

A publication of the Rochester Academy of Science FOSSIL SECTION The FOSSILETTER

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June Picnic Meeting

The Section will hold its final meeting before the summer break on Tuesday June 4. This will mark the return of our joint Fossil and Mineral picnic at the RAS Astronomy Section's Farash Center at Ionia, NY, and will feature the election of officers for the 2024 – 2025 term. The site will be open at 5:30 PM and grilling will start at 6:00 PM.

This meeting will have ASRAS member David Bishop presenting his "2023 Astronomy Year in Review". Those of us who have seen his annual presentation in past years recognize it as a very entertaining report on everything space related. It is good fun science for a general audience.

ACTION REQUIRED: Please notify Dan Krisher (<u>dlkfossil@gmail.com</u>) via email if you plan to attend so enough food can be purchased and let him know whether you prefer hots (red or white) or burgers. The Section will provide meats, rolls, condiments, and plates, cups, and utensils. We ask each attendee or family attending to bring a dish to pass as well as their preferred beverage.

The site has a large deck as well as indoor facilities (including flush toilets) so if there are rain showers, they will not be an issue. The Astronomy Section has a seating limit of 50 inside the building.

If this is your first time there, you should take the offered tour of the site which includes numerous telescopes enclosed in domes and buildings as well as a radio observatory. Although there are observatories in New York with larger telescopes (such as the 40-inch Newtonian at SUNY Oneonta), the ASRAS Farash Center is the largest NY observatory in number and range of telescopes.

You should visit the website for the observatory, <u>http://www.rasny.org/</u>. Then, click on "Astronomy" in the "What's happening"

section. This gets you to the Astronomy Section of the Rochester Academy of Science (ASRAS) background page. Then, on the right side, top, click on "Our Observing Site". The picture below of "The Wolk Observatory Looking North" shows their facilities. The building all the way to the right has the deck where we will picnic, and the meeting room, kitchen, and bathroom.

You can get driving directions (your GPS, Google maps, etc.) to 8355 County Road 14, Ionia, NY 14475. This will work with most mapping tools. With GPS, you can also use the coordinates: 42.930976, -77.496872 or 42°55'46.7" N, 77°30'01.7" W. If you need explicit directions, write me at mgrenier@frontiernet.net.



Next meeting after June is October 1

Speaker is yet to be determined. Mark your calendars. Also, this is the last newsletter until the October issue.

Help Needed at ADK Outdoor Expo

The Expo is on Saturday, June 8 in Mendon Ponds Park, Pittsford. **Please call or email John Handley if you can help for a couple hours** — (585) 802-8567, <u>jhandley@rochester.rr.com</u>). You can help kids "collect" a fossil, show off our new display examples, and talk with prospective members. Astronomy and Mineral Sections will also be there. Under our pop-up, you'll sit in the shade and be sheltered from any showers. You'll have plenty of time to see all the exhibits and activities, enjoy live music by the Golden Link Folk Singing Society right behind us, and buy food or ice cream from Dave's Sidewalk Café and Molly V's.

Presented by the Genesee Valley Chapter of the Adirondack Mountain Club and Monroe County Parks, the Outdoor Expo is a celebration of the great outdoors. Try out a kayak or canoe on the 100-Acre Pond, go for a short hike on the park's beautiful trails, visit the Wild Wings birds of prey facility and the Mendon Ponds Park Nature Center, explore camping, backpacking, bicycling and bike repair, crafts, the petting zoo, etc. For the full schedule of events, see:

https://adk-gvc.org/play/outdoor-expo-before/



Follow the path to the pond & you will find us.

This event is free, open to the public, and fun for the entire family.

New Fossil Section Outreach Kit

by Dan Krisher

The new Fossil Section outreach kit is nearly finished and will be ready for the ADK event. Dan has created labels for all the specimens on cardstock. We have the crinoids and the Smilodon skull. The caddis fly in amber is on order. Dan has a tote that holds most of the material and each specimen is in a box bottom with cushioning and a zip lock bag with the label, so setup is easy. The kit includes membership forms, RAS pamphlets, Fossil Section pamphlets, and a new 11 x 17 annotated bedrock map of NY laminated in plastic and with a cross-section and Paleozoic column on the back side, made by Fred Haynes. This will be useful to any of us for talking about the Paleozoic bedrock and geology in western NY. The kit also includes fossil giveaway materials for kids (fossils, bags, and labels).

