Arkansas Rockhound News

January 2021

Mission Statement

The Central Arkansas Gem, Mineral and Geology Society is dedicated to promoting interest in mineralogy and the related sciences, interest in lapidary and the related arts; to encourage field trips and the enjoyment of collecting and preserving minerals as they occur in nature, and the study of geological formations, especially those of our Natural State of Arkansas.

We are a small group of people that enjoy getting together to share our common interests.

Regular meetings are at the Terry Library 6:30 PM on the fourth Tuesday of the month (except December)

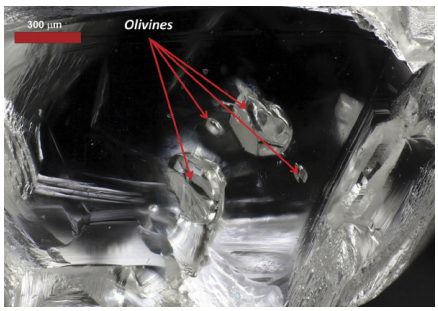
**Due to closures during the COVID-19 pandemic, we will meet at 2504 Riverfront Drive #3, Little Rock, AR 72202 - gate code: #2020

Inclusions in Quartz….the How and the why

By J. Michael Howard, *presented at the August 2020 meeting*

This talk is going to discuss what inclusions are present in Arkansas quartz, but before we get to that, we need to understand how and why inclusions occur.

Many of the minerals present as inclusions in another mineral are formed before the mineral doing the capture, though some may form during the same time or late in the host crystals growth. Let's take diamond for example. Diamond has been studied extensively and is well known for containing inclusions, including graphite, pyrope garnet, chromite, Cr-diopside, olivine, and others.



We know diamond formed in the upper mantle of the earth, based on laboratory results that tells us what its stability field is. By stability field, I mean that area of temperature and pressure at which a given mineral is stable. As diamond grows by accretion of carbon atoms to its crystal structure, it is under both high

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HELP!
Send in your:
stories, articles, tips, photos
suggestions or questions!

Submissions due by the 28th of each month.

From the president...

Notes from the November meeting...

As we are closing out 2020, I hope 2021 is not so interesting as this year has been. We will continue to have our meetings at David Hodge's condo community room. Once Terry Library opens up the meeting room, we can move back.

Our show is scheduled for October 2nd and 3rd, 2021. With the vaccine starting distribution it looks like we will be able to put on our show!

At the November meeting a motion was passed to carry over dues paid for 2020 to also cover dues for 2021. If you paid dues for 2020 you don't pay dues for 2021. If you didn't pay your 2020 dues then you will have to pay for 2021.

We also approved a motion to enter a more formal agreement with UALR. Stephanie Blandin developed a "Memorandum of Understanding" between CAGMAGS and UALR. The purpose is to define our expectations from the students who receive the scholarship we give to UALR and what we expect from the students.

From the editor...

Welcome to 2021! I hope everyone has had a safe and happy holiday season. I

We have had an exciting end of the year. In October we headed out to Colorado for elk hunting (Brandon's first trip, we had no luck). We sold our house (much quicker than expected) and are spent most of October/November packing and moving. We are currently living in our shop while we work on our new house. Luckily my side of the shop was pretty set up to live in, and bonus, we're living amongst ALL our rocks! And lapidary equipment. We had a great Christmas and are looking forward to a new year.

So how was your holidays? Anyone get any fun gifts? Cool rocks? I would love to see pics and share with our members! Drop them and a brief description to me and I'll add them to the next newsletter!

temperature and high pressure. It forms a very dense strong structure of tightly packed atoms. It has what is called a high crystallographic strength. That means as it forms it can push other minerals out of the crystals way. This is taking place in a plastic medium, in other words, in a rock material that behaves as a plastic, not as a solid or liquid. Along with the accretion of carbon atoms, when there are other minerals present, some get captured as inclusions and some do not, but in all instances where the captured minerals exhibit a crystal form, they formed first.

