



# EARTHQUAKE

*e-Newsletter about what's movin' and shakin' at the Earth Science Museum*

Earth Science Museum, 3215 W. Bethany Home Rd., Phoenix, AZ 85017  
[www.earthsciencemuseum.org](http://www.earthsciencemuseum.org), [scote@earthsciencemuseum.org](mailto:scote@earthsciencemuseum.org), 602-973-4291

October 2021  
Volume 10, Issue 10

## ESM OUTREACH UPDATE

Mardy Zimmermann, Outreach Coordinator

Requests for outreach have been slow to non-existent recently and are not expected to change until after the first of the year.

# Help Wanted

By Harvey Jong and Shirley Coté

The ESM is planning to participate at the 49<sup>th</sup> Annual Flagg Gem and Mineral Show at Mesa Community College. The show will be held on January 7-9, 2022, so we are looking for some interested people to help staff our exhibit and sales tables.

The theme for the 2022 show is fluorescent minerals. Are you fascinated with fluorescent minerals? Do you own a UV light and would be interested in helping show visitors discover the hidden beauty of minerals that fluoresce?



If you have attended the show before, you may be familiar with our popular fluorescent mineral display that uses an enclosed black tent. To reduce the potential public and volunteer exposure to



the Covid-19 virus, we are, however, planning a new more open-air arrangement.

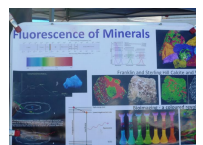
Instead of using a large, fully enclosed black tent to create a dark environment where visitors enter and gather around a display case, we are planning to fully enclose just the specimens with this photo lightbox. This enclosure has a small Velcro flap opening for viewing the glowing minerals. While the



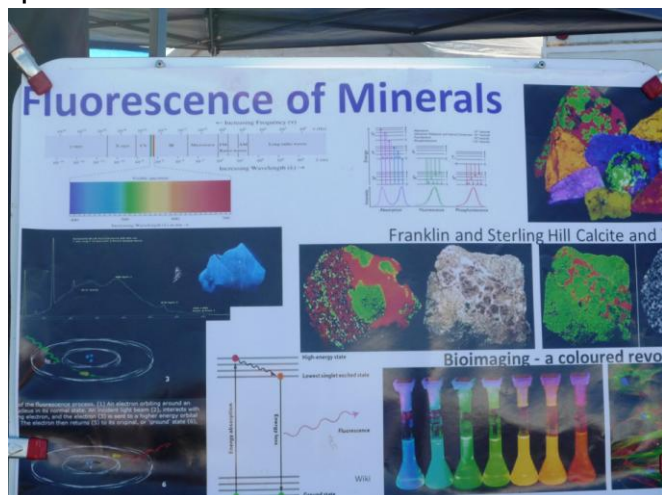
number of minerals on display will be reduced, we are planning to add a longwave UV light to the regular shortwave source. To reduce some of the ambient sunlight, the lightbox will be placed on a table under the black canopy with only one or two side panels.

Our black tent also hosted another crowd-pleasing activity where visitors checked whether their recent mineral prizes or purchases “glow”. This fluorescent checking will be moved to a separate area and will be carried out using a special viewing cabinet equipped with a UV light with three different wavelengths.

We are seeking volunteers to help with the fluorescent display area. This may involve explaining what visitors are seeing with either the display



samples or their specimens and answering questions.



Show volunteers are also needed to assist with the ESM's sales tables. Do you like talking with people about rocks, minerals and jewelry? There will be jewelry, rocks, fossils and flats of mineral specimens for sale.

Plans are to use 2-4 glass-topped enclosed metal cases (34 x 22 x 3 1/4 ") to display sales items. This will minimize the amount of causal contact.

Plenty of hand sanitizer and cleaning supplies will be on hand.

There are certainly lots of things to do during the three-day show. If you are planning to attend, can you please consider spending some time helping with ESM activities? Any help you can provide will be greatly appreciated. Also, the opportunity to meet and help other show visitors can be rewarding!

If you are interested in volunteering some time towards either selling minerals and jewelry or helping visitors discover the beauty of fluorescent minerals, please send a brief note on the day/time/activity that you can help to:

[harvey.jong@earthsciencemuseum.org](mailto:harvey.jong@earthsciencemuseum.org).

Thank you!

## Egg Carton Program on Hold

The ESM's Egg Carton Program has been a very popular long-standing activity at the Flagg Show. It provides children the opportunity to build their own personal collections of rocks, minerals, or fossils. For just one dollar, kids can select 12 different labeled specimens. The program, however, involves lots of close contact and a high degree of touch among participants as children and their parents or relatives work together in choosing samples and finding the corresponding labels. Unfortunately, this presents a myriad of opportunities to spread the COVID-19 virus both during and after the show. Since no effective ways of mitigating the risk could be identified, a decision was made to hold off on this activity for the 2022 show. Continuing the program at future shows will be re-evaluated as pandemic conditions improve.



