

# The FOSSILETTER

VOL. 38

Number 8

June 2021

## June Meeting

The June section meeting is on Tuesday, June 1, 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.

We have as our guest Dr. Scott MacLennan, who received his Ph.D. from Princeton, recently completed post-doctoral work at the University of Rochester, and is now in a post-doctoral position at the University of Arizona in Tucson. President Dan will conduct some business, mostly on field trips, and then Scott will speak to us on his researches in the Cryogenian (from Greek κρύος (*krýos*), meaning "cold" and γένεσις (*génesis*), meaning "birth"—*think really, really cold!*) and even some earlier occurrences of similar cold climate. His talk is titled, "An introduction to global glaciations, Earth's most extreme climate change events"



Dr. Scott MacLennan

As Scott writes, "Geological evidence suggests there were periods deep in our planet's history where Earth was entirely covered by glaciers. These events, termed 'Snowball Earths', imply a radical breakdown of the negative feedbacks that have kept Earth's climate relatively clement over its entire 4.5-billion-year history. In this presentation

I will briefly discuss fundamental controls on Earth's long term climate stability, summarize the evidence that supports the 'Snowball Earth' hypothesis and what the potential drivers of such extreme climate change may be. Finally, I will discuss some new exciting results that I helped to collect that are changing our understanding of what we think Earth's climate was like before the most recent Snowball Earth episode."

You likely know by now that geologists are dividing up the Precambrian into periods the same as the Paleozoic, Mesozoic, and Cenozoic are. The Ediacaran Period was the first formally designated. It was ratified in 2004 by the International Union of Geological Sciences, making it the first new geological period declared in 120 years. It covers the time from 635 million years ago (Mya) to the beginning of the Cambrian Period 541 Mya. It represents the time from the end of the global Marinoan glaciation to the first appearance worldwide of somewhat complicated trace fossils (*Treptichnus pedum*). Fossils of the enigmatic Ediacaran biota are frequently covered in this newsletter.



© SIMON TERREY/SCIENCE PHOTO LIBRARY  
Artist's conception of Cryogenian earth perhaps with some open water at equator. Courtesy [dailymail.co.uk](https://www.dailymail.co.uk).  
©Simon Terrey

The Cryogenian period is defined as lasting from 720 to 635 million years ago. It was the second Precambrian period officially designated. There are fossils! Fossils of testate amoeba (*Arcellinida*) first appear as do the oldest known sponges (animals!) It has been suggested that others originated at this time including red algae and green algae, stramenopiles (eukaryotic protists), ciliates, and dinoflagellates. The Cryogenian is noted for the Sturtian and Marinoan glaciations—the greatest ice ages known to have occurred on Earth. These events are the subject of much debate. The major Cryogenian scientific controversy concerns whether these glaciations covered the entire planet including the ocean surfaces freezing or whether a band of open sea survived near the equator.

Lastly, the Tonian is defined as the span from 1000 to 720 Mya. These three periods now make up the Neoproterozoic Eon.

Scott is originally from South Africa, and did his undergraduate and master's degree at the University of Cape Town. After spending two years in the mineral exploration industry, Scott undertook his Ph.D. at Princeton University. He focused his work there on integrating field geology with high precision geochronology. Scott worked primarily in Ethiopia to test the Snowball Earth hypothesis and in Australia to characterize crustal deformation early in Earth history. Scott then went on to do postdoctoral work in stable isotope geochemistry at the University of Rochester and will continue that work at the University of Arizona.

### President's Report by Dan Krisher

The Section's May meeting was held via ZOOM on 5/4. The meeting consisted of a short business portion which was followed by the evening's speaker. The speaker for the evening was Dr. Ben Dattilo, Associate Professor (and Distinguished Lecturer) at Indiana University-Purdue University Fort Wayne. Dr. Dattilo spoke to us last June on crinoids and the structure of their columnals. This talk dealt with strophomenid brachiopods which is one of the most common type of brachiopod found in the Devonian rocks of New York. Dr. Dattilo's research is focused on the physiological and paleoecological adaptations of these fascinating brachiopods. More specifically, how did they live

and thrive with a shell with such restricted interior volume.

