

Rock & Gem

SEPTEMBER 2010

THE EARTH'S TREASURES • MINERALS AND JEWELRY



**R&G Kids:
Science Ed.**

ROCKHOUND

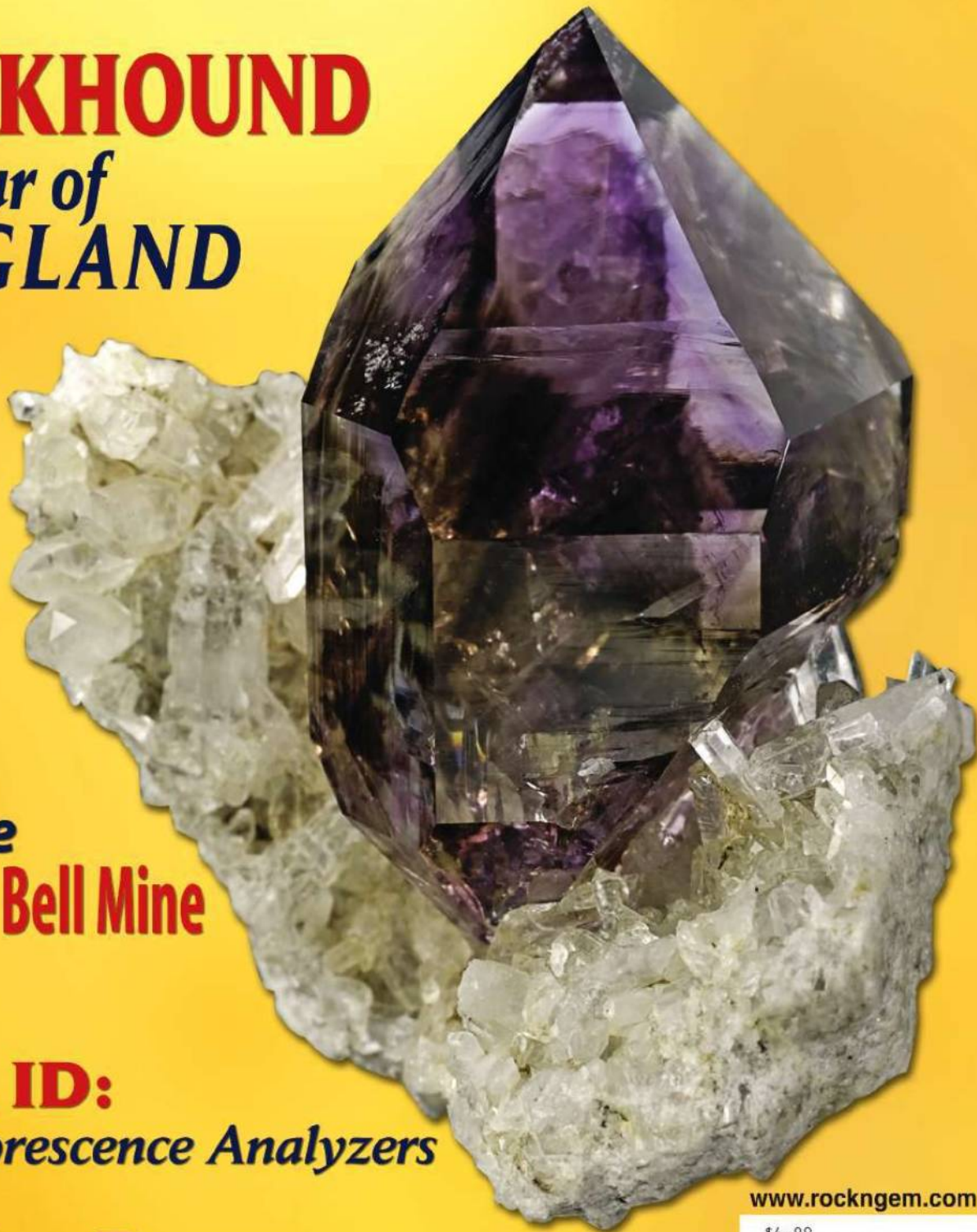
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AZURITE,
SILVER

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the **Silver Bell Mine**

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FIELD TRIP:
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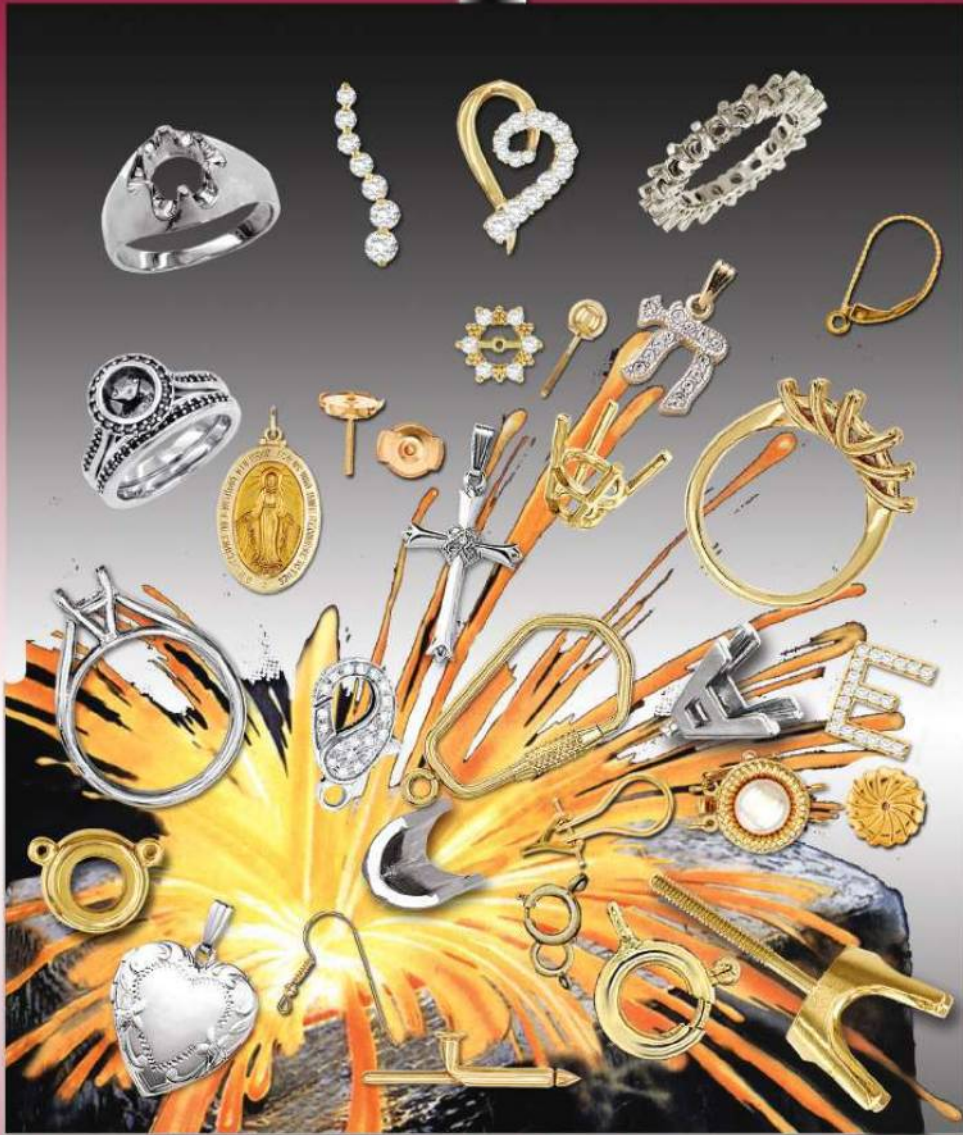
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Rock & Gem

Volume 40, Number 09

September 2010

ON THE COVER

Jackson's Crossroads (Wilkes County), Georgia, is producing gem-quality amethyst quartz with vibrant color and luster that is destined for classic status. This 3.9-centimeter-high specimen is from the Houran Collection. (Jeff Scovil photo)

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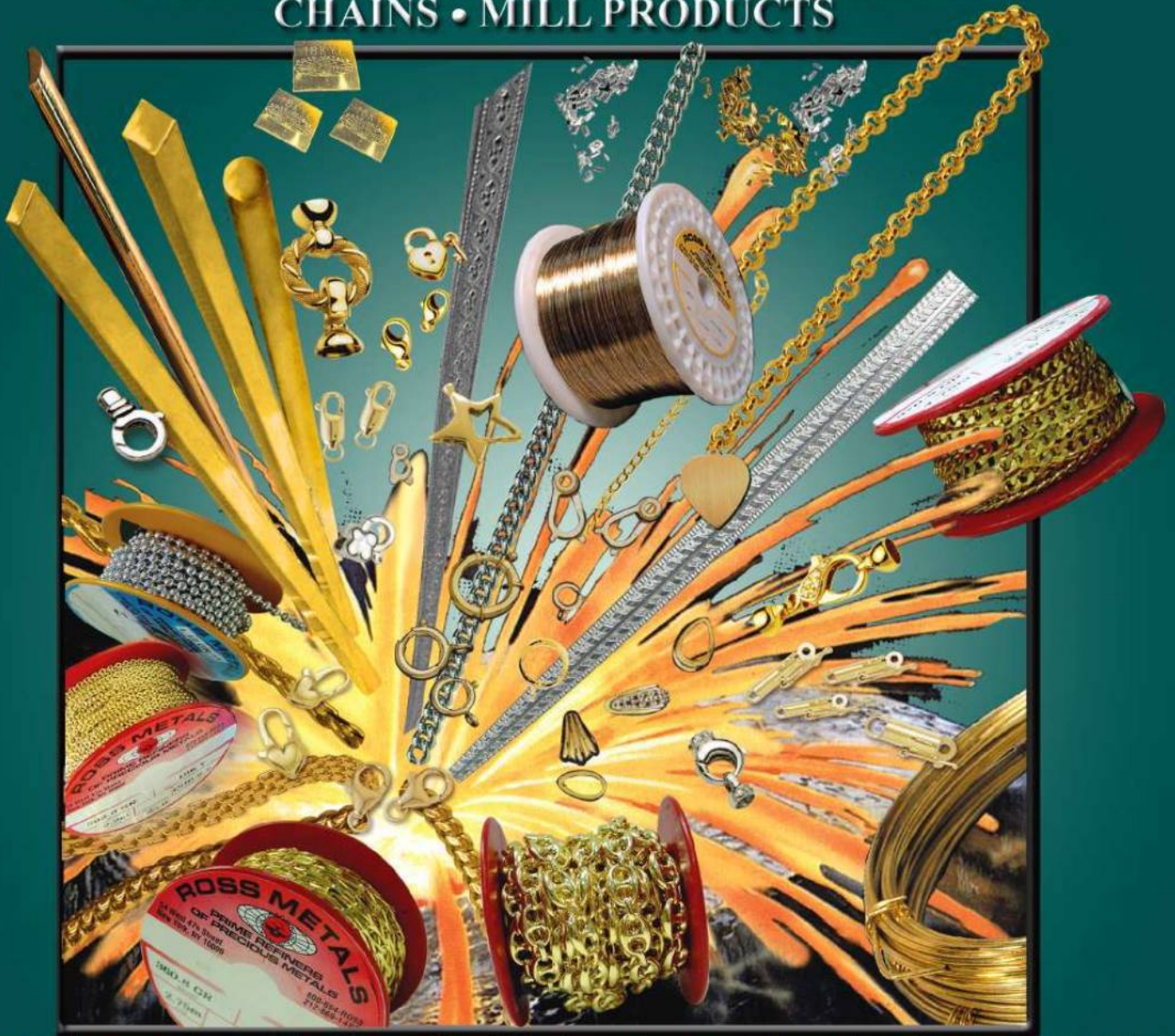
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Conservation and Recreation

At the White House Conference on America's Great Outdoors in April, President Obama introduced the America's Great Outdoors Initiative to "develop a 21st-century conservation agenda and to reconnect Americans with our great outdoors." In short, the administration is writing a new environmental use policy that favors the recreational use of our public lands and it is asking for your input into the process.

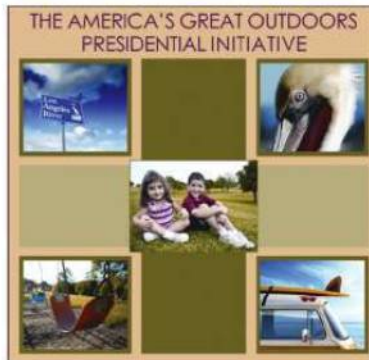
On July 8, I attended a public listening session at Occidental College in Los Angeles. The purpose of the listening session was for citizens to have a chance to share their ideas about how public lands and money should be used with senior representatives of the U.S. Environmental Protection Agency, the White House Council on Environmental Quality, the U.S. Department of Agriculture, the U.S. Department of the Interior, and the U.S. Department of Defense, who will be helping to craft this new policy. Los Angeles Mayor Antonio Villaraigosa, EPA Administrator Lisa Jackson, Department of the Interior Secretary Ken Salazar, White House Council on Environmental Quality Chair Nancy Sutley, U.S. Department of Agriculture Undersecretary Harris Sherman, and Assistant Secretary of the Army (Civil Works) Jo-Ellen Darcy were in attendance.

I was alerted to this event by Richard Pankey, president of the American Lands Access Association (ALAA), a sister organization of the American Federation of Mineralogical Societies whose purpose is "advancing the interests of earth science amateurs with legislatures and land use management agencies" (www.amfed.org/land_use_policy.htm). Speaking at a similar gathering in Davis, California, Pankey told the panel, "The purpose of the American Lands Access Association is to promote and ensure the rights of amateur fossil and mineral collecting, recreational prospecting and mining, and the use of public and private lands for educational and recreational purposes; and to carry the voice of all amateur collectors and hobbyists to our elected officials, government regulators and public land managers. We represent the over 52,000 members of 640 societies of the American Federation of Mineralogical Societies and the many, many millions of unaffiliated rockhounds. ... We believe that conservation and recreation are compatible and desirable. We need to get past the prejudice that 'use is abuse'."

If you're a rockhound or lapidary, I'm sure you have opinions about how our public lands should be used. Our lawmakers are offering us an opportunity to share our views. Go to www.doi.gov/americasgreatoutdoors/ to leave your remarks or to vote for others' suggestions. I've already posted mine. You can also comment by writing to Department of the Interior, Fish and Wildlife and Parks, America's Great Outdoors, 1849 C St NW, Washington, DC 20240 or e-mailing ago@ios.doi.gov.



A big "thank you" to the Ventura Gem & Mineral Society for donating grab bags as this month's *Rock & Gem* Kids quiz prize. If your club would like to encourage children's participation in rockhounding by sponsoring our monthly quiz, please contact me for details.



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This machine, made in the USA for Kingsley North features an all stainless steel construction 18/8 grade, 3/4" stainless steel shafts with ball bearings. It also has a 1/3 HP, 1725 RPM thermal protected ball bearing motor with rear mounting plate, complete with a 2 qt. capacity adjustable drip water system with 6 shut off valves, one for each wheel. Water system mounts are on the back of the machine. Lid has three hold down screws for easy removal, the shaft is tapped for a 1/4-20 spin-on polish head at both ends, the machine comes with only a right hand spin on head and features a front drain valve. Features two 6" x 1 1/2" metal bonded 80 and 220 grit diamond grinding wheels, plus four 6" x 1 1/2" resin bonded diamond wheels, 325, 600, 1200 & 3000 grits. A right hand 6 x 1/4" 20 spin - on polish head, polishing pad and 2 grams diamond compound is included along with complete instructions, and a 1 year warranty on machine and motor. Dimensions - 26" W x 17" L x 9" H. Ships in two boxes (motor ships separately) wt. 66lbs.

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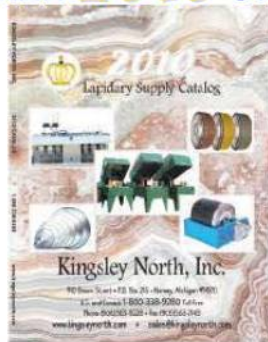
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CRAFTSMAN OF THE MONTH

This little project started with the purchase of a truck," writes September Craftsman of the Month Dave Wester, of Bothell, Washington. "We had traded our SUV for a pickup in which to haul rocks from the field, and of course, what's a truck without a tow hitch? Dealers now make it a habit to put a hitch cover in place that advertises the dealership, but the one on my truck wasn't destined to advertise for long. It was oval in shape, and it seemed that it would look better made from rock. What more can a rockhound ask for but a 6-inch cabochon on his truck?"

"The first objective was to find a slice of rock large enough. I discussed this project with a friend, who said, "If you're going to do this, you might as well use something nice" and proceed to give me a nice slab of Saddle Mountain petrified wood—our state rock. I agree: The wood is beautiful!"

"I started my project using the hitch cover as a template. I used a scribe to trace the outline of the hitch cover onto the slab. Basically, this was going to be a large cabochon! Using a trim saw, I cut as close to the scribe lines as possible, and then I moved to a diamond wheel. Using an 80 grit wheel, I ground the sharp edges down as close to the scribe as possible, frequently checking the fit of the cut rock against the hitch cover to ensure it was shaped properly.

"Once the basic shape was cut, I used a 220 grit diamond wheel to smooth the edges and put a slight bevel on the edge. This cabochon was too large to polish on the 6-inch wheels, but I could get a nice edge polish before finishing the face. I ran the huge cab through all six wheels and got a nice beveled, polished edge.

"Using my right-angle grinder and 4-inch diamond pads (like used for marble countertops), I started working on the face. The 50 grit took the saw marks out and I proceeded to sand using 100, 200, 400, 800, 1500, 3000, 4000 and 6000 grit pads to finish the face out nicely.



"Next, I took the cover hitch and mounted it in my bench vice so the advertising plate was up and level. The next question was what to use to attach the cab to the plate. Looking around my shop, I discovered Liquid Nails® adhesive handy. When cured, it would be waterproof. I applied the Liquid Nails to the plate and spread it using a popsicle stick. Lastly, I took the finished cab and placed it on the plate, positioning it so it covered the advertising nicely.

"This is a simple project that can be done with any hitch cover, basic lapidary tools, and almost any kind of rock! It's unique, a real conversation starter, and when you're driving, if a person following you is a rockhound and sees it (which they will), they'll probably smile and know you're a 'hound, too!"



