Rochester Academy of Science™

BULLETIN

"An organization of people interested in the Natural Sciences"

November 2024; Vol. 78, #9

President's Message

Fall Paper Session

Coming up this month—our *50th Annual Fall Scientific Paper Session*.

RAS members may still register at https://rasny.org/paper-session. It is **free** to attend and morning refreshments await you. Meet us on November 16, 2024 at Edwards Hall, SUNY Brockport, 191 Holley St, Brockport, NY 14420 8 AM to 3 PM. There will be scores of fascinating research projects shown and discussed. Come hear our ***Larry King Memorial Lecture*** speaker Dr. John A. Tarduno on "***Did a magnetic field collapse trigger the emergence of animals?***"

* * *

More on Dr. John Tarduno:

John Tarduno is an influential scientist who is author or co-author of 329 research works that together have 6604 citations. His research centers on the application of paleomagnetism to problems in geodynamics, geomagnetism and environmental change. He has his PhD in geophysics from Stanford University (1987). He was the Assistant Research Geophysicist with Scripps Institution of Oceanography from 1990-1993, then joined the Department of Earth and Environmental Sciences at the University of Rochester, where he founded the Paleomagnetic Research Group and laboratory. He served as co-chief scientist on an ocean drilling cruise in the Pacific Ocean, and led field research in Australia, Botswana, India, Japan, Lesotho, New Zealand, South Africa, Swaziland, and Zimbabwe. He has also led scientific expeditions to the High Canadian Arctic and the Sahara.

John is the recipient of numerous honors, including election as Fellow of the American Geophysical Union and Fellow of the American Association for the Advancement of Science for "providing large-impact contributions to the study of Earth's paleomagnetic record and for a matching mentoring outreach to students in this geophysical discipline." He was awarded the Price Medal of the Royal Astronomical Society for investigations of outstanding merit in solid-earth geophysics in 2016 and the Petrus Peregrinus Medal of the European Geosciences Union in 2017. He also has a Guggenheim Fellowship.

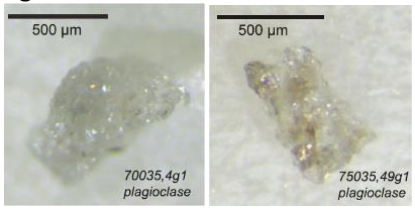
Dr. John Tarduno in front of the Ediacaran Nama sequence on the border of South Africa and Namibia. Photo courtesy of Dr. Tarduno

The Early Moon Magnetic Field

The Earth has a strong magnetic field but the moon has none. Scientists wonder if it ever did. The Earth's is imperfectly understood, but most scientists accept that the core works as a dynamo in which convective fluid motion driven by heat from radioactive decay in Earth's outer core moves conducting material (liquid iron) and generates an electric current, producing the magnetic field. The Moon has a metallic lunar core and it may have worked as a dynamo in early times.

The Paleomagnetic Research Group headed by Dr. Tarduno together with other contributors has recently reported that if it ever did, it did not last past about the first 140 million years of the Moon's existence. The paper, titled "*A lunar core dynamo limited to the Moon's first ~ 140 million years*" published in *Communications Earth & Environment*, *5*(1), 456.) is at https://www.nature.com/articles/s43247-024-01551-z.

Their study of ~3.7 billion-year-old (Ga) Apollo basalts 70035 and 75035 using single crystal paleointensity (SCP) found no magnetic evidence, nor did analysis of 3.97 Ga Apollo breccia 61016 and 4.36 Ga ferroan anorthosite 60025, indicating that there was no magnetic field at these times. If there ever was, it had to be earlier. A 2023 study set the Moon's age at >4.46 Ga. It could be 4.53 Ga.



Apollo crystal samples from basalts, left 70035, right 75035.

RAS Paper Session Schedule.
Saturday, 11/16
Edwards Hall, SUNY Brockport, 191 Holley St, Brockport, NY 14420
9-10:30AM Oral Presentations I
10:30AM-11:40PM Poster Session A
11:30AM-1PM Lunch – on-campus at cafeteria or bring your own.
11:40PM-1PM Poster Session B
1-2PM Welcome & Larry King Memorial Lecture. Edwards 109.
2-3PM Oral Presentations II

Events for November, 2024

Nov 1 Fri: Astronomy Members Meeting
7:30 p.m. – 9:30 p.m. RIT Image Science Building. Speaker: Steve Fentress, retired Planetium Director. Contact: Anthony Golumbeck at semp@use.startmail.com.

