The Apache Junction Rock & Gem Club, Inc.

SMOKE SIGNALS

Mar 2013

The Club meets on the second Thursday of every month October thru April at 7:00 pm at the Lapidary Shop, at the corner of Superstition & Ocotillo, Apache Junction, AZ

Club Dues - $24 a year per member prorated to first of month of joining. This may be paid at the general meeting or by mail to Ron Ginn, 691 N. Velero St., Chandler, AZ 85225.

In This Issue

Next Meeting – Apr 11, 2013

Field Trips

Minutes of March 14, 2013

Submitted by Barbara Bayer

The Meeting was called to order at 7:05 pm by the Vice President. He led the Pledge of Allegiance.

- The Secretary's report for February 2013 was accepted as distributed. The Sunshine report was that 1 get well card and 2 grief cards were sent to members of the club.
- Martha Montague gave the Treasurer's report as follows: General checking account $3,875.03, General savings account $121.35, Lapidary checking account $3,636.08, Lapidary savings account $995.70, Show checking account $10,108.51, Show saving account $2,535.68 which all total to $21,232.35. The first CD is worth $6,097.41 and the second CD is worth $8,565.83. There are two receipt books in the Lapidary Shop- one for memberships and one for shop time and saw fees. If needed, a third receipt book can be placed in the shop. The club has received a notice of tax exemption for our present property in the amount of $17,892.00. The value of the shop property is $111,825.00. The billing for the shop insurance totaled $850.00. The club has purchased QuickBooks for business finances to prepare more comprehensive reports.
- Ron Ginn of the Membership Committee reported that we have 211 members in the club.
- Bill Stasi of the Lapidary Shop reported the need for monitors for the Summer months. He has a bulletin board to post notices of club meetings and Coalition trips. The 18" saw has been repaired. He is preparing a shop budget. He presented purchasing another 18" saw for the price of approximately $2000. This purchase will be presented to the Board, then the Membership. There is no further news of the rebate on the old electrical lights and the completion of the electrical work.
- Wally Frlich reported there were 1539 adults attending this year's Rock Show. The lower numbers may be due to the conflict with the Tucson Shows and the economy. There were 12,000 coupons distributed, plus 250 envelopes of information and coupons

distributed to schools, organizations, and at the Flagg Show. He wishes to thank all volunteers who worked at the show. He also thanked Jeanette Porrett who replaced Oma Frlich for the Ming Tree activity. The volunteers who made Ming trees this year also made an adequate number for 2014. Mr. Frlich asks us to remember our Rock Show sponsors as listed in the program. Katy Tunnicliff was able to get 30 sponsors at $30.00 each for the program this year.

- Barbara Bayer reported on the progress of the Field Trip Manual. She has heard from the Tonto and Prescott National Forest offices. She has requested input from three members of the club who participate frequently in field trips
- Cindy will give a report soon on conducting sales at the Lapidary shop.
- Ted Montague stated we have permission to park in the business parking spaces across Supersitition when the business is closed. We can also park in another area which will be posted on the bulletin board with a map.
- The speaker for the evening was David Bayer, a geologist and mining engineer, who presented "Development of a Natural Gas Field".
- The meeting was adjourned.
- The silent auction was held following the meeting.

Article of the Month

Inclusions: Minerals Inside Minerals

by Andrew A. Sicree

Inclusions

Natural crystals of minerals are never "perfect." Even an apparently flawless, water-clear crystal of quartz displays minute imperfections upon examination under a microscope. Inclusions are but one type of imperfection formed during the growth of a crystal – other types of imperfections include grain boundaries, crystal growth step dislocations, and trace impurities. Inclusions consist of small blebs of gas, liquid, and/or other, "foreign" crystals caught up ("included") inside the crystal structure.

In the laboratory, crystals can be grown from ultra-pure starting materials at carefully controlled temperatures and pressures, so that the resulting crystals do not trap inclusions. Synthetic (man-made) crystals may have very few flaws, but natural mineral crystals can contain inclusions of gases, liquids such as salt water, and crystals of other minerals. Gemologists use the presence or lack of inclusions as an aid in determining whether or not a gemstone was cut from a natural or a synthetic crystal.