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 at 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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 Spruce Pine, NC.....July 29-30-31-Aug. 1
 Tucson, AZ.....September 9-10-11-12
 Minneapolis, MN.....September 26-27
 Detroit, MI.....October 1-2-3
 West Springfield, MA.....October 8-9
 Asheville, NC.....October 26-27
 Orlando, FL.....October 29-30-31

2011

- Asheville, NC.....January 4-5
 Orlando, FL.....January 7-8-9
 Tucson, AZ.....January 29-February 11

TUCSON

Gem Mall
January 29- February 11

Holiday Inn-Palo Verde/Holidome
February 3 - February 11

Grant Inn on Grant Road
January 29 - February 11

- Minneapolis, MN.....April 3-4
 Detroit, MI.....April 8-9-10
 West Springfield, MA.....April 15-16
 Orlando, FL.....April 29-30-May 1
 Franklin, NC.....May 6-7-8
 Las Vegas, NV.....June 3-4-5

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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 McDonnell, 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—ARLINGTON, TEXAS: 53rd annual show, "Texas Treasures"; Arlington Gem & Mineral Club; Arlington Convention Center, 1200 Ballpark Way; Sat. 10-6, Sun. 10-5; adults \$6, seniors and children \$3; Kids' Korner, Rock Food Table, gem identification, silent auction, Grand Prize, hourly door prizes, vendors, jewelry, beads, gems, minerals, fossils; contact Karen Cessna, 2213 Hackberry Dr., Arlington, TX 76013, (817) 860-5232; e-mail: cessnak@ont.com; Web site: www.agemclub.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—BRUNSWICK, GEORGIA: Show; Golden Isles Gem & Mineral Society; Glynn Place Mall, 100 Mall Blvd.; Sat. 10-7, Sun. 12-6, Mon. 10-5; adults \$2, children under 5 free; grab bags, kids' treasure dig, door prizes, exhibits, demonstrations, educational resources, gold, silver, gemstones, mineral specimens, fine jewelry, hand-crafted jewelry, beads, findings, tools; contact Beverly Johnson, 1007 Fountain Lake Dr., Brunswick, GA 31525, (912) 267-7850; e-mail: bevbj@comcast.net

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.rollingstonesgems.blogspot.com

9-12—TUCSON, ARIZONA: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Holiday Inn Palo Verde/Holiday, 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. 10-7, 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: DLMCLU@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—MONROEVILLE, PENNSYLVANIA: Show; MalicJewels Jewelry & Gift Show; Monroeville Convention Center, South Hall, 209 Mall Blvd.; Fri. 12-6, Sat. 11-6, Sun. 11-5; free admission; loose diamonds, colored gemstones, contemporary, antique, estate, costume, custom designed, gold, silver, titanium and beaded jewelry, beading supplies, mineral specimens, gift items; Debbie Williams, 270 E. Hunt Hwy., Suite 16, #323, San Tan Valley, AZ 85143, (480) 458-7600; e-mail: debbie@malicjewels.com; Web site: www.malicjewels.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

continued on page 30



Rhodochrosite - Fred Wilda ©

COLORADO MINERAL & FOSSIL SHOW

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SEPT. 15 - 19, 2010

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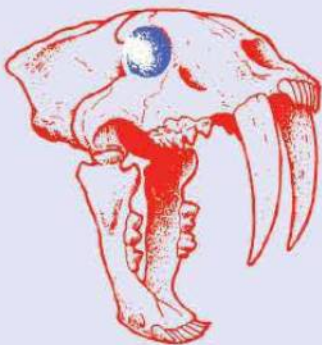
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A UNIQUE *Mineral Tour* of ENGLAND

Story and Photos by Bob Jones



After a delightful lunch at Caerhays Castle, we gathered for a group shot with our delightful hosts Charles and Elizabeth Williams (seated). That's me in the back row, center!

This Rockhound Trip Was Filled with Firsts



Members of the tour group try their hand at collecting fluorite on the slopes of Mam Tor, site of the Treak Cliff bleu-jaune fluorite mine.

When I was approached by Crizmac Tours of Tucson, Arizona, in January 2008, I had no idea we would be creating such a unique opportunity. When asked where we should tour, I immediately suggested England, the foreign country with which I am most familiar. With the support of *Rock & Gem*, Crizmac Tours did the important organizational work for the tour while incorporating my ideas and recommendations. The tour started in London on May 4, 2010 with 29 hardy souls in attendance and lasted 11 days. During that time, we went into caves and underground mines, collected specimens in two classic areas, and saw minerals that are seldom seen by rockhounds. The crowning day of the tour was spent in Cornwall, where we saw a collection of classic Cornish specimens hitherto not accessible to rockhounds.

The first stop on the tour was the Natural History Museum, London, which houses a fabulous mineral collection. I feel that this is the most beautiful mineral museum in the world. Our host at the museum was Alan Hart, head of the mineralogy department. After a brief introduction, Alan began pulling superb minerals from the locked drawers. These minerals are too light-sensitive to display permanently, so they are seldom seen by anyone, let alone a group of rockhounds!

The first specimen revealed was a proustite from Chanarcillo, Chile, an amazing red beauty more than 5 inches long and almost as thick as your wrist! The specimen still holds its vivid red color, as it is always kept in the dark. This classic beauty was followed by the noted Karabachek topazes from Russia. These crystals still have their delicate sherry color thanks to thin wooden sleeves that cover them. Other beautiful specimens were revealed, after which we paid a visit to the Russell Room, which is not open to the general public. Housed here are Sir Arthur Russell's vast collection and other equally large and well documented collections.

We concluded that first day by enjoying a quick walk through the Tower of Lon-

don, where the royal regalia—crowns, scepters, rings and riches beyond your wildest dreams—are carefully guarded.

Day two saw us headed north to Chatsworth House, England's most beautiful estate home. Owned by the Duke and Duchess of Devonshire, this estate has a notable mineral collection that was assembled in the 1700s by Georgiana, Duchess of Devonshire (1757-1806). Heavily in debt from gambling and with child, Georgiana fled to Europe, where she studied chemistry and mineralogy under the guidance of noted European scientists. The collection she assembled was in storage at Chats-



This remarkable pyrrargyrite, probably from Germany, was found in the Caerhays mineral collection just before the tour group arrived at the castle.

worth until the 1990s, when members of the Russell Society, a group of amateur and professional mineralogists, were invited to prepare it for public display.

The entire collection is not on display. Thanks to Russell Society members Roy Starky, Franz Werner, and Neal Hubbard, however, our tour members were invited into the back rooms of Chatsworth to see several drawers of Georgiana's minerals, another unique rockhound adventure! Franz gave an excellent lecture on the collection and its history.

Day three saw us in Derbyshire, where Richard Haw, geologist at the Treak Cliff mine, led us underground to see remarkable yellow-and-violet banded fluorite in place. "Blue John" fluorite, as it is known,

is an amazing stone when carved into objets d'art! The name is a perversion of the French "bleu et jaune", meaning "blue and yellow". After a morning underground, Richard took us to a virgin collecting site, where several members were thrilled to dig fine, small fluorite crystals out of shallow cavities in limestone rock. This was yet another unique event!

For the wives on the tour, we next visited the Wedgewood Factory and Museum, which holds an always impressive exhibit of classic pottery, much of which was made using clay from Cornwall's pits. A couple of tour members even had the fun of creating their own Wedgewood pot, from soft clay to finished form!

That evening, we bedded down near Bristol, in Somerset, home of the Bristol Mineral Society, led by Jim Edmondson. Jim and his wife, Sally, and club member Sonia Heal joined us for an evening chat and shared some of the specimens Jim and Sally had previously dug. While in Somerset, the tour group visited the caves and cheese-making facilities in Cheddar Gorge, where the cheese by that name originated.

We finished the last four days of the tour in Cornwall, one of the great metallogenic provinces in the world. Its impact on industry and commerce is remarkable. At different points in history, Cornwall produced more than

60 percent of the world's copper and more than 70 percent of its tin supply. Granted, those production amounts pale when compared to modern production figures, but in their day, Cornish miners using nothing but hammer and drill made Cornwall the king of copper and tin mining.

Many modern mining methods evolved in the mines of Cornwall, including the Bickford fuse, which was the first dependable fuse for igniting gunpowder, and the Blake jaw crusher, which replaced the maidens and children who had previously crushed ore brought to the surface manually. The first general use of steam power in mining evolved in Cornwall, and the great Cornish pump engine helped de-water mines the world over.



Our group got to go underground at the Treak Cliff bleu-jaune fluorite mine. The darker areas in the mine wall are fluorite.



Caerhays Castle, a classic Norman-style structure, houses a remarkable 18th-century Cornish mineral collection.

Our first day in Cornwall was consumed by traveling to and settling in Truro, a town in the center of the county that was the center of the tin trade at one time. We spent much of the next day at the Geevor tin mine, a relatively modern facility that is open for tours. The tour took us underground into the narrow confines of this mine, where miners removed only enough waste rock to follow the narrow veins of ore. The tunnels were just wide and high enough for Cornish miners, who were notoriously short of stature, but were a tight fit for touring rockhounds!

After lunch at the Geevor mine, we headed back to Truro and paid a very interesting visit to the Royal County Museum, which houses Philip Rashleigh's mineral collection and his important papers. Rashleigh collected during the heyday of Cornwall's copper and tin production. He traded specimens with notable scientists and collectors like Count Jacques Louis de Bournon and Henry Heuland. We were able to see many specimens that were pictured in Rashleigh's 1797 two-volume "catalog", which featured some of the earliest renditions of minerals in color!

Rashleigh's personal catalog and correspondence were brought out of hiding in the museum library for our tour group to enjoy. This opportunity to see items that are never on public display was made possible by Courtenay Smale, an active board member and consultant to the museum, who acted as our guide.

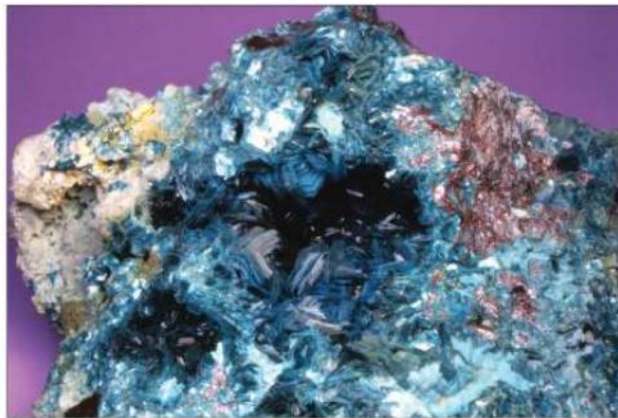
On May 11, our tour group was hosted by Charles and Elizabeth Williams, resident owners of Caerhays, one of Cornwall's great private castles. This elegant Norman-style edifice is known the world over for its exotic plants and gardens and will soon offer the great Williams mineral collection for viewing.

The collection, which was begun in the days before American independence, consists of mainly Cornish arsenates and phos-

phates that were mined hundreds of years ago. It also holds specimens from countries such as Russia, Italy, Norway and France, indicating that the Williams family bought and traded minerals through the centuries.

Noteworthy in the collection are probably the world's largest clinoclase spherule, a nearly 3-inch ball of radiating crystals; torbernites from the Old Gunnislake mine,

everyone had seen all three, we assembled in the castle's huge foyer for wine. From there, we were escorted into the great hall for lunch with the Williamses. The ambience, a most friendly host and hostess, and delicious food and drink made this castle visit the highlight of this international tour, a unique experience enjoyed by only 29 rockhounds thus far.



One of the world's finest chalcophyllites, found in Cornwall, resides in the Phillip Rashleigh collection.

which may be the world's largest for the species from that locality; and an equally remarkable suite of more than 20 specimens of liroconite, a rare copper arsenate from Cornwall, which is the type locality.

The collection also contains a remarkable suite of azurites from Chessy, France. The largest specimen in this suite is a superb 8-inch by 10-inch cluster of sharp, undamaged, blocky crystals. They are the best I have ever seen.

After it has been completely studied and cataloged by Smale, the Williams collection will eventually be on public display as part of the Caerhays Castle tour.

Our large group was divided into smaller groups. Charles led the group around the castle grounds, showing them many rare and unusual plants, many of which were flowering. A second group toured the castle itself, while the third group viewed the mineral collection with Smale. When

Our final day in Cornwall was devoted to our main interest: rock collecting. Collecting in Cornwall is almost a thing of the past; the mines are shut and there are no dumps. They were either hauled off by collectors or simply removed to "beautify" the landscape, so it was difficult to find a dump worthy of collecting, but we did it and even managed to find one in a special geologic region!

Jutting into the Atlantic Ocean near the mouth of the English Channel are two peninsulas, the Lizard Peninsula and Penwith Peninsula. On Penwith Peninsula, the headland known as Land's End is a typical Cornish granitic intrusion.

We know that Cornwall's moors are great granite intrusions that brought the mineral solutions into the ancient rocks called "killas". The Lizard Peninsula is geologically different from the rest of Cornwall. It is a highly metamorphosed serpentine rock that was not part of the original English land mass but what is called a "terrane", an errant piece of a continent that broke loose and drifted for millennia before attaching to another tectonic plate. It is now known to have been part of the African Plate before attaching to England's land mass on the edge of the Eurasian Plate.

In Kynance Cove, on the Lizard Peninsula, members of the tour group were able to collect pieces of serpentine. The cliffs here are off limits, but the small, surf-tumbled rocks torn from those cliffs can be collected in modest amounts. We followed a trail down a cut in the cliffs to the small beach in Kynance Cove. Before this area was de-

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UNIQUE Mineral Tour from page 14



Alan Hart, Curator of Mineralogy at the Natural History Museum, London, shows the tour group one of the Karabacek topazes.

clared a special heritage site by the English government, the serpentine was mined as a lapidary stone. It was used for carved objects and decorative items.

In the cove, among the tumbled surf rocks, we found myriad pieces of very nicely colored black, red and green serpentine partially polished by wave action. Everyone in the group was happy because our collecting was successful and we had a fun adventure in the cove.

You can still buy items made from serpentine in the gift shops in the village of Lizard. You can also get Cornish pasties, those crusty rolled meat and vegetable-filled pastries miners feasted on during their lunch breaks underground. After a morning of successful collecting and hiking, we tried a pasty before heading to our last stop, the King Edward mine.

Like all other Cornish mines, the King Edward mine is closed, but it is being developed into a complete working example of an old classic Cornish mine, with all the old equipment working! Seeing this early equipment actually functioning makes one realize what an arduous task mining was in those "good old days".

To finish the tour in style, we headed back toward London, making a quick stop at one of England's oldest monuments, Stonehenge. Thousands of years old, this remarkable structure was at the very least an astronomical observatory and may well have had other equally important uses.

When you consider that we saw museum collections, visited stately homes, had two opportunities to collect, had lunch and wine in a real castle, and saw minerals not on display to the general public, it is no wonder the participants all asked for more of the same in the future! The question remains, Will *Rock & Gem* participate in another "unique" rockhound tour equal to this amazing adventure? That question is yet to be answered! If it does happen, you'll read about it in *Rock & Gem!*

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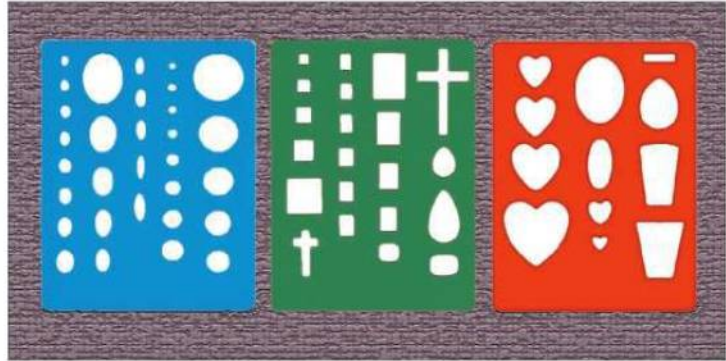
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S HOP TALK

by William A. Kappeler

Beyond the 30x40 Oval



The 30-millimeter by 40-millimeter oval cabochon is arguably the gold standard of lapidary. Most of us made one as our first project when we began the hobby. When the word "cabochon" is mentioned, the first thing that comes to the minds of most us is the 30x40. This oval and its smaller brothers and sisters have become commonly known as "the cabochon shape." Technically, of course, a cabochon is any stone that has been cut and polished, but is without facets. Whatever it is called, a 30x40 is still a 30x40, and after making a pile of them, most folks are ready for something new.

Perhaps the easiest transition is to the teardrop or pear shape. These shapes are cut and polished in much the same way as the ovals, but the shape is somewhat more refined and is very nice for pendants, earrings, and even rings. One minor problem is that there are not nearly as many commercial mounts available for these shapes as there are for oval cuts. This fact opens the door to learning some new skills. The shapes are well suited to use in wire-wrapped settings, mounts fabricated in silver or gold and, of course, mounts formed by lost wax casting.

One of the all-time favorite cabochon shapes is the heart. This cut has been around almost as long as lapidary itself. Most of the grinding, sanding and polishing is done as it is done on the good old 30x40 oval. The tricky part is at the top, where the curves come down and meet to form a "V". A lot of care has to be taken to ensure that the wheel or disk does not touch the side opposite the one being worked on. This is a good place to use a Foredom or Dremel tool or even some small diamond files.

Many lapidaries cut the heart as a double, with a rounded cabochon finish on the front and back. When trying this, it is important that, after the preform shape is completed, a line is drawn exactly midway on the edge. Use something like a Sharpie® permanent marker so that the line will be

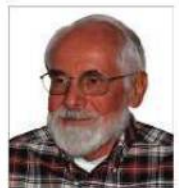
about 1/16 inch wide. When forming the edges, you will stop at the edge of the line. This will leave a small flat line around the edge, which will prevent chipping. If a clinch mount or a "V" grooved wire bezel is used, the flat spot will be hidden. If the stone is to be used without a mount, the sides must be brought together very carefully to avoid either chipping or creating a wavy edge.

Another very popular non-oval cabochon shape is the cross. Most template sets have a couple of crosses in them, but this simple shape is easy to lay out without a template. When using the trim saw to cut out the shape, however, remember that the arc of the saw will not allow you to cut right up to the corners where the vertical and horizontal lines intersect, since the blade will cut beyond the line on the bottom.

This problem can be solved by lifting the preform and easing it into the blade while being careful not to overcut the bottom, or by simply cutting as far as possible on both the vertical and horizontal parts of the cross, then snapping the scrap piece out. This, of course is a little risky, and might result in the breaking of a vital part. Well, it can always be called a "freeform cross".

These are just a few of the many types of cabochons that get away from the standard 30x40 oval. There are also star stones, loaf cuts, sugar loaf cuts, squares, rectangles, triangles, and my favorite of all, the freeform cab. Sometimes, the pattern in a slab just cries out for a certain curve or shape. The "boomerang", the "bean", trapezoids, and so forth are all good possibilities for freeform cabs. Let your imagination run wild!💎

Please feel free to send your questions and comments about any of my columns to Shop Talk, 25231 Pericia Dr., Mission Viejo, CA 92691 or quappelle@cox.net.