ESM Outreach at the yearly Flagg Gem & Mineral Show; Egg Carton Program and Sales Tables (below)  
Photos by S. Coté





## Arizona Rocks 101

Text by Ray Grant

Photo by Cynthia Grant

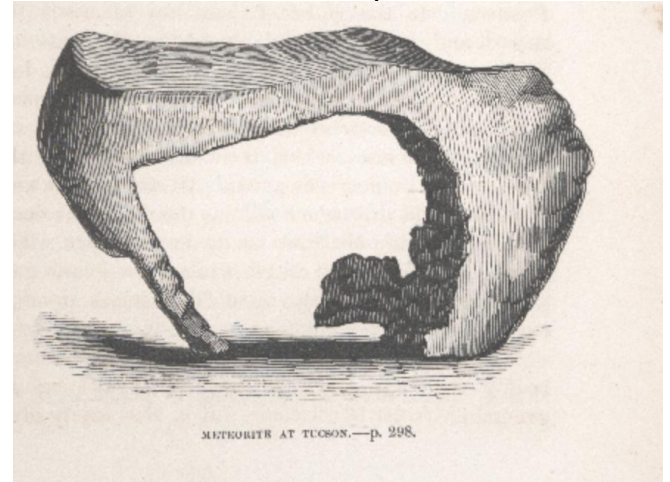
I recently came across a reference by J.L. LeConte in the *American Journal of Science* Volume XIII, number 38, March 1852, about the Tucson Ring Meteorite. He was in Tucson which was still part of Sonora, Mexico at that time and reports: "I saw two large masses of iron, evidently meteoritic, which were used as anvils by two blacksmiths of that town." A subsequent search on the internet and I found a book by John Bartlett, *Personal Narrative of Explorations in Texas*, 1854, that has: "I examine a remarkable meteorite, which is used for an anvil in the blacksmith's shop." He has a drawing of the meteorite in his book. He also reports: "There is another larger mass within the garrison grounds, of which I did not take a sketch."

The Ring Meteorite weighs 1,400 pounds and the other meteorite weighs 633 pounds. They are both at the Smithsonian Institution in Washington and their acquisition and transportation to Washington is another interesting story. The Ring was moved from Tucson in 1860 and took several years to get to Washington. The other mass went to San Francisco until 1941 and then to Washington

The meteorites were reported to have been found south of Tucson before 1845. There are different stories about the exact location, one says 40 miles southeast of Tucson and another says 20 miles distant. The early reports said: "we were told there are many more" and "many larger masses." People have searched over the years but have not found large masses of iron meteorites south of Tucson.

There are full scale models of the Ring meteorite at the Arizona Museum of Natural

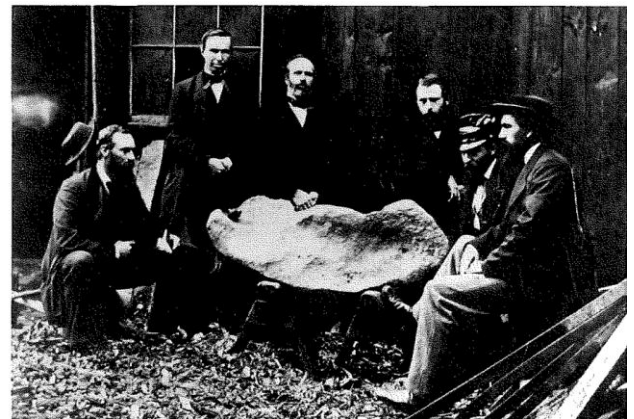
History in Mesa and at the ASU Center for Meteorite Studies in Tempe.



Drawing of the Tucson Ring Meteorite by John Bartlett, 1854



With two of my grandsons looking through the Tucson Ring Meteorite model at the Arizona Museum of Natural History in Mesa



The smaller Tucson meteorite in San Francisco in 1862 with members of the California geological Survey Photo from the Arizona Historical Society



**AZ Mining, Mineral & Natural  
Resources Education Museum  
Update October 2021**

<https://ammnre.arizona.edu/>

Catie Carter Sandoval

cscarter@email.arizona.edu

703.577.6449

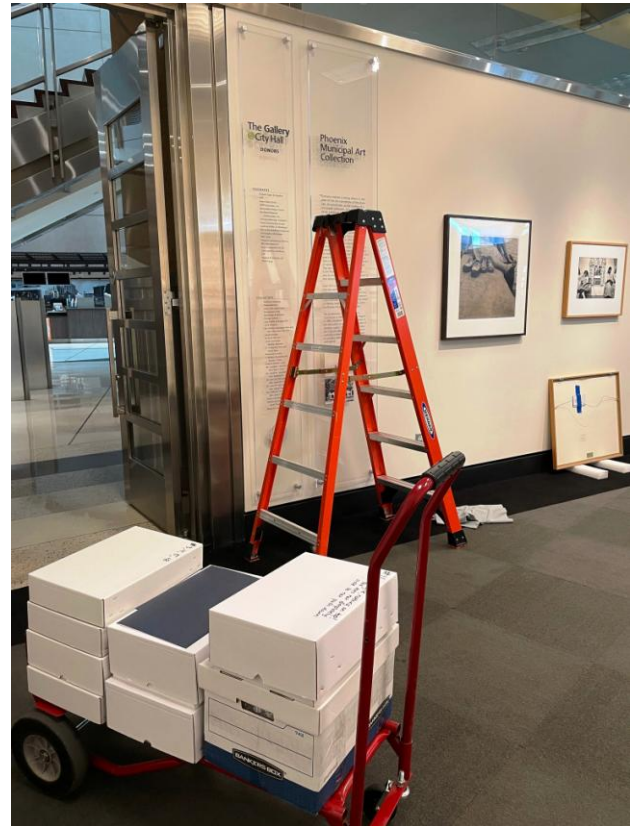
Help support the museum at:

<http://tinyurl.com/SupportMM-NREMuseum>

On October 8<sup>th</sup> we delivered a loan of 24 mineral specimens and 6 historic mining artifacts to Phoenix City Hall, where they will be part of a new public exhibition called 'From Mine to Medallion,' on the first floor 'Gallery @ City Hall.' The exhibit will connect Arizona's copper mining history with a current public art installation of 300 copper medallions mounted atop light poles along a three-mile stretch of Central Avenue in Phoenix. Our specimens, which include native copper and copper ores, will be displayed in the center of the gallery and supplemented by context about how copper is mined and processed before being fashioned into art. The exhibit will also include historic photos, maps, and information from the artists who created the medallions. The Gallery @ City Hall is located inside Phoenix City Hall at 200 W. Washington Street. Installation is still in process and the gallery is currently closed to the public but will reopen this fall, date TBD. We will update you when the exhibit is open.

