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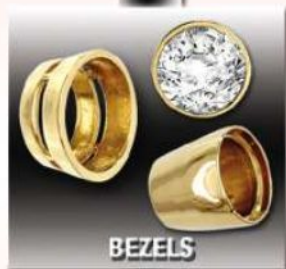


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FEATURES

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Greater processing speed means greater recovery
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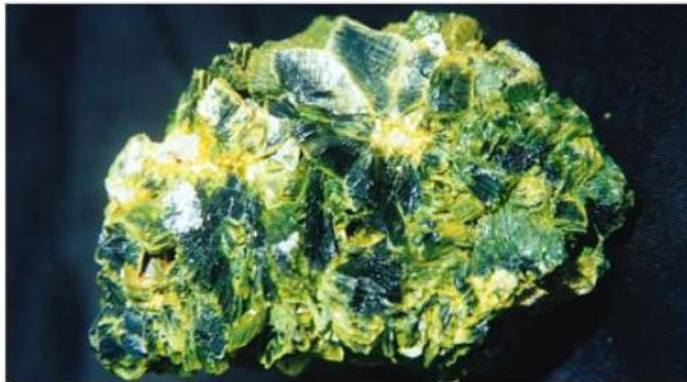
The Trap Rocks of New Jersey.....20
An important source of zeolites and associated minerals
by Bob Jones

Rockhounding and Radioactivity.....30
Radiation monitors add a new dimension to mineral collecting
by Steve Voynick

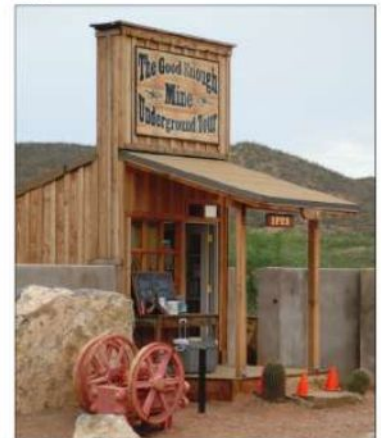
20



30



58



SUBSCRIPTION QUESTIONS? Call (760) 291-1549

Rock & Gem Kids.....40
Meet Mr. Bones and take our quiz!

Cire Perdue44
Discover the art of lost wax casting
by Bob Jones

A Great Find in Gaithersburg50
Visit a gem of a rock show in Maryland
by Andrea Stein

Southern Arizona's Mines.....58
Six historic and inspirational tours near Tucson
by Helen Serras-Herman

REGULAR COLUMNS

All She Wrote 6	Picks & Pans.....42
Craftsman of the Month..... 8	Off the Dop.....52
Show Dates.....10	Many Facets..... 56
Shop Talk..... 18	Contest Rules.....57
Rock Science.....26	On the Rocks.....72
	Field Notes 74

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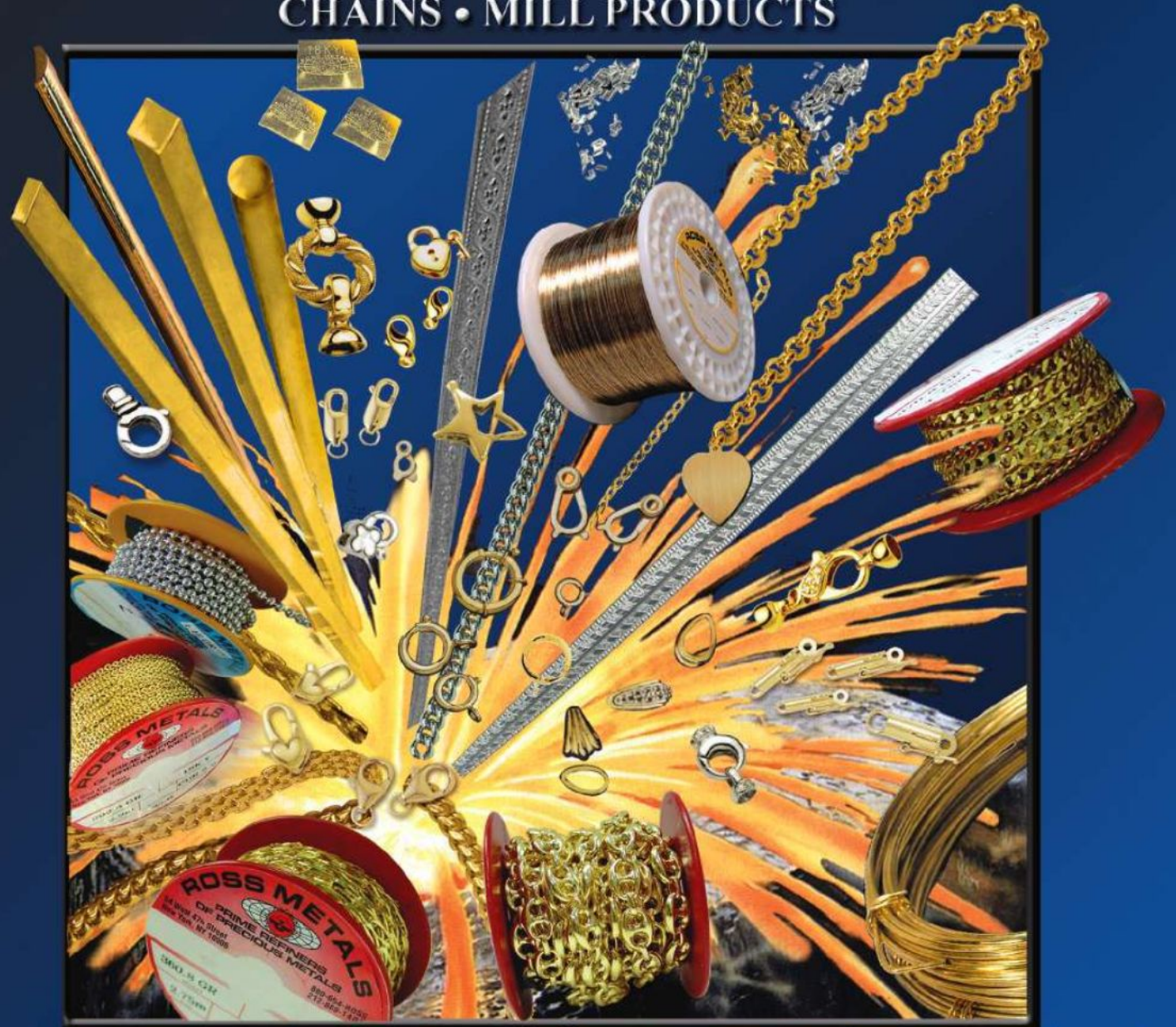
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The Write Stuff

When collecting sites are closed by faceless officials or laws restricting our hobby are enacted in some far-off capital, it's easy to feel that you don't have a voice in the matter. Recently, however, when California State Parks issued an order limiting gold-recovery activity on the American River, some Northern California clubs flexed their writing muscles and showed what can happen when rockhounds and businesses come together and make their opinions known.

Diane Vida, of the Mother Lode Goldhounds Association (MLGA) in Foresthill, California, told *Rock & Gem*, "On Mar. 29, 2010, Ruth Coleman, head of California State Parks, issued order #690-006-2010, a 'hands and pans'-only regulation, which also affected any rockhounding, for the Auburn Recreation District (ARD). The ARD comprises 55 miles of both the north and south forks of the American River in Northern California. ARD manager Mike Lynch informed Dennis Robnett, of Pioneer Mining in Auburn, California, about the order on Apr. 23, 2010.

"The news launched a major writing campaign, headed by Don Robinson, President of the Mother Lode Goldhounds, Jim Hutchings, Vice-President of the Roseville Rockrollers, and the members of these clubs. They were able to convince the California State Parks authorities to withdraw the order. They also received assurance that, if the issue should come up again, a meeting would be held to get public input on this subject."

According to Robinson, the agency's turnaround took a scant seven days—lightning speed when it comes to the government. "A big 'thank you' goes to those who took the time to write and let them know that the order was not in good keeping with those who use the river for recreation and enjoyment," says Vida.

The MLGA recognizes its members' responsibility in ensuring that the Auburn gold-panning area remains open to its activities. Member Carol Ebbitt, writing in the club's May 2010 newsletter (www.goldhounds.com/newsletter.htm), said, "It is important to remember that in numbers and with the written word we have been successful in staving off another citizen right being taken away. It is also important to remember that we must be the good citizen miner by leaving an area better than when we arrived" (p. 7).

Speaking out to legislators and land management officials, especially as part of an organized effort, can be effective, and there are plenty of opportunities to do so. The keys are to stay informed about pending state and federal legislation and to take the time to write a letter or make a phone call. Your local club, the American Federation of Mineralogical Societies, and the American Lands Access Association can all help keep you in the loop. "There are now and will be more battles for us to wage," says Ebbitt. "Remember what was accomplished this week and when asked to write letters, do the same thing again" (p. 7).

The MLGA will host the California and U.S. gold panning championships on Sept. 4, 2010 during its annual Foresthill Heritage Celebration. See the article in *Picks & Pans* (p. 42) for more information.




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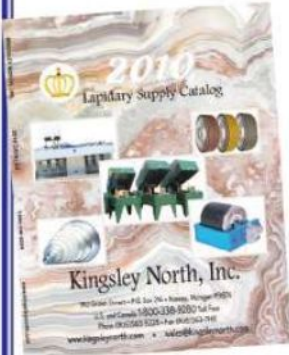
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1-1041	80	166.00	137.00
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1-1045	360	120.00	100.00
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1-1048	80	200.00	168.00
1-1049	100	182.00	154.00
1-1050	180	165.00	140.00
1-1051	220	165.00	140.00
1-1052	360	165.00	140.00
1-1053	600	155.00	130.00

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3-0310	1,200	92.00	74.00
3-0311	3,000	92.00	74.00
3-0312	8,000	92.00	74.00
3-0313	14,000	92.00	74.00

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CRAFTSMAN OF THE MONTH

This project started in the early 1970s with a trip to the Big Cimarron in Colorado," writes June Craftsman of the Month James M. Lynch, of Clifton, Colorado. "I found a nice river-tumbled tan jadeite rock and a large (5-inch by 9-inch by 8-inch) piece of Curecanti agate.

"I brought the rocks home and cut slabs, 1/8 inch thick, of both rocks on my 18-inch slab saw. Next, I tumbled the slabs in a 12-pound tumbler, packed fairly tightly so the slabs would slide rather than flip side to side. I used 120 grit, 220 grit, and 600 grit for a week each. Then I used, pre-polish and chromium oxide, a week and a half on each. It took five weeks for each batch of agate and jadeite separately.

"My next step was to pack and pad the slabs nicely for a stained glass-type project. They went into hiding for about 25 years, during which time I moved about 10 times, before I got them out again. I then found the shape and style of lampshade I wanted when a neighbor was throwing one away. After cleaning it completely and reinforcing the wire frame, I made templates from file folders for the shape and size of each rock slab. They were each numbered, as no two pieces were the same.

"Then, I found the slab I wanted for the center of each side, making sure it fit inside my template. Next, I laid down the surrounding stones and traced the template onto them. I cut them to size on my trim saw. With the side pieces cut to the shape of the sides, I laid



the center stone for each side on the surrounding slabs and traced its shape onto them. I then used a spindle-type grinder to shape the side pieces to the center stone. Then the project went back into hiding for a few more years.

"I made friends with some people in our rock club who also did stained glass. After some talking, the project came back out, and they taught me how to wrap each piece with the copper foil and solder them together. After placing the top pieces on the proper sides, I tacked them together enough to set them on the frame.

"The next step was to lay out the flat area between the sides and skirting using the same steps. I then soldered all the pieces together. The final step was adding the skirting pieces to the bottom and soldering them. I then placed a finial on top to hold the lampshade securely in place.

"The lamp stand is a piece of twisted cedar from Western Colorado that was hand sanded and polished. It was passed down for generations through my wife's family. The white base is a 1 1/4-inch-thick slab of white marble that

I got in Marble, Colorado, and hand sanded with 600 grit emery paper. Then I polished it with tin oxide and a polishing pad on a side buffer. Drilling some small holes in the marble allowed me to mount the lamp stand to the base with screws.

"No longer in hiding, this finally completed project is on display in our home." ♦



Would you like to be named Craftsman of the Month?

To enter the contest:

- Write a 500-word step-by-step description of how you crafted your lapidary project from start to finish. Submit an electronic copy of the story, along with your printed manuscript, if you are able.
- Take least one sharp, close-up, color photo of the finished project. Submit a photographic print or a high-resolution (300 dpi at 4 inches by 5 inches) digital photo as a .tif or .jpg file on a CD. (Contact the editor with questions.)
- Send your materials, along with your name and street address

(required for delivery), to Craftsman of the Month, *Rock & Gem* magazine, 290 Maple Ct., Ste. 232, Ventura, CA 93003. Submissions will not be returned, so do not send originals. Only winners will be notified.

Craftsman of the Month winners receive a two-speed Dremel Model 200 N/40 MultiPro kit and a wall plaque in recognition of their creativity and craftsmanship. Winning projects are also posted on our Web site, www.rockngem.com.



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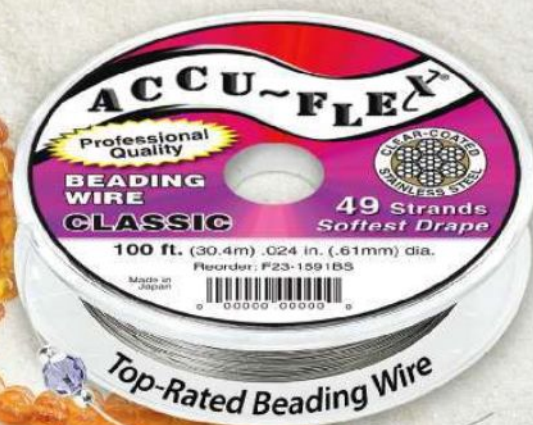
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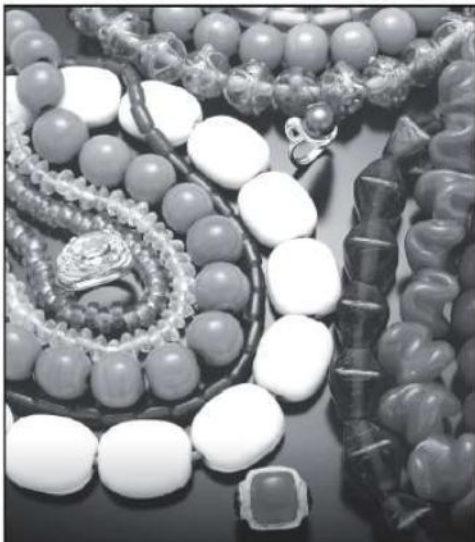
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JULY 2010

1-4—SISTERS, OREGON: Show, "Sister's Round-up of Gems"; Oregon Gem Shows; Sister's Elementary School, 611 E. Cascade, off Hwy. 20; Thu. 9-6, Fri. 9-6, Sat. 9-6, Sun. 9-4; free admission; contact Jean Miller, P.O. Box 136, Molalla, OR 97038, (503) 829-2680; e-mail: shadow92337@molalla.net; Web site: www.ogmshows.com

2-4—FARMINGTON, NEW MEXICO: Show; San Juan County Gem & Mineral Club; Farmington Civic Center, 200 W. Arlington St.; Fri. 10-6, Sat. 10-6, Sun. 10-5; free admission; door prizes, rocks, gems, minerals, Farmington Freedom Days; contact Mickie Calvert, P.O. Box 1482, Farmington, NM 87499, (505) 632-8288; e-mail: mickie2@earthlink.net

2-4—FISHERSVILLE, VIRGINIA: 23rd annual show; Treasures Of The Earth Gem & Jewelry Shows; Augusta Expoland, 277 Expo Rd. (I64 Exit 91); Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$3 (good all 3 days), children under 16 free; jewelry makers, goldsmiths, silversmiths, gem trees, wire wrap, wire sculpture, pearls, stone beads, stone setting, dealers, amber, opal, minerals, fossils, door prizes, classes; contact Van Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: van@toteshows.com; Web site: www.toteshows.com

2-4—PASADENA, CALIFORNIA: Show; International Gem & Jewelry Show Inc.; Pasadena Convention Center, 300 E. Green St.; Fri. 12-6, Sat. 10-6, Sun. 11-5; adults \$8; open to the public, professional jewelers, artists; contact International Gem & Jewelry Show Inc., 120 Derwood Circle, Rockville, MD 20850, (301) 294-1640; e-mail: info@intergem.net; Web site: www.InterGem.com

2-4—TIMONIUM, MARYLAND: Show; International Gem & Jewelry Show Inc.; Maryland State Fairgrounds, Expo Hall and 4-H Bldg., 2200 York Rd.; Fri. 12-6, Sat. 10-6, Sun. 11-5; adults \$8; open to the public, professional jewelers, artists; contact International Gem & Jewelry Show Inc., 120 Derwood Circle, Rockville, MD 20850, (301) 294-1640; e-mail: info@intergem.net; Web site: www.InterGem.com

9-11—DURANGO, COLORADO: Show; Four Corners Gem & Mineral Club; La Plata County Fair Grounds, 2500 Main Ave.; Fri. 10-6, Sat. 10-6, Sun. 10-5; free admission; jewelry, kids' activities, gold panning, jewelry making tools, gems, minerals, fossils, beading supplies, door prizes, mineral displays, raffle, silent auction; contact Bill Birza, P.O. Box 955, Durango, CO 81302, (970) 385-6850; e-mail: wcbirzz@durangolive.net; Web site: www.durangorocks.org

9-11—INDIANAPOLIS, INDIANA: Show and sale; GemStreet USA; The Indiana State Fairgrounds, The Pioneer, Our Land Bldg., 1202 E. 38th St.; Fri. 10-6, Sat. 10-6, Sun. 11-5; fine gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

9-11—LIVONIA (DETROIT), MICHIGAN: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Embassy Suites, Livonia/Novi, 19525 Victor Pkwy.; Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: www.glwshows.com

9-11—MARIETTA (ATLANTA), GEORGIA: Show; Frank Cox Productions; Cobb County Civic Center, 548 S. Marietta Pkwy.; Fri. 1-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave. #203, Sarasota, FL 34236, (941) 954-0202; e-mail: frankcox@comcast.net; Web site: www.frankcoxproductions.com

9-11—MARLBOROUGH, MASSACHUSETTS: Show; International Gem & Jewelry Show Inc.; Royal Plaza Trade Center, 181 Boston Post Rd. W; Fri. 12-6, Sat. 10-6, Sun. 11-5; adults \$8; open to the public, professional jewelers, artists; contact International Gem & Jewelry Show Inc., 120 Derwood Circle, Rockville, MD 20850, (301) 294-1640; e-mail: info@intergem.net; Web site: www.InterGem.com

9-11—SACRAMENTO, CALIFORNIA: Show, "Gem Faire"; Gem Faire Inc.; Scottish Rite Center, 6151 H St.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

9-11—SAN RAFAEL, CALIFORNIA: 2nd annual show, "San Francisco Fine Mineral Show"; FineMineralShow; Embassy Suites Hotel, San Rafael-Marin County, 101 McInnis Pkwy.; Fri. 10-6, Sat. 10-6, Sun. 10-5; contact Dave Waisman, P.O. Box 8543, Spokane, WA 99203; Web site: www.finemineralshow.com

9-11—TACOMA, WASHINGTON: 15th annual show, "Puget Sound Bead Festival"; The Bead Factory; Hotel Murano Bicentennial Pavilion, 1320 Broadway; Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$7; more than 75 vendors, artists, bead merchants and artisans; glass, clay, semi-precious stones, silver, wood, and polymer beads, ancient to contemporary, more than 70 classes, jewelry making, jewelry business, glass bead making, seedbeading, wireworking, contemporary jewelry design and marketing; Teachers' Showcase, Saturday Night Bead Party; contact Melissa Lovejoy Goldman, 3019 6th Ave., Tacoma, WA 98406, (253) 572-5529 ext. 121; e-mail: Melissa@thebeadfactory.com; Web site: www.pugetsoundbeadfestival.com

10-11—BETHEL, MAINE: 49th annual show; Oxford County Mineral & Gem Association; Telstar Regional High School, 284 Walkers Mills Rd. (Rte. 26); Sat. 9-5, Sun. 10-4; adults \$2, children under 12 free; contact Hugh Chapman, (207) 836-2987, or Dennis Brown, (207) 647-2154; e-mail: oxfordcountymineralandgemassoc@gmail.com; Web site: www.oxfordcountymineralandgemassociation.blogspot.com

10-11—CULVER CITY, CALIFORNIA: 49th annual show, "Fiesta of Gems"; Culver City Rock & Mineral Club; Veterans Memorial Auditorium, 4117 Overland Blvd.; Sat. 10-6, Sun. 10-5; free admission; 27 vendors, rough and polished rocks, minerals, jewelry, beads, demonstrations (glass lampwork bead making, faceting, precious metal clay), half-day classes, kids' games, books, magazines, hourly drawings, grand prize raffle; contact Robert Thirlaw, 28602 Mt. Whitney Way, Rancho Palos Verdes, CA 90275, (310) 213-7677; e-mail: thirlawr@earthlink.net; Web site: <http://culvercityrocks.org>

10-11—ROSEVILLE, MINNESOTA: Show; Anoka County Gem & Mineral Club; Har Mar Mall, 2100 Snelling Ave.; Sat. 10-6, Sun. 12-5; free admission; gems, minerals, jewelry, fossils, agates, collectibles; contact Martha Miss, 8445 Grange Blvd., Cottage Grove, MN 55016; e-mail: rockbiz@cs.com

16-17—MINOCQUA, WISCONSIN: 42nd annual show; Lakeland Gem Club; Lakeland High School; 9573 State Hwy. 70; Fri. 10-6, Sat. 10-5; free admission; children's activities, speakers, demonstrations, dealers, minerals, native copper, fossils, gems, jewelry, silent auctions, door prizes, silent auctions; contact Mike Schramm, P.O. Box 1337, Rhinelander, WI 54501, (715) 499-6898; e-mail: simplyliving@frontiernet.net

16-18—BOONE, NORTH CAROLINA: 16th annual show, "High Country Gem, Mineral & Jewelry Show"; Treasures Of The Earth Gem & Jewelry Shows, National Guard Family Support Group; Boone National Guard Armory, 274 Hunting Hills Ln.; Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$2 (3 days), children free; jewelry makers, goldsmiths and silversmiths from all over the US, gem trees, wire wrap, wire sculpture, pearls, stone beads, stone setting, dealers, amber, opal, minerals, fossils, hourly door prizes, grand prize; contact Van Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: van@toteshows.com; Web site: www.toteshows.com

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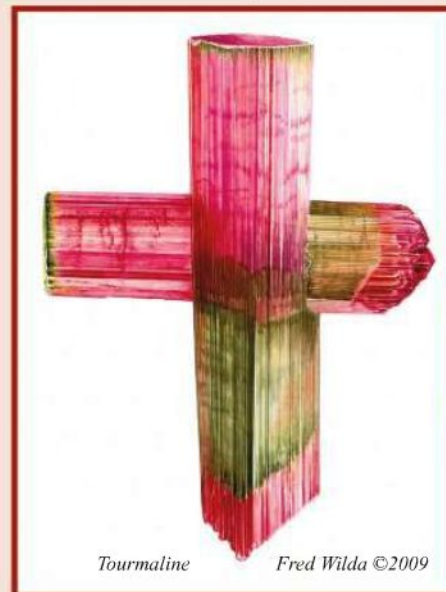
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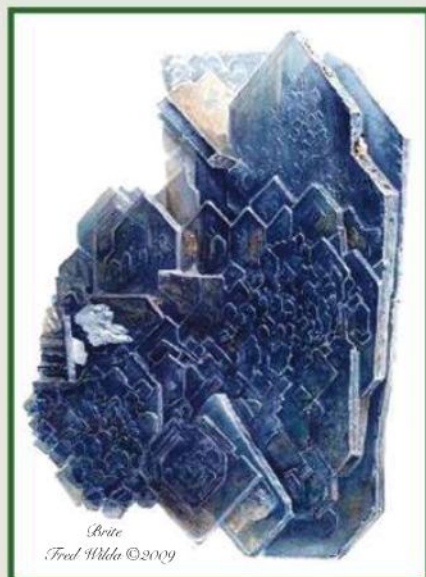


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Power Sluicing for GOLD

Greater Processing Speed Means Greater Recovery

Story and Photos by Marc Davis

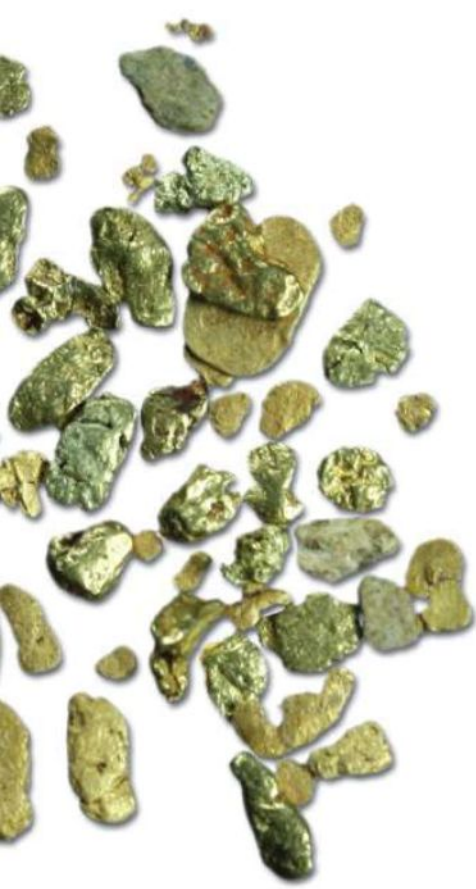
The more dirt you dig, the more gold you can find, or so the theory goes. If that's true, then running a power sluice can help you fill your poke with gold, because you can certainly dig and process a heap of dirt with it. Similar to a hand sluice, a power sluice utilizes a sluice box to capture gold. However, as the name implies, the power sluice utilizes a gas engine to run a pump that sends water through a hose to the sluice. In conventional hand sluicing, the sluice box is positioned in a river or stream and the natural flow of water is used to wash the pay dirt.



A power sluice does not have to sit in the water to recover gold, but is often set up high above the waterline.

Power sluices are not limited to being located in the river. The sluice is often set up on an earthen bank high above the water line and therefore was commonly referred to as "high banking" (also "hibanking"). The equipment used in this form of mining is referred to as a "high banker" or "hibanker" by some manufacturers. The miners in my area of California prefer to use the term "power sluicing" to describe this method of mining because they believe the term "high banking" is associated with activities that are restricted by local regulations.

Power sluicing for gold is seeing a new surge of interest in the state of California because suction gold dredging was suspended throughout the entire state in August 2009, when Senate Bill 670 was signed into law. The resumption of dredging depends upon the results of a Department of Fish and Game environmental review. Updates on this issue can be found at www.dfg.ca.gov/suctiondredge/. While they wait for this situation to be resolved, many California dredgers are looking for alternate ways to pursue their hunt for those elusive nuggets and flakes of gold, and power sluicing is high on the list.



RIGHT: This two-piece plastic sluice uses molded plastic riffles rather than carpet to catch the gold. The lower section can be detached and placed in a river for use as a conventional sluice.

BELOW: A hopper, spray bar, and grizzly screen on this aluminum power sluice allow the operator to shovel pay dirt directly into the unit, washing and classifying the material in one operation.