On 4/24 the Section held its first field trip of the 2021 season. A group of 8-10 people visited the Middle Silurian Rochester Shale at a railroad cut just west of the town of Lockport. We had gorgeous weather and remained on site for about 4 hours. The second field trip for the section was scheduled for 5/8 and was planned for the Lower Devonian Rickard Hill road cut near Schoharie however this was postponed due to weather.

### Fossil Section Election

Your ballot has been sent separately and should be returned by email by end of day June 15, so the votes can be tallied and the winners announced before our July picnic.

#### RAS Fossil Section Slate for the 2020-2021 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): **Open**

Directors whose terms have not expired are

Melanie Martin (2023) and Fred Haynes (2022)

### Fossil Section June Field Trips

#### by Dan Krisher

If you are interested in either or both of these, contact me at [DLKFossil@gmail.com](mailto:DLKFossil@gmail.com) as soon as possible. I will also put reminder notes out on email to the whole section.

#### June 5, 2021 Little Beard's Creek



*A highly productive, little visited private site, we filled many containers with fossil specimens in 2019.*

This is 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.

Our last visit in June 2019 was with nine members and guests. Good corals and snails were collected.

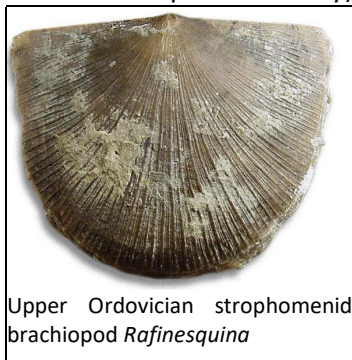
**JUNE 2021 Portland Point:** (Date TBD pending Permission) A new site for the Section that exposes Middle Devonian siltstones and shales. A wide variety of Hamilton Group fauna is available for collecting, however organisms that favored sandier environments are typical at this site.

The famous quarry site has been closed to collecting since 2016, so this is a rare opportunity, albeit at a nearby railroad cut. This is the type exposure for the Portland Point Member, which is the bottommost of the Moscow Formation, and lies below the Windom Shale. So this is older than the fossils of Little Beard's Creek and 100 miles east and hence closer to the Devonian shoreline, so the fossils will be different. The weathered railroad cut exposes about 40 feet (12 meters) of rock. The lowermost 16 feet of exposure consists of medium grey, highly fossiliferous, soft silty shale. Shell beds, especially near the top of this, yield abundant brachiopods, particularly *Athyris*, *Tropidoleptus*, *Spinocyrtia*, small bryozoans, and the rugose coral *Stereolasma*.

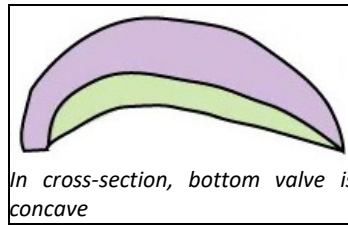
### Strophomenid Brachiopods Wanted

Dr. Ben Datillo, our speaker last month (see next article) has requested donations of strophomenid brachiopods collected in the Devonian of New York if you can spare them from your collections.

These will be used in his on-going research into the ecology of strophomenates. He assures you that they will be destroyed and not returned, since they will be sliced up microscopically thin in cross-section for analysis (as he showed in his May 4 talk with us of his previous study).



How do you identify these in your collection? Strophomenids usually have large, semicircular shells, with one concave and one convex valve. A short, flat area borders the



hinge region, and the hingeline is straight.

If you can spare some, please send them to Ben. He

requires that both the top and bottom shell be preserved articulated. Contact him if you have any questions.

Since you are shipping what are essentially "rocks" and want to do it as cheaply as possible, I recommend using the Postal Service's smallest fixed rate box. If sent by post office (USPS) use this address: Biology Dept., Purdue Fort Wayne, 2101 East Coliseum Blvd., Fort Wayne, IN 46805.

If you use another freight carrier (UPS, FedEx, DHL etc), ship to: Biology Dept., Purdue Fort Wayne, 5190 St. Joe Road, Fort Wayne, IN 46805.