So in the instance of quartz, say from Brazil, Arkansas, or Madagascar, the minerals we find as inclusions were present, either as grains or crystals. Let's take the case of rutilated quartz. For a long time, many scientists thought that the titanium was present in the formational liquids and when the quartz formed, the rutile exsolved out of the quartz structure to form hairs. But detailed laboratory studies of rutilated quartz could not make those rutile needles dissolve back into the quartz! So that fact led to further studies. Finally it was concluded that the rutile formed first, then the quartz formed over it. Good evidence for this was the discovery in Brazil of hematite plates with oriented rutile coming from them, looking somewhat like starbursts. These have been found without any quartz crystal coating them, as well as with clear quartz crystals encasing them.

So in the instance of quartz, quartz simply encases the mineral inclusions. That is the how, now to the why…..

The why is because quartz forms in and from a somewhat complex fluid. Besides containing water, dissolved silica and salts, it contains traces of elements that may form other minerals. Some of the reactions that take place have to do with the chemical nature of the host rock. If the host is mostly sandstone, then not only are the chemical reactions more simple, but also the quartz can more readily nucleate onto properly oriented individual sand grains. If the host is a shale, then clay particles composing the shale are first not very easy to nucleate on, but also clay contains many trace elements bound to the clay particles and between them. These elements may be more available to the passing fluids to dissolve and mix with those fluids. Certain minerals, like chlorite and ankerite, or siderite, may begin to crystallize in these moving fluids….The fluids we are discussing obey the laws of hydraulics, one of which states that if under high pressure, and a route to lower pressure forms, the fluid will move toward the lower pressure. Just like when you turn on a faucet with a garden hose attached... Why does the fluid move into the hose? Because it is a direction of lower pressure. Then you go to the nozzle to open it to water your flowers or garden or grass. Why does it spray out? The open air is a zone of lower pressure.

So in a quartz-forming hydraulic system, these fluids move upward and outward into an open fracture system. Some minerals may be carried with them and some fragments or tiny bits of clay or rock may be carried with them. How does this happen? During the building of the Ouachita Mountain system, there was much folding and faulting of rock that occurred over some 40 million years. As rocks fold, any trapped formational fluids are under hydraulic pressure, and when a fault begins, those fluids not only lubricate that fault, but they travel upwards into the geologic rock section towards lower pressure. In a fault, sometimes hard rocks grind against hard rocks or soft rocks against soft rocks, but also hard rocks grind against soft rocks. These hard rocks in the Ouachita Mountains consist of novaculite and sandstone, where as soft rocks consist predominantly of shales and mudstones. There is structural evidence that cherts flowed with the pressures involved so they behaved

plastically. When shales ground against shales, a fine black clay-based powder or mylonite was formed.

Now lets look at some of the more common minerals that form inclusions in quartz and determine their origins. We will start with Chlorite. Chlorite may appear as green dusty to granular clouds of grains dispersed within quartz crystals, it may form green phantoms with terminations, and it may be restricted to just two or three faces within the quartz crystal. Clouds of grains indicate that during the formation of quartz crystals, a continuous source of the chlorite grains was moving along with the flow of the fluids and probably that the flow was very slow, giving the grains time to settle out from the moving fluid. The chlorite grain size was small and deposition was occurring on all faces of the growing quartz

crystal. Now if suddenly the source of the chlorite bearing fluids were cut off, but other silica-rich fluids continued to move, a phantom would be formed by deposition of clear crystal onto the green crystal. Now, if the chlorite grains were somewhat coarse and it took significant flow to transport them, they would still have a tendency, in open spaces where the flow slowed somewhat, to drop out of the fluid. And where would they drop? On the leeward side of the crystals that were forming. The leeward or down flow side of the quartz crystals receive the least growth and had slightly lower hydraulic pressure. Often when this is seen in a specimen, one can orient the direction of fluid flow by looking at the clear sides vs the chlorite coated sides. Flow across the clear faces not only wash them free of particles, but also supply more silica-rich fluids for greater growth.

