing the quarry must have their wheels chocked the entire time with their parking brake engaged.
3. **No participants under 18 years of age will be allowed.**
4. You **MUST** provide your own **safety gear**, including all the following **REQUIRED GEAR**.
  - a. Hard Hat
  - b. High visibility (Hi-viz) shirt and / or vest. (Orange or safety yellow)
  - c. Safety Glasses. Even if you wear prescription glasses, have safety glasses with you. Each quarry will decide if you must wear them or not.
  - d. Sturdy, closed toe shoes. Boots preferable. No tennis shoes, etc.
  - e. Gloves recommended but not required.
5. **If you show up without all the respective safety gear you will not be allowed in** and will be banned from future MM trips for 6 months. You just cost someone their slot.
  - a. If you need to cancel a MM trip you are signed up for - do it as soon as possible. There will be a waiting list.
  - b. If you habitually cancel within 24 hours of a MM trip, you will face consequences, including being banned from future MM trips for up to 6 months.
  - c. **If you NO SHOW** for a MM trip, you will be banned from attending future MM trips for 6 months.
6. **YOU MUST STAY IN THE QUARRY COLLECTING AREA THE ENTIRE TIME OF THE TRIP.** This is a hard and fast Martin Marietta Rule. If you cannot stay the entire time, do not ask for a spot. (Remember, you are either riding with someone else, or you are transporting 3 other people.) You can't leave to go to the bathroom or go up to the office to go to the bathroom or leave early for any reason other than an emergency.
7. Report all injuries to a trip leader, no matter how minor.
8. **All Martin Marietta rules, and quarry specific rules must be followed explicitly.** Any violations will be immediately dealt with. Consequences can include anything from a verbal reprimand all the way up to a 6-month ban from future MM trips. A lifetime ban from MM trips can occur for serious, dangerous behavior that jeopardizes NCFC future access.
9. **NO pictures** are allowed to be taken inside of the quarry without prior permission from the quarry manager and the NCFC board. This includes pictures of your fossils on the ground. Picture time after the trip at the parking area will be done if we are granted permission at the quarry. All pictures must have the location metadata removed.
10. **No Social Media** posting before, during or after a trip that gives ANY details that could identify a Martin Marietta Quarry. You may say, "I found these fossils in the Castle Hayne Formation of NC." You may not say I found these in a quarry that contains Castle Hayne Formation. Please ensure that Martin Marietta cannot be tied to any post. Again, all location metadata must be scrubbed.
11. You will be required to **sign waiver documents** for Martin Marietta and the NCFC before any quarry entry.

## 2025 Membership Application - North Carolina Fossil Club



Name (1) \_\_\_\_\_ email \_\_\_\_\_

(Primary adult member -18 or older for Single/HH Membership)

Name (2) \_\_\_\_\_ email \_\_\_\_\_

(Secondary adult member - 18 or older for HH Memberships)

Address \_\_\_\_\_

City, State, ZIP \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_

First names of minor (<18) children: \_\_\_\_\_

\*\*\*Current members need to only complete name, any changes and sign the Liability Statement.\*\*\*

Select **One** Type of Membership

(Enclose check or money order

for the indicated amount.)

Individual (new) \$20.00

Individual (renewal) \$15.00

Household (new) \$25.00

Household (renewal) \$20.00

Children of NCFC members who are dependent minors (<18) and living at home may accompany parents on any trip *except those with specific age restrictions*.

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.

The Fossil Club's newsletter, JANUS, is published four times a year and is available only online for members. You may read it online or download it from the website

### NCFC Liability Statement

The Undersigned hereby acknowledges his/her understanding that fossil collecting is an inherently dangerous activity which can result in serious bodily injury or death, and/or property damage and hereby confirms his/her voluntary assumption of the risk of such injury, death or damage.

The Undersigned, in return for the privilege of attending field trips related to the collection of and/or study of fossils, or any other event or activity conducted or hosted by the North Carolina Fossil Club (NCFC), hereinafter collectively and individually referred to as "NCFC Events", hereby releases the NCFC, NCFC Members of the Board, NCFC Event leaders or organizers and hosts, landowners and mine or quarry operators from any and all liability claims resulting from injury to or death of the undersigned or his/her minor children or damage to his/her property resulting from any cause whatsoever related to participation in NCFC Events.