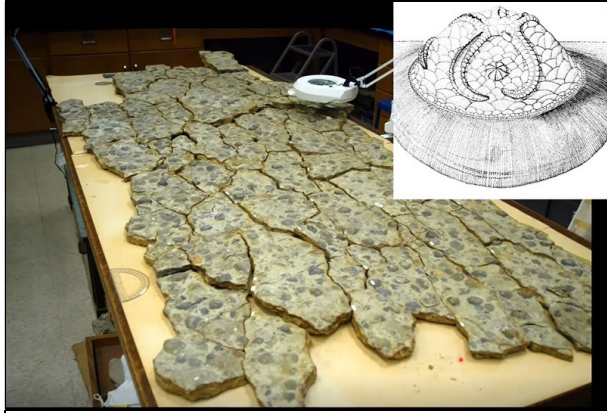
Ben can be reached at:  
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### May Meeting: Strophomenid Brachiopods by Michael Grenier

We were delighted once again to have Dr. Benjamin Dattilo, well known for NOT being one of the world's greatest authorities on brachiopods. If fact, he declaims knowing much about brachs at all. However, when he encountered an interesting brachiopod problem, he could not resist bringing his analytical skills to understanding and shedding light on the resolution to the issue. This was, of course, done in a way that would occur to few if any knowledgeable brachiopod specialists. Sometimes, it takes an outsider.

After some brachiopod background material and a summary of the life orientation mystery and debate, he opened the main part of the talk describing how he first encountered the problem as a grad student with a slab of strophomenids, collected by Jack Kallmeyer, in the office of paleobiologist Dr. David Meyer at U. Cincinnati. For the rest of the story, if you weren't with us, see his talk at <https://youtu.be/+FQXFwgfmTil>. This video

begins with our business meeting. You can skip ahead to 11:18 if you want just the lecture.



*The Coryville shell pavement slab part*

Altogether, we had 43 people in attendance, including guests from the Buffalo Geological Society, the North Coast (Cleveland) Fossil Club, the Dry Dredgers (Cincinnati) fossil club, the Geological Society of Minnesota, and the fossil section of the Natural History Society of Maryland.

The paper (Plotnick, R.E., Dattilo, B.F., Piquard, D., Bauer, J. and Corrie, J., 2013. **The Orientation of Strophomenid Brachiopods on Soft Substrates.** *Journal of Paleontology*, 87(5), pp.818-825.) is available to download from

[https://indigo.uic.edu/articles/journal\\_contribution/The Orientation Of Strophomenid Brachiopods On Soft Substrates/10767962/files/19280447.pdf](https://indigo.uic.edu/articles/journal_contribution/The%20Orientation%20Of%20Strophomenid%20Brachiopods%20On%20Soft%20Substrates/10767962/files/19280447.pdf)

### April/May Fossil Field Trips



*Among our dozen or so intrepid collectors were Lee Tutt, Melanie Martin, Joe Sullivan, and Dan Krisher.*

Unfortunately, the May 8th Schoharie field trip had to be postponed due to the weather, and will be rescheduled. However, we had splendid weather for the April 24th trip to the Gulf at

Lockport for fine collecting in the Silurian Rochester Shale.



*Part of Melanie's haul were these lovely Caryocrinites (crinoid) plates*



*Fossils of bryozoa, brachiopods, corals, crinoids, cystoids, trilobites, and others eroding out of the slope abound at this site. We filled bags and buckets with specimens.*



*During our 2019 trip, we unsuccessfully sought for the home in which Othniel (O.C.) Marsh was raised as a child. This time, we found it. Marsh was the 19th C. Yale dinosaur paleontologist famously in contention with Edward Cope.*

**Fossil News by Michael Grenier**

***New aboreal pterosaur with an opposed thumb***

This study provides the oldest record of a true opposed thumb, a sophisticated adaptation related to arboreal habitat, based on a new pterosaur species from the Jurassic of China, *Kunpengopterus antipollicatus*. Opposed thumbs are adaptations to arborealism and rare for non-mammal vertebrates. It is the first ever found in pterosaurs.

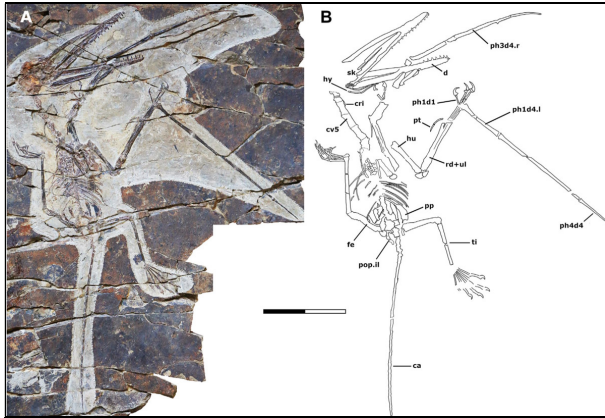


Figure 1. (A and B) Holotype specimen BPMC 0042 (A) and a schematic skeletal drawing (B). Scale bars, 50 mm.

