A publication of the Rochester Academy of Science FOSSIL SECTION

The FOSSILETTER

VOL. 39 Number 4 February 2021

February Meeting

The February section meeting is on Tuesday, February 1, at 7:30 PM. This meeting will be conducted as a virtual meeting on Zoom. Details on how to login in are in the accompanying email.

Forests first appear in the fossil record during the Devonian period and two of the earliest are in New York State. Our distinguished guest and speaker is Dr. Christopher Berry who will discuss "*The Devonian Fossil Forests of Gilboa and Cairo in New York and Others*."

Dr. Berry is Senior Lecturer in Earth and Environmental Sciences of Cardiff University in Wales where he studies the diversification, evolution and impact of the evolution of large land plants in the Devonian Period, 420-360 million years ago. He is interested in rare 'fossil forests' which tell us about ancient terrestrial ecology. He provides us with the following summary and introduction for his talk.

Devonian Forests by Dr. Christopher Berry

The Devonian transition to a forested planet, that time of evolution of the first trees and forest ecosystems, is one of the key episodes in the history of life and the development of the Earth System. In recent years many new strands of information have been woven together to tell a totally new story about the morphology and anatomy of the earliest trees and the ecology of the Devonian transition. New York has been central to some of these key developments, but they have gone hand in hand with great discoveries and new interpretations of materials from around the world. This talk will focus on New York, but put the developments into a global context.

Eospermatopteris from Gilboa has a long history of being regarded as 'the earliest tree'. Fossils of similar plants from Europe demonstrate that *Eospermatopteris* is just one of the final stages of development of the cladoxylopsid group and the product of a long history of evolution of related plants. Fragments from Belgium and Venezuela gave clues to the final reconstruction of *Eospermatopteris*, and extraordinary, almost complete tree fossils from New York opened our eyes to their great size, whilst the rediscovered Gilboa fossil forest allows study of their ecology.

Dr. Christopher Berry in the Devonian fossil forest in Svalbard, a Norwegian archipelago between mainland Norway and the North Pole. photo provided by Dr. Berry.

Gilboa Fossil Forest Tree stump fossils on display at visitors center. Photo from www.mindat.org

Eospermatopteris was slowly replaced by the woody *Archaeopteris*. Fossils of *Archaeopteris* roots from Cairo, New York, demonstrate the massive change in rooting structures which enabled *Archaeopteris* to come to dominate late Devonian forest ecosystems, whilst their foliage is known from all over the world.

Lycopsids (club mosses) are present as fragments in many localities in New York, and the spectacular Naples Tree from New York demonstrates their size. But presently we have to go to Svalbard and to China to see them in forests, and learn how Devonian lycopsids were already favoring wetland habitats.

Membership Renewal Time

We are still awaiting many of our members to make their renewal of membership (which expired 12/31/2021). If you have not, please renew at your earliest convenience. A membership form was attached to the last newsletter email, or you can get one at **rasny.org/mbform.pdf**.

President's Report *by Dan Krisher*

In place of the Fossil Section's December show-n-tell and pizza party the Section was treated on December 5th, to a behind the scenes tour of the Rochester Museum and Science Center and its current dinosaur show. The tour was arranged by member George McIntosh who retired from the museum a couple of years ago.

As is tradition, the Section did not have a January meeting. When monthly meetings resume in February, they will continue to be ZOOM meetings as they have been for the last nearly two years. In early January, the Section was offered and accepted an invitation to participate in the ADK Expo event in June.

December Meeting *by Michael Grenier*

On December 5th sixteen of us had a delightful Sunday afternoon tour at the local Rochester Museum and Science Center. RMSC paleontolo-gist and RAS Fossil member George McIntosh took us behind-the-scenes into the collections area to see specimens and items in the collection rarely (or never) exhibited. We also visited the room in

George showing East Bloomfield mastodon skull in the basement. Photo by William Stoddard

Many cabinets had shelves filled with FarView mastodon parts. Photo by William Stoddard

Lower jaws and more. Note the shape of the teeth. Photo by Melanie Martin.

which the Rochester Academy of Science Herbarium collection has its thousands of specimens of New York State plants going back to the 19th Century, all carefully preserved and maintained by our RAS Life Sciences section.

A room with Native American watercraft and early Rochester memorabilia. Photo by William Stoddard

We then enjoyed a guided tour of the RMSC's "Expedition: Dinosaur!" exhibit, which was covered in the last issue.