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Boxed specimens ready to deliver to The Gallery @ City Hall on the first floor of Phoenix City Hall.



Doug O. and Susan S. helping map out one of the mineral displays in the center of the exhibit



## Pinal Museum and Society News

351 N. Arizona Blvd., Coolidge, AZ

Pinal Geology and Mineral Society meeting

**November 17, 2021**

[www.pinalgeologymuseum.org](http://www.pinalgeologymuseum.org)

Ray Grant [raycyn@cox.net](mailto:raycyn@cox.net).

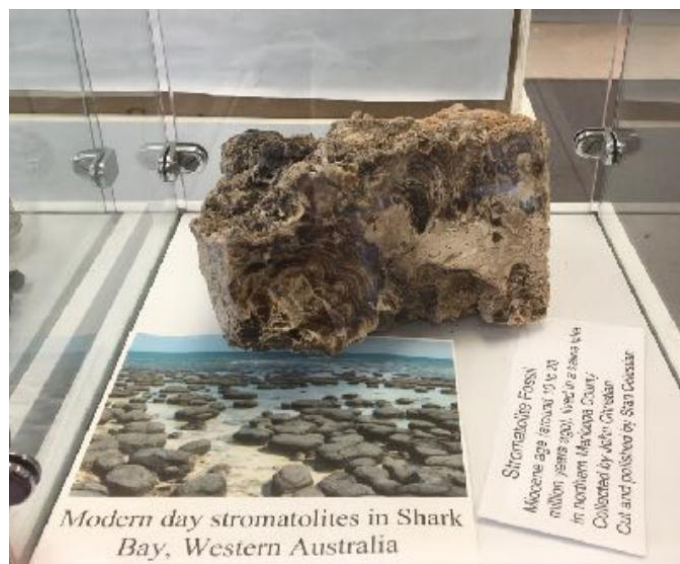
The Museum will be open on Saturdays

In November from 10 a.m. to 2 p.m.

The Museum is reopening on a limited basis for right now and hopes to expand the open days in the future please check our website to see which days we are open.

Masks are required for all visitors and volunteers over five years old. We have taken this step to protect our volunteers so they can safely open the Museum for you. Please provide your own masks. We will have some on hand at the Museum, but cannot guarantee to provide them. If wearing a mask is a problem, please plan your visit for later.

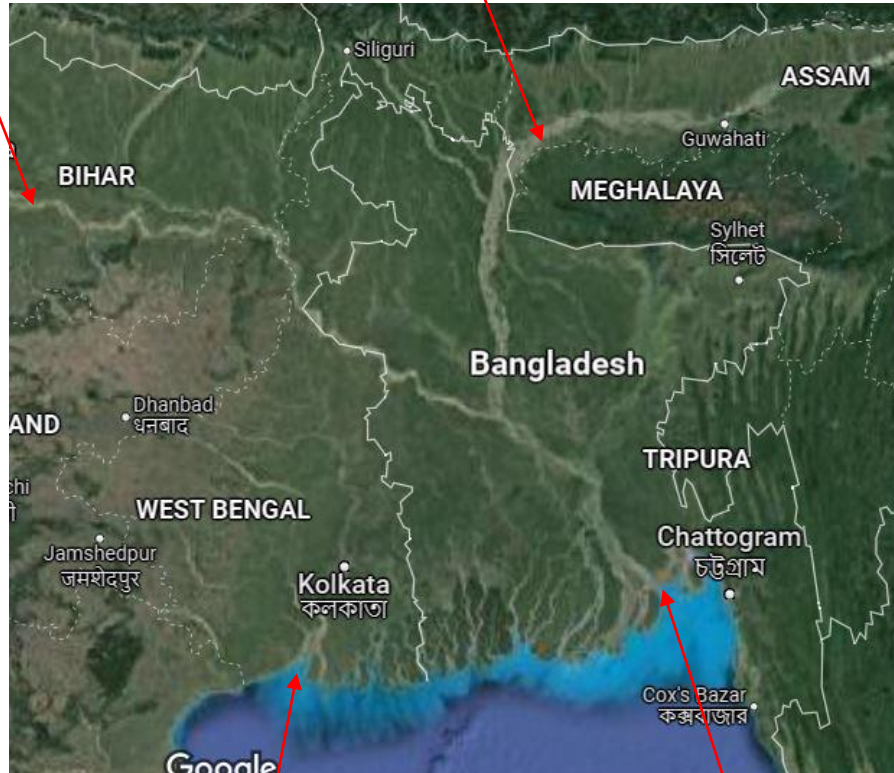
We have a couple of new cases. They were donated by John Ebner and painted by Israel Pineda and put in the Museum last Saturday. One of the specimens in the new cases is a stromatolite from Maricopa County donated by John Christian. Stromatolites are one of the earliest forms of life on earth. They appeared some 3.7 billion years ago and still exist today. They are a cyanobacteria and the first life form to take carbon dioxide from the atmosphere and give off oxygen. So we owe them our existence. John's specimen is Miocene in age (10 to 20 million years ago) and lived in a saline lake north of Phoenix.