Pterosaurs lived during the Mesozoic and were the first vertebrates known to evolve powered flight. Arboreal habitat has been proposed for some taxa, and possibly played a role in the origin of pterosaur flight. Skeletal adaptations correlated to specialized lifestyles are often difficult to recognize and interpret in fossils.

The discovery adds to the known array of pterosaur adaptations and the history of arborealism in vertebrates. It also adds to the impressive early bloom of arboreal communities in the Jurassic of China, shedding light on the history of forest environments.

The holotype is an almost complete skeleton lacking only the posterior region of the skull. Found in the Linglongta strata (161–158 million years ago; mya) of the Tiaojishan Formation, Liaoning Province, China, it is now in the Beipiao Pterosaur Museum of China. A second specimen assigned to this species as a paratype is an incomplete skeleton gravid with two eggs that is in the Zhejiang Museum of Natural History and was reported in 2011 but left unnamed.

Based on the holotype, its estimated wingspan is 85 cm (about 33 inches). The most striking feature of the holotype is that, on both sides, the

pollex (thumb) is preserved in a true opposed position, with its grasping side facing the grasping side of the other digits. Alternative explanations, such as the digital position being altered during preservation and artificial alteration of the specimen (counterfeit) were tested and rejected.

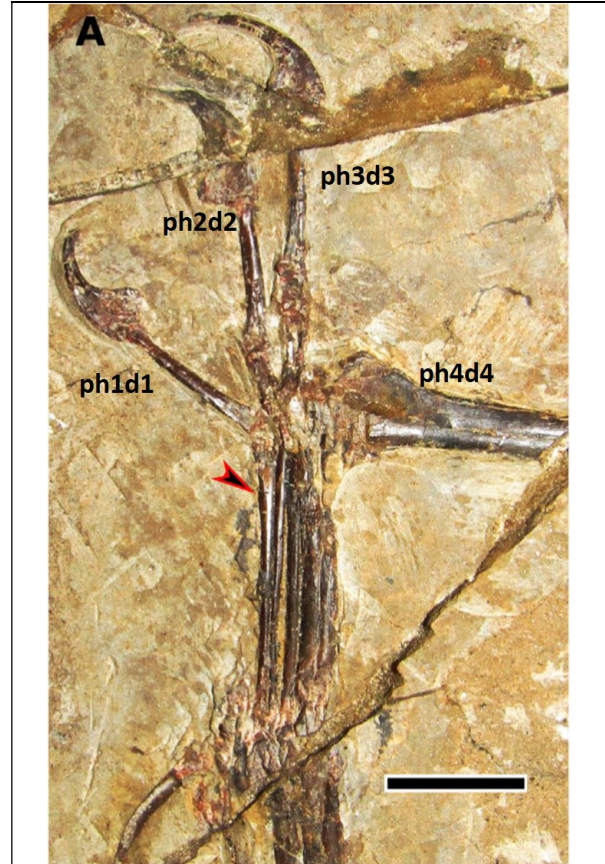


Figure 2A. Detail of the left manus, exposed in ventral view. Scale bar, 10 mm. The arrowhead indicates the twist on metacarpal I, which allows ph1d1 to be opposed. Abbr: d, digit; ph, phalanx.

A statistical principal-coordinate morphometric analysis based on 17 characters, such as limb proportions, limb mobility, and claw curvature was performed to test the idea that this species may have been arboreal, compared to 25 other pterosaur species and 156 other amniote species. *Kunpengopterus* clustered with animals such as the Dendrolagus (tree kangaroo) and Bradypus (three-toed sloth) rather than with any other pterosaurs or ground-dwelling animals. This suggests that niche partitioning probably took place among pterosaurs, allowing them to have coexisted in a forest environment by exploiting different microhabitats, with *Kunpengopterus* occupying treetops. (The Tiaojishan Formation paleoenviron-

ment is interpreted as a subtropical forest. Wood growth rings indicate the paleoforest was warm, humid, and seasonal.)