BOTTOM: The spray bar on this power sluice shoots water counter to the gravity flow of the pay dirt. This slows the amount of material entering the sluice system, resulting in a more consistent feed rate.



More material can be processed with a power sluice than with a gold pan or conventional hand sluice for several reasons. Many power sluice setups incorporate a hopper and screen, along with a water spray bar, to both wash and classify the material by size as it enters the unit. Classifying the material results in better fine gold recovery, while still moving through a great deal of pay dirt. The incorporated screen and spray bar allow the operator to shovel material directly into the power sluice. Most hand sluices do not have a built-in screen; therefore, the operator has to screen the material in a separate, time-consuming operation or risk losing fine gold by running oversize material through the box.

With both hand sluices and power sluices, the flow of water running through the sluice and the angle of the sluice can be adjusted to determine how much material can be processed. On a power sluice, the volume of water flowing through the unit is controlled by the discharge from the water pump. The water needs to flow fast enough to push unwanted rocks and gravel through the unit, yet must be slow enough so that fine gold will be retained. The slope of the sluice is used in conjunction with the water flow to control the movement of material through the unit. Since these two factors are fully adjustable with a power sluice, the unit can be fine-tuned to handle a high





Dirt from on top of bedrock is screened through a grizzly. Undersize material goes into the unit and oversize goes into the tailings.

volume of material while still retaining the fine gold. Larger power sluices can handle material feed rates that are about as fast as a miner can shovel.

By contrast, the non-motorized hand sluice has its limitations when it comes to adjustability. The flow of the river and the slope of the river bottom limit the flexibility of a hand sluice; the miner must work with the hand Mother Nature has dealt him. Natural water flow is generally slower and the angle of a hand sluice is usually less than that of a power sluice, so the same amount of material will move through a hand sluice more slowly than through a power sluice. Shoveling too quickly can overload a hand sluice, resulting in fine gold loss.

Using a power sluice can also open up more area to prospecting. When panning and hand sluicing, most prospectors stick fairly close to the river so they do not have to carry their pay dirt very far to process it. When power sluicing, a prospector can search for gold a significant distance away from the river. If a good deposit is located, the water used to process the gold is pumped to the diggings; the prospector doesn't have to carry the pay dirt to the water. This savings in time and work opens up territory that others have overlooked just because the hot spot is too far from the water.

Oftentimes, miners don't bother to study the river, looking for these high banks where gold might be lurking. Many gold-bearing rivers have cut their way down through earth and rock to their current level. Left behind on the sides of the river canyons are banks that were once part of the river bottom. These old, high channels still contain gold that was deposited in yesteryear. They can yield a bonanza for the miner who takes the time and effort to find them.



Plastic power sluices are lightweight and can be attached to a backpack with bungees for transporting.



Steve de Caccia and Robert Jordan use a two-part molded plastic power sluice held together by a metal frame with adjustable legs.

Another advantage to power sluices is that they can be used where water is present, but is not moving quickly enough to work a conventional hand sluice. Old hydraulic-mining pits are a good example, especially early in the season when many of these pits have ponds of standing water left from winter rains. Standing water in desert washes can be utilized, as well.

As with any mining operation, sampling is still essential to good gold recovery. A miner can dig and process a stack of dirt to begin with, it is obviously a waste of time. Before you move in your engine and sluice unit, it is prudent to check first with your gold pan and find a good-paying location.

An ideal situation for a power sluice is a deposit in which the dirt itself contains a paying amount of gold. I ran into such a deposit when working a wash in Arizona. I sampled the banks of the wash using a gold pan and found that there was an area with a fairly consistent amount of gold from top to bottom. This worked out great. I moved a power sluice into the wash and simply shoveled gravel directly into the unit. The faster I shoveled, the more gold I got. I did not have to remove a bunch of barren overburden and then clean up the bedrock in order to get the gold. However, it took a great deal of sampling before I found this location.

When setting up your power sluicing operation, it is a good idea to pay attention to what is happening with your tailings and the water that is exiting the box. In some states, it is illegal to let muddy water run back into a river. Therefore, if you are close to a river, it is good practice to construct a tailings dam to prevent the muddy water and material from flowing back into the river.

Power Sluice Manufacturers

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Power sluicing for gold is seeing a new surge of interest in the state of California because suction gold dredging has been suspended throughout the entire state. All the California dredgers are now looking for alternate ways to pursue their hunt for those elusive nuggets and flakes of gold, and power sluicing is high on the list.

Like many other California dredgers, I have been checking out the power sluicing options that are currently available. Power sluices come in many different varieties. Home-built models made of wood or aluminum can work well if they are properly designed. I still have a home-built model that I constructed more than 20 years ago after reading about how to build a gold harvester in "A Gold Harvester", by Carl Fischer (February 1982 *Rock & Gem*). Another option is a factory-built aluminum model with removable gold-catching riffles and carpet.

These units have been the standard for many years. In recent years, however, lightweight units constructed mostly of plastic have become very popular. These units offer greater portability than previous models, they are extremely easy to clean up, and they efficiently retain fine gold.

After reevaluating my own equipment and checking the improvements that have been made to commercial units over the years, I've decided that a new unit is in order. I'd like to have a lighter-weight unit that still has the capability to handle high volumes of material. The new models that utilize molded plastic seem to fit the bill.

I recently had the opportunity to make a couple different prospecting trips with some of my miner friends, two of whom recently acquired a new lightweight unit. The first power sluice I checked out was a Long Tom model (Angus Mackirk Mining & Manufacturing) owned by Steve Lintner. It was an extremely portable two-piece molded plastic sluice that quickly bolted together to form one long power sluice. It had a header box at the top end to evenly distribute the water that was jetted into the box from the pump, but it did not come



As a lift-out plastic riffle section is washed with a sprayer, the concentrates and gold are caught in a plastic tub.



Before moving in your sluice unit, it is prudent to check first with your gold pan and find a good-paying location.

with a built-in grizzly screen or legs. Since there were no legs, the slope of the box was adjusted by simply setting the sluice up on the existing rocks.

The unit was designed so that the bottom half could be disconnected, placed in the river, and used as a conventional hand sluice. The sluice had a couple metal cross bars placed width-wise across the top of it. These bars provided stability to the unit, but were also intended to allow rocks to be placed on top of the sluice to hold it down in the river when being used in the hand sluice configuration. This adds versatility to the unit and could potentially save some money for a miner who doesn't already own a hand sluice.

Lintner made a couple of modifications to his power sluice. First, he added a screen, or grizzly, just below the header box by cutting a couple inches off the top of a 5-gallon plastic bucket. He attached this ring to the power sluice and placed a removable grizzly, designed to fit on top of a bucket, directly onto his power sluice. This way, he can shovel material onto the grizzly, where it is automatically classified, instead of screening it into a bucket first.



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The nugget traps in the upper hopper of this power sluice catch big gold that could otherwise be washed into the tailing pile.



A ring was cut from the top of a 5-gallon plastic bucket and used to attach a grizzly to this power sluice.

Next, Lintner added a "T" fitting and a shut-off valve to the incoming water connection just in front of the header box. He then connected a hose with a sprayer to the T. The sprayer can be used to wash down material that he shovels into the grizzly. It can also be used to wash down nearby bedrock to aid in gold recovery, and it can be used to wash out the sluice during cleanup.

Lintner uses a small, lightweight, gas-powered water pump when he is working near the river. He has heavier, more powerful pumps that can be used to pump water over long distances or up high inclines. On this particular outing, Lintner and I were working fairly close to the river. We were working down to bedrock, processing the material as we went. Once we hit bedrock, we cleaned out the crevices that we suspected carried heavier concentrations of gold. Lintner's power sluice saved us a lot of time, since we did not have to transport our pay dirt across the boulders and down to the water for processing. We had a good day. Lintner's unit worked flawlessly and was very easy to transport and set up.

The second lightweight power sluice I checked out was a model G-1 Concentrator (U.S. Prospector) being used by Steve de Caccia and his mining partner, Robert Jordan. Their sluice was divided into two parts, a hopper section and a sluice section. The two sections are held together by a metal frame with adjustable legs. The hopper section came equipped with a large spray bar. This bar directs the water counter to the gravity flow of the hopper. Once material is shoveled into the hop-

per, the spray action of the water simultaneously washes the material and keeps it from flowing too quickly down into the sluice. This provides a controlled flow of pay dirt going through the unit.

The hopper also has a series of thin, straight depressions running perpendicular to the length of the hopper. These depressions are located above the grizzly and are designed to trap large nuggets and flakes before they reach the grizzly at the bottom of the hopper. Once the material does reach the grizzly, the larger material drops off the end of the unit, while the undersized material falls through the grizzly

Lintner's power sluice saved us a lot of time, since we did not have to transport our pay dirt across the boulders and down to the water for processing.

screen and into the sluice section. The undersized material then continues through a series of riffles and slick plates, where the fine gold is trapped.

De Caccia has also made some modifications to his unit. He, too, added a T and hose with a sprayer and a water shut-off valve. The shut-off valve is located downstream of the T, but is upstream of the connection to the power sluice. When the valve is turned down, it decreases pressure to the

sluice and increases water pressure to the spray hose. The change in pressure comes in handy for increasing water flow to the sluice when processing pay dirt, and during cleanup, the water flow can be redirected from the sluice to the hose and sprayer.

De Caccia also carries a small, magnetic torpedo level with him. He adjusts the sluice from side to side to keep it level. By keeping the unit level, he helps the water flow evenly across the entire width of the sluice. This keeps the unit running efficiently. The same result can be achieved by firing up the power sluice, watching how the water flows through it, and then adjusting it accordingly. This trial-and-error method works, but it is more time consuming to set up.

To clean up the unit, de Caccia and Jordan simply lifted both the hopper and sluice sections out of the metal frame. Then they washed the material that was trapped in these two plastic parts into a tub using the spray hose. Finally, they panned out the concentrates to recover the larger gold and retained the black sand for later processing. This is a very quick and easy recovery method and goes a bit faster than using units that rely on removable riffles and carpet to catch the gold.

Depending on your circumstances, one of these new lightweight power sluices might be the right piece of equipment for you. Whether you are a Californian searching for an alternative to dredging or a prospector simply looking for ways to increase the amount of gold you take home at the end of the day, power sluicing is a proven method that could help you recover more gold.💎



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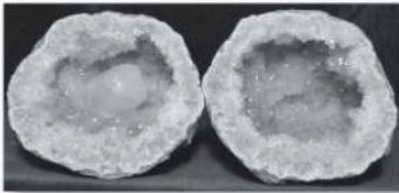
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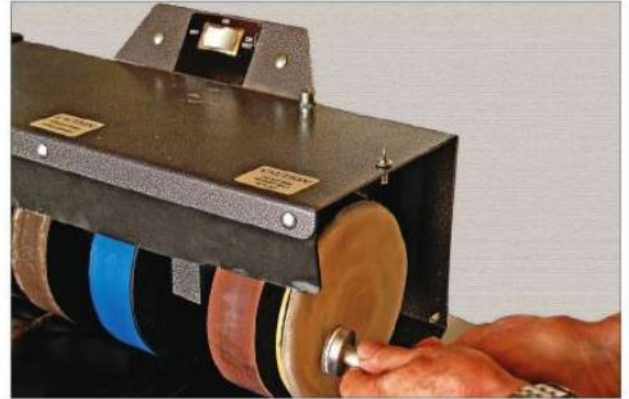
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SHOP TALK

by William A. Kappeler

Polishes and Polishing



Perhaps the most often voiced concern from beginning lapidaries (and even some experienced ones) is that they are having trouble getting that perfect polish. Of course, absolute perfection is always just beyond our grasp, but the pursuit of it is always possible. The most important part of this pursuit is attention to detail.

Every step in the grinding, sanding and polishing steps is critical. A flaw in any one of these steps will remain until, in the final polishing step, it will leap out like a neon arrow pointing out a lack of attention to detail.

Let's take a look at the detail that needs to be attended to. The first step in the process is grinding. The purpose of grinding is to establish the basic shape of the cabochon. It does this by breaking out little chips of the stone in rows that we call scratches. The scratches made during the grinding step are pretty coarse and must be removed completely by the second step.

The second step uses a finer grit with the purpose of completely removing all the coarse scratches made by the grinding step and leaving only its own size of scratch. Every bit of the scratch pattern from the grinding step must be removed. It can never be assumed that the next step will remove any tiny scratches from two steps back.

A loupe, magnifying glass, or magnifying lamp can be a real friend for this process. Another help is to use a trick that is usually recommended for beginners, but can work just as well for us old geezers, and that is to alternate the scratch pattern 90 degrees for each step. That way, if the grinding was done from top to bottom of the stone, the next step should be from side to side. If any top-to-bottom scratches are still visible, the step is not finished. When the last sanding step is finished and it is certain that the only scratches visible are those from the last step, the stone is ready for polishing.

Gemstone polishing may well be the most misunderstood process in our hobby. There are three general theories on polishing. First is the fine scratch theory. This theory states that a polish is achieved by

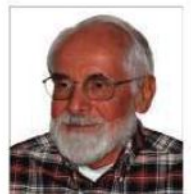
creating finer and finer scratches until they are so fine they become invisible.

Second is the Beilby flow theory. This offers the explanation that, as the surface of the stone heats up by the friction developed, the surface melts and flows. More recently, scientists have modified this theory and now believe that the surface does not actually melt, but reaches a state of plasticity and moves much like clay on a potter's wheel.

The third theory believes that the surface is smoothed by removing it atom by atom through chemical reaction. My poor, old, plodding mind still subscribes to the fine scratch idea. The truth is that I—and I suspect most of us—don't really care about the science. I just want shiny stones.

If each step in the grinding and sanding process has been followed to the letter, the polishing step is a breeze. The type of polish and polishing buff you use is a personal choice. If there were a standard for everyone, there would be no problem, but the truth is that you will learn by trial and error what works best for you. If you have prepared the stone properly, you will get a good polish with just about anything. The pursuit of perfection, however, requires a lot of experimentation. Keep a little notebook handy and jot down what you do. That way, when you reach the polish you are after, you will know how you got there. ♥

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The Trap Rocks of NEW JERSEY

An Important Source of Zeolites
and Associated Minerals

Story and Photos by Bob Jones



The slots in the bottom of this prehnite are actually casts of the original anhydrite upon which the prehnite formed!

The volcanic trap rock quarries of India are currently producing huge quantities of superb specimens of zeolite minerals. India's production eclipses both in quality and quantity the zeolites and associated minerals produced by New Jersey's trap rock quarries in the first half

20 www.rockngem.com

of the 20th century, but that does not mean the Jersey traps were not important—far from it. And the reasons are quite apparent when you take the time to think about it. New Jersey's quarries were significant for America's construction and road building industries while they operated.



Natrolite, a sodium, aluminum silicate, formed a fine, small, radiating spray of needle crystals in a basalt vug.



Collectors prize choice specimens of green botryoidal prehnite such as this hand-size specimen from the trap rocks of New Jersey.



When you collect pectolite, you had better wear leather gloves, because its needle crystals are as sharp as cactus needles.



The typical cauliflower form of this choice example of stilbite is a characteristic that makes the mineral easy to identify.

India's zeolite sources, as prolific and spectacular as they are, have not been producing long enough to have had numerous studies done on their formation and occurrence. That will come in time, but right now the number of in-depth studies and articles about Indian trap minerals is limited.

The New Jersey trap quarries and their minerals, on the other hand, have long been the focus of scientific studies and writings, particularly by academics from nearby universities and colleges.

The more prolific quarries are the two on New Street in Paterson (Passaic County), New Jersey. The Upper New Street quarry began operations in 1893 as Paterson was experiencing rapid growth. It ceased operating in 1925, but collecting was still allowed into the 1970s. This open-door policy accounts for the volume of specimens that exist from this quarry.

The same can also be said for the nearby Lower New Street quarry. Mining commenced there in 1900 and ended in the mid-1930s, though collecting was still allowed into the 1950s. After that, collecting was only allowed for student studies and scientific research. Again, this benevolent collecting attitude really contributed greatly to the supply and the understanding of New Jersey zeolites and related minerals.

Virtually all the New Jersey deposits are within a 50-mile radius of a dozen or more universities and colleges, from which professors and students ventured forth, rock picks in hand, to collect rocks for study. This was possible because of the generally friendly attitude of the quarry operators toward collectors in general, at least in the decades before and just after World War II.

The Northeastern United States was a hotbed of mineral clubs during the 1900s,

and it was common practice for clubs to organize collecting trips into the quarries. In many cases, these club field trips included curators from museums and professors from local universities and colleges. All this means we are privileged to have a much better grasp of the New Jersey deposits and their suites of minerals than is currently available on the deposits that are currently producing in India.

The New Jersey trap rock quarries, like most such basalt deposits, were operated for both highway and railroad aggregate, as well as for concrete, asphalt and gravel. The bulk of the basalt formations quarried here are in the First Watchung Mountain, a 200 million-year-old sill that is part of the Piedmont Geologic Province.

The lavas that make up the Watchungs are called "pillow lava". The beauty of pillow lava is that it is slow-moving when mol-



Light-green, gemmy crystals of the non-zeolite mineral datolite like these from the New Jersey trap rock quarries are highly prized.



Crystals of prehnite, a non-zeolite that is often found with zeolite minerals, often develop as tight clusters of knoblike growths.

ten, so it tends to fold over on itself as it flows. The surface of the molten lava cools first and, when it folds over, traps air that creates spaces in the cooled rock. These spaces can later serve as ideal sites for mineral-bearing waters to become trapped and produce minerals.

Keep in mind that, as a molten lava flow develops, its temperature slowly drops upon exposure to the atmosphere. Any water that is in or comes into contact with the flow is heated by it and becomes a hydrothermal solution, capable of dissolving mineral elements from the rock.

A very important fact to understand about minerals is that all species do not crystallize at the same temperature. Some form crystals at high temperatures (around 500 degrees F), while others form at lower points on the thermometer as the solution slowly cools.

Among the earliest mineral species to form from the cooling hydrothermal solutions in the Jersey basalt deposits were anhydrite and glauberite. This is because hydrothermal solutions in basalt tend to be rich in calcium, sodium, and the sulfate radical (SO_4). Anhydrite (CaSO_4) is a calcium sulfate and glauberite ($\text{Na}_2\text{Ca}(\text{SO}_4)_2$) is a sodium, calcium sulfate.

Once crystallized, these two minerals survive as long as the solution from which they formed remains fairly hot, but the solutions inevitably cool. As the temperature falls, glauberite may dissolve back into solution, providing the elements that are later used to form such species as prehnite, $\text{Ca}_2\text{Al}(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$; apophyllite, $(\text{K},\text{Na})\text{Ca}_4\text{Si}_8\text{O}_{20}(\text{F},\text{OH}) \cdot 8\text{H}_2\text{O}$; and datolite, $\text{CaBSiO}_4(\text{OH})$. All these minerals are found in the Jersey traps. When the glauberite redissolves, the anhydrite

is still in crystal form and may become coated with a thin layer of botryoidal and fibrous prehnite.

As cooling continues, albeit very slowly, anhydrite becomes unstable and goes back into solution. The prehnite coating, however, remains intact and preserves a superb copy, or cast, of the original anhydrite crystals. These prehnite pseudomorphs after anhydrite are much prized by collectors.

When glauberite and anhydrite dissolve, their elemental components, calcium and sodium, return to solution and are used by developing zeolites as they crystallize. From this solution, then, we get such zeolites as heulandite, natrolite and stilbite. Heulandite is a sodium, barium, aluminum silicate. The aluminum is a common constituent of solutions in basalt, having been derived from the breakdown of the basaltic feldspar. Barium, which is much less common, is also a minor component of the original basalt. Natrolite, a sodium, aluminum silicate, is less stable than heulandite, so it is seldom a component in the final crystals of most New Jersey mineral species.

Stilbite, on the other hand, emerges as an important species. It forms in lovely bow-tie crystal clusters and persists through the gradual cooling of the hydrothermal solutions. In fact, stilbite is very often found on other, earlier-developed species like quartz, datolite, apophyllite and prehnite.

You can see this wonderful sequence of deposition in many of the specimens from the Jersey quarries, particularly the Upper New Street and Lower New Street quarries.

Once a sequence of mineral species has developed, that is not necessarily the end. The continued introduction of later mineralized solutions from surface weathering may

dissolve existing species and rearrange their atoms into a new mineral, or other species like gypsum, calcite and quartz may form.

This brief description of the sequence of mineralization noted in the New Jersey trap rock quarries is just a generalization of the crystallization process, but as you check your specimens from the New Street, Prospect Park, and other quarries in New Jersey, you can visualize the sequence of mineralization and species development.

Other minerals of importance found in these trap rocks. Pectolite, chabazite, mesolite, laumontite and more develop within the sequence just described. The specific mineral contents of a quarry or mineralized pocket is determined by the combination of conditions—temperature, solution content, and the like—that existed at the time of crystallization. That is why some quarries are well known for certain species that are in short supply elsewhere.

Of the considerable number of quarries in the Watchung Mountain complex, several stand out as major specimen sources for various reasons, including the length of time they have been operated, accessibility, and of course, mineralization. Of these many deposits, some are noted for just one or two finds, like the Chimney Rock Quarry at Bound Brook, New Jersey, where exceptional natrolite crystals were once found. These natrolites, discovered in late 1972, were as much as 1/4 inch thick and up to 7 inches long! Unlike the usual brittle needle crystals, these natrolite crystals were extremely sturdy and sharp and perfectly terminated.

The big specimen producers in the Watchung Mountain outcrops are the Upper and Lower New Street quarries. The other really big producer was the Prospect

Park quarry at Prospect Park, New Jersey. These three quarries operated during the first half of the 20th century and were almost always open to specimen collectors, even during the years of operation, and were a remarkable source of zeolites and associated minerals. All are closed to collectors now.



This cluster of green prehnite crystals is almost completely covered by pseudocubic apophyllite crystals.

One of the easier minerals to recognize from New Jersey is stilbite. Stilbite actually develops in two forms, though they look alike. There is yet another mineral, stellerite, that is stilbite's twin in appearance. It is not possible to distinguish these minerals by sight. Stilbites collected years ago may well be stellerite going unrecognized.

The two forms of stilbite vary in calcium and sodium content, so in scientific texts the name is written "stilbite-Ca" or "stilbite-Na", depending on which element constitutes more than 50 percent of the cation atoms in the structure. The obvious properties of stilbite are not affected by its sodium-calcium content, so collectors can't tell the difference by sight.

The best specimens are aggregates of nearly parallel tabular crystals packed together. This creates striations on the sides of the crystals and at the wedge-shaped terminations. The blades are slightly concave, so the middles of the crystals are depressed. These bundles are also pinched in the middle, so the specimens are referred to as "wheat sheaf stilbite".

Stilbite will also form lovely, diverging fans of crystals. These seem to have a common starting point at the base from which they fan out; their wedge-shaped terminations create a rounded top. In extreme cases, these stilbite crystals form a perfect sphere.

Stilbite has high luster along the prism sides and shows a very good pearly luster in its broad faces that is easily recognized. Its color tends to be quite subdued. In more or less pure form, it is white, but trace impurities color it a pale brown. Iron oxide is probably the cause of pinkish red crystals, which are found less often than the white to tan specimens.

New Jersey stilbite is also found in cruciform twins, crystals that penetrate each other at nearly right angles to form a cross.

The finest stilbites were found at the New Street quarries in Paterson and the Montclair quarry and another source at Great Notch, New Jersey. Lesser amounts did show up at other sites, but the great majority of stilbites, some of them up to 3 inches long, were found at the two New Street quarries.

Prehnite is another very common mineral in the New Jersey quarries, particularly at Lower New Street and Prospect Park. It is not a zeolite, but is most often found with minerals of that group.

Almost all prehnite found in New Jersey is green, in shades that can range from faint to rich. It forms in tight aggregates of tiny, radiating crystals, which produce a lumpy-looking botryoidal mass. It was not unusual in this state to find open cavities virtually lined with prehnite playing host to later-forming minerals.

Prehnite is often associated with calcite, datolite, apophyllite, which are all non-zeolites, but are very often found with zeolites in volcanic environments. Pectolite, a zeolite that is nasty to handle, often forms with prehnite. When the Jersey quarries were operating and collectors were allowed in, prehnite was so common it was considered a ho-hum find unless it had a bevy of associated minerals with it or was exceptionally unusual.

One type of prehnite found here is anything but ho-hum! It makes pseudomorph casts, almost always after anhydrite. Some of the pseudomorphs are broad, flat and hollow, and can be 4 inches or more across, mimicking the earlier anhydrite. Others are interesting, odd, fingerlike growths, some of which are shaped like an arrowhead!

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The Trap Rocks of NEW JERSEY from page 25



Stellerite is often mistaken for stilbite because it mimics that mineral's bowtie habit.

I referred to pectolite as "nasty". If you have ever collected pectolite at the Jersey sites, you know what I mean. Unless you are wearing gloves, you more than likely will end up with needlelike pectolite crystals embedded in your fingers.

Pectolite crystals are brittle and hard, and develop diverging, nearly parallel growths with perfect cleavage. When split, a pectolite specimen displays myriad needle crystals diverging in a fan-like form and terminating in a smooth, rounded surface. In the extreme, pectolite forms complete, or nearly complete, spheres that are smooth-surfaced, showing no crystal terminations.

The world's finest pectolites were found in New Jersey, particularly at the Upper and Lower New Street quarries, Prospect Park quarry, and Bergen Hill. The mineral formed complete spheres that sometimes were several inches across. Handled with care, pectolite is a fascinating species because of its perfect cleavage, fanlike groupings, and spherical habit.

Another non-zeolite from New Jersey is apophyllite, which occurs in amygdaloidal cavities in the Watchung Mountains. The New Jersey apophyllite lacks the intense green color seen in the popular crystals from India, but the crystals are sharp and often cubelike, with modified corners and striated faces. Most are white to colorless, though some smaller pale pink and faint green crystals did occur. The crystal form and good size of the crystals make this an admired species.

The larger New Jersey apophyllites reached as much as 2 inches on an edge. Most of the better crystals were found in the Paterson quarries, at Bergen Hill, and less often at Snake Hill, all in the Watchung volcanic flows.

Datolite is one of the prized non-zeolites from New Jersey. It is prized by the gemologist, as it can occur in light-green, gemmy crystals that can be faceted. It is prized by the crystallographer because it has myriad crystal faces. And it is prized by the collector because it occurs in fine groups of highly modified crystals to 2 inches on an edge. Most specimens are small clusters of intergrown crystals that are usually pale yellow-green, but are sometimes nearly colorless. The high luster of datolite, along with its geminess and multifaceted crystal form, make it a very interesting species to study. Most crystals have two dominant faces that come together in a wedge shape, a rather distinctive feature.

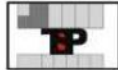
The better datolite crystal groups were found at the Lower New Street quarry and the Prospect Park quarry in Paterson.

Other zeolites that are fairly common in the New Jersey volcanic flows include heulandite, chabazite, gmelinite and analcime. The heulandite crystals can be up to 2 inches long and develop a coffin shape. With a strong pearly luster and this unique shape, heulandites are fairly easy to identify. Prospect Park is apparently the better New Jersey source of this monoclinic species.