The Velociraptors exhibit (or Deinonychus). Photo by Melanie Martin.

RMSC MASTODONS *by Michael Grenier*

The Museum has two local mastodon finds, neither complete. The first was found in Avon, NY, in 1991 when the pond side of the 18th green at the FarView Golf Course off Avon Geneseo Road was being excavated.

Note that their logo features a mammoth. Mastodons are often mistaken for mammoths, even though they are not closely related, having diverged from a common ancestor in the Oligocene about 28 to 24 million years ago x

Gerry in the Albertosaurus. Photo by Sue Kloc.

Mammoths are much more closely related to modern elephants than to mastodons. Wooly mammoths were tundra creatures, whereas mastodons dwelt in temperate forests. Mammoth teeth had hard ridges for grinding dry vegetation. Mastodon teeth had blunt cones for its preferred diet of herbs and leaves. Although some mammoths have been found in New York, most fossil elephants found here are mastodons, with over 130 found so far. The RMSC display is a good place to view comparative fossils and to learn the difference between these magnificent beasts.

The second was found in East Bloomfield in 1994 on land owned by Vaughan and Becky Buchholz, when a backhoe operator digging a pond uncovered bones of a mastodon buried seven feet below the surface of their land. Based on Carbon-14 dating, the Avon specimen is 11,600 years old and the East Bloomfield one is somewhere between 11-12,000 years old. Both are males. These specimens are the basis of the RMSC mastodon exhibit, though the skeleton on display is a cast of a more complete specimen found elsewhere.

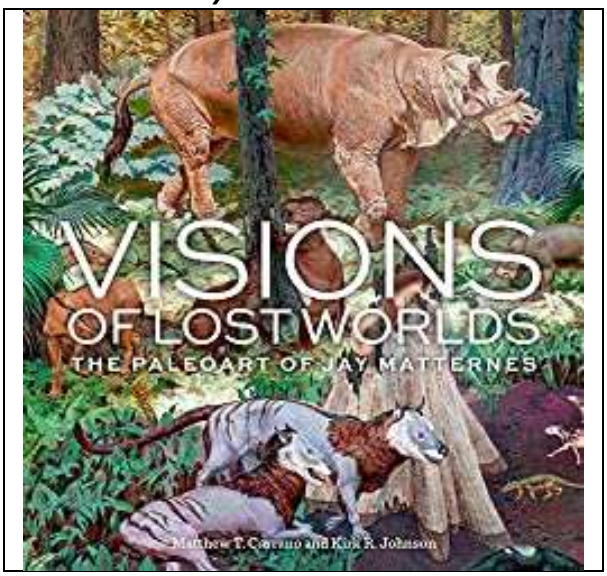
Dinosaurs at Dusk *by Michael Grenier*

I have not yet been to the new Rochester Museum and Science Center planetarium show that opened last week, but wanted to let you know

about it even without a review. This 45-minute program, suitable for all ages, "Dinosaurs at Dusk" takes you on an adventure back to the Mesozoic Era, replete with non-avian dinosaurs, pterosaurs, and the ancestors of modern-day birds—the feathered theropod dinosaurs. You travel with Lucy, an aspiring future paleontologist, and her father, a science teacher. They explore the Triassic, Jurassic and Cretaceous periods, while searching for clues to the origins of flight. When time runs out, they experience first-hand the cataclysmic "last day" of the dinosaurs. I expect impressive special effects.

Shows on weekends. Check for show times: https://rmsc.org/strasenburghplanetarium/schedule/day.listevents/2022/01/29/-

Book Review *by Michael Grenier*

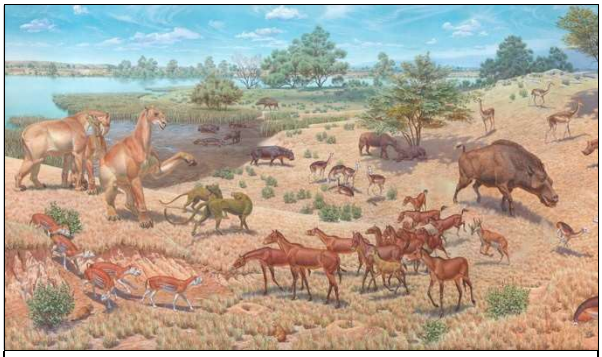


Visions of Lost Worlds: The Paleoart of Jay Matternes, by Matthew Carrano and Kirk Johnson, illus. by Jay Matternes. Smithsonian Books, 2019. 236 pages.

