

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 6. 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 2023 – 2024 term.

This meeting will have ASRAS member David Bishop presenting his annual "2022 Astronomy Year in Review". Those of us who have seen this in past years recognize it as a very entertaining report on everything space-related. 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 or burgers.

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.

There will be a tour of the site which includes numerous telescopes enclosed in domes and buildings as well as a radio observatory which is under construction. 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.

The site will be open at 5:30 PM and grilling will start at 6:00 PM. As always, the Section will provide meats, rolls, condiments, and plates, cups, and utensils. Each attendee or family attending is asked to bring a dish to pass as well as their preferred beverage.

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 4

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

Fossil Section Election

Your ballot was sent separately and should be returned to <u>fredmhaynes55@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): Melanie Martin For Director (two-year-term): **Open**

Director whose term has not expired is Fred Haynes (2025).

Fossil Section Summer Field Trips by Dan Krisher

Following are the Summer field trips for our 2022 field trip season. For additional information contact me at <u>DLKFossil@gmail.com</u>.

How to sign up for a field trip - The process for "signing up" for one of these trips is straight forward. About a week or so before a trip I will send an email out to all Section members concerning the upcoming trip. All interested 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.

6/17 Little Beard's Creek - This is a large shale exposure along Little Beard's Creek in a stream near Geneseo. The site exposes the Windom Member of the Moscow Formation and aside from many brachiopods and a few trilobites, the site is most well-known for the size and quantities of horn corals it produces.

7/8 Pompey Center and Other Road Cuts - The primary and first stop is a family friendly large road cut east of Syracuse which largely exposes the Delphi Station member of the Skaneateles formation. Bivalves are common as well as gastropods, trilobite parts and nautiloids. Following this we will visits 1 or 2 other road cuts which expose portions of the Onondaga Formation. Due to the nature of the rock the collecting can be challenging but whatever we find will be relatively new to most collectors.

7/15 Jaycox Run (Rain date 7/22) - 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 removal of exposed fossils. There may also be an opportunity to visit the adjacent Wheeler's Gully which would be a first for the Section.

Additional late summer trips - The schedule for the month of August is still being worked out and will be shared via email when it is finalized. One candidate is a guided visit to the Penn Dixie site just south of Buffalo. This is a fee site with the current cost being \$14 for adults and \$12 for children. This is a well-known site famous for its trilobites and produces a wealth of other Hamilton Group fauna.

President's Report by Dan Krisher

The Section's May meeting was a hybrid meeting and was held on 5/2. After a short business portion, Michael Grenier introduced the speaker for the evening—Dr. Jennifer Olori, Associate professor in Biology at SUNY Oswego. Her talk was entitled *"Frogamanders, False Signals and Funky Worms: Are Debates Concerning the Origin of Modern Amphibians Coming to an End?"*

On 5/6 the Section held its first field trip of the 2023 season. Three members visited 3 Silurian sites just west of the town of Lockport. The first stop was the Gulf site which exposes the Lewiston member of the Rochester Shale Formation. After about 3 hours of fruitful collecting the group moved to the Pekin site which exposes a sponge bioherm in the upper Gasport and lower Goat Island Formations. After about 45 minutes the group made its final stop at the lower Hickory Corners site which exposes the Hickory Corners Member of the Reynales Formation.

PRI Wants Your Devonian Fossils

by John Handley

The Paleontological Research Institution is trying to grow its New York Devonian collection. As you are likely aware, avocational paleontologists often have some of the best and most interesting specimens. Also, many localities are no longer accessible. At this time, the goal to document collections whose owners may possibly be willing to donate them. Immediate donation is not sought yet because accepting and curating specimens require resources that are not available at the moment. However, PRI staff would like to know about possible donation collections for planning purposes. For a museum to accept specimens, they must be of good quality, collected legally and have detailed locality information. Contact Greg Dietl at PRI (gpd3@cornell.edu) for more information.

