



# The Rostrum

The Newsletter of the Maryland Geological Society  
Baltimore, Maryland  
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## President's Message

**"I hope you know a lot of stuff because I have a lot of questions"**

The challenge above was presented to me by my seven-year-old granddaughter after trying to answer her questions about how the universe was formed. Before she woke the next morning, I had to use the internet to educate myself on the most current research and theories on the creation of the universe. Back in the days of my youth (so many, many years ago), we had to rely on our copy of Encyclopedia Britannica to provide the answers followed by a trip to the local library. Fortunately, today we have a wealth of immediate knowledge to tap into with just a few keystrokes and this will hopefully enable me to stay at least one step ahead of my granddaughters. And what a time this is to be asking questions about the universe with the expected launch of the James Webb Space Telescope this month. If everything comes together, the telescope will be able to detect light from the first galaxies that were formed in the universe and date to a time of over 13.5 billion years ago. It is difficult for me to comprehend nearly every aspect of the Big Bang Theory as well as the various technologies incorporated into the telescope. Maybe in a few short years from now it will be my granddaughters trying to explain all of this to me.

Cheers, Rick

## Dates to Remember

**TBD, January, 2022 - Zoom Meeting/Elections**

**Please note: An email will be sent out once a date and time have been determined.**

### Meeting Time

TBD



Science is organized knowledge.  
Wisdom is organized life.

Will Durant



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### **Maryland Geological Society**

Founded in 1991, MGS is comprised of both amateur and professional mineral and fossil collectors. The organization emphasizes collecting, identification, study and display aspects of the geological sciences. MGS is a nonprofit organization affiliated with the American Federation of Mineralogical Societies (AFMS) and the Eastern Federation of Mineralogical and Lapidary Societies (EFMLS).

### **Dues**

Annual dues are \$15.00 per individual adult member. Applications for membership may be obtained from the MGS website or by contacting the Membership Chairman, Mike Folmer, at 417 West Maple Road, Linthicum, MD 21090, (410) 850-0193. Dues are payable by January 1st of each year.

### **Meetings**

Meetings are held bimonthly, beginning in January at the Bowie Community Center, located at 3209 Stonybrook Drive, Bowie, MD - (301) 464-1737. The doors open at 11:00 AM and the meetings are completed by 3:00 PM. Club meetings will be held as scheduled so long as the Bowie Community Center is open.

## **Meeting Dates & Programs for 2021**

**January 17:** Zoom Meeting

**July 18:** No Meeting

**March 21:** Zoom Meeting

**October 14:** Zoom Meeting

**May 16:** Zoom Meeting

**December:** No Meeting

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### **The Rostrum**

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### **Website**

[www.mdgeosociety.org](http://www.mdgeosociety.org)  
Material for the website should be sent to Jim Stedman at [stedmanjim@gmail.com](mailto:stedmanjim@gmail.com).

## Featured Mineral: Eudialyte

Bob Farrar

The Featured Mineral for December will be eudialyte. Named for the Greek words for "readily decomposable" (due to its solubility in acids), eudialyte is not a common mineral, but it is an interesting one, and well worth learning about.

Eudialyte is a complex silicate mineral with the formula  $\text{Na}_{16}\text{Ca}_6\text{Fe}_3\text{Zr}_3(\text{Si}_3\text{O}_9)_2(\text{Si}_9\text{O}_{27})_2(\text{OH}, \text{Cl})_4$ . It crystallizes in the trigonal system, but distinct crystals are not apparent in many specimens. Eudialyte is typically pink or red in color, but may also be brown, violet, or green. Other physical properties include translucency, perfect cleavage, a hardness of 5.0 to 6.0, and specific gravity of 2.74 - 3.10. Eudialyte is not something the average collector is likely to need to identify; it is best to obtain it from a reliable source who should have accurate identification.

Eudialyte typically occurs in alkaline syenite formations, which are similar to granites but with little quartz. The type locality is Kangerdluarsuk, Ilimaussaq, Greenland; crystals of several centimeters have been found in that area. Most commonly seen on the mineral market is material from the Kipawa River complex in Quebec. There eudialyte occurs in matrix with agrellite and other minerals. Also in Quebec, sharp, well-formed crystals occur at Mt. St. Hilaire. Crystals up to 8 cm. have been found on the Kola Peninsula of Russia. Other significant localities include Brazil, Norway, Ireland, and Guinea.