## The World's Largest River Delta, Bay and Abyssal Fan The Ganges Delta and the Bay of Bengal

Wikipedia and Google Maps

The **Ganges-Brahmaputra Delta** is a river delta in the Bengal region of South Asia, consisting of Bangladesh and the Indian state of West Bengal. It is the world's largest river delta and it empties into the Bay of Bengal with the combined waters of several river systems, mainly those of the Ganges River (1,560 mi.) and the Brahmaputra River 2,391 mi. It is also one of the most fertile regions in the world, thus earning the nickname the **Green Delta**.



The delta stretches from the Hooghly River east as far as the Meghna River (over 200 miles).

The Ganges Delta has the shape of a triangle and is considered to be an "arcuate" (arc-shaped) delta. It covers more than 105,000 km<sup>2</sup> (41,000 sq mi or slightly larger than the state of Kentucky) and, although the delta lies mostly in Bangladesh and India, rivers from Bhutan, Tibet, India, and Nepal drain into it from the north. Approximately 60% of the delta is in Bangladesh and 40% in West Bengal, India. Most of the delta is composed of alluvial soils made up by small sediment particles that finally settle down as river currents slow down in the estuary. Rivers carry these fine particles with them, even from their sources at glaciers as fluvio-glacial (glacial melt water). Red and red-yellow laterite soils are found as one heads farther east. The soil has large amounts of minerals and nutrients, which is good for agriculture.

The delta is composed of a labyrinth of channels, swamps, lakes, and flood plain sediments (chars). The Gorai-Madhumati River, one of the distributaries of the Ganges, divides the Ganges Delta into two parts: the geologically young, active, eastern delta, and the older, less active, western delta.

The Ganges Delta lies at the junction of three tectonic plates: the Indian Plate, the Eurasian Plate, and the Burma Plate. The edge of the Eocene (56 to 33.9 million years ago) paleoshelf runs approximately from Kolkata to the edge of the Shillong Plateau. The edge of the paleoshelf marks the transition from the thick continental crust in the northwest to the thin continental or oceanic crust in the southeast. The enormous sediment supply from the Himalayan collision has extended the delta about 400 kilometers (250 mi) seaward since the Eocene. The sediment thickness southeast of the edge of the paleoshelf beneath the Ganges Delta can exceed 16 km (10 miles).

The **Bay of Bengal** is the northeastern part of the Indian Ocean, bounded on the west and northwest by India, on the north by Bangladesh, and on the east by Myanmar and the Andaman and Nicobar Islands of India. Its southern limit is a line between Sangaman Kanda, Sri Lanka and the north westernmost point of Sumatra (Indonesia). **It is the largest water region called a bay in the world.**

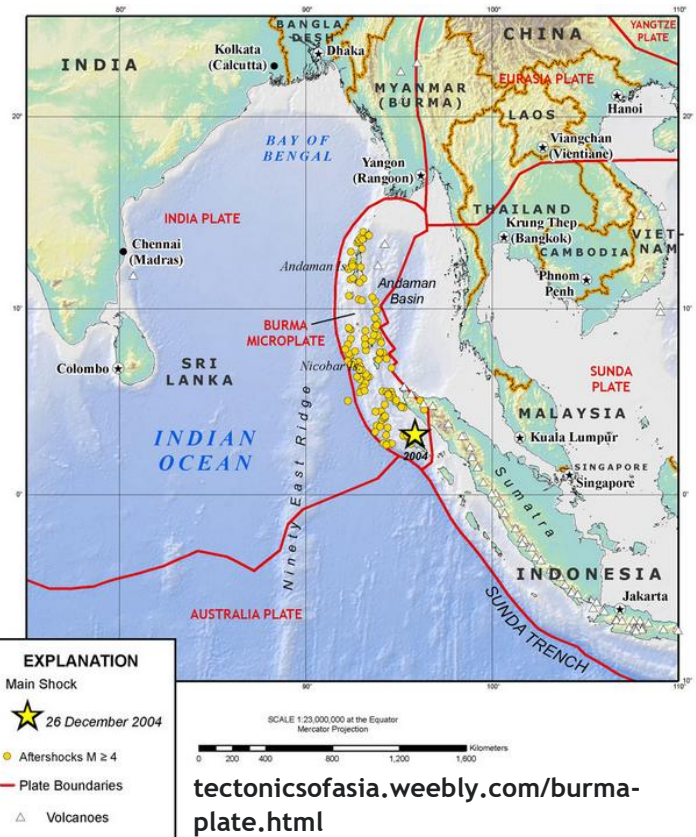
The Bay of Bengal occupies an area of 2,600,000 square kilometers (1,000,000 sq mi which is more than the area of the combined states of Alaska, Texas and Washington). A number of large rivers flow into the Bay of Bengal: the Ganges-Hoogly, the Padma, the Brahmaputra-Jamuna, the Barak-Surma-Meghna, the Irrawaddy, the Godavari, the Mahanadi, the Brahmsani, the Baitarani, the Krishna and the Kaveri.

