DAISY MOUNTAIN ROCKCHIPS

The purpose of Daisy Mountain Rock & Mineral Club is to promote and further an interest in geology, mineralogy, and lapidary arts, through education, field experiences, public service, and friendship.

VOLUME 6, ISSUE 6 **JUNE 2021**

WULFENITE

Red Cloud Mine, Yuma County, Arizona

FOSSILS: PART XVIII

Kingdom: Animalia
Phylum: Echinodermata
Classes - Asteroidea, Ophiuroidea, Edrioasteroidea, Holothuroidea

By Susan Celestian

Classes Asteroidea (starfish), Ophiuroidea (brittle stars), Holothuroidea (sea cucumbers) and Edrioasteroidea do not account for very many Echinodermata fossils; however, they are a bit unusual.

- The geologic record:
  - Asteroidea - Ordovician-Recent
  - Ophiuroidea - Early Ordovician-Recent
  - Holothuroidea - Late Ordovician-Recent
  - Edrioasteroidea - Cambrian-Permian
- Anatomy:
  - Asteroidea (Starfish):
    - There is a central disc and 5 (or more) arms. See Figure 1.
    - *Ossicles* (plates and other support structures) are embedded in and cover the upper surface, below the epidermis. In fact, these are what is most often fossilized. These are often spiny (See Figure 2).
    - The madreporite, like in the echinoids, is a sieve-like plate that is on the upper surface and filters water supplied to the internal water vascular system. See Figure 1.
    - The mouth is on the underside, the anus on the upper.
    - *Pedicellariae,* jawed or clawed structures fend off encrusting organisms, on the upper surfaces.
    - The underside of each arm is lined with tube feet. See Figure 2.
    - Starfish are sensitive to touch, light (there are light sensitive "eye" spots at the tips of the arms), orientation, water chemistry and temperature.
    - Starfish can drop an arm voluntarily (autotomy), when threatened by a predator.
    - Most starfish can regenerate arms autotomized or bitten off by a predator. See Figure 1.

Echinodermata continued on page 7...

WULFENITE

By Susan Celestian

Chemical Formula - $Pb(MoO_4)$
Crystal System - *Tetragonal (3 axes of unequal length, at 90° to each other). Go to https://www.mindat.org/min-4322.html or https://www.minerals.net/mineral/wulfenite.aspx for interactive wulfenite crystal graphics. Note that at mindat you can click on 8 different crystal forms -- icons to the right of the graphic)*
Growth Forms/Habits - *Tabular, square (the latter two frequently with beveled edges), pseudo-cubic, pyramidal terminations more uncommon.*
Hardness - *2.5-3*
Luster - *Adamantine, sub-adamantine, resinous*
Streak - *White*
Colors - *Orange-yellow, yellow, honey-yellow, reddish orange, colorless (rare), gray, brown, olive-green, black*
Diaphaneity - *Translucent to opaque*
Specific Gravity - *6.5-7.5*
Cleavage - *One distinct, one good*
Fracture - *Irregular, uneven, conchoidal*
Occurrence - *Alteration mineral in the oxidized zone of lead deposits found in arid climates; often paired with mimetite.*
Uses - *Source of Molybdenum, sometimes Lead*

Wulfenite continued on page 16

As I was unable to attend the June meeting, I have no speaker review. It was Mary Lou Redinger, an archaeologist credited with discovering lost sources of Maya jade, in Guatemala, where she has lived for 47 years. She operates JadeMaya in Guatemala, the Museum of Jade, and works to protect ancient Maya wisdom through the non- profit: The Maya Conservancy.

MO MORE MEETINGS UNTIL SEPTEMBER…..

HAVE A COOL SUMMER!!!!!

INSIDE THIS ISSUE

Each item is now hyperlinked to the page on which it is found

Zoom Board Meeting Minutes
May 31, 2021

- In Attendance: Bill F., Bob E., Bob S., Cynthia B., Deanne G., Don R., Ed W., Howard R., Nancy G., Rebecca S., Sue C., and Tiffany P.
- Bill F. called the meeting to order
- May meeting minutes approved
- Cynthia B. went over the financials
  - Not finalized until end of month
    - (Executive meeting happened to land on the last day of May)
  - Refunds from cancelled show
    - In & Out – no way to contact
    - Royalty Rentals – no refund allowed
    - SW Barricade – will refund, possible fee
    - AZ Rentals – refund possible
  - $300 was spent for a new saw for our slab saw by Ed W.
- Tiffany P. discussed membership
  - 3 or 4 new members
  - New nametag vendor working well
    - About 1 week turn-around for orders
- Dave Haneline Mine was discussed
  - Ed W. will turn in Notice of Intent soon
- Tiffany P. gave an update to the wire wrapping class
  - 6 or 7 people showed to the first class
  - Another class will be June 8th at the Civic Building from 4:30-6:30pm
  - May have summer classes
    - Email Jennifer G. to let her know you are interested jennifer@eliteshuttersandblinds.com
- Bill F. discussed the field trips
  - Lynx Creek was successful
    - Everyone left with some gold flecks
  - Check your emails, the fires in the area are affecting our local trips
- Bob S. asked for the lapidary hours to be examined
  - The hours for lapidary and silversmithing are 8:30am-12:00pm
    - Mon (lapidary only), Thurs, and 1st 3rd and 5th Sat of the month
    - June dates - 3, 5, 7, 10, 14, 17, 19, 21, 24, 28
      - The center has limited capacity due to covid restrictions
      - The rest of the center closes at 9am, so don't be late
      - The center may require classes before using the machines
      - Contact Shirley Cote if you are interested in lapidary/silversmithing services Crystalc17@gmail.com
  - North Mountain Visitor's Center has specific hours for the club to have exclusive access to the *club's* equipment
    - A club approved monitor must be present while operating machines
      - This is an issue for changing lapidary schedule
    - Ed W. is going to analyze the schedule for any changes possible
- Do not forget to wear your name-tag on club events!

