



## Wickenburg Gem & Mineral Society, Inc.

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*The purpose of this organization shall be to educate and to provide fellowship for people interested in*

## NON-CLASTIC SEDIMENTARY ROCKS — Evaporites\*

There are many evaporite minerals, but some include: calcite, gypsum, anhydrite, halite, sylvite, polyhalite, carnallite, barite, borax, hanksite, trona, glauberite, and many more -- although not all reach thicknesses worthy of 'rock' status. See Table 1. (Note: Limestone often has its origin through evaporation, however, it was dealt with separately, in a previous newsletter.)

**Rock Halite and Rock Gypsum Environments of Deposition:** All evaporites are minerals that are deposited in the increasingly saline environment of an evaporating basin of marine and non-marine water. Restricted seas or marine bodies in arid environments will evaporate and as the water becomes super-saturated, minerals

will begin to crystallize out of solution. The order in which the most important minerals form are: calcite, gypsum, anhydrite, halite, sylvite. As you can see, gypsum precipitates out at lower salinities than does halite (one of the last minerals to form).

Similarly, non-marine basins -- typically closed basins in arid climates (such as Death Valley) support an evaporative environment. Streams flow into basins (typically fault basins), out of which there is little or no drainage. So evaporation acts on the water entering the basin, evaporite minerals build up, and further influx from streams increases the potential for mineral buildup. Thus, these deposits can reach great thicknesses over broad geographic areas.

**Halite or Rock Salt (NaCl)** occurs in mineable quantities in many places in Arizona, the broader United States, and around the world. Halite is concentrated in the central portions of evaporative basins -- where prolonged evaporation results in the highest salinities. As it requires high salinities to form, halite is generally associated with other rocks/minerals, such as limestone, gypsum and anhydrite.

There is a Morton salt mine in the Valley, west of Phoenix, at Dysart Rd and Glendale Av. One of the thickest salt deposits in the world, the Luke Salt Body, a deposit at least 6000' thick (may exceed 10,000' thick) and covering about 40 square miles (holding a potential total of 15 mi<sup>3</sup> of salt), is mined by dissolving the salts (primarily halite with gypsum) below ground, and pumping the brine into

*Evaporites continued on page 5.....*

### NON-CLASTIC SEDIMENTARY ROCKS

<p><b>LIMESTONE</b> - composed of precipitated crystals of calcite; will fizz in acid</p> <ul style="list-style-type: none"> <li>* <b>Crystalline Limestone</b> - fine to sugary calcite crystals, without fossils</li> <li>* <b>Fossiliferous Limestone</b> - fine calcite crystals, usually marine fossils</li> <li>* <b>Oolitic Limestone</b> - composed of small spheres of calcite</li> <li>* <b>Coquina</b> - composed of nearly only shells and shell fragments</li> <li>* <b>Chalk</b> - composed of the microscopic calcite shells of planktonic animals (coccoliths, foraminifera)</li> <li>* <b>Travertine</b> - coarsely crystalline calcite (very sugary), often banded in various colors (browns, reds, blacks)</li> </ul>
<p><b>DOLOSTONE</b> - similar to limestone, but composed of dolomite; will fizz weakly after powdered; generally devoid of fossils</p>
<p><b>CHERT</b> - microcrystalline quartz; conchoidal fracture; waxy luster; any color</p> <ul style="list-style-type: none"> <li>* varieties include flint, chert, jasper, chalcedony, agate, opal (although chalcedony, agate, opal do differ a bit from flint, chert, jasper)</li> </ul>
<p><b>ROCK SALT</b> - composed of halite; cubic cleavage; salty taste</p>
<p><b>GYPSUM</b> - composed of gypsum; easily scratched by fingernail</p> <ul style="list-style-type: none"> <li>* varieties include: alabaster (massive, sugary); selenite (generally clear); satin spar (fibrous)</li> </ul>
<p><b>DIATOMITE</b> (aka diatomaceous earth) - composed of the microscopic silica shells of diatoms; similar to chalk, but will scratch glass will not fizz in acid, and is less dense.</p>
<p><b>COAL</b> - composed of the carbonized remains of plant debris; brown-black; low density</p> <ul style="list-style-type: none"> <li>* varieties include: peat (loose visible plant debris), lignite (brown, with some visible plant remains), bituminous ("soft coal", black)</li> </ul>

