The Sooner Rockologist

March 2007 Volume 62, Number 2

Oklahoma Mineral & Gem Society Purpose

The purpose shall be an educational relationship among the members for the study of rocks, gems, minerals, fossils, and lapidary techniques, and for the exchange of the results of such studies and classifications with similar societies and the public. (We have fun, too!)

Membership & Meetings

General Membership meetings are held on the third Thursday of each month at 7:00 p.m., with the exception of June and December when our anniversary picnic and Christmas party are held in lieu of regular meetings. Guests are welcome.

On the first Monday of each month at 6:00 p.m. (except holidays), we meet for a Demonstration & Work Night, giving members an opportunity to share information, teach each other, and assist each other with various personal projects.

Meetings are held at the Will Rogers Garden Exhibition Building, 3400 NW 36th Street in Oklahoma City. Annual dues are $10.00 for a single membership and $15.00 for husband and wife. A $1.00 per person initiation fee applies to new members, subject to application and approval.

The Sooner Rockologist is the official publication of the *Oklahoma Mineral and Gem Society, Inc.* and is published each month, *except January and July*.

ENVIRONMENT OF AGATE FORMATION

By Robert G. Welch

The purpose of this article is to broaden the debate on agate formation to include important factors that have not been covered in previous writings about agate formation. The environment is always an active influence on secondary mineral systems near the surface of the earth.

Many of the variations that occur in agate, from its outer bands to its innermost bands, are likely due to changes that are occurring at the surface above the zone of agate formation. These changes can include alternations of slow forming megaquartz to rapidly forming spherulitic quartz to opal, and chalcedony pseudomorph after opal.

The environmental changes begin with the eruption of a volcano and the deposition of a bed of lava. If the lava is basaltic or andesitic it will be low enough in viscosity for gas bubbles to form and rise toward the top of the flow. This provides a place for the agates to form. It should be remembered that volcanic areas are seismically active and earthquakes of varying intensities can occur. Earthquakes are the probable cause of much of the deformation of the agate banding seen in some agates.

The lava flow has low internal porosity and is composed of microcrystals, and therefore it is resistant to weathering. As it slowly weathers, the silica is included in secondary minerals and does not form as free silica. For the agate to form, a source is needed with high surface area and an unstable internal structure.

Volcanic ash has a high internal surface area and is composed of unstable volcanic glass that weathers rapidly. It can form in two ways: as pyroclastic flows that rush down the volcano at high speeds at 500 to 600 degrees Fahrenheit to form welded tuff, or as a gradual ash fall that will be uncompacted. Pyroclastic flows will pick up air as they rush down the volcano, which will form gas pockets within the tuff that can be sites of agate formation. Uncompacted ash can be deposited unevenly as it is distributed by the wind.

Once the ash is in place, it will be acted upon by the climate. If the climate is dry, the ash will remain relatively unaltered. For silica colloid to form, the porosity must fill to field capacity with water, which requires a fairly wet climate. Although many

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Appointed Officers & Committee Chairpersons

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Show, 2007 Arlene Burkhalter
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Ways & Means Wanda & Dean Manderscheid
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Workshop Mark Brickmann

agate areas are now in desert, climate change has occurred since the agate formed. As an example, the plant and animal life preserved by volcanism during the Paleocene and Eocene Epochs, in the Big Bend area of Texas and in Chihuahua, show that the climate was much wetter than it is today.

When the ash has been wetted to field capacity, the voids will be filled with air and the particles will have a thin coating of water. The water and oxygen will begin the weathering process. If the ash is of basaltic or andesitic composition, the weathering will produce clay and free silica. Silica has a very low solubility in water, so the silica will be in the form of a colloid. Most of the other elements in the ash will be in the dissolved phase, including calcium, iron, magnesium, manganese and other elements that ionize in water.

The water contained in the volcanic ash will remain bound to the surface area of the ash particles, until another rain event fills the voids with new water. The contact between the ash and the lava bed will be a capillary barrier to downward migration of the water, until the ash becomes saturated. At saturation, the water with the contained silica and dissolved minerals, will seek out fractures and will very slowly seep down to the vesicles in the lava, and gradually coat the inside of the vesicle. If the fracture is large enough, the colloidal solution may come in more rapidly and also collect as water level bands at the bottom of the vesicle.

