



## 2019 Spring Calendar

### March

- 7 **Creekside Elementary School** - Science Night, Chapel Hill, NC
- 9 **Old Dock Quarry** - Full
- 15 **Clark's Quarry** - Full
- 16 **Tar River**- Full
- 17 **NCFC Meeting**- NCMNS, 11 West Jones Street, Raleigh, 1:30 pm, Level A conference room
- 30 **Green's Mill Run** - Full

### April

- 11 **Hunter Elementary School** - Science Night, Raleigh, NC
- 13 **Sylvan Bird Sanctuary** - Fossil Fair, Scotland Neck, NC
- 13 **Wayne Community College** - Homegrown Science in NC, Goldsboro, NC
- 13 **Old Dock Quarry** - Full
- 20-21 **Dino Days** - NCMNS, Durham, NC Volunteers still needed-Julie Niederkorn - outreach@ncfossilclub.org
- 21 **Stratford Hall** - Full
- 26 **Onslow Quarry** - Open Quarry Day (just show up) be there at 8:30
- 27 **Norwood Festival and Fossil Fair** - Norwood, NC Volunteers still needed-Julie Niederkorn-outreach@ncfossilclub.org
- 27 **Meet Your State Symbols** - Capitol Grounds, Raleigh NC

### May

- 17 **Clark's Open Quarry** - Full
- 18 **Old Dock Quarry** - A few openings, contact Linda McCall at lndmccall02@yahoo.com
- 19 **NCFC Meeting**- NCMNS, 11 West Jones Street, Raleigh, 1:30 pm, Level A conference room
- 25 **Aurora Fossil Festival** - Aurora, NC, Displayers and Volunteers still needed-Eric Sadorf - emsadorf@usgs.gov

## President's Message

The world of Paleontology is full of discovery and surprises, which is probably why so many of us love to go on field trips, hear talks, and read about those new discoveries. In the NCFC we endeavor to provide opportunities for all of those things in an informal atmosphere that encourages participation, discussion, and sharing.

We have a full slate of wonderful talks scheduled for our meetings in 2019, with a variety of topics to interest everyone. Dr. Andy Heckert from Appalachian State University started off our year at the January meeting with his talk on "There were Aetosaurs before there were Ankylosaurs," which gave us a view into the Triassic not only in our own state, but across the globe. Long time club member Don Rideout will tell us in March about his extensive experience collecting in the Belgrade Quarry in Maysville, NC. Would you like to travel with Mark Twain and his followers back into the Paleozoic of New York State? You will have that opportunity when Dr. Michael Pratt talks to us in May. Invertebrate enthusiasts will enjoy our July meeting, and September will bring us a paleontological mystery (and some insight into its solution?) from the western part of our state.

We also have a generous number of field trips this spring, so be sure to check the website for the schedule and how to sign up. It will be similar in the fall. Many of the procedures are relatively new, so if you have questions, ask our Field Trip Coordinator, Linda McCall.

There are always outreach opportunities, and you are encouraged to do whatever you have time for. Julie Niederkorn, our Outreach Coordinator, can help you sign up to volunteer at any of them. Schools are always looking for educational help with their science programs, but you can also display or volunteer at the Norwood Fossil Fair in April and/or the Aurora Fossil Festival in May.

Continued next page

Great News! We have dates for the next two Fossil Fairs!  
For 2019 (this fall!) in Wilmington at the Cape Fear Museum, the date will be Saturday, Nov. 2. I am looking for someone to volunteer to be the general coordinator for that. We'll have lots of volunteers but need someone to be the central point person. Please contact me if you can do it!

For 2020 in Greensboro at the Greensboro Science Center, the date will be Saturday, Nov. 7. Todd Power has graciously offered to be the general coordinator for that one (thank you, Todd!)