President's Report by Dan Krisher

The Central New York Earth Science Student Symposium (CNYESSS) was held at Syracuse

University on 4/20 with Section members attending. The Section held its first field trip of the season on 4/27. The trip was to Lockport and was very well attended by individuals and families. On 5/4 the Section had a field trip to Split Rock Quarry located southwest of Syracuse. This was a first for the Section and four members attended.

The Section's May meeting was live and on Zoom and was held on 5/7. After a short business portion, the meeting was turned over to Section Vice-President Michael Grenier who introduced the speaker for the evening. The speaker was Dr. James Boyle, Assistant Teaching Professor and Director of Undergraduate Studies in the Geological Sciences Department at SUNY Buffalo. His presentation was entitled, "A victim of its own Success—The armored fish *Dunkleosteus terrelli*.

The Section has a field trip scheduled for 6/1. We will be visiting the Little Beard's Creek site near Geneseo. This is always a Section favorite and a great one for families with kids. The Section will hold its annual joint picnic with the Mineral Section on 6/4 at the Farash Center at Ionia. As always, the Sections will be providing the meat and rolls. Member Dave Bishop will give a short talk on the year in astronomy.

On June 8, the Section will participate in the annual ADK day activities at Mendon Ponds Park. The Section has two other planned trips. One is to the Penn Dixie Fossil Park south of Buffalo on 6/29. This site charges a small fee, but you keep everything you find, and you are sure to find at least parts of trilobites. On 7/13 the Section will visit the Jaycox Site near Geneseo. Details for these trips will follow as the dates draw closer.

Fossil Section Election

Your ballot was sent separately and should be returned to <u>17melanie@gmail.com</u> or filled out at the June 6 Annual Fossil Section Picnic, where the votes will be tallied and the winners announced. **RAS Fossil Section Slate for the 2022-2023 Term** For President: Dan Krisher For Vice Pres. & Program Chair: Michael Grenier For Secretary: Dan Krisher For Treasurer: John Handley For Director (three-year-term): **Open** Directors whose terms have not expired are Fred Haynes (2025) and Melanie Martin 2026.

Upcoming Fossil Section Field Trips by Dan Krisher

About a week or so before each trip I will send an email out to all Section members concerning the upcoming trip. All nterested members should get back to me via email at least 2 days before the trip and I'll respond with additional information for that trip as soon as I receive your email. I will send out a final email to all attendees the night before the trip. If you have any questions or otherwise need to get a hold of me, you can contact me at DLKFossil@gmail.com or at (585) 698-3147. The following field trips are scheduled for June and July.

6/29 – Penn Dixie: This family-friendly site is a large open shale pit. There is a modest daily fee to collect but we may be able to get a group rate. The site exposes the Middle Devonian Windom Member of the Moscow Formation. A wide variety of fauna can be found but the site is most well-known for its trilobites. The date selected is shortly after the Dig with the Experts so there will be many well-weathered piles.



7/13 - Jaycox Run: The trip will visit the Jaycox Run site between Avon and Geneseo and the collecting will be in the Middle Devonian Ludlowville and Moscow Formations. This is a Genesee Valley Nature Conservancy site that requires permission to visit. Heavy rains over the past few years have seriously eroded the Green's Landing bed so collecting in that area of the outcrop will be limited. No large-scale removal of bedrock will be allowed. Collecting will be limited

to surface collecting, only the removal of exposed fossils.



Jaycox Run trip in July 2019. (photo by Fred Haynes) Aside from the above trips, additional trips for late July and August are being planned.