Figure 4. Life reconstruction of *K. antipollicatus* in the Tiaojishan paleoforest. Opposed pollex depicted as being utilized in handling food items (a palaeontinid) and in clinging to trees (a ginkgo). Paleoart courtesy of Chuang Zhao, reproduced with permission.

Based on tooth anatomy, these pterosaurs were probably insectivores, further favoring a niche partitioning scenario. Analyses suggest an arboreal lifestyle for the new species, but not for other closely related species from the same locality, implying a possible case of ecological niche partitioning.

This paper (Zhou, Xuanyu, et al. **A new darwinopteran pterosaur reveals arborealism and an opposed thumb.** *Current Biology* (2021)) is available from the editor.

### **Life-Saving Fossils!**

Here's the answer to anyone who suggests that your fossil hobby is akin to stamp collecting and has little relevance. A new study shows that certain fossils may save that person's life. The research is in early stages, but shows that chemicals from

fossilized tree resin, more commonly known as amber, may have strong anti-bacterial properties.

This study has not yet been published, but was presented at this past April's meeting of the American Chemical Society. Preliminary results had also been presented at their 2019 meeting. The following material is from Science Daily:

[www.sciencedaily.com/releases/2021/04/210405075859.htm](http://www.sciencedaily.com/releases/2021/04/210405075859.htm).

Folk medicine often reflects what works without knowing why it works. In this case, researchers, Elizabeth Ambrose and her grad student Connor McDermott (U. Minnesota), explored why people in Baltic nations have used ancient amber for medicinal purposes. Even today, infants are given amber necklaces that they chew to relieve teething pain, and people put pulverized amber in elixirs and ointments for its purported anti-inflammatory and anti-infective properties.

Ambrose and McDermott pulverized Baltic amber samples, and filtered, concentrated, and analyzed the amber powder extracts by gas chromatography-mass spectrometry (GC-MS). Isolated compounds were tested against nine bacterial species, some of which are known to be antibiotic resistant. Three 20-carbon, three-ringed organic compounds—abiatic acid, dehydroabiatic acid and palustric acid—were found to be active against monodermic bacteria with a single lipid bilayer. These are called gram-positive because they give a positive result in the Gram stain test. They include *Listeria*, *Clostridium*, *Streptococcus*, *Staphylococcus*, *Corynebacterium*, and *Bacillus*. Several species of these are currently troublesome due to having developed antibiotic resistance.

The 44 million-year-old Baltic amber is from resin of now-extinct pines in the *Sciadopityaceae* family which acted as a defense against microorganisms such as bacteria and fungi, as well as herbivorous insects that would become trapped in the resin. McDermott obtained a Japanese umbrella pine, the closest living species to the trees that produced the resin that became Baltic amber. He extracted resin from the needles and stem and identified *sclarene* in the extracts which could theoretically undergo chemical transformations to produce the bioactive compounds the researchers found in Baltic amber samples.



Toddler wearing Baltic Amber Teething Necklace (from [www.balticessentials.com](http://www.balticessentials.com))

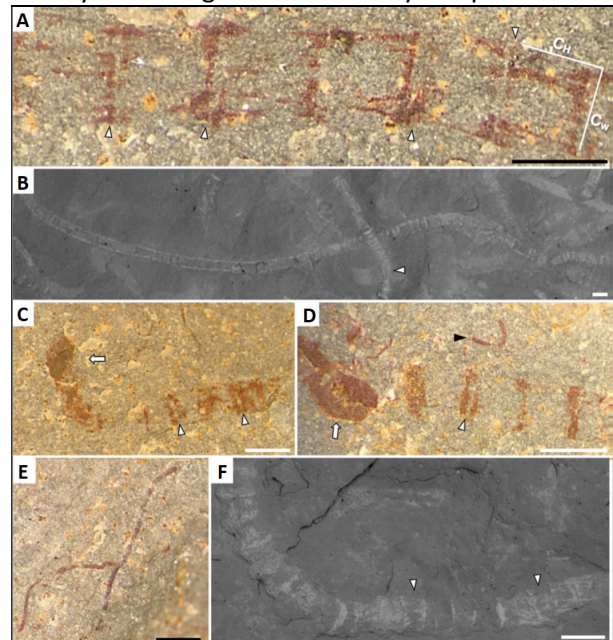
### Fossil Marine Macroalgae from the Tonian

In our opening piece celebrating Scott MacLennan's upcoming talk, we mentioned the Tonian Period preceding the Cryogenian. The Tonian does have fossils. An international team published on some interesting fossils from Canada's Yukon just this past March.