Diane Chapman Willis  
President, NCFC



**NCFC President Diane Willis at January meeting**

**Dr. Andy Heckert discussing Aetosaurs  
at the January NCFC Meeting**



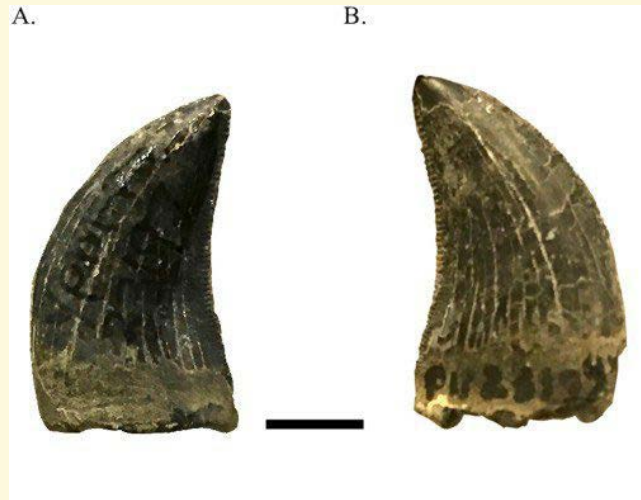
**Outreach -  
Terry Denny at Lacy  
Elementary School in  
Raleigh**

## North Carolina Fossil Discoveries Published in 2018

Several papers were published in 2018 that highlighted fossils found in North Carolina. Here are the abstracts of some found through Google searches and other methods. I'm sure I've missed a few.

Brownstein, C.D., 2018. **A large dromaeosaurid from North Carolina.** *Cretaceous Research* Vol. 92, pp. 1-7.

The Dromaeosaurid tooth in this paper was found by NC Fossil Club member Gerard Case. Scale bar is 5 millimeters.



**Abstract:** During the Cretaceous period, North America was divided into two landmasses, the eastern Appalachia and western Laramidia. Recent research on several sites scattered across the eastern margin of North America has allowed for the analysis of vertebrate faunas from the once obscure terrestrial fossil record of Appalachia, revealing the landmass harbored a distinctive fauna composed of mostly relict forms. One geological unit that has produced a comparatively extensive record of terrestrial vertebrates, including non-avian dinosaurs, is the middle Campanian Tar Heel Formation of North Carolina. Here, the first definitive occurrence of a dromaeosaurid from the Tar Heel Formation is reported on the basis of a tooth from a fairly large member of that group. This tooth clusters with those of dromaeosaurine dromaeosaurids from the western United States and Canada in morphometric analysis, differing in morphology and size from other dromaeosaurid teeth from southeastern North America that have been assigned to saurornitholestines or considered indeterminate. The tooth described herein is intermediate in size between those of smaller dromaeosaurids like *Saurornitholestes* and gigantic forms like *Dakotaraptor*, filling the gap between larger- and smaller-bodied dromaeosaurids from the Late Cretaceous.

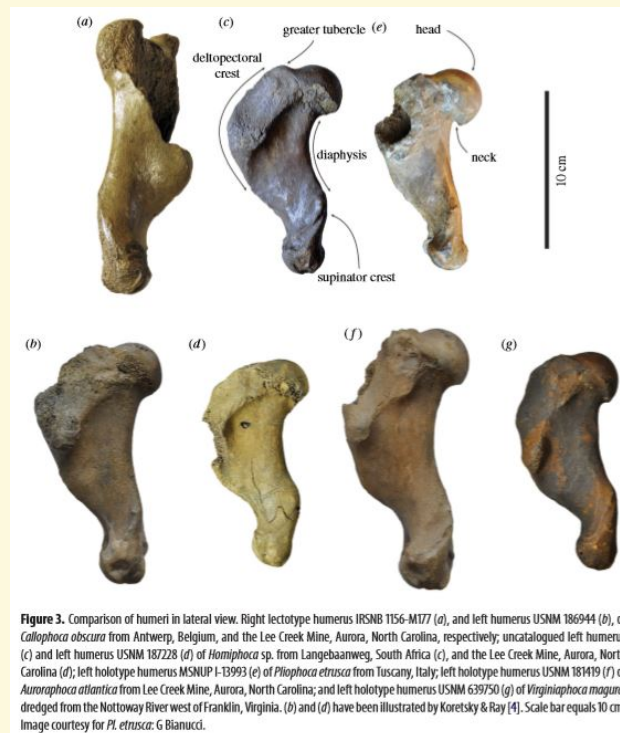
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Dewaele, L., Peredo, C.M., Meyvisch, P., and Louwye, S., 2018. **Diversity of late Neogene Monachinae (Carnivora, Phocidae) from the North Atlantic, with the description of two new species.** *Royal Society Open Science* Vol. 5(3).