Many major Rivers of India and Bangladesh flow west to east before draining into the Bay of Bengal. The Ganga or Ganges is the northernmost of these rivers. Its main channel enters and flows through Bangladesh, where it is known as the Padma River, before joining the Meghna River. However, the Brahmaputra River flows from east to west in Assam before turning south and entering Bangladesh where it is called the Jamuna River. This joins the Padma where upon the Padma joins the Meghna River that finally drains into Bay of Bengal. The Sundarbans is a mangrove forest in the southern part of the Ganges-Brahmaputra Delta which lies in the Indian state of West Bengal and in Bangladesh. The Brahmaputra at 2,948 km (1,832 mi) is the 28<sup>th</sup> longest river in the world. It originates in Tibet. The Hooghly River, another channel of the Ganges, flows through Kolkata and drains into Bay of Bengal at Sagar in West Bengal, India.

The Ganga-Brahmaputra-Barak Rivers deposit nearly 1000 million tons of sediment every year. The sediment from these three rivers form the Bengal Delta and the submarine fan, a vast structure that extends from Bengal to south of the Equator, is up to 16.5 kilometers (10.3 mi) thick, and contains at least 1,130 trillion tones of sediment, which has accumulated over the last 17 million years at an average rate of 665 million tons per annum. The fan has buried organic carbon at a rate of nearly 1.1 trillion mol/yr (13.2 million t/yr) since the early Miocene period (23 million to 5.3 million years ago). The three rivers currently contribute nearly 8% of the total organic carbon (TOC) deposited in the world's oceans. Due to high TOC accumulation in the deep sea bed of the Bay of Bengal, the area is rich in oil and natural gas and gas hydrate reserves. Bangladesh can reclaim land substantially and economically gain from the sea area by constructing sea dikes, bunds, causeways and by trapping the sediment from its rivers.

## Lithosphere and plate tectonics

The lithosphere of the earth is broken up into what are called tectonic plates. Underneath the Bay of Bengal, which is part of the great Indo-Australian Plate is slowly moving north east. This plate meets the Burma Microplate at the Sunda Trench. The Nicobar Islands and the Andaman Islands are part of the Burma Microplate. The India Plate subducts beneath the Burma Plate at the Sunda Trench or Java Trench. Here, the pressure of the two plates on each other, increase pressure and temperature resulting in the formation of volcanoes such as the volcanoes in Myanmar, and a volcanic arc called the Sunda Arc. The Sumatra-Andaman earthquake and Asian tsunami (Dec. 2004) was a result of the pressure at this zone causing a submarine earthquake which then resulted in a destructive tsunami.



Swatch of No Ground is a 14 km-wide (8.7 mi-wide) deep sea canyon of the Bay of Bengal. The deepest recorded area of this valley is about 1340 m (0.8 mi). The submarine canyon is part of the Bengal Fan, the largest submarine fan in the world.

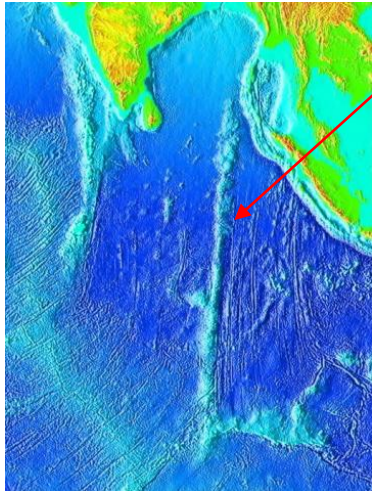
## Submarine fans

A submarine fan is also known as abyssal fan, deep-sea fan, or underwater delta. The Bay of Bengal fan, known as **Bengal Fan**, also known as the **Ganges Fan** is the world's largest abyssal fan. The fan is about 3,000 km (1,900 mi) long, 1,430 km (890 mi) wide with a maximum thickness of 16.5 km (10.3 mi). The fan resulted from the uplift and erosion of the Himalayas and the Tibetan Plateau produced by the collision between the Indian Plate and the Eurasian Plate. Most of the sediment is supplied by the Ganges and Brahmaputra rivers which supply the Lower Meghna delta in Bangladesh and the Hoogly delta in West Bengal (India). Several other large rivers in Bangladesh and India provide smaller contributions. Turbidity currents have transported the sediment through a series of submarine canyons, some of which are more than 2,400 kilometers (1,500 mi) in length, to be deposited in the Bay of Bengal up to 30 degrees latitude from where it began. To date, the oldest sediments recovered from the Bengal fan are from Early Miocene (23 to 5.3 mya) age. Their mineralogical and geochemical characteristics allow us to identify their Himalayan origin and demonstrate that the Himalaya was already a major mountain range 20 million years ago.

The fan completely covers the floor of the Bay of Bengal. It is bordered to the west by the continental slope of eastern India, to the north by the continental slope of Bangladesh and to east by the northern part of Sunda Trench off Myanmar and the Andaman Island, the accretionary wedge associated with subduction of the Indo-Australian Plate beneath the Sunda



Plate and continues along the west side of the Ninety East Ridge. The Nicobar Fan, another lobe of the fan, lies east of the Ninety East Ridge.

