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MARCH 2011



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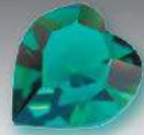
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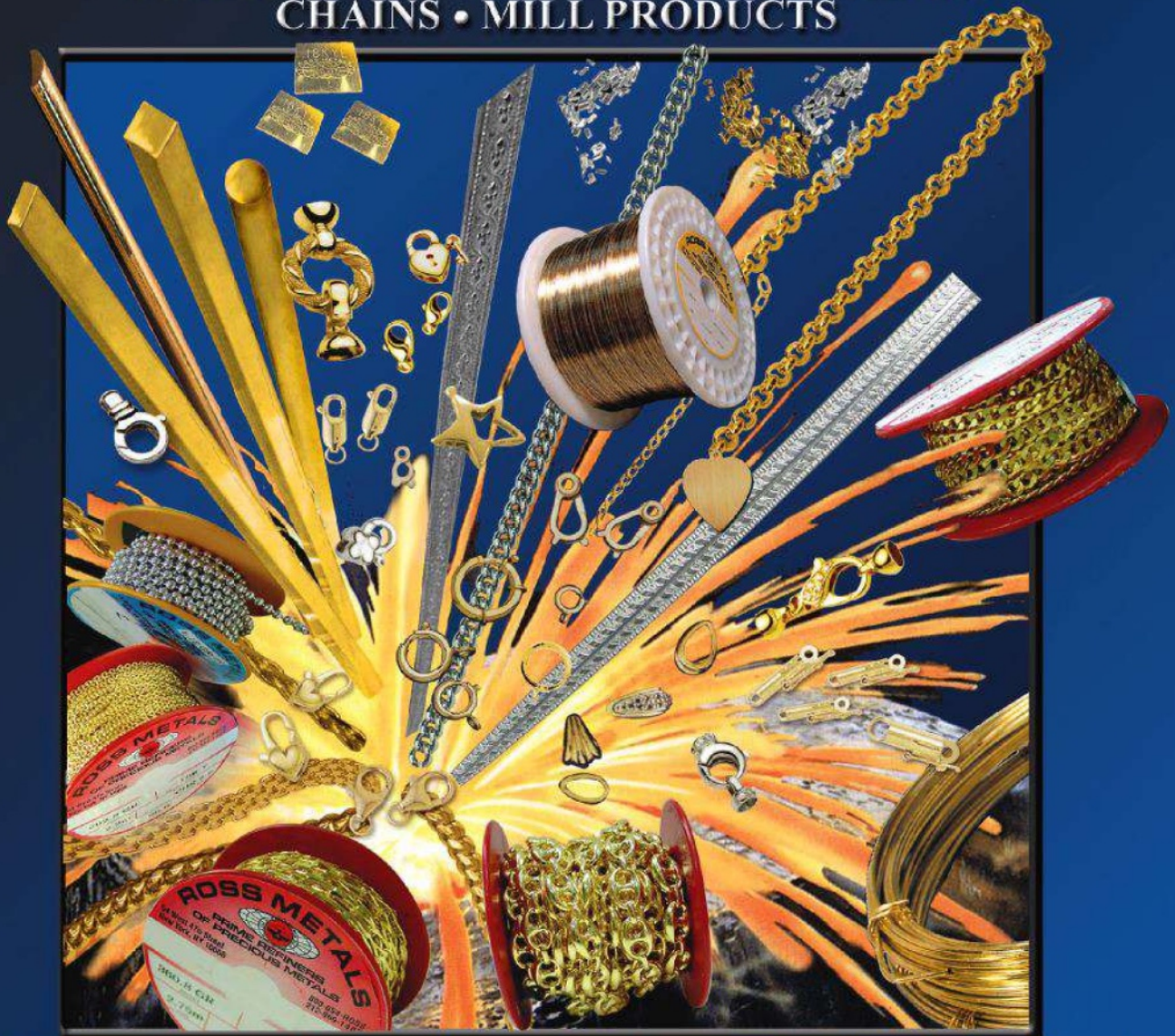
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CATALOGS AVAILABLE