This paper describes some seal fossils found at Lee Creek and includes a Virginia fossil found by, and named for, NC Fossil Club member Joe Magura (specimen g in this illustration).

**Abstract:** While the diversity of 'southern seals', or Monachinae, in the North Atlantic realm is currently limited to the Mediterranean monk seal, *Monachus monachus*, their diversity was much higher during the late Miocene and Pliocene. Although the fossil record of Monachinae from the North Atlantic is mainly composed of isolated specimens, many taxa have been erected on the basis of fragmentary and incomparable specimens. The humerus is commonly considered the most diagnostic postcranial bone. The research presented in this study limits the selection of type specimens for different fossil Monachinae to humeri and questions fossil taxa that have other types of bones as type specimens, such as for *Terranectes parvus*. In addition, it is essential that the humeri selected as type specimens are (almost) complete. This questions the validity of partial humeri selected as type specimens, such as for *Terranectes magnus*. This study revises *Callophoca obscura*, *Homiphoca capensis* and *Pliophoca etrusca*, all purportedly known from the Lee Creek Mine, Aurora, North Carolina, in addition to their respective type localities in Belgium, South Africa and Italy, respectively. *C. obscura* is retained as a monachine seal taxon that lived both on the east coast of North America and in the North Sea Basin. However, *H. capensis* from North America cannot be

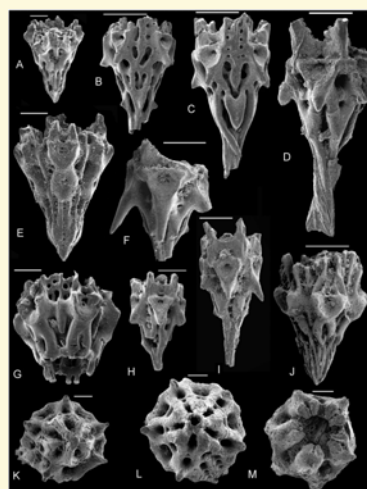
identified beyond the genus level, and specimens previously assigned to *Pl.etrusca* from North America clearly belong to different taxa. Indeed, we also present new material and describe two new genera of late Miocene and Pliocene Monachinae from the east coast of North America: *Auroraphoca atlantica* nov. gen. et nov. sp., and *Virginiphoca magurai* nov. gen. et nov. sp. This suggests less faunal interchange of late Neogene Monachinae between the east and west coasts of the North Atlantic than previously expected.



Gale, A.S., Sadorf, E., and Jagt, J.W.M., 2018. **Roveacrinida (Crinoidea, Articulata) from the upper Maastrichtian Peedee Formation (upper Cretaceous) of North Carolina, USA – The last pelagic microcrinoids.** *Cretaceous Research* Vol. 85, pp. 176-192.