Another holiday and another pleasant surprise under the tree from my son and his family—a gorgeous art book, but more than just that.

If you ever visited the Smithsonian Museum of Natural History (Washington D.C.), you likely saw six large murals by paleoartist Jay Matternes, which were there for decades—the first going up in 1957 and the sixth in 1975. They were dismantled and stored away in 2015, so you have missed your opportunity to see the originals, but this book has magnificent reproductions of each of them.

So, how do you take six paintings and make a 236-page book out of them? Matthew Carrano (Smithsonian Curator of Dinosauria) and Kirk Johnson (Director) have extensively written about the creation of each of the murals, and include many of the studies and drafts that went into the creative process. This is their celebration of Jay's career. Together with period photos of the artist, specimens, museum settings, and other persons, I counted 331 illustrations. These also include Jay's three dinosaur murals and other works from his long career, but the focus is on the six Age of Mammals murals.

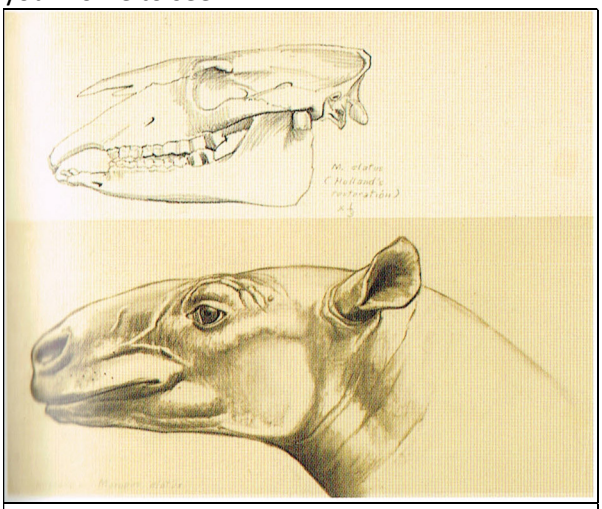


Nebraska Savannah, Late Oligocene-Early Miocene, based on the fauna of the Harrison and Marsland formations. Painted 1961, acrylic on canvas, 12 feet high by 24 feet 3 inches wide.

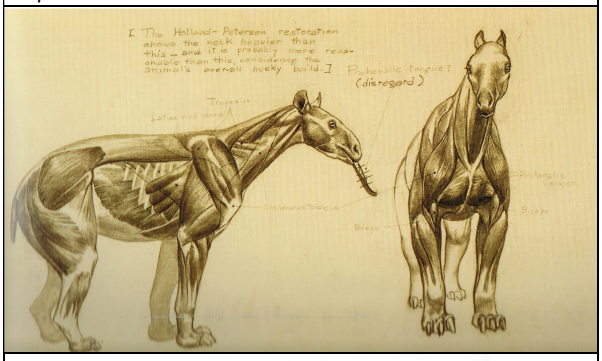
Jay Matternes, 88, is very much alive and collaborated with the authors on the book. They clearly see him as on a par with Charles Knight of the American Museum of Natural History.

Jay's finished art works are lush, the research and artist notes, the studies, and the historical photos, including some of the dig sites, are delightful to see, and Matt and Kirk have produced a well-written, very readable story. This book is a must for anyone who enjoys fossils brought to life

in paleoart. You should leave it out for visitors to your home to see.



p. 105, "Matternes envisioned the head of Moropus *with relatively bare skin and a bemused expression (top). The reconstructed musculature (bottom) is fairly horselike. Matternes first included—but later rejected—the possibility that it had a very long, prehensile tongue."* Moropus *was a chalicothere, related to horses, rhinos, and tapirs.*