Videos of April & May Meeting Lectures

The lectures by Gerry Kloc and John Hendricks from our April meeting and that by Jennifer Olori in May have been put up on our website at <u>https://rasny.org/fossil-section-calendar</u>. Scroll down to past meetings to find them.

The Significance of Samuel Ciurca's Eurypterid Collection

By ChatGPT, as provoked by John Handley

The ChatGPT Artificial Intelligence (AI) application has been much in the news over the past several months, but perhaps you have not seen a result. The following is the unedited result of entering the query in the title. Not bad. The four topics have been italicized by the editor. Maybe we'll let ChatGPT write future articles for us. [editor]

Samuel Ciurca's Eurypterid Collection is significant for several reasons:

1. *Rare specimens*. The collection contains some of the rarest eurypterid specimens in the world. Eurypterids are extinct arthropods, commonly known as sea scorpions, that lived during the Silurian and Devonian periods. The specimens in Ciurca's collection are some of the finest and most complete examples of these ancient creatures.

2. *Historical importance*: The collection is also significant from a historical perspective. Eurypterids are important because they represent some of the earliest evidence of life on land. They are also important because they were among the largest predators in the seas during their time, with some species reaching lengths of up to 2.5 meters.

3. *Scientific research*: Ciurca's collection is an important resource for scientific research. Researchers can study the specimens to learn more about eurypterid anatomy, behavior, and ecology. The specimens can also provide valuable information about the environment in which they lived and the

conditions that led to their extinction.

4. *Education*: The collection is also significant for education. It provides an opportunity for students and the general public to learn about eurypterids and their place in the history of life on Earth. Ciurca's collection has been used in numerous museum exhibits and has inspired many people to pursue careers in paleontology and related fields.



Book Review

By Michael Grenier

A (Very) Short History of Life on Earth: 4.6 Billion Years in 12 Pithy Chapters, by Henry Gee. Macmillan, 2021, 280 pp.

Dr. Henry Ernest Gee has written several books and we favorably

reviewed his *In Search of Deep Time* (1999) in our May 2015 issue. He is Senior Editor, Biological Sciences (including paleontology) for the scientific journal *Nature*, a British paleontologist, and evolutionary biologist. This book won the 2022 Royal Society Trivedi Science Book Prize for the most compelling popular science writing accessible to the public, so I looked forward to reading it.

The book is small, only 7" by $4\frac{3}{4}$ " and 208 pages for the 12 chapters, so expect the material to be a well-written easy-read summary of evolution. Important assertions are connected to end notes which frequently provide sources for more detailed information backing up the stated facts. The notes cover 56 pages and are good reading themselves.

The first chapter, A Song of Fire & Ice, in only 13 pages covers the first 3¹/₂ billion years of earth's history–mostly a matter of cosmology, physics, and chemistry leading to the origin of life. Some aspects of that account are Gee in story-telling mode, as evidence for life's origins are scant. The "fire" is the whole earth from formation to cooling and life is believed by some scientists (controversially) to have originated within 100

million years of the earth's formation, in the first part of this first 600-million-year eon (the Hadean). The ice was two episodes of global glaciation. The first came after the Great Oxidation Event, when atmospheric and oceanic free oxygen rose following the evolution of photosynthesis. Oxygen is a poison and created a mass extinction of single-celled organisms not adapted to resist it. The second occurred 715 million years ago following the breakup of the super-continent Rodinia, lasted 80 million years, fostered the evolution of multicellular life, and ushered in the Ediacaran. As Gee notes, "For if life was forged in fire, it was hardened in ice."

After the second chapter, Animals Assemble, covering the evolution of all known phyla in the Ediacaran and Cambrian, Gee's thesis is revealed. Despite the book's title, this is the evolution-not of all life-but of vertebrates leading to humans. The next six chapter titles spell this out-The Backbone Begins (evolution of vertebrates), Running Aground (vertebrate invasion of the land), Arise Amniotes (the vertebrate egg in reptiles and live birth in advanced mammals), Triassic Park (mammal-like reptiles), Dinosaurs in Flight, and Those Magnificent Mammals (the rise of mammals and their Cenozoic radiation). The evolution of other animals and of plants is covered sufficiently, as it provides context for the vertebrates. I have no complaint over these 101 engaging pages. The last three relevant chapters cover the evolution of Homo and their hominid ancestors.