Cornwall's copper deposit produced many uncommon species, including liroconite. This 2.9-cm-high crystal group is from Wheal Gorland at Gwennap. (Jeff Scovill photo)

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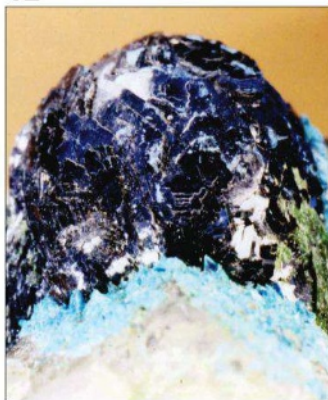
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Notice: On rare occasions, typographical errors occur in prices listed in magazine advertisements. For this reason, advertisements appearing in *Rock & Gem* should be considered as requests to inquire, rather than as unconditional offers to sell. All prices are subject to change without notice.

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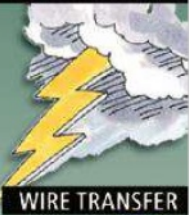
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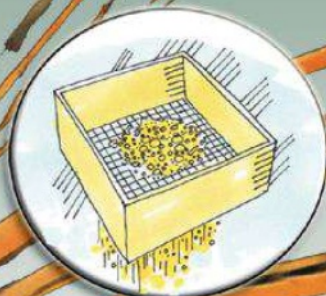
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Kurtzeman Passing

Long-time readers may recall the fine color photographs that accompanied so many of my early articles in *Rock & Gem*. They were the work of professional photographer Jeff Kurtzeman, who passed away Dec. 22, 2010 in Kirksville, Missouri.

Jeff's skills were well recognized, as he was a contributing photographer for *Arizona Highways* magazine, one of the best state magazines ever published. It was Joe Stacey, editor of *Arizona Highways*, who teamed me with Jeff to write an article on Arizona minerals for the May 1972 issue of the magazine. Our work for *Rock & Gem* was a direct result of that assignment. Jeff was a special friend and a most generous fellow who will be long remembered for his kindnesses.

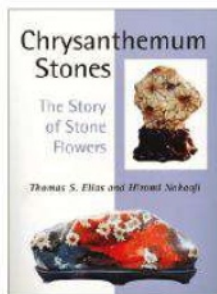
—Bob Jones



Chrysanthemum Stones: The Story of Stone Flowers by Thomas S. Elias and Hiromi Nakaoji \$29.95

Found mainly in China and Japan, chrysanthemum stones are sedimentary rocks such as limestone that contain radiating clusters of mineral crystals. Usually consisting of calcite or celestite, and sometimes of aragonite or quartz, these crystals often have the appearance of chrysanthemums, flowers that have long been prized and cultivated by the Chinese and Japanese. One reason chrysanthemum stones are not well known in the West has been the lack of a comprehensive, English-language work explaining the lore, geological origin, history, and collector value of these natural objects of art.

With *Chrysanthemum Stones*, authors Thomas S. Elias, former Director of the United States National Arboretum, and Hiromi Nakaoji, a native of Japan, have filled that gap. This 144-page, softcover book has 120 color photographs, maps, a glossary, and a bibliography. Even without an index, which would have been helpful, this interesting and well-written book should easily accomplish its purpose of boosting the awareness and popularity of chrysanthemum stones in English-speaking countries. (**Floating World Editions, 2010**)

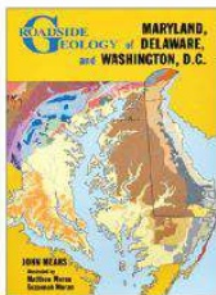


—Steve Voynick

Roadside Geology of Maryland, Delaware, and Washington, D.C. by John Means \$24.00

Mountain Press, which has enjoyed great success with its 63 geology-oriented titles, has now released *Roadside Geology of Maryland, Delaware, and Washington, D.C.* as the 23rd book in its popular "Roadside Geology" series. As many *Rock & Gem* readers know, these books are highly readable, educational and entertaining guides to the geology behind the landforms, topography, and natural scenic attractions along our nation's roads and highways. Like the rest of the series, this one is written by a regional expert, Maryland resident and former geology professor John Means.