Solid inclusions

Solid inclusions (i.e., minerals within minerals) can be visible to the unaided eye or too small to see (microscopic). Solid inclusions can arise when a crystal envelops earlier, pre-existing mineral crystals. "Sand calcites" are an example of one mineral (calcite) encasing a pre-existing mineral (quartz in the form of sand grains). Similarly, when two minerals grow at the same time, one can incase the other, such as when small grains of pyrite are found scattered throughout a fluorite or calcite crystal. Alternatively, solid inclusions can be generated when a chemical reaction produces blebs of a daughter mineral within the pre-existing parent mineral. This can occur when one mineral "exsolves" another. Typically, an exsolution reaction occurs because the components of daughter mineral cannot remain dissolved within the parent mineral as temperature drops. Or it can occur because of a solid-state chemical reaction – reactant chemicals diffuse through the solid parent mineral to create blebs of the daughter mineral in the interior of the parent.

The famous "chalcopyrite disease," in which blebs of chalcopyrite are found within sphalerite, was originally described as an exsolution reaction, but later researchers recognized that, more often, it was a solid-state replacement reaction that created solid inclusions of chalcopyrite within sphalerite parent crystals.

Red or orange hematites growing parallel to cleavage planes in mica are another example of solid inclusions. Additional examples include amazonite (in which streaks of albite occur with microcline – this "perthite" texture is created by an "unmixing" or exsolution reaction) and tourmaline within quartz (sometimes called "tourmalinated quartz").

Everyone's favorite inclusion

Rutilated quartz is perhaps the best-known example of a solid inclusion. In rutilated quartz, golden rutile (TiO_2, tetragonal) crystals are trapped within clear quartz. Usually, these rutile crystals appear as curved, whisker-thin crystals, arcing through the quartz host in no particular direction.

When cabbed or faceted, rutilated quartz makes fascinating gemstones.

In some minerals, however, the orientation of rutile inclusions is controlled by the structure of the host crystal. Rutile "silk" inside of corundum crystals can be oriented parallel to the lateral axes of the hexagonal crystal. Thus, the fine silky rutile crystals are at 60° to each other. If a silk-laden corundum (typically as the ruby or sapphire variety) is cut so that the hexagonal axis points out of the center of a polished cabochon, the rutile inclusion generate a six-pointed "star" effect – creating the much desired star sapphire or star ruby.

Fluid inclusions

Within a mineral, cavities containing liquids and/or gases are known as fluid inclusions (sometimes abbreviated "FI"). Some fluid inclusions contain only liquid, most commonly salt water although petroleum-filled inclusions occur, while others hold both a liquid and a gas phase. Gases within fluid inclusions might be water vapor, carbon dioxide, methane, other gases, or mixtures of gases. Multi-phase inclusions contain two or more phases.

Fluid inclusions range from the macroscopic (big enough to see with the naked eye) down to microscopic inclusions smaller than 0.01 mm across. Crystals contain billions of microscopic fluid inclusions per cubic centimeter. Thus, a quartz crystal that is only eight inches long and three across may hold more than a trillion microscopic fluid inclusions.

Long, thin, tube-like fluid inclusions are common in natural emeralds (a feature used by gemologists examining stones to determine if they are natural or synthetic emeralds). Typically, emerald fluid inclusions are filled with salt water; they may also enclose gas bubbles and solid salt crystals. This fluid is a remnant of the hydrothermal fluid that produced the emerald. The salt crystals do not dissolve in the inclusion's water because the water is saturated with respect to salt.

Uses of fluid inclusions

Many fluid inclusions are filled with salt water. This salt water is a trapped sample of the fluid from which the mineral precipitated.

We can determine how salty the water is because salt water freezes at a lower temperature than pure water does. Road crews take advantage of this fact when they spread salt on icy roads in wintertime; salt prevents the formation of ice even as the water temperature drops well below the normal freezing point of water. The depression of the freezing point depends upon the concentration of salt in the water. One can determine the "saltiness" of the water within a microscopic fluid inclusion without directly analyzing it. A small, thin slice of a mineral with fluid inclusions is examined via a microscope while it is being slowly cooled below 0°C (32°F). The microscopist watches for the point at which the fluid inclusions freeze – the freezing temperature can then be compared to data tables to determine the salinity of the inclusions.

In a similar manner, two-phase liquid-gas inclusions can be heated until the gas phase disappears and only one phase remains. This point is known as the "temperature of homogenization" and it represents the lowest possible temperature at which the host mineral could have formed.