Examples of chlorite-included quartz are known from many locations in Arkansas, but the more spectacular examples come from shale hosted quartz veins….the shale being the source of the iron and other elements to form the chlorite. The Willis mine in Saline County is but one example.

The above five pictures illustrate the several conditions of formation discussed above for chlorite inclusions and phantoms.

Now I want to address the so-called blue phantoms from the old Robbins mine, now the Wegner Blue Phantom mine. A critical examination of these phantoms must include an analysis of the grayish blue to black inclusions so well known from this location. These black particles, of various sizes have been reported from many locations within quartz veins in the Ouachita Mountains, but the Robbins mine has yielded a large volume of specimens when compared to other sites. What is this black material being included within the quartz? Early literature listed them as carbon inclusions, graphite inclusions, etc.

But this does not stand to reason! We do not see significant carbon or graphite present in the host rocks, and certainly there was not enough heat present to make graphite out of any local dead petroleum. Chemical analysis of these quartz crystals reveals one significant thing is present in the inclusions….Aluminum. The most common aluminum-bearing minerals in the Ouachita Mountains are black shales, composed of black clay, mostly illite. So, here we have an instance of quartz crystals forming, faulting grinding shale against shale, and flushing out of those fine black to gray particles into the silica-bearing fluids... then they behave much like chlorite in the veins, sorting and separating out on the basis of the fluid flow and their particle size. Shale inclusions in quartz are seen in scattered in many of the Arkansas quartz veins. I have one specimen in my collection from the Ron Coleman mine that has moderately large irregular clots of black shale encased by quartz.

So chlorite and shale are the two most common inclusions in Arkansas quartz crystals, but there are many others much more scarce. Here is a list of minerals I put together, along with examples of better known locations:

Cinnabar inclusions were recovered from the Bloody Cut in Pike County Mercury District and jamesonite inclusions noted from the May mine in the Sevier County Antimony District.

Pyrite and Chalcopyrite from both the north Arkansas lead/zinc districts, and from the Miller Mountain mine in the Ouachita Mountains.

Quartz sand encased in clear quartz from Jimmy Coleman's mine in Garland County.

Fine-grained iron oxide, formerly called leucoxene, after Arfvedsonite in smoky quartz, from the contact rocks adjacent to the Magnet Cove intrusion in Hot Spring County.

Brookite in quartz from the Miller Mountain mine, Garland County.

Rutile, Cookeite, and Rectorite from the Jeffrey quarry, North Little Rock, Pulaski County, from the Stand-on-your-Head Claim, Saline County, and from the White Cloud mine, Pulaski County.

Siderite in quartz may be readily confused with ankerite and adularia inclusions. You really need a chemical analysis of these various rhombohedral inclusions to be absolutely certain. Below are some identified examples. First, is siderite.

Then there is ankerite, this specimen is from Arkansas.

Also, adularia from Miller Mountain mine in Garland County, Arkansas.

Finally, possibly the rarest of all quartz inclusions from Arkansas…..galena in quartz crystals from the Lucky #7 mine, Lake Winona area, Saline County, Arkansas. I made the first identification of this mineral several years ago while working for the Geological Survey of Arkansas.

Pseudo-inclusions! Sometimes we encounter what some folks would call an inclusion…. that is really a pseudo-inclusion. It looks like an inclusion but does not meet our definition of an inclusion. Most commonly these consist of either black manganese oxide or brown, yellow, or even reddish iron oxide. They have the form we call dendrites. These formed later within thin planar fractures in quartz crystals, the key is later, not before. Here are 3 examples of cut quartz crystals that display attractive dendrites. They are sometimes also considered plant fossils, but are pseudo-fossils because they are totally inorganic.