The text of this 368-page, softcover book is embellished by 190 photographs and 115 maps and illustrations, all in full color. Thirty-five individual "road-guide" sections identify the nature and origins of the geological features and rocks that are visible from the window of a vehicle. The author's concise explanations cover everything from the origins of the massive shale formations of western Maryland's mountains to how the earth's sixth-largest meteor-impact crater helped to form Chesapeake Bay. For the rockhound, *Roadside Geology of Maryland, Delaware, and Washington, D.C.* also serves as a valuable complement to regional mineral-collecting guides. (**2010**)



—Steve Voynick

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Kingsley North, Inc.

6" Stainless Steel Diamond Grinding/Polishing Unit

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. 66 lbs.



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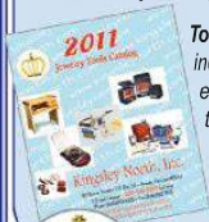
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CRAFTSMAN OF THE MONTH

This is a project that I started at the second silversmithing class I took," writes March Craftsman of the Month Robert Cropp. "It uses Apache Dendritic Picture rhyolite from around Deming, New Mexico, one of my favorite stones to polish and certainly one of the rarer rocks to find. I met one of the holders of the claim from which this very unusual material comes last year and have been a huge fan of the material ever since.

"First, I selected a nice section and cut it out of a slab in a freeform shape that saved the most picture pattern I could without making the cab too large. I then polished it on my Genie with 220, 600, 1200 and 1400 grit wheels. This particular rock is a little harder to polish than a lot of others and takes a little patience. It usually will not take a 'mirror' finish, but it does polish up nicely and has very unique colors and patterns.

"Next, I shaped a bezel around the cab and soldered it together with hard silver solder. The next thing I decided to do was solder a piece of square wire inside the bezel with medium solder, instead of using a solid backing sheet, so I could show both sides of the stone, as I had a really hard time deciding which side of the cabochon looked best. This was the most difficult piece I have ever done, as I found it very hard to solder this small piece in all the way around. I have only been doing silversmithing for less than two years and don't quite know all the tricks, yet.

"After that, I sanded the edges smooth. The next thing I did was take another piece of square wire and make a small loop on the top of the bezel for a jump ring for the chain to pass through and a small loop of square wire on the bottom for the beads that I wanted to attach to the bottom of the pendant. I soldered them on at the same time with soft solder. I then smoothed out everything once again. After that, I made a jump ring out of some silver scrap and soldered it together inside the loop on top with soft solder.

"Finally, I got to put the cabochon into the pendant and polish the piece. The finishing touch was putting two small garnet beads and a natural pearl on a piece of wire that had a blunted end and attaching it to the pendant.

"This is the most difficult project I have done to date, and I don't know if I could ever part with this piece, as it turned out much better than I thought it would. It was truly a joy to see the finished product." ♦



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. Save it as a document file.
- Take at least one sharp, close-up, color photo of the finished project. Photographic prints (no laser prints) or high-resolution (300 dpi at 4 inches by 5 inches) digital photos are acceptable.
- Burn your document file and digital photo (.jpg or .tif) to a CD.
- Mail your CD, photo, and a printed copy of your manuscript, 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. Contact the editor at (805) 633-3824 ext. 129 or editor@rockngem.com with any questions about these requirements.

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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SHOW DATES

Send show information at least four months in advance to *Rock & Gem Show Dates*, 290 Maple Ct., Suite 232, Ventura, CA 93003-3517; e-mail: editor@rockngem.com; or use the electronic form at www.rockngem.com.