Analcime also has a readily identified crystal form. It looks like a white garnet, thanks to its trapezohedral, or 24-sided, shape. Most analcimes occur as colorless crystals, some transparent, but most a chalky white. Sometimes, they are tinted red thanks to an iron oxide impurity. The larger crystals, which come mainly from the two Paterson quarries, are as much as an inch across and quite sharp.

Though all the New Jersey quarries are closed now, there is still hope for more specimens. Any construction job that blasts away at the Watchung volcanics could yield specimens. During construction of Interstate 80 in the late 1960s, wonderful specimens were exposed for collecting. Who knows? This may happen again. Let's hope so!♥

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ROCK SCIENCE

by Steve Voynick

Polymorphs: Calcite and Aragonite

Among the polymorphic minerals—those with identical chemistries but two or more different structural forms—calcite and aragonite are perhaps the most familiar. Calcite and aragonite both consist of calcium carbonate (CaCO_3), but calcite crystallizes in the rhombohedral system and aragonite in the orthorhombic system.

Polymorphism in minerals is caused by variations in temperature and pressure that change the size of atoms and thus the nature of their atomic-bonding arrangements. As pressure increases, atomic radii become smaller and sometimes reach a point at which crystal stability demands a different crystal structure. Similarly, a rise in temperature increases the vibration of atoms, expanding their electron orbits and increasing their effective sizes. These changes in atomic size can result in different atomic-bonding arrangements that alter a mineral's lattice structure and physical properties.

Despite their identical chemistries, aragonite and calcite have significant physical and structural differences. In calcite, carbonate ions lie in a single plane and are aligned in the same direction. But in aragonite, the carbonate ions lie in two planes that align in opposite directions.

Aragonite has a single plane of perfect cleavage, while calcite, with its rhombohedral structure, has perfect rhombohedral cleavage in three directions. Because of closer atomic packing, aragonite has greater density than calcite. And because closer atomic packing also shortens the length of atomic bonds and thus increases bonding strength, aragonite, at Mohs 3.5 to 4, is considerably harder than calcite (Mohs 3).

Conditions of temperature, pressure and chemistry at the time of crystallization determine whether calcium carbonate crystallizes in the rhombohedral system as calcite or in the orthorhombic system as aragonite. Generally, higher temperatures and pressures are conducive to calcite formation. High concentrations of calcium ions in mineral-bearing solutions also favor calcite formation. Some crystals begin their growth as calcite, but as the calcium-ion concentration of the mineral fluids decreases, complete their growth as aragonite. This is the reason some calcite-crystal terminations (the final sequence of crystal growth) actually consist of aragonite.

Polymorphic minerals differ in stability at various temperatures and pressures. At the



ambient temperature and pressure of the Earth's surface, calcite is stable and will retain its rhombohedral structure indefinitely. Aragonite, however, is metastable, meaning that its stability is limited. Over time, aragonite will transform to calcite, which accounts for the abundance of calcite-after-aragonite pseudomorphs.

Calcium carbonate actually exists as three polymorphs, or trimorphs: calcite, aragonite, and the rare mineral vaterite. Vaterite is a high-temperature mineral that crystallizes in the hexagonal system as long, thin fibers or small, platy crystals. Some polymorphs crystallize in the same system.

Other familiar polymorphic minerals (or native elements) include carbon (C), which exists in the cubic form as diamond and the hexagonal form as graphite; iron disulfide (FeS_2), which crystallizes in the cubic form as pyrite and in the orthorhombic form as marcasite; silicon dioxide (SiO_2), most familiar as quartz, which crystallizes in the hexagonal system, but also exists as cristobalite (tetragonal), tridymite (triclinic), coesite (monoclinic), and stishovite (tetragonal); titanium dioxide (TiO_2), whose polymorphs include brookite, anatase and rutile; and potassium aluminum silicate (KAlSi_3O_8), whose polymorphs are the feldspar minerals orthoclase and microcline.

Specialized collections of polymorphic minerals are especially interesting because they show how minerals with identical chemistries can vary widely in form and properties. ♦

Steve Voynick is a science writer, mineral collector, former hardrock miner, and the author of books like *Colorado Rockhounding* and *New Mexico Rockhounding*.



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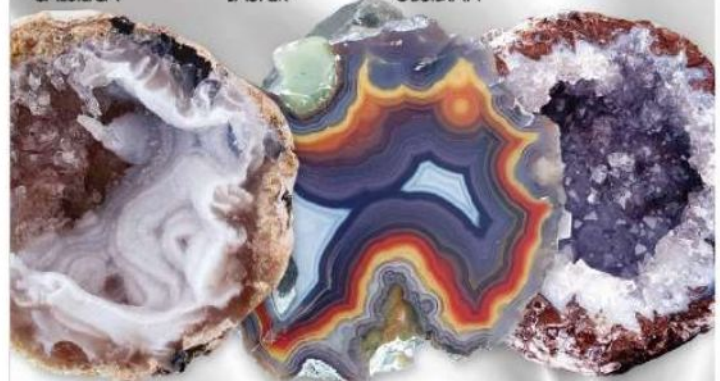
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Show Dates from page 10

FL 34236, (941) 954-0202; e-mail: frankcox@comcast.net;
Web site: www.frankcoxproductions.com

16-18—REEDSPORT, OREGON: Show, "Treasures of the Earth"; Lower Umpqua Gem & Lapidary; Reedsport Community Bldg., 415 Winchester Ave.; Fri. 10-6, Sat. 10-6, Sun. 10-4; contact Bill Hendrickson, (541) 271-6816; e-mail: bamoonman7@msn.com

16-18—SAN RAFAEL, CALIFORNIA: Show, "Gem Faire"; Gem Faire Inc.; Marin Center/Exhibit Hall, 10 Avenue of the Flags; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

16-18—SHARONVILLE, OHIO: Show and sale; GemStreet USA; The Sharonville Convention Center, 11355 Chester Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; fine gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

17-18—ERIE, PENNSYLVANIA: 41st annual show; Gem City Rock & Mineral Society; JMC Ice Arena, 423 W. 38th St.; Sat. 10-6, Sun. 10-5; adults \$3, seniors \$2, children under 12 free; rocks, gems, jewelry, minerals, fossils, wire wrapping, findings, beads, Mini-Mine, Discovery Blocks; contact Bob Gallivan, (814) 454-6770; e-mail: gallivan@lycos.com; Web Site: www.gemcityrockclub.org/show.htm

17-18—MOOSE LAKE, MINNESOTA: 41st annual show, "Agate Days"; Carlton County Gem & Mineral Club; Moose Lake High School gym and parking lot, 413 Birch Ave.; Sat. 9-5, Sun. 9-4; dealers, Lake Superior agate, cutting materials, specimens, crystal groups, fossils, gems, jewelry, lapidary equipment, rough-rock tailgaters, door prizes, field trip info, Agate Stampede Sat.; contact Allen Hyopponen, (218) 525-7766; e-mail: willow73@cpinternet.com

17-18—NORTH CONWAY, NEW HAMPSHIRE: Show, "Saco Valley Gem, Mineral & Jewelry Festival"; Saco Valley Gem & Mineral Club; North Conway Community Center, 2628 White Mountain Hwy.; Sat. 9-5, Sun. 10-4; free admission; silent auctions, Spin-a-Gem, children's gem dig, gem, mineral and jewelry displays; contact Bob York, (603) 356-4424; e-mail: quartzhunter@aol.com

17-18—SANTA MONICA, CALIFORNIA: Show, "Bead Faire"; Gem Faire Inc.; Santa Monica Civic Auditorium, 1855 Main St.; Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

17-18—TULSA, OKLAHOMA: Show, "Treasures of the Earth"; Tulsa Rock & Mineral Society; Central Park Hall, Expo Square, Tulsa County Fairgrounds, 21st and Yale; Sat. 9-6, Sun. 10-5; adults \$6, children under 12 and Scouts in uniform free; special Scout and children's areas, club displays, special displays, silent auction, door prizes, classes, lectures, lapidary demonstrations; Wayne Mouser, 1514 S. Carson Ave., Tulsa, OK 74119, (918) 582-8700; e-mail: okyrocks@peoplepc.com; or Finis Riggs, (918) 587-4400; e-mail: Lriggs@cox.net; Web site: www.ttownrockhound.org

22-25—FRANKLIN, NORTH CAROLINA: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Watauga Festival Center, 426 Watauga Rd. (Hwy. 441N); Thu. 10-6, Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

22-25—MANSFIELD, OHIO: 50th show, "The Golden Age of Collecting"; Richland Lithic & Lapidary Society; Kingwood Center, 900 Park Ave. W.; Thu. 10-5, Fri. 10-5, Sat. 10-5, Sun. 10-5; free admission; demonstrations, faceting, wire-wrapping, silversmithing, cabbings, exhibits, minerals, fossils, fluorescents, gems, jewelry, silent auction Sat.; contact Jay Medici, P.O. Box 56, Sparta, OH 43350, (419) 768-9128; e-mail: jmedici@bright.net

23-25—PORTLAND, OREGON: Show, "Bead Faire"; Gem Faire Inc.; Oregon Convention Center/Exhibit Hall B, 777 NE MLK Jr. Blvd.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

24—FRANKLIN, NORTH CAROLINA: 3rd annual show, "Franklin Faceter's Frolic"; U.S. Faceters Guild; The Fun Factory, 1024 Georgia Rd.; Sat. 9-5; admission \$5; dealers, rough, equipment, equipment demonstrations, faceting programs, faceting instruction, door prizes; contact Roy Kersey, 637 Mize Circle, Seymour, TN 37865, (865) 368-6081; e-mail: rkersey@tds.net

24-25—FLAGSTAFF, ARIZONA: Show, "Flagstaff Jewelry, Gem, and Mineral Show"; Val Latham, Sharon Szymanski; Radisson Woodlands Hotel Flagstaff; Sat. 10-5, Sun. 10-4; contacts Sharon Szymanski, (480) 671-6191, or Val Latham, (602) 466-3060

24-25—FREDERIC, WISCONSIN: 43rd annual show; Indianhead Rock & Mineral Society; Frederic High School; Sat. 10-5, Sun. 10-4; free admission; contact Roy Wickman, (715) 357-3223, or Dan Beal, (715) 472-8809

24-25—HAMBURG, NEW YORK: Show; BeadStreet USA; The Erie County Fairgrounds, The Grange Bldg., 5600 McKinley Pkwy.; Sat. 10-6, Sun. 11-5; vintage beads, Swarovski crystals, lampwork, precious metal findings, gemstones, supplies; contact Jane Strieter Smith, (216) 521-4367; Web site: www.beadstreetusa.com

24-25—SOUTH BURLINGTON, VERMONT: 31st annual show, "Champlain Valley Gem, Mineral & Fossil Show"; Burlington Gem & Mineral Club; Tuttle Middle School, 500 Dorset St.; Sat. 10-5, Sun. 10-5; adults \$3, seniors and students (6-16) \$2, children under 6 free with adult; dealers, exhibits, lectures, demonstrations, children's activities, silent auction, door prizes; contact Kathy Howe, (802) 656-4118; Web site: www.burlingtongemandmineralclub.org

24-25—TENINO, WASHINGTON: 16th annual show, "Rock & Gem Rendez-Vous"; Washington Agate & Mineral Society, Tenino Rock Cruisers; Parkside Elementary School, Stage St. S (I-5 Exit 88, go east approximately 8 miles, turn right); Sat. 9-6, Sun. 9-5; free admission; dealers, demonstrations, door prizes, Spinning the Wheel, displays, "Oregon Trail Days Celebration" across the street; contact Daniel De Boer, 5107 Brenner Dr. NW, Olympia, WA 98502; e-mail: keylock1@live.com

25—BANCROFT, ONTARIO, CANADA: 14th annual show; Bancroft Gem & Mineral Club; Royal Canadian Legion Hall, 25 Station St.; Sun. 10-4; adults \$2, under 18 free; 25 dealers, demonstrations, live auction, silent auctions, drawings; contact Frank Melanson, (613) 332-1032; e-mail: fwmelanson@sympatico.ca

JULY-AUGUST 2010

29-1—SPRUCE PINE, NORTH CAROLINA: Show, "North Carolina Mineral and Gem Festival"; Mitchell County Chamber of Commerce; Spruce Pine Commons, Hwy. 226; Thu. 10-6, Fri. 10-6, Sat. 10-6, Sun. 12:30-5; adults \$3, seniors \$1 Thu., children under 12 free; special exhibits, demonstrations, kids' events and activities; contact Patti Jensen, P.O. Box 858, Spruce Pine, NC 28777, (828) 765-9033; e-mail: pjensen@mitchell-county.com; Web site: www.ncgemfest.com

29-1—SPRUCE PINE, NORTH CAROLINA: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Pinebridge Executive Inn, 207 Pinebridge Ave.; Thu. 10-5, Fri. 10-5, Sat. 10-5, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

30-1—EUGENE, OREGON: Show, "Gem Faire"; Gem Faire Inc.; Lane County Events Center/Exhibit Hall, 796 W. 13th Ave.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

30-1—PRESCOTT, ARIZONA: Show and sale; Prescott Gem & Mineral Club; Prescott Gem & Mineral Club; Embry Riddle Aeronautical University Activity Center, 3700 Willow Creek Rd., Bldg 84; Fri. 9-5, Sat. 9-5, Sun. 9-4; adults \$2, children under 12 free; hand-crafted jewelry, rough rock, slabs, cabochons, beads, fossils, crystals, equipment, raffle; contact Maggi Lieber, 4855 E. Diamond Dr., Prescott, AZ 86301, (520) 831-0017; e-mail: maggiscratch@msn.com; Web site: www.prescottgemmineral.org

31-1—CUTCHOGUE, NEW YORK: 29th annual show; The Long Island Mineral & Geology Society; Cutchogue East Elementary School, Main Rd.; Sat. 10-5, Sun. 10-5; adults \$5, children under 12 free with adult; jewelry, minerals, gems, fossils, lapidary, grand door prize; contact Frank Basile, 975 Rambler Rd., Southold, NY 11971; e-mail: cypernut@optonline.net; Web site: www.limineralandgeology.com

AUGUST 2010

6-8—DALTON, GEORGIA: 19th annual show; Treasures Of The Earth Gem & Jewelry Shows; Northwest Georgia Trade & Convention Center, 2211 Dug Gap Battle Rd., I-75 exit 333; Fri. 2-7, Sat. 10-6, Sun. 11-5; adults \$3 (3-day ticket), children under 16 free; jewelry makers, goldsmiths and silversmiths size, reconstruct, repair, design or make original jewelry from customer-selected gems, stones, opals and crystals, wire wrap, wire sculpture, stone beads, pearls, stone setting, dealers, amber, opal, fossils, minerals, door prizes, grand prize, wire wrapping classes; contact Van

continued on page 36

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BLACK SPINEL, (black diamond subst.), fine cut, 2 mm round brilliant	\$0.90 each
SILVER TOPAZ, fine cut, 3 mm round brilliant cut, \$0.75 each, 6 mm round	\$3.60 each
SKY BLUE TOPAZ, fine cut, 3 mm round	\$2.00 each
AMETHYST, dark purple, fine cut, 3 mm, round brilliant cut	\$1.25
CITRINE, gold color, fine cut, 6x3 mm marquise	\$1.99 each
GARNET, red, fine cut, 4 mm round	10 pcs for \$7.50
RHODOLITE GARNET, fine cut..... 4 mm round, trillion \$2.50 each	2.5 mm, round \$.80 each
HESSONITE, 3 mm, round brilliant, root beer color,	\$1.75 each
MEXICAN OPAL, fine cut..... orange, 4x6 mm oval \$3.00 each	yellow, 7x5 mm oval, \$2.99
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HELENITE, volcano stone, fine cut 5 mm rounds, red, blue, or green	\$3.00 each
TOURMALINE, cabochon , pink..... round, 4 mm \$3.50 each	round, 5 mm \$5.40 each



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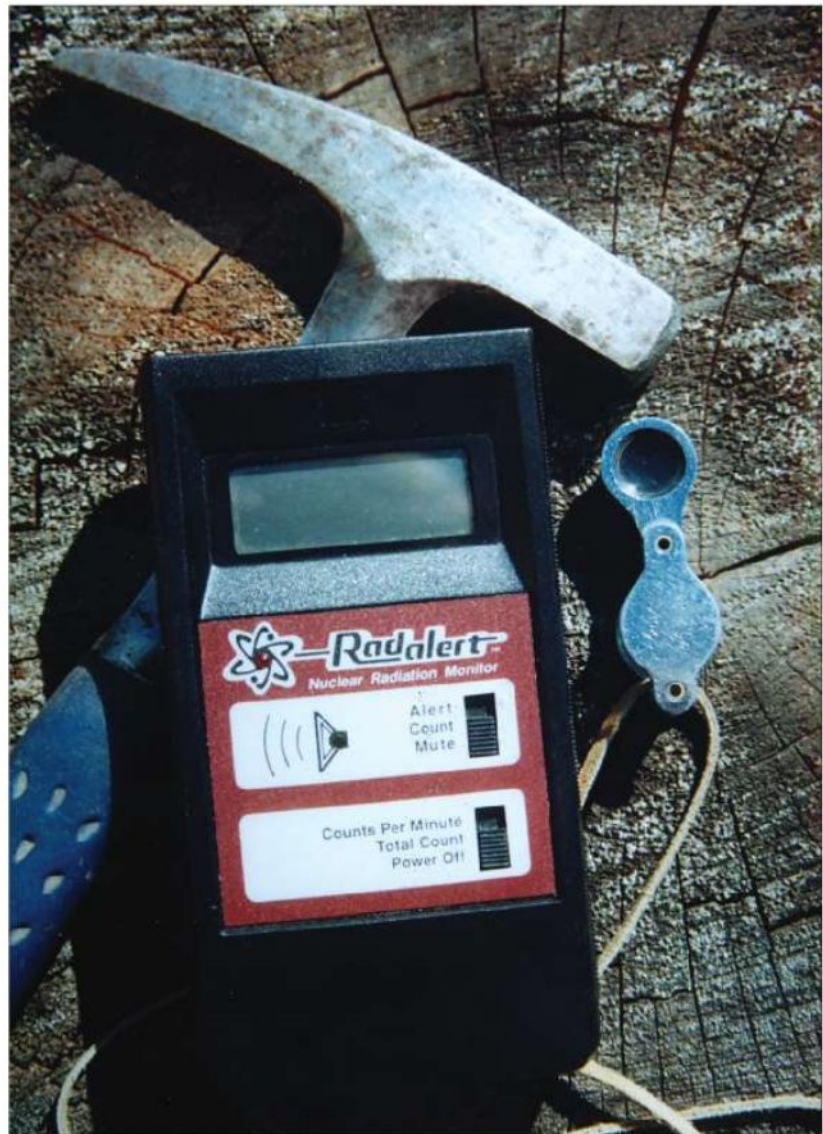
Story and Photos by Steve Voynick

Not surprisingly, the phrase “nuclear radiation” has an ominous ring to it, since the topic is most often discussed in the negative contexts of atomic weapons tests, radioactive waste dumps, dangerous radon concentrations, and radiation leaks at nuclear laboratories and nuclear power-generation facilities. Yet, despite its disquieting resumé, nuclear radiation is a natural phenomenon that we are subjected to every day.

“Radiation,” a general term for energy in the form of waves or particles, includes everything from heat and light to microwaves and nuclear radiation. Also called “ionizing radiation”, nuclear radiation is produced by nuclear fusion, nuclear fission, and atomic decay, the last being the natural disintegration of unstable heavy elements or isotopes into stable atomic forms. Materials that emit nuclear radiation are said to be “radioactive”.

Ionizing radiation can have geophysical, cosmic or man-made origins. The geophysical sources of radiation are radioactive minerals. The main source of cosmic radiation is the sun, which is essentially a giant nuclear furnace. Man-made sources of radiation include X-radiation (X-rays) and laboratory-produced, unstable, radioactive heavy elements.

Rockhounds, prospectors, and mineral collectors are most interested in geophysical radiation, the radiation emitted by radioactive minerals. Those that are the most familiar to collectors are bright-yellow carnotite (hydrous potassium uranium vanadate) and tyuyamunite (calcium uranium vana-



Radiation monitors add a new dimension to mineral collecting and can be as important a tool as a rock hammer or loupe.

date); greenish-yellow autunite (hydrous calcium uranium phosphate); green torbernite (hydrous copper uranium phosphate); purplish-black uraninite (uranium oxide); black thorianite (thorium oxide); and reddish-brown monazite (cerium lanthanum thorium phosphate).

Being able to detect and measure the radioactivity of these and other minerals adds a new dimension to field trips, enhances the educational aspects of mineral collecting, and furthers a basic understanding of the earth sciences. And all it takes to get started is a radiation monitor.

Before examining radiation monitors, radioactive minerals, and radiometric prospecting, let's look first at radioactivity, a property that was unknown until 1896. The two most common radioactive elements, uranium and thorium, were discovered in 1789 and 1829 respectively. Neither element initially attracted much interest from scientists, and only a few uranium compounds that served as coloring agents for ceramics, glazes, and glass had any practical uses.

The discovery of radioactivity closely followed the 1895 discovery of X-radiation, a form of ionizing, penetrating electromagnetic energy that is capable of exposing photographic film. Many scientists of the day believed—erroneously—that luminescent minerals emitted a similar type of penetrating radiation. Among them was French physicist Antoine Henri Becquerel, an authority on both mineral luminescence and laboratory photography, who was focusing his attention on uranium minerals and compounds, many of which were luminescent.

In 1896, Becquerel began his experiments by wrapping photographic plates in light-proof black paper, setting luminescent uranium minerals atop the plates, then placing them where direct sunlight would cause the minerals to fluoresce. After noting faint “smudge” exposures on the photographic plates, he placed coins and other thin metallic objects under the uranium minerals to produce photographic silhouettes on the plates. That demonstrated the substantial penetrating power of an unknown form of



LEFT: This 3-inch specimen of crystalline autunite has a high level of radioactivity that will register on a radiation monitor from more than a foot away.



CENTER LEFT: This radiation monitor has detected higher-than-normal levels of radioactivity in a large piece of fossilized dinosaur bone.



BOTTOM LEFT: High-grade camotite is one of the radioactive minerals you can collect in uranium-mining districts using a radiation monitor.

BELOW: This inactive, unventilated uranium mine in western Colorado has high levels of radioactivity due to the dangerous concentration of radon gas.



radiation, which Becquerel still thought was some form of luminescence.

But when a period of cloudy weather forced Becquerel to delay his experiments, he stored both the uranium minerals and the plates together inside a dark desk drawer. Later, out of curiosity, Becquerel developed the photographic plates and was astounded to find them already exposed.

In subsequent experiments, Becquerel demonstrated that uranium minerals, even without sunlight-induced luminescence, continuously emitted an invisible form of penetrating radiation. He also proved that it was the uranium compo-

nent of the minerals, and not the minerals themselves, that emitted this radiation, which scientists referred to as “uranium rays” or “Becquerel rays”.

Several years later, Polish-born French chemist Mme. Marie Curie, whose work was vital in revealing the nature of geophysical radiation, coined the term “radioactivity”. Curie, her physicist husband Pierre, and Becquerel later shared the 1903 Nobel Prize for the discovery of radioactivity.

Scientists next discovered the radioactive properties of thorium, along with the previously unknown radioactive elements radium and polonium. By 1906, it was clear



that radioactivity was the radiation energy released by the nuclear transmutation (the continuous disintegration or decay) of the nuclei of unstable heavy elements and their isotopes. This understanding would evolve into quantum theory and launch a new branch of science, nuclear physics.

Natural radioactivity consists of three distinct types of radiation:

alpha and beta particles and gamma rays. Due to high mass and low energy, alpha and beta particles have relatively little penetrating power. Alpha particles are stopped by a piece of paper or an inch of air. Gamma rays, however, with their low mass and very high energy, are similar to man-made X-radiation and can penetrate significant thicknesses of many metals and up to a foot of rock.

Initially, scientists could only crudely detect radioactivity on photographic plates and fluorescent screens. But in 1908, German physicist Hans Geiger, in collaboration with English physicist Ernest Rutherford, devised a way to detect the ionizing effects of radioactivity. Geiger's device employed a metal cylinder filled with inert gas and fitted with a wire extending down its center. The tube walls and wire functioned as electrodes, while the glass ends that sealed the tube acted as insulators.

Geiger then applied a voltage that was almost strong enough to pass an electrical current through the gas between the electrodes. When brought near a radioactive material, ionizing radiation passed through the metal tube to ionize the gas atoms and enable them to conduct current between the electrodes. When amplified, this current produced an audible "click." Because the ionized gas immediately returned to its normal energy state, its atoms were again able to detect new rays or particles, thus making possible quantitative measurement, or "counting."

Geiger's invention, called the "Geiger counter," greatly aided the early studies of ionizing radiation. It was a ponderous instrument that was very sensitive to alpha radiation, but largely insensitive to beta and gamma radiation. In 1928, Geiger solved the sensitivity problem with the assistance of his colleague, Walther Müller. Together,



This Geiger counter is typical of those used by prospectors during the post-World War II uranium rush in the Uravan Mineral Belt of Colorado and Utah.

the two physicists designed a new tube, the Geiger-Müller tube, which was equally sensitive to all three forms of radiation. Modern versions of this basic tube are still employed in radiation monitors today.

During the 1930s, nuclear physicists realized that neutron bombardment could split the nuclei of atoms of the uranium-235 isotope into radioactive isotopes of lighter elements while simultaneously releasing huge amounts of energy. In 1942, researchers demonstrated the first continuous fission reaction that proved the feasibility of atomic weapons, an achievement that suddenly made uranium a very valuable strategic material.

Following World War II, the U.S. Atomic Energy Commission (AEC) rushed to develop secure, domestic uranium sources. The AEC built uranium mills, paid cash for uranium ore and cash bonuses for uranium discoveries, and did everything else possible to lure miners and prospectors to the largely unexplored Uravan Mineral Belt. This effort triggered the nation's last all-out, frontier-style mineral rush, in which the key piece of equipment was the Geiger counter. These Geigers were completely redesigned in 1946; the new instruments were affordable, durable, shoebox-size units that weighed about 4 pounds and had improved sensitivity.

Prospectors bought them by the thousands. Although their vacuum-tube circuitry drained heavy, dry-cell batteries at alarming rates, they nevertheless did their job well. The Geigers' waving needles, blinking lights, and audible clicks revealed the locations of thousands of uranium "hot spots". By 1952, some 400 underground uranium mines scattered across the Uravan Mineral Belt were shipping ore to the AEC's mills. A few years later, Geigers led prospectors

to other major uranium deposits in New Mexico and Wyoming.

Today, most of the surviving Geigers that served the great uranium rush of the late 1940s and early '50s have been relegated to museums. In their place have come modern radiation monitors that are ideal for mineral collectors and field rockhounds. I've used various radiation monitors and have come

to rely on the durable Radalert™, manufactured by International Medcom of Sebastopol, California. Though I've used it in extreme temperatures and banged it around in car trunks and backpacks for 20 years, my original unit has lost none of its accuracy or reliability.

The Radalert weighs just 9.6 ounces, measures 6 inches by 3 inches by 1¼ inches, and fits in a shirt pocket. Its single 9-volt alkaline battery lasts for months, thanks to its solid-state integrated circuits, digital liquid-crystal display, and light-emitting diode, which have replaced the vacuum-tube circuitry and power-consuming lights and needles of the old Geigers.