References:

Images utilized from numerous sources obtained by searching for pictures of quartz mineral inclusions utilizing Google search engine.

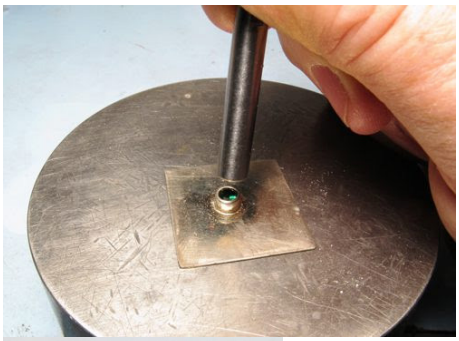
Brad's bench tips...

Bezel Closer

A bezel closer is a steel punch that makes quick work out of pushing the metal down over a round stone and burnishing it. It works with regular bezels, with tube settings, and with prong settings. Stones can be set in as little as 30 seconds.

The working end is a concave cavity that fits over the bezel or prong setting and is pushed and twisted to capture the stone. Sets can be purchased but are expensive and contain many sizes you will probably never use. If all you need is one or two sizes, here's how you can make them yourself.

Find a round steel rod or bolt a little larger in diameter than your bezel cup or prong setting. Cut a 5 inch length. File both ends flat. Locate the center of one end, centerpunch a divot, and drill a small pilot hole about 5 mm deep. Remember to use a little oil as lubricant when cutting steel.



Select a ball bur a bit larger than the bezel. Enlarge the pilot hole to a full hemispherical cavity. Test for proper fit with your bezel. Bezel should first contact the cavity about a third of the way in. When the size is correct, polish the cavity using Zam on a length of chopstick in your flexshaft. If the tool is not polished, it will leave scratches on your bezel or prongs.

When using the tool, the first step is to capture the stone correctly. I usually work by hand and push the punch straight down over the bezel or prongs. This causes the metal to start bending over the stone. Next, if it's a small stone, I inspect with a lens to be sure the stone is staying level. This is repeated until the stone is seated on its bearing and can't move anymore.

Next you want to force the metal down onto the stone uniformly all the way around. While this can be done by hand, I often gently tap the punch with a hammer. Finally, I burnish the bezel by twisting the punch around.

BENCH SHEARS

When cutting sheet metal, it's quicker and easier to use a set of shop shears as compared with using a hand saw. The cut is not as precise, but many times you don't need that. Shears will easily cut up to 24 gauge sheet, and some will cut 22 or even 20 gauge.

Current prices for shears run from $13 - $36 in jewelry catalogs, and the Joyce Chen scissors recommended on some jewelry blogs run more than $20. But we found a cheaper alternative at the 99 Cent Store - some gardening utility scissors that were only $1.07

I buy a half dozen of them at a time for use in my jewelry classes. They're great for cutting bezels, trimming around a bezel cup and cutting a piece off a larger sheet.

Learn New Skills with Brad's "How To Do It" Books Jewelry-Making Books
Amazon.com/author/bradfordsmith

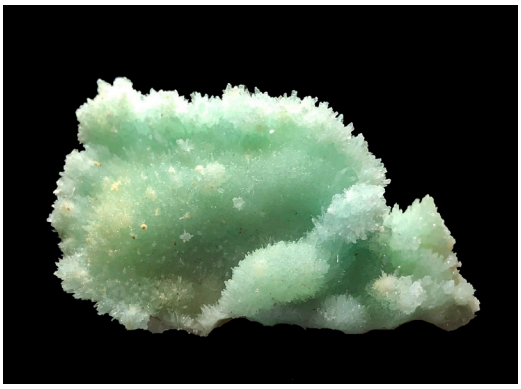
Kids Corner...

Brandon Heck is the Junior Editor of Arkansas Rockhound News. He is 12 years old and has enjoyed rockhounding since he could walk. In each issue he will share information about minerals that he loves and about his adventures in rockhounding.