MARCH 2011

4-6—DEL MAR, CALIFORNIA: Show; Gem Faire Inc.; Del Mar Fairgrounds/Bing Crosby Hall, 2260 Jimmy Durante Blvd.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

4-6—SHARONVILLE, OHIO: Show and sale; GemStreet USA; Sharonville Convention Center, 11355 Chester Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$7, seniors (60+) and students (12-17) \$5, children under 12 free; gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

4-6—LARGO, FLORIDA: 41st annual show and sale; Suncoast Gem & Mineral Society; Minnreg Bldg., 6340 126th Ave. N., between 66th St. and US19 N, south of Ulmerton Rd.; Fri. 10-6, Sat. 10-6, Sun. 10-5; adults \$5 (three days), Web site coupon, students \$4, children under 6 free; dealers, club sales, finished and unfinished gems, jewelry, beads, minerals, equipment, tools, magazine back issues, prize drawings, displays, grab bags, lapidary demonstrations, beading and wire wrapping; Suncoast Gem & Mineral Society, PO Box 13254, St. Petersburg, FL 33733-3254; Web site: www.sgams.com

4-6—RICHMOND, INDIANA: 38th annual show; Eastern Indiana Gem & Geological Society; Wayne County Fairgrounds, 861 N. Salisbury Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-4; adults \$4, seniors (60+) \$3, students (7-18) \$1, children 6 and under free; jewelry, minerals, fossils, crystals, dealers, demonstrations, displays, silent auctions; contact John LaMont, (765) 647-4894, or Dave Straw, (765) 966-4249

4-13—IMPERIAL, CALIFORNIA: Annual show, "California Mid-Winter Fair and Fiesta"; Imperial Valley Gem & Mineral Society; IV Expo, 200 E. 2nd; Fri. 12-10, Sat. 12-10, Sun. 12-10, Mon. 4-10, Tue. 4-10, Wed. 4-10, Thu. 4-10, Fri. 4-10, Sat. 12-10, Sun. 12-10; contact John Pyle Jr., PO Box 1721, El Centro, CA 92244, (760) 562-3453; e-mail: jp.ivgms@att.net; Web site: http://ivgms.tumblr.com

5-6—ARCADIA, CALIFORNIA: Show; Monrovia Rockhounds Inc.; LA County Arboretum, Ayres Hall, 301 N. Baldwin Ave., 1 block south of 210 Fwy.; Sat. 9-4-30, Sun. 9-4-30; adults \$8, seniors and students \$6, children \$3; more than 10 dealers, minerals, gems, jewelry, beads, findings, fossils, club geode cracking, Grab Bags, Treasure Wheel, Dino Dig, Fossil Find, prize drawings, grand prize raffle; contact Jo Anna Ritchey, 224 Oaks Ave., Monrovia, CA 91016, (626) 359-1624; e-mail: joannaritchey@gmail.com; Web site: www.moroks.com

5-6—BIG SPRING, TEXAS: 42nd annual show; Big Spring Prospectors Club; Howard County Fair Barn; Sat. 9-5, Sun. 10-5; free admission; gems, minerals, jewelry, dealers, demonstrations, displays, spinning wheel, hourly prizes, jewelry repair, stone setting; contact Jerald Wilson, 707 Tulane, Big Spring, TX 79720, (432) 263-4662, or Lola Lamb, (432) 263-3340

5-6—CALDWELL, IDAHO: 57th annual show; Owyhee Gem & Mineral Society; O'Conner Field House, 2200 Blaine; Sat. 10-6, Sun. 10-5; adults \$3, children under 11 free; dealers, jewelry, gems, minerals, beads, exhibits, fluorescent minerals, dinosaur fossils, educational displays, lapidary demonstrations, faceting, wire wrapping, silversmithing, cabbing; contact Carolyn Roberts, 50 N. Robinson Rd., Nampa, ID 83687, (208) 466-6191; e-mail: ncrobertsrp@msn.com; Web site: www.owyheerocks.com