Since the Silurian Period, when plants invaded the land, the environment has been altered by the growth of plants on the volcanic ash. Prior to that time, bacteria probably already had established themselves in soils. Plants have several effects, one of which is to speed the return of moisture to the atmosphere. More important to agate formation is the plants effect on soil formation and the chemistry of the water. Plant roots absorb minerals from the water and can alter the pH of the water, which can affect the color of the agate bands. Plant roots also create pathways for water migration as plants die and their roots decay. Plant communities change over time in response to climatic and soil conditions, which can change the chemistry of the water as it moves downward.

The character of the ash will change due to weathering, and the percentage of clay to unaltered ash will increase as weathering proceeds. The clays formed from basaltic and andesitic ash will be those that swell when wet and shrink when dry. Shrinkage cracks will provide new pathways for water migration. Eventually the entire ash bed will be altered to clay and agate formation will come to an end until new ash is added to the site by the volcanism. Ash beds from different eruptions can vary in their chemical composition, which can also affect the coloring of the agate bands.

Climatic conditions will vary over the span of the several hundred years of agate formation. There will be wet years and dry years, which will affect the plant community on the ash. This can affect the nature of the agate bands. Drought may result in slow growing megaquartz bands. Wet years could result in more frequent bands and even thicker spherulitic bands. Rises in temperature with abundant moisture may be the cause of opal bands. In older agates and many younger agates, the opal has been changed to the replacement form of chalcedony, recognized by interlocking anhedral crystal structure. These bands are denser and less porous than the spherulitic bands.

Some agates, such as the Botswana Agates and many Scottish agates, have various degrees of distortion of the bands. I believe this to be due to earthquakes during the agate formation. As the agate forms, the spherulitic bands are composed of loosely packed thin crystals perpendicular to the bands. Because of this structure, the agate is a solid but can be deformed by the slight reorientation of the crystals within the bands. The agate becomes more solid as additional silica diffuses through the earlier deposited bands and eventually becomes a solid rock.

Gem Stone of the Month

March – Aquamarine

Overview: Aquamarine is a member of the Beryl family of stones as is Emerald. Meaning "sea water", it's not hard to figure out that it derives this name due to it's color being similar to that of the ocean. The color ranges from very light to medium light blue, frequently with a light touch of green. The most desired color is the deeper shade of blue. Aquamarine is often heated to enhance the coloration; this treatment is stable and permanent.

Usage: Aquamarine is very durable and well suited for jewelry. Aquamarine is said to have a soothing influence on married couples. Its power to help husbands and wives work out their differences and ensure a long and happy marriage makes it a good anniversary gift. Aquamarine also protects against the wiles of the devil. A dream of aquamarine means that you will meet new friends. .

Legend: Aquamarine has become symbolic of safety at sea, and according to legend, is a treasure of the mermaids. The first documented use of aquamarine is by the Greeks between 480 and 300 B.C. Amulets of aquamarine were thought to render sailors fearless and protect them from adversaries at sea, especially if the stone was engraved with Poseidon on a chariot.

Occurrence: We obtain the majority of our Aquamarine from Brazil and Africa. The majority of our African Aquamarine comes from the famous Santa Maria area, renowned for the rich hue of the material obtained there.

One of the puzzles of agate formation is that some agates consist of clear chalcedony, while others have a variety of colored bands. This could be in some way related to the fact that colloidal silica and dissolved metallic ions react differently in the environment. Calcium, iron, manganese and other metals may be absorbed by plants and not reach the site of agate formation. I am unaware of clear chalcedony in the Precambrian agates that formed before there were land plants. Alternating clear and colored bands could be a reflection of what is going on with the plant community in the soil above.

OMGS BOARD MEETING MINUTES • February 8, 2007

Members present: John Bode, J.C. Brown, Joyce McBryde, Oscar Carroll, Paul Cinnamon, Vernon Dorton, Billy Marie Nedd, Bob Welch and Dottie Smith.
Guests: Norma Cinnamon, Lou Dorton, and Henry Nedd.

Vice-president, Vernon Dorton, called the meeting to order at 7:00 pm at Denny's restaurant. The minutes of the last board meeting (January 11, 2007) were read. Joyce made the motion to accept the minutes, Oscar seconded, motion carried. Norma gave the treasurer's report for Vi Holmes. Joyce made a motion to accept until audit, Paul seconded, motion carried.

Correspondence: Several flyers were received—one for Ellinwood Swap, May 18 and 19, and McPherson Swap May 4-6. A card advertising a commercial show in Dallas, May 4-6. Also some newsletters from other clubs were received that have been given to the editor.

Old Business: Arlene Burkhalter called Vernon and said when the scholarship is presented that they would like some members of the club to attend so if anyone would like to attend to let him know.

