

The FOSSILETTER

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May 2021

May Meeting

The May section meeting is on Tuesday, May 4, at 7:30 PM. This meeting will be conducted as a virtual meeting on Zoom. Details on how to login in are in the accompanying email.

Dr. Ben Dattilo spoke with us last June on crinoids and the structure of their columnals. It was absolutely fascinating, so we have invited him back to talk with us again. We have not had a talk on brachiopods in a long time, and he has some very interesting research on these, so he will share this with us.

Some will say, "But brachiopods are boring!" Not so. This is presented as a detective story—essentially, what do we observe and what can we conclude about the way these creatures actually lived in their habitat. (As Sherlock Holmes noted in instructing Watson in "A Scandal in Bohemia" on the difference between seeing and observing: [Watson] "*I am baffled until you explain your process. And yet I believe that my eyes are as good as yours.*" [Holmes] "Quite so," he answered, lighting a cigarette, and throwing himself down into an armchair. "You see, but you do not observe. The distinction is clear. For example, you have frequently seen the steps which lead up from the hall to this room." "*Frequently.*" "How often?" "*Well, some hundreds of times.*" "Then how many are there?" "*How many? I don't know.*" "Quite so! You have not observed. And yet you have seen. That is just my point. Now, I know that there are seventeen steps, because I have both seen and observed.") The brachiopod will be a case study in observing the clues, a technique to apply to other fossils.

If you have ever collected fossils in New York, you have doubtless picked up some Strophomenida brachiopods. Strophomenida is an order of articulate brachiopods that occurred from the lower Ordovician to the lower Jurassic period, and they are common in Devonian rock.

Strophomenids usually have large, semicircular shells, with one concave and one convex valve. A short, flat interarea borders the hinge region, and the hingeline is straight. We might ask, "*What use is that concave shell and doesn't it just make the space in which they live very small? How could they attach to the bottom with no pedicle? How exactly did these creatures make a living on the Paleozoic ocean bottom?*" Yet they were very successful—they were the largest order of brachiopods, with over 400 known genera, and they lasted about 300 million years.

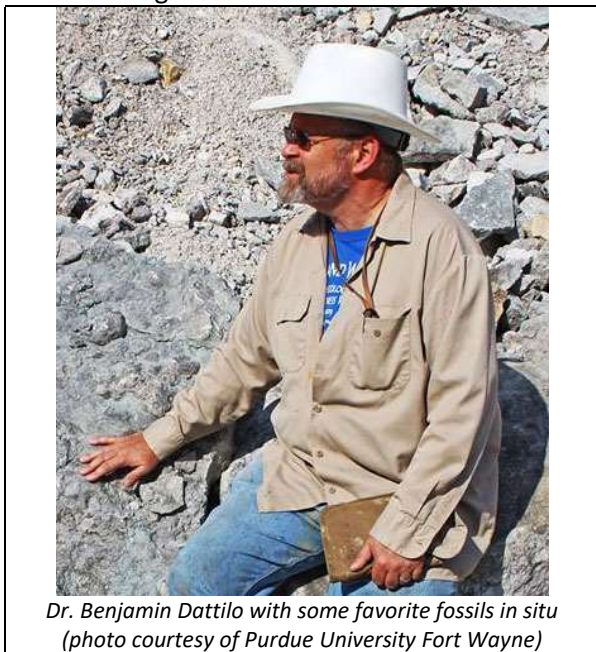


Common New York examples—Top left, *Devonochonetes coronatus*, top view, mid-Devonian, Lower Wanakah Shale. Top right, *Megastrophia concava*, mid-Devonian, Lower Wanakah Shale. Bottom, *Douvillina inacquistriata*, mid-Devonian, Tichenor Limestone, edge on, showing concave upper shell and convex lower shell.

Ben will use the Upper Ordovician strophomenid brachiopod *Rafinesquina* for his case study. This is a large brachiopod that existed from the Mid-Ordovician (Darriwilian) to the Late Silurian (Ludlow epoch) which he collects in the rocks of the Cincinnati Series. He will review the debate over the life position of these strophomenid

brachiopods and the various theories that have been proposed. The hinge structure has key clues to the life positions of *Rafinesquina* and other concavo-convex brachiopods as well. His talk is entitled, "*Mind the Gape: the hinge structure of Rafinesquina and its implications for strophomenid life strategies.*"

Ben is Associate Professor (and Distinguished Lecturer) at Indiana University-Purdue University Fort Wayne. He is a stratigrapher and paleontologist with a particular interest in the ecology and environments of the early Paleozoic. He concentrates his research efforts on the Upper Ordovician (450 million years old) deposits of the Cincinnati region.