Eudialyte is not of much importance economically, but does make interesting collector's pieces. Crystals are fine additions to any mineral collection. It takes a good polish, and matrix material can be cut into nice cabochons, spheres, or carvings. Eudialyte is thus something with which both mineral collectors and lapidaries should be familiar.



*Eudialyte specimen from the Kola Peninsula of Russia. Image by Rob Lavinsky and reproduced under Creative Commons Attribution-Share Alike 3.0 Unported license. Image is available at [Wikimedia Commons](#).*

## Field Trips

Field Trip Coordinators - Marci Robinson & David Shore

The Maryland Geological Society is an advocate of responsible collecting. The society has permission to collect in all of the sites listed that require such permission. Most trips are weather dependent and some require at least an average level of physical fitness. Field trips are restricted to MGS members only.

**No field trips currently scheduled.**

## The Tully Monster of the Mazon Creek Fossil Beds

Eric J. Seiffter, MD FACP

Exceptional fossil preservation of soft tissues requires very special conditions that occur rarely in the fossil record. When animals die in an anoxic environment with minimal bacteria, such as at the bottom of a sea and covered by mud, perhaps after a mudslide, decomposition can be delayed sufficiently to allow anatomic features to impress themselves onto the surrounding matrix. This type of burial also avoids the remains being eaten by scavengers. Not only are the soft tissues preserved along with the harder calcified shells or bony skeletons, but organisms that are predominantly soft-bodied remain intact instead of being lost to fossilization. Fine details of these organisms in the compacted mud are seen as impressions or variations in color.

A large fossil assemblage under these special conditions has been designated as a "lagerstätte," literally a "storage place" from the German, or more euphemistically as a "mother's lode." Famous lagerstätten include the Burgess Shale from the Cambrian Maotianshan in British Columbia, Canada, the Jurassic Solnhofen limestone in Germany, the Cretaceous Santana Formation in Brazil, our own western U.S. Eocene Green River Formation, and the Carboniferous Mazon Creek Fossil beds near Chicago, which are the subject of this report.



The Mazon Creek area. (from Sean McMahon/Field Museum of Natural History)

At Mazon Creek, a tributary of the Illinois River, nodules of reddish iron material made of iron (II) carbonate, known as siderite, formed from the seawater reacting with the decomposed carbon-based organisms. These reddish brown "ironstone concretions" surround the animal and plant remains to form the spectacular fossil findings. These nodules are found in a layer of shale, the Francis Creek Formation, that overlies coal in the Colchester Coal Formation along the banks of Mazon Creek in Grundy County, Illinois and were first discovered in the 1850s. The Francis Creek Shale is a delta sediment containing both terrestrial and freshwater organisms as well as a delta/estuary marine environment supporting marine creatures.

Strip mining for the coal starting in the mid-20<sup>th</sup> century in the Braidwood/Mazon Creek area involved removing the "worthless" shale layer, creating huge spoil piles. Many of the nodules might split open on their own, along seams formed from the fossil imperfections in the center of the nodule, often from the trauma of the strip mining. Collectors soon discovered that splitting the siderite nodules with a hammer was unduly destructive. But allowing the nodules to freeze and thaw over several seasons allows a natural splitting of the nodules. Pits 1, 6, and 11 were particularly productive sites for collecting. Following behind on foot behind the huge machines stripping the shale was particularly effective, but also particularly dangerous, and was banned after the early days.

The Mazon Creek assemblage was deposited 307 to 309 million years ago during the Pennsylvanian Subperiod, the second major interval of the Carboniferous Period. All specimens derive from Francis Creek Shale Member of the