The Radalert contains a miniaturized Geiger-Müller tube, a thin-walled, 2-inch-long, stainless-steel cylinder filled with a rarified mixture of the inert gases argon and neon, along with traces of a halogen "quenching agent" to buffer the ionizing-saturation effects caused by extremely high radiation.

The stainless-steel tube wall serves as the cathode, or negative electrode; a wire extending into the tube is the anode, or positive electrode. In operation, high-voltage current applied across the electrodes induces an electromagnetic field. When alpha, beta, gamma, or X-radiation ionizes the gas atoms within the tube, the tube discharges continuously in tiny electrical pulses. Integrated circuits process the pulses into counts that appear on the liquid crystal display.

The instrument operates with just two switches. Counts can be displayed in two modes: total (cumulative) count or counts per minute. Each count is accompanied by a red flash from a light-emitting diode and a sharp, mutable click.

The Radalert and similar radiation monitors provide relative, rather than absolute

or quantitative, measurements of radiation. This is because they detect and measure total nuclear radiation, which is a mix of geophysical, cosmic, and sometimes man-made radiation.

Most geophysical radiation is emitted by uranium, which is present in trace amounts in virtually all igneous rocks. Uranium's unstable atoms continuously disintegrate into a lengthy, orderly progression of radioactive elements and isotopes. These include proactinium, radium, radon, polonium, bismuth and lead, all of which, over billions of years, disintegrate into our stable, nonradioactive, common form of lead. The continuous nuclear disintegration of all the decay-chain materials produces varying amounts of alpha, beta and gamma radiation.

Most cosmic radiation originates in the sun, which emits intense gamma radiation. Only a tiny part of this gamma radiation reaches the earth's surface because of its distance from the sun and absorption by the earth's dense atmosphere.

During the past 70 years, the cumulative environmental load of cosmic and geophysical radiation has been increased by man-made radiation sources that include uranium mining, milling, refining and enriching; weapons manufacture and detonation; fission reactors that produce heat and heat-derived energy; accidental radiation releases; production of radioactive isotopes for medical and industrial uses; generation of X-radiation; and disposal of growing quantities of radioactive wastes.

Thus, the radiation background at any given point is the total of the geophysical, cosmic and man-made radiation load. Local background radiation consists of various types and intensities of ionizing radiation and varies widely with such factors as geology, solar-flare activity, and elevation above sea level. When radiation monitors determine abnormal levels of geophysical or cosmic radiation, they do so in measurements that are relative to total background radiation.

Before using a radiation monitor, it is necessary to first determine the local back-



This 20-pound piece of uranium ore, found on a mine dump in western Colorado, has the characteristic powdery, yellow coating of carnotite.



This high-grade specimen of pitchblende (uraninite), an oxide ore of uranium that is found in some pegmatites, has an easily detectable, high level of radioactivity.

ground radiation level in counts per minute. This can be done by taking the average of five or 10 one-minute counts. When determining the background radiation level, the radiation monitor must be in an open space and not, for example, in an underground mine or in direct contact with rock.

Background radiation levels always vary with elevation. At sea level, the normal background radiation is about 13 counts per minute. But at my home in the Colorado mountains—elevation 9,400 feet—the normal background level is 30 counts per minute. This difference results from less atmospheric shielding of cosmic radiation at higher elevations. Modern radiation monitors are so sensitive that they can even detect the minor, temporary increases in cosmic radiation generated by sunspot activity on the solar surface.

Background radiation levels can also vary with local geologic features, even over short lateral distances. As an example, background radiation levels near granite outcrops tend to be slightly higher than

background levels on nearby valley floors of glacial till and alluvial material—a reflection of the higher trace concentrations of uranium within the in situ granite.

Once the background radiation level has been established, the radiation monitor is ready for use. To detect radioactivity in mineral samples, hold the "alpha window" of the monitor as close as possible to the specimen. The alpha window is a small, screened port that enables low-penetrating alpha particles to reach the Geiger-Müller tube. Interestingly, in the RadaAlert, the alpha-window end of the miniature Geiger-Müller tube is made of muscovite, a mica of basic potassium aluminum silicate composition that is one of the few solid materials easily penetrated by alpha particles. Readings that are higher than the background level indicate that the specimen is radioactive, and its degree of radioactivity is measured in multiples of the background level.

Radiation monitors can easily detect even the faint radiation emitted from thin, fissure stains of bright-yellow tyuyamunite, radioactivity that is less than twice that of the background. On the other hand, the instrument will detect the relatively intense radioactivity emanating from small specimens of crystalline autunite from more than a foot away. Held close to an autunite specimen, the instrument's clicking turns into an angry buzz, while the digital readout indicates radiation levels hundreds of times above background.

Remember that radiation monitors provide only relative measurements of radiation; more sophisticated and costly instruments are needed to quantitatively measure the radioactivity of minerals in roentgens per hour and on other scales of measurement.

In uranium-mine dumps, radiation monitors can quickly identify rocks that are rich in such uranium-ore minerals as carnotite, tyuyamunite and uraninite. In radiometric prospecting, radiation monitors are used to detect and measure the radioactivity of exposed sedimentary strata in cliffs, ledges, and

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RADIATION



Rockhounding and Radioactivity from page 33



Even tiny stains of tyuyamunite emit sufficient levels of radioactivity to register on radiation monitors.

other outcrops. By correlating the various radiation readings both geographically and stratigraphically, prospectors can define structures with concentrations of uranium mineralization—the basic technique employed by the uranium prospectors of the post-World War II uranium rush.

Even fossils can be radioactive, especially the agatized dinosaur bone found in the Uruan uranium deposits of western Colorado and eastern Utah. The reason is that millions of years ago, when regional sandstones were concentrating the soluble uranium compounds in groundwater, such organic materials as tree trunks and dinosaur bones within the sandstone acted as precipitation traps that concentrated carnotite and other uranium minerals. Thus, fossilized wood and bone are often much more radioactive than is their host sandstone. In fact, radiation monitors can often detect low levels of radioactivity in the polished, reddish, agatized dinosaur bone that is sometimes used to make jewelry.

The uses of radiation monitors extend far beyond uranium-mining districts. Granite pegmatites, sections of granitic intrusions characterized by coarse crystallization and concentrations of rare and unusual minerals, can also hold concentrations of radioactive minerals.

A relatively common radioactive pegmatite mineral is monazite, a phosphate of cerium and lanthanum that also contains thorium and uranium. Monazite occurs in small, reddish-brown, elongated crystals that can be difficult to identify in the field. But radiation monitors can detect the diagnostic radioactivity of even tiny crystals, making identification a cinch. Another radioactive mineral sometimes found in pegmatites (as well as certain hydrothermal veins) is uraninite. Uraninite usually occurs as dark cubes and octahedrons or in a massive, botryoidal (pitchblende) form, both of which exhibit relatively high levels of diagnostic radioactivity.

Yet another radioactive element of interest is radon, a heavy, largely inert gas, accumulations of which are potentially hazardous. Virtually all granitic and many other igneous rocks contain trace amounts of ura-

nium that are continuously decaying into radium, radon, and the radon “daughters” (radon isotopes). As radon is created, small amounts escape from rock and soil into the atmosphere, where the gas is normally diluted to harmless levels. But in poorly ventilated houses built atop or near weathering granite bedrock, radon, which is a carcinogen, can accumulate to dangerous levels.

Radiation monitors can easily detect accumulations of radon gas. Simply compare outdoor background radiation levels to levels in basement or subfloor spaces. Elevated readings should be immediately reported to a local health department.

Elevated radon levels are also a health hazard in abandoned uranium mines. In the unventilated underground workings of old uranium mines, radon concentrations can produce radiation levels that are hundreds of times higher than normal background levels. No one should ever attempt to enter any abandoned underground mine, but especially uranium mines, where radon concentrations pose a special hazard. Even from outside the portals of old uranium mines, radiation monitors can detect elevated radiation levels, which are likely to indicate dangerously high radon concentrations within the mines.

A good radiation monitor will cost anywhere from \$300 to \$500—about the same as a quality metal detector—which is quite reasonable considering that it can add a new dimension to prospecting and mineral collecting. At the least, it will enhance your understanding of nuclear radiation. Its many uses are limited only by one’s creativity, scientific curiosity, and knowledge of nuclear radiation. When it comes to rockhounding and mineral collecting, a good radiation monitor is right up there with the rock pick as an essential piece of equipment. ♦

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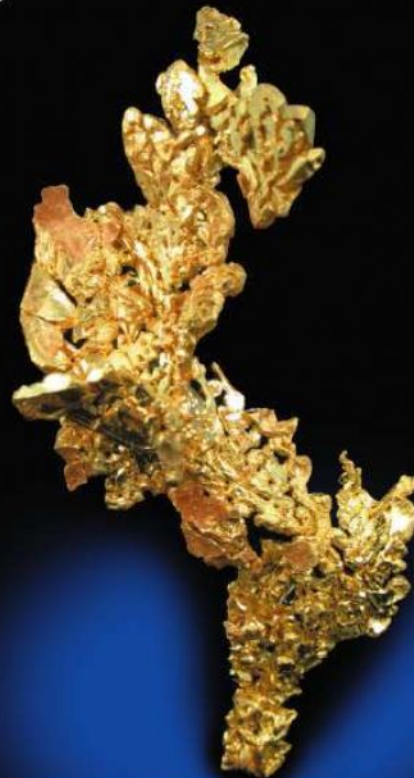
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Show Dates from page 29

AUGUST 2010

Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: vawimmer@verizon.net; Web site: www.toteshows.com

6-8—HILLSBORO, OREGON: Show, "Gem Faire"; Gem Faire Inc.; Washington County Fairgrounds, 873 NE 34th Ave.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

6-8—MELBOURNE, FLORIDA: Show; Frank Cox Productions; Melbourne Auditorium, 625 Hibiscus Blvd.; Fri. 10-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave., #203, Sarasota, FL 34236, (941) 954-2010; e-mail: frankcox@comcast.net; Web site: www.frankcoxproductions.com

6-8—NORTH BEND, OREGON: Show, "Nature's Wonders"; Far West Lapidary & Gem Society; North Bend Community Center, 2222 Broadway; Fri. 10-6, Sat. 10-6, Sun. 10-5; displays, jewelry, demonstrations, kids' activities, exhibits, silent auction, raffle, door prizes, dealers, faceted and rough gems, minerals, gold, silver, crystals, beads, mountings, tools; contact Rocky Pribble, P.O. Box 251, Coos Bay, OR 97420, (541) 572-8301

7—ISHPEMING, MICHIGAN: 35th annual show; Ishpeming Elks Club; 597 Lake Shore Dr.; Sat. 9:30-4:30; free admission; mineral displays, dealers, kids' area, silent auction, hourly prizes, raffle, mineral demonstrations, field trips Fri. and Sun.; contact Ernest Johnson, 1962 W. Fair, Marquette, MI 49855, (906) 228-9422; e-mail: ejohnson@nmu.edu

7-8—AUSTIN, TEXAS: Show; Austin Bead Society; Palmer Events Center, 900 Barton Springs Rd.; Sat. 10-6, Sun. 11-5; admission \$5, \$1 off with food donation; handcrafted jewelry, supplies, raffles; contact Austin Bead Society, P.O. Box 656, Austin, TX 78767-0656, or Michele Chesak; e-mail: mchesak@gmail.com; Web site: www.austinbeadsociety.org

7-8—BETHESDA, MARYLAND: 60th annual show; Gem, Lapidary and Mineral Society of Washington, DC; Stone Ridge School, 9101 Rockville Pike; Sat. 10-6, Sun. 10-5; adults \$6, seniors \$5, children under 16 free with paying adult; gemstones, minerals, fossils, jewelry, beads, collectibles, dealers, exhibits, Crystal Cave, kids' activities, door prizes; contact Mary Bateman, 2700 S. 9th St. #203, Arlington, VA 22204-2328, (703) 521-4614; e-mail: mbate1@verizon.net; Web site: www.glmisc.com

7-8—SAN FRANCISCO, CALIFORNIA: Show, "Golden Gateway to Gems "In the Pink"; San Francisco Gem & Mineral Society; County Fair Bldg. (Hall Of Flowers), Golden Gate Park, 9th Ave. and Lincoln Way; Sat. 10-6, Sun. 10-5; adults \$7, seniors \$6, child under 12 free with adult; demonstrations, jade carving, chain maille weaving, wire wrapping, bead stringing, silver metal clay modeling, cabochon cutting, California Academy of Sciences displays; contact Carleen Mont-Eton, 4134 Judah St., San Francisco, CA 94122, (415) 564-4230; e-mail: publicity@show.sfgms.org; Web site: www.sfgms.org

7-8—WATERVILLE, MAINE: 40th annual show, "Mid-State Gem & Mineral Show"; Water-Fair Gem & Mineral Society; Mount Merici School, 152 Western Ave.; Sat. 10-5, Sun. 10-4; free admission; dealers, gems, minerals, fossils, beads, jewelry, specimens, demonstrations, lapidary arts, books, magazines, educational displays, fluorescent minerals; contact Ellery Borow, P.O. Box 47, Waterville, ME 04903-0047, (207) 547-3154

12-15—BUENA VISTA, COLORADO: Show, "The Rock Show at Buena Vista: A CONTInental Divide TAILgate"; Contin-tail LLC; Rodeo Grounds, Gregory Rd. and Rodeo Rd.; Thu. 9-5, Fri. 9-5, Sat. 9-5, Sun. 9-5; free admission; more than 120 dealers, rocks, minerals, gemstones, fossils, beads, jewelry, lapidary equipment, demonstrations (glint-knapping, stone cutting, wire wrapping, beading, precious metal clay), free rock for children, door prizes, fluorescent mineral display; contact Carolyn Tunnicliff, 1130 Francis #7010, Longmont, CO 80501, (720) 938-4194; e-mail: ctunnicliff@comcast.net; Web site: www.coloradorocks.org

13-15—NOVI, MICHIGAN: Show; International Gem & Jewelry Show Inc.; Rock Financial Showplace, 46100 Grand River Rd.; Fri. 12-6, Sat. 10-6, Sun. 11-5; adults \$8; open to the public, professional jewelers, artists; contact International Gem & Jewelry Show Inc., 120 Derwood Circle, Rockville, MD 20850, (301) 294-1640; e-mail: info@intergem.net; Web site: www.InterGem.com

13-15—PASS CHRISTIAN, MISSISSIPPI: Show; Harrison County Gem & Mineral Society; West Harrison County Community Center (Espy Center), 4470 Espy Ave.; Fri. 12-7, Sat. 9-6, Sun. 10-5; adults \$3, children 12 and under free; door prizes, grand prize raffle, bring your rock and stump the

expert Sun.; contact Tomsey Westermeyer, 9270 Serenity Dr., Pass Christian, MS 39571, (228) 586-5279 or (229) 326-2390; Web site: tomsey@cablone.net

13-15—PORT TOWNSEND, WASHINGTON: Show; Port Townsend Rock Club; Jefferson County Fairgrounds, 4907 Landes St.; Fri. 10-9, Sat. 10-9, Sun. 10-6; contact Tom Madsen, 2915 state Rte. 20, Port Townsend, WA 98368; e-mail: tommadsen@olympen.com

13-15—TACOMA, WASHINGTON: Show, "Gem Faire"; Gem Faire Inc.; Tacoma Dome/Exhibition Hall, 2727 E. "D" St.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

13-15—WEST SPRINGFIELD, MASSACHUSETTS: Show, "East Coast Gem, Mineral & Fossil Show"; Martin Zinn Expositions LLC; Better Living Center, Eastern States Exposition, 1305 Memorial Dr.; Fri. 10-7, Sat. 10-7, Sun. 10-5; adults \$6, ages 12 and under free with adult; more than 200 dealers from the U.S. and abroad, door prizes, guest speakers, museum-quality exhibits, gem panning, large wholesale section, collection of Bill Larson, Pala Int!; contact Martin Zinn Expositions, P.O. Box 665, Bernalillo, NM 87004-0665, fax (303) 223-3478; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

14-15—LAKEVIEW, OREGON: Show, "Tallman Rock Roundup"; Tallman Rockchippers; Lake Co. Fairgrounds, 1900 N. 4th; Sat. 10-4, Sun. 10-3:30; free admission; kids' activities, silent auction, dealers, demonstrators, field trips; contact Johanne Deidrich, 244 N. M St., Lakeview, OR 97630, (541) 947-3237; or LeRoy Johnson; e-mail: lostmymarblesor@yahoo.com

14-15—RICE LAKE, WISCONSIN: 14th annual show; Northwest Wisconsin Gem & Mineral Society; University of Wisconsin, Barron County; Sat. 10-5, Sun. 10-4; free admission; contact Roy Wickman, (715) 357-3223, or Dave Skrupky, (715) 986-2547

14-15—WALNUT CREEK, CALIFORNIA: Show, "Contra Costa Crystal Fair"; Pacific Crystal Guild; Civic Park Community Center, 1375 Civic Dr. at Broadway; Sat. 10-6, Sun. 10-4; admission \$6; contact Jerry Tomlinson, (415) 383-7837; e-mail: sfxtl@earthlink.net; Web site: www.crystalfair.com

20-22—BRIDGETON (ST. LOUIS COUNTY), MISSOURI: Show; Greater St. Louis Association of Earth Science Clubs; 12365 St. Charles Rock Rd.; Fri. 4-9, Sat. 10-6, Sun. 11-5; adults \$5, seniors \$4, juniors (6-17) \$2; national dealers, gems, fossils, minerals, jewelry, equipment, hourly prizes; contact Robert Morse, (636) 462-4423; e-mail: morse@centurytel.net

20-22—CARTERSVILLE, GEORGIA: Show, "Southeast Gem, Mineral & Fossil Show"; Martin Zinn Expositions LLC; Holiday Inn, I-75 and 411 NE; Fri. 10-6, Sat. 10-6, Sun. 10-5; free admission; 80 wholesale and retail dealers, open to the public; contact Martin Zinn Expositions, P.O. Box 665, Bernalillo, NM 87004-0665, fax (303) 223-3478; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

20-22—COSTA MESA, CALIFORNIA: Show, "Gem Faire"; Gem Faire Inc.; OC Fair & Event Center/Bldg. 10, 88 Fair Dr.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

20-22—LAKE GEORGE, COLORADO: Outdoor show; Lake George Gem & Mineral Club; U.S. Hwy. 24, next to post office; Fri. 8-5, Sat. 8-5, Sun. 8-5; free admission; 40 dealers, minerals, fossils, jewelry, lapidary, local amazonite, smoky quartz, topaz; contact Becky Blair, (719) 748-3030; e-mail: blairra@hotmail.com; or John Rakowski, (719) 748-3861; e-mail: rakgeologist@yahoo.com

20-22—LEBANON, PENNSYLVANIA: 13th annual show and sale, "Gem Miner's Jubilee"; Mid-Atlantic Gem & Mineral Association; Lebanon Expo Center, Rte. 72 and Rocherty Rd.; Fri. 10-6, Sat. 10-6, Sun. 10-4; adults \$6, children under 12 free; gems, jewelry, minerals, fossils, beads; contact MAGMA, (301) 565-0487; Web site: www.gem-show.com

20-22—LEXINGTON, KENTUCKY: Show, "Gemboree 2010"; Blue Grass Gem & Mineral Club; Lexington Convention Center "Heritage Hall", 430 W. Vine St.; Fri. 12-6, Sat. 9-7, Sun. 10-6; adults \$1, students and children free; rocks, gems, minerals, jewelry, fossils, Kentucky agate, displays; contact Phillip Daly, 10330 Forkland Rd., Parksville, KY 40464, (859) 854-0418; e-mail: phillipdaly@bellsouth.net; Web site: <http://sites.google.com/site/gemboree2010/>

20-22—SARASOTA, FLORIDA: Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Trail (Hwy. 41); Fri. 10-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave.

#203, Sarasota, FL 34236, (941) 954-0202; e-mail: frank.cox@comcast.net; Web site: www.frankcoxproductions.com

20-22—SEASIDE, OREGON: Show; Oregon Gem, Mineral & Jewelry Shows; Seaside Convention Center, 415 1st Ave.; Fri. 10-6, Sat. 10-6, Sun. 10-4; free admission; free pearls to 100 ladies daily; contact Jean Miller, P.O. Box 136, Molalla, OR 97038, (503) 829-2680; e-mail: shadow92337@molalla.net; Web site: www.ogmshows.com

21-22—BOSSIER CITY, LOUISIANA: Show; Ark-La-Tex Gem & Mineral Society; Bossier Civic Center, 620 Benton Rd.; Sat. 10-6, Sun. 10-5; adults \$4, students \$1, children 5 and under and Scouts in uniform free; door prizes, youth activities, exhibits, live demonstrations; contact Charlie Johns, 9314 Overlook Dr., Shreveport, LA 71118, (318) 687-4929; e-mail: cwsejohns@bellsouth.net; Web site: www.larockclub.com

21-22—MADRID (CANTON), NEW YORK: 44th annual show; St. Lawrence County Rock & Mineral Club; free admission; outdoor/indoor show, kids' fluorescent mineral hunt Fri., mineral-collecting field trips, free wire wrapping lessons, geode cracking, swapping; contact William deLorraine, (315) 287-4652; e-mail: wdellie@verizon.net; Web site: www.Stlawrencecountymineralclub.org

21-22—YELM, WASHINGTON: Show, "Biggest Little Gem Show in the N.W."; Nisqually Valley Rockhound Society; Yelm City Park, Hwy. 507 (I-5/Marvin Rd. Exit 111); Sat. 10-6, Sun. 9-4; free admission; silent auction, door prizes, kids' booths, tailgaters, inside displays; contacts Mike Smith, 18814 119th Ave. SE, Yelm, WA 98597, (360) 458-8747, or Tim Howard, 17240 110th Ave. SE, Yelm, WA 98597, (360) 458-7841; e-mail: Tim_WSSMI@comcast.net

27-29—SAN DIEGO, CALIFORNIA: Show, "Gem Faire"; Gem Faire Inc.; Scottish Rite Event Center, 1895 Camino del Rio S; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

27-29—SOUTH BEND, INDIANA: 47th annual show and sale; Michiana Gem & Mineral Society; St. Joseph County 4-H Fairgrounds, Esther Singer Bldg., 5177 S. Ironwood Rd. (at Jackson Rd.); Fri. 2-7, Sat. 10-6, Sun. 10-4, adults \$2.50, children 6-12 \$1, under 6 free; dealers, gems, fossils, minerals, jewelry, demonstrations, exhibits, Kids' Korner, silent auction; contact Marie Crull, (574) 272-7209; e-mail: crullb2@sbcglobal.net; or Kathy Miller, (574) 291-0332

28-29—COLUMBUS, OHIO: Show; BeadStreet USA; The Veterans Memorial Bldg., North Hall, 300 W. Broad St.; Sat. 10-6, Sun. 11-5; vintage beads, Swarovski crystals, lampwork, precious metal findings, gemstones, supplies; contact Jane Strieter Smith, (216) 521-4367; Web site: www.beadstreetusa.com

28-29—CONCORD, NEW HAMPSHIRE: 47th annual show, "Gem & Mineral Festival"; Capital Mineral Club; Everett Arena, 15 Loudon Rd., I-94 exit 14; Sat. 9-5, Sun. 10-4; adults \$5, kids 12 and under free with parent; retail and wholesale dealers, displays, raffles, door prizes, minerals, crystals, faceted gems, books, magazines, fossils, jewelry, carvings, displays, free mineral for kids under 12; contact Scott P. Higgins, (207) 439-1107; Web site: www.capitalmineralclub.org

28-29—FREEPORT, NEW YORK: Show; Freeport Recreation Center; 130 E. Merrick Rd., Meadowbrook Pkwy. exit M9 west; Sat. 10-5, Sun. 10-5; adults \$5.50, children under 12 free with adult; dealers, minerals, gems, jewelry, fossils, beads, save 50 cents with this ad; contact Ralph Gose, P.O. Box 1418, Melville, NY 11747, (631) 271-8411; e-mail: kaleidoscopegemshows@yahoo.com

28-29—JASPER, TEXAS: 16th annual show; Pine Country Gem & Mineral Society; The Event Center, 6258 Hwy. 190 W, 5 miles west of Jasper; Sat. 9-5, Sun. 10-5; adults \$2, students and children free; silent auction, Spinning Wheel, door prizes, grand prize raffle, rock food table, lapidary demonstrations, educational exhibits; contact Jonetta Nash, Rte. 2 Box 248, Jasper, TX 75951, (409) 384-3974; e-mail: jonetta.nash@yahoo.com

28-29—MOUNTAIN HOME, ARKANSAS: Show; Ozark Earth Science Gem, Mineral & Fossile Club; Senior Center in Cooper Park, 1101 Spring St.; Sat. 10-6, Sun. 10-5; free admission; door prizes, mineral and gem displays, interactive children's events, minerals, fossils, handmade jewelry, demonstrations, silent auction, touch and feel area; contact Edward Hakesley, 821-1 Alexis Cir., Mountain Home, AR 72653, (870) 424-0956; e-mail: edscamp3@yahoo.com; Web site: www.ozarkearthscience.org

28-29—PEORIA, ILLINOIS: 47th annual show and Midwest Federation Convention; Geology Section of the Peoria

continued on page 40



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ROCK & GEM Kids

Variscite

$\text{AlPO}_4 \cdot 2\text{H}_2\text{O}$ (hydrated aluminum phosphate)

Variscite, a phosphate mineral, is a sister mineral of turquoise. Both are hydrated aluminum phosphates, but variscite lacks the copper content that turns turquoise blue. Its color varies from lime green to emerald green, and single specimens often exhibit a range of hues. Like turquoise, the best variscite has a firmer consistency and is waxy in luster; poorer material tends to be chalky and earthy. It's translucent to opaque and takes a nice polish with a pleasing, pearly finish. It's lightweight like turquoise (specific gravity 2.4 to 2.6) but a little softer (Mohs 3.5 to 4.5; turquoise is 5 to 6).

Also like turquoise, variscite is a secondary mineral, one whose formation draws on previously deposited minerals. Variscite forms in cracks near the surface where aluminum-rich clays are present. Water holding dissolved phosphates reacts with aluminum. The results include small nodules, vein fillings, and crusts of variscite.



JIM BRACE-THOMPSON PHOTO

Variscite often forms as nodules and is primarily used in lapidary to produce cabochons exhibiting a range of green hues.

Unlike turquoise, variscite isn't found only in dry, desert environments. In fact, it was first described in 1837 as coming from a locality in Vogtland, Germany. "Variscite" comes from *Variscia*, the Roman name for Vogtland. In America, variscite is sometimes called "utahlite" after deposits located around Fairfield, Utah, or "lucinite" for a locality near the town of Lucin, Utah.

Although it has no industrial uses, variscite is great for lapidary work, particularly making cabochons and carvings. Variscite would absorb the oil used to lubricate a rock saw, so it would usually be cut with water or other lubricant with an oil-free base. It's also difficult to polish evenly because it's mixed with other, softer or harder minerals. It is often streaked with yellow crandallite. In fact, as many as 13 other phosphate minerals occur with variscite, sometimes within the same nodule! This mixture can create interesting color patterns.

—Jim Brace-Thompson

Take the Quiz, Win a Prize!

The Quiz is open to U.S. residents 17 and younger. All the questions can be answered by carefully reading *Rock & Gem Kids*. Mail your answers to **July Quiz, Rock & Gem magazine, P.O. Box 6925, Ventura, CA 93006-9899**. Five winners will be drawn from the valid entries received by **July 31, 2010**. Valid entries must include the correct answers, the entrant's name, age and address, and the signature of a parent or guardian. This month's prize is a mineral and fossil grab bag generously donated by the Ventura Gem & Mineral Society.