New Business: There was some question about the directory—if someone has a disc. Dottie typed up a list of members from the membership cards and old directory but it is not in directory form. There is $200 in the budget (same as last year) for the directory.

Paul said he and John need to inventory the equipment but it has been too cold to check in the storage and he doesn't know what equipment, projector and peripherals were bought. They plan to inventory the metal cabinet at the meeting place before the meeting.

Paul mentioned that the club has three cases on display at the Omniplex that are in poor condition. He took one case home that needs new labeling and internal lighting. John made a motion to spend up to $100 for restoration of the cases, Bob seconded, motion passed.

Meeting adjourned.

Dottie Smith, Secretary

Aquamarine deposits are found on all continents. The most important ones are in Brazil (Minas Gerais, Bahia, Esperito Santo). Numerous finds have been made in the inner highlands of the Malagasy Republic. Australia (New South Wales), Burma, Sri Lanka, India, Kenya, Mozambique, Zambia, South Africa, Namibia, Tanzania and the U.S. (Colorado, Connecticut, California, Maine, North Carolina.) also produce Aquamarine.

Physical Properties

Color	Greenish Blue-Blue
Refractive Index	1.57 – 1.59
Chemistry	Beryllium Alu Silicate
Hardness	7.5
Density	2.62-2.71
Crystal Group	Hexagonal

Aquamarine can be worn as a Planetary stone, or as a modern birthstone by Pisceans (March). It can also be worn as a lucky charm by Scorpios.

Who in this world of ours, their eyes in March first open, shall be wise, in days of peril, strong and brave, and wear a Bloodstone to their grave.

"A goal is a dream
with a deadline."
From How to Think and Grow Rich

OMGS GENERAL MEETING MINUTES • February 15, 2007

Because of our guest speaker, the program was presented first. Steve Westrop, the Curator of Invertebrate Paleontology at the Sam Noble Museum, gave the program, "Forensic Paleontology". Very, very interesting

President John Bode called the meeting to order. Wanda Manderscheid introduced our guests, Harold McMahan, Robert and Dawson Helms, David Fitch, Joni and Barbara Schreck and Ben Whitney.

Vernon Dorton made the motion to accept the previous minutes as printed in the Rockologist, Dale Moore seconded, motion carried. Vi Holmes gave the treasurer's report, which will be filed for future audit.

New members, John & Nan Bevins, were introduced.

Doyle McCown told about our displays:

Paul Cinnamon brought the Fossil Case he had refurbished.
The Bevins brought a rock from Mt. Erebus, Antarctica, one from Romania, and one from Europe.
Dottie Smith brought Garnet and Amethyst crystals and some salt crystals.
Billy Marie Nedd also brought Garnet and Amethyst crystals.

Vernon Dorton won the door prize, a 2007 mineral calendar.

Old Business: Budget—The budget for 2007 was destroyed in a fire. Paul Cinnamon made a motion to use the same budget as last year, Jerry Cannedy seconded, motion carried.

There was no new business.

Volunteers for March: Cookies—Elaine Welch, John & Nan Bevins, and Dale Moore; kitchen help—Lou Dorton and Ambrosia Geffre.

John Bode asked for someone to be the new parliamentarian.

Coming Events: The Red Rock Canyon Swap is April 27, 28 & 29; the Exhibitors & Judges Seminar is March 31; the Rocky Mountain Federation/American Federation Show is in Roswell, NM, June 7 through 10.

We have received flyers for the Ellinwood and McPherson Swaps in May, and a card advertising a commercial show in Dallas in May.

The meeting was adjourned.

Dottie Smith, Secretary

Tips & Hints

Natural and synthetic stones need TLC. Here are some tips for extending the life and luster of your stones.

Clean stones with hot, soapy water. Dry stones thoroughly with a soft towel. Some stones can be cleaned in an ultrasonic cleaner; some can be permanently damaged if cleaned in one (amber, coral, lapis, opal, pearl and turquoise, for example).

Rub gems with a smooth, soft cloth to remove fingerprints and keep them shiny. Store stones away from intense heat and light.
The Boulder Bouncer, 7/05; from Rio Grande

Cleaning Stone Beads
Immerse stone beads in warm, soapy water and scrub gently with a soft brush. Then rinse the beads and place them on a towel to dry. Most stone beads can be ultrasonically cleaned as well. Please note: Beads that are dyed or organic (amber, bone, coral, horn, ivory, opal, pearls or turquoise, for example) can be damaged if cleaned in an ultrasonic cleaner. Also dyed stones should not be steam cleaned.
The Boulder Bouncer, 7/05

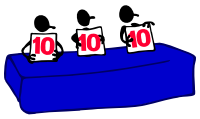
Transparent stones should be polished on both front and back; otherwise, saw marks can show through and appear to be cracks.
Emerald Gems, 9/04

Show Committee Report

Congratulations to Ovetta Vermillion for winning a free book of tickets to the 2007 Show for her idea for the show name "Discover Treasures of the Earth". The committee has revised it to "Discover Treasures of Oklahoma".