Nov 6 Wed: Astronomy Board Meeting
7:00 p.m. – 9:00 p.m. Farash Center. ASRAS Members are welcome to attend. Contact: Anthony Golumbeck at semp@use.startmail.com.

Nov 12 Tues: Fossil Meeting
7:00 p.m. Note earlier time. Meeting at Pittsford Community Center, room **019**, 35 Lincoln Avenue Pittsford, NY 14534 and on Zoom. Open to all RAS members and guests. Our guest speaker is Dr. Judy Massare, Professor Emerita, SUNY Brockport. She will speak on "The Charles Moore Collection of Lower Jurassic Ichthyosaurs." She will discuss how collections amassed in the 19th Century are still relevant to research today. Judy is one of the leading researchers and experts on Mesozoic marine reptiles, especially ichthyosaurs. For meeting details and Zoom login info, see the RAS November FossiLetter or contact Michael Grenier at paleo@frontier.com.

Nov. 13 Wed: Herbarium
12:00 p.m. - 3:00 p.m. The Life Sciences section will hold a workshop at the RAS Herbarium, located in the basement of the Rochester Museum and Science Center (RMSC). We will be continuing to organize plant specimens in preparation for digitizing the collection. If you plan to attend, please send an RSVP to rasherbarium@gmail.com. At RMSC go to the front desk to meet other participants. For more information, contact herbarium curators, Tim Tatakis and Steven Daniel, by emailing rasherbarium@gmail.com.

Nov 13 Wed: RAS Board Meeting
7:00 p.m. -9:00 p.m. Pittsford Community Center, room **206**, 35 Lincoln Ave, Pittsford. Zoom option available. For details, contact Michael Grenier at mgrenier@frontiernet.net.

Nov 17 Sun: Astronomy Open House
12:00 p.m. – 3:00 p.m. Farash Center, 8355 County Road 14, Ionia. Contact: Anthony Golumbeck at semp@use.startmail.com.

Nov. 26 Tues: Mineral Members Meeting
7:00 p.m. – 9:00 p.m. Pittsford Community Center. Room 19. 35 Lincoln Ave. Zoom optional. Dr. Paul Fitzgerald will speak about glacial erratics in Antarctica and how they help reveal the tectonic history of the continental interior hidden below the ice. Contact: Jutta Dudley,juttasd@aol.com.

STRASENBURGH OBSERVATORY:
ASRAS will operate the telescope at the Strasenburgh Planetarium on mostly clear Saturday nights, dusk until 10:30. For more information, contact: Jim Seidewand at (585) 703-9876.

Volunteer Needed
Help is needed in preparation for our annual Scientific Papers Session.

Classified Advertisement
⬇ Volunteer Opportunity ⬇
RAS Scientific Paper Session Help
Rochester Academy of Science, Rochester, NY.
Volunteers Needed at SUNY Brockport on November 16 to help with greeting and registration tables, monitor morning refreshments, guide attendees to session locations, photograph presenters, take down signs at end of day. Send note of interest - mgrenier@frontiernet.net.

Helix Nebula; Oct, 2024, Rick Albrecht

Aurora; Oct 10, 2024, Mike Naven

2020-2021 Undergraduate Student Research Grant Award Winner Paper Published

We are happy to report that the Honors Thesis from research that we funded was published in the prestigious *Proceedings of the Royal Society B* in 2023. Congratulations to John Deitsch, who graduated from Cornell in June 2022 and to his advisor and co-author Dr. Sara A. Kaiser.

Artificial light at night increases top-down pressure on caterpillars: experimental evidence from a light-naïve forest

by John F. Deitsch

John Deitsch conducting an experiment on the effects of artificial light at night.

Abstract: Artificial light at night (ALAN) is a globally widespread and expanding form of anthropogenic environmental change that impacts arthropod biodiversity by affecting individuals, populations and communities. ALAN is known to alter interspecific interactions including arthropod predation and parasitism, but it is not well understood how ALAN impacts top-down pressure on larval stages of arthropods such as caterpillars. In this study, I tested the hypothesis that ALAN increases top-down pressure on caterpillars from arthropod predators and parasitoids. I experimentally illuminated study plots in a light-naïve forest with low levels of LED lighting at the Hubbard Brook Experimental Forest, New Hampshire, May–Aug 2021. I measured predation rates on plasticine clay caterpillar models while sampling the response of the arthropod community with Malaise and pan traps. I compared clay caterpillar predation rates and daily catch rates of arthropod predators and parasites between experimentally-illuminated plots and control plots. I found that predation rates on clay caterpillar models, the abundance of predators in both Malaise and pan traps, and the abundance of parasitoids in pan traps were significantly higher on experimental plots than on control plots. These results provide experimental evidence that low levels of ALAN increase top-down pressure on caterpillars in a light-naïve forest. Although the specific mechanism by which ALAN impacts top-down pressure was unclear, the response of arthropod predators and parasitoids to new light sources was immediate. This study highlights the importance of examining ALAN impacts on earlier life stages to mitigate the effects of nocturnal light pollution on arthropod biodiversity.