TABLE 1 Non-Clastic Sedimentary Rock Chart

### INSIDE THIS ISSUE

Evaporites	1, 5
Minutes	2
Field Trip to McGuffy Cabin	3-4
Show list, Field Trips, Club Information	6
Uses of Rock Salt and Rock Gypsum	7

### Meeting Minutes — October 14, 2016

The meeting was called to order by Marty at 7 P.M. The pledge of allegiance was recited and a moment of silence was observed. There were 24 members present, with 3 guests. The minutes of the September 2016 meeting were not available to read. The treasury report was read by Treasurer Debbie and accepted. Fliers were available for the upcoming rock shows, located in Sedona on Oct. 15 and 16, 2016, Black Canyon City on November 4 through 6, 2016, Wickenburg on November 26 and 27, 2016, Flagg Show in Mesa on January 6 through 8, 2017, and Deming, NM on March 9 through 12, 2017.

Old Business discussed. The first aid kit is in need of restocking, and is to be taken out on trips by the trip leader.

New Business discussed. The November Rock and Mineral Show was discussed, including Karen obtaining a gold nugget for raffle. Help is needed for getting gifts for the raffle, door prizes, and silent auction. Sign-up sheets were passed around for shirts and working, kids table help needed, best rock, silent auction table, kitchen help, and help with set up and tear down. It was requested to leave the doors open during the sale due to people not entering when closed.

Dale taught rocks to 20 children at the preserve.

The rock room at Stanton will be moved to the Quonset hut. Bill and Karen will have the keys now, and members will need to contact them to use the room, after they are settled in their new location. There is an 18-inch saw, a trim saw, and a capping machine. Bill and Karen are requesting members to leave a donation to use the equipment. There will be an outing to help move the rock equipment and items in the room, and Bill and Karen will let the members know when they will need help.

Dale stated that someone is needed to verify the markers in place for the two claims owned by WGMS, with coordinates. Bill and Karen will do this.

There was a rock safari in September, 2016 to see dinosaur bones, yellow jasper, red agate, onyx, travertine, olives, stomach stones, and more.

*Continued.....*

Elections will be coming up soon. Please consider running for an office.

Up-coming outing. There will be a trip to the McGuffey ranch on the north side of Lake Alamo on Saturday, October 22, 2016. We will meet at the corner of Hwy 93 and Vista Keyhole, at mile marker 192 at 7:50 A.M. There will be need for high clearance vehicles for the last mile or so, and some hiking. There will be a map available. Jim and Alice will be the outing leaders. There is a cabin to go into, and some petroglyphs to see.

Show and tell was done. Al won the raffle.

There was no program given.

Door prizes were won by Marty, Jim, Jason, and Joyce.

The meeting was adjourned at 8:30 P.M.

Respectfully submitted, Judy, Secretary



This is a view of timbers inside the Camp Verde Salt Mine -- an underground mine just outside of Camp Verde, AZ. Native Americans worked some tunnels as long ago as 2000 years. Fort Verde personnel mined salt for stock (and human) consumption, in the 1870's. In the 1920's, salt was commercially mined for use in paper pulp processing. In the early 1930's AZ Chemical Co. drove 14 horizontal tunnels and produced about 100 tons of 'salt cake' per day. At that time it was the most productive mine in the U.S. These timbers are being deformed due to the growth of salt crystals ripping the wood apart, plus the weight of the overburden. The white stalactitic material is thénardite (sodium sulfate). *Photo by Stan Celestian*

### NOTES FROM THE EDITOR

Have a geological interest? Been somewhere interesting? Have pictures from a club trip? Collected some great material? Write a short story (pictures would be great). I'd like topic suggestions also.

Deadline for the newsletter is the end of the month.