Videos of April & May Meeting Lectures

The lectures by James Boyle in May on A victim of its own Success—The armored fish Dunkleosteus terrelli and in April by George McIntosh on Late Devonian crinoid ghost lineages have been put up on our website at https://rasny.org/fossil-sectioncalendar. Scroll down to past meetings to find them. You'll also find the March Samuel J. Ciurca, Jr. Memorial Lectures by James C. Lamsdell on c From catfish to crustaceans to chelicerates: eurypterids at 200(ish) and by Derek Briggs on *Ciurca's curious creatures.* February's talk by Kristina Curry Rogers on The Unlikely (but Very Lucky!) Triumph of Dinosaurs and last November's talk on The Devonian of New York: Overview and quide to future research by D. Jeffery Over are there along with all other past recorded lectures.

Fossil News

Did a magnetic field collapse trigger the emergence of animals? Univ. of Rochester Press Release May 2, 2024, by Lindsey Valich, Senior Communications Officer, Science and Engineering. Submitted by David Bishop.

https://www.rochester.edu/newscenter/ediacara n-fauna-magnetic-field-collapse-604132/

The Ediacaran Period, spanning from about 635 to 541 million years ago, was a pivotal time in Earth's history. It marked a transformative era during which complex, multicellular organisms emerged, setting the stage for the explosion of life. But how did this surge of life unfold and what factors on Earth may have contributed to it?



University of Rochester illustration of Ediacaran life by Michael Osadciw.

University of Rochester researchers uncovered compelling evidence that Earth's magnetic field was in a highly unusual state when the macroscopic animals of the Ediacaran Period diversified and thrived. Their study raises the question of whether these fluctuations in Earth's ancient magnetic field led to shifts in oxygen levels that may have been crucial to the proliferation of life forms millions of years ago and fueled the proliferation of complex, multicellular organisms.



fossil impression of Dickinsonia, an example of Ediacaran fauna, found in present-day Australia. (Credit: Shuhai Xiao, Virginia Tech)

According to John Tarduno, the Ediacaran fauna life forms were notable for their resemblance to early animals—some even reached more than a meter (three feet) in size and were mobile, indicating they probably needed more oxygen compared to earlier life forms. He said, "Previous ideas for the appearance of the spectacular Ediacaran fauna have included genetic or ecologic driving factors, but the close timing with the ultra-low geomagnetic field motivated us to revisit environmental issues, and, in particular, atmospheric and ocean oxygenation."

About 1,800 miles below us, liquid iron churns in Earth's outer core, creating the planet's

protective magnetic field. Though invisible, the magnetic field is essential for life on Earth because it shields the planet from solar wind—streams of radiation from the sun. But Earth's magnetic field wasn't always as strong as it is today.

Tarduno and his team used innovative strategies and techniques to examine the strength of the magnetic field by studying magnetism locked in ancient feldspar and pyroxene crystals from the rock anorthosite. The crystals contain magnetic particles that preserve magnetization from the time the minerals were formed. By dating the rocks, researchers can construct a timeline of the development of Earth's magnetic field. Leveraging cutting-edge tools, including a CO2 laser and the lab's superconducting quantum interference device (SQUID) magnetometer, the team analyzed with precision the crystals and the magnetism locked within.

Their data indicates that Earth's magnetic field at times during the Ediacaran Period was the weakest field known to date—up to 30 times weaker than the magnetic field today—and that the ultra-low field strength lasted for at least 26 million years. A weak magnetic field makes it easier for charged particles from the sun to strip away lightweight atoms such as hydrogen from the atmosphere, causing them to escape into space. If hydrogen loss is significant, more oxygen may remain in the atmosphere instead of reacting with hydrogen to form water vapor, leading to a buildup of oxygen over time.

The research conducted by Tarduno and his team suggests that during the Ediacaran Period, the ultraweak magnetic field caused a loss of hydrogen over at least tens of millions of years. This loss may have led to increased oxygenation of the atmosphere and surface ocean, enabling more advanced life forms to emerge.

Tarduno and his research team previously discovered that the geomagnetic field recovered in strength during the subsequent Cambrian Period, when most animal groups begin to appear in the fossil record, and the protective magnetic field was reestablished, allowing life to thrive. "If the extraordinarily weak field had remained after the Ediacaran, Earth might look very different from the water-rich planet it is today: water loss might have gradually dried Earth," Tarduno says.