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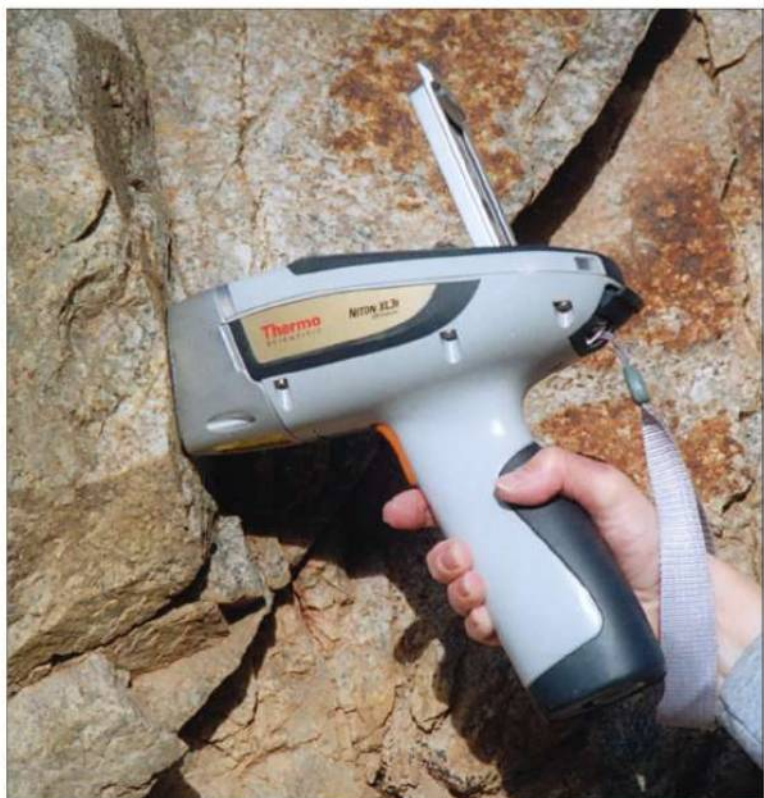
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X-RAY Fluorescence Analyzers

Science Fiction Comes to Life
in this Handheld Device

Story and Photos by Steve Voynick

In one of the original “Star Trek” television episodes, starship crew members were exploring a cave. Dr. Spock placed a handheld scanning device against the cave wall, pushed a button, then glanced at a tiny video screen that displayed the rock’s elemental components. In the “Star Trek” lexicon, that scanning instrument was a “tricorder”, so named for its sensing, computing and recording capabilities. Of course, when that episode was filmed 40 years ago, the extraordinary level of sensitivity and degree of miniaturization and computing power necessary for such a device to actually function were pure science fiction. Nevertheless, the “tricorder” did offer a tantalizing glimpse into the future of mineral exploration and mineral identification.



If portable XRF analyzers were readily affordable, they would change the entire concept of field mineral collecting.

That future has now arrived in the form of the portable X-ray fluorescence analyzer. Recently, Thermo Scientific, a part of Thermo Fisher Scientific, of Billerica, Massachusetts, loaned me a Thermo Scientific Niton® XL3t X-ray fluorescence (XRF) analyzer. Using this self-contained, handheld, approximately 3-pound instrument, I identified an array of confusing mineral specimens, determined the precise compositions of precious- and base-metal alloys, identified and quantitatively measured the chromophoric elements in various gem materials and mineral crystals, and “assayed” ore samples. Each nondestructive analysis required only a few seconds and provided both laboratory-grade accuracy and a permanent data record.

If portable XRF analyzers sound like a dream come true for mineral collectors, rockhounds, and prospectors, they are. But unfortunately, XRF analyzers are still a dream when it comes to amateur or hobbyist use. The problem is cost: The instrument that I borrowed for a week sells for \$42,000.

Despite their cost, thousands of XRF analyzers are now routinely employed for environmental analysis in science and industry, for quality control in manufacturing and processing operations, for safety inspections of consumer goods, and in many related applications. More than 2,000 Thermo Scientific Niton XRF instruments are at work in the fields of mining and mineral exploration, identifying and quantitatively analyzing minerals, “assaying” ores and drill-core samples, controlling ore grades in working mines, and determining the elemental compositions of mill tailings, mill concentrates, and smelter products. In mining and mineral-exploration uses, XRF instruments, because they perform their analyses in real time, typically pay for themselves in just a few months.

Portable XRF analyzers are the most exciting and remarkable innovation in mineral identification to appear in decades. If they were more affordable, they would heighten the awareness of mineral chemistry, change the way field trips are conducted and mineral collections are cataloged, enhance the general understanding of mineralogy, and in short revolutionize the entire concept of mineral collecting.

Ele	8	$\pm 2\sigma$	8mm
Bal	54.35	1.56	
Sr	0.010	0.003	
As	0.332	0.034	
W	0.419	0.132	
Zn	1.88	0.11	
Cu	22.26	1.01	
Fe	20.40	0.45	
Mn	0.073	0.036	

XRF analysis of a sample of high-grade oxidized copper ore from Lordsburg, New Mexico, shows high copper and iron content, along with significant values of tungsten, zinc and arsenic and appreciable amounts of silver.

Although portable XRF analyzers are relatively new, the phenomenon of X-ray fluorescence has been known since 1913. X rays are part of the electromagnetic spectrum, which includes, in order of increasing frequencies, radio waves, microwaves, infrared, visible, and ultraviolet light, X rays, and gamma rays. X rays and gamma rays are both ionizing forms of electromagnetic radiation, meaning they can displace electrons in atoms. When X rays bombard atoms, certain electrons become energized; in order for the atoms to return to their normal state, these electrons release their excess energy as secondary or fluorescent X rays.

X-ray fluorescence in minerals is similar in principle to the familiar phenomenon of ultraviolet fluorescence, in which ultraviolet light energizes electrons in the atoms of certain minerals. In turn, these electrons release their excess energy as visible light.

In 1915, physicists discovered that fluorescent X-ray energies and frequencies are mathematically related to the atomic numbers of the fluorescing elements, thus having potential value in analytical chemistry. By the early 1920s, researchers had developed the first crude X-ray spectrographs. These early instruments could qualitatively analyze the elemental components of minerals by dispersing fluorescent X rays into identifiable spectra.

By that time, particle theory could explain the cause of X-ray fluorescence. When a primary X-ray beam strikes an atom, it energizes and dislodges an electron from each of the atom's two innermost orbital shells, called the "K" and "L" shells. To regain electrical stability, the resulting orbital voids become filled by electrons from the



The ability of portable XRF analyzers to obtain accurate, real-time elemental analyses greatly speeds the processes of field mineral exploration and prospecting.

next-highest orbital shells. To fill these voids, the "descending" electrons then release fluorescent X rays in energies that are equal to the energy differential between the adjacent orbital shells. Fluorescent X-ray energies and frequencies are unique to each element. XRF analysis is based on detecting and measuring the energy and frequency of the fluorescent X rays emitted by electrons that fill both the "K" and "L" shells.

The first XRF spectrometers were developed in 1948. These instruments used Geiger counters to detect fluorescent X rays, which microscopic diffraction gratings then separated into their spectral components. These instruments could identify elements between the atomic numbers 22 (titanium) and 92 (uranium). Although cumbersome and relatively insensitive by modern standards, they were nevertheless quickly employed in laboratory mineral analysis.

By the 1970s, lithium fluoride crystals had replaced the old diffraction gratings. Multichannel spectrometers could simultaneously identify different elements; increased sensitivity enabled the identification of elements as light as potassium (19), and computerization made possible real-time analyses.

Following advancements in miniaturization and computer microprocessors, portable, handheld XRF analyzers began appearing in the mid-1990s. Continued refinement has produced the remarkable instruments in use today.

Lighter elements remain the most difficult to identify with XRF technology. With fewer electron shells, their X-ray fluorescence is much weaker than that emitted by the heavier elements. Nevertheless, many modern XRF analyzers can identify el-

ements as light as chlorine (17). Advanced Thermo Scientific XRF analyzers can now identify and quantify elements as light as magnesium (12).

In quantitative elemental measurement, today's XRF instruments have extraordinary sensitivity. Thermo Scientific XRF analyzers can quantify elements present in trace levels at or even below crustal averages. In fact, they can identify and quantitatively measure elements that are present only in a few parts per million—levels beyond the limits of detection that are possible with most traditional chemical-assay methods.

The Niton XL3t analyzer that I used is configured especially for geochemical analysis and can identify 29 elements, each selected because of their importance in general mining and mineral-exploration applications. Although this particular instrument is not configured to identify inert gases, heavy halogens, or many rare elements, it can "read" such elements as calcium, vanadium, iron, titanium, nickel, copper, tin, zirconium, silver, gold, bismuth, manganese, tungsten, molybdenum, lead, zinc, antimony, arsenic, and the platinum-group metals.

The instrument's pistol grip enables "point-and-shoot" operation. When the trigger is pressed, the instrument emits a primary X-ray beam from a high-voltage X-ray tube. It simultaneously detects the much weaker fluorescent X rays emitted by the sample, amplifies this signal in a digital-signal processor, then passes the amplified signals on to three microprocessors in its central-processing unit. From there, readable, digital data is sent to a liquid-crystal-display touch screen and memory bank

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X-RAY Fluorescence Analyzers from page 21



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# 334 Mining Cu/Zn		
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Time 12.1 sec		
Ele	%	± 2σ
Bal	76.74	0.50
Mo	0.063	0.004
As	0.138	0.047
Pb	5.99	0.17
Zn	12.77	0.26
Cu	0.013	0.006
Fe	3.68	0.08
Mn	0.355	0.028

This Niton XL3t analysis display of "galena" ore from Colorado's Black Cloud mine actually shows a much higher content of zinc than lead.

(and optionally to a USB port and a wireless connection). The Niton XL3t has three specialized modes for analyzing bulk samples, alloys, and soil samples. The operator chooses the appropriate mode and related functions by using simple computer commands on the touch screen or scroll keys.

In the bulk-sample mode, I analyzed several specimens that I had acquired over the years in the field or at rock shops. Some had unknown mineralogical origins, while others had poorly defined crystal forms or contained many impurities, all of which made positive, visual identification uncertain. One small specimen had little discernible crystal structure, a reddish-brown color, substantial density, and a quartzlike hardness. I had guessed it to be a type of garnet, but when XRF analysis returned a reading of 47.23 percent zirconium, I learned that my "garnet" was actually zircon (zirconium silicate).

Analysis of a specimen of stibnite (antimony trisulfide) returned an expected result of about 61 percent antimony. But I was surprised to learn that this specimen also contained significant quantities of bismuth, iron, and arsenic—even a surprising 0.02 percent silver.

The Niton XL3t also quickly identified the chromophoric elements in quartz crystals of various colors. Colored quartz consists almost entirely of silicon and oxygen, along with traces of accessory chromophoric elements that impart color. Although this instrument displays light elements like silicon and oxygen under a collective "balance" reading, it specifically identifies and quantifies any heavy, chromophoric metals that are present. Analysis of a translucent slab of bright-green Australian chryso-prase (quartz) showed that the "balance"

elements silicon and oxygen comprised 98.48 percent of the sample. Also present was 1.48 percent nickel—the chromophore that produces the characteristic green color in chryso-prase—and a trace of iron.

Analysis of an amethyst specimen from Maine's Deer Hill pegmatite showed a balance (silica) content of 97.87 percent and just over 1 percent each of iron and manganese, the chromophoric metals responsible for its beautiful lilac color.

To use an XRF analyzer, the operator places the X-ray window directly against the sample. The Niton XL3t analyzes an area with a diameter of 8 millimeters (about 1/3 inch). When working with mineral specimens, the operator must carefully select representative portions of the sample surface, just as an exploration geologist would carefully select representative samples for chemical assay. This instrument is optionally equipped with a digital camera that displays an image of the sample surface, enabling precise placement of the X-ray window at a preselected point.

Another optional feature enables the Niton XL3t to reduce the standard, 8-millimeter-diameter target area of the primary X-ray beam to a diameter of only 3 millimeters (about 1/8 inch). This "small-spot" collimation makes it possible to analyze very small samples or small inclusions or anomalies within larger specimens. Using this feature, analysis of a flame-fusion synthetic ruby (aluminum oxide) returned a reading of 99 percent "balance" (aluminum and oxygen) and 0.97 percent chromium, the chromophore that produces the ruby-red color.

XRF analysis was recently used to solve a case of gemstone fraud after a San Francisco gemological laboratory noticed that

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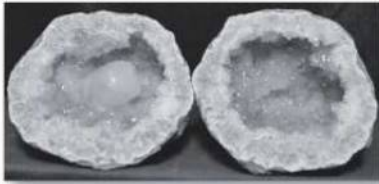


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X-RAY Fluorescence Analyzers from page 22



The analysis of a vein center of the famed "amethyst ore" from Creede, Colorado, was performed in 12.4 seconds and showed high values of lead and zinc.



The real-time results of XRF analysis of Australian chryso-prase show a "balance" (silicon and oxygen) content of 98.48 percent, and lesser amounts of nickel and iron.

something didn't appear quite right in a batch of natural rubies. When optical examination couldn't pinpoint the problem, the lab rented a Thermo Scientific portable XRF analyzer, which detected the presence of lead, an element not found naturally in rubies. That clue enabled a gemologist to ascertain that numerous holes in flawed rubies had been filled with red leaded glass. The leaded glass had been cleverly formulated so that its refractive index closely matched that of natural ruby, making optical detection virtually impossible.

XRF analysis has become a standard tool in mining, mineral processing, and mineral exploration. Traditionally, these fields relied on chemical assaying, which involves collecting samples, shipping them to laboratories, and waiting for results—and then often repeating the entire, time-consuming process. But with portable XRF instruments, geologists and mining engineers now perform on-the-spot elemental analyses to delineate ore bodies, control ore grades, "assay" drill cores, and assess milling and smelting efficiencies, all in real time and with huge savings in time and cost.

Supervisors at the Henderson molybdenum mine near Idaho Springs, Colorado, use Thermo Scientific Niton XRF analyzers to "assay" molybdenite ore as it is mined. They then "blend" ores from different production headings to formulate "mill-feed" ore of optimum grade to maximize milling efficiency.

Mineral collectors who frequent mining districts know that the mineralogical complexity of most metal ores can often be misleading, making visual identification difficult. As an example, one popular collector's item, high-grade vein ore from the now-closed Black Cloud mine in Leadville, Colorado, consists mainly of heavy, distorted, gray, cubic crystals with accessory pyrite and quartz. The specimens look like, and are traditionally described as, "galena" (lead sulfide). But XRF analysis revealed

that these specimens actually consist of 12.7 percent zinc, 6.0 percent lead, 3.6 percent iron, and 0.3 percent manganese, with lesser amounts of copper, arsenic and molybdenum. The abundance of zinc explains the distortion of the "galena" crystals. Interestingly, these specimens also contain 0.01 percent silver, the equivalent of 20 troy ounces of silver per ton of ore.

In analyzing a typical specimen of molybdenite (molybdenum disulfide) ore from the Climax mine near Leadville, I took care to average representative readings. The result was 0.865 percent molybdenum, very close to the historic average grade of Climax ore. But analysis of an exposed vein of gray molybdenite returned a molybdenum content of nearly 7 percent, a figure that applied only to the vein and not to the overall sample. This finding highlighted the importance of selecting representative portions of samples and averaging several readings when "assaying" complex ore samples. Analysis of this ore also revealed 0.589 percent iron as glittering bits of pyrite (iron disulfide) and lesser but still significant quantities of tin, tungsten, and the rare-earth element cerium, all of which had been recovered as byproducts at various times in the mine's history. Results like these confirm the value of XRF analyzers in mineral exploration and prospecting.

In the alloy mode, the Niton XL3t identifies and quantifies a wide array of alloys. Analyses of gold alloys all agreed with stated karat ratings: 75.0 percent gold for 18-karat alloys, 58.3 percent for 14-karat alloys, and 41.6 percent for 10-karat alloys. The XL3t also verified the composition of the sterling-silver alloy that is standard in many coins and decorative and jewelry items as 92.5 percent silver and 7.5 percent copper. It's little wonder that buyers of antique gold and silver items use XRF analyzers for on-the-spot confirmation of alloy compositions.

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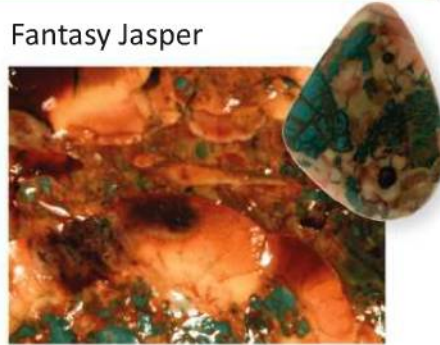
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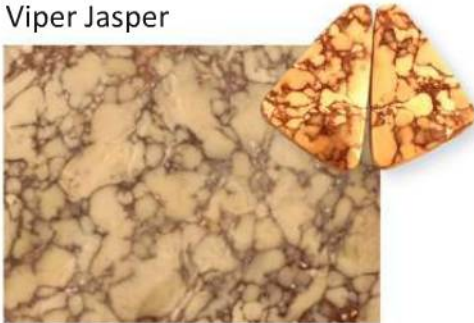
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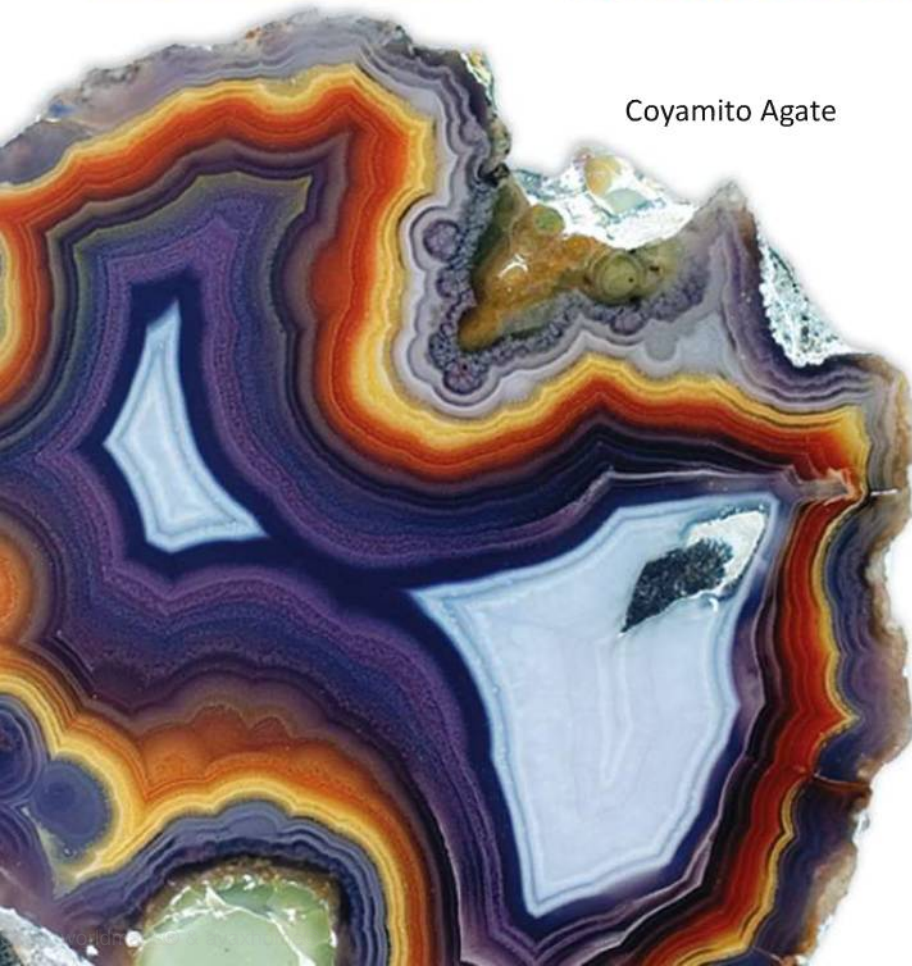


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X-RAY from page 24



The real-time results of XRF analysis of Climax mine molybdenite ore show lesser amounts of elements so numerous they scroll off the bottom of the screen.

Even analysis of common base-metal alloys can often prove surprising. A belt buckle that I had long assumed to be pewter (an alloy containing at least 90 percent tin) actually consisted of 72.20 percent lead, 12.53 percent tin, 5.68 percent antimony, and 2.44 percent copper, along with small amounts of zinc, silicon, and several other elements. Because it consists primarily of lead, this alloy is inexpensive and easy to cast, while the tin, antimony, and copper content make it hard and durable.