Respectfully submitted, Rebecca Slosarik, secretary

Zoom General Meeting Minutes
June 1, 2021

- In Attendance: 19 Zoom participants
- Bill F. called the meeting to order
- Mary Lou Ridinger discussed her spectacular Jade specimens from Guatemala
  - Check out the beautiful jewelry on their website! JadeMaya.com
  - Or email Mary Lou directly marylouridinger@jademaya.com
  - You can also check out Mary Lou's TedTalk – search her name
- Cynthia B. discussed the financials
  - Storage trailer fees coming soon
- Dave Haneline Mine was talked about
  - Yavapai County is missing $60 registration
    - We have registered with BLM
    - Ed W. will register in the near future
- Bill F. gave field trip updates
  - Check emails, newsletter, or website for current information
  - Always double check before coming on trips
    - Weather, fire, and availability permitting
  - The season will start again in September
- Tiffany P. talked about membership
  - If you need a nametag please email: dmrmclub@gmail.com
- Ed W. discussed an upcoming show
  - Still looking for location
  - Hopefully we can have a show in March 2022
- Jennifer G. will have another wire wrapping class
  - Tuesday June 8th 4:30-6:30pm at the civic building
- Do not forget you can always bring specimens for show-and-tell to the meetings
- The next general meeting will be September 7th at the Civic Building
  - See you then and please stay safe!

Respectfully submitted, Rebecca Slosarik, secretary

FIELD TRIP TO SUNSET CRATER

Saturday, June 12, 2021

Photos by Susan Celestian & Bill Freese

On that very warm summer day, 18 DMRMC members, in 8 vehicles, met at Sunset Crater. After a short orientation, the group walked the Lava Trail in the National Monument. There they viewed many volcanic features, smelled *Ponderosa* sap, and enjoyed the view. Then it was off to the pumice pits that straddle State Route 89, north of Sunset Crater. After gathering samples, it was off to Strawberry Crater. There most folks walked at least part of the trail around the breached cinder cone, admiring the very cool volcanic bombs that litter the slopes.

Sniffing the sweet vanilla scent of the Ponderosa Pine

The a'a' Bonita lava flow from Sunset in the foreground, lava dome O'Leary Peak in the background

Field Trips continued on page 5...

….Field Trips continued from page 4

The San Francisco Peaks poke dramatically into the view behind the rubbly a'a' flow of Sunset Crater.

Xenolith - a chunk of country rock trapped in the basalt at Sunset Crater

Squeeze up (like mud squishing between your toes) at Sunset Crater

Spatter Cone at Sunset Crater

Orientation at the Pumice Pits

Adonis Blazingstar

Pumice Breccia

Pumice, Pumice Everywhere!

Field Trips continued on page 6...

….Field Trips continued from page 5

GOAL: Strawberry Crater

Off on a trek

There is a great view of the Painted Desert from Strawberry Crater.

And way of in the background is Gray Mountain -- a big monocline.

Field Trips continued on page 7...

….Echinodermata continued from page 2

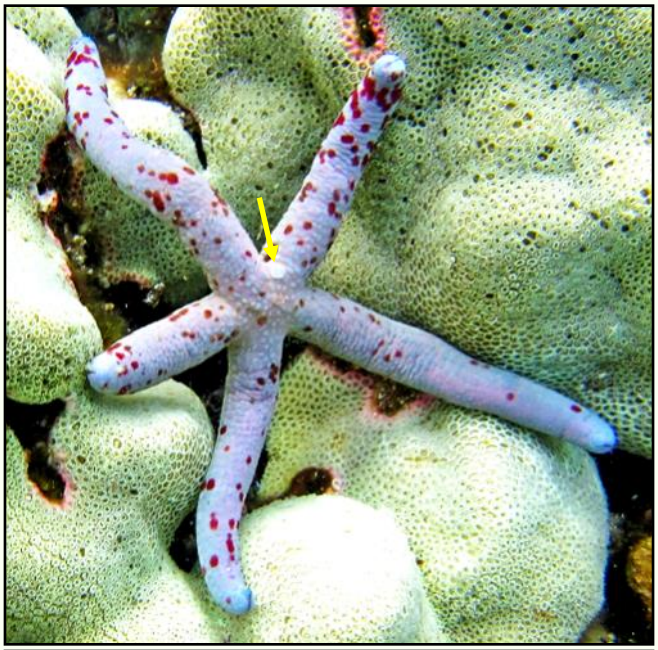

FIGURE 1 STARFISH The basic body plan of a starfish is a central disc, surrounded radially by five arms. In the close-up view, you can see how plated is the dermis. The arrow points to the madreporite. If you enlarge the view on your screen, you can see the outlines of the sub-dermal ossicles (calcite plates). The stubby arm will regrow to match the others.

This is *Linckia multiflora (Mottled Linckia),* at Kapoho Tidepools, on the Big Island of Hawaii. *Photo by Susan Celestian* Back to Page 2

FIGURE 2 STARFISH TUBE FEET You can see the many tube feet (fleshy tubes with "sucker" ends) lining the dark orange areas. (Note also the spines.) Sand Star (*Astropecten armatus*), Rocky Point, Mexico. *Photos by Stan Celestian* Back to Page 2

* Starfish are flexible, but can attain rigidity when necessary. See Figure 3.

FIGURE 3 STARFISH ARE FLEXIBLE Here are a couple Ochre Starfish (*Pisaster ochraceus*) at Otter Crest Beach, Oregon. They are exposed at low tide, and are clinging to a rock, with their tube feet. Note the curling of their arms, demonstrating their flexibility. (Also note the small white spines adorning their surface.) *Photo by Susan Celestian*

* There are many variations on the basic body plan of starfish. See Figure 4.

FIGURE 4 (a-i) VARIATIONS OF STARFISH BODY PLAN Most starfish directly reflect the radial, pentameral body plan; however, there are variations. *Photo credits at each image.*

Choriaster granulatus, Great Barrier Reef, by Richard Ling, licensed under CC BY-NC-ND 2.0

Echinoids continued on page 8….