Dr. Benjamin Dattilo with some favorite fossils in situ (photo courtesy of Purdue University Fort Wayne)

President's Report by Dan Krisher

The Section's April meeting was held via ZOOM on 4/6. The Section president was unable to attend due to a prior commitment, so the meeting was run by vice-president Michael Grenier. The meeting consisted of a brief business portion followed by the evening lecture. The speaker for the evening was Dr. William Ausich, Professor Emeritus of Earth Sciences at the Ohio State University. The title of Dr. Ausich's talk was "Extreme Crinoids".

Fossil Section May Field Trips

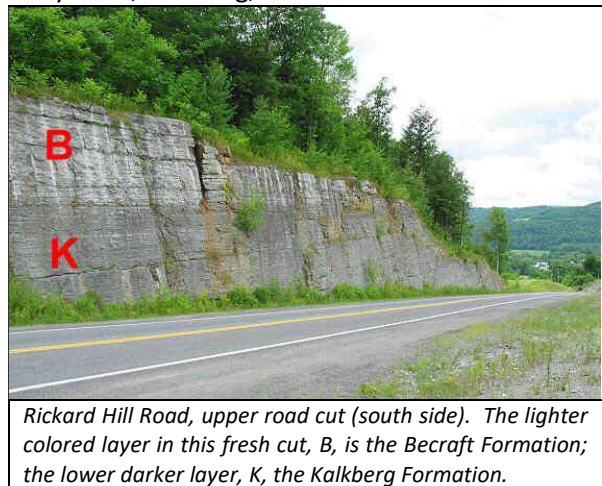
by Dan Krisher

If you are interested in either or both of these, contact me at DLKFossil@gmail.com as soon as

possible. I will also put reminder notes out on email to the whole section.

May 8th - Rickard Hill and Others: This family-friendly site is a large road cut near Schoharie, New York southwest of Albany. This is a long day trip to collect in the Lower Devonian Helderberg Group. Once again brachiopods, corals, snails, sponges, and trilobites can be found but will be different genera and species from what was found earlier in the season. We will meet there and make a stop or two at other sites on the way home. Also, if there is interest, we may go to the nearby Gilboa Devonian Forest site 30 miles to the southwest.

The Helderberg Group at Schoharie, NY is part of the exposed strata of the Lower Devonian stretching in New York State in a narrow band from Port Jervis to the Helderberg Mountains southwest of Albany and west to Syracuse. The carbonate-rich sediments that became these rocks were deposited in shallow warm seas. The Helderberg Group limestones and calcareous shales are most accessible for study at a road cut on Rickard Hill Road east of Schoharie, Schoharie County, NY. The formations of the Helderberg Group exposed at this location are (from lowest to highest) the Coeymans, Kalkberg, and Becraft Formations.



Rickard Hill Road, upper road cut (south side). The lighter colored layer in this fresh cut, B, is the Becraft Formation; the lower darker layer, K, the Kalkberg Formation.

Grabau (1906) lists 115 species at this site. These include 4 coral species, 2 conularia, 6 bryozoa, 8 crinoids, 38 brachiopods, 28 gastropods, 15 pelecypods, 4 cephalopods, and 9 trilobites.

For more information, see Karl Wilson's website bingweb.binghamton.edu/~kwilson/Devonian/DevSites/Schoharie/Schoharie.htm from which much of this information and the photo of the road cut were taken.

May 22nd - Road Cuts Near Tioga, PA. A series of large road cuts near Tioga PA exposes Upper Devonian strata. The rock is primarily siltstone and sandstone and contains a fauna of brachiopods and bivalves. These sites were visited during the 2017 New York State Geological Association annual meeting in 2017. At these sites, the exposed formations include the Chemung, Catskill, and West Falls.

These coastal paleo-environments included near shore marine settings and large rivers and small streams that periodically flooded, producing muddy floodplains and swamps. When these floods occurred, ancient fish that lived in these waterways were pushed out onto the floodplain, died, were covered by sediments, and preserved. As floods receded, plants colonized the mud that also preserves trackways of invertebrate animals.