Analyses of modern bronze alloys showed compositions almost exclusively of copper, tin and manganese, with only traces of other metals. But the compositions of 300-year-old bronze spikes recovered from shipwrecks proved much different. These old bronze alloys consisted mainly of copper and tin, along with relatively large amounts—up to 5 percent—of such elements as zinc, bismuth, arsenic, antimony, iron and lead. Some even showed small but significant quantities of silver and gold. The large proportions of these accessory elements testify to the inability of the era's crude metallurgical processes to refine copper and tin to high purity.

In XRF analysis, X rays interact only with the surface of most materials, so sample surfaces must be clean and free of foreign matter, tarnish, staining, rust, or other chemical-oxidation products. Metal plating must also be considered in XRF analysis. When thick plating is present, only the plate metals will fluoresce. When an object is thinly plated, XRF analyzers will sometimes "read" both the plate and the underlying metal. Readings for thin, 14-karat gold plating typically show about 3 percent gold, a misleading figure that represents a composite analysis of both the plate and the underlying base metals.

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RG9/10

Any discussion of XRF analyzers must include safety considerations. The energy in the primary X-ray beam of a Niton XL3t is much less than that of a typical dental or medical X-ray. Nevertheless, X rays are a form of ionizing radiation, and exposure to certain levels over periods of time can be harmful. Human X-ray dosage is measured in rems or millirems (1/1000 rem), and the allowable, occupational X-ray exposure in the United States is set at 5,000 millirems per year. Even when used as many as 2,000 hours annually, proper operation of a Niton XL3t will expose the operator to less than 20 millirems during the entire year.

The safe use of portable XRF analyzers is also largely a matter of common sense: Never hold samples in your hand for analysis, never expose body parts to the primary X-ray beam, and always place the X-ray window in direct contact with the sample before depressing the trigger so that the sample absorbs the X-ray energy and backscatter is minimized. Thermo Scientific XRF analyzers also have several built-in safety features to promote safe use.

For anyone interested in the earth sciences, using an XRF analyzer is a wonderful learning experience. Although priced beyond the means of most amateur mineralogists, XRF analyzers can be rented for roughly \$500 per day or \$2,000 per week. That's still not pocket change, but renting can put XRF analyzers within the reach of many gem and mineral clubs. As the focus of a special meeting or field trip, a rented XRF analyzer would give club members an opportunity to positively identify many of their mystery specimens while benefiting from a first-hand lesson in XRF technology.

Thinking back to that old "Star Trek" scene with the tricorder, one can only wonder what the capabilities and costs of portable XRF analyzers might be in 10 or 20 years. In the future, these instruments will have a greater ability to detect even weaker X-ray fluorescence and thus identify additional light elements. Advances will also take place in miniaturization and greater computing power.

In recent years, the prices of many electronic devices such as digital cameras, cell phones, and computers have declined significantly, but don't expect XRF analyzers to become readily affordable in the foreseeable future. That's due to the high costs of continued research and development, along with the fact that XRF analyzers are not produced in quantities necessary to substantially reduce manufacturing costs. In the meantime, anyone interested in the earth sciences with a chance to use a portable XRF analyzer should not pass up the opportunity.

For further information on portable Thermo Scientific XRF analyzers and XRF technology, visit www.thermoscientific.com/niton or www.niton.com.

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Show Dates from page 10

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11—TULSA, OKLAHOMA: Show, "Indian Nations Artifact & Fossil Show"; Bill Breckinridge and Harvey Shell; Oral Roberts University, Mabee Center, 81st and Lewis Ave.; Sat. 8-5; adults \$3, children 12 and under free; contact Harvey Shell or Bill Breckinridge, (918) 284-8216; e-mail: billbreckinridge2003@yahoo.com

11-12—DOWNEY, CALIFORNIA: Show; Delvers Gem & Mineral Society; Woman's Club of Downey, 9813 Paramount Blvd.; Sat. 10-6, Sun. 10-4; free admission; contact Fred Dexting, (562) 425-0192; e-mail: mdexting@verizon.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—PITTSBURGH, PENNSYLVANIA: Show; Inter-galactic Bead & Jewelry Show; The Circuit Center & Ballrooms, 5 Hot Metal St.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun.; children 12 and under free; unique beads, exhibitors offering helpful advice; contact Angela C., 3865 Lawrenceville Hwy., Suite 107, Lawrenceville, GA 30044, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: <http://beadshows.com>

11-12—POWELL, VERMONT: 47th annual show; Northern Berkshire Mineral Club; Sat. 10-6, Sun. 10-5; American Legion Post #90, Rte. 7, one mile north of the old Green Mountain Race Track; adults \$4, children 15 and under free with adult; minerals, gems, jewelry, gifts, children's fish pond, prizes; contact Larry Michon, P.O. Box 297, North Adams, MA 01247, or (413) 663-8430

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—RICHMOND, BRITISH COLUMBIA, CANADA: 50th annual show, "Gold 'N' Opportunities"; Richmond Gem & Mineral Club; Richmond Arts & Cultural Center; 7700 Minoru Gate; Sat. 10-5, Sun. 10-4; dealers, club boutique table, member show cases, kids' corner; contact Livia Waterson, 7700 Minoru Gate, Richmond, BC V6Y 1R9

11-12—ROSEBURG, OREGON: Show, "Rough to Gems"; Umpqua Gem & Mineral Club; Douglas County Fairgrounds, 2110 Frear St., I-5 Exit 123; Sat. 10-6, Sun. 10-4:30; displays, Wheel of Fortune, silent auction, dealers, raffle, demonstrations, door prizes, gold panning, children's rock hunt; contact Bob Sampson, (541) 459-1755, P.O. Box 1264, Roseburg, OR 97470

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

continued on page 38

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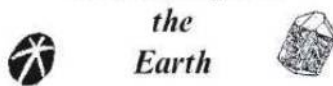
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ROCK SCIENCE

by Steve Voynick

From Limestone to Marble

Since the time of classical Greece (6th through 4th centuries BCE), many of the world's greatest examples of sculpture and architecture have been executed in marble, and for good reason. Marble occurs in beautiful colors, is soft enough to be easily worked, and polishes to a gleaming luster. It can also be quarried from massive formations in huge blocks suitable for the largest sculptures and most ambitious buildings and monuments.

Its color and luster set marble apart from all other types of stone; it ranges from bright white through a rainbow of subtle hues, and polished marble's distinctive luster has a soft glow that projects a sense of depth and roundness.

The term "marble", which stems from the Greek *marmaros* ("crystalline rock" or "shining stone"), actually has two meanings. In its commercial context, it refers to any decorative or dimensional stone, calcareous or not, that is softer than granite, such as travertine, serpentine, onyx, and fine-grained limestone. But petrologists who specialize in the study of rocks define marble more precisely as limestone that has been altered by the heat and pressure of regional metamorphism.

Limestone is a sedimentary rock of marine origin that consists predominantly of calcareous minerals such as calcite (calcium carbonate) and/or dolomite (calcium magnesium carbonate). The highest grades of limestone are off-white; most grades are light to dark gray. Despite its dull luster and poor polishing qualities, limestone is abundant and inexpensive and is therefore widely used as exterior building blocks.

But when limestone is subjected to metamorphism, it undergoes remarkable changes. Under the heat and pressure of regional metamorphism in deep-burial environments, the solid limestone first takes on a plastic consistency. During this transformation, any fossils or sedimentary textures in the limestone, along with its fine-grained crystalline structure, are destroyed. Then, as the heat and pressure are slowly reduced, the plastic mass recrystallizes as much larger grains that form a tough, interlocking mosaic and solidifies. With a hardness of approximately Mohs 3, marble is considerably softer than limestone (Mohs 3.5 to 4), but because of its tightly interlocked crystals, marble has considerably more density and durability.

The purest marble, called statuary marble, is snow-white ("blinding white" in the



lexicon of the marble trade) and has a visible, glittering crystalline structure. Statuary marble forms only from high-grade limestone containing about 80 percent calcite. Because of its soft, white glow, sculptors consider statuary marble the "classic" and most beautiful of all marble varieties. Its distinctive glow is due to calcite's low refractive index, which enables light to penetrate a few millimeters into the stone before scattering in all directions and reflecting back. This effect produces the characteristic "waxy" look of fine marble and imparts a warm, almost lifelike appearance to sculptures.

Colored marble is created by the noncalcareous minerals that are present in quantity in lower grades of limestone. Pink and red are imparted by hematite or iron (ferric) oxide; yellows by limonite, an indeterminate mixture of hydrous iron oxides; greens by serpentine-group minerals (metamorphic asbestos minerals); blues by diopside, a calcium magnesium silicate; and dark grays to near-blacks by organic material that became carbonized during metamorphism. Marble colors can be uniform or they can have attractive, swirling patterns created by the flow movements of the metamorphosing limestone when it was in a plastic state.

The Italian Renaissance sculptor Michelangelo created his finest works in marble, and it remains the preferred medium of master sculptors today—a fitting legacy for a beautiful rock that was once common limestone.

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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Silver Bell TURQUOISE

Bill Bowers Had a Unique Collecting Opportunity

Story and Photos by Gerry Blair

Bill Bowers drove the water wagon at Silver Bell for the longest time. The water within the “wagon” was not fit to drink and was not intended for washing, but was used as a dust suppressant within the always dusty Big Pit that hugged the southwest flank of Arizona’s Silver Bell Mountains. The logically named Silver Bell mine was an important part of the double handful of mines within the old Silver Bell District and a major part of what is currently called the Silver Bell Complex.



Bill Bowers fabricated this bracelet from 27 nuggets he picked up while working at the Silver Bell mine.

The Silver Bell mine is not primarily a silver mine. It is mainly a copper mine, where more than a million tons of ore-bearing gangue was sifted through each month in search of the red metal. Gold, silver and lead was also available.

The Bell also offered another interesting byproduct. I am talking about turquoise of an excellent nature. I first saw an example of Silver Bell turquoise the day I first saw Bill. He was walking the aisles of the Prescott Gem & Mineral Show in 2007, just as I and 50 other like-minded folks were. Even so, Bill stood out in the crowd. He was handsome in a Western sort of way and wore the obligatory blue jeans and a hat that was not quite 10 gallons, but nearly so. A grand belly told a tale of many satisfying meals. Beneath the belly was a leather belt adorned with some of the finest turquoise I had seen in a month of Sundays: deep blue, with little webbing and, at times,

a subtle hint of green. The material resembled Blue Gem turquoise, but was obviously not from that famous Lander County, Nevada, mine.

Around the crown of Bill’s 8½-gallon hat hung a leather, silver and turquoise band that matched his belt and was nearly as grand. Bill and I shook hands, howdied, and talked turquoise.

“I drove the water wagon,” Bill grinned slyly, “because I was able to roam the pit and have first grab at the turquoise. We did not see a lot of turq at Silver Bell and ASARCO [American Smelting and Refining Co.] did not holler much when I climbed off the wagon occasionally. I carried a canvas sample sack in the truck and was able to fill it within a few minutes much of the time.”

The Silver Bell turquoise, as Bill recalls, was somewhat deep within the pit, maybe 300 or 400 feet beneath ground



This concho style hat band displays the range within the Silver Bell turquoise character. Spider web, solid blue, water marking, birdseye and more.

"Water Wagon" Bill Bowers fell off the wagon a number of times to collect gem-grade turquoise at the Silver Bell mine.

level. This was deeper than many of the Southwestern producers, but not nearly as deep as the turquoise recovered from the Lavender Pit down Bisbee, Arizona, way. Much of the Silver Bell material was a thin blue chalk. That chalk graded up to a hard blue material that sometimes showed as nuggets. The many stones within Bill's belt and hatband were cut from the latter. Bill had hoarded his Silver Bell turquoise, which he collected during the mid-'80s, learned the basics of lapidary and metal working, and somewhat recently put those skills together to fashion eye-catching jewelry.

Bill and I exchanged business cards, promised to keep in touch, and went our separate ways. Months later, I found the card and, remembering the color and nature of that Silver Bell blue, telephoned to set up a meeting so we could buy some turquoise.

My wife, Beverly, and I met Bill and Irma at the Denny's café in Prescott Valley, Arizona, on a dandy mid-March day. Bill was wearing his handsome belt and hatband and carried a sample case a bit bigger than an attaché case. We guzzled coffee as our eyes ogled the contents of the case. Beverly quickly took possession of a handsome natural chip and nugget necklace; not to be outdone, I added a matching one to my pile. Beverly chose a natural nugget and I made a grab for a half-dozen finger rings. She picked several natural cabochons and I selected a trio of multistone bracelets, one made of a gang of seafoam sort of nuggets of Blue Gem blue, one displaying cut cabs of a handsome blue, and one a chip cooperation that somewhat resembled some of Charles Loloma's later work. Finally, we took the band from Bill's hat and the belt from below Bill's belly.

Both the Blairs and the Bowerses were happy as we left Denny's. Bill was busy fat-

tening his wallet with his strong hand and holding up his Levis with the other. Beverly and I were toting a pleasant load of silver and turquoise and were shivering as a cold wind blew through our bank accounts.

Later, back in Havasu, I asked the Internet about the Silver Bell (sometimes written Silverbell) and found some interest-

it was so flavored with minerals it would cause a buzzard to toss his maggots. Drinking water was transported to the townsite, first by horse-drawn wagon, later by truck, and finally by railroad cars. The lack of drinkable water, the hot summers, and the cold winters caused some to call Silver Bell "The Hellhole of Arizona".

Even though the basic formula for **turquoise** remains somewhat constant, *Mother Nature* gets creative at times and varies the quantities of the minerals within.

Even though the basic formula for turquoise remains somewhat constant, Mother Nature gets creative at times and varies the quantities of the minerals in it. Varying amounts of copper might influence the shade of blue and trace iron can cause the blue to become blue-green and, in extreme instances, varying shades of green and green-blue.

Turquoise from specific mines can also be distinctive. For example, classic green-tinted blue nuggets come from the Fox mine near Crescent Valley, Nevada. The neighboring White Horse claim offers nuggets that are more blue and less green. Specimens of turquoise from one of the many mines within the Royston District (near Tonopah, Nevada) and from the Stone Mountain mine (near Yerington, Nevada) can be a green-blue that shades to a pure green. Some material from each of those areas shows bicolor and tricolor aspects, the greens blending beautifully with traces of blue. The nugget and seam material from the prolific Sleeping Beauty mine (near Miami, Arizona) is most often a hard, pure blue. The Lavender Pit (Bisbee, Arizona) is best known for a deep dark blue that has come to be called "Bisbee Blue".

Another distinguishing characteristic is the presence or absence of matrix. Some Bisbee material incorporates a red-brown matrix that is mainly the copper oxide cuprite. Some turquoise matrix forms a series of fine lines that we have come to call "spi-

ing information. According to the Arizona State Museum Web site (www.statemuseum.arizona.edu/exhibits/blm_vignettes/silverbell_history.shtml), mining began in the Silver Bell Complex during the early 1870s. Charles O. Brown, of Tucson, and his partners worked the Mammoth Lode and Young America mines. Later, the Atlas, Old Boot, and Prospector mines were opened. Still later, those mines and many more were consolidated to form the Silver Bell Mining District.

Development of the company town of Silver Bell was somewhat hindered because there was no easy access to potable water. There was some local water available, but

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Silver Bell TURQUOISE from page 35

der webbing". The size and pattern of the web spacing can be distinctive. Material from the No. 8 mine in Crescent Valley, Nevada, has a characteristic appearance that immediately suggests its source. No. 8 turquoise ranges from medium blue to pale blue, almost white, and the webbing can be black, brown, gray or reddish. Many of the Chinese and Tibetan mines produce turquoise that has extra-large webbing.

Material included in the turquoise can also aid in identification. Both the Duval mine (Ithaca Peak, north of Kingman, Arizona) and the Metcalf pit (Morenci, Arizona) has produced turquoise that includes the iron dioxide pyrite. The Duval material I have seen have been more generously endowed with pyrite.

Some specimens of turquoise contain treelike crystallizations of manganese oxide, called dendrites (from *dendron*, the Greek word for "tree"). Those specimens can be handsome and can suggest a source such as Morenci and Ithaca Peak, Arizona, Pilot Mountain, Nevada, and half a handful of others.

All turquoise forms within a matrix of other rocks. Miners sometimes call this the "mother rock". When visible, it can aid in identification of the source. The turquoise of the Royston District commonly forms within a pleasant tan rhyolite. Some of the Royston material is a thin seam of medium blue turquoise surrounded by rhyolite. It is cut and cabbed and sold under the name of "ribbon rock".

There are number of other subtle clues the turquoise can give. The features known as "watermarks" consist of pale blue puddles outlined by darker turquoise, or vice versa, and there is a polka-dot pattern of webbing that is called "birdseye". In my opinion, stones with a combination of matrix colors, turquoise colors, and some webbing or matrix are more attractive than all-over spider-webbing or pure blue or blue with random splotches of the same black inclusions.

Sound simple? It is not. Every turquoise mine—at least all that I know of—produces a diversity of turquoise grading from extra fine down to toss-your-waffles bad. Too often, we writer types focus on the top grade a mine produces and ignore all else. Further complications arise from what I call "look-alike" mines. The Duval Property near Kingman, Arizona, was one such. I served a three-year sentence in Kingman during the late 1960s and had an opportunity to see a lot of Duval turquoise. I spent my time looking at turquoise, thinking about turquoise, writing about turquoise, and dreaming about turquoise.

I have seen Ithaca Peak and Aztec Peak material that imitated about every speci-



Some of the Silver Bell seam material was used to construct a handful of finger rings.



Some small pieces of vein material were large enough to produce stones of exceptional beauty.

men in my collection. The many mines in China are also very good at imitation. You ready for the bottom line? No human—at least none I know of—can look at a piece of turquoise they did not mine themselves and say with certainty the piece came from a specific location. Mining the material yourself is the best way to be sure of its origin. The next best way is to buy from a truthful miner (yep, there be a few around). The farther turquoise travels from its origin, the more hands it passes through, the more doubtful location information becomes. The way I see it, the best we can do is to say, "When I purchased this piece, the seller said it was from the Lander Blue mine near Battle Mountain, Nevada" or "A close inspection causes me to believe this piece of turquoise came from the Old Man mine north of Kingman, Arizona." Beware of "experts" who profess to know all there is to know about turquoise.

Finally, a toast to the men in tight levis who sweat and swear within tunnels and pits to liberate ore, specimen material, turquoise, and other cuttables. Your efforts are appreciated. ♡

Gerry Blair is a lapidary, silversmith, and mineral collector from Lake Havasu City, Arizona. He has written more than 100 articles about mines, minerals, and lapidary and jewelry techniques.