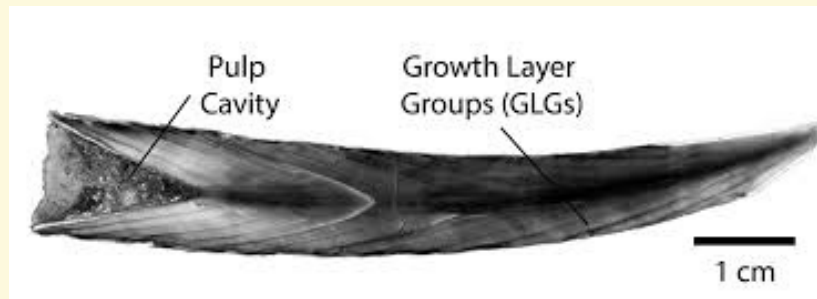
Specimens in this paper were found by NC Fossil Club member Eric Sadorf. Scale bars on *Birgenelocrinus* specimens below are 200 and 500 microns.

**Abstract:** Microcrinoids belonging to the Order Roveacrinida are described from the Late Maastrichtian Peedee Formation of North Carolina. Five species are present; *Applinocrinus texanus* Peck, 1973, *Lucernacrinus multispinosus* Gale, sp. nov., *Birgenelocrinus degraafi* Jagt, 1999, *B. jagti* Gale, sp. nov. and *Peedeeocrinus sadorfi* Gale, gen. et sp. nov. Two of these species (*A. texanus*, *B. degraafi*) and close relatives of two others (*Lucernacrinus*, *Birgenelocrinus jagti*) are known from the upper Maastrichtian (upper Maastricht Formation) of the Netherlands and northeastern Belgium, indicating that the Roveacrinida were flourishing and widespread up to the end of the Cretaceous. It is concluded that Paleogene and Neogene records of Roveacrinidae represent contamination of samples by Cretaceous (Turonian) material.



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Gilbert, K.N., Ivany, L.C., and Uhen, M.D., 2018. **Living fast and dying young: Life history and ecology of a Neogene sperm whale.** *Journal of Vertebrate Paleontology*. Vol. 38(2).

The authors used Sperm whale teeth from the Lee Creek Mine in this study.



**Abstract:** Physeteroidea (sperm whales) attained great diversity during the Miocene and early Pliocene, and the phosphatic sands of the U.S. Atlantic Coastal Plain have produced thousands of specimens. Although postcranial and cranial materials are rare, teeth are remarkably common and have the potential to provide valuable insight into the lives of these animals. We examine a suite of Physeteroidea indet. teeth from the Lee Creek Mine to better constrain the life history and ecology of this extinct group. Wear facets indicate that these animals, unlike modern sperm whales, had both maxillary and mandibular teeth, suggesting a raptorial feeding ecology more akin to killer whales. A relationship between tooth diameter and body size established for modern odontocetes suggests that these animals as adults were also about the size of modern killer whales. Because physeteroid teeth grow continuously over ontogeny and are not replaced, counts of accretionary growth layer groups can be used to ascertain the age of an animal at death. Tallies of growth increments from 10 teeth, including some of the largest available, reveal that life spans only rarely exceeded 20 years, significantly shorter than the 65+ years typical of modern sperm whales or orcas. Despite their large size, these odontocetes experienced a ‘fast’ life history, more like beluga whales today. We suggest that the rapid growth and short life span exhibited by the Lee Creek physeteroids are, like the modern beluga, evolutionary responses to high predation pressure imposed by large co-occurring predatory taxa, particularly including *Carcharocles megalodon* or other large macroraptorial physeteroids.

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Hoffman, D.K., Heckert, A.B., and Zanno, L.E., 2018. **Under the armor: X-ray computed tomographic reconstruction of the internal skeleton of *Coahomasuchus chathamensis* (Archosauria: Aetosauria) from the Upper Triassic of North Carolina, USA, and a phylogenetic analysis of Aetosauria.** *PeerJ* February 13, 2018.

The authors used CT scans of an Aetosaur from Chatam County, North Carolina to see bones inside the rock matrix. Scale bar is 5 centimeters.