Fossil impression of Fractofusus, an example of Ediacaran fauna, found in what is now Newfoundland, with a Canadian penny nearby for scale. (Credit: Shuhai Xiao, Virginia Tech)

The work suggests that understanding planetary interiors is crucial in contemplating the potential of life beyond Earth. "It's fascinating to think that processes in Earth's core could be linked ultimately to evolution," Tarduno says. "As we think about the possibility of life elsewhere, we also need to consider how the interiors of planets form and develop."

This paper— Huang, W., Tarduno, J.A., et al. "Near-collapse of the geomagnetic field may have contributed to atmospheric oxygenation and animal radiation in the Ediacaran Period." *Communications Earth & Environment* 5.1 (2024): 207—is available at

https://www.nature.com/articles/s43247-024-01360-4.

Paradox Lost. We had Benjamin Dattilo as our speaker in May 2021 at which time he told us of his work analyzing the shape of strophomenid brachiopods, with their thin, concavo-convex shells. He particularly discussed *Rafinesquina*, a ubiquitous fossil colonizer of Paleozoic muddy seafloors, evidence of a very successful organism. They were hypothesized to have filter-fed in a concave-upward orientation, with their shell mostly closed to keep mud out, leaving little living space inside the shell. The paradox is that epibiont distributions on strophomenoids support a convex-upward life position, as do studies of strophomenoid stability and trace fossils formed by strophomenoid sediment-clearing.



Dattilo Fig 1 C, CMC IP98737, from Manchester, IN, USA; section near sagittal plane. D, CMC IP98750, from St Leon, Indiana, USA: D, ventral valve relatively free of epibionts;

Dattilo's team investigated the gape angle of Rafinesquina using serial thin sections and peels, silicified specimens, computer modelling, SEM analysis, x-ray micro CT, and 3D printing. They found that the hinge line structure suggests that Rafinesquina could easily open its shell by 45° or more. This wide gape eliminates constraints on feeding orientation. In either convex-up or concave-up orientation, Rafinesquina and other strophomenids could feed with slow, diffuse inhalant currents incapable of disturbing sediment, and could snap valves shut to forcefully expel enough water to clear sediment from the mantle cavity, explaining previously described moat-shaped trace fossils associated with shells.



Dattilo Fig 4B, Wide feeding gape angle in living brachiopods, a cluster of wide-gaping thecideids dominated by Thecidellina meyeri, CARMABI field station, Curaçao, Netherland Antilles; individuals are c. 5 mm wide. Images courtesy of: P. Ryan

This paper— Dattilo, Benjamin F., et al. "Paradox lost: wide gape in the Ordovician brachiopod Rafinesquina explains how unattached filterfeeding strophomenoids thrived on muddy substrates." *Palaeontology* 67.2 (2024): e12697 is available at

https://onlinelibrary.wiley.com/doi/pdf/10.1111/ pala.12697.



Dattilo Fig 15 One hypothesized reconstruction of Rafinesquina in life, with its shell at full gape. Coloration is not intended to be true-to-life; in keeping with previous figures, diductor muscles are rendered in pale pink, whereas adductor muscles are rendered in pale blue. The ventral valve is encrusted by the craniiformean brachiopod Petrocrania scabiosa. Illustration by K. Hartshorn.

Alabama high school student discovers fossil whale, By Dennis Pillion, The Birmingham News, Aug. 29, 2023, submitted by David Bishop. https://www.al.com/news/2023/08/alabamateen-finds-34-million-year-old-whale-skull-may-

be-new-species.html.

An Alabama high school student and her teacher have unearthed a fossilized whale skull estimated to be 34 million years old that might belong to a species of whale previously unknown to science. Lindsey Stallworth, a junior at the Alabama School of Math and Science in Mobile, was hunting for fossils at her family's property in Monroe County this summer with ASMS science teacher Drew Gentry, who also happens to be a paleontologist. Gentry has already discovered two new species of turtles from Alabama fossils, and was present to help find, identify and excavate the skull from a chalky hillside.

"We saw something, and we were like 'oh my gosh, what is this?" And once we started digging into it and looking, we slowly realized what we had actually found," said Stallworth. What they found is at least the skull portion of an ancient whale that swam the shallow seas that covered most of south Alabama millions of years ago.