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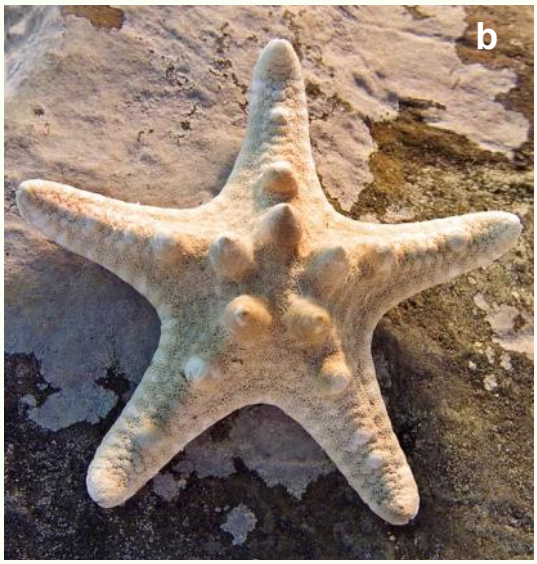
Figure 4 Starfish Variations continued:



Starfish_by Philip Hay and licensed under CC BY-NC-ND 2.0

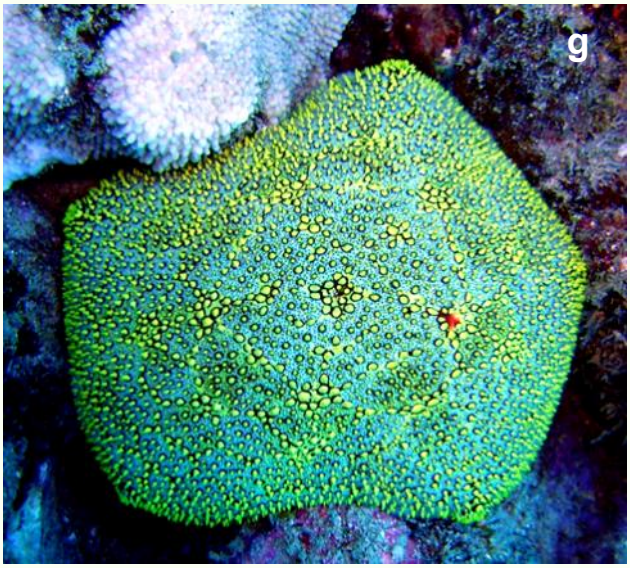
Note that this adult starfish does not conform to the normal symmetry.

Square starfish (Tosia magnifica) at Rye Pier, Australia_by Saspotato and licensed under CC BY-NC-ND 2.0

Starfish at Miami Beach, Honduras by Nick Leonard and licensed under CC BY-NC-SA 2.0

Cinnamon Sunstar (Crossaster papposus) in England by Keith Roper and licensed under CC BY 2.0

Novodinia antillensis (near 1,640 feet depth in Roatan, Honduras by NOAA DeepCAST I Expedition and licensed under CC BY 2.0



Another weird one! Pincushion Starfish (*Culcita novaeguineae*)_by Maynard Hogg and licensed under CC BY-NC-SA 2.0

Echinodermata continued on page 9….

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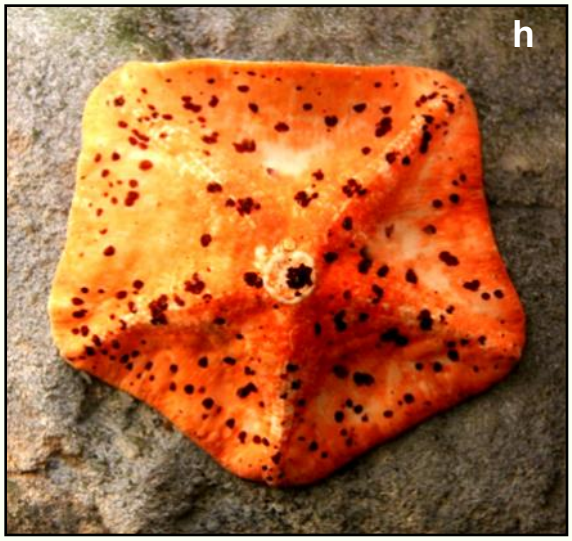
Figure 4 Starfish Variations continued:



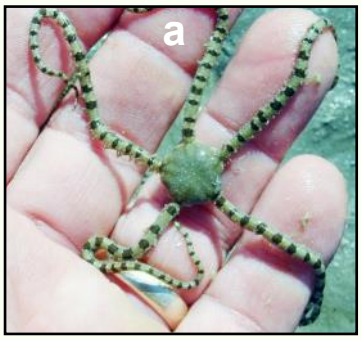
Ambush Starfish (*Stegnaster inflatus*) from Southern Encounter Aquarium and Kiwi House, Christchurch, New Zealand by Avenue and licensed under CC BY-SA 3.0

*

Crown of Thorns (*Acanthaster planci*) at_Malapascuas Island by mattk1979 and licensed under CC BY-SA 2.0

The Crown of Thorns, like some other starfish, has toxin-laced spines. As an aside, this starfish is voraciously predatory, and has had a devastating effect of coral reefs, already stressed by other external factors.

- Ophiuroidea (Brittle Stars aka Serpent Stars):
  - Distinct central disc and 5 whip-like arms. See Figure 5.



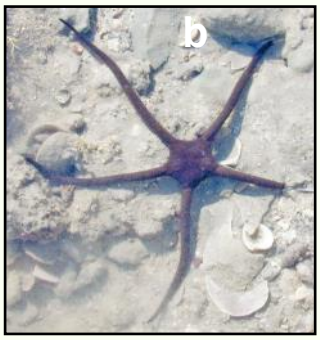


FIGURE 5 BRITTLE STARS Brittle stars don't display as much variability in body form as do starfish, but patterns and spiny-ness varies. (a) *Ophiocomella alexandri* - Alexander's spiny brittle star, (b) *Ophiodrma teres* (c) *Ophiocoma erinaceus - Spiny Brittle Star* *Photos by Stan Celestian*

- Unlike in starfish, all brittle star organs reside in the central disc.
- *Ossicles* (plates and other support structures) are embedded in and cover the upper surface, below the epidermis. In fact, these plates are what is most often fossilized.
- The mouth/anus, pedicellariae, and madreporite are all on the under surface.
- The outer edges of arms are lined with spines.
- Brittle stars are sensitive to touch, orientation, water chemistry, and many seem to be sensitive to light.
- Brittle stars are very flexible.
- Like starfish, brittle stars can drop an arm voluntarily (autotomy), when threatened by a predator.
- Also like starfish, brittle stars can regenerate arms autotomized or bitten off by a predator.

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- Holothuroids (Sea Cucumbers):
  - Named for their resemblance to cucumbers, sea cucumbers do not resemble other echinoderms, generally having a leathery spherical to cylindrical body. See Figure 6 a-g.