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

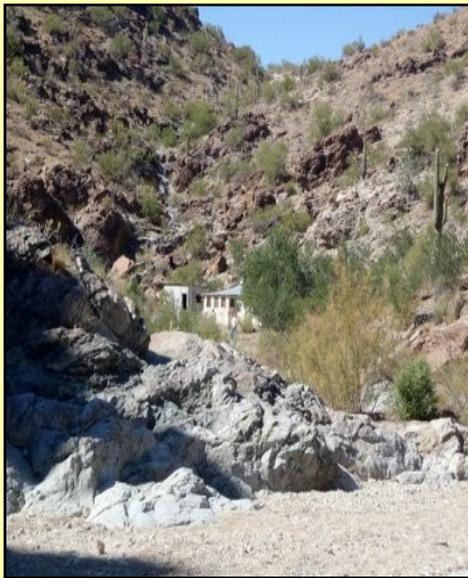
## FIELD TRIP TO McGUFFY CABIN

Story and photos by Alice Schneider

Gem and Mineral members left for our trip at 7:50 a.m., and arrived at the parking site at 11:45 a.m. After eating lunch, we hiked down to the cabin and went on down to view the pictographs. As Jim and Alice were in the lead, we got to see a really nice buck, with a rather large rack. Gayle and Dean got pictures of a nice burro, waiting to come down to the spring for water. Members who attended the trip: Jim and Alice S., Jim and Judy Z., Gayle H. & Dean (new members), Jason M., John B., Bonnie and Mark (new members from North Carolina), Eric R. and three friends from Canada, Marty and Roma H., Al and Erma R., and Paula.



.....McGuffey Cabin continued from page 3



From sign at site:  
Welcome to Venice  
(known to us a Venus)  
McGuffey's cabin. Venus  
was born August 26, 1890  
and came to this cabin as  
a young bride of a miner.  
We do not know his name  
or what happened to him  
but she remained here  
mining until the mid to late  
1970's. She was quite a  
colorful and entertaining  
person shopping at  
on her way to or from  
Venus died in October  
Wickenburg. Several  
have lived here since has  
moved out but it largely remains the way it was when she was here. Minus the  
outhouse which was torn down years ago by a motorcycle group that had  
intended to rebuild it but never did. Please enjoy your stay here and leave it as  
you found it for everyone else to enjoy.

Wayside  
town.  
1983 in  
people



has moved out but it largely remains the way it was when she was here. Minus the outhouse which was torn down years ago by a motorcycle group that had intended to rebuild it but never did. Please enjoy your stay here and leave it as you found it for everyone else to enjoy.



**Scenes from the  
McGuffey Cabin**

.....Evaporites continued from page 1

evaporation basins at the surface. The plant produces about 7.3 million bags of salt per year.

Probably the largest salt deposit in the world lies beneath Michigan, in what was the Michigan Basin. During the Silurian, this basin accumulated great thicknesses of gypsum, anhydrite, and halite.

In total, about 1968 feet (600m) of gypsum and halite were deposited, (with one salt bed nearly 500' thick). That is equivalent to the evaporation of a column of seawater 621 miles deep. This evaporative cycle lasted between 15-20 million years. This salt is mined in conventional underground mines -- with over 100 miles of roads in the Detroit Salt Company's mine under Detroit.

For Rock Salt see Figures 1 & 2.



**FIGURE 1** This is a chunk of the Camp Verde salt body at Camp Verde. It formed in a lake. The arrow points to a plant fossil. The blue color is due to a disruption of the atomic structure ("color center"). *Photo by Stan Celestian*



**FIGURE 2** This pink halite is from the brine pools of Trona, CA. In this fault basin, many evaporite minerals form that are used for industrial purposes -- borax, soda ash, and salt. *Photo by Stan Celestian*

**Gypsum or Rock Gypsum or Gyprock ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ )** forms at salinities lower than those of halite, and as a result even more extensive deposits of gypsum occur in the world. Numerous small gypsum mines have operated in Arizona.

For Rock Gypsum see Figures 3 & 4.



**FIGURE 3** This satin-spar gypsum is from a deposit in Camp Verde area. It formed in the same lake system as the halite in Figure 1. *Photo by Stan Celestian*



**FIGURE 4** This attractive rock is a sample from the State Line Outcrop of the Castile Formation, on Rt. 180/62 at the New Mexico-Texas border. It formed in the equatorial and restricted Permian Delaware Basin. The white layers are gypsum (probably formed as anhydrite hydrated), while the dark layers are calcite. Some have proposed that the dark/light couplets represent varves, which are seasonal depositional layers. The dark layers represent humid times with lower salinities and increased organic debris; while the light layers formed during drier times, with increased evaporation and rising salinities.