At these road cuts, you will find various fossils such as brachiopods, pelecypods, crinoids, bryozoa, plants, and fish parts including fins, spines, and scales (*Bothriolepis*, *Holoptychius*, *Sauripteris*, *Sterropterygion*, *Ganorhynchus*, and *Dipterus*)

Fossil Section Election – Need Volunteers

It is once again time for the Fossil Section to nominate its slate of officers for the 2021-2022 year. \PLEASE consider helping and nominate yourself to be President, Secretary, or Board member. We promise that it is not much work! If you might be interested in running for any of these positions but would like additional information as to the duties and time involved, please contact one of the current Officers or Board members. The finalized ballot will appear in the June newsletter. Current RAS Fossil Section Officers are listed on last page.

April Meeting – Extreme Crinoids by Michael Grenier

We had a very engaging talk on April 6 by William Ausich, who has studied crinoids since he was in college and has encountered many unusual species over the years. After giving a summary lesson on crinoid normal physiology and ecology, including that they depend on currents to bring the food to them, he reviewed many that deviated

from that. Some had helically coiled stems. Others lay the stems along the seafloor with the calyx and arms recumbent on it. Crinoids create tiers on the seafloor, dividing up the feeding space, so very short stemmed (or no stem) crinoids feed at the bottom with longer stemmed ones higher up in the water column. *Seiocrinus* had very long stems, 20 meters or more, and attached to driftwood to feed on plankton and particles at the sea surface.



18 m long specimen of the crinoid *Seiocrinus* from the Holzmaden Shale. Umwelt Museum Hauff, Holzmaden. Attached to a floating log! (Courtesy of John Nudds Twitter @LagerstattenJohn)

Modern crinoids are included and Dr. Ausich showed videos of swimming crinoids and one now well-known of a deep sea crinoid (*Neocrinus decorus*) crawling on the bottom to escape a predator, dragging its columnal stem behind it.



www.youtube.com/watch?v=cZcomBnNKXg

Although we had 52 people in attendance, there were more who had wanted to attend. Dr. Ausich graciously offered to repeat the talk on April 22nd, and another 46 people attended that one.

Fossil News by Michael Grenier A *Teratophoneus T. rex?* Really?

This is a case study in misreporting of fossil news, appearing in the Rochester Democrat & Chronicle.

I do not blame the D&C as they simply published what was sent by their parent Gannett Corporation. Why does it matter? Because many dinosaur-loving children, who self-identify as their family's dino experts, happily reported the finding of a major *T. rex* site to their friends and families, only to learn, eventually, that they were given wrong information, however inadvertently. Believe me, these kids know the difference between *Tyrannosaurus rex* and *Teratophoneus curriei*. In fact, I first heard of *Teratophoneus* a few years back from an enthusiastic 12-year-old. Facts matter. Dinosaurs are regarded as the "gateway drug" to hard science. Hook a kid on these fascinating critters and in 10-15 years you'll have a physicist or chemist or something. Betray them, and who knows?

The article that appeared in the D&C is reproduced in full here. Read the article and determine how many *T. rex* were found by Dr. Alan Titus of the Bureau of Land Management and his team. *Five*, right? But, if you read the original BLM press release, you will get a different answer—none. *T. rex* isn't even mentioned in the release. Although they found a type of tyrannosaur, they did not find any *T. rex*, which would not exist for another 10 million years. In birdwatching, this would be akin to telling a reporter that you saw an osprey and have them report in print that you saw a California Condor.

So, here's a little bit on tyrannosaur phylogeny, then on to the real news. *Tyrannosaurus rex* was, of course, the first dinosaur found of this lineage, the latest (~68-66 Ma), and was apparently extant right up until the end-Cretaceous mass extinction. Naturally, it was descended from a long line of other related animals, which take the family name Tyrannosauridae from *T. rex*. At least 29 distinct species have been identified, spanning 100 million years. The earliest tyrannosaurs, *Proceratosaurus bradleyi* and *Kileskus aristotocus* are from the late Jurassic (~166 million years ago). *Proceratosaurus* was one of the first dinosaurs found in England, was called *Megalosaurus*, and was featured as "life-like" sculpture with *Iguanodon* at the 1851 Crystal Palace exhibition. Found in Russia *Kileskus* was published in 2010. *Guanlong wucaii* (China 2006) is another late Jurassic member (~160 Ma)

and appears to have had feathers. The two nearly complete *Dilong paradoxus* (Liaoning, China, 2006) specimens are from the early Cretaceous (~126 Ma) and they are known to have had feathers as did the much larger *Yutyrannus huali* (China, 2006) of about the same age (~125 Ma). *Teratophoneus curriei* (Utah 2011) is a closer relative of *T. rex*, about 10 million years earlier (~77 Ma).