FIGURE 6 a-g SEA CUCUMBERS Fleshy, cylindrical bodies are commonly displayed by sea cucumbers. *Photos by Sue and Stan Celestian*

White Spotted (Actinopyga mauritiana), Two Step Beach, HI

Chocolate Chip Sea Cucumber (Holothuria cf. dofleinii), Kapoho Tidepools, HI

Sea Cucumber, Exmouth, Western Australia, Australia

Sea cucumber, Cholla Bay, Mexico

Plump Sea Cucumber with a fecal "string of pearls", Kapoho Tidepools, Hawaii

Light-spotted Sea Cucumber, Kapoh Tidepools, HI

Lion's Paw or Sticky Snake Sea Cucumber, Kapoho Tidepools. These sea cucumbers are nocturnal, and were draped over the rocks -- seemed to be at least 6' long!

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….Echinodermata continued from page 10

- *Ossicles* (plates and other support structures) are embedded in and cover the upper surface, below the epidermis, in most species. In fact, these are what is most often fossilized. Figure 7.

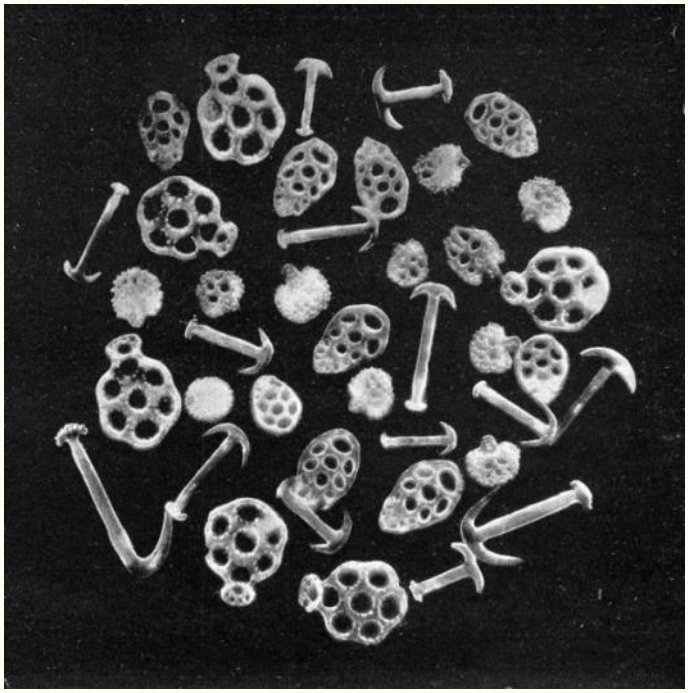

FIGURE 7 HOLOTHUROID OSSICLES For the most part, sea cucumber fossils are the ossicles that were once supporting their flesh. *Public Domain (PD-US-expired),* originally published *Marvels of the universe. A popular work on the marvels of the heavens, the earth, plant life, animal life, the mighty deep, with an introduction by Lord Avebury and with contributions by leading specialists, etc.*, published in 2 vols in London 1911-1912.

- The mouth is at one end (with retractable tentacles), and the anus is at the other. See Figure 8.

FIGURE 8 SEA CUCUMBER TENTACLES In this photo, a sea cucumber has extended its tentacles, with which it feeds, trapping debris in the currents. *Photo by ozfoodie and licensed under CC BY-NC-ND 2.0*

- Sea Cucumbers range in size from 0.12" to 10'.
- Most sea cucumbers do have tube feet.
- Sea cucumbers are sensitive to touch and water temperature; and while they have no sensory organs per se, they seem to be sensitive to the presence of light.

♦ Edrioasteroids:

- Edrioasteroids are extinct.
- Edrioasteroids look like a small button, with 5 arms, arranged radially - straight or curved. See Figure 9.

FIGURE 9 FOSSIL EDRIOASTEROID This is an excellently preserved edrioasteroid from the Upper Ordovician Bellevue Limestone in northern Kentucky. It is attached to hard substrate. The fossil is 1/2" in diameter. *Photo by James St. John and licensed under CC BY 2.0.*

- Like all other echinoderms, edrioasteroids had an exoskeleton composed of calcite plates.
- The mouth was on the upper surface, the anus below.
- Edrioasteroids were very small -- an inch or less in diameter.

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Habitats:

- Starfish, brittle stars, sea cucumbers, and edrioasteroids are all exclusively marine.
- **Starfish** are found from the intertidal down to 20,000'. They are found in all Earth's oceans (including very cold ones), although their diversity is greatest in tropical water.
- **Brittle Stars** occupy niches from the intertidal to the deep ocean; Arctic/Antarctic to tropics. In fact, over 1/2 of the known extant species live below 600' depth.
- **Sea Cucumbers** are found from the intertidal to depths exceeding 35,000' (6.6 miles)!
  - At depths exceeding 5.5 miles, they comprise 90% of the total macrofauna biomass.[1]
  - In New Zealand, the Strawberry Sea Cucumber population can exceed 93 per square foot.[1]

Habits:

- Starfish, brittle stars, and edrioasteroids all live on the sea floor. Some sea cucumbers are capable of swimming or floating.
- Edrioasteroids exclusively encrusted onto some hard substrate -- rock or shell.
- Feeding habits:
  - Starfish - most are predators (sponges, bivalves, gastropods, coral polyps, etc); a few are detritus eaters, suspension feeders, or capable of absorbing nutrients out of seawater.
    - Example: A starfish will pull apart a bivalve, extrude its stomach and digest the bivalve externally, absorbing a nutritious soup, and leaving behind an empty shell.
  - Brittle Stars - primarily scavengers or detritus eaters; some may prey on crustaceans or worms.
  - Sea Cucumbers - scavengers, eating plankton and detritus, ingesting sediment and digesting the good bits; also filter feeders, using their tentacles to entrap passing debris.
- Mobility:
  - Starfish move by activating their tube feet, powered by a water vascular system. See Figure 10.