Primary vs. secondary inclusions

If a fluid inclusion forms at the same time as the host mineral forms, the inclusion is called primary. In the determination of fluid inclusion salinity and temperature of homogenization, it is important to use inclusions that are primary. It is also important that the primary inclusion not leak. A leaky inclusion no longer has the same bulk composition it had when it formed – this can generate an inaccurate temperature of homogenization. In general, the larger an inclusion is, the more likely that it will have leaked. This is why large inclusions (i.e., those large enough to be visible to the naked eye) are seldom used in scientific studies. Herkimer "diamonds" (really quartz) are well known for their large fluid inclusions. The walls of the inclusions tend to reflect light dramatically – hence the "diamond" moniker. Many of these inclusions may have leaked dry.

Not all fluid inclusions are "primary" in nature. Secondary fluid inclusions form after (often well after) the host mineral has been deposited. For instance, say that a crystal of quartz precipitated from a warm saline fluid. Thousands of years after the crystal formed, it cracks under stress. Then, a new warm saline fluid percolates into the crack, precipitating additional quartz to "heal" the crack. Any fluid inclusions in the healed crack are secondary in nature. Fluid inclusions in a healed crack only give you data about the second fluid. Care must be taken when studying fluid inclusions to assure that only primary inclusions are examined.

Ages of fluid inclusions

Fluid inclusions can be quite old. For instance, a study of minerals at the 2.2 billion-year-old natural nuclear fission reactors at Oklo in Gabon found hydrocarbon-bearing fluid inclusions that were trapped before, during, and after the time the reactors went critical.

Enhydros

The water-filled geodes sold at rock shows as "enhydros" are not proper examples of fluid inclusions *per se* although the idea is similar. Enhydros are chalcedony geodes with their inner cavities filled with water containing dissolved sodium, magnesium, calcium, chloride and sulphate ions. Chalcedony is cryptocrystalline (consisting of many very small crystals) and the fluid is not inside of a single crystal but rather trapped in the vug at the center of the geode. Careful cutting and polishing of the geode allows you to see the trapped fluid sloshing around inside the vug. The lapidary must be careful not to cut too close to the vug or the enhydro will leak water and dry up. Note that if your enhydro does dry up, it can often be restored by soaking it a bucket of water; water will seep back into the vug.

How Did We Get Names of Geologic Periods?

The geologic time scale is peppered with interesting names for the various time periods. Why do we call one period the Cambrian and the next the Ordovician? During the years 1820-1850, geologists began to organize rock strata in relative chronological order and give names to the various periods. Many of the period names have British origins simply because British geologists did the work. The "Cambrian" arises from the Roman name for Wales, and the subsequent two periods, the "Ordovician" and the "Silurian" are named for Welsh tribes. The county of Devon, in England, gave us the "Devonian."

The "Carboniferous" comes from the Coal Measures, the British term for the coal-rich rocks. (In North America, the Carboniferous is divided into the Mississippian and Pennsylvanian Periods – names derived from the river valley and the state.) A Scottish geologist, Roderick Murchison, named the "Permian" after strata found near Perm, in Russia. The "Triassic" comes from the Latin *trias*, meaning triad, because rocks of that period occurred in three distinct sections: red beds, chalk layers, and black shales. The Jura Mountains in the Alps, with extensive layers of marine limestones, gave us the name "Jurassic." The Latin word for chalk, *creta*, is the root of the name "Cretaceous," which was derived from the chalk-rich rocks of the Paris Basin in northern France.

Bench Tips

See more BenchTips by Brad Smith at Facebook.com/BenchTips/ or Yahoogroups.com/group/BenchTips/

Rock Shows

Mar 2013

22-23—YUMA, ARIZONA: Retail show; Sharon Szymanski; Yuma Civic Center; 1440 Desert Hills Dr.; Fri. 10-5, Fri. 9-4; adults $3, children (under 12) free with adult; indoor gem and jewelry show, dealers, minerals, fossils, rough, slabs, fine and costume jewelry, beads, copper, unset gemstones, lapidary equipment and supplies, wire wrapping on the premises; contact Sharon Szymanski, 1792 E. Laddoos Ave., San Tan Valley, AZ 85140, (480) 215-9101; e-mail: goldcanyon2@yahoo.com

May 2013

25-26—PINETOP, ARIZONA: Show and sale; White Mountain Gem & Mineral Club; Hon-Dah Resort/Conference Center; junction of Hwy. 260 and Hwy. 73, enter off Hwy. 73; Sat. 9-6, Sun. 10-4; adults $2, children (16 and under) free; demonstrations, speakers, kids' activities, silent auction, raffles, fluorescents, jewelry, minerals, fossils; contact Rick Olson, 8276 Tahoe Pl., Show Low, AZ 85901, (928) 251-0949; e-mail: walkaround@earthlink.net; Web site: whitemtngmc@gmail.com

