The Newsletter of the North Carolina Fossil Club *www.ncfossilclub.org*

JANUS

2021 Number 2

Summer and Fall Calendar

Upcoming Outreach and Trips: Trips are pending, watch your inbox for details.

July

18 **NCFC Meeting**- via Zoom at 1:30 pm. Dr. Chris Widga, East Tennessee State University will present "Memories of Mammoths: Extinct Elephants of the Eastern US". Pre-registration required; watch for a notice.

September

19 **NCFC Meeting**- via Zoom? (check email for location). Matthew Borths, Ph.D., Curator, Division of Fossil Primates, Duke Lemur Center, Duke University will give a talk. Preregistration required; watch for a notice.

October

23, 24 Aurora Fossil Museum is partnering with the National Park Service to hold a 2-day **National Fossil Day Celebration** on Saturday & Sunday October 23 & 24.

November

6 **NCFC Fossil Fair**- will be held at the Schiele Museum of Natural History & Planetarium in Gastonia, NC. See President's Message for more information.

President's Message

Greetings Fellow Fossil-philes! What a difference 90 days makes! Three months ago, uncertainty prevented us from knowing if we would hold our signature annual event, the NCFC Fossil Fair. Today we can confidently announce we will be holding this grand affair on Saturday November 6 2021 at The Schiele Museum of Natural History & Planetarium in Gastonia, NC. Today, the President ~~pleads~~ asks for volunteers – members who will 1) display, 2) volunteer to sit at the NCFC Membership, Voting, Book and or Meg Tooth Raffle Tables, 3) volunteer to sit-in for fellow members/volunteers for lunch and breaks or 4) serve as Fossil Fair Coordinator. Now that we have an agreed venue, it is important to have a Coordinator to serve as a central contact and begin planning. Since the Fair will occur in a rather traditional manner, the Coordinator can depend on precedent and prior experience so hopefully the role is not as daunting. Please send an email to rekrailler@ncfossilclub.org if you want to display, otherwise volunteer to help on the day or serve as Fossil Fair Coordinator. Special thanks go out to the most eager members … you have been cooped up too long it seems! … who have already volunteered to display: J. Mickle, D. Peters, J. Magura, T. Kohler, D. Rideout, T Denny, W. Krailler and D. Grater and to otherwise help out: M. Boulton, T. Kohler and D. Grater. I can imagine how a year at home may have prompted many of you to update, revise, reorder, rearrange and otherwise improve your collections – maybe some of you actually went into the field (or surfed online) to add to your collections! So, this is a fantastic opportunity for you to share the results of your efforts with other fossil enthusiasts, young and old.

And now for a less joyful subject. Although most fossil hunters are generally respectful of the privilege we have when we are granted access to sites and soils bearing fossils and are supportive of the educational institutions that enrich our avocation, there are always rare individuals who are, well, frankly, idiots (You all know so many other words spring to mind!) Over the past several months, social media posts describing some really bad fossil-hunting behaviors have appeared and been brought to my attention. Thankfully, as far as it is possible to tell, the posters are not members of the North Carolina Fossil Club who have all agreed to abide by a Code of Ethics when fossil hunting. This includes conducting ourselves in a manner that best represents the NCFC and making a sincere effort to keep informed of all laws, regulations, and rules regarding collecting on private and public lands. Please behave responsibly and respectfully.

Be well. Be safe. See you in the field.

Ramona

Ramona Krailler
President, NC Fossil Club

Ode to Florida's State Stone

Agate adoration, aimed upon my heart!
Calcedony beauty, nature's work of art.
Thirty million years to form, marvels from the start,
Pseudomorph creation sets these jewels apart.

What spark of ancient life, rendered so unique,
Forms this rainbow wonder, lovely sculptured treat?
First name is Cnidaria, stinging nettle Greek
And surname anthozoa, polyps magnifique!

Mesozoic coral, unaware of fate,
Not to know the honor, of a future state.
Transforming life and death, science fiction trait,
Desire for this reef, never will abate.