Lindsey Stallworth, 16, discovered a fossil whale on her family's property. Both photos courtesy of Alabama School of Math and Science.

Stallworth said she had hunted for shark teeth and other fossils on her family's property for most of her life but having a biology class with Gentry allowed her to take that interest to the next level. "My family mainly looks for different types of shark teeth, but we are realizing now that there was a lot of stuff we've never recognized was there," she said. Gentry and Stallworth spent much of the summer excavating the skull and moving it to the new paleontology laboratory at ASMS for further study.

Gentry said the whale appears to be a smaller relative of the *Basilosaurus cetoides*, a 50- to 60foot ancient whale that is Alabama's state fossil. "It has the potential to be a new species, yes, especially considering the time period that this whale is from," he said. He said the full skeleton is probably about 15-20 feet in length, and that next summer, they will continue excavation of the site to see how much more of the skeleton is intact. If the full skeleton is there, Gentry said it could take years to dig it all out.

"We don't yet know if the entire skeleton is there, but the preservation is pretty fantastic," Gentry said. "And there are lots of different bones sort of protruding from the hill that we were digging in, so it's likely that more of the skeleton is present." In the meantime, Stallworth works with Gentry at ASMS to clean out, study and preserve the skull. Thanks to a new Research Fellows Program at ASMS, Stallworth will be able to work on the fossils during her junior and senior years of high school, and perhaps beyond.



Stallworth in prep lab at ASMS

3D mouth of an ancient jawless fish suggests they were filter-feeders, not scavengers or hunters. U. of Birmingham Press Release April 10, 2024. https://www.birmingham.ac.uk/news/2024/3dmouth-of-an-ancient-jawless-fish-suggests-theywere-filter-feeders-not-scavengers-or-hunters

Experts have used CT scanning techniques to build up the first 3D pictures of these creatures, which are some of the earliest vertebrates in which the mouth is fossilized. Their aim was to answer questions about feeding in early vertebrates without jaws in the early Devonian epoch around 400 million years ago.

Feeding behaviors are commonly used by scientists to help piece together early evolution of vertebrates, and different jaw shapes and constructions can suggest a broad range of feeding strategies. In the absence of jaws, many competing theories have been developed ranging from biting and slicing, to filtering food from sediment or water.

This team has been able to visualize the mouth parts of one of these jawless fish, called *Rhinopteraspis dunensis*, in detail. The images revealed the structure and arrangement of fingerlike bones that project from the lower 'lip' of the animal's mouth, which the scientists believe acted to control the mouth's size and shape as it captured food particles from surrounding water.

Senior author and project lead Dr Ivan Sansom said: "The application of CT scanning techniques to the study of fossil fish is revealing so much new information about these ancient vertebrates and giving us the opportunity to study precious and unique specimens without destructive investigation." Lead author Dr Richard Dearden explained: "In this case, these methods have allowed us to fit all of the small bones of this animal's mouth together and try and understand how it fed from this integrated system rather than by using isolated bones. Instead of a steady trend towards 'active food acquisition' -scavenging or hunting - we see a real diversity and range of feeding behaviors among our earliest vertebrate relatives."





371/journal.pone.0283505.

CALENDAR OF EVENTS

June

Tuesday, June 4, FOSSIL ANNUAL PICNIC 6:00 PM Location: Farash Center for Observational Astronomy, Ionia, NY.

Saturday, June 29, FIELD TRIP: Penn Dixie,

July

Saturday, July 13, FIELD TRIP: Jaycox Run

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

ROCHESTER ACADEMY OF SCIENCE FOSSIL SECTION

Monthly meetings are held as hybrid meetings, live but also broadcast on Zoom. Meetings are held the first Tuesday of each month from October to December and from February to May at 7:30 pm. In-person meetings are now held at the NEQALS Community Meeting Room, 1030 Jackson Rd, Webster, NY 14580 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 <u>mgrenier@frontiernet.net</u> or by U.S. Postal Service mail to 692 Maple Drive, Webster, NY 14580. The 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.