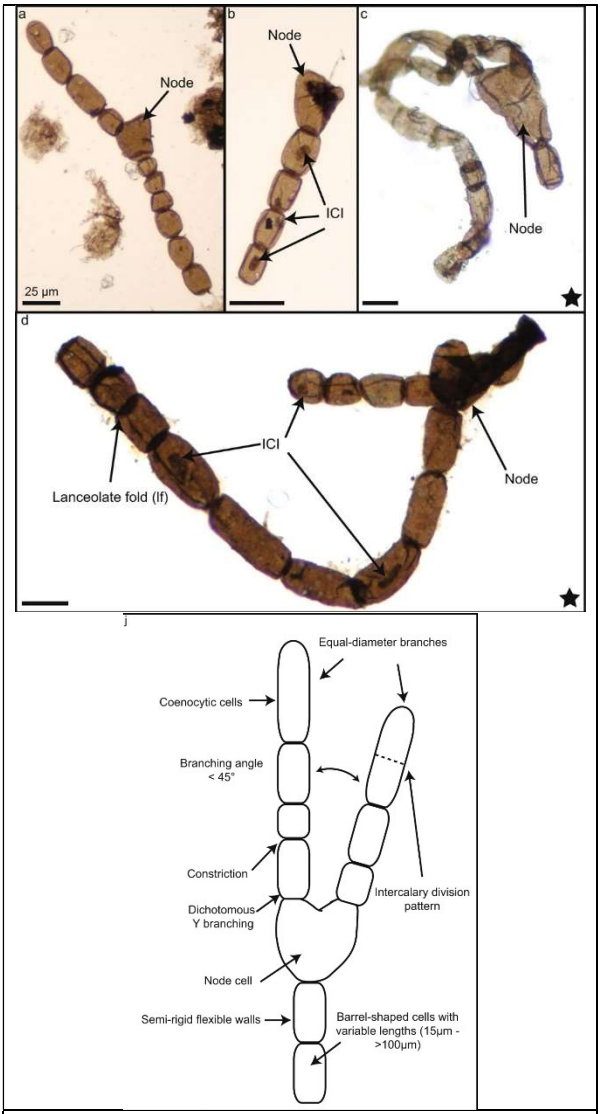


I do not know when the next live meeting will be, but I hope it is soon, and I will bring this and other reviewed books to be borrowed.

Fossil News

Intracellular bound chlorophyll residues identify 1 Billion-year-old fossils as eukaryotic algae. *Materials provided by University of Liege, Belgium.*

Researchers from the University of Liège discovered the first in-situ evidence of chlorophyll remnants in a billion-year-old multicellular algal microfossil preserved in shales from the Congo Basin. This discovery has made it possible to unambiguously identify one of the first phototrophic eukaryotic organisms in the fossil record.



a–c, *Branched specimens with node cell, equal-diameter branches, lanceolate folds (lf), and intracellular inclusions (ICI).* ***j,*** *Sketch of* A. tetragonala, *displaying the main features of the microfossil. Black stars correspond to specimens that have been analyzed by SR-µXRF.*

The emergence of photosynthesis is a fundamental step in the evolution of eukaryotes and therefore of life, as it has profoundly modified terrestrial ecosystems. Although molecular clocks predict this emergence during the Proterozoic (3rd Precambrian eon from -2.5 billion to -541 million years ago), scientists have found very few unambiguous microfossils of photosynthetic eukaryotes. The detection of metabolic by-products in individual microfossils is the key to identifying their metabolism, but until now it has remained elusive.

A new scientific study conducted on Congo Basin fossils by Marie Catherine Sforna at ULiège developed a new methodology using fluorescence and synchrotron X-ray absorption to identify the phototrophic chemical remnants in fossils preserved in shales from the Congo Basin. "We identified these fragments as chlorophyll derivatives, indicating that *Arctacellularia tetragonala* was a phototrophic eukaryote, one of the first unambiguous algae,"

This paper (Sforna, Marie Catherine, et al., "Intracellular bound chlorophyll residues identify 1 Gyr-old fossils as eukaryotic algae." *Nature Communications* 13.1 (2022): 1-8.) is open access at https://www.nature.com/articles/s41467-021-27810-7.

Millipedes 'as big as cars' once roamed Northern England, fossil find reveals. *Original material written by Sarah Collins and provided by University of Cambridge.*

The largest-ever fossil of a giant millipede – as big as a car – has been found on a beach in the north of England. The fossil – the remains of a creature called *Arthropleura* – dates from the Carboniferous Period, about 326 million years ago, over 100 million years before the Age of Dinosaurs. The fossil reveals that *Arthropleura* was the largest-known invertebrate animal of all time, larger than the ancient sea scorpions that were the previous record holders.

The specimen, found on a Northumberland beach about 40 miles north of Newcastle, is made up of multiple articulated exoskeleton segments, broadly similar in form to modern millipedes. It is just the third such fossil ever found. It is also the oldest and largest: the segment is about 75 centimeters long, while the original creature is estimated to have measured around 2.7 meters long and weighed around 50 kilograms.