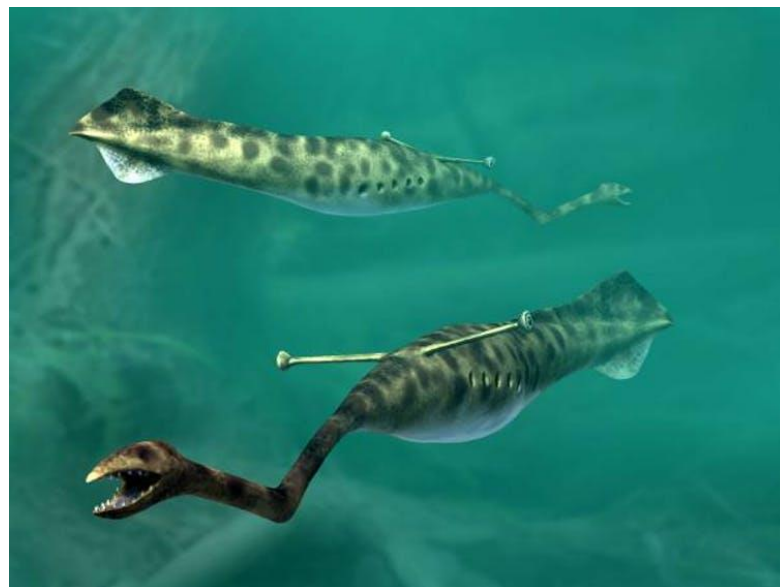


Carbondale Formation (Desmoinesian) near Chicago in parts of Grundy, LaSalle, Kankakee, Will, and Livingston Counties. At that time central and western Illinois lay along the equator, and shallow seas bordered dense swamps and forests. Marine creatures included shrimp, primitive sharks, jellyfish, worms, molluscs, sea cucumbers, worms, brachiopods, and squids. True ferns, seed ferns (gymnosperms), horsetails (calamites), and less often lycopsids, dominated the flora of the Mazon Creek. Pecopterids were the most abundant flora here (almost 30% of the Braidwood findings). The rivers meandering through the swamps carried the plants into the sea, where they were preserved. The plant fossils have also been found embedded in the shale outside the siderite nodules. The fauna and flora would resemble the Amazon River delta today.

In 1955, the amateur fossil collector Francis Tully, a pipefitter from Lockport, Illinois travelled to the Field Museum of Natural History with his discovery of a bizarre creature with the following features:

- an elongated soft body with segmenting banding that ended in a squid-like tail with 2 fins
- A rigid bar or stalk that protruded beyond the contours of the head and body in a perpendicular direction behind the head (like a hammerhead shark) with eyes at both ends colored with jet black melanin
- An elongated proboscis or snout extending from the tip of the head that ends with a jaw with 8 teeth (a shape similar to the Cambrian arthropod *Opabinia regalis* of Burgess Shale fame)

At first, collectors referred to this fossil as "Mr. Tully's Monster" or more simply "Tully's Monster." It was not "monstrous" in size, measuring only 8 to 15 inches, but the moniker referred to its unusual conformation that defied easy classification. No one could decide if this was a vertebrate or invertebrate, although most scientists and collectors favored the latter at first. And surely, there was complete uncertainty about the phylum of invertebrates with which it belonged. The shape and fins evoke an active swimmer that preyed on smaller prey in the bottom of the sea. It did not resemble any animal alive today or in extinction. In 1966, Dr Eugene Richardson, Curator of Fossil Invertebrates at the Field Museum named this weird creature *Tullimonstrum gregarium* in honor of the discoverer and in 1989, it became the Illinois State Fossil, an appropriate honor since it has never been discovered anywhere else in the world.



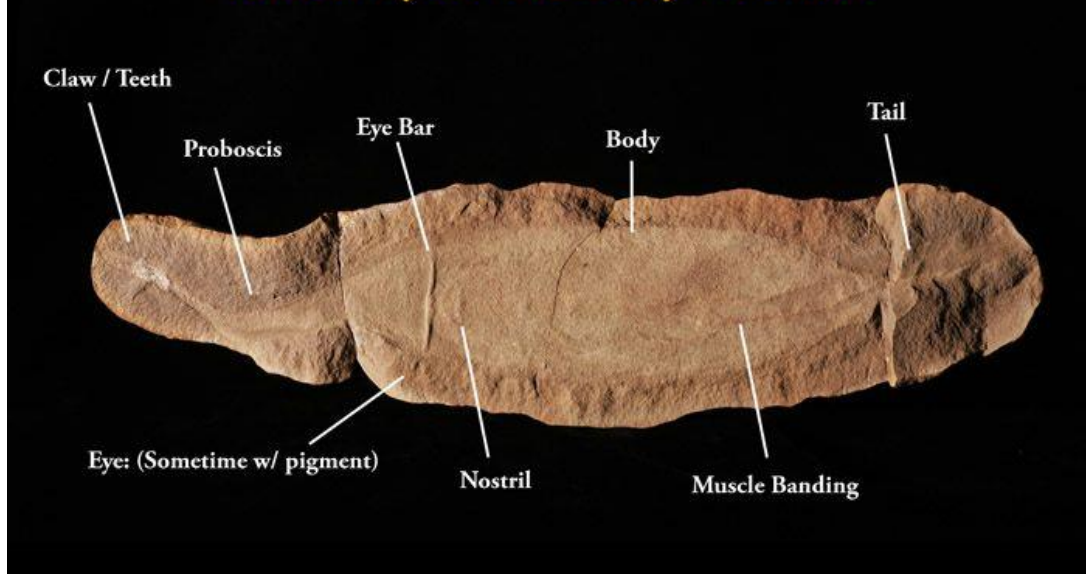
Another possible look for the Tully Monster. [Nobu Tamura/Wikimedia](#), [CC BY-SA](#)