FIGURE 10 STARFISH TUBE FEET In this photo, a starfish, using its tube feet with suction cups at the ends, clings to the glass walls of an aquarium tank. *Photo by ppelliti and licensed under CC BY-SA 2.0.*

  - Brittle Stars use their very flexible legs to move about or cling to corals or other stationary object.
  - Like star fish, most sea cucumbers have tube feet, used for locomotion (and for attachment to a stable substrate). Go to this YouTube site for a view.
  - Edrioasteroids were permanently attached to a substrate.
- Reproduction:
  - Starfish: Most species have separate sexes. However, some are hermaphroditic (individuals produce both eggs and sperm), and others change sexes during various stages of their lives. Usually eggs are fertilized in the water and become part of the plankton. In some species eggs may be attached to a rock, and in others they are held in brood pouches.

[1]https://en.wikipedia.org/wiki/Sea_cucumber#Habitat

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Some starfish are capable of asexual reproduction. Those that can, may divide themselves, usually needing to retain a portion of the central disc, where lie the organs. A very few species can grow an entirely new organism from just a fragment of an arm. See Figure 11. And in some species, the larva can either autotomize body parts or bud, to from new individuals (they may do this when they sense that food is plentiful).

FIGURE 11 ASEXUAL REPRODUCTION IN STARFISH Here is an entirely new starfish growing from a portion of the arm of another starfish. This form is called a *comet* -- can you tell why*? Photo by Danial Kwok and licensed by CC BY-NC-ND 2.0.*

- ♦ Brittle Stars and Sea Cucumbers reproduce sexually, in the same ways as star fish.

► Respiration:

- ♦ Starfish respire in several ways: small protrusions on their bodies exchange gases, and tube feet act as gills.
- ♦ Brittle Stars have ciliated sacs on the underside of the disc, that function to exchange gases and in excretion.
- ♦ Sea Cucumbers have branching tubules, just inside the anus, that absorb oxygen from sea water and waste gases from the organism. By drawing water in and out of the anus, sea cucumbers 'breathe'.

Interesting facts:

► Starfish have an average lifespan of 35 years[2], sea cucumbers 5-10 years[3], and brittle stars up to 5 years[4].

► More than 60 species of brittle stars are bioluminescent, i.e. they can glow. (*Wikipedia*)

► When threatened (or maybe just clearing house), sea cucumbers can expel their inner organs -- that will regenerate within a few days or weeks.

Starfish, Brittle Stars and Sea Cucumbers are quite fleshy, and decay upon death, so are not common as fossils. However, there are many known fossils in each group -- if only as ossicles within the micro-component of sands. Images of fossil starfish, brittle stars, sea cucumbers and edrioasteroids follow in Figures 12-18.

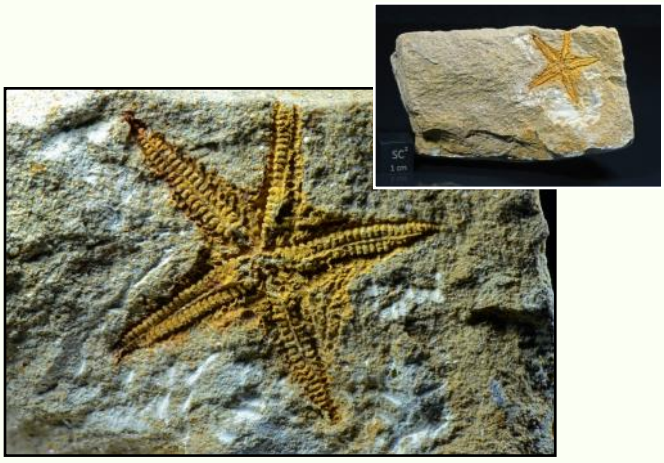


FIGURE 12 STARFISH This small (about 1") starfish (*Promopaleaster sp*) impression is from the Silurian Heathcoate Formation in Victoria Australia.
Photo by Stan Celestian

[2]http://awesomeocean.com/trending-now/9-cool-facts-starfish/
[3]https://protecttheoceans.org/wordpress/?p=2158
[4]https://en.wikipedia.org/wiki/Brittle_star#:~:text=of%20a%20year.-,Life%20span,Gorgonocephalus%2C%20may%20live%20much%20longer.

Echinodermata continued on page 14….

....Echinoids. continued from page 13

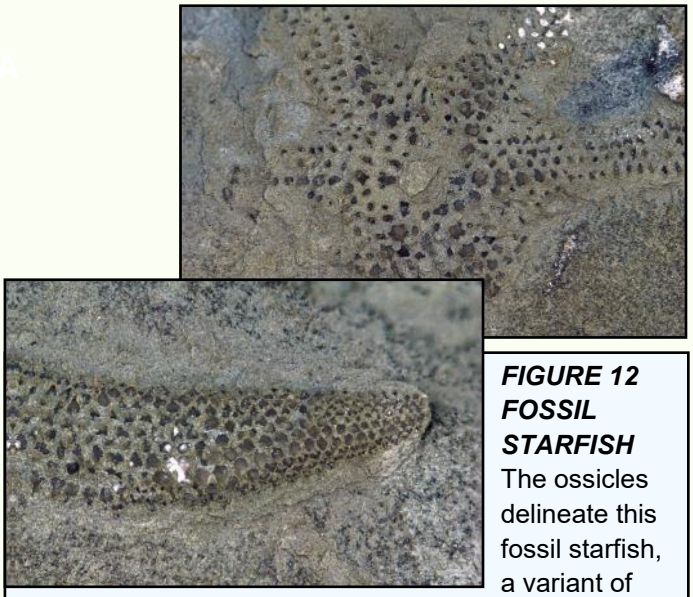


FIGURE 12 FOSSIL STARFISH The ossicles delineate this fossil starfish, a variant of *Promopalaeaster*, from the Late Ordovician of Warren Co., OH. *Photo by James St. John and licensed under CC BY 2.0*

FIGURE 13 FOSSIL STARFISH This group of fossil starfish is on display at the Naturhistorisches Museum in Bern, Switzerland. *Photo by Curious Expeditions and licensed under CC BY-NC-SA 2.0 .*

FIGURE 14 FOSSIL BRITTLE STAR This is *Geocoma libanotica*, a small (1-inch) Middle Cretaceous brittle star from Haqel, Lebanon. *Photo by Stan Celestian*

FIGURE 15 FOSSIL BRITTLE STAR This is a beautifully preserved (and we are hoping authentic) Ordovician brittle star fossil from the Mecissi area in Morocco. *Photo by Stan Celestian*