1. Both _____ and _____ are hydrated aluminum phosphates.
2. A _____ is one whose formation draws on previously deposited minerals.
3. Poor variscite tends to be _____ and _____.
4. A _____ mineral has water in its crystalline structure.
5. _____ is the way light reflects from the surface of a crystal, rock or mineral.



The Man Behind Mr. Bones

Its head towers above the temporary walls of show booths. It prowls the aisles, seeking unsuspecting prey to take into its gaping jaws. It is a 20-foot-long replica of a *Tyrannosaurus rex* skeleton and it's a big hit at rock shows. Sometimes, the prey lines up to have the skeleton lower its jaws over their heads, but it's the victim who's taken by surprise that gets the biggest grins. Sheathed in black to aid the illusion that the skeleton moves on its own is Tim Seeber, the man behind the bones.

The phenomenon started in 1995 when Tim, an art teacher from Louisville, Colorado, became a volunteer at the Denver Museum of Nature and Science, helping put together the dinosaur skeleton replicas in its Prehistoric Journey exhibit. While he worked, he had access to the individual bones and was able to measure them. From these measurements, he replicated the skeletons in papier-mâché and foam rubber on a wire and metal tubing framework.

Tim made his first costume, a *Tyrannosaurus rex*, for Hallowe'en. As he walked around a party, Tim recalls, "Someone yelled out, 'Mr. Bones!' and it swept the room. I figured, 'Why fight it?'" The name stuck.

Tim decided to use his dinosaur costumes to entertain and to educate people about dinosaurs. While taking part in a parade, he was inspired by the custom plates he saw on the vintage cars. He fashioned one that read "MR BONES" for the back of his costume to help get the word out about his new venture.

It must have worked: Tim estimates he works 15 shows, 20 to 30 school programs, and 15 to 20 library programs per year. His collection includes Utahraptor and duck-billed Lambeosaurus costumes, each with its own license plate, and a Velociraptor marionette. He spends his vacations digging up dinosaurs or prospecting in the badlands of Utah, but he'll never give up his day job. "It's the best job in the world," Tim says, "because I get to make thousands of people smile every day."

—Lynn Varon

Adults: For information about Tim's programs, contact him at Tim Seeber, 821 Mckinley Ave., Louisville, CO 80027-1933 or (303) 661-0489.



Tim Seeber's black outfit helps to give the illusion that the replica *T. rex* skeleton walks the show floor under its own steam.



Prey waits patiently for the thrill of having "Mr. Bones" lower his foam rubber jaws over their heads.

Word Match Glossary

Match the terms from this month's *Rock & Gem Kids* in the column on the left to the correct definition on the right. Use a dictionary if you need help.

- | | |
|---------------------|---|
| 1. hydrated | A. The way light reflects from the surface of a crystal, rock or mineral |
| 2. lubricant | B. Allows light to pass through diffusely (spread out) |
| 3. luster | C. Contains the elements phosphorus and oxygen in the chemical formula PO_4 |
| 4. nodule | D. A substance for reducing friction |
| 5. opaque | E. Contains water in its crystalline structure |
| 6. phosphate | F. A small, rounded lump |
| 7. specific gravity | G. A measure of the density of a mineral |
| 8. translucent | H. Does not transmit light in thin sections |

ANSWER KEY: 1:E; 2:D; 3:A; 4:F; 5:H; 6:C; 7:G; 8:B

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Show Dates from page 37

Academy of Science; The Grand Hotel, 4400 N. Brandywine Dr.; Sat. 9-5, Sun. 10-5; free admission; "Homer" the Triceratops display, speaker Dr. Michael Henderson, silent auctions, kids' area, fluorescent display, panning flume; contact Jim Travis, (309) 645-3609; e-mail: boatnick@aol.com; Web site: http://pasgeology.com

SEPTEMBER 2010

3-5—SANTA BARBARA, CALIFORNIA: Show, "Gem Faire"; Gem Faire Inc.; Earl Warren Showgrounds/Exhibit Hall, 3400 Calle Real; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

3-6—CRAWFORD, NEBRASKA: 24th annual show, "Crawford Rock Swap"; Northwest Nebraska Rock Club; Crawford City Park, 1st St. and Main St.; Fri. 8-6, Sat. 8-6, Sun. 8-6, Mon. 8-12; free admission; buy, sell, trade, swap, rocks, minerals, fossils, agates, free agate bed field trips; contact Wade Beins, 120 Gordon Ave., Box 569, Chadron, NE 69337, (308) 432-8950; e-mail: agates@bbc.net

3-6—FORT BRAGG, CALIFORNIA: 48th annual show; Mendocino Coast Gem & Mineral Society; Town Hall, Main and Laurel; Fri. 10-6, Sat. 10-6, Sun. 10-6, Mon. 10-4; free admission; contact Don McDonell, P.O. Box 868, Fort Bragg, CA 95437, (707) 964-3116, or Jane Webb, (707) 964-7182

3-6—HENDERSONVILLE, NORTH CAROLINA: 20th annual show, "Gem & Mineral Spectacular"; Henderson County Gem & Mineral Society; Whitmire Bldg., 301 Lily Pond Rd.; Fri. 10-6, Sat. 10-6, Sun. 10-6, Mon. 10-5; adults \$3 (free faceted gemstone), children under 12 free with adult (free grab bag); dealers, gems, minerals, jewelry, supplies, fossils, beads, bench jeweler, educational programs, displays, lapidary demonstrations, geode cracking, door prizes, free shuttle to Hendersonville Apple Festival; contact Ken Gillon, (828) 606-1353; Web site: www.hcgms.org

4-5—AUGUSTA, MAINE: 21st annual show; Kennebec Rocks & Minerals Club; National Guard Armory, Western Ave.; Sat. 10-5, Sun. 10-4; door prizes, lapidary demonstrations, fluorescent display, mineral displays, dealers, minerals, jewelry, gems, fossils, geode slicing, mineral mine, kids' games, free kids' stones, "Rocky" the rockhound dog; contact KRMC, (207) 873-6270

4-6—CANBY, OREGON: Show, "Willamette Valley Gem, Mineral & Jewelry Show"; Oregon Gem, Mineral & Jewelry Shows; Clackamas County Fairgrounds, 694 N.E. 4th Ave.; Sat. 9-6, Sun. 9-6, Mon. 9-4; free admission; contact Jean Miller, P.O. Box 136, Molalla, OR 97038, (503) 829-2680; e-mail: shadow92337@molalla.net; Web site: www.ogmshows.com

4-6—SILVER CITY, NEW MEXICO: 27th annual show; Rolling Stones Gem & Mineral Society; Grant County Business and Conference Center, 3031 Hwy. 180 E, next to ACE Hardware; Sat. 10-5, Sun. 10-5, Mon. 10-4; free admission; more than 55 dealers, daily free field trips, silent auction, wheel of fortune; contact Marcia Andre, 1311 Peterson Dr., Silver City, NM 88061, (575) 534-0006; e-mail: marciarandre@gmail.com; Web site: www.rollingstonesgms.blogspot.com

9-12—TUCSON, ARIZONA: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Holiday Inn Palo Verde/Holidome, 4550 S. Palo Verde Rd. (I-10 at Palo Verde Rd.); Thu. 10-6, Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

9-12—TUCSON, ARIZONA: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; The Grant Inn, 1365 W. Grant Rd. (I-10 and Grant Rd.); Thu. 10-6, Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

10-12—FERDALE, CALIFORNIA: 6th annual show, "Wildcat Gem Fest"; Wildcat Gem & Mineral Society; Humboldt Co. Fairgrounds, 1250 5th St.; Fri. 12-7, Sat. 10-1, Sun. 10-5; free admission; door prizes, raffles, kids' games, demonstrations, classes, gems, minerals, fossils, jewelry, silent auction; contact Mike Martin/The Stonery, P.O. Box 189, Miranda, CA 95553, (707) 499-6194; e-mail: micknorma@directv.net

10-12—GREENFIELD, INDIANA: 34th annual show, "Greater Indianapolis Gem, Mineral & Fossil Show"; 500 Earth Sciences Club of Indianapolis; Hancock County 4-H Fairgrounds, 802 Apple St.; Fri. 10-8, Sat. 9-7, Sun. 10-4; free admission; dealers, swappers, fossils, minerals, gems, jewelry, lapidary equipment, silent auctions, door prizes, kids' activities, demonstrations, educational displays and

programs, special fossil exhibit by the Children's Museum of Indianapolis; contact Don Mahoney, 17914 Juniper Rd., Argos, IN 46501, (574) 892-5264; e-mail: DLMCNACLU@aol.com; Web site: www.geology.iupui.edu/Outreach/500_earth_sciences/index.htm

10-12—MARIETTA (ATLANTA), GEORGIA: Show; Frank Cox Productions; Cobb County Civic Center, 548 S. Marietta Pkwy.; Fri. 1-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave. #203, Sarasota, FL 34236, (941) 954-0202; e-mail: frankcox@comcast.net; Web site: www.frankcoxproductions.com

10-12—SAN RAFAEL, CALIFORNIA: Show, "Gem Faire"; Gem Faire Inc.; Marin Center/Exhibit Hall, 10 Avenue of the Flags; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

10-12—TOLEDO, OHIO: 39th annual show and sale; Toledo Gem & Rockhound Club; Stranahan Complex, 4645 Heatherdowns Blvd.; Fri. 2-8, Sat. 10-6, Sun. 11-5; adults \$4, seniors and students \$3, children under 12 free; free kids' mineral kits and games, exhibits, demonstrations, mini classes, Touch & Feel Area, scholarship raffle, silent auction, club sales, more than 20 dealers, beads, jewelry, gems, precious metals, fossils, minerals, carvings, gem trees, tools, equipment; contact Jerri Heer, 247 Decatur, Toledo, OH 43609, (419) 531-8124; e-mail: jheerx6@aol.com; Web site: www.rockyreader.com

10-12—WINSTON-SALEM, NORTH CAROLINA: 39th annual show; Forsyth Gem & Mineral Club; Educational Bldg., Dixie Classic Fairgrounds, Gate #9; Fri. 10-7, Sat. 10-7, Sun. 12-5; contact W.A. Marion, 1163 Bear Creek Church Rd., Mocksville, NC 27028; e-mail: MarionA1@yadtel.net

11-12—FAIRFIELD, IOWA: Show; The Sac & Fox Lapidary Club; The Fairfield Arts & Convention Center, Main & Briggs; Sat. 9-6, Sun. 10-5; adults \$3, students \$1, children under 6 free; children's activities, demonstrations; contact Betty Morris, 618 N. Lincoln St., Mt. Pleasant, IA 52641; e-mail: emorris@lisco.com; Web site: sacandfoxlapidaryclub.com

11-12—ROSEBURG, OREGON: Show, "Rough to Gems"; Umpqua Gem & Mineral Club; Douglas County Fairgrounds, I-5 Exit 123; Sat. 10-6, Sun. 10-4:30; free admission; dealers, rough, gems, minerals, fossils, beads, jewelry, tools, equipment, books, display cases, demonstrators, knapping, UV mineral exhibit, silent auction, wheel of fortune, geode cutting, raffle, door prizes, gold panning, kids' rock hunt; contact Bob Sampson, 752 Cooper Creek Rd., Sutherlin, OR 97479, (541) 459-1755; e-mail: davenmow@q.com

11-12—SILOAM SPRINGS, ARKANSAS: Annual fall swap; Northwest Arkansas Gem & Mineral Society; clubhouse, Hwy. 43N; Sat. 9-5, Sun. 10-5; free admission; auction, kids' gem wash, silent auctions, grab bags; contact Dave Leininger, (479) 787-5619; e-mail: hulagrub@aol.com; Web site: www.nwarockhounds.org

11-12—WALLA WALLA, WASHINGTON: Show, "Walla Walla Gem & Mineral Show"; Marcus Whitman Gem & Mineral Society; Walla Walla County Fair Ground, Community Center, 9th St. and Orchard; Sat. 10-5, Sun. 10-5; dealers, opal, petrified wood, jasper, agate, sunstone, wire wrapping, faceted gems, slabs, rough, jewelry, silent auction, demonstrations, kids' section; contact Warren Rood, (509) 522-2330; e-mail: warrenrood@yahoo.com

12—BLOOMINGTON, MINNEAPOLIS: Show, "Rings & Things BeadTour"; Rings & Things; Hilton Minneapolis/St. Paul Airport, Ballroom A, B, C & D, 3800 American Blvd. E; Sun. 12-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

14—GREEN BAY, WISCONSIN: Show, "Rings & Things BeadTour"; Rings & Things; Suamico Ale House, 2310 Lineville Rd.; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

15—MILWAUKEE, WISCONSIN: Show, "Rings & Things BeadTour"; Rings & Things; Clarion Hotel Airport, 5311 S. Howell Ave.; Wed. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

15-19—DENVER, COLORADO: Fall show, "Colorado Mineral & Fossil Show"; Martin Zinn Expositions LLC; Holiday Inn - Denver Central, 4849 Bannock St.; free admission; 200 wholesale and retail dealers from all over the world, free shuttle to shows at the Merchandise Mart;

continued on page 48

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July 29 - August 1 Spruce Pine, NC; NC Mineral and Gem Festival; Pinebridge Coliseum; 97 Pinebridge Ave.
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BOOK REVIEW:

Amber: The Natural Time Capsule

by Andrew Ross

Inclusions in mineral specimens have their own appeal, but those that can be seen in pieces of amber are particularly fascinating. While not a mineral, this hardened resin has caught the interest of mineral and fossil collectors and lapidaries because of the ancient animal remains it can contain. For the curious amber collector, *Amber* (Firefly Books, 2010) offers a practical guide to identifying these creatures to increase your knowledge and enjoyment.

Author Andrew Ross is the curator of fossil arthropods (invertebrate animals with external skeletons) at the Natural History Museum, London. While curating the museum's amber collection in the 1990s, he recognized the need for a single, easy-to-use reference that explained how to properly identify the insects found in amber specimens.

Chapter One discusses the nature of amber and how to identify fakes. Chapter Two deals with the locations around the world in which amber is found and the characteristics of each variety. Chapter Three talks about the organic and inorganic inclusions for which amber is valued. Chapter Four is a practical guide to identifying the arthropods that may be found in amber, judging by wings, legs, body segments, probosces, and a host of other characteristics.

More than 160 clear, close-up, color photos of specimens from the museum's collection illustrate the book. Maps, charts, and line drawings complement the text and aid in identification. This 112-page hardcover book sells for \$29.95.

—Lynn Varon

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Gold Panning Championships

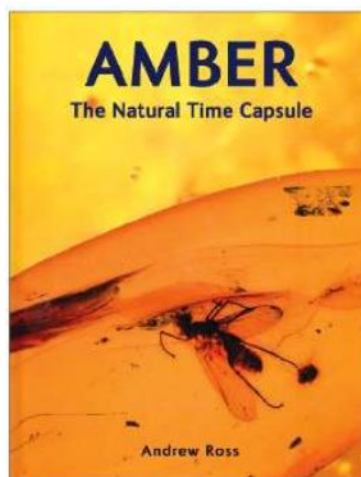
The Mother Lode Goldhound Association (MLGA) will hold the Annual Foresthill Heritage Celebration, which includes the California and U.S. gold panning championships, Sept. 4-5, 2010 in Foresthill, California.

The celebration begins Saturday and features historical displays, gold panning, old-town tours, and a pig roast. The gold panning championships take place on Saturday, with six divisions of competition: Beginners, Juniors, Women's Skilled, Men's Skilled, Veterans, Open and Team.

The competition is an opportunity for panners to demonstrate their gold-recovery skills. Each panner is given a 3-gallon bucket of river gravel salted with a number of small (minus 20 mesh plus 24) gold flakes. The flakes recovered are compared to the amount that was placed in the bucket. The object, obviously, is not to lose any gold. Time also factors into the panner's score.

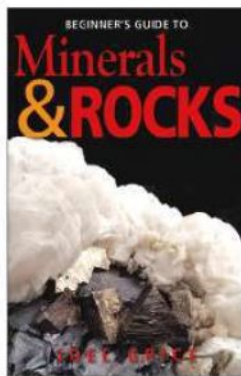
In the 2009 championships, Mike Sutton recovered all his gold in three minutes, 12 seconds to win the Men's Skilled competition, while Barbara Sutton achieved full recovery in three minutes, two seconds in the Open division.

The championships will be held in Memorial Park in Old Foresthill beginning at 8 a.m. Admission is free. For registration information, call the MLGA at (530) 367-2891 or visit www.goldhounds.com or www.foresthillchamber.org.



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BOOK REVIEW:
**Beginner's
 Guide to
 Minerals
 and Rocks**
 by Dr. Joel Grice

The names connected with the *Beginner's Guide to Minerals and Rocks* (Fitzhenry and Whiteside Ltd., 2010) are very well known to this reviewer. Dr. Joel Grice is Curator of Minerals at the Canadian Museum of Nature. Ole Johnsen, who took the majority of the photographs, is Curator of the Mineral Collection at the Geological Museum, University of Copenhagen, Denmark, and is internationally recognized for his mineral work. Bob Gault, who also contributed mineral and rock photographs to the book, is associated with the Canadian Museum and is a well-known lecturer. These gentlemen are leaders in the science of mineralogy and have been involved with minerals for decades. You can be assured of the accuracy of this book's information because of their participation in its creation.

The book's introduction is designed in sections that treat what minerals and rocks are, where they come from, the equipment you'll need in the field and at home, and how to deal with your collection once obtained. This information is ideal for the beginning rockhound, as it anticipates many of the questions a novice will ask.

The body of the book is divided into the major sections Metallic Minerals and Non-Metallic Minerals, followed by Rocks. Each mineral and rock is figured, often four or five times, and described by its physical appearance and properties. Occurrences are briefly described and a few interesting facts are given for each mineral and rock. Since the book is designed and written in Canada, it emphasizes Canadian minerals and localities, but the factual information, the guides to collecting, and the descriptive information are universally applicable.

For someone who is just starting out in the mineral hobby, this text is most useful. It is the kind of book every mineral club should have on its library and make accessible to all collectors.

The photographs are particularly useful in that they are not of the very best minerals, but of the types of specimens you will find in nature.

The 317-page paperback book contains more than 200 full-color photos and identification charts, and retails for \$29.95.

—Bob Jones

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CIRE PERDUE

Story and Photos by Bob Jones/Art Objects by Carol Sues

The Art of Lost Wax Casting

Officially known as cire perdue, lost wax casting has been a significant art technique for over 6,000 years. Small gold artifacts dating to about 5,000 BCE that were dug up in the Near East are evidence of this fact. The Spaniards who invaded South America in the 1500s found small animal figures cast in copper and plated with gold, which they thought were solid gold!

Gold castings done thousands of years ago were used for décor and adornment. By the Middle Ages, lost wax casting was being used to make utilitarian and practical items. Though we are not sure when and how this fascinating process was first developed, we know it was put to a great variety of uses. Today, lost wax casting is one of the more challenging art forms for the amateur lapidary; it can be frustrating and expensive.



The detailed designs on these pure-silver pot necklaces are made possible with the lost wax method.

While small gold objects were cast early on, the development of bronze casting made it possible to cast much larger pieces. Huge bronze castings were done in China perhaps 3,000 or 4,000 years ago, and the Colossus of Rhodes was made of cast bronze sections. This huge statue, over 100 feet high, was built at the mouth of the harbor at Rhodes, an island in the Aegean Sea, some 300 years before the birth of Christ.

How could such a huge casting be made? Oddly, the technique used then is not much different from the way large lost wax castings are done now: in pieces. The larger the casting, the greater the number of separate pieces.

Lost wax casting is not for the faint of heart. It is complicated and fraught with problems the artist must develop the skills and techniques to overcome. An understanding of metals is required to be suc-

RIGHT: Since the wax mold evaporates in the kiln and is lost, each lost wax casting is unique.

LEFT: This Chasing Star kachina was cast in 14K gold using the lost wax method.



cessful. It is a test of an artist's patience, but cire perdue can produce some of the most artful and highly detailed objects you will ever see.

For the amateur, printed information on the art is readily available. One of the latest and most comprehensive small books on lost wax casting is Fred R. Sias Jr.'s text *Lost-Wax Casting: Old, New, and Inexpensive Methods* (Woodsmere Press, 2005).

Lost wax casting gets its name from the fact that an object is made of wax, encased in a molding material called "investment" and then heated to harden the investment and vaporize the original wax model. Thus the wax model is lost! This means every lost wax casting is unique.

Lost wax casting is no simple task. Perhaps the most exciting thing about this technique is when you successfully produce a fine piece of metal art.

A major advantage of casting is that it allows the artist to create exquisite detail such as thin feathers, delicate facial features, every strand of hair on a head, and so on. No other metalsmithing process can achieve the exacting detail possible through the lost wax process.

There is a wide assortment of special waxes made just for casting. They are grouped in two general categories: soft and hard. The soft waxes are easy to shape and work, while hard waxes are better suited to carving and mechanical shaping.

For example, Phoenix, Arizona, artist Lee Epperson, whom I profiled in my article

"Indian Silver Bowls" (March 1989 *Rock & Gem*) uses a small bench lathe to shape hard wax blocks into initial wax blanks for casting small, silver Native American pots. Lee carves traditional designs in great detail in the pot blank. He hollows out the wax pot and casts it in silver.

Another Phoenix artist, Carol Sues, uses softer waxes of different colors to create superb, highly detailed Hopi Indian kachinas before casting them in 0.999 fine silver. Feathers, hair, and body detail are recreated in a lifelike manner. The different types of colored wax help her keep track of the many details of her work as she incorporates them into the final design.

If you decide to try this art, consult with suppliers of waxes and tools for your project. If possible, talk with people who sell waxes or artists who do this work. They can help you decide which waxes and other supplies you'll need. One really excellent source of information is a local college art program or a community or county art pro-

gram, which is often available for a minimal charge. There you will learn the basics, do a few practice castings, and be able to use the equipment they have.

You must understand that lost wax casting is probably the most demanding art form for a beginner to attempt, as it is full of pitfalls, real problems and frustrating results. Before you start, you should talk to other artists who have experienced all the frustrations and problems in casting. You must also understand this is no inexpensive hobby. As a beginner, you might be able to use the equipment available in a college art class or community center class, but eventually, if you are going to do serious casting, you must have all the equipment in hand! But once you've successfully completed a project, you'll be hooked on this marvelous art form.

EQUIPMENT

Equipment is the greatest cost associated with getting started in the art of lost wax. You will eventually need a kiln, a vacuum

For More Information

Lost-Wax Casting: Old, New, and Inexpensive Methods

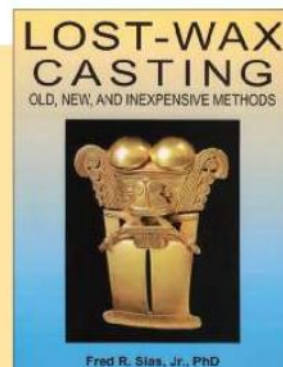
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The different types of colored wax help Carol Sues keep track of the many details of her work as she incorporates them into the final design.

or a centrifuge, and an electromelt. The kiln heats the casting, driving off the wax and hardening the investment. The vacuum is used to pull the molten metal into the mold cavities while pulling the trapped air out. A centrifuge, an alternate source of casting, "throws" the molten metal into the investment cavity to ensure the metal reaches all parts of it. The electromelt liquefies the metal you are going to pour into your mold. You'll also need a flask made of stainless steel to take the heat of the kiln, plus tongs and insulated gloves for handling it.

To make the actual wax model, all sorts of dental picks and narrow blades, a hot wax pen, and maybe an alcohol lamp will come in handy. As you learn the process, you may even construct some home-made tools for your specific needs.

In the early days of this technique, clay was probably the most commonly used investment. Now we use a special investment material made specifically for lost wax work. Art and school programs have wax and investment available for a nominal fee, again helping you decide whether you want to pursue the art of lost wax seriously before you lay out too much cash.

PROCESS

To try your hand at lost wax casting, start with something really simple, perhaps a ring. Of course, you can buy ready-made ring models done in wax, but what's the fun of that?

In order for the molten metal to completely fill the voids in the mold, trapped air must be allowed to escape. This is accomplished through the use of "sprues". If air becomes trapped in the spaces left by the volatilized wax, it will block the flow of the liquid metal. The resulting casting will be incomplete.



This wax model has sprues attached and is ready to go into the flask for investment.



The flask containing the investment mold goes on the vacuum machine, ready for the molten silver.

The cooling effect the investment has on the molten metal as it flows into the mold can also prevent a complete cast. Even though the investment is really hot from being in a kiln, if it cools enough, the molten metal cools too quickly and stops flowing, resulting in an incomplete casting.

Once you've made your wax model you have to add the sprues, tubes made of wax that extend from various parts of the model to the surface of the investment. The word sprue literally means, "hole"; when the wax



Once the flasks are stacked in the kiln, the kiln is brought up to about 1,400 degrees F.



While the molten silver is poured into the hot investment mold, the vacuum pulls air out and silver in.

sprue vaporizes away, it leaves a hole in the investment that can be used to deliver molten metal to all parts of the mold.

The larger and more complicated the piece, the more sprues must be strategically placed to do their job. On a small, simple wax model you only need one to serve as the avenue through which you can pour the molten metal. More complex models need more sprues to allow the molten metal to reach small areas extending off the main body of the object.



To retrieve the cast silver object, the investment is immersed in water, which breaks it down and releases the object.



The residual investment is removed from the small and narrow areas with a dental pick.

The finished wax model is invested in the flask, leaving the top ends of the sprues exposed as an opening into the investment. The flask has to be able to withstand enough heat to vaporize the wax and keep the molten metal hot enough to flow into every crevice or opening.

Once the wax has been vaporized, the investment mold is ready to receive molten metal, be it gold, silver or bronze. The next step is to melt the metal to be poured, whether it be sterling silver, pure silver, or a less costly metal. For relatively small work, an electromelt is used. This is a carbon-lined furnace that resembles a large can with a side handle. It sits on a high-temperature electric hot plate to heat the metal to melting point. The electromelt has a thermometer to record the melting temperatures of the metals, which can exceed 2,700 degrees F.

The molten metal is poured into the sprue opening in the top of the flask. If your original model is very simple and small, the metal will fill the void left by the vaporizing wax and complete your casting.

Anything of significant size or complexity cannot be cast by simply pouring molten metal into the investment. The metal has to be "encouraged" to flow into all the nooks and crannies. This is accomplished in one of two ways. One way is to use centrifugal force to "throw" the metal into the mold. Early on, this was accomplished by hanging the flask on the end of a wire, pouring in the molten metal, and forcefully swinging the flask around in a circle.

The modern method of centrifugal casting uses a machine that looks like a miniature centrifuge used to train test pilots. The flask is mounted in the centrifuge on its side. In front of the sprue end of the flask is a hopper-like receptacle in which the metal is melted. The centrifuge is immediately spun. The resulting force "throws" the molten metal into the flask with enough force to cause the metal to fill all spaces.

The second common way to encourage the molten metal into the investment is the vacuum cast method. The flask has an opening in the bottom and sits in a special base. When the metal is poured, the flask is put on a vacuum machine designed to pull the air out of the investment while pulling the molten metal into the openings.