*Photo by Stan Celestian*

**UPCOMING AZ MINERAL SHOWS**

**November 4-6 - Black Canyon City, AZ** High Desert Helpers Rock-A-Rama; High Desert Park, 19001 E Jacie Lane; Fri-Sun 9-4; Admission: Free.

**November 12 - Tempe, AZ** Gallery TCR , 906 S Priest, #107; Sat 9-6; Free.

**November 19-20 - Apache Junction, AZ** Apache Jct Rock and Gem Club; Skyline High School, 845 S Crimson Rd, Mesa, AZ; Sat 9-5, Sun 10-4; Admission: \$3, students \$1, children free.

**November 19-20 - Payson, AZ** Payson Rimstones Rock Club; Payson High School Longhorn Gym, 310 S McLane Rd; Sat 9-5, Sun 10-4; Admission: \$2, children free.

**November 26-27 - Wickenburg, AZ** Wickenburg Gem and Mineral Club; Hassayampa Elementary School, 251 S Tegner St; Sat 9-5, Sun 10-4; Admission: Free.

**January 1-February 29 - Quartzsite, AZ** For show schedules <http://www.desertusa.com/cities/az/quartzsite.html>

**January 6-8 - Mesa, AZ** Flagg Foundation; Mesa Community College, Dobson, north of US 60; Daily 9-5; free.

**January 20-22 - Globe, AZ** Gila County Gem and Mineral Society; Gila County Fairgrounds, 900 E Fairgrounds Rd, Globe, AZ 85501; Sat 9-5, Sun 10-4; \$3/person, \$5/couple, students and children free.

**February 9-12 - Tucson, AZ** Tucson Gem and Mineral Society; Tucson Convention Center, 260 S Church St; Thurs-Sat 10-6, Sun 10-5; Admission: \$13, under 14 free with adult.

**March 25-26 - Anthem, AZ** Daisy Mountain Rock and Mineral Club; Boulder Creek High School Gym,

If you are travelling, a good source AND clubs is <http://www.the-vug.com/vug/vugshows.html> or <http://www.rockngem.com/ShowDatesFiles/ShowDatesDisplayAll.php?ShowState=AZ> For out-of-the-country shows: <http://www.mindat.org/shows.php?current=1> A good source for a list of Arizona Mineral Clubs and contact information is [http://whitemountain-azrockclub.org/Public\\_AZ\\_Clubs\\_Links.html](http://whitemountain-azrockclub.org/Public_AZ_Clubs_Links.html)

**BIG ROCK & MINERAL SALE**

Saturday, Nov 12 and Sunday, Nov 13 from 7am to 1pm at 1253 S Anvil Place Chandler, AZ 85286.

Questions? Call 480-831-6435

Most minerals are self-collected from AZ, WY, UT: petrified wood, 4 Peaks amethyst, San Carlos peridot, Blue Ball Mine azurite nodules, Rowley and Red Cloud Mines wulfenite, Apache Mine vanadinite, Diamond Point quartz, Payson geodes, Aquarius Mts garnets, Camp Verde glauconite and agate, Alpine Luna blue agate, yellow and orange calcite from Rye, minerals from the Silver King and Reymert Mines, Apache tears, Apache tears in matrix, Chiloto Mine minerals (hematite, azurite, malachite, chrysocolla), topaz from Topaz Mt, sunstones, and trilobites from Utah, blue petrified wood & fossil fish from Wyoming, AZ fossils from Payson and the Rim.

**UPCOMING WGMS FIELD TRIPS**

**WEDNESDAY, NOVEMBER 2**

Jason M. will lead a trip up the Hassayampa River, for agate, jasper, chrysocolla, and others.

DATES SUBJECT TO CHANGE

**DON'T FORGET ABOUT THE CLUB SHOW COMING UP THANKSGIVING WEEKEND. VOLUNTEER TO HELP !!!!!**

If you all have some place that you would like to go, let Bob B. 623-388-0749, Marty H. 602-469-7770, or Craig J. 208-681-4770 know. This is your club. Let's go out and have some fun.