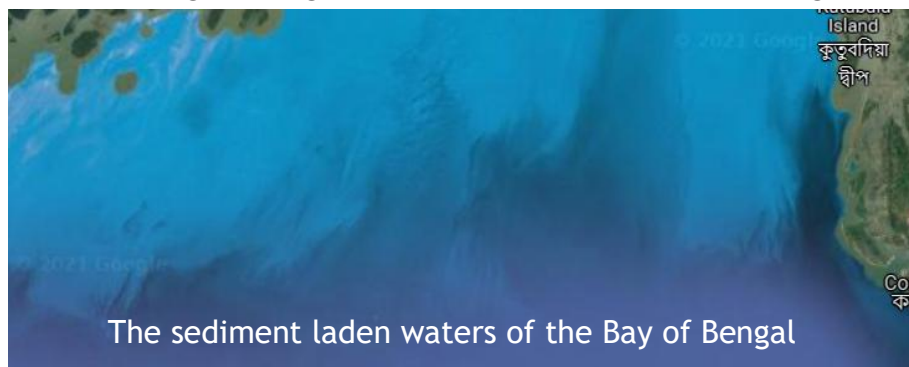


The **Ninety East Ridge** is a mid-ocean ridge on the Indian Ocean floor named for its near-parallel strike along the 90<sup>th</sup> meridian at the center of the Eastern Hemisphere. It is approximately 5,000 kilometers (3,100 mi) in length and can be traced topographically from the Bay of Bengal southward towards the Southeast Indian Ridge (SEIR), though the feature continues to the north where it is hidden beneath the sediments of the Bengal Fan. The ridge extends between latitudes 33° S and 17° N and has an average width of 200 km (124 mi).

A **turbidity current** is most typically an underwater current of usually rapidly moving, sediment-laden water moving down a slope; although current research (2018) indicates that water-saturated sediment may be the primary actor in the process.

Researchers from the Monterey Bay Aquarium Research Institute found that a layer of water-saturated sediment moved rapidly over the seafloor and mobilized the upper few meters of the preexisting seafloor. Plumes of sediment-laden water were observed during turbidity current events but they believe that these were secondary to the pulse of the seafloor sediment moving during the events. The belief of the researchers is that the water flow is the tail-end of the process that starts at the seafloor.

In the most typical case of oceanic turbidity currents, **sediment laden waters** situated over sloping ground will flow down-hill because they have a higher density than the adjacent waters. The driving force behind the turbidity current is gravity acting on the high density of the sediments temporarily suspended within a fluid. These semi-suspended solids make the average density of the sediment bearing water greater than that of the surrounding, undisturbed water.



The sediment laden waters of the Bay of Bengal

As such currents flow, they often have a "snow-balling-effect", as they stir up the ground over which they flow, and gather even more sedimentary particles in their current. Their passage leaves the ground over which they flow scoured and eroded. Once an oceanic turbidity current reaches the calmer waters of the flatter area of the abyssal plain (main oceanic floor) the particles borne by the current settle out of the water column. The sedimentary deposit of the turbidity current is called a turbidite.

## Parent/Teacher Resource

### Page 1

<https://www.kids-earth-science.com/>



#### VOLCANOES FOR KIDS

Volcanoes are fascinating for all kids to learn about. Huge explosive eruptions shooting hot magma into the air are fascinating topics for kids to learn about. In our unit on volcanoes we have webpages about the Hawaiian Islands and Mauna Loa Volcano. They learn about shield volcanoes, composite volcanoes and cinder cones.

Notorious eruptions of Vesuvius and Krakatoa are also included in topics about volcanoes that are interesting to learn about. A new great shield volcano has been discovered in the North Pacific Ocean. Learn more about this massive shield volcano too.

#### THE ROCK CYCLE

The Rock Cycle consists of three major groups of rocks. Igneous Rocks were at one time molten rock that cooled to form solid rock. Volcano rocks were all blown out of a volcano or cooled in a lava flow. Intrusive rocks cooled beneath the Earth's surface.

The boys in the picture above are looking for garnets near Wrangell, Alaska. The garnet ledges were deeded to the children of Wrangell many years ago where they collect the garnets and sell them to visitors.

#### SCIENCE ACTIVITIES

Kids Earth Science is a fun subject when kids do lots of activities to enrich their learning about our planet. Science activities, experiments projects and science fair projects on our website are all designed for you to have fun while learning. The activity pages are easy to do activities that demonstrate science principles with easy to find or recycled materials.

#### SCIENCE EXPERIMENTS

The experiments and projects contain more in depth material that will take longer to do. The science fair information on our website explains how to turn science experiments and projects into entries at science fairs.



## 5<sup>th</sup> ANNUAL GEM & MINERAL "FALL SHOW & SELL"



We invite you to join the Gila County Gem & Mineral Society on November 6<sup>th</sup>, 2021 in Miami, AZ for our 5<sup>th</sup> annual Gem & Mineral "Show & Sell Fall Event"

This event will again be held in the parking lot of Oasis Insurance at 411 W Live Oak (Highway 60), located in Miami from 10:00am to 2:00pm.

Come and see what we have to offer for sale, make your own rock covered copper tree, grab some popcorn and a drink and visit with other rock hounds and jewelry makers.

Come check out our club house and see what we offer for our club members.

We will have free wire wrapping going on during this event. If you have a stone you would like to try to wrap you're welcome to bring it. We will have the supplies provided for you to work with. This is one of many things we offer free to our club members. Ask us how you can become a member.

Would you like to be a vendor in our event? We offer 8 foot table space for \$10. Must be rock and mineral related items. (Tables and chairs will be provided) deadline to reserve a table is Monday November 1<sup>st</sup>, 2021

For more information or to reserve a table contact Jodi Brewster at 623-810-9780 or [jodibrewster66@gmail.com](mailto:jodibrewster66@gmail.com)

**November 13th - 14th, 2021**



### **A World of Stones and Gems**

Presented by the Lake Havasu Gem and Mineral Society

We are proud to announce the Gem and Mineral Show, in its 51<sup>st</sup> year. It is a spectacular event that features club members' individual collections of unusual minerals, fossils, and rocks from all over the world. Special vendors create a boutique marketplace, offering unique collectible and gifting items. Watch as professionals demonstrate their crafts. Enjoy opportunities to shop for one of a kind; jewelry, faceted and cabochon jewels, fossils, tools, findings, finished jewelry, slabs, and gifts galore.