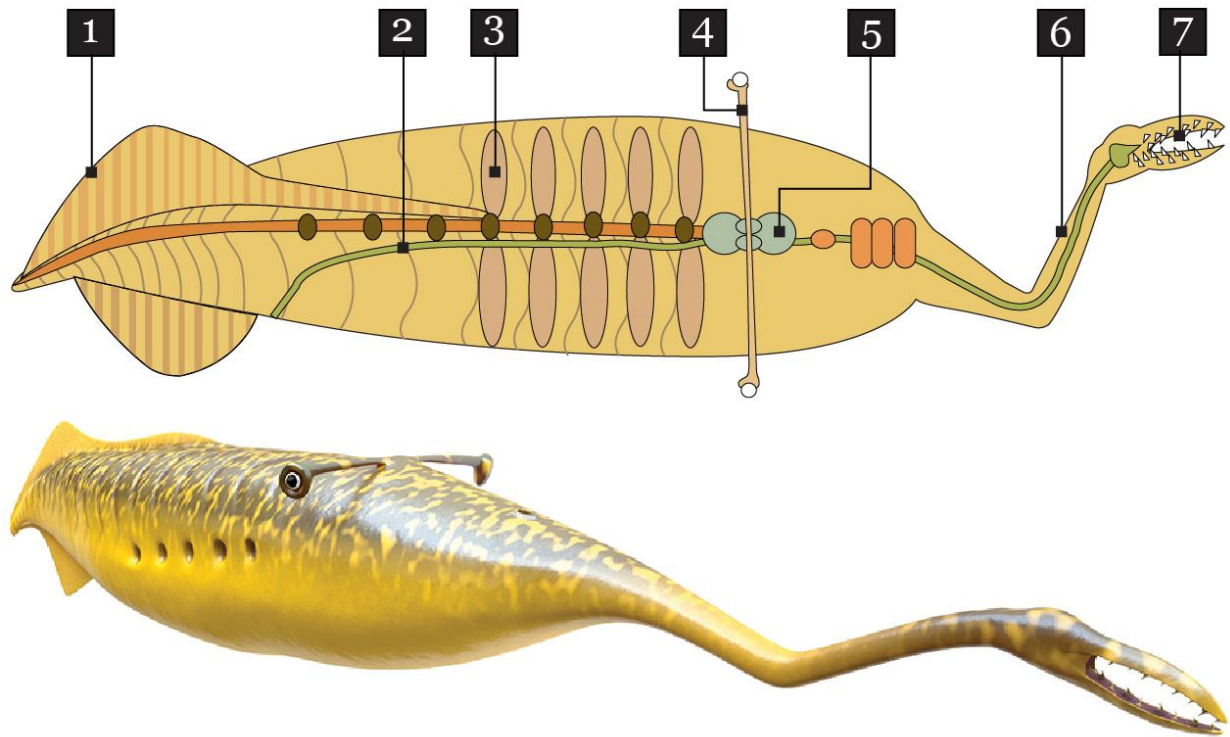


This is the holotype specimen for the Tully Monster: note the muscle banding, flared tail, eyebar with black pigment defining one of the eyes, and the long snout ending in jaws.