Figure 2B) Plasticine clay caterpillar model beside live Heterocampa caterpillar.

Conclusion: This study shows that low levels of ALAN from solar powered LEDs increases top-down pressure on caterpillars from other arthropods. I investigated how ALAN impacts predation rates on plasticine clay caterpillar models while measuring the response of the arthropod community in a light-naïve habitat.

Figure 2C) Plasticine clay caterpillar model with Tachinid fly.

Parasitoid abundance increased significantly on experimental plots in pan samples, but parasitoid abundance did not significantly differ between treatments in Malaise samples, which is a less effective trapping method for some parasitoids. The results of this study provide further evidence that ALAN impacts top-down pressure in arthropods and highlights the need for further research investigating the specific mechanisms through which ALAN impacts predation and parasitism in arthropods. A more detailed understanding of how ALAN impacts arthropods of all life stages will allow us to mitigate the negative impacts of light pollution on arthropod biodiversity.

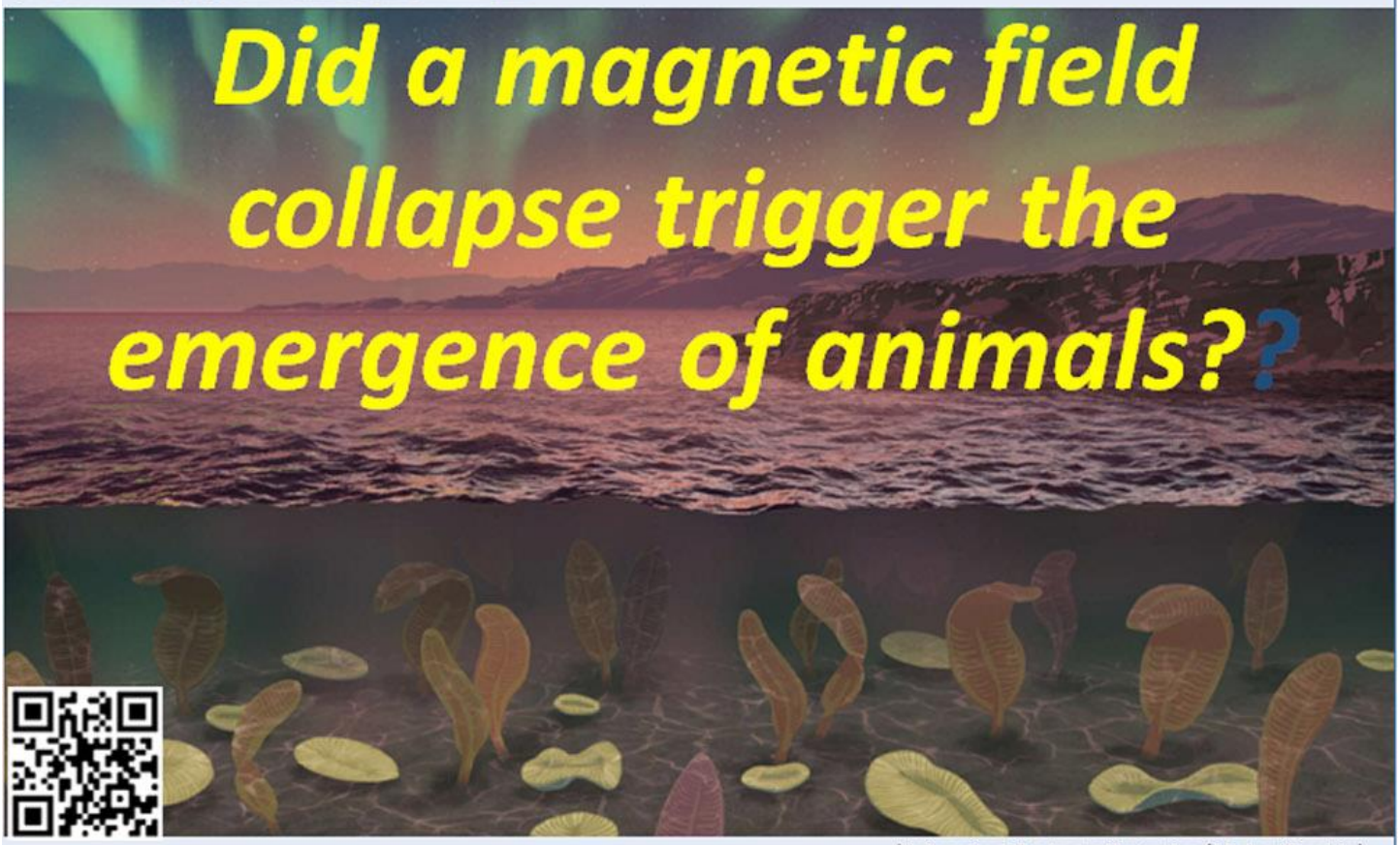
Figure 2G) live noctuidae (owlet moths) caterpillar observed in the study area among those used as model for plasticine clay caterpillars