I do strongly recommend this book for its first 179 pages and end notes. I find the last chapter (*The Past of the Future*) and the epilogue problematical, but it is likely very entertaining for others, for here

Gee moves from science to science fiction in speculating on how life will continue to evolve and how it will end. He acknowledges this in an end note, "from this point onward, most of what I say is conjecture, or what scientists call making stuff up." It feels out of place to me, though some science-based sections tied back to the evolution of life and were interesting and educational. Also, other reviewers have complained that other than a few geological time charts, there are no illustrations of any kind. I believe many readers would have appreciated illustrations of the species being discussed.

This book is readily available at several local libraries in Monroe County, which means you should easily be able to get it through inter-library loan if your local library does not carry it.

Fossil News edited by Michael Grenier

Note: None of the following papers are available for download but all can be had on request from your editor.

Middle Cambrian Burgess Shale Fauna Found Exquisitely Preserved in Middle Ordovician Strata in Wales

Middle Ordovician "marine dwarf world" found from Castle Bank, Wales (UK) Chinese Academy of Sciences Headquarters News Release May 1, 2023. <u>https://www.eurekalert.org/news-</u> releases/987824

An unusually well-preserved "Marine Dwarf World" from 462 million years ago (Darriwilian

World" from 462 million years ago (Darriwilian Stage, Middle Ordovician Period) is exposed at Castle Bank, Wales. The site has yielded over 150 species, with many of miniaturized body size.



Reconstruction of the Castle Bank community. Credit: YANG Dinghua

Castle Bank, in Powys, is one of the very rare sites where soft tissue and complete organisms are preserved, providing an unrivaled view of the evolution of life. Among the best of these sites are Burgess Shale-type faunas, named after the classic Burgess Shale fossil-bearing deposit in Canada. Many of these sites occur in rocks from the Cambrian period (542–485 million years ago), when recognizable animal fossils first appeared. However, almost none occur in post-Cambrian rocks. As a result, paleontologists know a lot about Cambrian marine life, but less about how it evolved in the periods immediately afterwards. Castle Bank rivals the best of the Cambrian deposits in diversity of fossils and extraordinary levels of preservation.

The remarkable new assemblage was discovered in 2020 by Dr. Joe Botting and Dr. Lucy Muir near Llandrindod, central Wales. So far, well over 150 species have been recovered, almost all of them new. Many of the animals are very small, at only 1-3 mm long, but they preserve minute details. They range from arthropods like crustaceans and horseshoe crabs to various types of worms, sponges, starfish, and many more. In some animals, internal organs such as digestive systems and even nerves are preserved, together with the limbs of tiny arthropods and delicate filter-feeding tentacles. Such exquisite detail is known from the best Cambrian faunas, but not previously from the Ordovician. The deposit includes animals with morphologies similar to the iconic Cambrian taxa Opabinia, Yohoia and Wiwaxia, among others.

The Cambrian witnessed the origin of the major animal groups. The Ordovician was a critical time in the history of life as well, with an extraordinary diversification of animals that produced hard skeletons and abundant fossils. Also, more familiar ecosystems similar to today's coral reefs appeared by the end of the Ordovician. Until now, however, a big "gap" has existed between these two evolutionary events.

This new Burgess Shale-type fauna from the middle of this interval will help close the gap, answering questions about the animal shift from Cambrian fauna to Palaeozoic fauna and about the shift in ecosystems from the Cambrian style (which were similar across much of the world) to the much more diversified ecology we see today.

