VOLUME 48, Issue 5
AUGUST 2016

GNEISS TIMES

Wickenburg Gem & Mineral Society, Inc.
P.O. Box 20375, Wickenburg, Arizona, 85358
E-Mail — wgmsociety@gmail.com
www.wickenburggms.org

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

SEPTEMBER MEETING CANCELLED -- NEXT MEETING IS OCTOBER 14th.

NON-CLASTIC SEDIMENTARY ROCKS — Limestone

We have been looking at Clastic Sedimentary Rocks -- those rocks composed of the fragments of previously-existing rocks, whether igneous, metamorphic, or sedimentary. Shifting gears a bit, we will now consider non-clastic (or chemical) sedimentary rocks--those created by the precipitation of minerals or deposition of non-minerals.

Limestone is composed of at least 50% calcium carbonate (calcite), and there will be also quartz, clay, silt, feldspar, and other mineral or fecal constituents. It will be massive to thinly-bedded, and is usually gray, tan, or white. See Table 1.

NON-CLASTIC SEDIMENTARY ROCKS

LIMESTONE - composed of precipitated crystals of calcite; will fizz in acid * Crystalline Limestone - fine to sugary calcite crystals, without fossils * Fossiliferous Limestone - fine calcite crystals, usually marine fossils * Oolitic Limestone - composed of small spheres of calcite * Coquina - composed of nearly only shells and shell fragments * Chalk - composed of the microscopic calcite shells of planktonic animals (coccoliths, foraminifera) * Travertine - coarsely crystalline calcite (very sugary), often banded in various colors (browns, reds, blacks)
DOLOSTONE - similar to limestone, but composed of dolomite; will fizz weakly after powdered; generally devoid of fossils
CHERT - microcrystalline quartz; conchoidal fracture; waxy luster; any color * varieties include flint, chert, jasper, chalcedony, agate, opal (although chalcedony, agate, opal do differ a bit from flint, chert, jasper)
ROCK SALT - composed of halite; cubic cleavage; salty taste
GYPSUM - composed of gypsum; easily scratched by fingernail * varieties include: alabaster (massive, sugary); selenite (generally clear); satin spar (fibrous)
DIATOMITE (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.
COAL - composed of the carbonized remains of plant debris; brown-black; low density * varieties include: peat (loose visible plant debris), lignite (brown, with some visible plant remains), bituminous ("soft coal", black)

TABLE 1 Non-Clastic Sedimentary Rock Chart

The term "limestone" encompasses a number of varieties. However, no matter the variety, limestone will always fizz vigorously in dilute hydrochloric acid.

Crystalline Limestone is generally a dense rock composed of interlocking fine-coarse crystals of calcite. See Figures 1 and 2.

Crystalline Limestone Environments of Deposition: This rock most typically forms in shallow, relatively quiet, warm, ocean environments -- such as on the continental shelf -- remote from the influx of stream-introduced sands and muds. Occasionally, it forms in mineralized lake environments. The calcite is either directly precipitated from the water, or is secreted by algae or coral. Very, very fine-grained rocks were probably deposited in hypersaline and anoxic lagoons.

FIGURE 1 Redwall Limestone This is a coarse-grained crystalline limestone, formed by the accumulation and re-crystallization of crinoid fragments. *Photo by Stan Celestian*

Limestone continued on page 3…….

INSIDE THIS ISSUE

Meeting Minutes — May 6, 2016

No minutes available.

MARK YOUR CALENDARS !!!

WGMS
ANNUAL GEM & MINERAL SHOW
November 26 & 27, 2016

If your perception of time is like mine, it is flying -- which means that the show is just around the corner, and will be here before you know it.

Please try to plan on volunteering some time. Help will be needed in setting up on the 25th, and taking down on the 27th. In addition, volunteer participation will probably be the factor that determines whether the show will include: raffle, silent auction, and children's area. Those are all activities that make a well-rounded show.

More details will be available at the October meeting.

CIVILIZATION EXISTS BY GEOLOGICAL CONSENT, SUBJECT TO CHANGE WITHOUT NOTICE.

