Rochester Academy of Science

BULLETIN

"An organization of people in the Natural Sciences"

June 2020 - Vol. 74, #6

President's Message

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change." -- quotation wrongly attributed to Charles Darwin.

Whether from our friend Charles or not, it is doubtless true. Adapt we must to changing environment and adapt your RAS indeed has. Our Astronomy Section immediately began remote virtual meetings with the April 3rd and May 1st meetings, including their planned speakers. The Fossil Section, unable to hold their April meeting, resumed virtually in May with larger than usual attendance. June's Fossil meeting is described on the right side of this page. Your RAS Board of Directors has missed no meetings and continues to plan upcoming events such as the Fall Scientific Paper Session, presuming that large gatherings may be feasible by then.

As announced last month, we still plan a live annual meeting in July in conjunction with **Roche*STAR* Fest.** If this becomes infeasible, we will plan an alternative means.

I continue to promote science education for mental health and growth. Most Science museums have developed excellent virtual outreach programs. I am using local museum programs, but these are offered nationwide. Enjoy visiting a museum now you might never get to otherwise.

Yours in Science,

Michael Grenier,
RAS President

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The June 2nd Fossil Section Meeting

will feature a presentation by
Benjamin F. Dattilo, Ph.D., Associate Professor at Indiana University-Purdue University Fort Wayne,
on the topic:

Revealing the Hidden Functions of Crinoid Columnals

All RAS Members are Invited to Join.
(See Calendar of Events on page 3 for event details)

Dr. Ben Dattilo. Photo credit: IPFW University.

Whole echinoderms (crinoids, sea stars, etc.) are made up of small mineralized skeletal elements called "ossicles" ("little bones") and include the ubiquitous crinoid columnals. These ossicles are unique in that each one is made up of what appears to be a single crystal of calcite with a spongy microstructure (holes about 1 micron across). This microstructure is called stereom.

Everyone who seriously collects marine fossils knows that most echinoderms fall apart before final burial, and that a fully articulated crinoid is not only a beautiful thing, but it is a rare thing. Less well known is that, as a rule, the beautifully articulated crinoid is generally not well preserved at the microscopic scale, and the spongy stereomic structure will be indecipherable.

This is a shame because the stereomic structure is associated with a variety of connective tissues: muscles, ligaments, and a "locking" ligament that is known only in echinoderms. Ligaments hold ossicles together; muscles are required for movement; and locking ligaments hold the complex skeleton rigidly in one position without fatigue for feeding or holding the animal to the seafloor. Therefore, the precise microscopic geometry of the stereom is very useful for reconstructing how extinct crinoids lived.

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The trick to preserving crinoid microstructure is to fill the tiny spaces with anything but calcite, because it is really difficult to tell the difference between the original calcite and the calcite filling. Pyrite provides much better contrast, and pyritization is pretty common under the right conditions. If the pyrite crystals are adequately abundant and if the crystals do not grow too large, then pyrite can reveal the structure pretty well. A rarer and much finer preservation occurs when the ossicle is filled with phosphate. I explore the very fine details of stereom structure in crinoid columnals that have been phosphatized.

Photo Right: A fossil of a typical crinoid, showing (from bottom to top) the stem, calyx, and arms with cirri. (www.fossilera.com)

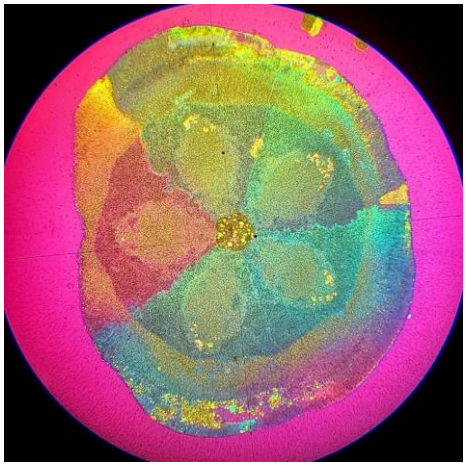

Photo Left: Image of ultra-thin cross section of Cincinnaticrinus (Late Ordovician, near Brookville, Indiana). Photo of 70 Million-year-old specimen taken with cell phone through eyepiece of a petrographic microscope. The pentameric structure is apparent. (*Collected by Christopher Aucoin.*)