Once the metal has cooled and solidified, the enclosing investment mold can either be broken away or dissolved away in water to reveal the final casting. If the casting is successful, the object will be a near-perfect replica of the original wax design. Residual investment has to be picked off the casting using dental picks. As you learn about casting, you'll also learn how to deal with metal shrinkage during cooling.

Your work is hardly complete yet. Sticking out of the casting are all the sprues, now made of cast metal. These have to be clipped or cut off and saved for the next casting project. Removing the sprues leaves ugly scars that have to be finished off smoothly by grinding or filing or by using a torch to get the metal to flow a bit. Once that is done, the entire casting has to be polished!

Lost wax casting may be a trial of patience when you first attempt it, but when you complete a successful cast, a feeling of exhilaration encourages you to do it again and again, designing more detailed and larger pieces. Try it! It's one of the premier art forms of metalsmithing. ♦

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Show Dates from page 40

SEPTEMBER 2010

Wed. 10-6, Thu. 10-6, Fri. 10-6, Sat. 10-6, Sun. 10-5; contact Martin Zinn Expositions, P.O. Box 665, Bernalillo, NM 87004-0665, fax (303) 223-3478; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

15-19—DENVER, COLORADO: Show and sale, "Denver Coliseum Mineral Show"; Eons Expositions; Denver Coliseum, 1900 44th St.; Wed. 10-6, Thu. 10-6, Fri. 10-6, Sat. 10-6, Sun. 10-4; free admission; 130 dealers, minerals, fossils, crystals, meteorites, gems, artisan jewelry, gold, services, equipment, displays; contact Lowell Carhart, 7514 Antelope Meadows Circle, Peyton, CO 80831, (719) 886-7046; e-mail: lowellcarhart@yahoo.com; Web site: www.ColiseumShow.com

16—SCHILLER PARK, ILLINOIS: Show, "Rings & Things BeadTour"; Rings & Things; Comfort Suites O'Hare Airport, 4200 N. River Rd.; Thu. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

17-19—BEREA, OHIO: Show and sale; GemStreet USA; The Cuyahoga County Fairgrounds, The Arts & Craft Bldg., 164 Eastland Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; fine gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

17-19—COOS BAY, OREGON: Show, "South Coast Rock & Gem Fest 2010"; Far West Lapidary and Gem Society; 4th St. parking lot, across from Outdoor-In, downtown; Fri. 10-5, Sat. 10-5, Sun. 10-5; dealers, rockhound sales, jewelry, gems, minerals, fossils, rough and finished rocks, tumbled rock, geodes, faceted stones, cabochons, thunder eggs; contact Rocky Pribble, P.O. Box 251, Coos Bay, OR 97420, (541) 572-8301

17-19—DENVER, COLORADO: Show, "Colorado Fossil Expo"; Martin Zinn Expositions LLC; Denver Merchandise Mart Plaza Annex, 451 E. 58th Ave.; Fri. 9-6, Sat. 10-6, Sun. 10-5; adults \$6, seniors and teens \$4; 50 dealers, fossils, meteorites, petrified wood, amber, paleontological exhibits, part of the Denver Gem & Mineral Show; contact Martin Zinn Expositions, P.O. Box 665, Bernalillo, NM 87004-0665, fax (303) 223-3478; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

17-19—ENID, OKLAHOMA: Show; Enid Gem & Mineral Society; Oak Wood Mall, 4125 Owen K. Garriot (Hwy. 412); Fri. 10-6, Sat. 10-6, Sun. 12-5; contact Billy E. Wood, (580) 234-5344

17-19—HOLLAND, MICHIGAN: Show, "Rockhounding: A Green Hobby"; Tulip City Gem & Mineral Club; Holland Civic Center, 150 W. 8th St.; Fri. 9-8, Sat. 9-7, Sun. 11-5; adults \$2, students 50 cents; more than 50 club member, museum and college displays, "green" demonstrations, Petoskey stone polishing, kids' games, touch display, fluorescent mineral display, lapidary demonstrations, silent auction, club sales, children's silent auction, 8 dealers, fossils, minerals, jewelry, lapidary equipment, contact Rebecca Cistaro, 1162 Wintergreen Dr., Holland, MI 49424, (616) 393-9307; e-mail: r4squares@charter.net; Web site: www.tulipcity.org

17-19—LINCOLN, MISSOURI: Show and swap; Mozarkite Society of Lincoln, Missouri; Lincoln City Park; Fri. 10-5, Sat. 9-5, Sun. 10-5; free admission; beading, public digs for Mozarkite; contact Ted Bollick, 1201 S. St., Clinton, MO 64735, (660) 890-4983, or Kay Shaver; e-mail: kayshaver405@wmconnect.com; Web site: www.mozarkite.com

18—GRAND RAPIDS, MICHIGAN: Show, "Rings & Things BeadTour"; Rings & Things; Stars Room, 3221 Plainfield Ave. NE; Sat. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

18-19—CASTLE ROCK, WASHINGTON: Show; Southern Washington Mineralogical Society; Castle Rock Fairgrounds; Sat. 10-6, Sun. 10-4; spin table, gem dig, country store, magnetic sand, gold panning, rock cutting, silent auction, live auction Sat., demonstrations, door prizes, scholarship raffle, black light display, dealers; contact Fran Wolff, P.O. Box 1492, Kalama, WA 98625, (360) 560-2987; e-mail: fwolff@comcast.net

18-19—CLARKSVILLE, INDIANA: Show, "Falls Fossil Festival"; Indiana Society for Paleontology; Falls of the Ohio State Park, 201 W. Riverside Dr.; Sat. 9-6, Sun. 10-5; free admission; vendors, fossils, minerals, books, jewelry, polished stones, guided Devonian fossil bed hikes, Silurian and Devonian fossil collecting piles, Cave-in-Rock mineral collecting pile, children's craft activities, guest speakers, fossil and rock ID, fossil park and museum brochures; contact

continued on page 64

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A GREAT FIND IN Gaithersburg



The Gaithersburg show's upstairs vendor area has grown over the years to fill the entire floor.

Visit a Gem of a Rock Show in Maryland

Story and Photos by Andrea Stein

On one of the first warm and sunny days after a dreary winter with record snowfall, about 1,700 people chose to spend part of their weekend inside, polishing cabochons, marveling at fluorescent rocks, and discovering flint knapping.

50 www.rockngem.com



Ben Pope helps son Alex, 6, choose a gift for Mom with help from younger brother Kyle, 4.



Julian Novoa, 7, examines his mother's discovery at the Mini-Mine exhibit.



Six-year-old Jack Roth answers a question about meteorites on the club's Junior Quiz.

Rock & Gem

When the club placed a sign outside advertising a **“Rock Show”**, a group of *bewildered teenagers* wandered in looking for a **concert**.

These were just a few of the demonstrations and exhibits at the 46th annual Gem, Mineral and Fossil Show held in Gaithersburg, Maryland, on the weekend of Mar. 20-21, 2010. Visitors could also shop for jewelry, gems, minerals, fossils, and other items from vendors like June and Larry Markland, who have been selling June's handmade jewelry here since 1986.

The Gem, Lapidary & Mineral Society of Montgomery County (www.glmsmc.com) holds this popular event in a two-story building on the Montgomery Country Fairgrounds, 20 miles or so northwest of Washington, D.C. The club of about 200 enthusiastic members hosted 22 dealers, 15 demonstrations, and 59 exhibits to share their passion for geology and support awards and scholarships in the earth sciences. According to Mark Dahlman, who co-chaired the show with Pat Repik-Byrne, “we usually see quite a few new members after the show due to people finding out about us”.

After eagerly digging through the Mini-Mine for a colorful stone, children are encouraged to pick up the Junior Quiz and head for the exhibits. They search for answers to questions such as “How are igneous rocks formed?” as they examine the carefully crafted displays. A cave-like area in the back of the room where Publicity Chairman George Durland fascinates everyone with his knowledge of fluorescent rocks and minerals is another favorite stop.

Dan Spielman is a founding member of the club and recalls meeting in a grocery store with Dotty Porter, the group's first president, and several others. “I was the only one to sign up to come back,” he remembers. He returned for the next meeting, which attracted 15 to 20 people, and the club officially formed in 1963.

According to Jack Busch, also an original member of the club, the first show was held at a local high school. When the club placed a sign outside advertising a “Rock Show”, a group of bewildered teenagers wandered in looking for a concert. After this misunderstanding, the event became known as the “Gem, Mineral and Fossil Show”, but children and teens are always welcome and the club encourages youngsters to join and explore the earth sciences as a hobby or career.

The hands-on nature of this club show can awaken an interest in looking for fossils or learning how to wire-wrap a gemstone. And that interest can often be contagious. Jeff Nagy shares a faceting station at the show with his father, William, who picked up the hobby a few years after his son. Nine-year-old Gwen Metrey became interested because of her twin brother Alex's rock collection. And while club member Doug Baum shows children how to polish a cabochon, his wife and son help in other areas.

So next year, if you're in the nation's capital, make a stop in Gaithersburg for the Gem, Mineral and Fossil Show. Unlike Washington's cherry blossoms, the treasures you find here will last a lifetime.💎



Morgan Campbell looks over items for sale by The Mineral House.



Nine-year-old Gwen Metrey, polishing a marble cabochon, became interested in rocks and minerals after her twin brother started a collection.



Geologist Pat Haynes shows Scout Malik Mason a close-up view of mineral structure.



Logan Fawley, 9, learns the technique of flint knapping from Gem, Lapidary & Mineral Society member Mark Seaver.

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OFF THE DOP

by Jim Perkins

Aquamarine



Aquamarine is the traditional birthstone for March. It is a variety of beryl with a Mohs hardness of 7.5 to 8, that is colored greenish blue to blue-green by traces of iron. Recently, a young couple was referred to me by a local jewelry company. They wanted a Princess-cut aquamarine for an engagement ring. They had been rock hunting in North Carolina and really liked aquamarine.

Around the same time, I was doing some work for Jason Adams, an antique and art dealer in Akron, Ohio. He showed me a stunning antique aquamarine set in a platinum ring. The ring has an interesting story from which I think everyone can benefit.

While in Cleveland, Jason found the ring for sale. Since the stone was over 60 carats in weight, the owner was sure it was just a big piece of cut glass and wanted to sell it for only what she thought the metal in the ring was worth. Jason has a keen eye and a knack for finding treasures in other people's trash, so he bought the ring and took it to a gemologist for identification.

It's easy to make incorrect assumptions about estate jewelry, which is why I encourage people to either check the stone with a refractometer or another instrument or have it looked at by a knowledgeable person. It turned out that the stone was not glass, but a fine piece of aquamarine. It is really a stunning collector stone. The color is good and the faceting is amazing for the age of the stone. Big, clean aquamarines are not easy to find or cheap to purchase.

The only steady source of aquamarine I know of is African Gemstones LLC, owned by Hilmar Bosch, from South Africa. My wife's cousin recently purchased a very beautiful piece of aqua from Hilmar and plans to cut it into a stone for his wife, who also wants to wear it as an engagement ring. I'm sure it will be beautiful when he's finished with it.

Some younger people and colored-stone aficionados are beginning to think of colored stones as an engagement ring alternative to diamonds, although diamonds are still the most popular choice among brides. I've had several requests to cut colored stones for engagement rings recently. Aquamarine is second in popularity only to emerald as far as beryl is concerned, and the Princess cut seems to be very popular, as well.

Aquamarine's color range is very narrow: It can be blue, very slightly blue, or green-blue. The name aquamarine is derived from two Latin words: *aqua*, meaning "water", and *marina*, meaning "of the sea". The gem's most valuable color is a moderately strong, medium-dark

blue to slightly greenish blue. Aquamarine's natural crystal shape is hexagonal columns with flat faces. Crystals can be very small or as large as 100 pounds. The color of aquamarine is not heavily saturated, so fashioned aquamarines have to be fairly large to show intense, dark color.

Brazil has been the world's most important source of gem-quality aquamarine since 1811. However, other sources include Pakistan, Zambia, Nigeria, Madagascar and Mozambique. Popular shapes for aquamarine include the emerald cut, round brilliants, ovals, the Princess cut, and the Asher cut. I enjoy cutting beryl in general and finish polishing it on an aluminum oxide lap.

I finished my Princess cut aquamarine as an 8-millimeter stone weighing 2.5 carats. I took it to my gemologist for an appraisal, which I supply to my customers with their stone free of charge.

I showed the aquamarine to my customer, told him the size and carat weight, and left him alone to look it over and think about whether it would be right for him and his fiancé. He examined it carefully for quite a while; I think he was in shock by its brilliance and scintillation. The stone had little extinction in it, too, but that was more technical knowledge than I thought he needed; I didn't want to bore him with details only I found fascinating. The stone I cut was from Brazil and a little pale in color, but color preferences are subjective. Suddenly he announced, "I like it and I'll take it."

After the deal was closed, we spent quite a while talking about gems in general. I never know when I'll meet a person who is interested in gems, but I often meet the most interesting people through lapidary. ♥

Send your comments and questions about any of my columns to Off the Dop, P.O. Box 1041, Medina, OH 44258, or e-mail me at jimperkins@zoominternet.net.



Rock & Gem

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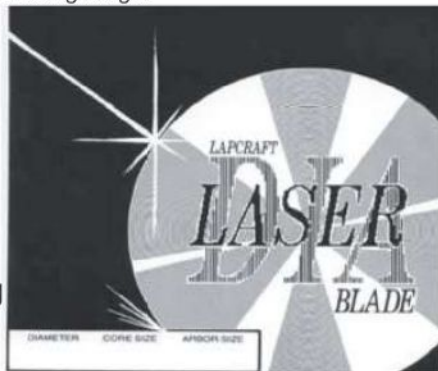
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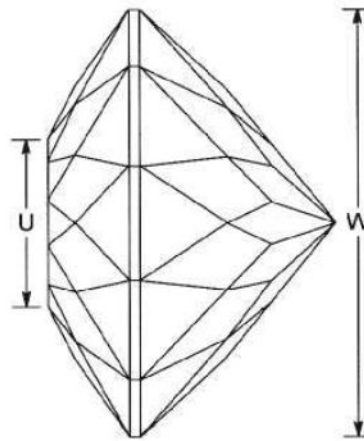
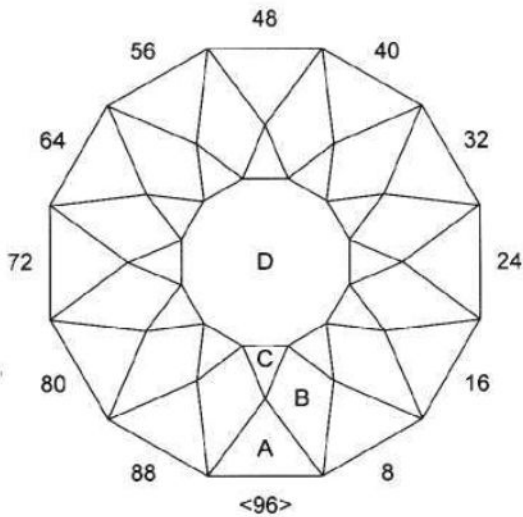
by Guest Faceters

Faceters are welcome to submit their original designs for publication. Mail materials to Many Facets Submissions, *Rock & Gem* magazine, 290 Maple Ct., Ste. 232, Ventura, CA 93003.

Several years ago, I volunteered to teach faceting at the William Holland School of Lapidary Arts, a nonprofit school in northern Georgia. Of course, like almost all instructors, I started all the students on a modified round brilliant design on which I had simplified the angles and index numbers. But I kept getting the question, "Do you have a design that gives a lot of flash, but is simple enough for a beginner to cut?"

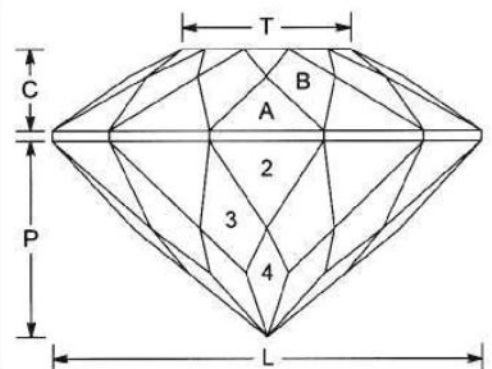
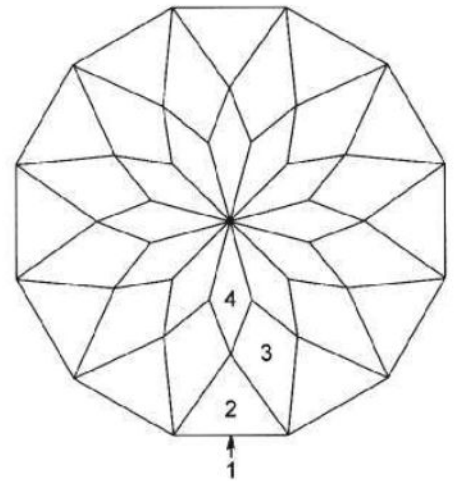
I found that, when I suggested a Portuguese cut, I was told "That looks too complicated" or "It has too many facets; it can't be easy". My answer to this dilemma was to use GemCad to create a Portuguese-type design but give it a name that did not have the word Portuguese in it. Thus was born the Talladega Bonfire. When cut in cubic zirconia and given a good polish, it can produce a stunning effect.

—David Corn



Talladega Bonfire

a 12-sided Portuguese cut for beginning faceters
 Angles for R.I. = 1.750
 73 + 12 girdles = 85 facets
 12-fold, mirror-image symmetry
 96 index
 $L/W = 1.000$ $T/W = 0.392$ $U/W = 0.392$
 $P/W = 0.457$ $C/W = 0.191$
 $Vol./W^3 = 0.236$



PAVILION

1	90.00°	96-08-16-24-32-40-48-56-64-72-80-88	Cut 12 facets of equal width to be the girdle.
2	47.25°	96-08-16-24-32-40-48-56-64-72-80-88	Cut to temporary center point (TCP).
3	43.25°	04-12-20-28-36-44-52-60-68-76-84-92	Cut to TCP.
4	39.15°	96-08-16-24-32-40-48-56-64-72-80-88	Cut to permanent center point.

CROWN

A	35.10°	96-08-16-24-32-40-48-56-64-72-80-88	Establish girdle width.
B	31.25°	04-12-20-28-36-44-52-60-68-76-84-92	Just touch girdle.
C	27.45°	96-08-16-24-32-40-48-56-64-72-80-88	Just touch facet A.
D	0.00°	Table	

When using rough with a R.I. above 1.75, the stone should have a width larger than 8 millimeters.

2010

Lapidary Article of the YEAR CONTEST

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WHO IS ELIGIBLE

U.S. residents only, age 18 and older.

HOW TO ENTER

Submit a step-by-step lapidary project article to *Rock & Gem*. For submission guidelines, visit www.rockngem.com/submissions.asp or write to *Rock & Gem* Writers' Guidelines, P.O. Box 6925, Ventura, CA 93006-9899.

"Lapidary" is defined as the working of precious or semiprecious gem materials or metals into an ornament to be worn or decoratively displayed. How-to stories dealing with the building of lapidary tools, display paraphernalia, and other items are welcome, but are not eligible for the contest.

Authors must complete and return a Contributor Agreement and W-9 form before their entry will be considered for publication. Contact Managing Editor Lynn Varon at (805) 644-3824 ext. 129 or editor@rockngem.com for these forms.

All conditions and requirements of the writers' guidelines and the Contributor Agreement apply.

All step-by-step lapidary projects published in 2010 cover date issues of *Rock*

& *Gem* are eligible for the 2010 contest, regardless of the year of submission, and will be automatically judged.

The number of lapidary project submissions received may exceed the available space. *Rock & Gem* publishes approximately 6 to 12 project article per year.

The authors of all published articles will receive normal payment for the article, as determined by the editor.

If a winning entry was contributed by a separate author and photographer or by multiple authors, one prize will be awarded to the contributors, to be divided as they see fit.

JUDGING

Articles will be judged by a combination of reader response and editorial merit. Readers should send a brief explanation of why a project deserves the big prize to 2008 Lapidary Article of the Year Contest, *Rock & Gem* magazine, 290 Maple Ct., Ste. 232, Ventura, CA 93003 or to editor@rockngem.com.

Don't wait to send in your vote! The deadline for 2010 votes is January 1, 2011. The winner will be notified by January 17, 2011.

Readers may vote for more than one article per year, but are limited to one vote per article.

The final decision will be made by the Managing Editor of *Rock & Gem*.

THE PRIZE

The winner will receive a complete faceting package from Lapcraft Inc. that includes four 8-inch faceting laps (a 360 Islander, a 1200 standard, a 3000 standard, and a Finalap with 50000 diamond slurry), a bottle of 50000 diamond spray, an 8-ounce bottle of Tool Cool, and a DiaLaser diamond saw blade in the winner's choice of size (4 to 8 inches). It is valued at \$550.



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Southern ARIZONA MINES

Six Historic and Inspirational Tours Near Tucson

Story and Photos by Helen Serras-Herman



Famous for its silver production in the 19th century, the Good Enough mine, located in the heart of Tombstone, Arizona, was re-opened for public tours in March 2007.

Many rockhounds visit southern Arizona every year, mostly during the month of February when the gem shows take place in Tucson. Some come only for a few days, while others take advantage of the wonderful mild weather and stay longer. Southern Arizona has been a center for mining exploration for over 100 years. Many mines were discovered and many fortunes in precious metals—gold, silver and copper—have been made and lost.

All southern Arizona's major mines produce valuable copper ore and the highly sought after copper-related minerals turquoise, azurite, malachite and chrysocolla, along with a multitude of secondary minerals. Turquoise from the Bisbee, Arizona, mines is legendary, as is chrysocolla in chalcidony quartz (known as gem silica), some of which occurred in spectacular drusy formations at the old Inspiration mine and the current Ray mine near Globe, Arizona. A lot has been written about these minerals in articles and books over the years. You may not be aware, however, that you can visit some of these mines today.

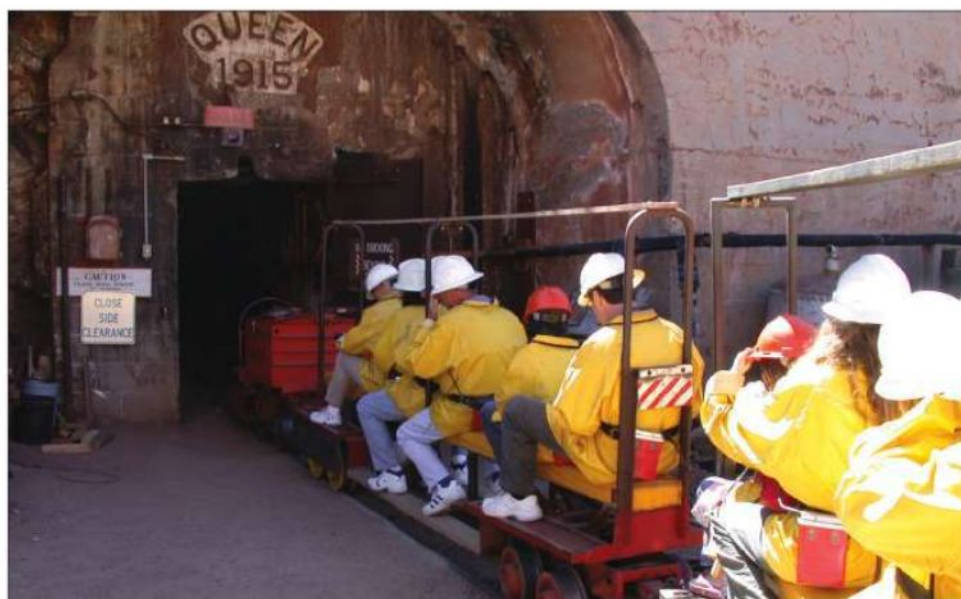
Six mines in southeastern Arizona offer tours or overlooks so that you may get a better understanding of the magnitude of the mining and the processes involved: the Asarco Mission mine, the Good Enough mine, the Tombstone mine, the Queen mine, the Morenci mine, and the Ray mine. All these mines have played a vital role in the population and development of this area.

TOP LEFT: Chrysocolla is the predominant copper oxide mineral at the Morenci Mine, one of North America's largest producers of copper and one of the largest open-pit mines in the world.

TOP RIGHT: Turquoise from the Sleeping Beauty Mine, near Globe, is famous for its solid vibrant blue color and the absence of any matrix.

LOWER LEFT: The huge azurite-malachite specimen outside the front door of the Morenci motel is a welcoming reminder of the great finds of the mine.

LOWER RIGHT: To tour the Queen mine in Bisbee, visitors mount a small train, which takes them 1,500 feet deep into the darkness of the mine.



THE ASARCO MISSION MINE

The Asarco Mission mine, also known as the Pima mine, and the Asarco Mineral Discovery Center are located in Sahuarita, 15 miles south of Tucson on Interstate 19. Five mine tours are conducted every Tuesday through Saturday beginning at 9:30 a.m. The tour begins at the Mineral Discovery Center, which houses a wonderful small museum and theater (both with free admission) and a gift shop. On the tour, you will see how copper ore is mined in the open pit and processed to extract the copper.

The first stop on the one-hour tour is the Open-Pit Viewpoint on the south rim of the Mission mine. Four binocular telescopes provide a close-up view of the trucks and shovels working in the mine, which stretches two miles north to south and 1.75 miles east to west and reaches a depth of 0.25 mile.

You will watch as the haul trucks carry rock ore out of the pit and dump it into the crushers. Next, the inside grinders grind the ore into fine powder. In the concentration tanks, a slurry of water and pulverized ore is mixed with milk of lime to cause the copper minerals to separate and stick to the bubbles (froth flotation process) before the dried copper is sent to the smelter.

Visitors enter the indoor museum exhibit through a model of a ball mill similar to the actual mills that grind copper ore into powder at the nearby Mission mine. The outdoor exhibit is a growing collection of historic mine equipment that tells the story of mining. Also on display are two retired haul trucks that carried 75 and 170 tons of material. They make a great backdrop for your travel photos!

The mine's Web site has a lot of educational information about the process of

producing copper. The tour price is \$8 for adults, \$6 for seniors, \$5 for children ages 5-12, and free for children under 5.

THE GOOD ENOUGH MINE

The mining area of Tombstone at one time included 120 silver mines and more than 3,000 mining claims. The Tombstone mines were mostly independent mines, not owned and operated by one company or corporation.

The Good Enough mine, famous for its silver production in the 19th century, reopened for tours in March 2007, and is located in the heart of Tombstone, which a billboard dubs the "town too tough to die". The mine, located at 5th Street and Toughnut Street, was discovered in 1878 by Tombstone's first miner and founder Ed Schieffelin. The current owners are Shirley DeJournett and her husband, Andree, a for-

mer mayor of Tombstone. Their company, Tombstone Consolidated Mining Co., spent a lot of time and money to restore the mine galleries, obtain the necessary permits, and open it to the public.

The approximately one-hour guided tour of the mine is a walking underground journey that takes visitors to a depth of 100 feet and offers a glimpse of Tombstone's 130 years of history. After being fitted with safety mining hard hats and bright lime green and orange vests, visitors walk down a slope and enter the mine through a cave-like opening. Descending a long flight of steps brings you to a familiar mine scene: tunnels and stopes, darkness, limestone rock walls, and chrysocolla veins.