----- Will Durant

TRIP TO GREEN RIVER, UTAH
September 24, 2016

Bill and Karen C. are leading a trip to the Green River area. A while back they spent time in the area, and have a spot where a dinosaur fossil is being exposed by erosion. Collecting vertebrate fossils is illegal, except on private property, but this could be a very interesting outing. The scenery is spectacular, for sure!

Meeting site is on I-70 (south of Green River) at the Ruby Ranch Exit #175.

We will be driving about 8 miles on mostly good dirt roads. Bring buckets to collect potential gastroliths, agate, and travertine.

Other things to do in the area (or not too far away):

- **Goblin Valley State Park -- VERY cool!**
- **Crystal Geyser -- a geyser by the river**
- **River rafting**
- **Land Art on Monument Hill -- The Ratio and Elements**
- **Capitol Reef, Canyonlands NP, Arches NP, and Dinosaur NM are not far away**
- **McConkie Ranch for Petroglyphs, near Dinosaur NM**

http://www.wickenburggms.org/

If you ever have photos from a club field trip, send a couple to Dale, for posting on the website.

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

……..Limestone continued from page 1

Figure 2 Fine-grained Limestone The fine-grained Martin Formation at Diamond Point, in Gila Co., AZ hosts Herkimer Diamond-style quartz crystals. This type of limestone generally contains few or no fossils. There is a special type of fine-grained limestone, called *Lithographic Limestone*, which is so super-fine (grains under 1/250 mm) that it was used for printing plates -- hence the name. *Photo by Stan Celestian*

Fossiliferous Limestone differs from crystalline limestone, by having fossils ("sea shells") included. In this case, much of the rock body is probably a product of those organisms, rather than the result of direct precipitation. See Figures 3 and 4.

Fossiliferous Limestone Environment of Deposition: The depositional environment does not differ significantly from that of crystalline limestone -- it will be shallow warm, clear, ocean waters. As an example: Corals require light (they have photosynthesizing organisms, called *zoothanxanthellae,* within their tissues) for optimal growth, and sediment (silt and clay) may accumulate upon them and make it impossible to survive. So they must occupy shallow, clear, warm water. Other marine organisms are generally drawn to shallow waters, where food is abundant, and additionally will be drawn to corals and coral reefs as a source of (or attractor of) food, a hard substrate upon which to grow, and as protection. Hence an abundance of marine life accumulates within the shallow, warm, marine regime.

Figure 3 Fossiliferous Limestone This is a specimen of the Redwall Limestone, a Mississippian-aged formation renowned for abundant crinoid fossils. *Photo by Stan Celestian*

Figure 4 Fossiliferous Limestone This slab of the Naco Formation (Pennsylvanian-aged), from near Kohl's Ranch, Arizona is chock full of visible brachiopods, crinoids, bryozoans, and more. *Photo by Stan Celestian*

Oolitic LImestone is largely composed of oolites (ooids), small, spherical balls of calcium carbonate, or other mineral. See Figure 5-7.

Oolitic Limestone Environment of Deposition: This rock type forms in warm, super-saturated, shallow, agitated water. That could be within the marine intertidal or an inland lake (I found ooids forming in a small pool below Havasu Falls, in the Grand Canyon). Ooids form when calcium carbonate (usually) precipitates out and deposits on a sand grain or small bit of seashell. As the grain rolls about in oscillating currents, the

Limestone continued on page 4…..

……..Limestone continued from page 3

calcium carbonate is laid down in concentric layers, forming small spheres. When ooids reach about 2mm in diameter, they are too big to be easily rolled about, and they stop growing, to be buried by newly-forming ooids.