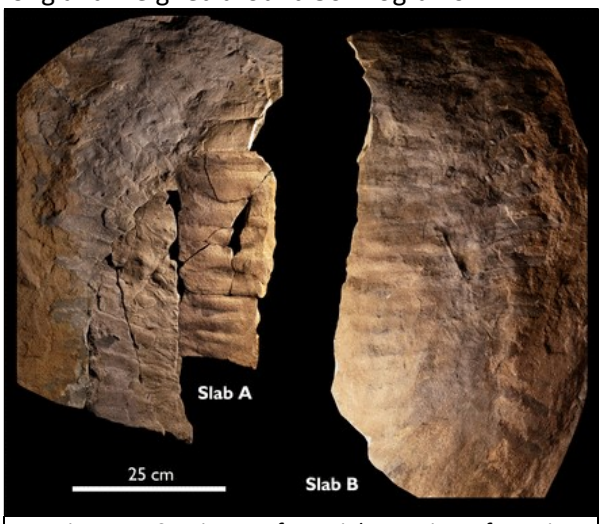


Fig. 1. Specimen of partial remains of a giant Arthropleura *(anterior 12–14 tergites) after excavation from the Serpukhovian Stainmore Formation, Howick Bay, Northumberland, England. Slab A and slab B are not part and counterpart, but rather a split through the middle of a three-dimensional dorsal exoskeleton. photographs credit: Neil Davies*

The fossil was discovered in January 2018 in a large block of sandstone that had fallen from a cliff to the beach at Howick Bay in Northumberland. "It was a complete fluke of a discovery," said Dr Neil Davies from Cambridge's Department of Earth Sciences, the paper's lead author. "The way the boulder had fallen, it had cracked open and perfectly exposed the fossil, which one of our former PhD students happened to spot when walking by."

Unlike the cool and wet weather associated with the region today, Northumberland had a more tropical climate in the Carboniferous Period, when Great Britain lay near the Equator. Invertebrates and early amphibians lived off the scattered vegetation around a series of creeks and rivers. The specimen identified by the researchers was found in a fossilized river channel: it was likely a moulted segment of the *Arthropleura's* exoskeleton that filled with sand, preserving it for hundreds of millions of years.

The fossil was brought back to Cambridge so that it could be examined in detail. It was compared with all previous records and revealed

new information about the animal's habitat and evolution. The animal can be seen to have only existed in places that were once located at the Equator, such as Great Britain during the Carboniferous. Previous reconstructions have suggested that the animal lived in coal swamps, but this specimen showed *Arthropleura* preferred open woodland habitats near the coast.

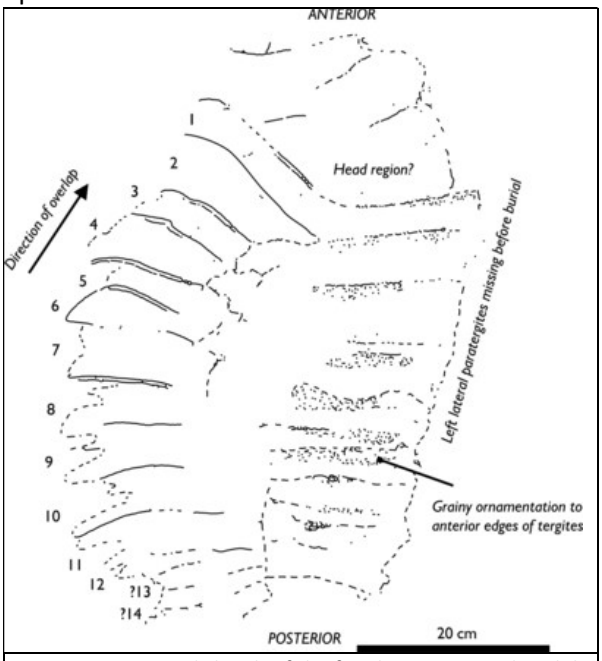


Fig. 2. Interpreted sketch of the fossil, as preserved in slab A, while still intact in fallen block of host sandstone prior to excavation. The overlap pattern of the paratergites on the left indicates that this is the ventral site of the dorsal exoskeleton. The typical ornamentation of the dorsal site of Arthropleura *tergites and paratergites is not visible.*

The great size of *Arthropleura* has previously been attributed to a peak in atmospheric oxygen during the late Carboniferous and Permian periods, but because the new fossil comes from rocks deposited before this peak, it shows that oxygen cannot be the only explanation.