The Good Enough mine opens daily at 9 a.m. and tours are led every hour on the hour. Admission is \$15 per person, \$12 for seniors, \$8 for ages 6 to 12, and free for children under 5.

The Tombstone mine is currently being restored, but is still closed to the public. It was Schieffelin's first mining claim, and wonderful cabbage-grade material is still coming out. This complex "Tombstone Ore" is known to contain silver, gold, chrysocolla, manganese, iron, lead, zinc and tungsten, along with rare halides and tellurides. The material is sold through Wayne Chartier, a local miner, and Betty Krug, of the Rhinestone Cowboy, a rock and jewelry shop in Tombstone, and is popular with lapidaries.

You can, of course, spend a wonderful day in Tombstone, a National Historical Landmark, diving into the local history, visiting the original site of the OK Corral

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gunfight, and enjoying the colorful re-enactments. Tombstone is only one hour, 20 minutes from Tucson, about 72 miles from the Convention Center.

THE QUEEN MINE

About a two-hour drive southeast of Tucson is the old town of Bisbee. Due to their close proximity, you may choose to visit both Tombstone and Bisbee in one day. Make sure your start early in the morning and remember that you will have to hustle in both places.

With historic hotels and restaurants, world-class museums, and many art and antique shops, Bisbee is on the National Registry of Historic Districts. The town, which was mostly built on the hillsides, was a booming mining community in the 1880s after the rich copper deposits were discovered in the area. Thousands of miners flocked in, and Bisbee became the largest city between St. Louis and San Francisco. Today, its well-preserved Victorian-era style buildings offer a glimpse of past grandeur.

To the gem and mineral lover, Bisbee is well known for classic copper minerals. A few shops offer local minerals and finished jewelry for sale, and the Bisbee Mining & Historical Museum recently remodeled its terrific mineral exhibit with the help of the Smithsonian Institution.

Just across the street from the museum is the Queen mine. DeWitt Bisbee, of San Francisco, purchased the mine with a group of investors in 1880. It was one of the most productive copper mines of the 20th century, producing 8 billion pounds of copper, 2.8 million ounces of gold, and 77 million



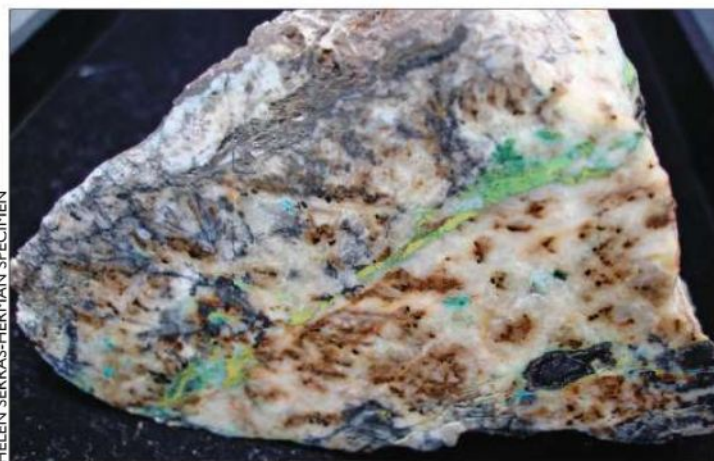
During the Asarco Mission mine tour, you will see the haul trucks carrying ore out of the pit and dumping it into the crushers.



In the Asarco Mission mine's concentration tanks, a slurry of water and pulverized ore is mixed with milk of lime to separate the copper minerals.



In the view from the overlook, the Ray mine stretches as far as your eyes can see, measuring 2.5 miles long and 1.5 miles wide.



HELEN SERRAS-HERMAN SPECIMEN

This specimen of complex "Tombstone Ore" is known to contain silver, gold, chrysocolla, manganese, iron, lead, zinc and tungsten, along with rare halides and tellurides.

pounds of silver—unimaginable numbers! It also produced the signature "Bisbee blue" turquoise, famous for its gorgeous, saturated, deep blue color.

Phelps Dodge Corp. closed the Bisbee underground mines in 1975. With the mayor and many volunteers helping to clean the site and re-timber the old workings, the Queen Mine Tour opened to visitors in 1976. Five tours depart each day, seven days a week, from the Queen Mine Tour Building. You'll be outfitted in a yellow slicker, a hard hat, and a miner's headlamp, then mount a small train that will take you 1,500 feet deep into the darkness of the mine. As the train runs through the tight tunnel, guides and participants direct their head lamps at the rock walls to illuminate some beautiful rock formations.

Most of the tour guides are retired Phelps Dodge employees and give a firsthand account of their mining days and of the history of the Bisbee mines. Several pieces of mining equipment are set up inside the mine and the tour guide explains their usage and history. The temperature inside the mine is always a cool 47 to 50 degrees F!

This incredible tour lasts approximately 1 hour and 15 minutes, and the cost is \$12 for adults, \$5 for ages 4-15, and free for children under 4. At the main building, there is also a wonderful exhibit of rocks and minerals, many of them local, and some are available for sale. Before leaving the area, be sure to stop at the scenic overlook just south of the mine, where you can view the now-closed Lavender open pit.

THE MORENCI MINE

The Morenci Mine is one of North America's largest producers of copper and one of the largest open-pit mines in the world.

The predominant copper oxide mineral is chrysocolla, chalcopyrite is the dominant primary copper sulfide, and chalcocite is the most important secondary copper sulfide.

The open-pit mine and processing facility, owned until 2007 by Phelps Dodge, is now owned and operated by Freeport-McMoran Copper & Gold, a company that has a total of five operating copper mines in North America: Morenci, Bagdad, Sierrita, Safford and Tyrone. The Morenci mine is located near the town of Clifton, in eastern Arizona, about a three-hour drive from Tucson.

In its first venture into mining, New York mercantile Phelps Dodge & Co. invested \$50,000 in the property in 1881. Through acquisition, Phelps Dodge consolidated all mining operations in the district by 1921. Initially an underground mine, the Morenci began transitioning to open-pit mining in 1937. At the urging of the U.S. government, the operation nearly doubled its production capacity during World War II to meet wartime needs.

The two-and-a-half-hour guided tour is conducted every Friday and Saturday at 9 a.m. and 1 p.m. Reservations are required and a small admission fee is charged. The "Copper Guides", mostly former Phelps-Dodge miners with a lot of experience and stories, welcome the participants near the front desk of the Morenci Motel, the company motel, in the heart of the mine community. It is the only accommodation in the area, unless you stay in Safford, 33 miles away (about an hour's drive). The mine workers stay at the motel Sunday through Friday morning, and when they go home for the weekend, tourists can stay Friday and Saturday nights. My husband and I did just that, driving up on Friday and staying at the Morenci Motel that night to be ready

for the tour in the morning. The huge azurite-malachite specimen outside the front door of the motel is a reminder of the great finds of the mine.

Before the Morenci tour, participants are briefed about the tour itinerary and given a short slide presentation about the mine's copper ore and the high-tech processes used to extract it. Then they board a climate-controlled tour bus and head out. The bus makes stops at several spectacular overlook points that enable you to experience the enormity of the operation. The view from the Coronado Overlook presents a vista that seems to never end. You can get off the bus and see the various processing steps, from taking raw ore from the ground and carried by the huge trucks that carry 270 tons of ore on tires almost 12 feet in diameter, to the crushers and concentrate tanks, to the finished, 98 percent pure copper slabs, ready to be sent to the refinery in Texas. The remaining 1 percent of valuable impurities include gold, silver, platinum, palladium, antimony, nickel sulfide, selenium and tellurium, which are sold separately. Closed-toe shoes are required for the tour, and shirts with sleeves are recommended.

This tour is an incredible experience. The mine's size is amazing, and visiting the facilities where the copper separates from the solution and the copper plates are created and stacked is truly amazing. At its peak in 2007, the mine employed more than 2,000 employees who worked around the clock, producing about 840 million pounds of copper each year.

The Morenci mine is 175 miles from Tucson, about three hours from the Convention Center. The town of Clifton is about 4.4 miles south of the mine and has a couple small restaurants and shops, but is

largely a ghost town. Thousands of miners abandoned it after the big copper crash of the 1980s.

THE RAY MINE

Although the Ray mine's operations are closed to the public, a spectacular overview of the mine is located about 70 miles northeast of Tucson, 18 miles northwest of Hayden, near the town of Kearny on state Route 177. The mine stretches as far as your eyes can see, measuring 2.5 miles long and 1.5 miles wide. The highest mining point to date is 3,000 feet in elevation and the lowest mined area is at 800 feet. The mine has been operating for 34 years with a 250,000 ton-per-day mine production and a 103 million-pounds-per-year solvent extraction-electrowinning operation.

Turn right at the big sign "Asarco-Ray Open Pit Mine Visitor's Overlook" and drive a short way on the dirt road. The overlook is open daily from 7 a.m. until dusk. A covered pavilion supplies shade from the harsh sun and photos and information about the mine. There is also some mine equipment, a huge shovel, and the perennial photo favorite, an enormous truck tire.

A historical marker at the overlook offers a glimpse of immigrant history. Mexican miners working for Ray Consolidated Copper built the nearby town of Sonora in 1911. It was a thriving, dynamic community, rich in Mexican culture, language and traditions. In the mid-1950s, expansion of the open pit began encroaching on the town, and by 1965 it was necessary to close Sonora and relocate the miners to a new town named Kearny. Sonora was demolished in 1966. My husband, Andy, comes from the coal regions of eastern Pennsylvania, where the coal company still relocates towns in order to get to the rich veins. Listening to these stories, he always feels a lump in his throat.

If you visit the Ray mine after touring the Morenci mine, you can make a loop from Tucson: Take Interstate 10 southeast, then north to U.S. Highway 191 and continue north to Safford to visit the Morenci mine; follow U.S. Highway 70 northwest to the historic towns of Globe and Miami; take U.S. Highway 60 south to Superior and the Ray mine; and finally travel state Route 77 back to Tucson.



Guests are fitted with safety mining hard hats and bright lime green-and-orange vests for the underground tour of the Good Enough mine.



Inside the Queen mine, tour guides explain the usage and history of various pieces of mining equipment and give firsthand accounts of their own mining days.

THE SLEEPING BEAUTY MINE

Near Globe is one of the very few still operating turquoise mines, the Sleeping Beauty mine. This turquoise is famous for its solid blue color and lack of matrix. Although the mine itself is closed to the public for safety and insurance reasons, a visit to the True Blue Jewelry & Gift Shop will give you a good idea of what the rough and finished turquoise looks like.

There are a couple more worthwhile stops in the old mining towns of Miami and Globe. You can learn some of Miami's early mining history at the Bullion Plaza Cultural Center & Museum, housed in a beautiful neoclassical school building, which is listed on the National Register of Historic Places. Some incredible mining equipment is displayed inside the museum and on the front lawn. The museum is open Friday and Saturday from 11 a.m. to 3 p.m.

The Center of Arts in downtown Globe has rotating contemporary art exhibits. While you're there, take a look at the beautiful, shimmering copper-covered head rails in the upper level entrance to the theater, a reminder of the rich copper history of the area. Also in Globe, the Gila County Historical Museum has displays of Native American and pioneer artifacts and exhibits on the lives of the miners in early Globe, ore cars, and large mining equipment.

One last stop less than 1.5 miles from downtown Globe, at the Besh-Ba-Gowah Archaeological Park, will complete your journey into local history. At the Hohokam reconstructed ruins, visitors are allowed to walk through a 700-year old pueblo, climb ladders to the upper-level rooms, and view the furnishings typical of the era. Numerous artifacts are on display inside the museum. The park is open daily from 9 a.m. to 5 p.m.

As with any other rockhounding field trip, remember the safety rules, wear comfortable clothes and shoes, carry plenty of water, follow all the mine regulations, and listen to your guides, and you will have an unforgettable time visiting these awe-inspiring mines. Before making any of these visits, check with the mines for current times, prices and regulations.

Visits to these mines will give you a broader appreciation of the lengthy process of mining precious metals, pique your interest in collecting these rare minerals and gems, and possibly inspire you to create some beautiful artwork with them.

Unfortunately, you are not free to rockhound for specimens at most of these mines unless you go in with a special group. Every year in October, the Bisbee Mining & Historical Museum organizes a turquoise hunt at Bisbee's #7 Legacy mine tailings. Reservations are required—call the Bisbee Mining & Historical Museum at (520) 432-7071—but don't despair! You may do some great "indoor rockhounding" at various local rock and mineral shops and museum gift shops. To quote my husband, "If we can't find it, we can buy it!"

Helen Serras-Herman is an acclaimed gem sculptor with over 26 years of experience and a 2003 National Lapidary Hall of Fame Inductee. See her work at her Web site, www.gemartcenter.com.

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April 9 - 11, 2010

Raleigh, N. Carolina -
Kerr Scott Building, State Fairgrounds

April 30 - May 2, 2010

Houston Texas -
Houston Fine Mineral Show, Embassy Suites Hotel, Room 201

August 13 - 15, 2010

Springfield, Massachusetts -
Eastern States Exposition Center

September 15 - 19, 2010

Denver, Colorado -
Holiday Inn North, Room 115

October 8-10, 2010

Detroit, Michigan -
South Macomb Community College Expo Center,
Warren, Michigan

November 12 - 14, 2010

Houston, Texas - Humble Civic Center



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18-19—HARTLAND, MICHIGAN: Annual show; Livingston Gem & Mineral Society; Old Hartland High School, 9525 Highland Rd.; Sat. 10-7, Sun. 10-4; adults \$2, students 50 cents, children free; dealers, demonstrators, flint knapping, children's games, wire wrapping, show cases; contact Chuck Amberger, 20815 Dixboro, South Lyon, MI 48178, (248) 446-0818; e-mail: camber2@sbcglobal.net

18-19—PASO ROBLES, CALIFORNIA: 19th annual show, "Rockhound Roundup"; Santa Lucia Rockhounds, Pioneer Park, 2010 Riverside Dr.; Sat. 10-5, Sun. 10-5; free admission; exhibits, raffle prizes, silent auction, demonstrations, youth activities, rocks, gems, minerals, fossils, meteorites, crystals, beads, carvings, lapidary equipment; contact Kim Patrick Noyes, 7343 El Camino Real #301, Atascadero, CA 93422, (805) 610-0603; e-mail: kimnoyes@gmail.com

18-19—REDWOOD CITY, CALIFORNIA: 44th annual show, "Harvest of Gems"; Sequoia Gem & Mineral Society; Community Activity Bldg., 1400 Roosevelt Ave.; Sat/ 10-5, Sun. 10-5; free admission; kids' activities, dealers, member displays, silent auction, earth science room; contact Carol Corden, P.O. Box 1245, Redwood City, CA 94064, (650) 248-7155; e-mail: ccorden@earthlink.net; Web site: http://sgms.drifmine.com

18-19—RHINEBECK, NEW YORK: 41st annual show and sale, "The Hidden Beauty of Stone"; Mid-Hudson Valley Gem & Mineral Society; Dutchess County Fairgrounds; Sat. 10-5, Sun. 10-4; adults \$5, seniors \$4, students \$2, children 12 and under and Scouts in uniform free with adult; 30-plus dealers, minerals, gemstones, fossils, meteorites, jewelry, 6 free rocks for kids, exhibits, fluorescent booth, lapidary demonstrations, wholesaler; contact Carolyn Reynard, (845) 471-1224; Web site: www.mhvgms.org

18-19—SCARBOROUGH, TORONTO, CANADA: 42nd annual show, "Wonders of the Earth"; Gem & Mineral Club of Scarborough; Don Montgomery Community Centre, 2467

Eglinton Ave. E; Sat. 10-6, Sun. 11-5; adults \$5, children \$1; dealers, jewelry, minerals, fossils, displays, lapidary demonstrations, live auction, silent auction, kids' auction, door prizes, kids' quarry; contact GMCS, (416) 282-5319; Web site: www.scarbgemclub.ca

19—NOVI, MICHIGAN: Show, "Rings & Things BeadTour"; Rings & Things; Sheraton Detroit Novi, 21111 Haggerty Rd.; Sun. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

21—INDEPENDENCE (CLEVELAND), OHIO: Show, "Rings & Things BeadTour"; Rings & Things; Skyline Hotel and Conference Center, 5300 Rockside Rd.; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

23—WEST HENRIETTA (ROCHESTER), NEW YORK: Show, "Rings & Things BeadTour"; Rings & Things; RIT Inn & Conference Center, 5257 W. Henrietta Rd.; Thu. 12-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

24-26—SALT LAKE CITY, UTAH: Show, "Gem Faire"; Gem Faire Inc.; South Towne Exposition Center/Exhibit Hall 3, 9575 S. State St.; Fri. 12-7, Sat. 10-6, Sun. 10-5; weekend pass \$5; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

24-26—SAN BERNARDINO, CALIFORNIA: Show, "OBMS Tail Gate Gem & Mineral Show"; Orange Belt Mineralogical Society; Western Regional Little League Ball Park, 6707 Little League Dr.; Fri. 9-dusk, Sat. 9-dusk, Sun. 9-dusk; free admission; rocks, jewelry, tools, lapidary display, education, kids' event, kids' club, silent auction, raffle, workshop; contact Shane Ripley, 205 W. Benedict #8, San Bernardino, CA 92408, (909) 557-3605; e-mail: OBMS_PR@yahoo.com; Web site: http://obmsrocks.yolasite.com

25—BURLINGTON, (BOSTON), MASSACHUSETTS: Show, "Rings & Things BeadTour"; Rings & Things; Hilton Garden Inn Boston-Burlington, 5 Wheeler Rd.; Sat. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

25-26—FRANKLIN, NEW JERSEY: 54th annual show; Franklin Mineral Museum; Franklin School, Washington Ave.; contact Lee Lowell, (973) 827-6671

25-26—MISSOULA, MONTANA: Show, "Big Sky Rocks"; Hellgate Mineral Society; Ruby's Reserve Street Inn, 4825 N. Reserve St.; Sat. 10-6, Sun. 10-5; contact Bob Riggs, 14 Holiday Ln., Missoula, MT 59801, (406) 543-3667

25-26—MONTEREY, CALIFORNIA: 51st show; Carmel Valley Gem & Mineral Club; Monterey Fairgrounds, 2004 Fairgrounds Rd.; Sat. 10-6, Sun. 10-5; adults \$3.50, senior \$2.50, children free with adult; exhibits, kids' stuff, grab bags, door prizes, wheel of fortune, demonstrations (fossil impressions, sphere making, silver jewelry making, grinding and polishing gemstones); contact Janis Rovetti, 1047 Roosevelt St., Monterey, CA 93940, (831) 657-1933; e-mail: janis12@sbcglobal.net; Web site: www.cvngms.org

25-26—OSHKOSH, WISCONSIN: 39th annual show; Oshkosh Earth Science Club; Sunnyview Expo Center, 500 E. County Rd. Y; Winnebago County Fair Grounds; Sat. 9-5, Sun. 10-4; adults \$2, students with ID \$1, children under 12 free; rocks, minerals, fossils, lapidary arts, jewelry, more than 80 vendors, private collections, Weis Earth Science Museum exhibits, kids' rock polishing and painting, take-home specimen kits, grab bags; contact Bob Fox, (920) 235-4669; e-mail: oesc-webmaster@hotmail.com; Web site: www.oesclub.com

25-26—SHARONVILLE, OHIO: Show; BeadStreet USA; The Sharonville Convention Center, 11355 Chester Rd.; Fri & Sat 11am; Sun 11am-5pm; vintage beads, Swarovski crystals, lampwork, precious metal findings, gemstones, supplies; contact Jane Strieter Smith, (216) 521-4367; Web site: www.beadstreetusa.com

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25-26—SOUTH SIOUX CITY, NEBRASKA: 45th annual show; Siouxland Gem & Mineral Society; South Sioux City Senior Center, 1501 W. 29th St.; Sat. 9-6, Sun.10-4; adults \$1.50, students (12 and older) 50 cents, children under 12 free; exhibits, four dealers, agates, rough and polished specimens, gems, beads, geodes, minerals, superb faceted jewelry, fossils, door prizes, spin the wheel, silent auction, displays, Siouxland dinosaur hunters' exhibits; contact Bob Powell, (712) 378-2775

25-26—TRAVERSE CITY, MICHIGAN: Annual show; Grand Traverse Area Rock & Mineral Club; Grand Traverse Heritage Center, 322 Sixth St.; Sat. 10-5, Sun. 11-4; adults \$2, children free with adult; dealers, rocks, gems, minerals, jewelry, demonstrations, jewelry making, rock cutting and polishing, kids' area; contact Cynthia Vaughn, (231) 276-6150; e-mail: Maple2b@aol.com

26—NORTH HAVEN, CONNECTICUT: Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn North Haven (Emerald Ballroom 1), 201 Washington Ave.; Sun. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

26-27—BLOOMINGTON (MINNEAPOLIS), MINNESOTA: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Ramada Inn Mall of America Hotel and Convention Center, 2201 E. 78th St. (I-494 at 24th Ave. S. Exit); Sun. 11-6, Mon. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

27—EAST HANOVER, NEW JERSEY: Show, "Rings & Things BeadTour"; Rings & Things; Ramada Inn and Conference Center (Ballroom), 130 Rte. 10W; Sun. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

28—ESSINGTON (PHILADELPHIA), PENNSYLVANIA: Show, "Rings & Things BeadTour"; Rings & Things; Ramada Inn Airport (Ballroom B, C & D), 76 Industrial Hwy.; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

30—PITTSBURGH, PENNSYLVANIA: Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn - RIDC, 180 Gamma Dr.; Thu. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

SEPTEMBER-OCTOBER 2010

28-3—IDABEL, OKLAHOMA: Show and sale; McCurtain Gem & Mineral Club; Museum of the Red River, 812 SE Lincoln Rd., Hwy. 70 S. bypass; Tue. 9-5, Wed. 9-5, Thu. 9-5, Fri. 9-5, Sat. 9-5, Sun. 11-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Doris Perkins, 405 SE Ave. G, Idabel, OK 74745, (580) 286-3133; e-mail: rperkins8236@sbcglobal.net

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1—COLUMBUS, OHIO: Show, "Rings & Things BeadTour"; Rings & Things; Crowne Plaza - Columbus North, 6500 Doubletree Ave.; Fri. 2-6; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

1-3—ANCASTER, ONTARIO, CANADA: Show, "Ancaster Gem, Mineral, Bead & Jewellery Show"; Robert Hall Originals; Ancaster Fairgrounds, 630 Trinity Rd.; Fri. 9:30-4:30, Sat. 10-6, Sun. 10-5; adults \$6, children under 12 free; jewelry, crystals, fossils, rocks, more than 30 dealers, free seminars; contact Robert Hall Originals, P.O. Box 29, 138 Sugar Maple Rd., St. George, ON, N0E 1N0, (519) 448-1236; e-mail: rockshow@roberthalloriginals.com; Web site: www.roberthalloriginals.com

1-3—INDIANAPOLIS, INDIANA: 12th annual show; Treasures Of The Earth Gem & Jewelry Shows; Indiana State Fairgrounds, Ag/Horticulture Bldg., 1202 E. 38th St.; Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$5 (3-day ticket), children under 16 free; jewelry makers, goldsmiths and silversmiths size, reconstruct, repair, design or make original jewelry from customer-selected gems, stones, opals and crystals, wire wrap, wire sculpture, stone beads, pearls, stone setting, dealers, amber, opal, fossils, minerals, door prizes, grand

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OCTOBER 2010

prize, 500 Earth Science Club display, silversmithing demonstrations and classes, lampwork bead demonstrations, wire wrapping classes; contact Van Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: vawimmer@verizon.net; Web site: www.toteshows.com

1-3—LIVONIA (DETROIT), MICHIGAN: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Embassy Suites, Livonia/Novi, 19525 Victor Pkwy.; Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

1-3—SARASOTA, FLORIDA: Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Trail (Hwy. 41); Fri. 10-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave. #203, Sarasota, FL 34236, (941) 954-0202; e-mail: frankcox@comcast.net; Web site: www.frankcoxproductions.com

2—CINCINNATI, OHIO: Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn - I-275 North (Ballroom), 3855 Hauck Rd.; Sat. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

2-3—JACKSONVILLE, ARKANSAS: Show; Central Arkansas Gem, Mineral & Geology Society; Jacksonville Community Center, 5 Municipal Dr.; Sat. 9-5, Sat. 9-5; free admission; more than 100 tables, more than 20 dealers, demonstrations, exhibits, door prizes, kids' dig, mineral identification; contact Pat Kissire, 4900 Sparks Rd., Little Rock, AR 72210, (501) 821-2346; e-mail: pkissire@sbcglobal.net; Web site: www.centralarkrockhound.org

2-3—JEFFERSON, WISCONSIN: 38th annual show; Rock River Valley Geological Society; Jefferson County Fair Park, Jackson and Peurmer Rd.; Sat. 10-5, Sun. 10-4; dealers, minerals, rocks, fossils, gems, jewelry, demonstrations (wire wrapping, faceting, cabochon cutting); contact Robert Schweitzer, (920) 674-2544

2-3—LEXINGTON, KENTUCKY: 20th annual show and sale; Rockhounds of Central Kentucky; Kentucky National Guard Armory, 4301 Airport Rd.; Sat. 10-6, Sun. 12-5; adults \$1, children 6-12 50 cents, or \$3 per family, Scouts in uniform free; dealers, minerals, jewelry, equipment, club sales and exhibits, Kentucky agate, door prizes, kids' quarry, silent auctions; contact Allen Ferrell, (859) 277-2469; e-mail: KYROCK2010Kentucky@yahoo.com; or Lamon Flynn (606) 726-9237; e-mail: flyrebec@aol.com; Web site: www.lexingtonrockclub.com

2-3—OMAHA, NEBRASKA: 55th annual show; Nebraska Mineral & Gem Club; Westside Community Center, 108th and Grover St.; Sat. 9-6, Sun. 10-5; contact Tim Kutsch, (402) 397-9606; Web site: www.nerockgem.us

2-3—WAYNESBORO, VIRGINIA: 43rd annual show; Shenandoah Valley Gem & Mineral Society; Kate Collins School, 1625 Ivy St.; Sat. 10-6, Sun. 12-5; admission \$1; eight dealers, gems, minerals, cutting material, jewelry, beads, door prizes; contact Roland Stetler, (540) 463-6098; e-mail: Kenneystetler@embarqmail.com

3—INDIANAPOLIS, INDIANA: Show, "Rings & Things BeadTour"; Rings & Things; Crowne Plaza Hotel - Indianapolis Airport, 2501 S. High School Rd.; Sun. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

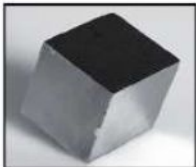
7-9—MOUNT IDA, ARKANSAS: Show, "Quartz, Quiltz and Craftz Festival"; Mount Ida Area Chamber of Commerce; Montgomery County Fairgrounds, Fairgrounds Rd.; Fri. 9-5, Sat. 9-5, Sun. 10-4; free admission; dealers, minerals, jewelry, quartz crystals, kids' crystal digging contest; contact Maureen Walther, Mount Ida Area Chamber of Commerce, Mount Ida, AR 71957, (870) 867-2723; e-mail: director@mtidachamber.com; Web site: www.mtidachamber.com