Figure 5 Oolitic Sand The photo on the left is oolitic sand from a beach at Cat Cay, Bahamas. On the right, is oolitic sand from Oolite Beach, Great Salt Lake, Utah. *Photo by Stan Celestian*

Figure 6 Oolitic Limestone This is a famous oolitic limestone building stone, from Oolitic, Indiana. The town was originally named Limestone, but the Post Office denied that name, as another Indiana town already had that name. Notable structures built of this limestone include: Empire State Building, Pentagon, Washington National Cathedral, Yankee Stadium, and 35 of the 50 state capitol buildings (*Wikipedia*). You will probably have to enlarge the screen view (200-400x) to see the oolites. P*hoto by Stan Celestian*

Figure 7 Oolitic Iron Ore This is the Silurian-aged Clinton Ironstone of Pennsylvania. In this case, the ooids are composed of hematite (iron oxide). In the literature, hematite ooids form either by direct precipitation, or by replacement of originally carbonate ones. *Photo by Stan Celestian*

Coquina Llmestone is composed almost entirely of abraded/rounded shells or shell fragments. See Figure 8.

Coquina Limestone Environment of Deposition: Coquina forms in places where the water is highly agitated, and capable of transporting and concentrating accumulations of relatively large shells and coral. During that transportation, the shells are abraded, broken, rounded, and sorted. The high energy tends to wash out any smaller sediment, leaving the heavier shell fragments to accumulate. These conditions are found on beaches, tidal channels, bars, and submarine banks.

Figure 8 Coquina Limestone This accumulation of shells and shell fragments formed on a Pleistocene (about 130,000 years ago) beach at Rocky Point, Puerto Peñasco, Sonora Mexico. *Photo by Stan Celestian*

Chalk is composed largely of the microscopic shells (or coccoliths) of coccolithophores, photosynthesizing phytoplankton. Think of coccolithophores as one-celled algae, that encases itself in a ball composed of round, overlapping calcite plates or coccoliths.

Chalk Environment of Deposition: Coccolithophores (and other planktonic creatures) occupy the sunlit surface waters of the world's oceans. Upon death, or 'shedding', they and their shells rain by the billions to the sea floor. During the Cretaceous (100-60 mya) coccolithophores were especially abundant. In the quiet, deep ocean, where there is no land-derived sediment to mask their presence, their

Limestone continued on page 5…..

……..Limestone continued from page 4

their calcite platelets could accumulate to produce thick beds of white, soft, chalk -- such as the White Cliffs of Dover. It is certainly hard to imagine how many microscopic particles must accumulate to produce so much chalk!

Travertine is usually very coarsely crystalline (sugary-looking), and is often banded, making it desirable as a decorative material. Colors are usually white, various shades of brown/yellow, reds, and occasionally black. A very porous rock related to travertine is called ***tufa***. See Figures 9-12.

Travertine Environment of Deposition: Travertine is deposited in caves and springs (usually hot). Upon emergence at the surface, highly mineralized water, will degas, lowering the partial pressure, and inducing precipitation. At higher temperatures, aragonite is the mineral deposited; while at lower temperatures, calcite is the mineral. Since deposition may be episodic, and the waters are generally intimately associated with surface conditions, the chemistry of the water changes frequently, resulting in impurities creating color banding.

Figure 9 The Pinnacles These tufa towers, near Ridgecrest, CA, formed around springs issuing into a large pluvial lake that occupied this basin during the Pleistocene. *Photo by Susan Celestian*

Figure 10 Tufa This interesting, porous, irregular formation is a bit of tufa that formed around hot springs issuing into Mono Lake, in northern California. *Photo by Stan Celestian*

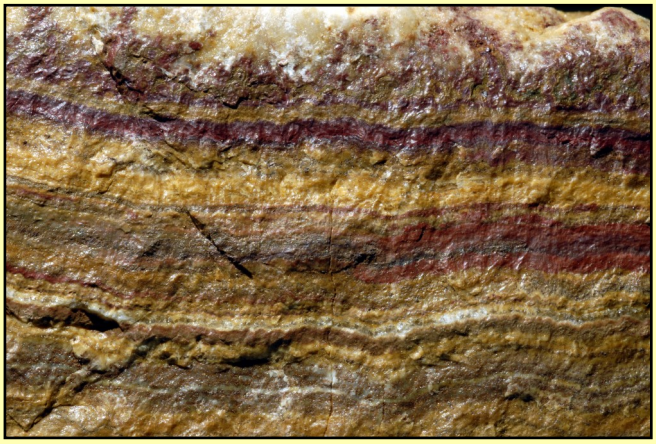

Figure 11 Travertine This lovely rock was created in ancient springs near Mayer, AZ. Small and varying amounts of iron oxide has produced the color banding. In 1927 there were 7 carmakers who used rock from Mayer for such details as gear shift knobs. Today you will see the quarry being worked for dimension stone. *Photo by Stan Celestian*