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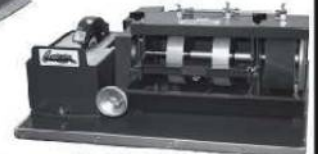
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Show Dates from page 30

SEPTEMBER 2010

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: Wholesale/retail show, "Denver Expo 2010"; T.E.P. Gem Show; National Western Complex, 4655 Humboldt Street Wed. 10-7, Thu. 10-7, Fri. 10-7, Sat. 10-7, Sun. 10-4; free admission; open to the public, free shuttles to other shows; contact Al Sargent, T.E.P. Gem Show, P.O. Box 2902, Tucson, AZ 85702, (520) 883-6447; e-mail: TEPGemShow@cs.com; Web site: www.tucsonelec tricparkgemshow.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; 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: mzxpos@aol.com; Web site: www.mzxpos.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: mzxpos@aol.com; Web site: www.mzxpos.com

17-19—DENVER, COLORADO: 43rd annual show, "Denver Gem and Mineral Show"; Greater Denver Area Gem & Mineral Council; Denver Merchandise Mart, 451 E. 58th Ave. (I-25, Exit 215); Fri. 9-6, Sat. 10-6, Sun. 10-5; adults \$6, seniors and students \$4, children free with adult; runs concurrent with the Colorado Fossil Expo, exhibits, dealer displays, minerals, fossils, meteorites, gems, jewelry, demonstrations, speakers, "Minerals of Creede/Mineral County"; contact Emily Epstein, (303) 233-2516; e-mail: emilye@spry.net.com; Web site: www.denvermineralsshow.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—HILLSBORO, OREGON: 30th annual show; Portland Regional Gem & Mineral Show Association; Washington County Fairgrounds, 873 NE 34th Ave., Hwy. 26 Shute Rd. exit; Fri. 10-6, Sat. 10-6, Sun. 10-5; contact Josh Heater, (971) 570-5456; e-mail: jfrankray@hotmail.com

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 pol-

ishing, 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

17-19—TIMONIUM, MARYLAND: Show; MalicJewels Jewelry & Gift Show; Timonium Fairgrounds Exhibition Halls, 2200 York Rd.; Fri. 12-6, Sat. 11-6, Sun. 11-5; free admission; loose diamonds, colored gemstones, contemporary, antique, estate, costume, custom designed, gold, silver, titanium and beaded jewelry, beading supplies, mineral specimens, gift items; contact Debbie Williams, 270 E. Hunt Hwy., Suite 16, #323, San Tan Valley, AZ 85143, (480) 458-7600; e-mail: debbie@malicjewels.com; Web site: www.malicjewels.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—TWO HARBORS, MINNESOTA: 11th annual show, "Agate City Rock Show"; Agate City Rock Shop; 721 7th Ave. (Hwy. 61); Sat. 9-5; free admission; dealers, collectors, buy, sell, trade, Lake Superior agate, agate, thomsonite, fossils, crystals, rough and polished rocks, flint knapping, marbles, spheres; contact Bob Lynch, 721 7th Ave., Two Harbors, MN 55616, (218) 834-2304; e-mail: bob@agatecity.com; Web site: www.agatecity.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 Alan Goldstein, 201 W. Riverside Dr., Clarksville, IN 47129, (812) 280-9970; e-mail: agoldstein@dnr.in.gov; Web site: www.fallsoftheohio.org

18-19—HARRISBURG, PENNSYLVANIA: 45th annual show; Central Pennsylvania Rock & Mineral Club; Zumbo Auditorium, 2810 N. 3rd St.; Sat. 10-6, Sun. 10-5; adults \$5, children 12 and under and youth Scouts in uniform free; Scouting programs, educational displays and talks; contact RJ Harris, 1109 Gunstock Ln., Mechanicsburg, PA 17050, (717) 795-0922; e-mail: webmaster@rockandmineral.org; Web site: www.rockandmineral.org

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.driftdmine.com

continued on page 40

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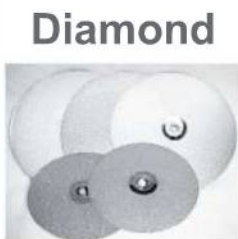


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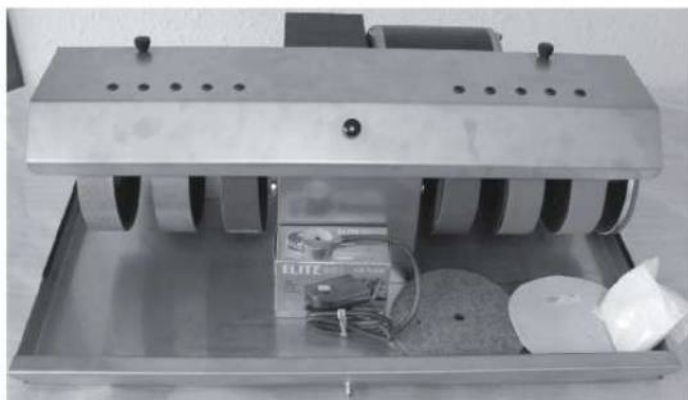
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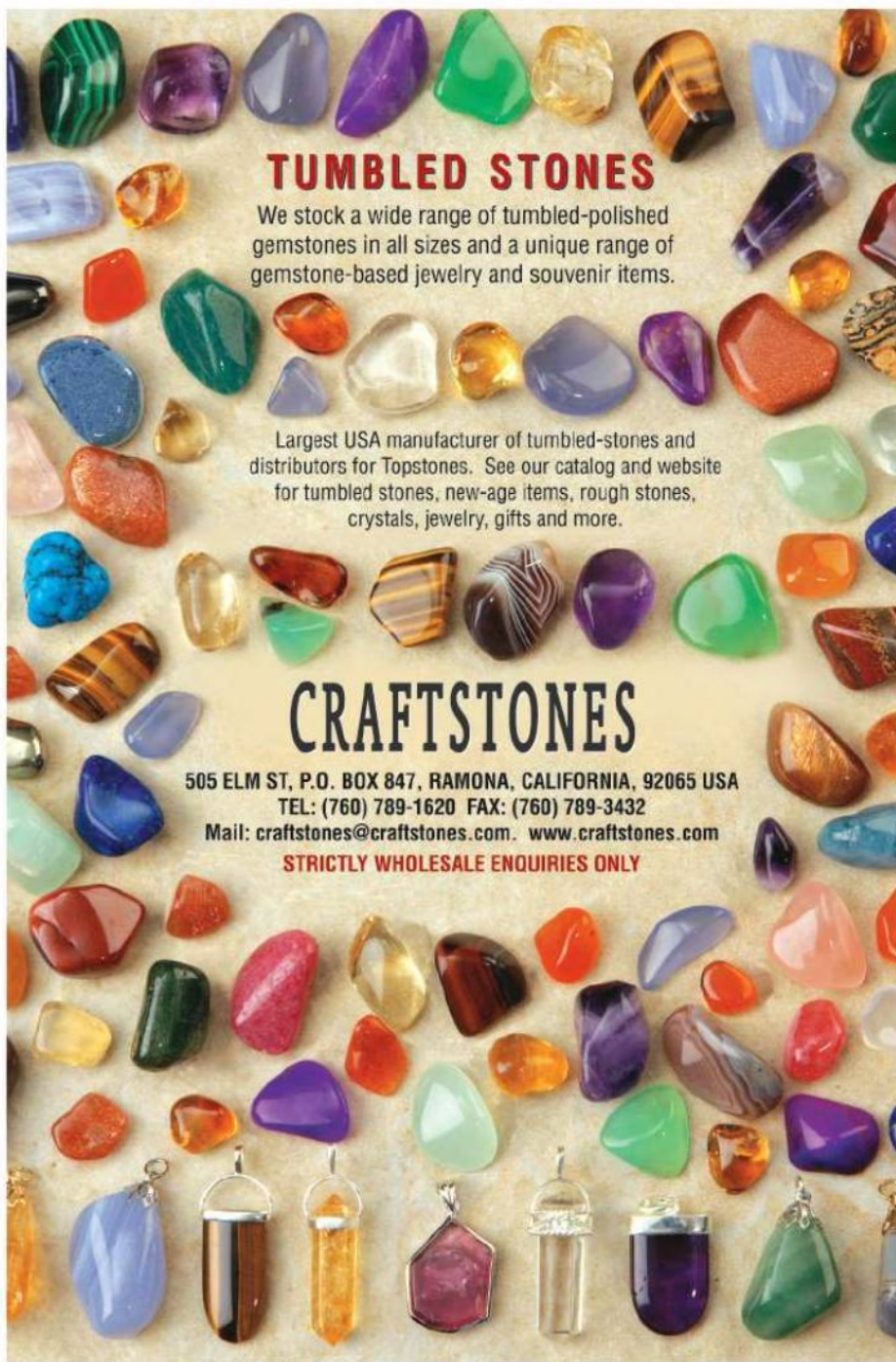
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18-19—SCARBOROUGH, TORONTO, CANADA: 42nd annual show, "Wonders of the Earth"; Gem & Mineral Club of Scarborough; Don Montgomery Community Centre, 2467 Eglinton Ave. E.; Sat. 10-6, Sun. 11-5; adults \$5, children \$1; dealers, jewelry, minerals, fossils, displays, lapidary demonstrations, live auction, silent auction, kids' auction, door prizes, kids' quarry; contact GMCS, (416) 282-5319; Web site: www.scarbagemclub.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—JACKSONVILLE, FLORIDA: Show; Jacksonville Gem & Mineral Society; Jacksonville Gem & Mineral Society; Morocco Temple, 3800 St. Johns Bluff Rd. S.; Fri. 1-6, Sat. 10-6, Sun. 10-5; displays; contact Tom Frame, 3133 Chapelwood Ln., Jacksonville, FL 32216, (940) 737-9867; e-mail: Jgms_show@hotmail.com

24-26—JOPLIN, MISSOURI: 12th annual show, "Rock-a-thon"; TriState Gem & Mineral Society; Joplin Museum Complex, 504 Schifferdecker Ave.; Fri. 9-6, Sat. 9-6, Sun. 9-6; free admission; demonstrations, door prizes, dealers; contact Chris Wiseman, P.O. Box 555, Joplin, MO 64802; e-mail: jmc-cwiseman@sbcglobal.net

24-26—OAKS, PENNSYLVANIA: Show; MalicJewels Jewelry & Gift Show; Greater Philadelphia Expo Center, 100 Station Ave.; Fri. 12-6, Sat. 11-6, Sun. 11-5; free admission; loose diamonds, colored gemstones, contemporary, antique, estate, costume, custom designed, gold, silver, titanium and beaded jewelry, beading supplies, mineral specimens, gift items; contact Debbie Williams, 270 E. Hunt Hwy., Suite 16, #323, San Tan Valley, AZ 85143, (480) 458-7600; e-mail: debbie@malicjewels.com; Web site: www.malicjewels.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—DURHAM, NORTH CAROLINA: Show; Inter-galactic Bead & Jewelry Show; Executive Banquet and

continued on page 48

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ROCK & GEM Kids

Cinnabar

HgS (mercury sulfide)

Cinnabar is easily identified by its bright-red color and brick-red or scarlet streak. Also, although soft (Mohs 2-2.5), it's fairly heavy (specific gravity 8-8.2). It most often forms in clumps with a dull, earthy luster, but occasionally takes the form of hexagonal crystals with beautiful diamondlike luster and translucency.

This sulfide mineral is associated with volcanic activity, filling fissures around fumaroles. It's deposited near the surface by mineral-rich aqueous solutions. Spanish mines produced a plentiful supply, and when Spaniards came to the New World, they recognized cinnabar deposits at Clear Creek, California. Other famous deposits have been mined elsewhere in southern Europe and in Peru. Recently, fine crystal specimens from China have been appearing on the mineral market.



JIM BRACE-THOMPSON PHOTO

Cinnabar may take the form of earthy clumps or brilliant crystals. If its host rock agatizes, it can be crafted into cabs with brilliant red highlights.

If you've collected cinnabar, be careful with it and wash your hands after you touch it. Cinnabar is the chief ore of mercury, which is a toxic metallic element. Cinnabar has been mined as far back as the time of the Roman Empire (27 BCE to CE 476) for this mercury content. The Romans crushed cinnabar and roasted it to separate pure mercury from the sulfur. The evaporated mercury was collected as it condensed into a silvery-gray liquid metal, sometimes referred to as quicksilver.

Mercury is an unusual metal in that it is liquid at room temperature. Miners have used it to separate gold and silver from other minerals, but this can prove hazardous. It's used in scientific instruments like thermometers and blood-pressure gauges, but because it's toxic, mercury is increasingly being replaced by other materials.

—Jim Brace-Thompson

Wyoming's State Rockhound Symbols

Nephrite jade was designated the Wyoming state gemstone in 1967. Nephrite tends to be dark green, although it ranges from cream across all shades of green and into black. Central Wyoming nephrite includes a gorgeous but rare apple-green jade and a green "snowflake jade" speckled by quartz inclusions. Wyoming jade can be difficult to recognize in the field because a red-brown rind sometimes hides the green beneath. But when cut and polished, jade takes a beautiful, mirrorlike finish that makes it a desirable semiprecious gemstone.

Little *Knightia* was named the Wyoming state fossil in 1987 thanks to efforts of elementary schoolteacher Maudie Barker and her students. A slender herring averaging just a few inches long, *Knightia* was the first fossil from the Eocene Green River Formation to be described in an 1856 paper by Philadelphia paleontologist Joseph Leidy. The Green River Formation, which has been dated at 40 million to 50 million years old, has become world famous for its abundance of beautifully preserved fish fossils, as well as crocodiles, leaves, insects, and even fossil bats.

Hundreds of *Knightia* fossils are sometimes found in individual beds called "mass mortality layers". The cause of such die-offs remains unknown. Perhaps it was algal blooms or ash from volcanic eruptions. Become a paleontologist and help solve the mystery!

Triceratops, a plant-eating dinosaur from the end of the Cretaceous period, was named Wyoming's state dinosaur in 1994.



JIM BRACE-THOMPSON PHOTO

Wyoming's state symbols include the dinosaur *Triceratops*, the fossil fish *Knightia*, and the gemstone jade.

Its name is taken from Greek words meaning "three-horn face", and it's often pictured in murals and cartoons using its horns to square off against *T. rex*. It also had a beak and a broad neck shield. *Triceratops* went extinct along with all other dinosaurs at the end of the Mesozoic Era, 65 million years ago, but we know about it from remains found in sediments blanketing Wyoming and neighboring states.

—Jim Brace-Thompson

Kids' Classes at the Colburn

The Colburn Earth Science Museum in Asheville, North Carolina, offers more than a dozen different classes for students in kindergarten through 12th grade.

All Colburn courses fulfill the science education requirements mandated in the North Carolina Standard Course of Study. Both school programs and home-school programs are offered.

School Programs

In Basic Rocks & Minerals, students learn to identify the most common rocks and minerals that occur in the earth's crust, explore the formation of igneous, sedimentary and metamorphic rocks, and discover the many ways minerals are used in their everyday lives.

In Journey Through Time: Fantastic Fossils, hands-on fossil kits allow students to dive into the ancient past and examine actual fossil remains of animals and plants that once inhabited the earth. Kids will "walk" through geologic time learning about key life forms, index fossils, and the changing nature of the earth itself through the eons.

In the museum's Outdoor Classroom, students can visit a real working rock quarry in the Asheville area and learn about the fascinating local and regional geology, the processes that formed the Southern Appalachians, and the metamorphic and igneous rocks and minerals that resulted.

Take a Geology Walk of Downtown Asheville with the museum's geologist and discover the geologic features in the granite, marble and limestone in the city's buildings and monuments.

Each year, instructors from throughout Western North Carolina bring thousands of students with diverse learning abilities to the Colburn for field trips that include classroom instruction and our "scavenger hunt" museum exploration.

After School

The Junior Rockhounds Club after-school program is a great way for rock-loving kids ages 6 to 10 to learn about minerals and their uses while building their own mineral collections. Club members receive mineral specimens at each monthly meeting. The Colburn's Curator/Geologist/Educator Phil Potter also teaches the Rockhounds about the properties and uses of featured minerals.

Rockhounds participate in fun rock-related activities or crafts and receive an introductory rock and mineral guide, a collector's box, and a mineral activity book.

Summer Camps

More than 100 children in kindergarten through fifth grade participate each summer in Colburn Earth Science Museum weeklong day camps. These camps are not only educational, but full of fun hands-on activities. Participants spend the last day of camp at the

Colburn's "outdoor classroom" at the Grove Stone and Sand Co. quarry in nearby Swannanoa, North Carolina.

Parents and club leaders can get more information about these programs from the museum's Web site or by calling the museum.

Colburn Earth Science Museum, 2 S. Pack Square, Asheville, NC 28801-3521, (828) 254-7162; www.colburnmuseum.org



COLBURN MUSEUM PHOTO

Take the Quiz, Win a Prize!

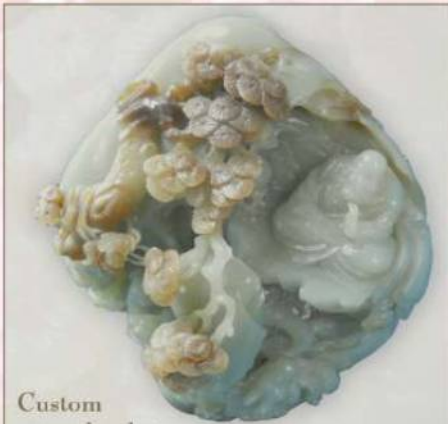
The Quiz is open to U.S. residents 17 and younger. All the questions can be answered by carefully reading *Rock & Gem Kids*. Mail your answers to **September Quiz, Rock & Gem magazine, P.O. Box 6925, Ventura, CA 93006-9899**. Five winners will be drawn from the valid entries received by **Sep. 31, 2010**. 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 gem, mineral and fossil grab bag generously donated by the Ventura Gem & Mineral Society (www.vgms.org).



1. Cinnabar is a _____ mineral that is associated with volcanic activity.
2. Cinnabar is the chief ore of the toxic metallic element _____.
3. Evaporated mercury condenses into a silvery-gray liquid metal sometimes referred to as _____.
4. A red-brown _____ can make Wyoming jade difficult to recognize in the field.
5. The _____ _____ in Wyoming has become world famous for its abundance of beautifully preserved fish fossils.



COLBURN MUSEUM PHOTO



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September 13 - 19 Denver, CO; Colorado Mineral & Fossil Show - Summer, Holiday Inn Room # 200, 4849 Bannock St.

October 3, Fallbrook, CA; Fallbrook Gem & Mineral Show, 123 West Alvarado St.

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PICKS & PANS

BOOK REVIEW:

Agates: Inside Out

by Karen A. Brzys

With its limitless combinations of bright colors and intricate patterns, agate is one of the most intriguing and widely collected of all forms of quartz. Thanks to its popularity and beauty, agate is the subject of a plethora of books ranging from simple primers and collecting guides to the most detailed, technical treatises of the theories of agate formation. And in terms of its comprehensive content, readability, organization, and superb color photography, Karen A. Brzys' *Agates: Inside Out*, just released in 2010, is among the best.

Brzys, who owns and curates the Gitche Gumee Agate and History Museum in Grand Marais, Michigan, begins by defining quartz itself and emphasizing the differences between the macrocrystalline and microcrystalline varieties. She then guides readers through the fascinating world of agates, explaining everything from the inflow and silica-gel theories of agate formation to the origin of agate's complex banding patterns, channel structures, and array of delightful colors.

After describing the 31 major types of agate, from botryoidal, brecciated and cloud to the shadow, tube, and water-level subvarieties, the author includes an informative and helpful chapter on agate hunting that will inspire any reader to plan a field trip. Brzys ends the book with a detailed listing of notable agate-collecting localities in 14 American states and eight foreign countries.