7-9—MOUNT IDA, ARKANSAS: 22nd Annual World's Championship Quartz Crystal Digging Contest; Mount Ida Area Chamber of Commerce; Montgomery County Fairgrounds, Fairgrounds Rd.; Thu. 9-3, Fri. 9-3, Sat. 9-3; adults \$80 (\$95 late registration); meet other miners, keep all you find, maybe even win a prize; contact Maureen Walther, Mount Ida Area Chamber of Commerce, Mount Ida, AR 71957, (870) 867-2723; e-mail: director@mountidachamber.com; Web site: www.mountidachamber.com

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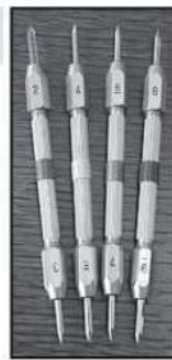


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Index to Advertisers

Ackley's Rocks	24	Lakeland Gem Club, Ltd.	57
Agate Days Rock Show	55	Lamberton Rake	42
Amateur Geologist	41	Lapcraft, Inc.	53, 55
Arrowhead Lapidary & Supply	36	Lasco Diamond Products	17
Au-Rus Wax Patterns	54	Lehigh Mineral Auction	49
AZ Timeless Treasures	49	Daniel Lopacki Co.	65
B&J Enterprise/Joyce Emerson	54	Lortone, Inc.	27
B&L Minerals	49	Joseph Maccarelli	54
Badger Sintered Tools	23	Majestic Press, Inc.	40
Barranca Diamond	35	MarZee Lapidary Tutorial DVDs	54
Beautiful Agates	49	Metalliferous	53
John Betts — Fine Minerals	35	The Mineral Gallery	49, 54
Bezel Form	23	Mineral of the Month Club	53
Bonanza Opal Mines, Inc.	49	Mineralab	66
CabStar Professional	23	Mineralman	49
Capistrano Mining	49	Minerals Unlimited	19
CarTopCampers.com	54	Miner's Keepers	66
Cascade Locks	24	Minertown	49
Collectorcabz.com	40	Minnesota Lapidary Supply Corp.	42
J S Copti	55	Nature's Outback	49
Covington Engineering	25	New Era Gems	47
Crystal Cave	54	North Coast Faceting	54
Crystal Grove	49	Northwest Distributors	43
Crystal Moon Gallery	54	Oakrocks.net	49
Deepak Gems	49	On the Rocks Gems, Jewelry & More, Inc.	55
Diamond Pacific Tool Corp.	C3	Optima Gem	52
Dragonsaye Auctions	49, 55	Oxy Rocks	55
Earthworks	26	Pickens Minerals	54
Easy Steps Video	24	Pioneer Gem Corp.	52
Bill Egleston	41	Polaris Tool & Machine	52
Eloxite Corp.	63	Polymetric Instruments, Inc.	54
Eon's Expositions	25	Pretty Rock	55
Facet Shoppe	26	Raytech Industries	37
Fac-Ette Manufacturing, Inc.	C4	Blaine Reed	54
Faceting Dials	47	Research Unlimited	54
Fall Creek Rock Shop	55	Rockaway Opals	49
Fine Mineral Show	54	The Rock Peddler	54
Fire Mountain Gems	9	Rocks & Minerals	49
John E. Garsow Gems & Minerals	41	Rock Star Jewelry Design	49
Gem & Lapidary Wholesalers, Inc.	15	Ross Metals	3, 5
Gem Center USA Inc.	27	Sapphire Mining	49
Gem Faire, Inc.	10	Search4Gems	55
Gem-Fare	40	Shipwreck Beads	19
The Gem Shop	25	South Pacific Wholesale Co.	28
Gem Miner's Jubilee	27	Joseph P. Stachura Co., Inc.	24
Gemological Institute of America	49	Super Agates	49
Gems by John, LLC	55	Sylmar Displays	18
The Geode Gallery	18	TFG Collector	34
Geological Wonders	49	Tagit	43
Georgia Rock Shop	34	Tru-Square Metal Products	37
Gilman's	42	U.S. Geological Supply	63
Great South Gem & Minerals, Inc.	35	Ultra Tec	C2
William Holland School of Lapidary Arts	43	Unique Tool	70
Hughes Associates	36	The Universe Collection	18
Inland Lapidary	29, 65	VR Gem Cutters	29
Imperial Manufacturing	54	The Village Smithy Opals, Inc.	19, 55
JS Gems Lapidary	48, 55	Whittmore Durgin Glass Co.	55
Jarvi Tool Co.	66	Wright's Rock Shop	49, 63
Jeanne's Rock & Jewelry	55	Martin Zinn Expositions, LLC	11
Jesco Products, Inc.	26		
Katy Rock Shop	49		
Kingsley North, Inc.	7, 28, 36		
Kino Rocks & Minerals	51		
Knight's	54		
Kristalle	49, 64		

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[May 2008, Vol.38 Num.5](#)

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Six mines in Southwestern New Hampshire *by R.W. Ballou*

[April 2007, Vol.37 Num.4](#)

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Fine specimens flood the market *by Bob Jones*

[September 2006, Vol.36 Num.9](#)

Rock & Gem Kids

Fluorite and a Mohs hardness test kit *by Steve Decker*

[March 1998, Vol.28 Num.3](#)

Fluorite

The bright idea behind Tucson's theme mineral *by Bob Jones*

FOSSILS

[April 2010, Vol.40 Num.4](#)

Indiana Archimedes

Collecting bryozoan fossils off Interstate 64 *by Robert Beard*

[March 2010, Vol.40 Num.3](#)

Tea's First Rockhounding Adventure

Utah rocks and fossils make a memorable time *by William A. Kappel*

[December 2009, Vol.39 Num.12](#)

Rock Science

Carbonized Fossils *by Steve Voynick*

[August 2009, Vol.39 Num.8](#)

Rock & Gem Kids

Turritella fossils, a junior lapidary, and a quiz

Black Water and Bones

Hunting fossils in South Carolina's Cooper River *by Richard Jacquot*



[April 2009, Vol.39 Num.4](#)

Montana's Jurassic Fossils

Collecting opportunities east of Bridger *by Kenneth H. Rohn*

[July 2008, Vol.38 Num.7](#)

British Columbia Fossils

Five collecting spots, one vacation *by William A. Kappel*

[June 2007, Vol.37 Num.6](#)

New Facts about Old Fossils

A traveling exhibition sheds new light on ancient creatures *by Murray Eiland*

[May 2007, Vol.37 Num.5](#)

House of Rocks

The Rice Northwest Museum of Rocks & Minerals *by Bob Jones*

Fossil Insects

The smallest fossils tell a big story *by Murray Eiland*

[September 2006, Vol.36 Num.9](#)

Dogtooth Mercenaria

Collecting calcite-filled clams at Rucks' Pit, Florida *by Everett Harrington*

Phosphate Fossil Treasures

Easy pickings on South Carolina's coastal plain *by Richard J. Jacquot*

[May 2006, Vol.36 Num.5](#)

Florissant Fossil Hunt

Colorado shales reveal a snapshot of Eocene flora *by Lori Lamb*

[September 2005, Vol.35 Num.9](#)

Collecting Grassland Agates

Nebraska's Buffalo Gap has fossils, petrified wood, and more

by Kenneth H. Rohn

[August 2005, Vol.35 Num.8](#)

Fossils in the Yucatan

Marine fossils abound on this Central American peninsula *by Dan and Carole Neilsen*

[June 2005, Vol.35 Num.6](#)

High Country Fossils

Fossil fishing in the Green River Formation *by Kenneth H. Rohn*

[May 2005, Vol.35 Num.5](#)

The ChuanJie Dinosaur Graveyard

China's bone beds hold hundreds of fossils *by Timothy Huang*

[March 2005, Vol.35 Num.3](#)

The Corbula Bed

Precambrian outcrops hold millions of marine fossils *by William L. Rader*

GARNET

[May 2007, Vol.37 Num.5](#)

Treasure State Adventures

Part III: Screen Montana gravel for garnets *by Kenneth H. Rohn*

[November 2005, Vol.35 Num.11](#)

The Frugal Collector: Garnet

They come in every color except blue *by Bob Jones*

[October 2005, Vol.35 Num.10](#)

Orogrande Garnet

Crystal-rich skarns also produce metallic minerals *by Robert Beard*

[August 2005, Vol.35 Num.8](#)

Caldrons of Garnets

Tempestuous conditions produce attractive gems *by Bob Farrar*

[July 2005, Vol.35 Num.7](#)

The Little Pine Garnet Mine

Western North Carolina produces large, well-formed crystals *Richard J. Jacquot*

[May 2004, Vol.34 Num.5](#)

Garnets

A rainbow of varieties, from almandine to uvarovite

by Kenneth H. Rohn

Ruby Reservoir's Red Gems

Garnets are the main catch, but corundum is present, too *by Lance Strong*

Rock & Gem Kids

Garnets and a lapidary project *by Steve Decker*

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O N THE ROCKS

Kristalle-ized Golds

In my February 2010 column, I saluted the work of The Collector's Edge, of Golden, Colorado, whose accomplishments in bringing new material to grass are well known and certainly worthy of recognition. Collector's Edge is not the only dealer group that has worked diligently to support the collector hobby while earning a profit. Other very active dealers go well beyond the business of selling minerals by supporting clubs and having a major impact on the specimen market. One such dealer organization is Kristalle, of Laguna Beach, California.

Before owners Wayne and Dona Leicht developed their mineral business, crystallized gold was seldom offered in the specimen market. A few crystallized specimens from older collections would appear and be offered to the collector hobby, but most collectors were used to seeing shapeless gold nuggets with little eye appeal. Few thought of gold as a spectacular crystallized collector mineral. For decades, little effort was made to market fine gold specimens to hobbyists due, in part, to a lack of fine crystallized gold. This began to change in the 1980s, thanks to the efforts of Kristalle.

If you collect gold specimens, you probably have at least one crystallized yellow beauty that has passed through the Leichts' hands. They travel the world over in search of fine minerals and still find time to support shows and exhibitions. It is safe to say that a majority of major museums display one or more gold specimens obtained from this public-spirited business whose strength is, in part, marketing crystallized gold.

As the price of gold skyrocketed in the 1980s, old gold properties were given a second look and one byproduct of this was crystallized gold. Enter Kristalle.

A series of significant occurrences, not the least of which were Wayne's diligent efforts and his serious study and writings about gold, placed Kristalle in the forefront of the crystallized gold market. Kristalle emerged as a premier source for crystallized gold and the Leichts, through lectures, special show exhibits, and marketing, launched a veritable campaign to educate the collector public about gold, its history, and its lore.

The result is that Wayne is now recognized by museum curators, collectors, and even the federal government as an expert on gold specimens and their values. Wayne is particularly well versed in California gold and its history.



Kristalle prepared this marvelous example of gold from the Eagle's Nest mine as a display specimen.

Books became one of Wayne's personal interests and he now boasts one of the finest and most extensive privately held collections of old and antique books and related items which emphasize gold memorabilia.

I've known Wayne and his delightful wife, Dona, for decades, as far back as when they had given up their 8 to 5 jobs to risk establishing their mineral business in 1976. They persisted through the years, gradually building up a clientele through hard work and dependable business ethics. They regularly entered special educational displays featuring specimens, books, maps, and other gold memorabilia at major shows.

It was natural that, when major collections of gold were offered for sale, Kristalle would try to acquire them. The first collection Kristalle obtained was assembled by Charles Crespi, of Angel's Camp, California. These golds were among the finest found in the several mines around Angel's Camp, which were known for finely crystallized gold.

Crespi, a local banker, had a strong interest in gold specimens, so he made an effort to assemble a notable crystallized gold collection. He died in 1961 and his collection came up for sale in 1978. Kristalle acquired it and, as luck would have it, the price of gold started its mercurial rise of the 1980s.

The Crespi collection held a number of exceptional gold specimens, including five

that were traded to the Smithsonian Institution for use in their public display. For the first time, the general public had a chance to see the truly stunning, artful beauty of crystallized gold.

Meanwhile, Wayne's writings on gold in the advanced collector magazine *The Mineralogical Record*, stirred even more interest in gold as a collector species. He was frequently invited to give lectures on gold and gold mining history and served as a consultant to museums and private collectors.

The second spectacular crystallized gold collection obtained by Kristalle was the Segrestrom collection. That name probably means nothing to the average collector, but when I tell you this exceptional privately owned gold collection was at one time on loan to the U.S. Mint, San Francisco, you might think of the collection as having considerable historic value.

From the U.S. Mint, the Segrestrom family moved the crystallized golds to the Wells Fargo History museum, also in the City by the Bay. Wells Fargo got its start during the great California gold rush, and even today, its history museum is well worth a visit!

Finally, this family-owned gold collection was put up for auction at the noted Buttersfield Auction House. Kristalle, once again, recognized the wisdom of acquiring this collection and bid successfully on it! Thanks to Kristalle's efforts, the spectacular specimens from this historically important collection ended up in both private hands and on public display in major museums.

The State of California also has a mineral collection with some gold specimens. The collection boasts one amazing California gold, the 13-pound Fricotte crystallized nugget found in 1865 at the Grit mine (El Dorado County). The state decided to move the collection into a new museum, the California State Mining & Mineral Museum, in Mariposa, the southern gateway to the Mother Lode country. Then curator Joel Bartsch, now president of the Houston Museum of Science, asked Kristalle to help make the new museum a notable place to visit by contributing displays. Kristalle loaned specimens and helped to establish a viable gift shop.

Not surprisingly, as interest in gold increased, due in part to Wayne's efforts, specimens of gold emerged from closets, old collections, and a host of surprisingly recent sources. The natural flow of these

specimens was often directed to the recognized gold expert, Wayne Leicht. People consigned their specimens to Wayne to trim, to treat, to appraise, and to sell. He became so well known for his expertise that museums, estate lawyers, and private citizens brought him in for critical appraisal work.

When the need for a professional and accurate article on California gold arose, it was often Wayne who got the nod! His article, "The History of Crystallized Gold" (*The Mineralogical Record*, Nov.-Dec. 1982) should be required reading for anyone with an interest in gold. His expert lectures on gold and gold mining history are always in demand.

Because of his reputation as an expert on gold and his well-recognized business ethics, Wayne was chosen by one California gold miner to handle the specimen production of an unusual gold mine, the Eagle's Nest.

The Eagle's Nest is a collection of 10 claims near Foresthill that produced what is called "pocket" gold. The gold occurs only sporadically in quartz seams in the Foothills Metamorphic Belt, which is noted for its many productive gold deposits.

This California gold mine was not an exceptional producer as gold mines go. This is because of the sporadic occurrence of the gold. It didn't have rich stringers of quartz from which gold could be steadily produced. Rather, the Eagle's Nest consists of narrow quartz stringers, few over 2 inches wide, that only yield gold intermittently in pockets.

The Eagle's Nest, therefore, was never a steady producer of values. Mining along the barren quartz veins would yield no gold for a time, then suddenly, work would encounter a rich area in which slender masses of white quartz would hold quantities of arborescent gold were completely locked in the quartz.

The problem with this type of occurrence, aside from the unpredictability of profits, is that there were so few open spaces in which the gold could crystallize. Instead, it formed branching fingers and arborescent masses completely enclosed in white quartz. Mining here was hardly profitable until it was realized the arborescent gold, once freed from the quartz, made spectacular display specimens! Today, the miners at the Eagle's Nest no longer mine quartz stringers that might prove barren; they use strong metal detectors to indicate potential sites for gold.

Wayne and the owner of the Eagle's Nest mine made an agreement on recovering and marketing the gold being found. The task for Wayne was to study the gold-bearing quartz specimens in hand to determine the most successful way to remove the quartz to yield marketable specimen gold.

Removing or etching away enough quartz to reveal the arborescent gold with-

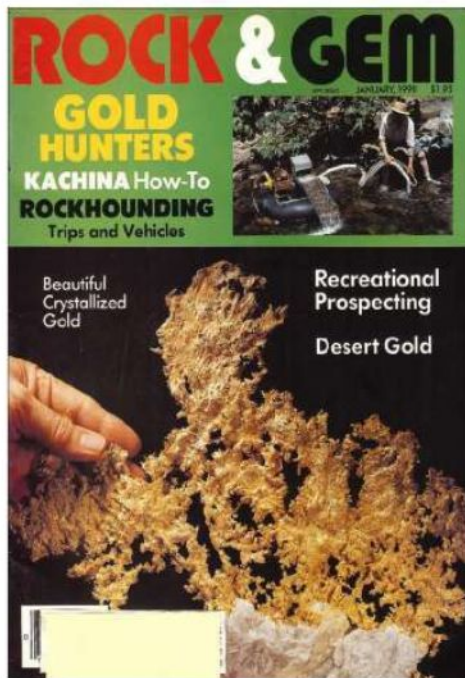


Kristalle is well known for its spectacular educational gold displays at shows, which helped promote gold as a collector mineral.

out damaging it seems simple enough—hydrofluoric acid dissolves quartz easily—but if all the gold in the specimen is not a single crystallized mass, removing the quartz indiscriminately would result in the gold falling apart. Besides, quartz that has been acid etched is not very attractive unless the etching is done very carefully.

Enough quartz had to be removed to achieve the best possible display specimen, but enough quartz had to be retained to hold the gold together as a single specimen. Such specimens brought the greater reward when sold.

Wayne was just the guy to solve this problem. His first step was to determine where the gold was hidden in the quartz. The continuity of the gold had to be traced so that enough quartz would be left to hold all the gold together while the unwanted quartz was removed, revealing the



The January 1990 cover of *Rock & Gem* featured this 70-ounce Eagle's Nest gold, from which editor Bob Jones helped remove quartz.

gold as a single arborescent beauty. The quartz was X-rayed with special machines, which peered into the slabs from all directions. The gold was revealed as shadowy filaments and sprays in the grayish X-ray image of the quartz. The quartz had to be removed by mechanical means, as te-

dious as that is, and was carefully chipped away!

On a visit to Kristalle some years ago, I had a chance to use a carbide-tipped tool to work on a big slab of gold-rich quartz. Believe me, this was tedious and time consuming. But the resulting piece of arborescent gold eventually appeared on the January 1990 cover of *Rock & Gem*!

An example of the recognized expertise of Wayne and Dona in the gold specimen market involves

a huge find of gold, termed "the Christmas find", made at the huge Jamestown (Tuo-lumne County), California, gold mine the day after Christmas 1992! Workers were startled by the ringing of the warning bell on the conveyor belt bringing ore up from the pit. The bell was supposed to indicate when something metallic passed along the belt. When workers went out to check the conveyor, they were stunned to find huge masses of yellow gold on the belt!

These "Christmas" crystallized gold masses varied from hand-size pieces to one monster weighing in at nearly 44 pounds! This one piece is the largest modern gold mass in hand. Kristalle was given the task of preparing the golds for public viewing and eventual sale. The largest mass from the "Christmas" find was acquired by the Ironstone Vineyard in Murphys, California, where it is now on secure public display in an open vault in the gift shop. Other specimens ended up in museums and private collections.

In keeping with Kristalle's strong support of the great Tucson Gem & Mineral Show™, the Christmas golds were displayed at the 1983 show. Visitors could hardly believe the size and brilliance of these monster golds. This largest gold specimen display, because of the timing of the discovery and the large and spectacular size of the pieces, was quite the talk of the show.

Wayne and Dona's contributions to our hobby are many. They travel all over the world displaying and acquiring fine specimens, and they are active and contributing members of mineral societies. Because of Wayne's ongoing contributions to and support of the Mineralogical Society of America, he was honored with the society's annual Scholarship award.

There is little doubt that the popularity of specimen gold among collectors today can be traced directly to the educational and business efforts of Wayne and Dona Leicht of Kristalle!💎

Bob Jones holds the Carnegie Mineralogical Award, is a member of the Rockhound Hall of Fame, and has been writing for *Rock & Gem* since its inception. He lectures about minerals, and has written several books and video scripts.



FIELD NOTES

BEAUTY INSPIRES US TO KNOW Minerals and Crystals

It is knowledge that gives pleasure to open minds.
 Also beauty gives pleasure to each heart it finds.
 Inspiration is pleasure that comes to your spirit.
 All three pleasures are there for those open to it.
 Rockhounds find beauty in what is inorganic.
 You can't quantify beauty or an aesthetic.
 And yet beauty adds to any crystal's value,
 And it leads further on anyone, such as you.
 Crystal minerals they illustrate some deep secret
 Of the universe workings that made those forms set.
 Mineral study enlarges your own point of view,
 Time and place get much larger and clearer for you.
 Creativity is there geologically,
 You can see it in color, size and quality.
 And in weight, chemistry and in composition,
 And accessory minerals with their perfection.
 Each piece found is unique and is one of a kind,
 There's a story behind every crystal you find.
 Crystals lift you from mundane to someone eager,
 To become an enthusiastic collector.
 Aesthetics and knowledge that you gain and you own,
 Will enlarge your cosmos from unknown to part known.
 Crystals remind us all that much time has been flown,
 And compares what we've learned to what still is unknown.
 A fine stellate or starlike crystal aggregate,
 Such as rutilated quartz is my favorite.
 My next favorite crystal: inclusions in quartz.
 If undamaged, the crystal is better of course.
 Sheen and schiller is also a popular sight,
 Found in tiger's-eye, cat's-eye and labradorite
 If you ever want your spirit to smile and know,
 Just go rock hounding in the field or in a Show.
 Iridescence, inclusions or just oddity,
 Makes more interesting crystals from normality.
 Plate tectonics helps too with crystallography.
 There's a lot you can get for your very small fee.

—Ronald J. Yadusky BS, MD, FACS

Back Articles

Owing to a mix up in changing my address after moving, I have missed a couple of issues. I have now happily received the April issue, and as always have been reading just about everything in it. I noticed with interest the first letter in the Field Notes, referring to an article Bob Jones wrote on building a library. Since I am new to studying and collecting minerals, I would very much like to have a copy of that article. How can I get about it?

—Larry P.
via e-mail

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—Editor

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In Defense of Doug

I felt someone should write a note in defense of Doug, the carnelian collector who was maligned as a hoarder by Mr. Burns in your Field Notes section of the May 2010 edition. Mr. Burns represents a very narrow point of view regarding collecting, one some of us do not share. As a 45-year agate and jasper collector who has accumulated a large collection, I must point out that agate and jasper specimens can be as variable as snowflakes. Would Mr. Burns have an agate enthusiast limit himself to a handful of Lagunas or Lakers or a single specimen of Morgan Hill Poppy jasper? Collectors accumulate specimens for their variety, for trade, for upgrading to better specimens, etc. That's what collecting is. It's up to the collector to decide the size and makeup of his collection.

Secondly, without these accumulations ... where would collectors arriving late on the scene find specimens for their collections? As the editor has stated, [the Lucas Creek, Washington,] carnelian location is now closed, as are Horse Canyon, Stone Canyon, and so many other fine sites. Politicians are working hard to close more locations all the time, and ranchers and farmers, due to property damage and liability concerns, are also continually closing sites. Doug's accumulation, and those of many other collectors, will eventually find its way into estate sales, silent auctions, club donations, gift boxes, eBay auctions, etc. and afford newer enthusiasts the opportunity to add to their collections specimens from areas closed to collecting. ... It should also be pointed out there are a lot of older folks in this hobby, many sites are both remote and difficult to access, and rocks are heavy. Sometimes it's nice to have someone with a stronger back collect extra material for later redistribution to less hardy collectors.

And finally, speaking of areas being closed to collecting, such closures are usually due to the wear and tear caused on areas by too many collectors. What causes more environmental damage, one person in one vehicle collecting a hundred agates or a hundred folks in a hundred vehicles visiting one area and collecting one agate each? As a former ranch owner, I would have always preferred to allow a single trusted collector on my land rather than a horde of vehicles and collectors, some of whom would be guaranteed to cause unwanted damage to property and roads.

—Mel Hixson
Kerrville, TX

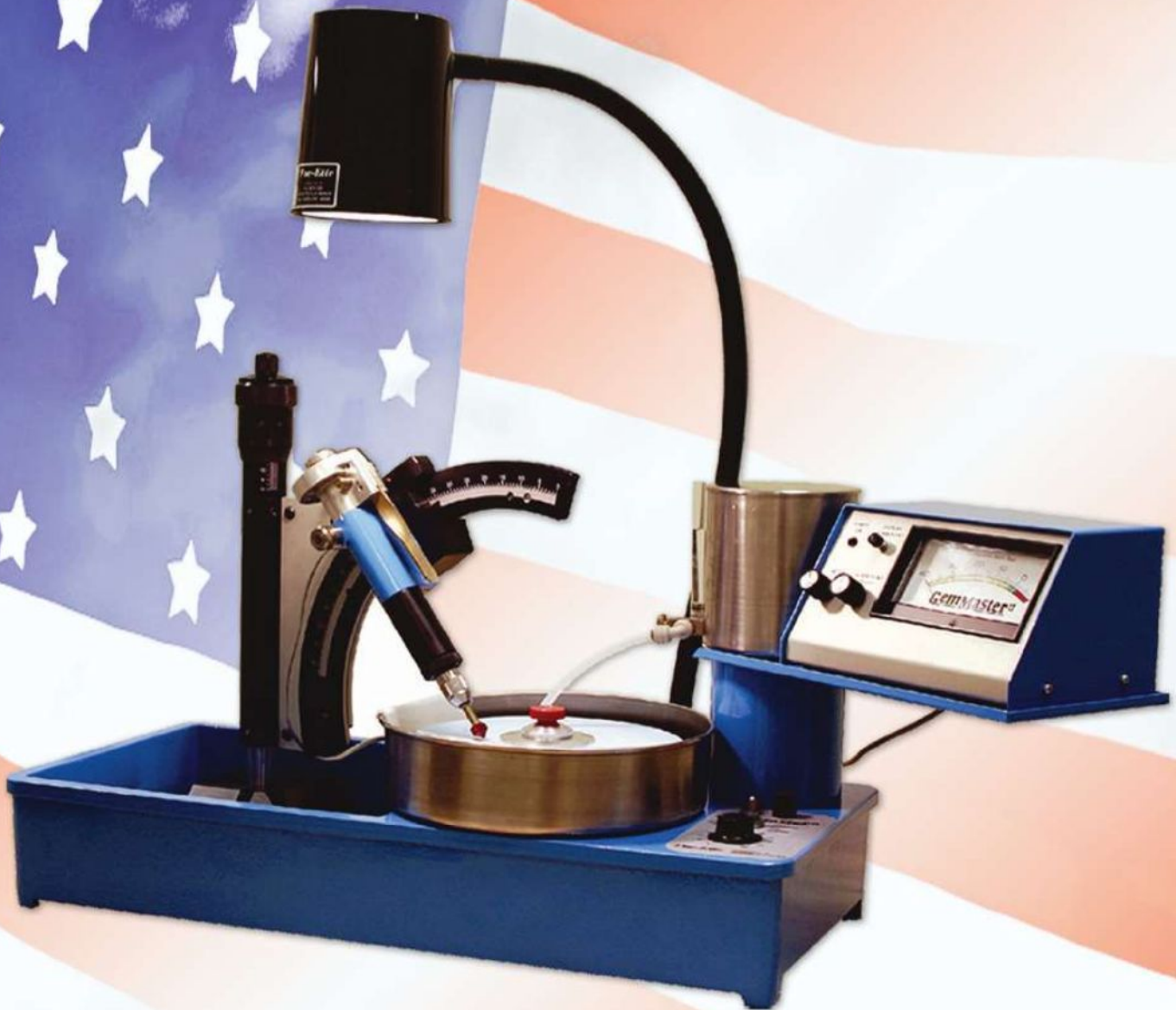


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