The show is November 3rd and 4th, so get it on your calendar now. You won't want to miss it!

State Council Exhibitors & Judges Seminar



Neil Suneson of the Oklahoma Geological Survey has arranged for us to use Plaza Room B in the Energy Center tower for the seminar on March 31st from 9:00 to 4:00.

We can park on the east side of the Energy Center (see campus map at WWW.visit.ou.edu/HTML/map.htm). The Energy Center is building #112 in the upper right corner of the map; walk down the stairs, and enter the building from the east side. Find the elevators and go to Level P (for Plaza). The gates to the parking lot should be up and there should be no problem parking in the lot on a Saturday.

Neil will be there to take care of opening the room, etc.

He seems to have thought of everything. Urge your club members to attend. We will be concentrating on setting up an attractive case and going over general rules, answering questions and who knows what else?

Arlene Burkhalter

Pyrite by Ron Graichen

Pyrite is fool's gold. It is very common. Most metallic ore deposits are pyritic and some non-metal ores also contain the mineral. Pyrite is merely a combination of iron and sulfur and in a few cases it is a poor ore for iron production.

Many mineral collections have beautiful crystalline specimens. Pyrite is brass-yellow and occasionally displays a bluish or purplish iridescence on crystal faces. Crush a small piece and the result is black. It is heavy and unusually hard for a metallic sulfide of which there are many. Crystals are commonly striated cubes or pyramids (octahedrons) and some have pentagon faces.

Chalcopyrite is similar, containing 35% copper; it does not often display crystals and never cubes. It is more golden, softer and crushes to a greenish-black color. Chalcopyrite almost always is associated with pyrite where the contrast in character can readily be seen. Both are sulfides meaning they are metals combined with sulfur.

From Carney Hound, 11/06

March 20th - Vernal Equinox, 8:07 P.M. EDT

The word *equinox* is derived from the Latin words meaning "equal night." The vernal, or spring, equinox is the point at which the Sun appears to cross the celestial equator from south to north, signaling the beginning of nature's renewal in the Northern Hemisphere.

On March 8th, 1976, **Meteorites** fell in northeastern China, with the largest fragment weighing about 3,900 pounds, perhaps the largest in recorded history.

From The Farmer's Almanac

UPCOMING SHOWS

March 23-25 Ada GMF Club Annual Swap, Show and Sale Free Admission. Contact Ed Vermillion 405-527-6431

April 13-14 Pond Creek Annual Swap near Enid

April 20-22 Wichita 54th Annual Show, Wichita, KS Cessna Activity Center

April 27-29 Red Rock Canyon Swap Meet – details to follow in the April issue.

OMGS CALENDAR UPDATE

Mar 5	**Workshop Night** 7:00 - Education Committee Meeting 6:00
Mar 8	**Board Meeting** 7:00 (dinner @ 6 - Denney's at 63rd & May Ave)
Mar 15	**General Membership Meeting** 7:00 – **Program**: Dale Moore presenting on the Grand Canyon and what he learned on his 2005 trip, such as the ages of the rock layers in the canyon, the types of rock in the layers, and how the canyon was formed.
Mar 31	**Exhibitors and Judges Seminar** – see page 5 for details
Apr 2	**Workshop Night** 7:00 – Education Committee Meeting 6:00
Apr 12	**Board Meeting** 7:00 (dinner @ 6 - Denney's at 63rd & May Ave)
Apr 19	**General Membership Meeting** 7:00
Apr 27-29	**Red Rock Canyon 9th Annual Spring Rock Swap**, Hinton, sponsored by Oklahoma State Council and hosted by OMGS (dates changed to avoid conflict with the Pond Creek and Wichita Shows).

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Editor's Note: Submit your contributions no later than the first of each month please! Submissions may be edited for punctuation, clarity and space.

If you have an announcement or a trip report to share, email or give it to me at the meetings. Email is preferred, so I don't have to retype it. Unless otherwise noted, articles are written or contributed by the Editor. **Thanks to all of you who contributed to this issue!**

FIRST CLASS MAIL – DATED MATERIAL

ADDRESS CORRECTION REQUESTED