"Hollywood" specimen *Teratophoneus* skull, discovered approximately two miles north of the "Rainbows and Unicorns Quarry" on Grand Staircase-Escalante National Monument.

Delete the *T. rex* references, and the article basically gets the news right. Although not announced until publication of the paper on April 19, the team has been working this site since 2014, to excavate the specimens and to do detailed analysis of the sedimentology, stable carbon and oxygen isotopes, and concentrations of rare earth elements within the bones and rock. The BLM press release from which the article is written is at: <https://www.blm.gov/press-release/evidence-indicates-tyrannosaurs-may-not-have-been-solitary-species-after-all>

For a much more detailed report of the project, with many photos, see <https://www.stgeorgeutah.com/news/archive/2021/04/20/ajt-new-findings-from-grand-staircase-escalante-indicate-that-tyrannosaurs-may-have-hunted-lived-in-groups/#.Ylifp6EpDIW>

Last month, the day before the paper was released and the news hit, Dr. Alan Titus spoke to the New York Paleontological Society on this find. Don Phillips, NYPS President, has graciously permitted us to access the recording of the talk. https://nyu.zoom.us/rec/share/uPh4plhf8J2a_PcFQ9Mf1eZA-b7KS6oS-rFfBlzwlier5GY7X51Ht1vIUwbraOB.1bD1Fn9h1XH6F-s2. The NYPS business meeting runs until 17:00,

First T. rex mass death site in southern US discovered in Utah

K. Sophie Will

St. George Spectrum & Daily News
USA TODAY NETWORK

ST. GEORGE, Utah – The Tyrannosaurus rex may not have been as solitary as we believed.

In a groundbreaking discovery of the first T. rex mass death site in the southern U.S., announced Monday by the Utah Bureau of Land Management, scientists found evidence of packlike behavior among the famous ancient predator in the Grand Staircase-Escalante National Monument.

“The new Utah site adds to the growing body of evidence showing that Tyrannosaurus were complex, large predators capable of social behaviors common in many of their living relatives, the birds,” said Dr. Joe Sertich, curator of dinosaurs at the Denver Museum of Nature & Science.

“This discovery should be the tipping point for reconsidering how these top

carnivores behaved and hunted across the northern hemisphere during the Cretaceous.”

In the past, paleontologists have long debated whether the huge dinosaurs lived and hunted alone or in groups.

However, with other findings of pack formations in Alberta, Canada, and Montana, the Utah finding may fossilize the belief of a social T. rex.

In the Canadian discovery, 12 individuals found over 20 years ago by Dr. Philip Currie, many scientists doubted T. rexes had the brainpower to organize into anything complex and thought it was an isolated case. Montana’s site built upon the social theory, but now this third site may bring more certainty to the idea.

At the Rainbows and Unicorns site in the Kaiparowits unit of the monument, named for the unbelievable discoveries found there, scientists have been working toward the social dinosaur conclusion since 2014. “We realized right away



This illustration shows how Tyrannosaurus rex bones were found by scientists at Grand Staircase-Escalante National Monument. PROVIDED BY UTAH BUREAU OF LAND MANAGEMENT

this site could potentially be used to test the social tyrannosaur idea. Unfortunately, the site’s ancient history is complicated,” said Dr. Alan Titus, a BLM paleontologist.

A pack of four, possibly five, Teratophoneus T. rexes seemed to have died in a seasonal flood after a slow-burn fire

between 66 million and 100 million years ago. Turtles, fish, rays, alligators and two other kinds of dinosaurs were also found during the dig.

Later, their bones were exhumed by a flowing river and reburied, making the find more perplexing.

The research of Dr. Celina Suarez, an associate professor of geology at the University of Arkansas, and her former Ph.D. student, Dr. Daigo Yamamura, definitively showed the dinosaurs were moving in a pack.

“None of the physical evidence conclusively suggested that these organisms came to be fossilized together, so we turned to geochemistry to see if that could help us,” Suarez said. “The similarity of rare earth element patterns is highly suggestive that these organisms died and were fossilized together.”

Excavation will continue “into the foreseeable future,” according to a news release, and will include more research into the T. rex’s behavior.

so you may want to skip that and start with the introduction to the talk. You MUST contact me to get the password which is being kept secure.