Honored, ancient, living world, one more gift you've sown,
Enchanted human hearts and souls, because you've turned to stone.

Written by Ramona Krailler. Photo from Wikipedia.

My Recent Find

Eric Sadorf

I recently found this ***Lytechinus variegatus*** urchin weathering out of a stream bank. It is from the Pliocene Rushmere Member of the Yorktown Formation. Published accounts of this species have it occurring in the Pleistocene Waccamaw and the Pliocene Goose Creek Formations of North Carolina. I had heard rumors of other collectors finding this species in the Yorktown but I have not seen any published accounts of occurrences within this Formation.

If you would like to submit a recent find to Janus, send me a photo and a brief account of the find to ericms60@gmail.com.

Newly identified giant saber-toothed cat roamed North America 5-9 million years ago

By Emily Caldwell - Science News

Original article: https://www.sciencedaily.com/releases/2021/05/210503113933.htm

A giant saber-toothed cat lived in North America between 5 million and 9 million years ago, weighing up to 900 pounds and hunting prey that likely weighed 1,000 to 2,000 pounds, scientists reported today in a new study.

The researchers completed a painstaking comparison of seven uncategorized fossil specimens with previously identified fossils and bone samples from around the world to describe the new species. Their finding makes a case for the use of the elbow portion of the humerus -- in addition to teeth -- to identify fossils of large saber-toothed cats whose massive forearms enabled them to subdue their prey.

The newly identified cat weighed an average of around 600 or so pounds and could have managed to kill prey weighing up to 6,000 pounds, the scientists estimate, suggesting that their findings provide evidence for another giant cat, one of the largest in Earth history.

"We believe these were animals that were routinely taking down bison-sized animals," said study co-author Jonathan Calede, an assistant professor of evolution, ecology and organismal biology at The Ohio State University's Marion campus. "This was by far the largest cat alive at that time."

Calede completed the study with John Orcutt, assistant professor of biology at Gonzaga University, who initiated the project. Orcutt found a large upper arm bone specimen that had been labeled as a cat in the University of Oregon Museum of Natural and Cultural History collection when he was a graduate student, and collaborated with Calede on the years-long effort to figure out what kind of cat it could be.

They have determined that the new species is an ancient relative of the best-known saber-toothed cat Smilodon, the famous fossil found in the La Brea Tar Pits in California that went extinct about 10,000 years ago.

The Oregon specimen was excavated on the traditional lands of the Cayuse, a tribe joined with the Umatilla and Walla Walla in the Confederated Tribes of the Umatilla Indian Reservation. In recognition of its origin, Calede and Orcutt collaborated with the Tamástslikt Cultural Institute to name the new species Machairodus lahayishupup. Machairodus is a genus of large saber-toothed cats that lived in Africa, Eurasia and North America, and in the Old Cayuse language, Laháyis Húpup means "ancient wild cat."

The study is published today (May 3, 2021) in the Journal of Mammalian Evolution.

Orcutt and Calede found similar uncategorized upper arm fossil specimens at the Idaho Museum of Natural History, where a big cat forearm was accompanied by teeth -- generally considered the gold standard for identifying new species -- as well as at the University of California Museum of Paleontology and Texas Memorial Museum.

"One of the big stories of all of this is that we ended up uncovering specimen after specimen of this giant cat in museums in western North America," Orcutt said. "They were clearly big cats. We started with a few assumptions based on their age, in the 5 1/2 to 9 million-year-old range, and based on their size, because these things were huge.

"What we didn't have then, that we have now, is the test of whether the size and anatomy of those bones tells us anything -- and it turns out that yes, they do."

The largest of the seven Machairodus lahayishupup humerus fossils available for the analysis was more than 18 inches long and 1.7 inches in diameter. By comparison, the average modern adult male lion's humerus is about 13 inches long.