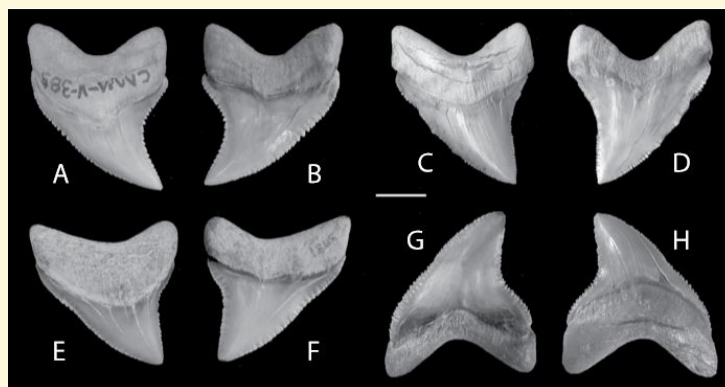
**Abstract:** Aetosauria is a clade of heavily armored, quadrupedal omnivorous to herbivorous archosaurs known from the Late Triassic across what was the supercontinent of Pangea. Their abundance in many deposits relative to the paucity of other Triassic herbivores indicates that they were key components of Late Triassic ecosystems. However, their evolutionary relationships remain contentious due, in large part, to their extensive dermal armor, which often obstructs observation of internal skeletal anatomy and limits access to potentially informative characters. In an attempt to address this problem we reanalyzed the holotype of a recently described species of Coahomasuchus, *C. chathamensis*, from the Sanford sub-basin of North Carolina using computed tomography (CT). CT scans of the holotype specimen clarify preservation of the skeleton, revealing several articulated vertebrae and ribs, an isolated vertebra, left ulna, left scapula, and the right humerus, though none of the material resulted in updated phylogenetic scorings. Reexamination of aetosaur materials from the holotype locality also indicates that several isolated osteoderms and elements of the appendicular skeleton are newly referable. Based on these results, we update the *Coahomasuchus chathamensis* hypodigm and conduct a revised phylogenetic analysis with improved character scorings for *Coahomasuchus* and several other aetosaurs. Our study recovers *Coahomasuchus* in a polytomy with *Aetosaurus* and the *Typothoracinae*, in contrast with a recent analysis that recovered *Coahomasuchus* as a wild-card taxon.

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Kent, B.W. and Ward, D.J., 2018. **A new species of giant thresher shark (Family Alopiidae) with serrated teeth.** in "The Geology and Vertebrate Paleontology of Calvert Cliffs, Maryland, USA". edited by Stephen J. Godfrey. Smithsonian Contributions to Paleobiology Vol. 100. pp. 157-160.

The authors use teeth from outside our state for the holotype and paratypes but mention the presence of these teeth in the Meherrin River in North Carolina. The scale bar is 1 centimeter.

**Abstract:** The Neogene has a remarkably complex array of large macrophagous sharks (BWK, this chapter) that is well represented along the eastern United States. Despite extensive research on fossil elasmobranchs in this area, one species of large thresher shark (family Alopiidae) with distinctively serrated teeth has not been previously named.



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Maisch, H., Becker, M.A., and Chamberlain, J.A., 2018. **Lamniform and Carcharhiniform Sharks from the Pungo River and Yorktown Formations (Miocene–Pliocene) of the Submerged Continental Shelf, Onslow Bay, North Carolina, USA.** Copeia Vol. 106(2).

Assemblages of fossil shark teeth collected through diving. Scale bars are 2 and 1 centimeter.

**Abstract:** The submerged continental shelf of Onslow Bay, North Carolina, preserves hardbottom limestone scarps with underlying clays as small isolated exposures in progressively deeper water seaward from the modern-day shoreline. These scarps formed as a result of wave- and current-driven erosion, transport, and redeposition of bottom sediments due to glacioeustatic sea level cyclicity and the migration of the ancestral shoreline since the Pliocene. Fossiliferous lag deposits containing an abundance of lamniform and carcharhiniform teeth, including those belonging to megatoothed sharks, occur