**Barite roses from Cleveland Co., OK**  
These "roses" formed as a shallow Permian sea retreated. As the barite precipitated out, red sand was incorporated in the crystals. In 1968 barite roses were

dubbed the official rock of Oklahoma. Photo by Stan Celestian

**Officers and Chairperson**

- President:** Craig Jones.....208-523-9355
- Vice President:** Martin Hagan..... 602-469-7770
- Secretary:** Judy Zimmerlee..... 517-652-1355
- Treasurer:** Debra Keiser..... 928-684-1013
- Program Director:** Dale Keiser..... 928-684-1013
- Publicity:** currently open position
- Membership:** Roma Hagan ..... 602-469-7662
- Editor:** Susan Celestian ..... 602-361-0739
- Field Trip:** Craig J, Bob B, Marty H
- Show Chair:** Beth Myerson.....480-540-2318
- Scholarship Chair:** Steve Hill..... 928-533-3825
- Historian:** Jeanine Brown..... 928-684-0489

Meetings are held the **2nd Friday** most months at **Coffinger Park banquet room**. Potluck dessert at 6:30 pm. Business meeting at 7:00 pm. **Exceptions: February and December** meetings are held on the **first Friday of the month**. We do not meet in the summer — **no meetings in June, July or August**.

**Membership Dues: \$15.00 Adults per Person \$ 5.00 Juniors and Students**

**Meeting Dates for 2016**

**Wickenburg:** Jan 8, Feb 5, Mar 11, Apr 8, May 13, Sept 9, Oct 14, Nov 11, Dec 9

**Stanton meets** Thursday after the Wickenburg meetings. Jan 14, Feb 11, Mar 17, Apr 14, May 19, Sept 15, Oct 20, Nov 17, Dec 8 (subject to change)

## MINERALS IN OUR EVERYDAY LIVES

### USES (AND USEFULNESS) OF ROCK SALT

- ◆ Historically, Roman soldiers were paid in salt. *Sal* ("salt") is the root word for *salary*, and good workers are "worth their salt"
  - ◆ Table salt - seasoning, preservative
    - ◆ De-icer
    - ◆ A sodium and chlorine source
- ◆ Cavities in rock salt are used to store radioactive waste, butane, propane, and other gases - due to the tendency of salt to flow when under pressure, (i.e. it generally does not crack, or cracks 'heal'), thus making it impermeable (at least in arid climates -- salt is soluble!)
  - ◆ Occurs as salt domes, that trap gas and oil

### USES OF ROCK GYPSUM

- ◆ Wallboard (gypsum is abundant, inexpensive, and contains water, thus making drywall a bit of a firewall in buildings)
  - ◆ Plaster of Paris, joint compound, medical casts
- ◆ Agricultural additive - supplies calcium and plant-available sulfate sulfur, breaks up clay/hard soils when it crystallizes in the soil, encourages growth of aerobic bacteria required for optimum mushroom growth
  - ◆ Retards hardening of Portland cement
    - ◆ Sculpture
- ◆ Filler in foods (average human consumes 28 lbs of gypsum in their lifetime), enhances fermentation and conditions water used in beer brewing, controls tartness and clarity of wine
  - ◆ Binder in medical tablets
    - ◆ Crayon additive
  - ◆ Mild abrasive in toothpaste
  - ◆ Filler in paint, paper, cotton, PVC
    - ◆ Blackboard chalk
  - ◆ Flux in nickel ore smelting

\*Some of the references used regarding rock salt and rock gypsum are:

<http://archive.azcentral.com/community/glendale/articles/20130712morton-turns-glendale-into-valleys-saltiest-city-prog.html>

Arizona Has Salt! By Steven L Rauzi AGS <http://www.azgs.gov/Mineral%20Scans/Arizona%20Salt%20in%202002.pdf>

<http://geo.msu.edu/extra/geogmich/evaporite.html>

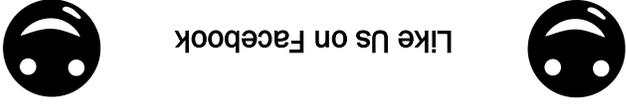
<https://www.sott.net/article/292524-The-giant-salt-mine-1200-feet-beneath-Detroit-Michigan>

<http://detroitsalt.com/>

<http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3091.2003.00588.x/abstract>

<http://okcavers.netfirms.com/publications/gypinok/gyp.htm>

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