The researchers hypothesized that if an isolated forearm bone were useful in telling species apart, that would be true among the big cat species alive today. Calede and Orcutt visited numerous museums in the U.S., Canada and France to photograph forearm specimens of lions, pumas, panthers, jaguars and tigers, as well as fossils of previously identified extinct big cats.

Calede used software to place landmark points on each digitized sample that, when drawn together, would create a model of each elbow.

"We found we could quantify the differences on a fairly fine scale," Calede said. "This told us we could use the elbow shape to tell apart species of modern big cats.

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"Then we took the tool to the fossil record -- these giant elbows scattered in museums all had a characteristic in common. This told us they all belonged to the same species. Their unique shape and size told us they were also very different from everything that is already known. In other words, these bones belong to one species and that species is a new species."

The researchers calculated estimates of the new species' body size based on the association between humerus size and body mass in modern big cats, and speculated about the cat's prey based on its size and animals known to have lived in the region at that time: rhinoceros were particularly abundant, as well as giant camels and giant ground sloths.

The teeth from the Idaho Museum of Natural History came from the lower part of the jaw and did not include the saber-shaped canines, but provided additional evidence that the fossil belonged to the Machairodus genus, which gave its name to the machairodontines -- the technical name for a saber-toothed cat, Orcutt said.

"We're quite confident it's a saber-toothed cat and we're quite confident it's a new species of the Machairodus genus," he said. "The problem is, in part because we haven't necessarily had a clear image in the past of how many species were out there, our understanding of how all these saber-toothed cats are related to each other is a little fuzzy, particularly early in their evolution."

Establishing that the humerus alone can be analyzed to identify a fossil cat has important implications for the field -- saber-toothed cats' "big, beefy" forearm bones are the most common specimens of fossil cats found in excavations, he said.

Only a reconstruction of the evolutionary history of saber-toothed cats can determine where this new species fits in, but Orcutt and Calede believe Machairodus lahayishupup existed early in the evolution of the group.

A discovery that this giant cat in North America existed at the same time similar animals lived around the world also raises another evolutionary question, Calede said.

"It's been known that there were giant cats in Europe, Asia and Africa, and now we have our own giant saber-toothed cat in North America during this period as well," he said. "There's a very interesting pattern of either repeated independent evolution on every continent of this giant body size in what remains a pretty hyperspecialized way of hunting, or we have this ancestral giant saber-toothed cat that dispersed to all of those continents.

"It's an interesting paleontological question."

The humerus bone excavated from north central Oregon, which is now on display in the University of Oregon Museum of Natural and Cultural History. Photo credit: John Orcutt

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'Winged' eagle shark soared through oceans 93 million years ago

By Laura Geggel - Editor Live Science

Original article: https://www.livescience.com/ancient-shark-flew-through-dinosaur-age-seas.html

It looked like a cross between a shark and a manta ray.

An illustration of the newly described eagle shark, which lived in an ancient seaway 93 million years ago. (Image credit: Oscar Sanisidro)

A bizarre shark with wing-like fins and a wide, gaping mouth soared through the seas of what is now Mexico about 93 million years ago, when dinosaurs still roamed the Earth, a new study finds.

This odd shark — dubbed Aquilolamna milarcae, or eagle shark of the Milarca Museum, where its fossil will go on display — looks remarkably like manta and devil rays, which also sport finned "wings." (Rays are closely related to, but are not, sharks.) This shark lived more than 30 million years before either of those creatures existed, the researchers said.

That's not the only similarity: This ancient shark was likely a filter feeder that gulped down tiny plankton-like critters when it was hungry, just like manta and devil rays do today. So, it's likely that the eagle shark lived in the same type of marine real estate that modern manta and devil rays do now, said study lead researcher Romain Vullo, a vertebrate paleontologist with the National Center for Scientific Research (CNRS) at Geosciences Rennes, in France.

A quarryman discovered the eagle shark specimen — a slab of limestone that preserved most of the shark's fossilized skeleton and imprints of its soft tissues — in Nuevo León, a state in northeastern Mexico, in 2012. When this shark was alive, that part of Mexico was covered by the Western Interior Seaway, a body of water that stretched from the Gulf of Mexico to the Arctic Ocean.