adjacent to these scarps. These specimens include teeth from: *Alopias grandis*, *Carcharhinus falciformis*, *Carcharhinus priscus*, *Carcharias* cf. *C. taurus*, *Carcharodon carcharias*, *Carcharodon hastalis*, *Galeocerdo aduncus*, *Galeocerdo cuvier*, *Hemipristis serra*, *Isurus oxyrinchus*, *Negaprion brevirostris*, *Otodus chubutensis*, *Otodus megalodon*, *Parotodus benedini*, *Physogaleus contortus*, and *Rhizoprionodon* sp. Comparison of biostratigraphically significant lamniform and carcharhiniform taxa from the submerged shelf with those from land-based assemblages along the Atlantic Coastal Plain of the USA indicates that the shallower shelf (~25 m deep) exposes the Miocene Pungo River Formation and intermediate and deeper shelf (~30–35 m deep) expose the Pliocene Yorktown Formation. Many of the Onslow Bay lamniforms and carcharhiniforms also occur in Miocene and Pliocene shallow marine assemblages around the world and reinforce the migratory abilities of these chondrichthyans in the late Cenozoic and the utility of lamniform and carcharhiniform teeth in biostratigraphic and chronostratigraphic analyses.



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Stringer, G.L., Clements, D., Sadorf, E., and Shannon, K., 2018. **First Description and Significance of Cretaceous Teleostean Otoliths (Tar Heel Formation, Campanian) from North Carolina.** *Eastern Paleontologist* Vol. 1, pp. 1-22.

Specimens in this paper were found by current and former NC Fossil Club members Don Clements, Eric Sadorf and Kevin Shannon. Scale bar is 1 millimeter.

**Abstract:** Fish otoliths (n = 866) from the Tar Heel Formation (Campanian) in North Carolina are the first Cretaceous ear stones to be described from the state and only the fourth study of Atlantic Coastal Plain Cretaceous otoliths. The 28 taxa (13 families) represent megalopids (tarpons), albulids and pterothrissids (bonefishes), congrid (conger eels), ariids (sea catfishes), gonostomatids (bristlemouths), aulopids (flagfins), polymixiids (beardfishes), trachichthyids (roughies), berycids (alfonsinos), pempherids (sweepers), and percoids. Otoliths reveal greater fish diversity than skeletal material alone, and indicate a shallow marine shelf, tropical/subtropical or warm temperate conditions, normal marine salinity, and muddy/sandy bottoms. Percentage similarity measurements between the Tar Heel Formation localities and the stratigraphically equivalent Woodbury Formation in New Jersey reflect the effects of paleogeography and paleoecology.