This paper is open access at: https://jgs.lyellcollection.org/content/early/2021/11/19/jgs2021-115/. (Neil S. Davies et al. 'The largest arthropod in Earth history: insights from newly discovered Arthropleura remains.' *Journal of the Geological Society* (2021). DOI: 10.1144/jgs2021-115.)

Researchers find low oxygen and sulfide in the oceans played greater role in ancient mass extinction. *Original material written by Bill Wellock and provided by Florida State University.*

Florida State University researchers have new insight into the complex puzzle of environmental conditions that characterized the 445-million-year-old Late Ordovician Mass Extinction (LOME), which killed about 85% of the species in the ocean. "We found that reducing conditions — with low to no oxygen and little to no hydrogen sulfide levels — are probably playing a much more important role than we previously thought," said lead author Nevin Kozik, a doctoral candidate at FSU.

The research is the first study to use measurements of multiple elements from several sites to examine the conditions that led to the LOME, the second-largest extinction event in the Earth's history and the only mass extinction to occur during what are called icehouse conditions, when Earth's climate is cold enough at the poles to support ice sheets year-round.

To measure oxygen and sulfide concentrations from millions of years ago, scientists use geochemical proxies that correspond to ancient marine conditions.

The extinction happened in two distinct pulses. Using these geochemical measurements as environmental proxies, the researchers found that oxygen levels decreased ahead of the first pulse and remained low. Levels of hydrogen sulfide in the oceans decreased initially leading into the first pulse of the extinction event, but then these levels increased afterward coinciding with the second and final pulse of the extinction.

At the same time the Earth's climate was cooling, glaciers were growing at the ancient South Pole (modern-day North Africa), which led to decreasing sea levels and habitat loss for marine organisms in shallow seaways in the tropics. Read rest of article at: https://www.eurekalert.org/news-releases/939727.

This paper is open access at: https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2021AV000563

CALENDAR OF EVENTS

February
Tuesday February 1, FOSSIL MEETING 7:30 PM. Virtual Meeting on Zoom. Speaker is Dr. Christopher Berry on "*The Devonian Fossil Forests of Gilboa and Cairo in New York and Others*." Visitors welcome.
March
Tuesday March 1, FOSSIL MEETING 7:30 PM. LOCATION To Be Determined. Speaker Dr. Sara H. Burch, Associate Professor, SUNY Geneseo speaking on the biomechanics of the *T. rex* forelimb. Visitors welcome.
April
Tuesday April 5, FOSSIL MEETING 7:30 PM LOCATION To Be Determined. Speaker to be determined. Visitors welcome.

Visitors are welcome to all Fossil Section meetings! For more information and the latest updates check the RAS Website (**www.RASNY.org**). You can also contact Dan Krisher at DLKFossil@gmail.com or John Handley at jhandley@rochester.rr.com for further information.

ROCHESTER ACADEMY OF SCIENCE FOSSIL SECTION

Monthly meetings will be held on Zoom until at least February 2021. Meetings are held the first Tuesday of each month from October to December and from March to May at 7:30 pm. In person meetings, when they can be held again, are at the Brighton Town Hall, Community Meeting Room, 2300 Elmwood Avenue, Rochester, NY unless otherwise listed.

OFFICERS	PHONE	E-MAIL
President: Dan Krisher	585-698-3147	DLKFossil@gmail.com
Vice President/Program Chair: Michael Grenier	585-671-8738	paleo@frontier.com
Secretary: Dan Krisher	585-698-3147	DLKFossil@gmail.com
Treasurer: John Handley	585-802-8567	jhandley@rochester.rr.com
Director (three-year-term): Melanie Martin	585-413-8264	martin@nanoparticles.org
Director (two-year-term): Fred Haynes	585-203-1733	fred.patty.haynes@gmail.com
Director (one-year-term): ***Open***		
APPOINTED POSITIONS		
Field Trip Coordinator: Dan Krisher	585-293-9033	DLKFossil@gmail.com
FossiLetter Editor: Michael Grenier	585-671-8738	mgrenier@paleo.com

---

The FossiLetter is published before each meeting month of the year. Please send submissions to mgrenier@frontiernet.net or by U.S. Postal Service mail to 692 Maple Drive, Webster, NY 14580. Deadline for submissions to the Fossiletter is the 15th of the month.

For scheduling changes and the latest updates please check the RAS Website (www.rasny.org) and click on the Fossil Section link. Last minute updates can also be found on the *General Announcements* page of the Academy Website.

What the FarView Golf Course's logo should look like