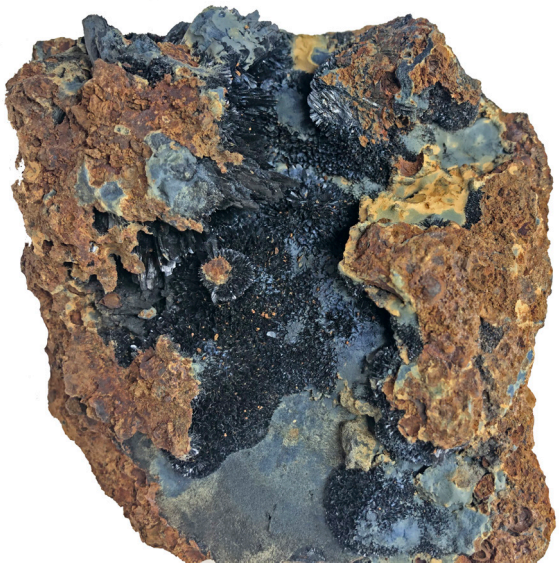
Recent additions to the Brandon Heck collection

Apophyllite on Quartz
Jalgoan, India

Apophyllite
Shirurampur, Maharashtra, India



Aragonite ("cast") ex Henry de Linde Collection
Monte Cristo Mine, Rush, Marion Co, AR



Vivianite (3 generations) ex R.D. Mushlitz Collection
Kerch Peninsula, Crimea, Russia

Quartz with Limonite
Androu mine, Erma Reka, Bulgaria

MEMBERSHIP FORM
Central Arkansas Gem, Mineral and Geology Society
Membership Dues: $15 / year Individual; $25 / year Family

Make checks payable to: "Central Arkansas Gem, Mineral and Geology Society".

Name:_____ Date _____

Business Name: _____ Birthday: Mo._____ Day _____

Address: _____ Anniversary: Mo._____ Day____

City:_____ State: ____ Zip:_____ Phone No._____

Cell Phone_____

Email address:_____ Occupation _____

How would you like your Club Newsletter delivered? U.S. Mail____ Email____

Family Members are considered as all of those living at the above address.

Please list their names, Birthday Mo./Day, if applying for a Family Membership.

Because of limited space, only one name will appear on the newsletter mailing label.

How did you hear about our Club?

_____

How long have you been interested in this hobby? _____ Do you have any equipment? _____

I would be interested in Attending ____ Hosting ____ work shop in _____ (subject)

on_____(day of week)

Please circle your club interests:

Mineralogy Lapidary Fossils Field Trips Geology Carving

Collecting Jewelry Making Casting Silversmithing Beading Wire Wrap

Other_____

Outside Interests: _____

These will be listed in the Membership Directory, so that members can find others with similar interests. In what areas would you be able to assist the Club:

Social Publicity/Advertising Educational Junior Programs Membership

Annual Show Committee Work Newsletter Articles Mineral Display

Other:_____

What would you like to see the club focus on in the coming year?_____

_____ I do not want my name to appear in the Club Directory.

_____ My name and address can appear, but NOT my Phone Number.

_____ Please do NOT include specifically the following info about me:_____

Please Mail to:

CAGMAGS, c/o Barbara Champagne, P.O. Box 241188, Little Rock, AR 72223

Central Arkansas Gem,
Mineral & Geology Society
PO Box 241188
Little Rock, AR 72223

2021 CAGMAGS Gem, Mineral and Jewelry show will be October 2 & 3

2021 Meeting Dates

**2021 meetings are currently being held at 2504 Riverfront Drive #3, Little Rock, AR 72202,
gate code: #2020**

January 26th
February 23rd
March 23rd
April 27th
May 25th
June 22nd
July 27th
August 24th
September 28th
October 26th
November 23rd

Join CAGMAGS!

Membership Dues - $15 Individual, $25 Family (Yearly)

Visit www.centralarrockhound.org to learn more!