5-6—ISSAQUAH, WASHINGTON: Show; East Kingco Rock Club; Pickering Barn, 1730 10th Ave. NW, across from Costco; Sat. 10-6, Sun. 10-5; free admission; dealers, gems, jewelry, silent auction, games, raffle, door prizes, demonstrators, displays; contact Norma McDonald, PO Box 2203, Redmond, WA 98073, (206) 612-3113; e-mail: eastkingco@gmail.com; Web site: www.eastkingco.org

5-6—NEWARK (STANTON), DELAWARE: 48th annual show; Delaware Mineralogical Society; Delaware Technical and Community College, Churchmans Rd. (Rte. 58), I-95 Exit 4B; Sat. 10-6, Sun. 11-5; adults \$6, seniors \$5, juniors \$4, children under 12 free with adult; mineral, lapidary and fossil exhibits, museum displays, dealers, minerals, fossils, gems, jewelry, lapidary supplies, door prizes, large specimen raffle, lapidary demonstrations, children's booth, club lapidary work and specimens for sale; contact Wayne Urion, (302) 998-0686; e-mail: wurion@aol.com; Web site: www.delministry.net

5-6—POMPANO BEACH, FLORIDA: Retail show; Intergalactic Bead & Jewelry Shows; Emma Lou Olson Civic Center, 1801 N.E. 6th St.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicats; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

5-6—VENTURA, CALIFORNIA: 49th annual show; Ventura Gem & Mineral Society; Ventura County Fairgrounds, 10 W. Harbor Blvd.; Sat. 10-5, Sun. 10-4; club member displays, gems, minerals, fossils, lapidary art, demonstrations, lapidary arts, jewelry making, door prizes, silent auctions, "Country Store", dealers, children's activities; free admission; contact Andy Anderson, (805) 987-0043; e-mail: lilliananderson@juno.com; Web site: www.vgms.org

6—SPOKANE, WASHINGTON: Show; Rings & Things; Mirabeau Hotel Spokane Valley, 1100 N. Sullivan Rd.; Sun. 11-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (509) 252-2900; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

11-13—BEREA, OHIO: Show and sale; GemStreet USA; Cuyahoga County Fairgrounds, 164 Eastland Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$7, seniors (60+) and students (12-17) \$5, children under 12 free; gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

11-13—COTTONWOOD, ARIZONA: Show, "Verde Valley Gem Mineral & Jewelry Show"; Mingus Gem & Mineral Club; Verde Valley Fairgrounds, 800 E. Cherry St.; Fri. 9-5, Sat. 9-5, Sun. 10-4; adults \$2, children 13 and under free with paying adult; more than 30 vendors, door prize raffles, educational displays, extensive children's area; contact Sarah Knowles, PO Box 1284, Cottonwood, AZ 86326; e-mail: Mingusgemandmineralclub@gmail.com

11-13—FT. MYERS, FLORIDA: Show; Frank Cox Productions; Harborside Convention Center, 1375 Monroe St. (downtown); 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

11-13—HILLSBORO, OREGON: 53rd annual show; Tualatin Valley Gem Club; Washington County Fairgrounds, 873 NE 34th Ave., on Cornell Road, across from Hillsboro Airport; Fri. 10-6, Sat. 10-6, Sun. 10-5; contact Roy Woo, PO Box 641, Forest Grove, OR 97116; e-mail: rwoo12648@gmail.com

11-13—KANSAS CITY, MISSOURI: 50th annual show, "Greater Kansas City Gem & Mineral Show"; Association of Earth Science Clubs of Greater Kansas City; MCC-BTC Exhibition Hall, 1775 Universal Ave. (I-435, Front Street Exit); Fri. 9-8, Sat. 10-7, Sun. 10-5; adults \$6, 5-12 years \$2; or Bruce Stinemetz, (816) 795-1641; e-mail: brucestinemetz@att.net; Web site: www.gemshowkc.org