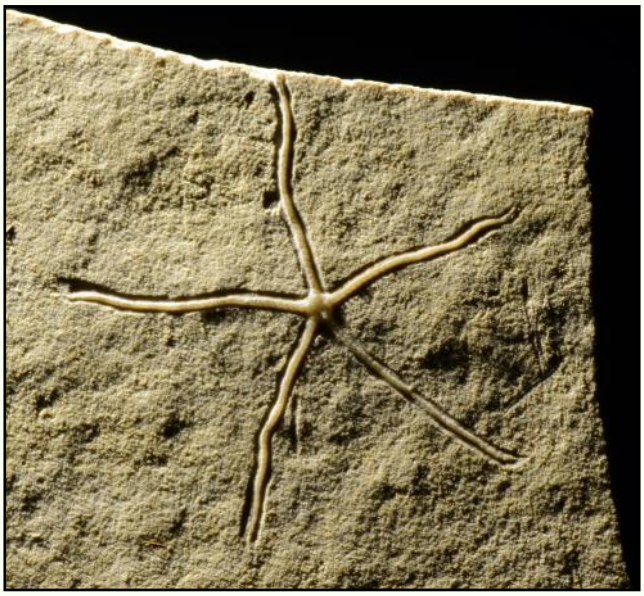


FIGURE 16 FOSSIL BRITTLE STAR This fossil brittle star is out of the Upper Jurassic Solnhofen Limestone in Germany. *Photo by Stan Celestian*

Echinodermata continued on page 15….

….Echinoids. continued from page 14

FIGURE 17 FOSSIL BRITTLE STARS This is identified as fossil counterprints of brittle star resting marks (in other words, the resting mark was a depression, and we are looking at the underside of the rock layer, at the infilling of the resting marks). The brittle star is *Asteriacites quinquefolius*, from a Triassic sandstone in Burgundy, France. *Photo is Public Domain (Wikipedia Commons).*

FIGURE 18 FOSSIL SEA CUCUMBER This is a rare fossil sea cucumber, from the Pennsylvanian Francis Creek Shale member of the Carbondale Formation of Mazon Creek, Grundy Co., IL. *The fossil is on display in the National Museum of Victoria, the photo was taken by David Bowers, and is licensed under* CC BY 4.0

FIGURE 19 EDRIASTEROID What at first glance just looks like some lump, is upon closer inspection (and you might want to enlarge the image on your screen) an edrioasteroid (*Carneyella pilea*). It is solidly encrusted onto a Rafinesquina brachiopod, from the Ordovician McMillan Formation in Dearborn Co., IN. It is about 3/8" in diameter.

Edrioasteroids have been found in Arizona's Pennsylvanian Naco Formation, so keep your eyes close to the ground, and examine every lump, the next fossil trip to the Payson area.

Photo by Stan Celestian

GENERAL RESOURCES FOR ASTEROIDEA, STELLEROIDEA, EDRIOASTEROIDEA, HOLOTHUROIDEA

https://en.wikipedia.org/wiki/Brittle_star

https://en.wikipedia.org/wiki/Edrioasteroidea

https://www.newworldencyclopedia.org/entry/starfish

https://en.wikipedia.org/wiki/Starfish

https://animalsoftheworld.info/invertebrates/blue-starfish/

...Wulfenite continued from page 2

First described in Austria in1845, wulfenite's name derives from Franz Xavier van Wulfen, Austrian mineralogist. It exists in solid solution[1] with a Tungsten mineral, Stolzite ($PbWO_4$).

Like Vanadinite, wulfenite is iconicly Arizona, and there are a number of famous mines. Wulfenite was officially made the Arizona State Mineral in 2017. The bill, sponsored by representative Mark Finchem, was initiated by Alexander Schauss, senior director of research and CEO of AIBMR Life Sciences, Inc. And Chris Whitney-Smith (MSA President, and DMRMC member) was instrumental in getting MSA (especially the juniors) involved in the campaign to get the bill passed.

Pure wulfenite is colorless, but that's no fun…..So most of the following images (Figures A-P) are more colorful.

FIGURE A Beautiful butterscotch orange wulfenite from the 79 Mine, Gila Co. AZ. *Photo by Stan Celestian*

FIGURE B Nestled in calcite, this tab is from the Old Yuma Mine, Pima Co., AZ. *Photo by Parent Gery, licensed by Creative Commons CC BY-SA 3.0*

[1] Solid Solution: A situation where two or more minerals exist as end members (on a line or triangle), and whose composition varies continuously between those end members.

FIGURE C The Glove Mine, in Santa Cruz Co., AZ, produced beautiful tabs of wulfenite. *Photo by Stan Celestian and used with permission of the Natural History Museum of Los Angeles County.*

FIGURE D A mine visited annually by our club is the Red Cloud Mine, La Paz Co., AZ. It is famous for it's bright red-orange crystals.
Photo by Stan Celestian

FIGURE E Rowley Mine (Maricopa Co., AZ) wulfenite is beautifully transparent orange tabs, associated with mimetite balls.. *Photo by Stan Celestian*

Wulfenite continued on page 17….

...Wulfenite continued from page 16

FIGURE F More butterscotch-colored wulfenite from the Defiance Mine, Cochise Co, AZ. These crystals are typically a bit arrow-shaped, with many parallel overgrowths. (a) *Photo by Stan Celestian and used with permission of the Natural History Museum of Los Angeles County. (b) Photo by Stan Celestian*

FIGURE G This is a stout pseudo-cubic wulfenite crystal, from the Erupción Mine Los Lamentos Mts., Chihuahua, Mexico. *Photo by Robert M. Lavinsky and licensed by Creative Commons CC BY-SA 3.0*

FIGURE H The San Francisco Mine (Sonora, Mexico) has produces many large, clear, orange wulfenite crystals, often with associated orange balls of mimetite. *Photo by Robert M. Lavinsky and licensed by Creative Commons CC BY-SA 3.0*

FIGURE I Practically colorless, these wulfenite crystals are from the San Rafael Mine, Nye Co., NV. (The field of view is less than 1/2") *Photo by Leon Hupperichs and licensed by Creative Commons CC BY-SA 3.0*

Wulfenite continued on page 18….