The Undersigned agrees to comply with any and all rules and restrictions which may be communicated to the undersigned by the NCFC Event leader and/or landowner and mine or quarry operator and acknowledges that failure to comply will result in immediate expulsion from the premises.

The Undersigned acknowledges that this release covers all NCFC Events and will remain in effect at all times unless or until it is revoked by written notice to the current President of the NCFC and receipt of such revocation is acknowledged.

The Undersigned further attests to his/her intent to be legally bound by affixing his/her signature to this release.

Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

**Privacy Policy:** The NCFC collects contact information for purposes of contacting you regarding your membership, collecting trips you may have signed up for and for other members who may wish to contact you. Your contact information is also included on a membership list published on a secure location on the NCFC website and is available to other current NCFC members. If you do not wish for your contact information to be included on the published membership list, please send an email to [membership@ncfossilclub.org](mailto:membership@ncfossilclub.org) with "membership list opt out" in the subject line. Please note while you will continue to receive information (electronic and paper) from the club; other members, including trip leaders may not have access to your contact information.

**Mail To:** North Carolina Fossil Club, P.O. Box 25276, Raleigh, NC 27611

## **NORTH CAROLINA FOSSIL CLUB, INC.**

**(Founded 1977)**

### **Members of the Board**

<b>PRESIDENT</b>	Terry Denny	(919) 779-9499	Garner, NC
<b>VICE PRESIDENT</b>	Linda McCall	(512) 422-2322	Reidsville, NC
<b>IMMEDIATE PAST PRESIDENT</b>	Ramona Krailler	(804) 704-9657	Durham, NC
<b>TREASURER</b>	David Sanderson	(919) 274-1254	Cary, NC
<b>SECRETARY</b>	Diane Willis	(919) 967-1008	Chapel Hill, NC
<b>MEMBERSHIP CHAIR/WEBMASTER</b>	Mike Bruff	(984) 212-6232	Clayton, NC
<b>EDITOR, <i>JANUS</i></b>	Eric Sadorf	(919) 614-1548	Cary, NC
<b>OTHER BOARD DIRECTORS</b>	Jeff Cohn (2026)	(919) 720-3417	Cary, NC
	Pam Causey (2025)	(336) 685-4118	Liberty, NC
	Trish Kohler (2025)	(919) 383-6328	Durham, NC
	Don Rideout (2025)	(252) 474-6222	Trenton, NC
	Travis Seymour (2026)	(252) 521-0282	Raleigh, NC
	Tony Shaver (2026)	(919) 478-9497	Sanford, NC
	Emily Bruff Simpson (2025)	(919) 578-0383	Murfreesboro, TN
	Judy Witowski-Argentine (2026)	(609) 234-6502	Raleigh, NC
<b>GENERAL CONTACT</b>	paleoNC@ncfossilclub.org		

## **NORTH CAROLINA FOSSIL CLUB**

### **CODE OF ETHICS AND CONDUCT**

1. Please conduct yourselves in a manner that best represents the NCFC.
2. Please make a sincere effort to keep informed of all laws, regulations and rules regarding collecting on private and public lands.
3. Never use the name of the Club to gain access to lands, or scientific sites actively under study by paleontological professionals for personal gain or profit.
4. Please act responsibly and safely on all club outings so as not to bring other members or yourself into harm or danger. Parents are responsible for their children and making sure their children follow all quarry, etc. rules. Firearms are prohibited from all Club functions.
5. Always respect and cooperate with the field trip leader or designated authorities in collecting areas. Do not bring along anyone not signed up for the trip, or any non-member to a trip without clearing it with the field-trip leader first.
6. Never collect a site immediately prior to a scheduled field trip thereby preventing fair collecting opportunities for the rest of the members of the Club. "Scouting" ahead of time by the field trip leader is fine.
7. You are encouraged to contact the appropriate professionals upon discovery of what you consider to be scientifically significant fossils. This includes excavation, preparation, and documentation of the fossils in question. You are encouraged to consider donating such fossils to appropriate facilities.