Photo Below: Living crinoids. (Photo Credit: the Smithsonian Museum of Natural History)

For a video tutorial on crinoids, see the link below of Dr. Charles S. Messing, Professor Emeritus Nova SU Florida on: "Sea Stars on a Stick: Introducing Crinoids"

https://vimeo.com/410445885?fbclid=IwAR0OUTq_iqoS2-UVkjf9IjFvVptemETeywPhbM32Dzva-JtSQT2Kxs82pKM

NOTE: Dr. Datillo requires viewing of this as necessary "pre-reading" before attending his June 2nd talk.

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2019-2020 Undergraduate Student Research Grant Awardee:

Jack Polentes, Hobart & William Smith Colleges.
Investigating Triggers for Ecological Succession at Zurich Bog, NY During the Holocene.
Sponsor Tara M. Curtin, Ph.D.

Jack Polentes, Hobart & William Smith Colleges

The classic model of bog succession proposes that the slow infilling of a lake or pond by sediment and organic matter produces a predictable sequence of vegetation communities beginning with a fen community followed by bog vegetation and culminating in a mature upland forest. The succession processes are thought to be gradual and climate independent. My research assesses whether there was a gradual succession from lake to fen to bog, or whether this evolution from one successional stage to another was abrupt in the 500-acre Zurich Bog in Arcadia, NY, and whether regional climate changes such as the Late Holocene drying period drove ecological succession. I collected and analyzed a 10.66 m-long core from the bog to determine whether abrupt drops in water table triggered distinct transitions in the study site's paleoenvironments. The analysis revealed five distinct lithofacies, i.e. sediment types. The core bottomed in laminated grey lacustrine silty sand, which was overlain by banded organic-rich sediment layers classified as sapropel, herbaceous peat, and fragmental woody peat. I used bulk magnetic susceptibility, loss-on-ignition, and grain size to semi-quantify compositional changes that reflect shifts in the paleoenvironmental conditions over the last ~13,000 years. I used published Environmental Tolerance Indices of molluscs in the banded sapropel and sapropel lithofacies to infer the water chemistry, temperature, and water depth. Based on these gastropods observed in the core, *Valvata tricarinata, V. sincera,* and *Amnicola limosa,* a cool, shallow (~ 4 m deep), clear but eutrophic lake existed between 12,600 and 6,300 years ago. The stable oxygen isotope composition ($\delta_{18}O$) of one gastropod species, *V. tricarinata,* will be used to infer any shifts in the source of precipitation to the study site. Bulk organic carbon isotope ($\delta_{13}C$) analyses of the sphagnum moss will be critical for assessing fluctuations in water table. Atomic carbon:nitrogen ratios of bulk organic matter will be used to infer the stage of fen to bog succession. The ability to better understand these environments is essential for gauging the susceptibility of wetlands to future climate change and understanding how climate change affect ecological succession as a whole at Zurich Bog.

The grant paid towards the costs of Cornell University Stable Isotope Laboratory for analysis of organic samples (moss, sedge and lake algae) for weight % carbon, weight % nitrogen, and $\delta_{13}C$. It also covered costs of University of New Mexico's Center for Stable Isotopes analysis of *Valvata tricarinata* (gastropod) samples to obtain an average $\delta_{13}C$ and $\delta_{18}O$ for each sample depth.

Valvata tricarinata (www.conchology.be)

Jack writes, "Thank you so much for the acceptance of my proposal. This funding will go a long way toward growing my research and analyses of Zurich Bog. I truly feel very fortunate and lucky for this support."

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Events for June 2020

For updates to events, check the Academy website, http://www.rasny.org, and Section websites.

Due to COVID-19 government-advised social distancing precautions, RAS public meetings are being replaced by Zoom and other virtual meetings. In May, phase one of a four phase "return to normalcy" plan has begun, and the possibility of public meetings is expected to increase during the summer. So, stay tuned to RAS and Sectional emails and websites for updates.