...Wulfenite continued from page 17

FIGURE J The Ojuela Mine Mapimi, Mexico has been a prolific producer of wulfenite - and crystals of many habits. (a) chunky pseudo-cubic crystals; (b) transparent and beveled tabs; (c) "sandwich" crystals -- core of darker wulfenite, with secondary film crystallized on each side of the tabs; (d) pyramidal crystals -- a bit of a change from the much more common squarish tabs. *Photos by: (a) Robert M. Lavinsky and licensed by Creative Commons CC BY-SA 3.0; (b) Stan Celestian and with permission of the Natural Museum of Los Angeles County; (c) Stan Celestian; (d) Stan Celestian.*

FIGURE K Note that these wulfenite crystals are zoned, with a transparent center bounded by cloudy growth. *Photo by Stan Celestian and with permission of the Natural Museum of Los Angeles County*

FIGURE L This is another pyramidal (dipyramidal) wulfenite crystal, from the Aurora Mine, Chihuahua, Mexico. *Photo by Stan Celestian and with permission of the Natural Museum of Los Angeles County*

Wulfenite continued on page 19….

...Wulfenite continued from page 18

FIGURE M Wulfenite from the Jianshan Mine, Xinjiang (Xinjiang-Uygur) Autonomous Region, China. *Photo by Robert M. Lavinsky and licensed by Creative Commons CC BY-SA 3.0*

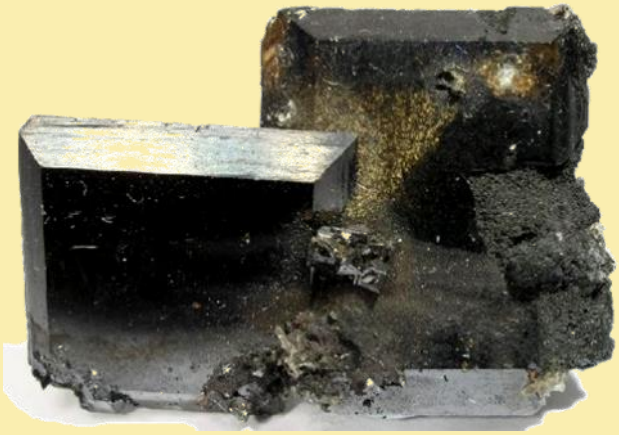


FIGURE N A very dark, black wulfenite specimen from the Tsumeb Mine, Tsumeb, Namibia. *Photo by Robert M. Lavinsky and licensed by Creative Commons CC BY-SA 3.0*

FIGURE O These are really lustrous, dipyramidal wulfenite crystals, from the Whim Creek Copper Mine in Western Australia, Australia. *Photo by R. Tanaka and used with permission.*

FIGURE P Another wulfenite specimen from the Jianshan Mine, Xinjiang (Xinjiang-Uygur) Autonomous Region, China. *Photo by Robert M. Lavinsky and licensed by Creative Commons CC BY-SA 3.0*

In a March 29, 2021 article (Wulfenite-Mimetite: Examining a Breathtaking Combination) in *Rock & Gem*, Bob Jones reports seeing a wulfenite crystal 5" across!!

GENERAL RESOURCES FOR WULFENITE

https://en.wikipedia.org/wiki/Wulfenite

https://www.mindat.org/min-4322.html

http://webmineral.com/data/Wulfenite.shtml#.YLwO_flKg2w

https://www.rockngem.com/wulfenite-mimetite-examining-a-breathtaking-combination/

https://www.minerals.net/mineral/wulfenite.aspx

https://www.rockngem.com/wulfenite-mimetite-examining-a-breathtaking-combination/

15....

MOLTEN MINI

A common sight along the highways and byways of northern Arizona, is a bright red layer (or more) flanked by black basalt. "I have seen that," you say. "What are those red layers?" Well…….. They are baked soils (or sometimes ash layers). The scenario goes like this:

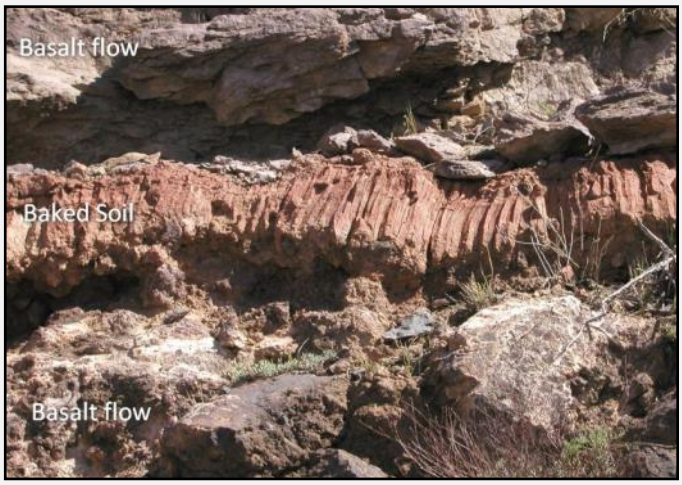
- A volcano erupts and a basaltic lava flows across the landscape.
- A period of time of exposure and weathering takes place. Air and precipitation facilitate chemical reactions that break down the surface of the aforementioned lava flow, producing a soil.
- The volcano -- or a different volcano -- erupts again, and another basaltic lava flow covers the soil.

  The intense heat (in the vicinity of 2000° F) dries out and bakes the soil, oxidizing the iron in the soil, to turn the layer red; and causing some hardening.

  In addition, as the baked soil cools, it may break up into 6-sided columns -- *columnar jointing* (more about that in the next issue).

This roadcut can be seen along State Route 89A, just south of the overlook of Oak Creek Canyon. Here a baked soil occurs between two lava flows -- the older one below and the younger above the soil zone. When you look closely, you see that the soil breaks up into narrow columns. *Photo by Stan Celestian*

This is a view of a roadcut on I-17, about 10 miles south of Flagstaff. The baked soil and basalt lava flow are labelled in white (look closely). *Photo by Mike Conway and courtesy of the Arizona Geological Survey.*



Here is another baked soil, between lava flows, along I-17, south of Flagstaff. It is red and columnarly jointed. Don't take your eyes off the road for too long, but these features are easily spotted as you whiz along. *Photo by John Shieffer and courtesy of the Arizona Geological Survey.*

UPCOMING FIELD TRIPS & MEETINGS

At this time there are no field trips scheduled. The forest fire situation and national forest closures have made it impossible to make any plans, at this point. As soon as there is some relief, I'm sure we'll be getting emails from Bill -- and back out into the field.