To read the Introduction, Methods, Results, and Discussion, request the paper from paleo@frontier.com.

Rochester Academy of Science
Larry King Memorial Lecture

Dr. John Tarduno

William Kenan, Jr. Professor
Earth and Environmental Sciences
University of Rochester
Paleomagnetic Research Group



Scan for more information

(University of Rochester illustration / Michael Osadciw)

Public Lecture

▫ **Saturday, November 16, 2024** ▫

SUNY BROCKPORT

Edwards Hall, 191 Holley Steet

Brockport, NY 14420

1:00 p.m. ▫ Free

Aurora; Oct 10, 2024, Burney Baron

Aurora from Webster Park; Oct 10, 2024, Chris McNiffe

Comet Tsuchinshan-ATLAS, Oct 22, 2024, Mike Naven

Saturn, Oct 12, 2024, Kevin Lyons

Aurora; Oct 10, 2024, Kevin Lyons

Aurora from Webster Park; Oct 10, 2024, Dick Bennett

Rochester Research in Review.

(These are Hot Links which when clicked lead to the press release on the Science Daily website.)

Study finds widespread exposure to hormone-disrupting chemical during pregnancy. University of Rochester, October 17, 2024.

Immunotherapy boosts survival of advanced Hodgkin lymphoma. University of Rochester, October 17, 2024.

Neurons look different in children with autism, research finds. University of Rochester, October 9, 2024.

Turning brain cells on using the power of light. University of Rochester, October 3, 2024.

New research offers hope for preventing age-related blindness. University of Rochester, October 2, 2024.

Antibodies in breast milk provide protection against common GI virus. University of Rochester, October 1, 2024.

Plant CO2 uptake rises by nearly one third in new global estimates. DOE/Cornell; October 21, 2024.

Liquefied natural gas carbon footprint is worse than coal. Cornell University; October 3, 2024.

A tool to enhance the taste and texture of sourdough and study the complexity of microbiomes. Syracuse University; October 1, 2024.

Gene named for mythical Irish land could aid muscle function after traumatic nerve injuries. University at Buffalo, October 25, 2024.

Researchers show why cannabis policies should shift to a harm reduction, health promotion approach to safeguard public health. University at Buffalo; October 23, 2024.

Why do we love carbs? The origins predate agriculture and maybe even our split from Neanderthals. University at Buffalo; October 17, 2024.

For long COVID, lithium aspartate at low doses is ineffective, but higher doses may be promising, study finds. University at Buffalo; October 2, 2024

It all adds up: Study finds forever chemicals are more toxic as mixtures. University at Buffalo; October 1, 2024.

Culprit that turns classical Klebsiella pneumoniae into a devastating, drug-resistant killer. University at Buffalo; October 1, 2024.

Coral reef destruction a threat to human rights. University of Technology Sydney, UB Prof Co-author; September 30, 2024.

ABOUT THE ACADEMY

The Rochester Academy of Science™, Inc. is an organization that has been promoting interest in the natural sciences since 1881, with special focus on the western New York state region. Membership is open to anyone with an interest in science. Dues are minimal for the Academy and are listed in the membership application online. Each Section also sets dues to cover Section-related publications and mailings. We are recognized as a 501(c)3 organization.

For information, contact President Michael Grenier at (585) 671-8738 or by email paleo@frontier.com.
The Academy Internet website is http://www.rasny.org or see us on Facebook at https://www.facebook.com/Rochester-Academy-of-Science-792700687474549**.**

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