There will be raffle baskets filled with great items, donated by members of our community. All the proceeds go toward our High School Scholarships. There will be hourly door prizes, scavenger hunt, games, and prizes for kids, as well as food and beverage services available. It is hosted by the Lake Havasu Gem and Mineral Society which is dedicated to educating our members and the community about gems, minerals, and fossils. It's certain to be fun and educational for the young and old alike.

Dates: **November 13, 9am - 5pm**  
**November 14, 9am - 4pm**

Aquatic Center \* 100 Park Ave \* Lake Havasu City, AZ

For more information call **928-733-6270** Admission \$2.00  
Website: <http://lakehavasugms.com>

### **APACHE JUNCTION ROCK AND GEM CLUB**

#### **FALL 2021 JEWELRY, GEM, ROCK & MINERAL SHOW**

Saturday & Sunday  
November 20 & 21, 2021  
9am - 3pm

**Admission:**  
Adults \$3.00  
Students with ID \$1.00  
*Children under 12 free*

Skyline High School  
845 S. Crimson Road  
Mesa, AZ. 85208

### **Wickenburg Gem and Mineral Show Nov 27 & 28, 2021**

**Free Admission**

**Jewelry**

**Fossils**

**Minerals**

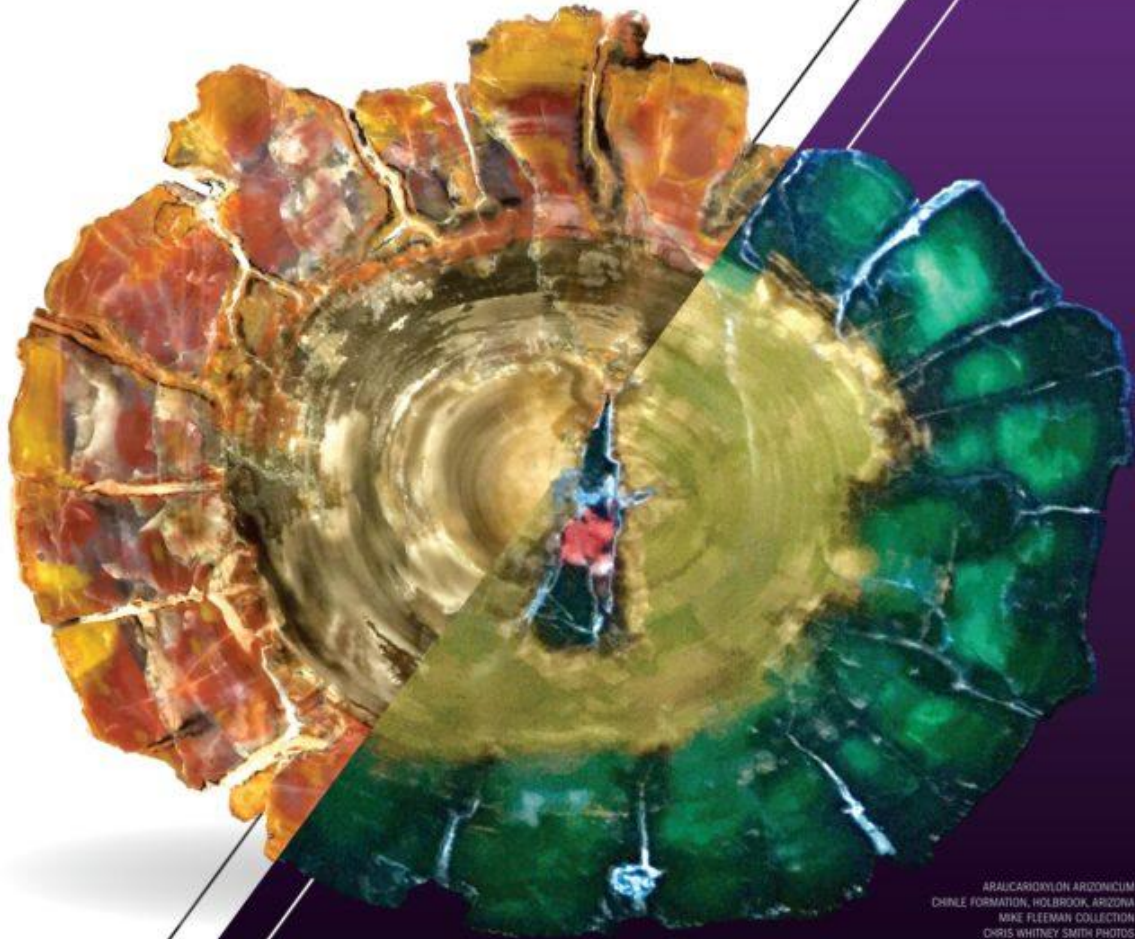
**Gems**



**Over 40 Vendors**   **Best Rock Contest**   **Raffle**  
**Door Prizes**   **Kid's Area**   **Silent Auction**

**Hassayampa Elementary School**  
251 South Tegner Street Wickenburg, AZ  
9am - 5pm Saturday • 10am - 4pm Sunday

49<sup>TH</sup> ANNUAL  
**FLAGG GEM and  
MINERAL SHOW**



ARAUCAOBYLON ARIZONICUM  
CHINLE FORMATION, HOLBROOK, ARIZONA  
MIKE FLEEMAN COLLECTION  
CHRIS WHITNEY SMITH PHOTOS



**FREE SAMPLES FOR KIDS  
FREE ADMISSION & PARKING**

## FLUORESCENT MINERALS

**JANUARY 7<sup>TH</sup>/8<sup>TH</sup>/9<sup>TH</sup>, 2022**  
MESA COMMUNITY COLLEGE | 9am - 5pm  
NE CORNER OF US 60 & DOBSON ROAD