Botting, J.P., Muir, L.A., Pates, S., McCobb, L.M., Wallet, E., Willman, S., Zhang, Y. and Ma, J., 2023. A Middle Ordovician Burgess Shale-type fauna **from Castle Bank, Wales (UK)**. *Nature Ecology & Evolution*, pp.1-9)

Opabinia-type fossil found at Wales Ordovician Castle Bank site. (Press release, Harvard University Dept. of Organismic & Evolutionary Biology, November 15, 2022, https://oeb.harvard.edu/news/welsh-%E2%80%9Cweird-wonder%E2%80%9D-fossilsadd-piece-puzzle-arthropod-evolution.)

The most famous fossils from the Cambrian explosion of animal life over half a billion years ago are very unlike their modern counterparts. One of these is the five-eyed *Opabinia* with its distinctive frontal proboscis.



Above, USNM PAL 57683 Opabinia regalis, courtesy Smithsonian Institution. Below, FLORMOON model of O. regalis for sale from <u>https://collectiblewildlifeqifts.com</u>.

In this paper, two new specimens with striking similarities to Opabinia are described from a new fossil deposit recording life in the Ordovician Period, 40 million years after the Cambrian explosion. The larger specimen measured 13 mm, while the smaller measured a miniscule 3 mm (for comparison Opabinia specimens can be 20 times as long). The authors describe the new taxon, Mieridduryn bonniae, with the larger specimen designated the holotype. The differences between the two specimens led the researchers to wonder if these were due to changes during the growth of one species, or whether there were two distinct species in this new deposit. The status of the smaller specimen was left open, reflecting these different possibilities. "The size of the smaller specimen is comparable to some modern arthropod larvae - we had to take into account this possibility in our analyses," said senior author Dr. Joanna Wolfe (Department of Organismic and Evolutionary Biology at Harvard University). "These Welsh animals are 40 million years younger than *Opabinia*." said Wolfe, "so it was important to assess the implications of some features.



Mieridduryn bonniae, specimen NMW.2021.3 G.7: a. Overview of whole specimen. B. Explanatory drawing of (a). Dashed white line indicates ventral-most point of left dorsolateral flaps, and demonstrates the twisted nature of the specimen. Blue lines indicate filamentous setal structures. ds dorsal sclerite, **gu** gut, **If** left dorsolateral flap, **II** left lobopod, **mo** mouth, **pr** proboscis, **rf** right dorsolateral flap, **rI** right lobopod, **sr** strengthening ray, **sp** dorsal spines on proboscis.

These small but scientifically mighty fossils are some of the first findings from this important new Ordovician fauna. Botting and Muir continue their work in the small quarry in the sheep field with more still to come. Muir added, "Even the sheep know we are on to something special here, they usually come to watch."

Pates, S., Botting, J.P., Muir, L.A. and Wolfe, J.M., 2022. Ordovician opabiniid-like animals and the role of the proboscis in euarthropod head evolution. *Nature Communications*, 13(1), p.6969

Lamiid plants survived end-Cretaceous extinction, so we get coffee and potatoes.

(Press release, The University of Kansas, February 7, 2023, <u>http://today.ku.edu/2023/02/07/fossil-</u> <u>fruit-california-shows-ancestors-coffee-and-</u> potatoes-survived-cataclysm-killed)

The Lamiids are a subclade of the Asterids, which includes the genus *Aster* and which is the

largest group of flowering plants, with more than 80,000 species, about a third of the total flowering plant species. The Lamiids consists of about 40,000 species and account for about 15% of angiosperm diversity.

The discovery of an 80-million-year-old fossil plant pushes back the known origins of lamiids to the Cretaceous, extending the record of nearly 40,000 species of flowering plants including modern-day staple crops like coffee, tomatoes, potatoes and mint.

Brian Atkinson, assistant professor of ecology & evolutionary biology at the University of Kansas reports that the fossil plant, *Palaeophytocrene chicoensis* "belongs to a group of lianas, woody vines that add structural complexity to rain forests. It shows us this group of flowering plants appeared super early in the fossil record. There'd been some hypotheses that they were around in the Cretaceous period — but no good clear evidence. This is a great indicator that structurally complex, modern-type rainforests may have been around as early as 80 million years ago."



