Rochester Academy of Science

BULLETIN

"An organization of people in the Natural Sciences"

November, 2018 - Vol. 72, #9

RAS Scientific Paper Session Schedule

Saturday, November 10
Geneseo College

Contact: RAS@geneseo.edu

Parking: Free. Park in lots L, LL, or W:

https://www.geneseo.edu/pts/parking-map

8:30 a.m. Presenters sign-in. Refreshments for all attendees. Bailey Hall.

9:30 a.m. – 12:30 p.m. Oral Presentations followed by Poster Session. Bailey Hall & Newton Hall.

12:30 p.m. Box lunch, optional. $10.00. Newton Hall.

Lunch Reservation required by November 5. Online payment only. Go to http://go.geneseo.edu/RASregister

1:00 p.m. Welcome & Larry King Memorial Lecture. Newton Hall 204.

The Cretaceous catastrophe, millions of years of evolution, the breeding talent of humans, and a good cook led to the tasty treat displayed at your table. Enjoy!

Happy Thanksgiving!

RAS Scientific Paper Session Lecture

Join us for an enlightening talk about newly dated glacial activity in western New York at the end of the "Ice Age!"
The end of the "Ice Age" was a time of climatic instability. About 13,300 years ago, as the continental ice sheet was in retreat, the glacier re-advanced well into Livingston and Cattaraugus Counties. Evidence from ^{14}C dated wood samples and thin layers of till deposits that did not transform the landscape, are part of the story we will hear from Dr. Young. The new findings will cause reconsideration of the overlapping time frame proposed for glacial Lake Iroquois. He'll also share with us how the timing of these events can be compared with the climate record derived from Greenland's ice cores.

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About our Speaker

Dr. Young is a professor of Geological Sciences at SUNY Geneseo since 1966 and has continued his Arizona and New York research to the present, with 75 peer-reviewed publications. Besides participating in photogeological studies for the Apollo 15-17 lunar landings for NASA during the 1970s, he concentrated on revising the Quaternary and recent geologic history of the Genesee Valley and western New York, when not continuing his summertime Arizona field research.

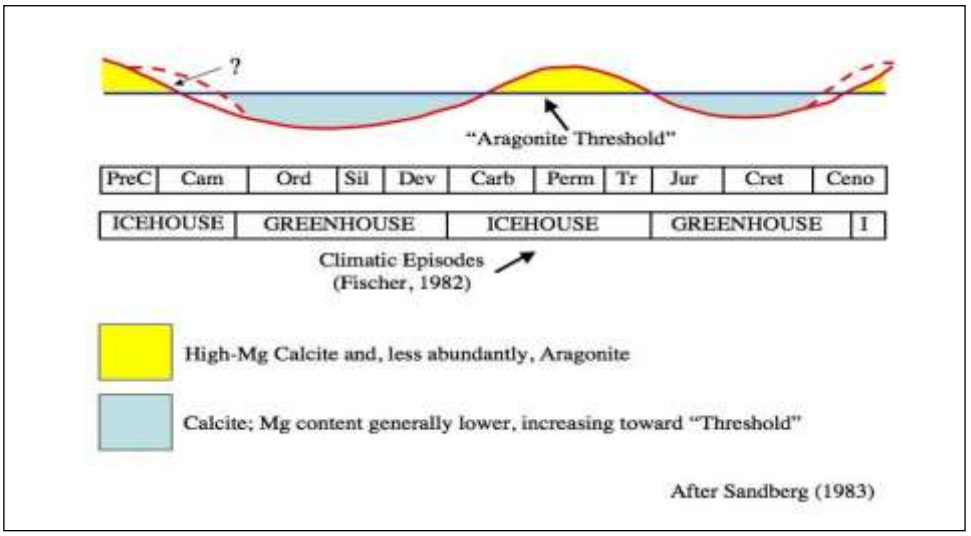
The Calcite and Aragonite Sea Cycle.

By Dan Krisher

The chemistry of earth's oceans has varied throughout geological time and these changes have had a profound effect on the development of the ocean's ecosystems. Perhaps the most significant aspect of changing ocean chemistry has been the quantity of low magnesium calcite and aragonite/ high magnesium calcite dissolved in the ocean water. Calcite and aragonite are termed polymorphs. They have the same chemical composition, $CaCO_3$, but calcite exhibits a trigonal crystal structure whereas aragonite has an orthorhombic structure. The differences in crystal structure have a significant effect on the stability of the two polymorphs, with calcite being substantially more stable than aragonite.

The ratio of these polymorphs has been cyclical throughout earth's history and this cyclicity has given rise to the concept of calcite and aragonite seas as shown by the chart on right. A calcite sea has a large portion of its $CaCO_3$ in the form of low magnesium calcite with lesser amounts in the form of aragonite/ high magnesium calcite. In an aragonite sea this ratio is reversed with aragonite/ high magnesium $CaCO_3$ becoming more important.

A primary driver of the cycle appears to be the rate of seafloor spreading. An active phase of seafloor spreading increases the amount of basalt being created at the mid-ocean ridge spreading centers. The minerals in the basalt react with the magnesium dissolved in the ocean water, pulling it out of circulation, thereby driving ocean chemistry into a calcite sea phase. A slowdown of seafloor spreading allows increased amounts of magnesium to remain dissolved in the ocean water thereby pushing ocean chemistry into an aragonite sea.