Figure 12 Travertine This is a view of the cross section of a speleothem. As groundwater dripped into a cavern, degassing and evaporation caused the precipitation of calcite. *Photo by Stan Celestian*

UPCOMING AZ MINERAL SHOWS

August 27 - Chandler, AZ Gilbert Mineral Show; Gilbert Historical Society Museum, 10 S Gilbert Rd; 10-3; Admission: free; Please park at Gilbert Elementary School west of museum (follow signs).

September 30-Oct 2 - Camp Verde, AZ Mingus Gem and Mineral Club, Cliff Castle Casino, 555 W Middle Valley Rd; Fri-Sat 9-5, Sun 10-4; Admission: $3, children under 12 free.

October 7-9 - Buckeye, AZ West Valley Rock & Mineral Club, Helzarockin' Gem & Mineral Show; Helzapopin' Arena; 802 N 1st St (Miller Rd), Buckeye; Fri-Sun. 9-4; Admission: $3, children 12 & under free.

October 8-9 - Sierra Vista, AZ Huachuca Gem and Mineral Club; Cochise College, 900 Colombo Av; Sat 9-5, Sun 10-4; Admission: Free.

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 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.

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.orig/eventlist.php\ A good source for a list of Arizona Mineral Clubs and contact information is http://whitemountain-azrockclub.org/Public_AZ_Clubs_Links.html

Synthetic Quartz grown in Russia. Note the clear area. That is the seed crystal. A wafer of natural quartz is suspended in an about 400°C solution of sodium carbonate or hydroxide, in which quartz fragments sit and dissolve. The wafer acts as a template upon which new quartz crystallization will occur. The blue color is due to cobalt. Synthetic quartz is used as gemstones and piezoelectric material in watches/clocks, and other electronic equipment. *Photo by Stan Celestian*

UPCOMING WGMS FIELD TRIPS

SEE PAGE 2 FOR DETAILS OF UPCOMING TRIP TO UTAH.

DATES SUBJECT TO CHANGE

CONSIDER VOLUNTEERING TO PLAN OR HELP PLAN TRIPS. YOU WOULD NOT NEED TO LEAD EVERY TRIP, BUT KEEP THINGS ON TRACK.

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. We have some dates to fill in.
This is your club. Let's go out and have some fun.

Check the website for field trip announcements, especially if you don't have email!

Officers and Chairpersons

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 LIMESTONE

"Lowly" limestone is one of the most versatile rocks on Earth!

* **Building stone, Facing stone, Curbing, Floor tiles, Countertops - 80% of the nation's dimensional limestone comes from Indiana**
* **Aggregate**
* **Raw material for mortar and Portland cement**
* **Roofing granules**
* **Flux, as in smelting of iron ore**
* **Sculpture**
* **Lapidary stones**
* **Soil conditioner to reduce acidity**
* **General acid neutralizer (quicklime and slaked lime)**
* **Mild abrasive in toothpaste**
* **Antacid**
* **Manufacture of glass**
* **Carpet backing**
* **Powder coating on chewing gum**
* **Sugar refining (milk of lime removes impurities)**
* **Animal feed filler**
* **Mine safety dust aka "rock dust" White powder is sprayed on the coal walls in underground coal mines. The whiteness serves to improve illumination. The coating also reduces coal dust, thus improving air quality and reducing explosion hazard.**
* **Filler in paint, paper, plastics, rubber, pharmaceuticals, asphalt**

Susan Celestian, editor
For Wickenburg Gem and Mineral Society, Inc
6415 N 183rd Av
Waddell, AZ 85355

Like Us on Facebook

https://www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438