Image of fruit belonging to Palaeophytocrene chicoensis. The Sierra College Museum of Natural History is the repository for this fossil. Credit: Brian Atkinson.

The well-preserved fossil was unearthed in the 1990s by construction crews building housing near Granite Bay in Sacramento, California. Located in deposits of the Chico Formation of the Late Cretaceous, the fossil was collected by Richard Hilton and Patrick Antuzzi and housed at the Sierra College natural history museum. According to Atkinson, the fossil fruit sheds new light on a "critical interval" in the history of life on Earth. "This fossil shows this diverse group of plants, the lamiids, were older than previously thought, and Cretaceous ecosystems on the west coast of North America may have resembled structurally complex rainforests."

"I spent seven years looking for these things [Cretaceous lamiids], and I couldn't find them," Atkinson said. "Somebody said, 'Oh, you should check out the Sierra College Museum of Natural History.' They gladly had me over to look at their fossil plant collection, and I was just kind of blown away by the diversity of plants that these guys dug up in this housing development."

"As I was opening this drawer, I noticed this fruit with really striking patterns on its surface. I immediately recognized it as belonging to this lamiid family called Icacinaceae, which is wellknown in younger, post-Cretaceous deposits after the mass-extinction event. And I thought, 'Oh my God, this is it!' You know, this family of plants have just these really striking fruits."

Atkinson said the findings help establish that one of today's most diverse flowering plant groups survived the cataclysm that killed the dinosaurs and most other animal and plant species. They then evolved into thousands of familiar modern species, including vital food crops for humanity.

Atkinson, B.A., 2022. Icacinaceae fossil provides evidence for a Cretaceous origin of the lamiids. *Nature Plants*, pp.1-4

The clams that fell behind, and what they can tell us about evolution and extinction. (Press release, University of Chicago, May 30, 2023, for the complete story, go to

https://news.uchicago.edu/story/clams-fellbehind-and-what-they-can-tell-us-aboutevolution-and-extinction)

A new study led by scientists with the University of Chicago examined how bivalves—the

group that includes clams, mussels, scallops, and oysters—evolved among many others in the period of rapid evolution known as the Cambrian Explosion. The team found that though many other lineages burst into action and quickly evolved a wide variety of forms and functions, the bivalves lagged behind, perhaps because they took too long to evolve a particular adaptation they needed to flourish.



Micro-CT scans of 460-million-year-old bivalves Anomalodonta (left) and Vanuxemia (right), early members of the lineage that gave rise to scallops, mussels, oysters, cockles, quahogs, and many other species. Images courtesy Stewart Edie

The study has implications for how we understand evolution and the impact of extinctions, the scientists said.

The bivalves branched out slowly compared to other groups that originated at the time. "It's kind of amazing they made it through at all," said Jablonski. "Even after they got their act together and began to diversify about 40 million years in, they never showed a true explosion in species or ecologies." It's not clear why the bivalves lagged, but one possibility is that they hadn't yet evolved a key organ that allowed them to take off: an enlarged gill to filter out plankton from water, as so many bivalves do today. By the time they came up with this adaptation, the seafloor was much more crowded. But the bivalves do survive and even thrive today, despite their lag.

Knope, M.L., Heim, N.A., Frishkoff, L.O. and Payne, J.L., 2015. Limited role of functional differentiation in early diversification of animals. *Nature Communications*, *6*(1), p.6455.

CALENDAR OF EVENTS

June

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

Saturday, June 17, FIELD TRIP: Little Beard's Creek

July

Saturday, July 8, FIELD TRIP: **Pompey Center and Other Road Cuts** Saturday, July 15, FIELD TRIP 7:30 PM. **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 now 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.

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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. 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. -----



Artistic reconstruction of the Ordovician fossil Mieridduryn bonniae. Original artwork by Franz Anthony courtesy Harvard University.