NOT MEETING IN JUNE:

Anthropology Field Trips
Life Sciences Field Trips
Herbarium Group
Mineral Section
Strasenburgh Observatory
Astronomy Star Parties

2 Tues: Fossil Section Meeting

7:00 p.m. The meeting will feature a presentation by Dr. Ben Dattilo, Associate Professor at Indiana University-Purdue University, on Crinoids and will delve into little known microscopic and soft tissue features of this group. Meeting will be held remotely via ZOOM. All members of the RAS are welcome to attend this meeting to hear our speaker, an authority on living and fossil crinoids. RAS Members must register for the meeting with Dan Krisher, dlkfosil@gmail.com. Meeting details will be shared only to registered attendees via email and in the June issue of the Fossil Section Newsletter *Fossiletter*, which will be sent on request to any RAS member. Contact paleo@frontier.com for meeting details.

5 Fri: Astronomy Section Meeting

7:30 p.m. Meeting held remotely via Zoom. Speaker: David Bishop. Topic: Astronomy Year in Review. Meeting details will be shared via email. Contact: Mark Minarich at mminaric@rochester.rr.com.

10 Wed: Astronomy Board Meeting

7:00 p.m. Meeting held remotely via ZOOM. Meeting details will be shared via email. Contact: Mark Minarich at mminaric-@rochester.rr.com.

20 Sat: SUMMER SOLTICE

5:43 p.m.

EVENTS IN JULY

17 Fri 19 Sun: RocheStarfest

Main Speaker: Dr. Nicholas Warner will speak on the Mars InSight Mission. The general theme will be thirtieth anniversary of the Farash Center. RAS will have board elections, honor a new RAS Fellow, and welcome Dr. Richmond as a new director. Note: the ASRAS board will meet on June 3rd to decide whether or not to proceed with RocheStarFest, and how. Contact: Mark Minarich at mminaric@rochester.rr.com.

Certificate of Appreciation

Office of the Monroe County Executive

Proudly Presented To:

Academy of Science

For Your Participation In Monroe County Winterfest Two-Thousand & Twenty

On behalf of all attendees, thank you for spending your time with us, and helping us showcase all that Monroe County has to offer. The work that you do is a critical part in what makes the Greater Rochester Region a tremendous place to live and play. We thank you for your partnership, and look forward to continued collaboration in the future.

Signed On March Tenth in the Year Two Thousand and Twenty

Patrick A. Meredith
Monroe County Parks Department Director

MONROE COUNTY SEAL ROCHESTER, NY

Adam J. Bello
Monroe County Executive

Mineral Storage Shed Arrives at Ionia

by Jutta Dudley, Mineral Shed Project Leader and Mineral Section Program Coordinator

I am happy to announce that a much-needed storage shed for the Mineral Section's possessions was acquired and put into place on May 13th! Located on the Farash Observatory grounds, the shed sits on a crushed stone foundation laid in March, months after trees had been felled and the ground was cleared. Project planning began in September and the ensuing tasks were accomplished one step at a time, albeit two unexpected and lengthy waiting periods.

The shed will be filled with section owned specimens and equipment stored at the Dudley home. Paul Dudley is the section's Mineral Curator and heads the outreach activities so, as a result, our home became a depository! In the next phase of the shed project, we must sort and organize the items and determine how and when to transport it all to Ionia. The corona virus situation makes the time frame unknown.

(Photo Credits: Jutta Dudley)

The Shed is pulled up the gentlest slope on the south lawn by a motorized "mule" to its site at the edge of the woods.

The mineral storage shed in place.

In Memoriam

Robert Holmes Plass

RAS Fellow 1983.
Member Astronomy Section.
d. November 15, 2013, age 91.

Academy membership record keeper, Director, delegate to Rochester Council of Scientific Societies.

Face masks were a common sight in 1918 too, although advice about standing 6ft apart seems to have had little traction. Photo credit: www.thetimes.co.uk

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 e-mail 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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