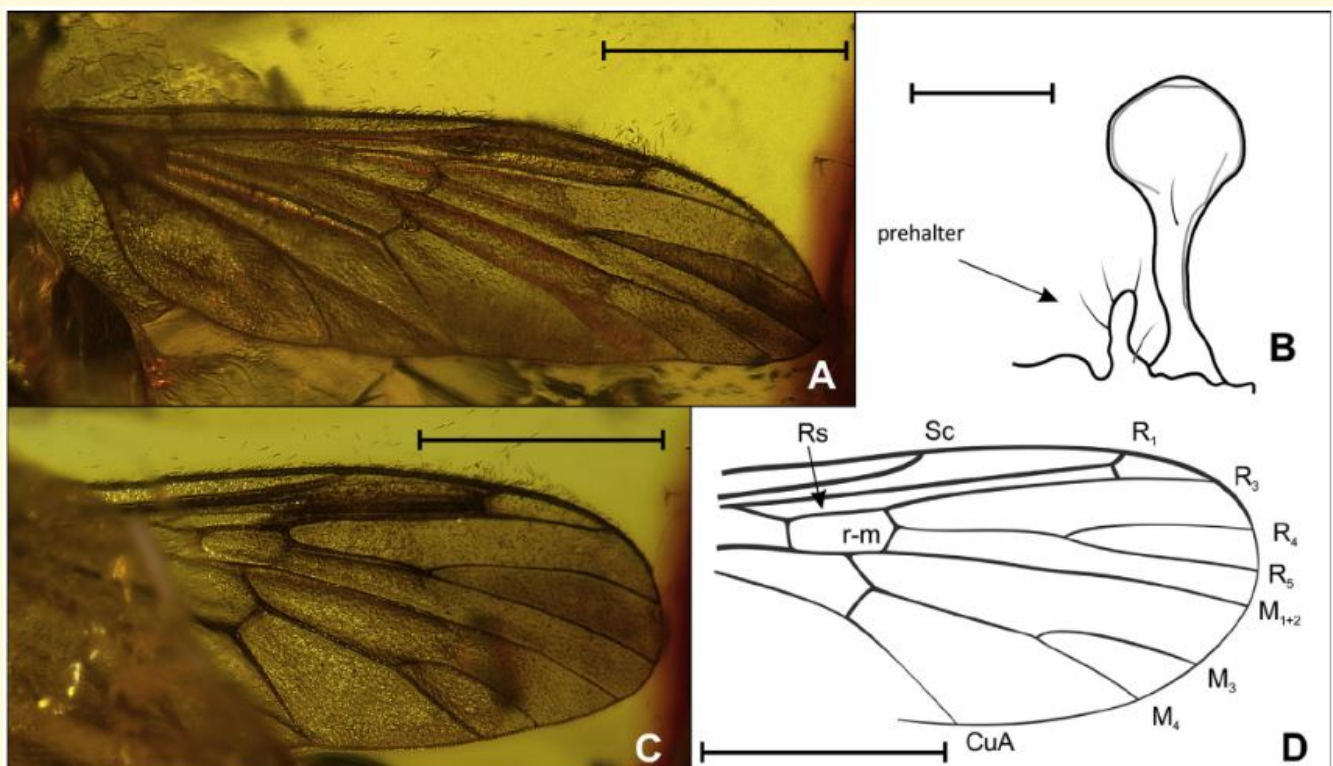


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Szadziewski, R, Krynicki, V.E., and Krzeminski, W., 2018. **The latest record of the extinct subfamily Eoptychopterinae (Diptera: Ptychopteridae) from Upper Cretaceous amber of North Carolina.** *Cretaceous Research* Vol. 82, pp. 147-151.

The specimen described in this paper was found by NC Fossil Club member Victor Krynicki.

**Abstract:** A new genus and species of female phantom midge *Neuseptychoptera carolinensis* gen. et sp. nov. in the fossil subfamily Eoptychopterinae is described and illustrated; this ptychopterid is from Upper Cretaceous (Campanian) amber of North Carolina. This is the first member of Eoptychopterinae from North America and the first found in Campanian age amber. We propose to treat the extinct subfamily Eoptychopterinae Lukashevich, 1995, as a junior synonym of the subfamily Eoptychopterinae Handlirsch, 1906, syn. nov. The elongated mouthparts of the new species have broad labella, and these are functionally interpreted as feeders for honeydew, fermenting plant juices, and nectar rather than for biting.



**Fig. 3.** *Neuseptychoptera carolinensis* gen. et sp. nov., female holotype: A, ventral surface of wing, photo taken at slight angle to ventral that narrows width appearance; B, halter and prehalter; C, dorsal surface of wing, partly obscured by fracture; D, wing veins. Scale bars: 1 mm (A, C, D), 0.2 mm (B).

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Last minute addition- This paper is dated 2019 but I thought I would add it now instead of waiting a year.