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Gem Faire Schedule

2011

FEB. 18, 19, 20	SANTA BARBARA, CA
FEB. 25, 26, 27	COSTA MESA, CA
MAR. 4, 5, 6	DEL MAR, CA
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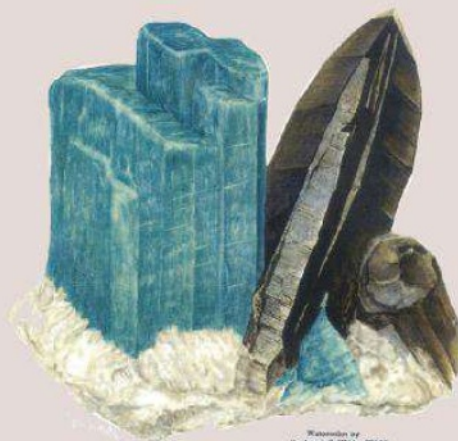
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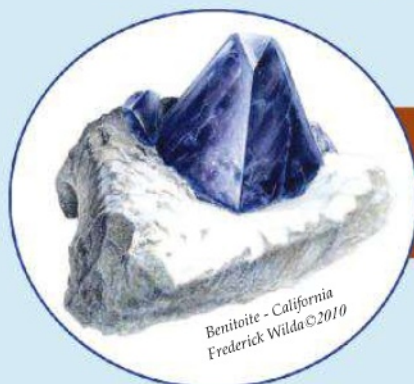
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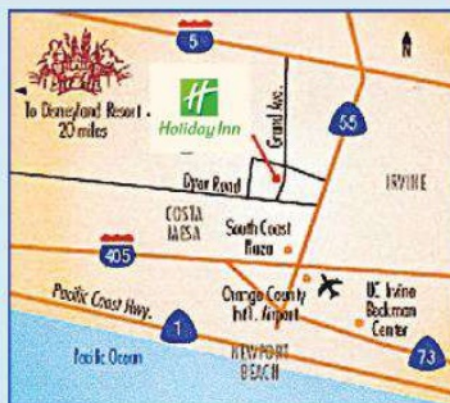
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CORNWALL'S Secondary Minerals

They Played an Important Part in Metal Production

Story and Photos by Bob Jones



Cornwall's mines have long been abandoned, but an engine house and surface workings remain as stark reminders of a great mining past.

Anyone who attended the February 2011 Tucson Gem & Mineral Show™ enjoyed seeing a special exhibit of superb secondary minerals from the mines of Cornwall, courtesy of Caerhays Castle in St. Austell, Cornwall. These specimens were mined centuries ago and are a fine representative example of a much larger collection housed the

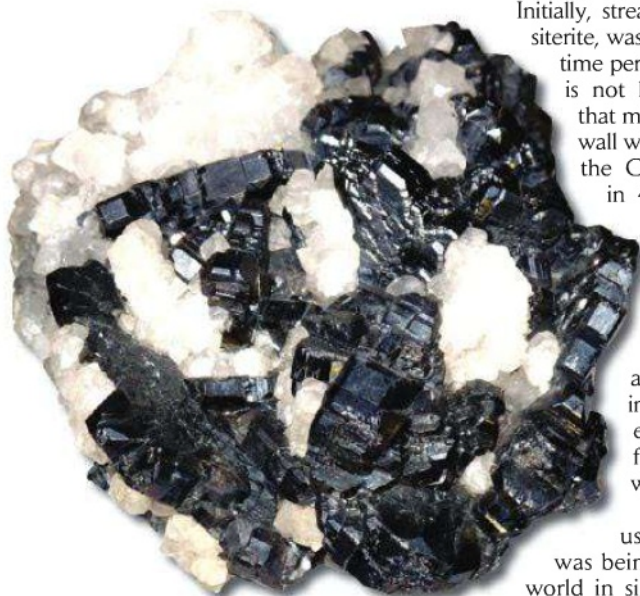
castle that was assembled in the 1700s and 1800s. The castle and the collection are owned by the Williams family, and these specimens are mainly from mines that were either owned or controlled by the family in the early days of mining in Cornwall. They are fine examples of exceptionally uncommon and rare mineral species from this great metallogenic province.