Jun 2013

5-9--Gem & Mineral Show, Flagstaff, AZ
at the corner of Rte 89 north & Silver Saddle Road
Becky Cox bcox@fusd1.org

Jul 2013

12-13—FLAGSTAFF, ARIZONA: Annual show; Val Latham, Sharon Szymanski; Radisson Hotel Ballroom; 1175 W. Hwy. 66; Fri. 9-5, Sat. 9-4; adults $3, children free with adult; gems, beads, rocks, jewelry, fossils, lapidary tools and supplies, gold and silver jewelry, rocks, agates, rock slabs, cabochons, rough rock, costume jewelry, wire wrapping on the premises; contact Val Latham, 840 W. Charleston Ave., Phoenix, AZ 85023, (602) 466-3060; e-mail: Val65@cox.net

Volunteers for the 2013 Show

Kelly, Katy, and Wally thank everyone who volunteered and worked at our 2013 show at Skyline High School the weekend of February 16-17. The following list of show workers may have some errors. The number in parentheses after each name is the number of two-hour shifts that the club member worked. Set-up and tear-down each counted as a separate shift, Some members did additional jobs related to the show. It was difficult to figure the number of shifts each member worked if their name wasn't on the master sign-up list. If there are errors on this list, please call Wally 480-982-7760 or e-mail him at wjfrlich@gmail.com to correct the errors. We thank them all for their contributions to the show.

Ron Ginn (8)
Alice Blom (1)
Anne Berrisford (2)
Barbara Bayer (8)
Bill Puscus (3)
Bill Stasi (3)
Bob Dugan (1)
Brenda Hehnke (1)
Brian Fermoyle (2)
Butch Donison (2)
Carol Leonard (4)
Carolyn Sillings (2)
Cathy Benedetto (1)
Cheryl Stearns (3)
Chuck Narveson (2)
Claude Koontz (7)
Connie Mace (2)
Craig Strawn (2)
Cristina Spadafino (5)
Cynthia Koontz (7)
Dave Faulkner (5)
David Bayer (5)
David Mullins (2)
Dawn Gruhn (1)
De Witt Wright (7)
Dennis Pikul (4)
Don Mace (2)
Dorrie Kapki (6)
Garth Harker (3)
Gary Blom (1)
Gary Selinger (3)
Harlan Jones (1)
Harold Silver (2)
Herve Desrosiers (3)
Hilde Zahm (5)
Hoolie Decaire (9)
Irene Cinnamon (1)
Jack Pawlowski (3)
Jeanette Porrett (3)
Jerry Ciptak (1)
Jim Armitage (1)
Jim Leonard (4)
Jim Newman (2)
Karin Ciptak (1)
Katy Tunnicliff (9)
Kelly Iverson (11)
Ken Perkins (5)
Lance Berrisford (2)
Lois Perkins (2)
Lynn Carlson (5)
Margie La Vigne (3)
Marlene Hubbard (1)
Martha Montague (4)
Mattie Gadd (2)
Natalie Kirmiel (7)
Norma Decaire (2)
O. J. Perala (1)
Paul Ewald (4)
Paul Stearns (9)
Richard Porrett (2)
Sam Bartles (1)
Sandra Lindner (4)
Serena Hehnke (1)
Sharon Jones (1)
Sue Vincent (3)
Ted Montague (5)
Tiny Baumann (1)
Tobia Eaks (3)
Wally Frlich (9)
Wayne Munster (1)
Whitey Kroll (5)

Jeanette Porrett would like to thank the following people for their participation in preparing Ming Trees for our 2013 show . These 19 members attended classes where they learned how to twist the Ming Tree wire-form and how to attach the trees to their bases. Then, at home, each member made at least 20 Ming Trees for the show. Over 200 trees were sold at the show.

Barbara Bayer
Arlene Beechler
John Beechler
Anne Berrisford
Lance Berrisford
Sharon Broadbent
Linda Fletcher
Brenda Hehnke
Serena Hehnke
Carol Leonard
Lynn Mistrot
Ken Perkins
Lois Perkins
Jeanette Porrett
Denise Powell
Bill Puscus
Carolyn Sillings
Harold Silver

Al Watkins

Wally Frlich thanks Richard and Jeanette Porrett and his wife Oma for spending a long afternoon stuffing envelopes with show materials and coupons.