This paper (Titus, A.L., Knoll, K., Sertich, J.J., Yamamura, D., Suarez, C.A., Glasspool, I.J., Ginouves, J.E., Lukacic, A.K. and Roberts, E.M., 2021. **Geology and taphonomy of a unique tyrannosaurid bonebed from the upper Campanian Kaiparowits Formation of southern Utah: implications for tyrannosaurid gregariousness.** *PeerJ*, 9, p.e11013) can be downloaded free from <https://peerj.com/articles/11013/>



Final topcoat going onto the skull jacket at the Rainbows and Unicorns Quarry. Right, Dr. Alan Titus (BLM photo courtesy of Alan Titus).



In this artist's rendering, bodies of dead Teratophoneus lie in the wetland region where they were likely killed by a flood. A Deinosuchus feeds on one carcass in the top right. Illustration by Victor O. Leshyk, St. George News

Amber-encased fossil shines light on evolution of bioluminescent insects

Given “The Wondrous World of Fireflies” talk at our April 13 annual meeting by Dr. Sara Lewis, I thought you would enjoy a paper on the oldest fossil firefly. If you haven’t seen the talk, it is at: <https://youtu.be/u67Da1QQyEs>. The recording started a little late and is about an hour long. This report is sourced from Science Daily with editing.

Most light-producing beetles are soft-bodied and quite small, and so have a scant fossil record. Trapped in Myanmar amber for ~100 million years, this exceptionally well-preserved, light-producing beetle with even the intact light organ on its abdomen, sheds light on the diversification of bioluminescent beetles in the Cretaceous.

With over 3,500 described species, light-producing beetles are the most diverse

bioluminescent terrestrial animals. Fireflies, fire beetles, glow-worm beetles and their kin use light to ward off predators, attract mates, and some females even use it to attract unsuspecting males to eat. Historically, despite their diversity, the evolution of bioluminescence in beetles has been poorly understood.



Fig 1. (a,b) *Cretophengodes azari* dorsal and ventral views under incident light, arrowhead showing the photic organ.

The majority of light-producing beetles fall into the giant superfamily Elateroidea with some 24 thousand known species and thousands more awaiting to be described. This extinct firefly is a relative of both Rhagophthalmidae and Phengodidae living firefly families. This beetle provides the link between these families and helps scientists understand how these beetles evolved and how they should be classified.

The team hypothesizes that light production initially evolved in the beetle's soft and vulnerable larvae as a defensive mechanism to ward off predators. The fossil shows that by the Cretaceous, light production was taken up by the adults as well. It could have then been co-opted to serve other functions such as locating mates.

This paper (Yan-Da Li, et al. **Cretophengodidae, a new Cretaceous beetle family, sheds light on the evolution of bioluminescence**. *Proceedings of the Royal Society B: Biological Sciences*, 2021; 288 (1943): 20202730 DOI: [10.1098/rspb.2020.2730](https://doi.org/10.1098/rspb.2020.2730)) can be purchased from the Royal Society or you can contact the editor for a copy.

CALENDAR OF EVENTS

May

Tuesday May 4, FOSSIL MEETING 7:30 PM. Virtual Meeting on Zoom Speaker is Dr. Ben Dattilo on the life habits of *Rafinesquina* brachiopods. Visitors welcome.

Saturday, May 8, Rickard Hill, Schoharie, NY and other sites Field Trip.

Saturday, May 22, Road Cuts Near Tioga, PA Field Trip.

June

Tuesday June 1, FOSSIL MEETING 7:30 PM. Virtual Meeting on Zoom. Speaker is Dr. Scott MacLennan, with geologic evidence for Cryogenian icehouse Earth & global glaciation ~751 Ma ago. Visitors welcome.

Saturday, June TBD, Portland Point Field Trip.

Saturday, June TBD, Little Beard's Creek Field Trip.

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

ROCHESTER ACADEMY OF SCIENCE FOSSIL SECTION

Monthly meetings will be held on Zoom until at least June 2021. Meetings are held the first Tuesday of each month from October to December and from March to May at 7:30 pm. In person meetings, when they can be held again, are at the Brighton Town Hall, Community Meeting Room, 2300 Elmwood Avenue, Rochester, NY unless otherwise listed.

OFFICERS

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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
FossilLetter Editor: Michael Grenier	585-671-8738	mgrenier@paleo.com

The FossilLetter is published before each meeting month of the year. Please send submissions to mgrenier@frontiernet.net or by U.S. Postal Service mail to 692 Maple Drive, Webster, NY 14580. Deadline for submissions to the FossilLetter 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.

PHOTO RIGHT: *Mascot Bruno supervises the Teratophoneus excavation on the Rainbows and Unicorns Quarry dig site.*