Molecular phylogenetic data suggest that photosynthetic eukaryotes first evolved in freshwater environments in the early Proterozoic and diversified into marine environments by the Tonian Period, but early algal evolution is poorly known in the fossil record. These newly discovered macrofossils from the ca. 950–900 Mya Dolores Creek Formation outershef marine deposits in the Wernecke Mountains were preserved by iron oxides and clay minerals and are of two sizes. The larger forms feature unbranching thalli with uniform cells, differentiated cell walls, longitudinal striations, and probable holdfasts, whereas the smaller specimens display branching but no other diagnostic features. (A thallus is a plant body that is not differentiated into stem and leaves and lacks true roots and a vascular system. Thalli are typical of algae, fungi, lichens, and some liverworts.)

The small fossils may be cyanobacteria. The larger ones are likely multicellular eukaryotic macroalgae with a green algal affinity based on

their large size and presence of rib-like wall ornamentation. If so, they are among the few green algae and some of the largest macroscopic eukaryotes recognized in the early Neoproterozoic.



Maloney et al. Figure 2. (A) Large macrofossil divided by double septa (arrowheads) into cells (CH—cell height, Cw—cell width) with longitudinal striations. (B) One large specimen (arrowhead) overlying another perpendicular to the first. (C) Large macrofossil with septa (arrowheads) and probable holdfast (arrow). (D) Holdfast (arrow) of large macrofossil overlapping another with double septa (white arrowhead). Note small fossils (black arrowhead). (E) Small macrofossil with branching. (F) Large macrofossil with longitudinal striations (arrowheads). White scale = 1 mm; black scale = 0.5 mm.

This paper (Maloney, Katie M., et al. **New multicellular marine macroalgae from the early Tonian of northwestern Canada.** *Geology* (2021)) is available from the editor.

### Next Issue in September

We'll be back in late September with October events news. At our October meeting we will have Dr. Melanie Jane Hopkins, Associate Curator of Invertebrate Paleontology at the American Museum of Natural History. She will speak to us on trilobite predation and interpretation of possible defensive behaviors, or some similar topic.

## CALENDAR OF EVENTS

### 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 5, Little Beard's Creek Field Trip.**

**Saturday, June TBD, Portland Point Field Trip.**

### July

**Saturday, July 10, Swamp Road Field Trip.**

**Saturday, July 21, Jaycox Run Field Trip.**

Visitors are welcome to all Fossil Section meetings! For more information and the latest updates check the RAS Website ([www.RASNY.org](http://www.RASNY.org)). You can also contact Dan Krisher at [DLKFossil@gmail.com](mailto:DLKFossil@gmail.com) or John Handley at [jhandley@rochester.rr.com](mailto: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	<a href="mailto:fred.patty.haynes@gmail.com">fred.patty.haynes@gmail.com</a>
Director (one-year-term): <i>Open</i>		

#### APPOINTED POSITIONS

Field Trip Coordinator: Dan Krisher	585-293-9033	<a href="mailto:DLKFossil@gmail.com">DLKFossil@gmail.com</a>
FossilLetter Editor: Michael Grenier	585-671-8738	<a href="mailto:mgrenier@paleo.com">mgrenier@paleo.com</a>

The FossilLetter is published before each meeting month of the year. Please send submissions to [mgrenier@frontiernet.net](mailto: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 15<sup>th</sup> of the month.

For scheduling changes and the latest updates please check the RAS Website ([www.rasny.org](http://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.

**MAP RIGHT:** *If you wish to see the Tonian macro algae site for yourself, it is easy to get to. Simply get yourself to Whitehorse (you probably already know the way), then drive up Yukon Route 2 to Mayo, a lovely little village of 200 people. It is only 250 miles (409 km). From there, drive up Route YT-11 E, the Silver Trail through the First Nation of Nacho Nyak Dun to the lovely Wernecke Mountains. The first 39 miles (62 km) are paved, after that, gravel road for the next 98 miles. Bring good boots, you'll be hiking after that. **Travel tip:** Winter is the most exciting time to be there.*