In 2016, more than 60 years after its discovery, 2 research papers published in *Nature* "rocked" the paleontological community. Scientists from Yale University, the Field Museum, and the Argonne National Laboratory proposed that the Tully Monster was actually a vertebrate most similar to a modern-day lamprey, a jawless fish with a funnel shaped mouth for sucking prey. The lamprey appears to be a model for the giant sandworms imagined on the planet Arrakis in the *Dune* novel and new movie. The two papers in *Nature* were based on an examination of over 1000 specimens at the Field Museum to identify biological characteristics and concluded that the Tully Monster was less similar to an arthropod or mollusc, and closer to a chordate. The key determinants were the "findings" of a cartilaginous notochord, gill pouches, a three-lobed brain, and melanosomes in the eye arrayed like a vertebrate (see illustration below). Further analysis suggested the Tully Monster belongs as a stem group vertebrate most like a fish. The Field Museum updated their exhibit in their second-floor exhibit on fossils declaring the mystery over: the Tully Monster is a fish!

## Anatomy of the Tully Monster





An artist rendering of a Tully Monster. (Paul Mayer/Field Museum of Natural History)

1. **Tail fins:** Elongated body with 2 fins for swimming.
2. **Notochord:** A back bone like rod made of cartilage.
3. **Gill pouches:** Up to five are noted.
4. **Eyes:** Stick out laterally on a rigid bar, perhaps to protect the optic nerve. Melanosomes in arrays similar to vertebrates.
5. **Brain:** Three lobes are similar in placement and size to a typical lamprey.
6. **Proboscis:** The creature had an elongated, flexible proboscis with teeth. It grabbed similar to lamprey-related fossils from the same area.
7. **Teeth:** Multiple rows of insect-like stylets or piercing teeth next to the mouth, similar to lampreys.

In 2017, Dr. Lauren Sallan and colleagues published a paper in *Paleontology* refuting the conclusions and interpretation of the biologic characteristics in the two *Nature* papers. They question the finding of a notochord particularly and would reinstate the possibility that Tully Monster belongs with arthropods or molluscs. Convergence with the evolution of vertebrate-like traits in heteropod gastropods or anomalocarids would be alternative examples refuting the vertebrate proposal. The linear band that was considered a gut in the 20<sup>th</sup> century, and then a notochord in 2016, begins anterior to the optic chiasm (the eye-bar), which never occurs in any other vertebrate. Sallan argues for it really being a gut which extends to the mouth. They entitled the manuscript: "The Tully Monster is Not a Vertebrate..." In refuting this argument, Dr. Paul Mayer of the Field Museum explained that the Sallan paper did not offer new evidence, only a reinterpretation of their findings. Mayer believes further work on the early evolution of fishes might inform this debate. No change was made to the Tully Monster exhibit at the museum, and visitors still believe that the mystery is solved.

In 2019, Drs. Ito, Wakamatsu, and McNamara discovered that melanosomes in cephalopods (like the octopus and squid) are invertebrates that also have melanosome arrays partitioned by size and shape like in vertebrates. Chemical analyses of the melanosomes were performed by particle acceleration using a synchrotron radiation lightsource. This emits bursts of radiation that excite elements embedded within the fossil to emit x-ray signatures that can identify and quantify different elements. This machine found that the ratio of zinc to copper is much higher in vertebrates than in invertebrates, both in living animals and in the fossil record, and specifically at Mazon Creek. What about Tully Monster?



The zinc to copper ratio suggests an invertebrate! However, the ratio of copper isotopes (63 versus 65) falls between vertebrate and cephalopod, supporting the conclusion that Tully Monster is not a vertebrate after all, nor is it a cephalopod. For these authors, other invertebrates are still in play.

My Tully Monster was collected by the late Dave Douglass, who founded the iconic rock and fossil shop in Evanston, Illinois just north of Chicago: Dave's Rock Shop. He collected many Tully Monsters and innumerable Mazon Creek Fossils over several decades beginning in the 1950s, first with his parents and then with his wife. This specimen is notable for a prominent eye-bar and prominent melanin pigmentation in the protruding eyes, the snout projecting from a head with a bite-mark, and evidence of segmentation in the torso (see figure below).



The Tully Monster controversy exemplifies how science advances. As new specimens emerge and as new techniques can be applied, older paradigms can be overturned or clarified. Within our lifetimes, we have seen upheavals in our views of ancient life. How many of us growing up in the 1960s could imagine moving continents due to tectonic plates, proof of a meteoric Armageddon at the end of the Cretaceous, or that dinosaurs weren't plodding reptiles, but rather warm-blooded bird-like creatures?