Increased seafloor spreading and the attendant increase in volcanism also increases the amount of CO_2 in the atmosphere and dissolved in the oceans. The increased CO_2 increases the acidity of the ocean and favors the formation of a calcite sea. As can be seen from the chart above, the increased CO_2 also results in a greenhouse (warmer) phase for the earth's climate in correlation with the calcite sea.

Biomineralizing organisms in the oceans are significantly affected by the calcite – aragonite ocean chemistry cycle. The creation of a hard shell or skeleton is energetically expensive and organisms which secrete skeletons or shells chemically similar to the prevailing ocean chemistry are always favored. Brachiopods, rugose corals and tabulate corals produce shells and skeletons of calcite and are naturally favored in a calcite sea. Mollusca such as clams (bivalves) and snails (gastropods) and scleractinian corals produce aragonite shells and skeletons and are favored in aragonite seas. This does not mean aragonitic organisms cannot occur is a calcite sea, only that it is energetically more expensive for them to create their shells or skeletons leaving them at somewhat of a physiological disadvantage.

Finally, the fossil preservation record itself is impacted by the calcite-aragonite sea cycle. Calcite fossils are inherently more stable in a calcite sea and more likely to be preserved with the same being true for aragonite fossils in an aragonite sea. This effect can be observed when collecting Middle Devonian fossils in New York. The Devonian was a time of calcite seas and the calcite brachiopods and corals are typically well preserved while the less stable aragonitic bivalves are often just molds or impressions with little or no original shell material.

Calcite Brachiopods

Aragonite Mollusca

Events for November 2018

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

2 Fri: ASTRONOMY SECTION MEETING
7:30 p.m.–10:00 p.m. RIT Carlson Center for Imaging Science, CAR-1125. Lot F. ***(NOTE new location)***. Main speaker: Dr. Segev Y. BenZvi, UR, Physics. Topic: "In the Mystery of Positrons, Dark Matter is the Leading Suspect". Snacks available at 7:00 p.m. Contact: Mark Minarich (585) 257-6042.

5 Mon: ASTRONOMY BOARD MEETING
7:00 p.m. UR, Bausch & Lomb Hall, 4th floor Chart Room. All ASRAS members welcome. Contact: Mark Minarich (585) 257-6042.

8 Thurs: ANTHROPOLOGY SECTION
7:30 p.m. Memorial Art Gallery. AIA Lecture by Dr. Stephen Batiuk, "Exploring the Roots of the Vine: The History and Archaeology of the Earliest Wines." Contact: Alex Smith (585) 750-3329.

10 Sat: RAS FALL SCIENTIFIC PAPER SESSION
8:30 a.m. - 2:00 p.m. Geneseo College. Oral and Poster Sessions, 9:30 a.m. -12:15 p.m. Lecture by Dr R. Young, 1:00 p.m. See this Bulletin for details. Contact: Jutta Dudley, (585) 385-2368 or Dan Krisher, (585) 698-3147.

13 Tues: FOSSIL SECTION MEETING
7:30 p.m. Brighton Town Hall., Downstairs Meeting Room. (***PLEASE NOTE***: The Fossil Section meeting is rescheduled due to Election Day). Our speaker will be Dr. Jacalyn Wittmer Malinowski, Assistant Professor in the Geology Department at SUNY Geneseo. The subject of her talk will be her ongoing work on Ordovician reefs. Refreshments will follow. If you have any questions, please contact Dan Krisher at DLKFossil@gmail.com or at (585) 698-3147.

14 Wed: LIFE SCIENCES HERBARIUM WORKSHOP
1:00 p.m. – 4:00 p.m. Basement of the Rochester Museum and Science Center (RMSC). No experience necessary. At RMSC front desk have staff person call ext. 368 in the Herbarium. If you'd like to attend, or for more information, contact herbarium curator: Elizabeth Pixley, (585) 334-0977 or eypixley@gmail.com).

14 Wed: RAS BOARD MEETING
7:00 p.m. Brighton Town Hall, Stage Conference Room.

18 Sun: ASTRONOMY PUBLIC OPEN HOUSE
12:00 p.m. - 4:00 p.m. (or later, if skies are clear). Marian and Max Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 1447. For cancellations or changes contact: Mark Minarich; (585) 257-6042, or see: www.rochesterastronomy.org/calendar-of-events

20 Tues: MINERAL SECTION MEETING
7:00 p.m. Brighton Town Hall, Downstairs Meeting Room. Geologist William Glynn presents "Geology and Geophysics of Oil and Gas Resources in NYS." You'll learn about NYS's history of oil and gas exploration and development, geophysical techniques, producing formations, their source rocks and structures that lead to an accumulation of oil and gas. Join us for an educational evening, door prizes and refreshments. Contact: Stephen Busschaert, (585) 351-7633.

22 Thurs: *THANKSGIVING!*

ONGOING EVENTS

STRASENBURGH OBSERVATORY
ASRAS will operate the telescope at Strasenburgh Planetarium on mostly clear Saturday nights. Contact: Jim Seidewand (585) 703-9876.

ASTRONOMY STAR PARTY
ASRAS hosts public outdoor star parties once a month on Fridays, either at Mendon Ponds Park or Northampton Park near Brockport. Notices are posted on the prior Wednesday at the ASRAS Facebook page, and www.rochesterastronomy.org/calendar-of-events, or, contact Jim Seidewand, (585) 703-9876.

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Happy Thanksgiving

Rochester Academy of Science
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For information, contact President Jutta Dudley at (585) 385-2368 or by e-mail: pres@rasny.org.

The Academy Internet website is
http://www.rasny.org
Or see us on Facebook at https://www.facebook.com/RochesterAcademyof Science**.**

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