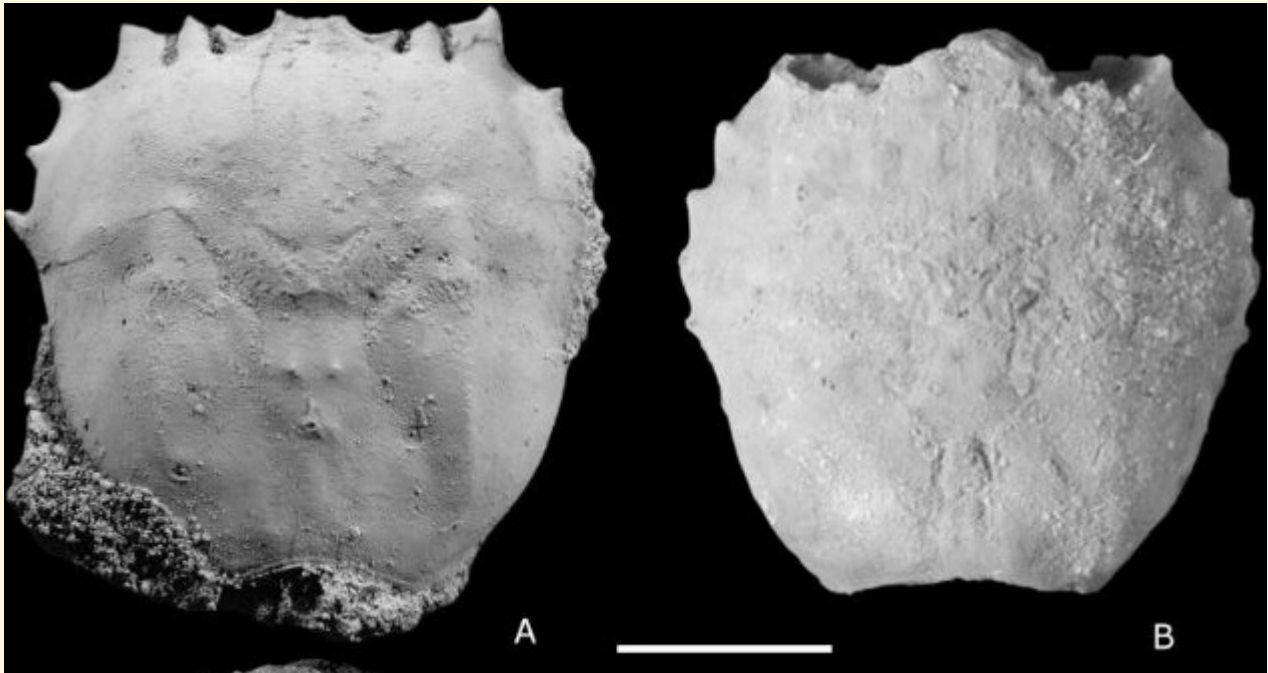
Van Bakel, B.W.M, Phillips, G.E., Clements, D.N., Nyborg, T., Osso, A, and Vega, F.J., 2019, **Palaeocorystoid crabs (Decapods, Gymnopleura) from the Maastrichtian of the Atlantic Coastal Plain, USA: The youngest occurrences of Cenocorystes and Cenomanocarcinus.** *Cretaceous Research* Vol. 96, pp. 172-178.

The specimens described in this paper were found by NC Fossil Club members Elizabeth Smalley and Mark McCoy (and family). NC Fossil Club member Don Clements is a coauthor.

**Abstract:** Two palaeocorystoid crab species, *Cenocorystes libbyae* n. sp. and *Cenomanocarcinus* cf. *robertsi* Feldmann, Schweitzer, Baltzly, Bennett, Jones, Mathias, Weaver and Yost, 2013, are recorded from the Maastrichtian (Upper Cretaceous)



Peedee Formation at Rocky Point in Pender County (North Carolina). The new species of *Cenocorystes* represents the first record of the genus from the western hemisphere, and the Rocky Point specimens of both genera constitute the youngest Cretaceous occurrences to date. The type material of *Palaeocorystes iserica* Fritsch, in Fritsch and Kafka, 1887 has been re-examined and the species transferred to the genus *Cenocorystes*.



**Editors Note:**

Self written articles are always welcome. Just send them to me at [ericms60@gmail.com](mailto:ericms60@gmail.com).

Thanks.

*Eric*

Contact info for our club can be found on our website:

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