Agates: Inside Out will appeal to both beginners and experts. For beginners, this book provides a solid foundation for further studies into agate, while experts will find it valuable for its stunning photographs.

The 248-page, 6-inch by 9-inch, softcover book includes 240 color photographs, 20 explanatory diagrams, footnotes, references, and an index. It retails for \$22.95.

—Steve Voynick

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BOOK REVIEW:

A Collector's Guide to the Pyroxene Group

by Robert J. Lauf

The pyroxene group of minerals includes a number of rock-forming minerals, many of which are popular collector minerals and gems. In *A Collector's Guide to the Pyroxene Group* (Schiffer Publishing Ltd., 2010), the author briefly describes each of the 22 minerals. He gives physical characteristics of each and goes into some detail on the rock types and environments in which these minerals occur. He lists localities in which the minerals are most likely to occur and gives some insights into associations, alterations, and other pertinent facts about each mineral.

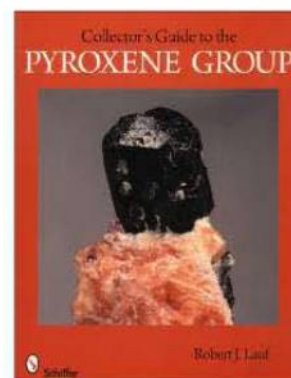
The color photographs are very useful, as they illustrate specimens that are of the quality an average collector is most apt to encounter, rather than museum-quality specimens, which are probably not normally available. The color photographs are excellent and there are close-up photos of some species that are particularly useful in helping the reader recognize some of the uncommon and hard-to-identify species.

The chapter "Taxonomy of Pyroxenes" is very useful in understanding the chemistry and crystallography of the entire group.

For the serious collector who wants to go beyond just collecting species without studying their mineralogy, this text is a very useful guide. Its 93 pages include more than 100 color photographs, crystal model drawings, and nomenclature tables.

—Bob Jones

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BOOK REVIEW:

California Rocks!: A Guide to the Geologic Sites in the Golden State

by Katherine J. Baylor

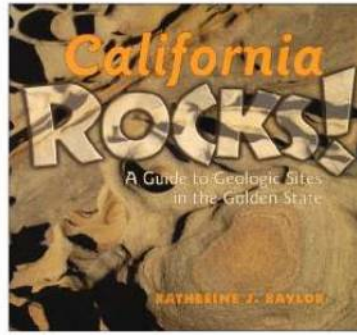
Everyone can enjoy California's beautiful scenery on the surface, but those who stop to consider the geological story behind the rock formations that can be seen on our public lands can gain an extra appreciation of their favorite landmarks. In *California Rocks!* (Mountain Press Publishing Co., 2010) readers get a geologic overview of many of California's parks and open areas.

Baylor, a hydrogeologist for the U.S. Environmental Protection Agency, holds degrees in geology and geography. She provides a brief and informative description of the geology and natural forces that have created the rock formations we see in these areas today. Simple maps help locate the areas described and graphic descriptions are useful in understanding the forces of geology at work. A glossary of terms, park contact information, and an index round out the 114 pages.

Keep in mind that collecting rocks and minerals at many public sites is restricted or forbidden. Always check with authorities before collecting in any publicly managed areas.

—Bob Jones

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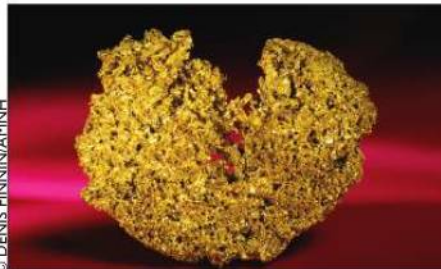
Field Museum Gold Exhibition

One of the rarest and most highly prized minerals in the world will be on display in a comprehensive exhibition at The Field Museum Oct. 22, 2010 through Mar. 6, 2011. The exhibition "Gold" explores humans' historical fascination with and reveals the art and science behind this enduring symbol of wealth, beauty and power.

One of the most wide-ranging exhibitions ever assembled on this valued mineral, "Gold" features a dramatic array of 560 extraordinary geological specimens and cherished objects from around the world—57 natural specimens, 147 culture-based pieces, 329 coins, and 28 gold bars and ingots—and presents the intriguing scientific and societal story behind this cherished metal. In one gallery, visitors step into a 300-square-foot room completely covered in a mere 3-ounce piece of gold, flattened to exquisite thinness.

The exhibition follows the path of gold from its origins deep in the earth to glittering examples of jewelry and artifacts that captivated ancient civilizations. Visitors will learn about the gold rushes of ancient times that literally shaped our world, as well as modern pop-culture baubles that mesmerize younger generations. Experience firsthand the attraction and splendor of some of the finest gold specimens on earth, and learn how gold has been found, mined, processed, and turned into objects that are both beautiful and useful.

Exhibition highlights include large nuggets of gold and specimens of rare crystallized gold, the first gold coins minted in ancient Lydia and Ionia (now Turkey), gleaming pre-Columbian jewelry, and rare doubloons retrieved from sunken Spanish galleons. Compelling modern objects in the exhibition include the White Sox



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Throughout the exhibition, visitors discover gold's amazing physical properties—extreme malleability, reflectivity and conductivity—and see how gold is invaluable for technological uses from telephones and televisions to satellite circuitry.

"Gold" is organized by the American Museum of Natural History, New York, in cooperation with The Houston Museum of Natural Science, and sponsored by Northern Trust. The Field Museum is located at 1400 S. Lake Shore Drive, Chicago, Illinois. Visit www.fieldmuseum.org for details. ♥

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Red River FELDSPAR

Collecting Phenocrysts in Northern New Mexico



The crystals are generally 1 inch to 2 inches in diameter and, while weathered, still exhibit the original feldspar crystal shape.

Story and Photos by Robert Beard

Northern New Mexico, when it comes to mineral collecting, often poses unique challenges for mineral collectors. While some of the foothills of the mountain ranges have good exposures, many collecting localities and mining districts in the higher regions are covered with extensive forests and talus, and finding good, accessible collecting sites is sometimes difficult. In this type of terrain, your collecting will often be limited to road cuts, especially if you are limited by either time or your vehicle.

An excellent road cut in northern New Mexico that is accessible by a two-wheel-drive vehicle and a short hike is the Red River feldspar crystal locality. Feldspar, while a common mineral, is much more interesting when you find it as crystals. The site is approximately 2.5 miles south-east of the town of Red River, New Mexico, and can easily be reached by Forest Access Road 488, which accessed from state Route 578. The area is within the Questa Ranger District of Carson National Forest, and is located within the Taos Range of the Sangre de Cristo Mountains.

I checked this site and the surrounding area using the GeoCommunicator (www.geocommunicator.gov) and found no active or former mining claims. The current status of the area can be obtained from the Carson National Forest Web site, www.fs.fed.us/r3/carson/index.shtml. When I prepared this article, no prohibitions against recreational mineral collecting were posted on the Web site, but National Forest conditions are subject to change. For specific information on the area, contact the Questa Ranger district directly at (575) 586-0520. Rockhounds are encouraged to review the Carson National Forest Web site before entering the area to verify that road access has not been closed due to weather, fire hazards, or other unforeseen conditions.

Although the area has been described in collecting guides, you have to know exactly where to go. I first learned of the site from *Gem Trails of New Mexico*, by James R. Mitchell (Gem Guides Book Co., 1996) while on a trip in northern New Mexico in May 2000. Site 30 in the book, listed as "Red River Pass", describes a locality with feldspar crystals that were up to 3 inches in diameter. This got my attention, as I am always looking for sites that are reported to have large crystals.

I was able to easily find the road to the site, but unable to find any of the large feldspar crystals. This was before the days when we had GPS data and precise locations of collecting sites, and the only information in *Gem Trails* was that the site was approximately 0.07 mile up the road in a deposit of gray monzonite. Monzonite, without getting too specific, is best described as a coarsely crystalline igneous rock that resembles gray granite. Unfortunately, most of the outcrops along the road resembled gray granitic rocks, and none of them that I saw had individual 3-inch feldspar crystals. It was soon clear that this trip was a bust, and I gave up.

"Feldspar" actually refers to a group of minerals rather than a specific mineral formula and crystal habit. According to the



The feldspar crystals are large phenocrysts within the groundmass of the volcanic rock and can often be easily removed with the tip of a rock hammer.



Since the collecting area is a road cut, the only hiking necessary is a short walk along Red River Pass Road from the parking area to the road cut.

Dictionary of Geologic Terms, by Robert L. Bates and Julia Jackson (Doubleday, 1984), feldspar minerals are the most widespread of all mineral groups and make up over 60 percent of the earth's crust.

While there are thousands of references to and descriptions of feldspars on the Internet, I often like to refer to classic mineralogical texts for reliable information. An excellent description of the feldspar group is given in *An Introduction to the Rock-Forming Minerals*, by W.A. Deer, R.A. Howie, and J. Zussman. It was originally published in 1966 by Longman Group Limited of London, but a second edition was published by Prentice Hall in 1996.

Feldspars are known as framework silicates, and the majority may be classified chemically as members of the ternary system $\text{NaAlSi}_3\text{O}_8$ - KAlSi_3O_8 - $\text{CaAl}_2\text{Si}_2\text{O}_8$. These are generally referred to as sodium, potassium, and calcium feldspars. Members of the series between sodium and potassium are called alkali feldspars, and those between sodium and calcium are plagioclase feldspars. They form a "solid solution"

of distinct feldspars between these end members. The alkali feldspars include sanidine, anorthoclase and albite. The plagioclase feldspars include anorthite, bytownite, labradorite, andesine, oligoclase and albite. Albite is included in both groups, as it is the sodium end member of both series.

The temperature of formation is also important in the potassium feldspar series. Potassium feldspar that solidifies at a high temperature, such as in some volcanic rocks, becomes sanidine, while potassium feldspars that form at a lower temperature, such as in some plutonic rocks, become orthoclase or microcline. Sanidine, orthoclase and microcline have identical chemical formulas but different crystal structures and are known as polymorphs.

Northern New Mexico, especially the Taos Range, has an abundance of volcanic and plutonic rocks. The New Mexico Bureau of Geology and Mineral Resources offers a free geologic map of the state for download at <http://geoinfo.nmt.edu/publications/maps/geologic/state/home.cfm/>. This map shows that the Red River area is a complex region of mainly Precambrian-age granites and gneisses and Tertiary-age intrusions. The Red River feldspar road cut is shown in granitic plutonic rocks described as variably foliated granites and granitic gneisses. The scale of the map, which is 1:500,000

Rock & Gem gives locality information for reference purposes only. Readers should never attempt to visit any of the sites described in this publication without first verifying that the location is open to collecting and obtaining the permission of the land and/or mineral rights holders.

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Red River **FELDSPAR** from page 51



Many excellent crystals can be found by scanning the outcrop for protruding phenocrysts.

(1 inch equals approximately eight miles), is far too small to show the specific geology of the outcrop area, but is still useful as a broad guide to the region.

No description of the geology around Red River is complete without at least a mention of the Questa molybdenum mine, a large open-pit mine just west of Red River and on the western slope of the Taos Range. Limited mining of the area started around 1919 and open-pit development of the Sulfur Gulch area of the mine began in 1965, with open-pit mining starting in 1967. Peak production was reached in 1976.

Unfortunately, as at many metal mines, the Questa accesses sulfide mineralization in the form of molybdenum disulfide (MoS_2), and when you have a primary metal sulfide as mining target, you almost always have lots of waste rock containing pyrite (FeS_2 or iron disulfide). Once you expose the pyrite and other sulfides to air, they rapidly oxidize and dissolve, which results in acidic drainage.

By the time open-pit production ceased in 1981, about 81 million tons of ore had been processed at an average grade of 0.185 percent molybdenum disulfide. Approximately 350 million tons of overburden rock were stripped away and deposited on the mountain slopes and in the tributary valleys of the area. This was before many current environmental protections and safeguards were in effect.

The Questa mine began producing as an underground mine in 1983 and mining continued through 1986, when the poor molybdenum market caused shutdown of the mine until 1989. Mining operations again were placed on standby in 1992 and resumed in 1995. In 2008, the price of molybdenum was so high that consideration was given to resuming open pit production, but molybdenum prices, along with the rest of much of the economy, collapsed shortly

thereafter. While the mine continues to operate, the long-term focus is likely to be on environmental cleanup.

The Questa mine provided a lot of jobs and money to the local economy and continues to do so today. It is important to note that while historic mining, especially prior to current environmental regulations, resulted in mine tailing problems and groundwater issues, much of the area has high naturally occurring background sulfide mineralization, which resulted from the mineral-rich hydrothermal fluids of the shallow magmas. These background conditions undoubtedly also affected water, drainage, and slope stability in the area. Part of the challenge to correcting the problems at the Questa mine will be to determine what damage was caused by mining and what was caused by background.

In the summer of 2009, I was able to return to the Red River area briefly. This time, I was with my wife, our two teenage kids, and our teenage niece. After spending an afternoon at the Taos Pueblo, we were taking the "Enchanted Circle" loop from Taos. It is such a popular drive that it even has its own Web site, www.enchantedcircle.org. We drove east from Taos to U.S. Highway 64, and turned north on state Route 38. We were soon approaching the Red River area. I had been burned on my previous trip and, being with my family, knew that another unsuccessful mineral trip could incur the wrath of everyone. However, as it was late afternoon and we had plenty of daylight, we decided to give it a try.

I had my copy of *Gem Trails of New Mexico* for directions. We turned left onto the unpaved road shown as Red River Pass, continued up to the first turn, and parked at an open area. Based on my previous trip to the site, I thought it would be best to park, walk, and observe as many rocks as possible in the hunt for the feldspar crystals.

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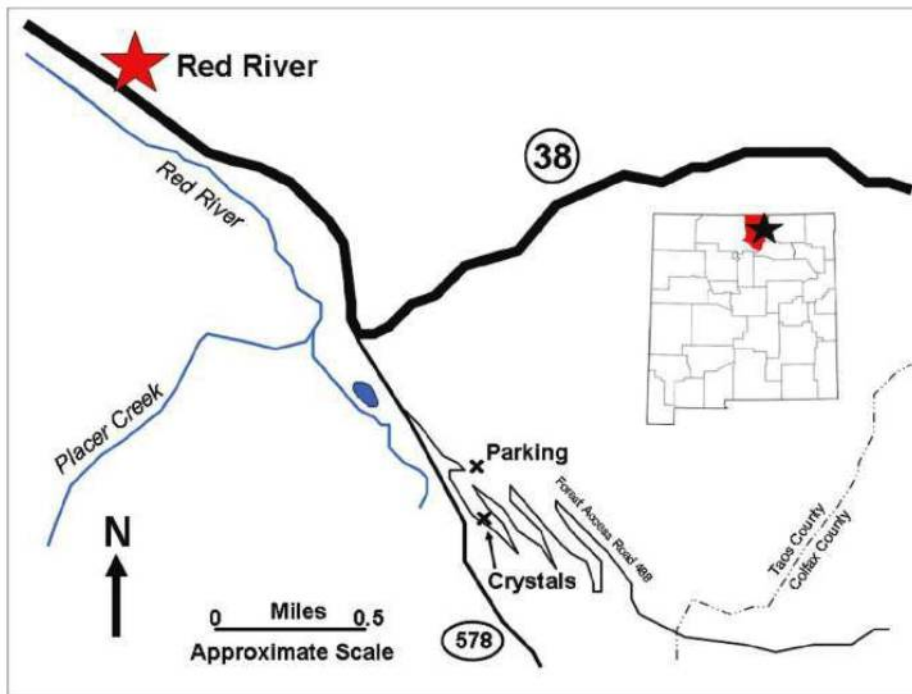
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Red River FELDSPAR from page 52



I thought that several pairs of eyes might be able to see some key features that I had not seen before.

We walked up the road looking at exposed rocks. Much of the rock was simply weathered, gray granitic rock without any large distinct crystals. However, I soon started seeing some larger phenocrysts in the rocks. Phenocrysts are the large and often conspicuous crystals that formed in the early stages of formation of an igneous rock. The presence of phenocrysts in the finer-grained granitic groundmass led me to believe that we might be getting close to the crystal outcrop. What we had seen so far was not worth collecting, but was encouraging.

We soon had our breakthrough moment. While walking up the road, the kids saw a distinct gray road cut with protruding crystals. They had found blocky, weathered crystals of feldspars with penetration twins and asked whether this was what we were looking for. I had walked right by this outcrop in 2000 and likely would have passed it again if they had not been with me. I then understood what *Gem Trails* was referring to in its site description: It was not large, unweathered feldspar crystals that would have to be broken out of granitic rock, but large, highly altered phenocrysts of feldspar that were weathering directly out of the groundmass. They protruded from the outcrop and many could be tapped out with the point of a rock hammer.

While the crystals showed a feldspar outline and commonly had penetration twins, they were not clear crystals. Most of the crystals had, to some extent, been altered to clay minerals. Clay is a common alteration product of feldspar, especially when the crystals have been subjected to hydro-

thermal fluids, which are common in near-surface intrusions. Although the Questa mine is on the other side of the Taos Range, many of the same thermal processes may have affected these rocks, but without the formation of sulfides.

This was extremely easy collecting. We found many crystals in the granitic rubble at the base of the road cut and we found many crystals in place. I focused on finding crystals with well-defined crystal outlines and penetration twins. We found many crystals with poorly defined crystal outlines and broken faces, and all were altered to some degree by clay mineralization. Breaking open the crystals revealed that many of them were not just a single crystal, but a complex intergrowth of feldspar and quartz. In some cases, this led to the appearance of "graphic granite" on broken crystal faces, which is when the quartz and feldspar form a pattern that resembles cuneiform writing. Some of the broken crystals had relatively unaltered feldspar with distinct cleavage planes, but I did not like to break them open, as this ruined them as display pieces.

From my field observations, I think the monzonite with the large feldspar phenocrysts likely represented one of the numerous Tertiary-age granitic bodies that had intruded the older Precambrian rocks in the area. It appeared that the rocks had just started to solidify, which formed the feldspar phenocrysts, when they intruded the Precambrian granitic rocks near the surface. There they finished solidifying, resulting in the finer-grained granitic groundmass. The abundance of clay minerals also suggested the rocks had been subjected to intense hydrothermal fluids, and this is relatively common in shallow igneous intrusions.

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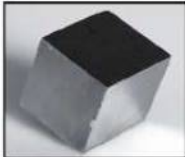
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FELDSPAR from page 54



This is a good example of a penetration twin that is commonly found at the outcrop.

As it was late in the afternoon, we had to focus on this road cut and did not get to check any other potential collecting areas farther up the hill along the road. The collecting area we found was somewhat limited in size, as it was mainly confined to an area of 30 feet or so along the side of the road. Once you knew what to look for, however, it is fairly easy to spot. Other similar outcrops are likely to be in the area and can easily be spotted by the gray of the monzonite and the large protruding phenocrysts. It is also likely that other sites farther up the road may not have been collected as extensively. It would be really interesting to find a relatively unaltered outcrop with these crystals, especially if any formed in cavities within the rock as it solidified.