THE TAILGATE SHOW TRADITION CONTINUES!  
**WWW.FLAGGSHOW.INFO**

**ALL ARIZONA CLUB MEETINGS MAY BE CANCELED  
DUE TO HEALTH CONCERNS!**



**Apache Junction Rock & Gem Club**  
Meetings are on the 2<sup>nd</sup> Thursday  
Next Meeting: Nov 11, 2021, 6:30 pm  
[www.ajrockclub.com](http://www.ajrockclub.com)  
@ Club Lapidary Shop  
2151 W. Superstition Blvd., Apache Jct.



**Daisy Mountain Rock & Mineral Club**  
Meetings are on the 1<sup>st</sup> Tuesday  
(unless a Holiday then 2<sup>nd</sup> Tuesday)  
Next Meeting: November 2, 2021, 6:30 p.m.  
**Please go to their website for more info**  
[www.dmrmc.com](http://www.dmrmc.com)  
@ Anthem Civic Building  
3701 W. Anthem Way, Anthem, AZ



**Maricopa Lapidary Society, Inc**  
Meetings are on the 1<sup>st</sup> Monday  
(unless a Holiday then 2<sup>nd</sup> Monday)  
Next Meeting: November 1, 2021, 7:00 pm  
[www.maricopalapidarysociety.com](http://www.maricopalapidarysociety.com)  
@ North Mountain Visitor Center  
12950 N. 7<sup>th</sup> St., Phoenix



**Mineralogical Society of Arizona**  
Meetings are on the 3<sup>rd</sup> Thursday  
Next Meeting: November 18, 2021, 7:30 pm  
**In person and online**  
[www.msaaaz.org](http://www.msaaaz.org)  
Franciscan Renewal Center  
5802 E. Lincoln Dr., Scottsdale



**Pinal Geology & Mineral Society**  
Meetings are on the 3<sup>rd</sup> Wednesday  
Next Meeting: November 17, 2021, 7:00 pm  
**On YouTube until further notice**  
[www.pinalgeologymuseum.org](http://www.pinalgeologymuseum.org)  
@ Artisan Village  
351 N. Arizona Blvd., Coolidge



**West Valley Rock & Mineral Club**  
Meetings are on the 2<sup>nd</sup> Tuesday  
Next Meeting: November 9, 2021, 6:30 pm  
[www.westvalleyrockandmineralclub.com](http://www.westvalleyrockandmineralclub.com)  
@ Buckeye Community Veterans Service  
Center  
402 E. Narramore Avenue, Buckeye, AZ



**White Mountain Gem & Mineral Club**  
Meetings are on the 1<sup>st</sup> Sunday  
(unless a Holiday then 2<sup>nd</sup> Sunday)  
Next Meeting: November 7, 2021, 1:00 pm  
[www.whitemountain-azrockclub.org](http://www.whitemountain-azrockclub.org)  
@ VFW Hall  
381 N. Central, Show Low



**Wickenburg Gem & Mineral Society**  
Meetings are on the 2<sup>nd</sup> Friday  
(February & December on the 1<sup>st</sup> Friday)  
Next Meeting: November 12, 2021, 7:00 pm  
[www.wickenburggms.org](http://www.wickenburggms.org)  
@ Coffinger Park Banquet Room  
175 E. Swilling St., Wickenburg

**ESM's Meeting Notice**

ESM's next meeting will be at North Mountain Visitor Center, 12950 N. 7<sup>th</sup> St., Phoenix, on Tuesday, TBA 2021, at 6:30 p.m.

**BECOME A MEMBER!**  
Join the Earth Science Museum's



**IS IT TIME TO RENEW YOUR MEMBERSHIP?**  
Please renew today! 😊😊😊

----- cut here -----  
**ESM Earth Science Investigation  
 Team Membership Form**  
 \_\_\_\_\_ **New Member**      \_\_\_\_\_ **Renewal**

Membership levels:

\_\_\_\_\_ **ESI Family \$20**

\_\_\_\_\_ **ESI Individual \$10**

Membership benefits:

- ◆ Monthly e-newsletter *Earthquake*
- ◆ Official team membership card
- ◆ Knowledge that your contribution is making a difference in earth science education.

**MANY THANKS TO OUR MAJOR DONORS!**

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- Flagg Mineral Foundation  
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**Earth Science Museum**

3215 W. Bethany Home Rd.  
Phoenix, AZ 85017

**Phone:**

602-973-4291

**Editor E-Mail:**

scote@earthsciencemuseum.org

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*We're on the Web!*

*Visit us at:*

[www.earthsciencemuseum.org](http://www.earthsciencemuseum.org)

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**Mission**

Our Mission is to excite and inspire all generations about earth sciences through educational outreach.

**Vision**

We envision a community where students and the general public have curiosity about, passion for, and understanding of the underlying principles of earth sciences.

For more information about the ESM, how to become a member or how to arrange for a school visit or Community function, go to:  
[www.earthsciencemuseum.org](http://www.earthsciencemuseum.org).

**NOTICE:**

ESM's next meeting will be at North Mountain Visitor Center, 12950 N 7<sup>th</sup> St, Phoenix, on Tuesday, TBA 2021, at 6:30 p.m.

**THANK YOU FOR YOUR CONTINUING INTEREST & SUPPORT!!!**

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