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## What the Pebbles Hide

A Poem by David Shore

The pebbles crunched beneath him as he walked,  
Their voices telling stories of the lives  
Of bodies which were cunningly concealed  
Beneath the shifting surface of their hordes.  
Those remnants once roamed free among the plains  
As creatures large and small and weak and strong  
Which have lain barren, bound in Death's stone chains  
Through mega-anna desolate and long.  
The man began to ponder death and life,  
And how the bones of old became again  
The bones of earth, devoid of any strife  
That plagued their time upon the earth in vain.  
For now, in Death's caress, they lie in peace,  
While man awaits the same serene embrace.

## Questionnaire - The Future of In-Person Meetings Beyond the Pandemic

This questionnaire is intended to initiate a discussion among the membership to help our club decide the structure, frequency, and content of in-person meetings for the future, NOT the Covid-related conditions under which we will resume in-person meetings (probably at least the first half of 2022). This discussion is being precipitated in part because of the uncertainty surrounding the status of the Bowie Community Center. We have been informed that the center will no longer be open on Sundays and they have given us no guidance on whether this is a temporary or permanent situation. Additionally, the meeting room costs have increased substantially and we have had some problems with excessive noise emanating from the adjacent meeting room. Consequently, this seems like a good time to examine long range planning for our future meetings.

### Part 1. Your Personal Background

- 1) **In the past, how often have you attended MGS meetings?**
  - A) Never or rarely (0-1 meetings/yr)
  - B) Occasionally (1-2 meetings/yr)
  - C) Frequently (3-4 meetings/yr)
  - D) Regularly (4 or more meetings/yr)
  
- 2) **How many miles do you currently travel to attend meetings at the Bowie Center?**
  
- 3) **How many miles would you be willing to travel to attend an MGS meeting?**
  
- 4) **Did you participate in any Zoom on-line meetings that were held in 2020 or 2021?**
  
- 5) **Would you participate in Zoom on-line meetings in the future?**

Part 2. Potential Changes for Consideration to Future Meetings

**6) When (frequency): How many meetings should be held per year?**

(History) Prior to Covid restrictions, a total of five meetings had been scheduled per year to be held in March, May, July, September, and November. This was a reduction from the previous standard of six meetings per year with the additional meeting held in January.

Options:

- A) Maintain the current schedule of five meetings/year.
- B) Reduce schedule to quarterly meetings (four meetings/year).
- C) Increase schedule to six meetings/year.
- D) Other (please specify or explain).

**7) When (day/time): Which day of the week should meetings be held?**

(History) For most of the club's existence, meetings have been held on a Sunday from 11:00 AM to 3:00 PM.

Options:

- A) Continue having meetings on a Sunday, mid-day.
- B) Move meetings to Saturday, mid-day.
- C) Either weekend day is fine.
- D) Move meetings to a weekday evening.
- E) Use a mix of the above.

**8) Where (geographical location): Where in Maryland should meetings be held?**

(History) For most of the club's existence, meetings have been held at the Bowie Community Center.

Options:

- A) Continue meeting at the Bowie Community Center.
- B) Find an alternate location located somewhere between Baltimore and DC.
- C) Hold meetings in locations that could be combined with a visit to a nearby collecting locality or museum.
- D) Hold the majority of meetings at a fixed location, but occasionally use option C above.

**9) How important is having a speaker at the meeting in determining whether you will attend the meeting?**

- A) Not at all
- B) Somewhat important
- C) Very important

**10) How important is the annual auction?**

- A) Have not attended
- B) Somewhat important
- C) It is one of the highlights of the year

**11) How important are the silent auction and raffle at the regular meetings?**

- A) Not at all
- B) Somewhat important
- C) Very important

**12) Is the length of the meetings (3-4 hours) appropriate?**

- A) Too short
- B) Too long
- C) Just right

If you made it this far, I would ask that you keep these questions in mind when we discuss this at a future meeting. Even better, if you would email me your responses and any comments you would like to add and I will compile the responses. Thanks. Email me at [rick.smith.mgs@gmail.com](mailto:rick.smith.mgs@gmail.com)

## Shows & Events

Due to restrictions in place for social gathering in many states resulting from the current pandemic, the majority of previously scheduled shows and events have been canceled or postponed. Consequently, no events are being listed here. Check with organizers for their latest guidance before planning on attending any event.

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## Dates to Remember:

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Please note: An email will be sent out once a date and time have been determined.

### Meeting Time

TBD

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#### ***The Rostrum***

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#### **First Class Mail**