DIRECTIONS

To get to the site, take state Route 38 east from the town of Red River. Turn south on state Route 578, and go approximately 0.25 mile. Look for an unpaved road on the left, which will be Forest Service Access Road 488, which is referred to as Red River Pass Road in *Gem Trails*. Turn north onto this road and proceed to the first good parking area, which will be at the east end of the first straight stretch of road before the road begins a sharp turn to the south and starts the climb up the mountain. I recommend parking at this location and walking to the site since there are no good parking areas at the outcrop.

For reference, I collected the following coordinates in the field and later checked them using aerial photographs from Google Earth (www.google.com). All coordinates are referenced using the North American 83 and World Geodetic System 84 (NAD83/WGS84) datum and are in the degree-minutes-seconds format:

Parking Area: 36° 41' 18.1"N, 105° 23' 02.2"W

Crystal-Bearing Road Cut: 36° 41' 09.7"N, 105° 23' 00.6"W

As I learned from experience, this can be a difficult outcrop to find without coordinates, but it is an opportunity to get some very unusual crystals and is a very quick and easy field trip, especially if you are already in Red River on vacation. ♥



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Show Dates from page 48

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; contact Doris Perkins, 405 SE Ave. G, Idabel, OK 74745, (580) 286-3133; e-mail: rperkins8236@sbcglobal.net

OCTOBER 2010

1—COLUMBUS, OHIO: Show, "Rings & Things BeadTour"; Rings & Things; Crown 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 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

1-3—SCHAUMBURG, ILLINOIS: Show; MalicJewels Jewelry & Gift Show; Renaissance Schaumburg Hotel & Convention Center, 1551 Thoreau Dr.; Fri. 12-6, Sat. 11-6, Sun. 11-5; free admission; loose diamonds, colored gemstones, contemporary, antique, estate, costume, custom designed, gold, silver, titanium and beaded jewelry, beading supplies, mineral specimens, gift items; contact Debbie Williams, 270 E. Hunt Hwy., Suite 16, #323, San Tan Valley, AZ 85143, (480) 458-7600; e-mail: debbie@malicjewels.com; Web site: www.malicjewels.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—GREELEY, COLORADO: Show; Rock & Mineral Society of Weld County; Greeley Senior Center, 1010 6th St.; Sat. 10-6, Sun. 10-3; free admission; jewelry, door prizes, gems, minerals, fossils, raffle, demonstrations, rough and polished rocks; contact Melanie DeHart, (970) 352-8149; e-mail: hamlethouse@yahoo.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,

continued on page 72

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Modern Mineral Classics

PART IV: Minerals from Mexico, Arizona, Michigan and Georgia



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The Milpillas mine azurites are brilliant and dark blue and are found in a variety of crystal clusters that appeal to all collectors.



The new, vibrant purple amethyst from Jackson's Crossroads, Georgia, rivals all other American amethyst.

Story and Photos by Bob Jones

The "Modern Classics" series of articles has been describing some of the mineral species that have been found in significant quantities during the last several decades that are destined to become classics. They are attractive, readily available, and exceptional examples of their species. Unless a mineral reaches a large number of collectors, it may never reach classic status. Minerals that occur in very limited amounts—such as bobjonesite, of which there are only a dozen or so specimens—are simply not going to have an impact on the collector market.

The minerals I am describing in this article are readily available and attractive enough to be of interest to the majority of collectors. They are the newly mined Mexican azurites, copper from Ray, Arizona, Michigan copper and silver and the new Georgia gem amethyst.

A covey of azurite sources has been producing a seemingly infinite supply of the beautiful blue crystals for the collector world. Older deposits like Morenci and Bisbee, Arizona, have certainly contributed choice azurites in quantity. Chessy, France, which I described in "Modern Mineral Classics, Part II" (May 2010 *Rock & Gem*), contributed its share in the 1840s, and Tsumeb, Namibia, has been an exceptional source of azurite, perhaps the world's best specimens. More recently, Touissit, Morocco, has been a source of superb azurites. Each of these localities probably qualifies as a future classic source.

Now a new source of azurite has burst onto the scene: the Milpillas mine in Sonora, Mexico. This deposit has yet to equal those listed above, but it has certainly created a lot of excitement at a time when most azurite sources are bereft of specimens.

The Milpillas azurites are light to dark blue and often nearly black. They have been found in textbook-sharp prisms up to 4 inches long and 2 inches wide. Amazingly lustrous, sharp crystals perched on a gray rhyolitic matrix add to the growing reputation of this deposit.

Serious mining at Milpillas only dates back about 10 years, though the deposit was known before that. The result has been superb azurites, luscious velvety malachite pseudomorphs after azurite, and thousands of pounds of red-green cuprite-infused chrysocolla, a wonderfully colorful cutting-grade rock.

Located just south of the Arizona-Mexico border, the Milpillas mine differs from the typical copper porphyry ore bodies of nearby Southern Arizona. Milpillas is a rhyolite deposit with just enough limestone to supply the carbonates necessary for the copper ions to form azurite and malachite.

Hydrothermal solutions invaded the rhyolite seams and joints, crystallizing into superb collectible specimens. Since these seams are quite narrow, many azurites are not perfect, often showing very minor "dings" that don't detract from their overall beauty in the least. The many that come out clean and undamaged, sporting brilliant crystals, are as good as the best from American sources and many rival the azurites from Africa.

The final decision as to whether Milpillas is a classic source can't be made yet. Based on the quantity and quality of what has surfaced so far, however, the prospect of Milpillas gaining classic status looks good.

Copper mines can also yield native copper. As a secondary mineral, copper does not form superb crystals in too many deposits. In the United States, two sources stand out: Ray, Arizona, and the Keweenaw Peninsula of Upper Michigan.

The Pearl Handle Pit at the Ray mine is best known for producing the best spinel-twinned copper crystals to come out of this country. These distinctive crystals developed in intergrown masses of easily identifiable swordlike blades. Therefore, Ray twinned native copper specimens deserve to be considered future classics.



The cutting-grade cuprite and chrysocolla from the Milpillas mine (Sonora, Mexico) is a bit tricky to polish, but has great color combinations.

The finest of these twinned coppers can be 7 inches long. Crystals 2 and 3 inches long were abundant when the mine was producing specimens. The majority of the specimens found, especially in the last few years, average only a couple of inches in length, but the mine is still active!

Because the Ray pit is an active mine, production of these twins is sporadic. Months can go by in which nothing is unearthed, then a zone will be breached that produces fine, though usually small, twinned specimens. As long as the Ray pit keeps operating, the chances of a steady supply of fine spinel-twinned copper specimens remains high.

Everyone knows about the native coppers from Michigan. They were formally mined for over 150 years and, after all the mines shut down, amateurs continued the hunt for specimens using metal detectors. The deposits were known to local and visiting natives long before Anglos arrived. Huge surface boulders attracted the indigenous people, who hammered them to break off small, useful pieces of the red metal. In 1844, geologist Douglass Houghton published his study of the region, and the information started a rush to the area!

The Michigan copper deposits are completely different from the porphyry deposits of the Southwestern United States.



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Modern Mineral Classics from page 61



EVAN JONES SPECIMEN

The azurites from the Milpillas mine (Sonora, Mexico) have caused quite a stir in the mineral world.

Michigan's coppers developed in basalt flows and, later, in conglomerate formations. Where space allowed, large clusters of dodecahedral copper crystals formed.

Unlike Arizona's mines, the Michigan copper deposits developed a very limited amount of secondary minerals. Instead, when copper-rich solutions encountered iron-bearing minerals like epidote, the copper precipitated out and crystallized into huge masses weighing multiple tons and countless well-crystallized specimens.

The Keweenaw Peninsula is world famous for its beautifully crystallized copper specimens in huge quantities. Most crystals are under an inch and occur in hand-size clusters of interlocking crystals, but crystals well over 2 inches have been found.

Keweenaw copper has a natural patina that adds to its value for collectors. Any well crystallized copper that has been bathed in acid to give it a new-penny luster immediately loses considerable specimen value. Collectors prefer their classic Michigan copper specimens *au nature!*

Another modern classic mineral found in the Keweenaw Peninsula is native silver in nicely crystallized clusters, which also occurred there in some quantity. Most of the silver is associated with and attached to copper. These specimens are eagerly sought by collectors because the combination of two native elements is uncommon!

Most of the silver crystals are slightly rounded and not as sharp as silvers from Kongsberg, Norway, or Germany, but the crystal clusters with copper are, nonetheless, very highly prized. The metallic clusters may resemble an object or figure. A specimen called "The Buffalo" resides in the A.E. Seaman collection at Michigan Technological University in Houghton.

Though the Keweenaw mines have shut down, some copper and even a little silver is still being found. Enterprising collectors are scouring dumps with metal detectors and making lucky finds of specimens, which can be worked out of the basalt.

If there is a region in America in which collecting is really alive and should persist for the foreseeable future, it is the Pikes Peak region of Colorado. This well-known peak of the Front Range is famous for its remark-



EVAN JONES SPECIMEN

The Ray copper mine in Arizona is noted for its classic spinel-twinned native copper specimens.

ably well crystallized amazonite and smoky quartz specimens, though the majority of finds today are made west of the peak.

Visible from the Great Plains, this over 14,000-foot-high mountain was the goal of explorers, mountain men, and argonauts. They doubtless found crystals of amazonite and smoky quartz on its slopes, but their search was for more lucrative float! Today, specimen miners search the area for blue-green amazonite and smoky quartz, which occur in open seams, sometimes in marvelous crystal groups.

I recall visiting old Clyde McReynolds in his home at 9,000 feet on the peak. He was responsible for keeping folks out of the watershed supplying the cities below. The shelf above Clyde's fireplace was lined with choice amazonite and smoky quartz crystals that he had simply gathered on his walks around the public watershed.

Today, the Lake George and Florissant areas on the western reaches of the mountain are the target areas for amazonite pockets that yield a wealth of their own.

Colorado's amazonites are blocky crystals seldom over several inches high, but per-



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Modern Mineral Classics *from page 62*



These azurite crystals have formed in a flowerlike arrangement, one of the more attractive forms of this superb copper carbonate.

fectly formed. They're sometimes half as wide as they are long, and their color ranges from pale bluish green to rich blue, sometimes with streaks or zones of white. The crystals may occur on a white to off-white feldspar matrix, which is often crystallized, as well. Other amazonites form large, more-or-less flat plates of interlocking crystals. The plate size is apparently influenced as much by frost action as by collector action.

The prize specimens are those that combine superbly colored amazonite and dark, sharp prisms of smoky quartz rising like apparitions above the blue-green crystal matrix. The quartz can be quite transparent or range from moderately dark to nearly black. In most cases, the smoky quartzes are not useful for gems.

Amazonite is the name applied to any microcline feldspar with a bluish color, no matter how faint. The color itself is an interesting internal phenomenon. Normally, microcline feldspar is white to slightly tan, but the Pikes Peak amazonite contains two things that give it color: water and lead!

Scientists have determined that an electron interchange between atoms of lead and molecules of water in the crystal structure affect light as it enters and exits the crystal faces, causing blue to be dominant in the light being transmitted to your eye.

The remarkable quality and quantity of superb amazonite, often with equally remarkable smoky quartz, have made the Pikes Peak region a prime target for collectors. The seams and pockets with crystals are apparently endless and serious mining claims bring forth specimens on a regular basis, so the current supply of good specimens seems assured to persist. Surely, the term "classic" can and will be applied to this prolific source of wonderful amazonite and smoky quartz specimens.

It may well be too early in the story of the discovery of superb amethyst quartz from Jackson's Crossroads, Georgia, to suggest these crystals can attain classic status. But the gem quality of these stunning violet to purple crystals and the gems cut from them equals or exceeds anything produced by previous mining in this country.



The blocky amazonite and fine smoky quartz crystals from the Pikes Peak area of Colorado certainly deserve classic status.

The criterion for judging amethyst's value, aside from clarity, is color. The finest color is a rich violet with a slightly reddish tint that holds up when stones are faceted. For a very long time, the amethysts from Russia, Korea, and Four Peaks, Arizona, have been considered the best the world has to offer. Now, a new gem amethyst is being mined in Georgia that is at least the equal of all these others.

The Jackson's Crossroads deposit, west of the small town of Tignall, Georgia, was found in 1988 shortly after logging had cleared the area. Exploratory collecting proceeded until it was possible to bring in mechanical equipment to do some serious mining. This exposed pockets that produced exceptional amethyst crystals and crystal groups. The amethyst ranges from pale to deep, intense violet with amazing vibrancy. Many crystals are facet grade and exceptionally lustrous, eminently suited for gem use.


The largest Jackson's Crossroads crystals reach about 8 inches in length. The dominant crystal form is not prismatic, the form that is most common for quartz; rather, these beauties show an equant habit, in

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Modern Classics from page 64



Some of Michigan's native silver forms fine herringbone twinning patterns.

which the crystal faces are just about the same dimension in every direction.

The color in amethyst is due to the presence of iron ions, which substitute for some of the silica atoms. The violet color of Jackson's Crossroads amethyst is virtually pure due to the lack of aluminum atoms, which often give amethyst a smoky tint.

The geology of the Jackson's Crossroads area is not well understood. The prevailing theory is that the host rock is granite that has been slightly metamorphosed and that silica-rich hydrothermal solutions later invaded the granite and deposited crystals in openings, some of which measure up to 25 feet deep! The pockets are often clay-filled, which helped protect the crystals from damage during rock movement.

One odd feature of these amethysts is their property of dichroism, which most quartz does not show. Dichroic minerals show two different colors when viewed from two directions 90 degrees apart. The Jackson's Crossroads amethyst shows two shades of violet!

This superb amethyst is often sold under the banner "Dixie Euhedrals", and the mine owners, Rodney Moore and Maynard Ledford, can be found at a number of shows in the Southeastern United States and one major show in Germany. If mining continues to produce fine clusters of gemmy crystals, I see no reason Jackson's Crossroads amethyst should not reach classic status.

This series on Modern Mineral Classics is intended to give some direction to collectors who wish to develop a collection that will stand the test of time. Readers can undoubtedly suggest many other candidates based on their personal taste.

The final installment in this series will focus on one state that has provided a significant variety of classics and been a major contributor to the gem market and the economics of America. Watch for "California Mineral Classics" in a future issue.

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"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*

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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.

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Decoding GemCad Diagrams



When faceter Robert Strickland introduced his computer program GemCad in the 1990s, it changed faceting in many ways. For the first time, amateur faceters were able to easily create their own faceting diagrams. They also had a tool for checking existing diagrams and editing them. Once a person understands basic faceting procedures, it's not difficult to enter a similar design into GemCad because it is done the same way as cutting a stone on a faceting machine.

We can store millions of faceting designs, articles and photos on a flash drive. I now have a laptop computer that I insert my flash drive into to look through my designs and print what I need. In some cases, I never even print the diagram and simply work directly from the computer screen. There is another advantage GemCad gives us over pre-GemCad diagrams: ratio factors, which GemCad automatically computes from the data input by the designer. They are stated as L/W, U/W, P/W, T/W, C/W, and Vol./W³. Some faceters, however, don't understand these mysterious codes. Let's look at these ratios and take the time to understand them.

First, we need to understand that the letters are abbreviations for words. For example, in "L/W", "L" stands for "length" and "W" is for width, actually the average girdle width of the finished stone. For example, in "L/W=1.25", "L" stands for length, "W" stands for width, and the slash (/) is a division symbol. Length divided by width constitutes a factor and the decimal number following the equal sign is the "ratio" for that equation, which GemCad has computed from the data input. Most factors will be less than 1, except those for L/W, in which the length and width can be equal (1:1) or the length can be greater than the width. For example, if L/W=1.25, we know the diagram will produce an oval or rectangle or some other fancy shape that is elongated.

Let's imagine we want to cut a 10-millimeter by 8-millimeter oval. We divide 10

by 8 and find the required factor is 1.25. Then we just have to find a diagram with that L/W. Always divide the length by the width to find the correct ratio.

P/W and C/W are ratios for the pavilion depth relative to the average girdle width and the crown height relative to average girdle width, respectively. We can add the P/W factor to the C/W factor, multiply the sum by the desired width of our finished stone, and know the depth of the piece of material needed to cut a stone of that size. Most pieces of gem rough have plenty of length and width to work with, but depth is frequently lacking. If we have a P/W + C/W that equals 0.6, we and we can multiply that number by our desired width: 0.6 x 8 = 4.8. Thus, we find that we need a piece of rough with a depth of 4.8 millimeters to cut it. Of course, I'd round that up to 5 millimeters and I like to add 2 millimeters to both the length and width for cutting waste, so I'd need a piece measuring 12 millimeters by 10 millimeters by 6 millimeters to cut a 10-millimeter by 8-millimeter stone.

I use the C/W to compute crown depth relative to pavilion depth; however, that's more involved, so I'll discuss that in a future article.

U/W and T/W are ratios for the table size, again relative to width. U/W is measured from point to flat on odd-symmetry stones like pears, trillions and hearts. T/W is measured flat to flat on rounds and fancy stones with even symmetry.

The Vol./W³ factor is an extremely useful but overlooked factor used to calculate carat weight. The formula is:

$$\text{Weight} = (\text{Vol.}/W^3) \times (\text{Specific Gravity}) \times \text{Width}^3/200$$

If you have your computer handy, you can download a utility program called Gem Weight Estimator, provided as freeware by Gary Kratochvil at www.jewelcutter.com. This program allows you to enter the volume factor, width and material from a pulldown list, then calculate the estimated carat weight of the completed stone with a single click of the mouse. I use this program all the time.

In the GemCad instruction lines generated by the designer, you may see shorthand like GMP, MP, TCP, CP, PCP and the like. These are abbreviations to save space and time and can be translated as follows:

- GMP = girdle meet point
- MP = meet point
- TCP = temporary center point
- CP = center point
- PCP = permanent center point

There are other abbreviations that are encountered frequently in faceting and there are three good references for them. First, the U.S. Faceters Guild Dictionary, by Fred VanSant, can be found at www.usfacetersguild.org/dictionary.shtml. Second, Robert Long and Norman Steele's seven-volume set of faceting diagrams, available through Bob's Rock Shop (www.rockhounds.com), explains the acronyms and a lot of the theory behind them in detail. A good faceting school is the third resource. Whenever I teach faceting, one of the first things I do is review GemCad diagrams and explain factors and common abbreviations. I think many instructors are doing this these days, as it is really important for all new faceters to learn to understand the components of a faceting diagram. ♦

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.