DATES SUBJECT TO CHANGE

Bill and the field trip committee will be actively looking for productive spots for field trips. If you have any suggestions, you are encouraged to contact him at bfreese77@cox.net

PRONGHORN
(*Antilocapra americana*)

Photo taken by Susan Celestian near Strawberry Crater.

Common in the western United States (with a range that extends down Baja California & a bit into Canada - excluding the coastal states), and unique to North America, the Pronghorn's Latin name means "American goat-antelope" -- and yet, it is related to neither goat nor antelope. It has horns, not antlers -- and they are the only known branched horns. Unusual among horned animals, these horns are shed annually.

Interestingly, the fawns, born in late May-early June, are nearly odorless, making them difficult for predators to "sniff out".

Living in treeless areas, they need to be able to run; and they can -- FAST! Sprinting at up to 60mph, they can maintain speeds of 30-40mph for long distances (longer than cheetahs). And they can bound up to 20 feet, while on the run. Plus they have good eyesight, spotting trouble at 4 miles.

- Weight: males (88-143 lbs); females (75-106 lbs)
- Eyes: high, prominent, 320° field of vision
- Not good jumpers, and so go under fences -- hence a movement to remove the bottom barbed wire of the many fences on the western plains.
- 4-day-old newborns can outrun a human.

https://nhpbs.org/natureworks/pronghorn.htm; https://en.wikipedia.org/wiki/Pronghorn

FACEBOOK

Visit and join the club page periodically. See what is happening, and boost our visibility on the web. Go to: The Daisy Mountain Rock and Mineral Club. It is set up so you can post photos of outings or related items. Share with friends!

AWARD-WINNING WEBSITE

http://www.dmrmc.com/

If you have comments, contact Nancy Gallagher.

INSTAGRAM

Follow the club on Instagram. Go to https://www.instagram.com/daisymountainrockclub/ and follow today. Share with friends!

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Clark L	Bob S.
	Nancy G

Meetings are held the **1st Tuesday of the month** at **the Anthem Civic Building**, 3701 W Anthem Way, Anthem, AZ 85086. General meeting at 6:30 pm. We **do not meet in July or August**.

DMRMCLUB@GMAIL.COM

Membership Dues:
First year $30, then $20.00 Adults per Person
First year $45, then $25.00 Family (2 people)

Meeting Dates for 2021

Jan 5, Feb 2, Mar 2, Apr 6, May 4, June 1, Sept 7, Oct 5, Nov 2, Dec 7

Words of Wisdom

passed along by our own

Bob Evans

NEEDED: QUALITY MINERALS (or OTHER) DONATIONS WITH LABELS -- for monthly raffle prizes; and for raffle, door prizes, and sales tables at the annual show. If you have specimens to donate, please see Robin Shannon. The Daisy Mountain Rock and Mineral Club is a 501(c)(3) non-profit organization, and will gratefully acknowledge your donation with a Tax Deduction Letter. Thank You!

NOTE FROM THE EDITORS

Have a geological interest? Been somewhere interesting? Have pictures from a club trip? Collected some great material? Send us pictures -- or write a short story (pictures would be great).

Deadline for the newsletter is the 22nd of the month.

Mail or Email submissions to:
Susan Celestian
6415 N 183rd Av
Waddell, AZ 85355
azrocklady@gmail.com

UPCOMING AZ MINERAL SHOWS

July 10-11 - Lakeside, AZ White Mountain Gem & Mineral Club; Country Court Event Hall, 3369 W White Mountain Blvd; Sat 9-6, Sun 10-4; Admission: ?. **CANCELLED**

August 6-8 - Prescott, AZ Prescott Gem & Mineral Club; Findley Toyota Event Center; Fri-Sat 9-5, Sun 9-4; Admission: adults $5, seniors $4, under 13 free with adult.

September 17-19 - Payson, AZ Payson Rimstones Rock Club; Mazatzal Hotel & Casino, Highway 87, Mile Marker 251; More details TBA.

October 8-10 - Buckeye, AZ West Valley Rock & Mineral Club; 902 N 1st St (Miller Rd); Fri-Sat 9-5, Sun 9-2; Admission: $3, under 13 free.

October 16-17 - Sedona, AZ Sedona Gem & Mineral Club; Sedona Red Rock High School, 995 Upper Red Rock Loop Rd; Sat 10-5, Sun 10-4; Admission: ?.

October 9-10 - Sierra Vista, AZ Huachuca Mineral & Gem Club; The Mall, El Mercado Drive; Sat 9-5, Sun 10-4; Admission: Free.

November 27-28 - Wickenburg, AZ Wickenburg Gem & Mineral Society; Hassayampa School, Wrangler Event Center, 251 S Tegner St; Sat 9-5, Sun 10-4; Admission: ?.

If you are travelling, a good source of shows AND clubs is http://the-vug.com/educate-and-inform/mineral-shows/ **OR** http://www.rockngem.com/ShowDatesFiles/ShowDatesDisplayAll.php?ShowState=AZ **OR** https://www.rockandmineralshows.com/Location/?displayShows=true

Visit http://rmfms.org/ for news about conventions, events, and associated clubs. If you are travelling, you might want to contact a club local to your destination. Maybe they have a field trip you could join, while in town.

NORTH MT OPEN STUDIO - JULY

You are invited to return to NMVC Open Studio. Lapidary & Silversmithing on Thursdays and the first, third and fifth Saturdays in a month, from 8:30 to noon with cleanup starting at 11:45.

NMVC requires that everyone wear a mask while in the building. (Other NMVC requirements will be sent in a later email or on premises.)

Only four people can sign up, and must do so for the full three hours that the shop will be open each day. First come, first served.

Please arrive no later than 8:45 a.m. The center may close to the public at 10.

Email your request for the day(s) you are interested in participating ASAP. Email Shirley Cote at crystalc17@gmail.com

July – Thursday's dates are 1, 8, 15, 22, 29
July – Saturday's dates are 3, 17, 31

If more than four people wish to participate on the same day, please expect to be bumped or rotated to another day as efforts to accommodate everyone will be taken.

We would also like to inquire as to anyone wishing to come in for **Lapidary Only Open Studio on Mondays.** Email Shirley at crystalc17@gmail.com

July - Monday's dates are 5, 12, 19, 26