This winged shark is unlike any shark alive today. "One of the most striking features of Aquilolamna is that it has very long, slender pectoral [side] fins," Vullo told Live Science in an email. "This makes the shark wider than long," with a "wingspan" of about 6.2 feet (1.9 meters) and a total body length of about 5.4 feet (1.65 meters).

"Another interesting feature is that the head is short, with an indistinct snout and a wide mouth," Vullo added. "The other parts of the Aquilolamna, such as its tail and caudal [tail] fin, are like [those] in many modern sharks. This gives to Aquilolamna a unique chimeric appearance."

Sharks, manta rays and other fish with skeletons made of cartilage are part of a group called elasmobranchs, which emerged about 380 million years ago. Modern plankton-eating elasmobranchs have two distinct body shapes — those with "traditional" shark bodies, such as the whale shark (the largest living fish in the world), and those with flattened bodies, including the manta and devil rays.

This newly analyzed shark has features from both of these body types. However, it's not a precursor species to rays, but rather an example of convergent evolution, where different groups independently evolved the same features. The newfound species' unusual remains reveal "an unexpected evolutionary experimentation with underwater flight among sharks," the researchers wrote in the study, published online Thursday (March 18) in the journal Science.

Fast or slow?

The eagle shark was not a fast and fierce predator like today's great white shark (Carcharodon carcharias).

"Aquilolamna was probably a relatively slow swimmer, comparable to other suspension-feeding elasmobranchs" that slowly

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swim through the water, guzzling down plankton, the researchers wrote in the study. It's likely that the eagle shark's long and slender pectoral fins acted as stabilizers, but they may have also helped propel the shark forward with slow flapping motions. The beast likely depended on its torpedo-shaped body and strong tail fin, waving side to side, to thrust it forward through the water.

The eagle shark's fossil doesn't have pelvic fins (located on sharks' undersides, near the tail) or a dorsal fin — the signature triangular fin that pokes ominously out of the water in most Hollywood shark movies. But it's not clear whether the shark didn't have these fins when it was alive, or whether they simply didn't fossilize.

What's more, none of the shark's teeth were preserved, which makes it difficult to know what kind of shark it is, said Kenshu Shimada, a professor of paleobiology at DePaul University in Chicago and a research associate at the Sternberg Museum in Kansas, who wasn't involved with the study.

"Identification of fossil sharks generally relies on tooth characteristics," Shimada told Live Science in an email. "So, the authors of the new study tentatively placed the new fossil shark in a group called the Lamniformes based on the characteristics seen in its vertebrae and tail skeleton, which are less taxonomically diagnostic." Modern lamniform sharks include iconic animals, such as the goblin, megamouth, basking, mako and great white sharks, Shimada added.

"This is indeed a remarkable discovery," but only the discovery of additional, well-preserved specimens, especially those with teeth, may shed light on the shark's true anatomy, as well as whether it really was a filter feeder, Shimada said.

It's unclear why A. milarcae went extinct, but this type of filter-feeding shark was probably dealt a grave blow by the 6-mile-wide (10 kilometers) asteroid that collided with Earth at the end of the Cretaceous period, about 65.5 million years ago. That mass extinction event, which killed the non-avian dinosaurs, also calcified "planktonic organisms resulting from an extreme acidification of surface oceans," which decimated ancient filter feeders' once-bountiful food buffet, the researchers wrote in the study.

Originally published on Live Science.

The eagle shark's well-preserved fossil, along with the fossils of an ammonite (Pseudaspidoceras pseudonodosoides), and bony fishes, including the needle fish (Rhynchodercetis regio). (Image credit: Wolfgang Stinnesbeck)

2021 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	☐ Individual (new)	$20.00
(Enclose check or money order	☐ Individual (renewal)	$15.00
for the indicated amount.)	☐ 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 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

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(Founded 1977)
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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.