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Show Dates from page 58

OCTOBER 2010

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.centralrockhound.org

2-3—JEFFERSON, WISCONSIN: 38th annual show; Rock River Valley Geological Society; Jefferson County Fair Park, Jackson and Peurner 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—OROVILLE, CALIFORNIA: 3rd annual show; Feather River Lapidary & Mineral Society; Oroville Rock Club, Municipal Auditorium, 1200 Myers St.; Sat. 10-5, Sun. 10-4; adults \$2, children under 12 free; rocks, gems, minerals, fossils, vendors, rough material, cabochons, handmade cabinets, tools, books, tumblers, wire wrappers, Wheel of Fortune, grab bags, polished rocks, raffles, door prizes, 2nd Annual World Rock Tumbling Championship; contact Connie Rossetto, P.O. Box 5772, Oroville, CA 95966, (530) 589-1840; e-mail: Crossetto@aol.com; Web site: www.oroville.rocks.com

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@mtida.chamber.com; Web site: www.mtidadachamber.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@mountidadachamber.com; Web site: www.mountidadachamber.com

8-9—WEST SPRINGFIELD, MASSACHUSETTS: Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Eastern States Exposition, Young Bldg., 1305 Memorial Ave. Fri. 10-6, Sat. 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

8-10—BIG SUR, CALIFORNIA: 19th annual show, "Big Sur Jade Festival"; South Coast Community Land Trust, Pacific Valley School PTO; Pacific Valley School, Hwy. One, opposite Sand Dollar Beach in Los Padres National Forest; Fri. 12-6, Sat. 10-5, Sun. 10-5; free admission; jade, jewelry, sculpture, raffle; contact Kirk Brock, (831) 659-3857 or 831-402-1143; Web site: www.bigsurjade.festival.com

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MANY FACETS

by Guest Faceters

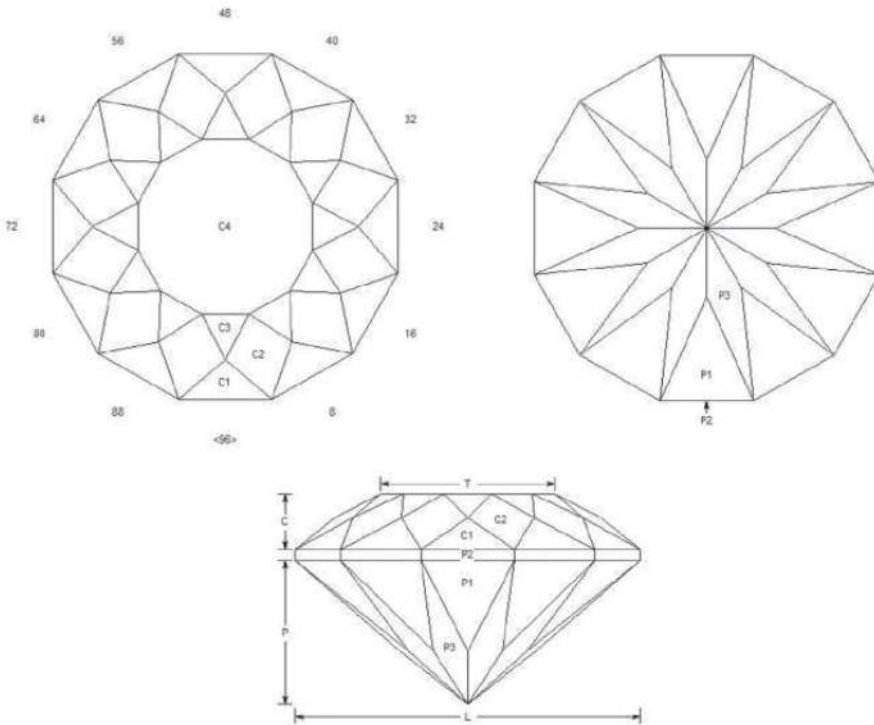
Faceters are welcome to submit their original designs for publication. Mail materials to Many Facets Submissions, *Rock & Gem* magazine, 290 Maple Ct., Ste. 232, Ventura, CA 93003.

I originally designed Derek for my nephew, who wanted a ring for his birthday. I cut the original stone from synthetic corundum (sapphire). Recently, Derek asked me to cut two stones: a 6-millimeter stone for a ring and a 10-millimeter stone for a necklace, which he wants to give to his girlfriend.

After looking at the original design, I decided it had too many facets to crowd onto a 6-millimeter stone. I could have cut them, but they really wouldn't add much to the performance of the stone compared to the effort. Therefore, I decided to modify the design slightly, keeping the "flavor" of the original design but, in my opinion, improving it.

Since I began working on this project, I have concluded a study of better angle choices based on "Faceting Limits", by Bruce Harding (*Gems & Gemology*, Fall 1975, page 78), and the freeware program "Facet Designer", by Anton Vasiliev. Perhaps if I were to design this stone now, I could find even better angle choice combinations for it; however, it makes a dazzling gem just as it is and isn't far off from perfection, as found in Harding's original study. For those interested in the details, a free download of the article is available at www.gia.edu/research-resources/gems-gemology/issues/issues_1934-80/index-back-issues_1934-80.html.

—Jim Perkins



DEREK II

CAD by Jim Perkins, jimperkins@zoominternet.net

© July 2010

Angles for R.I. = 2.170

61 + 12 girdles = 73 facets

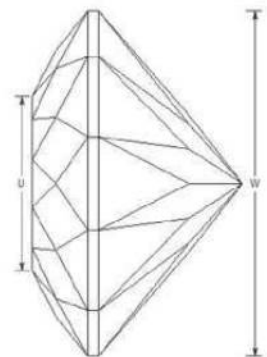
12-fold, mirror-image symmetry

96 index

L/W = 1.000 T/W = 0.507 U/W = 0.507

P/W = 0.416 C/W = 0.161

Vol./W³ = 0.219



PAVILION

P1	41.00°	96-08-16-24-32-40-48-56-64-72-80-88
P2	90.00°	96-08-16-24-32-40-48-56-64-72-80-88
P3	38.80°	04-12-20-28-36-44-52-60-68-76-84-92

Create a TCP.
Set size; polish girdle.
PCP; GMP

CROWN

C1	38.50°	96-08-16-24-32-40-48-56-64-72-80-88
C2	32.20°	04-12-20-28-36-44-52-60-68-76-84-92
C3	27.60°	96-08-16-24-32-40-48-56-64-72-80-88
C4	0.00°	Table

Set girdle height.
GMP
MP @ C1
MP @ C2

MP = Meet Point TCP = Temporary Center Point PCP = Permanent Center Point
GMP = Girdle Meet Point

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ON THE ROCKS

The CFMS-AFMS Show



Students at Wildacres have a chance to show off the skills they have learned during their week of workshops.

Each year, one club show is designated the federation show for its region. Of these, one is also honored as the national show, hosting the American Federation. This June, *Rock & Gem* attended the joint California Federation of Mineralogical Societies-American Federation of Mineralogical Societies show held in Whittier, California, and hosted by the North Orange County Mineral Club (NOCMC).

At this important annual event, delegates from all over the country come together to deal with current hobby-related problems. There are certainly plenty of problems to address. The American Federation also offers advice to member federations and clubs on various subjects, such as tax problems and insurance. It provides entertaining club programs, field trips, and club activities. And it is at the National Show that committees meet to discuss plans to re-open or keep open federal collecting sites under attack by the government.

There is a concerted effort by the government and its agencies, along with some private organizations, to close areas totaling millions of acres to recreational use and mineral collecting. We rockhounds must work to assure that not all the sites are closed and that the restrictions put in place are fair to all concerned. This is just one goal at the CFMS-AFMS show.

The 2010 national show was a real challenge for the NOCMC to put on. The original host club was unable to carry on, so the NOCMC took on the responsibility of organizing and running the show. Its members did a trojan job of finding a venue and organizing the activities and meetings, and ran the show efficiently, mainly with volunteers. They are to be commended for stepping in and doing a swell job.

The national show is always a treat, featuring fine competitive displays and special displays. It was very encouraging to see the dozens of competitive exhibits at this show—the most at a national show since 1989!

Dealers bring their best wares to the national show and the lectures are always educational and enjoyable. You learn what other federation groups are doing to build up the hobby. And don't forget the social aspects of a national show; you get to see old friends from other parts of the country.

One of the more disturbing things I learned at the 2010 national show is that there is a new bill in the California Legislature that has been proposed by a state senator from the Los Angeles area. SB 624 demands that serpentine be removed as the California state rock and replaced with some yet-to-be-named rock. The reason given for this demand is that serpentine may be associated with asbestos, a silicate mineral that is blamed for causing various types of cancer in humans.

California made serpentine its state rock in 1965, the only state to name one. Serpentine is closely associated with much of the gold that was mined in the Sierra Nevada foothills. We now know that serpentine is also a beneficial rock for many plants and trees that are unique to California. When serpentine breaks down and enters the soil, it has the ability to absorb carbon dioxide. So, serpentine is not all bad.

Since serpentine's association with asbestos is at issue, that raises another question: Which asbestos is the bill talking about, chrysotile asbestos or amphibole asbestos? Chrysotile asbestos is used in construction, art, jewelry and textiles. Amphibole asbestos, on the other hand, is credited with being associated with detrimental health effects, including cancer and asbestosis.

What I find curious about the bill is that it does not distinguish between serpentine associated with chrysotile and serpentine associated with amphibole, the far more dangerous form of asbestos. It seems to me a lot more work has to be done on this bill before causally tossing aside what has been a state rock for over 50 years.

Some federations hold retreats for their members. For the last 38 years, the Eastern Federation of Mineralogical and Lapidary

Societies (EFMLS) has hosted a wonderful classroom retreat in mountainous western North Carolina. The site is Wildacres, an odd name for a place some rockhounds think is paradise! When California members attended one of these EFMLS retreats some years ago, they decided to start their own. Now the California Federation holds two great educational retreats each year!

Wildacres is located high in the hills not far from Mount Mitchell, the highest peak in North Carolina.

The closest town is Little Switzerland; the name gives you a clue to the elevation and mild weather of the area. The famous Blue Ridge Parkway, which runs along the entire spine of mountains from Virginia to the Georgia border, passes within shouting distance of Wildacres.

This retreat's lodgings are two motellike buildings that can hold about 100 folks. There is a fine auditorium, a large meeting room for activities, and several well-equipped lapidary shops for classes. Most importantly, there is a swell kitchen and mess hall where the resident chef often uses local produce to prepare excellent food, which is served buffet- or family-style. The dining tables are round, which is conducive to talking and building camaraderie.

In the evening, those who prefer to enjoy cool mountain air may do so by gathering on one of the porches lined with rocking chairs. Trading stories is a natural outcome and it gives everyone a chance to catch up on the latest rockhounding news.

This retreat is just that, a quiet mountain site set up for learning and socializing. Encouraged by a 10 p.m. quiet time, the silence is broken only by the wind whispering in the trees and the occasional bird that announces his presence.

Folks who attend a Wildacres retreat can choose from many lapidary and mineral classes at a cost that is a real bargain. Aside from the modest fee for attending, the only other cost is for any materials you use in class, which varies depending on the classes you take. Imagine, enjoying a week's room and board in the mountains, classes conducted by a cadre of experts in a variety of subjects, and good food! To do that anywhere else would cost hundreds more and you wouldn't any get classes.

The one-week schedule starts with a sign-in and orientation day, which is followed by two days of classes, as a free day, and two more days of classes. The free day is for a field trip or just to relax. Participants check out and return home on the seventh day.

The choice of classes depends on the available instructors, but the subjects vary, giving every rockhound something of interest. Core classes are silversmithing, wire wrap, capping, show judging, and mineral identification. These are supplemented in various years by such fascinating arts as casting, scrimshaw, fused glass, chain mail, and faceting.

All the instructors are highly qualified. The judging class is taught by Jay Bowman, a nationally known author and a leader in show judging. The 2010 mineral identification class was taught by my friend Dr. Mike Wise from the Smithsonian Institution, who also lectured in 2009. When you attend the retreat, you can count on expert training in your chosen skill and an interesting morning lecture on a variety of subjects from experts to get you going!

The 2010 spring retreat was a lot of fun. I was invited, for the umpteenth time, to give the morning talks (four of them), plus a couple in the evening. This slightly unusual arrangement was because I had to leave the retreat a day early to fly to England to lead a scheduled mineral tour.

You don't have to bring equipment to the retreat—Wildacres provides what you need—unless you want to use something special. The facility has fully equipped lapidary, faceting and casting shops, as well as other equipment, all ready and waiting for classes to start. Some instructors bring their own equipment for special purposes.

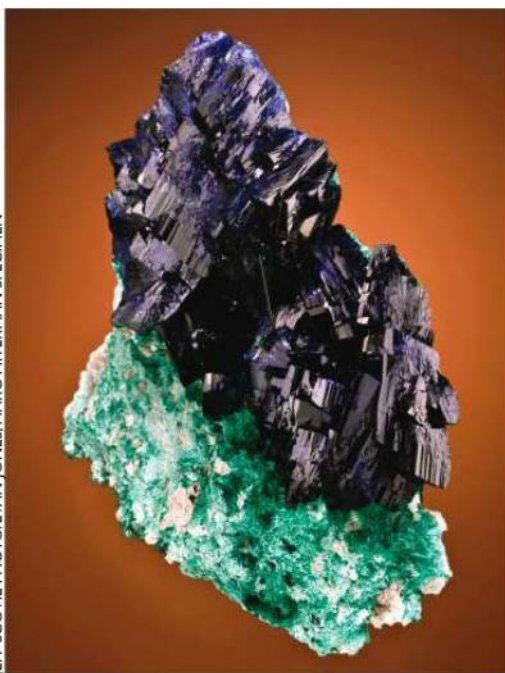
The mid-week open day is truncated so most folks can return to Wildacres by 3 p.m. for the parking lot swap and trade event. Artists offer their handmade jewelry or crafts and others bring what they've collected. Many just hang around and talk shop! That's the real treat of Wildacres: visiting and talking with a great group of artists and rockhounds who share the same interests you do.

Three special fun events are also held at Wildacres: Auction Night, Fun Night, and sharing time. Auction Night is a lot of fun. Its purpose is to raise money to offset the very reasonable rate charged at Wildacres. Wildacres is a nonprofit facility that provides lodging and board for the entire week and charges the EFMLS a very nominal amount that does not really cover all expenses. So the federation raises funds via an auction to help.

The items auctioned are often of a personal nature: something that has been "pilfered"



The free day at Wildacres is open to group field collecting.



JEFF SCOVIL PHOTO/EVAN JONES, MARC MITTERMAN SPECIMEN

This stunning Mexican azurite is being considered for the cover of Volume 1 of my soon-to-be-released book.

just to get a reaction when it goes up for sale. I had my shirt ripped off and sold one night. Another year, *I* was auctioned off! Lynne Luger, a delightful young lady, won the bidding that time and to pay off I had to buy her an ice cream bar later that evening!

Fun Night is really appropriately named. Some sing, others recite poetry or play an instrument, and a few get together ahead of time and develop a skit based on an event or person at Wildacres.

The sharing time lets students show the results of their training during the week. Fine jewelry, nice cabochons, colorful fused glass pendants, and more are there for all to enjoy. I have always been impressed with what students are able to create in just four days of classes.

The list of the retreat's past speakers, who are selected by Bruce Gaber, is remarkable. The retreat has hosted Fred Ward,

a well-known author and traveler; Bill Metropolis, formerly with the Peabody Museum at Harvard University; Jack Hanahan, a university professor; Bill Pinch, a noted mineral expert; and Dr. Mike Wise, of the Smithsonian. I've been a speaker there at least a half-dozen times and I've enjoyed every visit!

If you are interested in either the fall or spring retreat, be alert to announcements put out by the EFMLS or visit its Web site, www.amfed.org/efmls/wildacres.htm. Be sure your club president, editor, or whoever manages club communications and announcements is aware that you are watching for a federation announcement about Wildacres. Details about Wildacres retreats should be put in your club bulletin or at least announced at a club meeting more than once!

BOOK UPDATE

Christmas is on the horizon, which brings up the subject of what gift to get your rockhound partner or yourself! I've got a great suggestion. After years of prodding by collectors to write a book, I've done it. Volume 1 is in the mill as I write this. The plan is to have it hit the market just in time to solve the problem of what to get the rockhound in your life for Christmas.

The book is based on the series of Frugal Collector articles I did over a period of years in *Rock & Gem*. I've upgraded each article, added new information, and gathered some great pictures to give the book visual impact. Some chapters treat a single mineral, while other chapters cover the members of a chemical group. Approximately 30 chapters, in two volumes, treat a raft of common minerals and offer suggestions on how to find good examples of them in today's costly market. I've also included stories of many of the adventures I've had while traveling the world of minerals. Special-interest subjects like the discovery of the natural elements broaden the appeal of these books.

Volume 1 is set to be available for Christmas, with Volume 2 to follow close behind. If you enjoy *Rock & Gem*, you'll enjoy this book, which is intended to be both informative and entertaining. Watch *Rock & Gem* magazine for ads that will give cost information and tell you how to order the book once it is off the press!💎

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 submissions are subject to editing. Address questions to "Editor" for a private response or to "Readers" and provide the contact information you'd like published. Send to Field Notes, *Rock & Gem* magazine, 290 Maple Ct., Ste. 232, Ventura, CA 93003.

CLASSIC COLORS

Unique Minerals

The classic green of malachite,
 The classic blue of azurite,
 They both do have some great appeal,
 Like how the astronauts must feel,
 When viewing earth from outer space,
 And seeing lands and seas in place.
 Some classic colors are these two.
 Turquoise would be a more sky blue,
 And paler blue, aquamarine,
 There're many colors to be seen,
 They're found within the mineral's scene.
 Just name the colors, which you mean.
 You can choose a sapphire blue,
 For purple, amethyst will do.
 Another classic's ruby red,
 Choose golden yellow just instead.
 Why not just choose from each and all,
 And have yourself a jewelry ball.
 To leave one color out is strange,
 'Til you find out I can't rhyme "orange."
 Some colors get to rank and star,
 An orange garnet is grossular,
 Green spodumene is hiddenite,
 And pink beryl ismorganite.
 Pink tourmaline is rubellite.
 Green emerald we all know by sight,
 From all the colors beryl has.
 These colors give our lives some jazz.
 We rockhounds are not petrified.
 Though color keeps us satisfied.
 We like to press on to find more
 About minerals and all their lore.
 We learn about acicular,
 Streak, habit, and about luster,
 And hardness, and what's dendritic,
 And bladed, twins and prismatic.
 We learn about a crystal's form,
 What's arborescent, reniform,
 And other terms right down the line.
 We rockhounds tend to do just fine.
 —Ronald J. Yadusky, BS, MD, FACS

Burning Questions

Steve Voynick's article *Rockhounding and Radioactivity* (July 2010) was wonderfully informative. However, if a person knows that a rock is highly radioactive, why would he spend any length of time holding it (as is shown on page 33)? It is curious that Mr. Voynick did not explore this most obvious topic, or how a potential collector would safely store and then examine his radioactive specimens.

—Wendy Rosenblum
 Stamford, CT



I should have qualified the phrase "high level of radioactivity" in that caption as a "relatively high level of radioactivity for minerals." Radioactivity levels in minerals are actually quite low when compared with milled or otherwise concentrated forms of uranium or thorium.

The hand-held specimens in the two photos on page 33, while certainly radioactive, are both ores that are mined and handled by routine methods. The radioactivity of the oxide specimen (pitchblende) is relatively high compared with that of the carnotite specimen and is thus very readily detectable with a radiation monitor. Nevertheless, its radioactivity is much less than that of any processed form of uranium or thorium. Of course, it is always advisable that you wash your hands after handling any radioactive mineral specimen to prevent the ingestion of radioactive particles.

I should have mentioned some of the basic precautions to be taken in handling and displaying radioactive mineral specimens. Perhaps that topic might be the basis of a future article.

—Steve Voynick
 Rock & Gem Contributor

Educational Resources

I am a middle school science teacher. I am getting ready to start a unit on rocks and minerals. I am currently looking for some resources to help with my lesson plans and while I was searching, I came across one of your pages, www.rockngem.com/links.asp. Thanks for all the resources you provided, they were a tremendous help to me.

—Bridget Stanley
 via e-mail



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