In industry, the mines of Cornwall are probably best known for their tin production, which provided tons of the soft metal over two centuries. Among mineral collectors, however, Cornwall's suite of uncommon and rare species is very important and certainly eagerly sought.

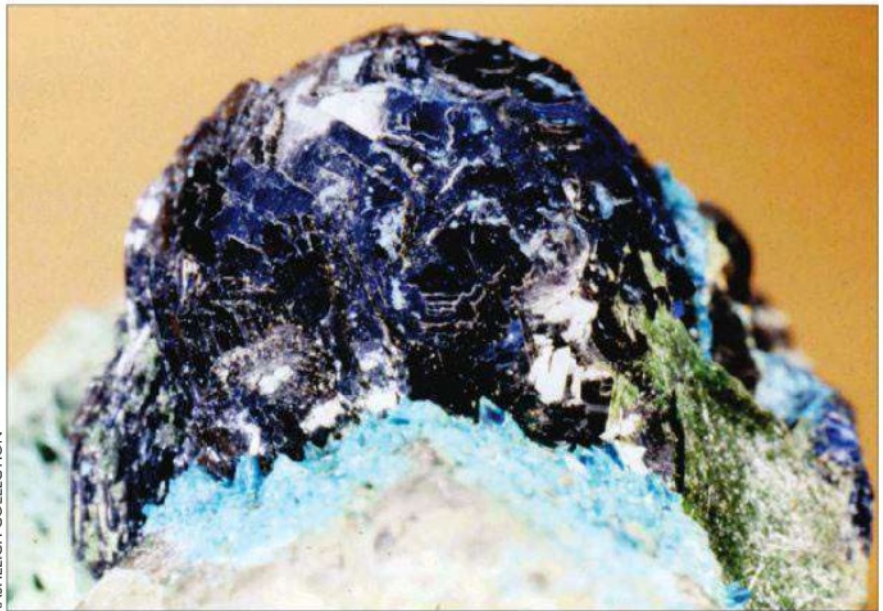
From the approximately two dozen species first found in the mines of Cornwall and neighboring Devon, you would immediately recognize wavellite (from Barnstaple, Devon), vivianite (St. Agnes), olivenite (Cornwall), ludlamite (Wheal Jane), connellite (Wheal Providence), clinoclase (Wheal Gorland), bourmonite (Wheal Boy), and bayldonite (Penberthy Consol). Today, these species are found in superb form in localities around the world and are eagerly collected. Even bourmonite, of which the Cornish specimens were the finest examples for so long, is available in fine specimens from China.

The history of the Cornish deposits goes back about 300 million years when, during the Carboniferous age, granite intrusions broke into the ancient sedimentary rock locally known as killas. Killas is a mix of ancient shale, sandstone, mudstone and conglomerates. Typically, this region was folded, faulted and fractured countless times during the ensuing millions of years.

The mineralization of the area came about as a result of hydrothermal action over a period of millions of years. Mineral-rich fluids deposited tin, copper, uranium, arsenic, iron, zinc, and other metal species.



This bourmonite is a cluster of cogsheel twins from the Herodsfoot mine at Liskeard, Cornwall.



RASHLEIGH COLLECTION

A fine 2-inch spherule crystal group of dark-green clinoclase includes blue lironite.



This lively blue connellite represents one of the rare copper arsenates from Cornwall.

Initially, stream tin, in the form of cassiterite, was gathered, though the exact time period of the first mining effort is not known. The assumption is that mining was going on in Cornwall when Herodotus wrote about the Cassiterides west of Europe in 430 BCE, since most take his writing as indicative of mining in Cornwall. There is no firm evidence to support that notion. We do know the Romans invaded England in 43 CE and they were at least mildly interested in tin. Their major effort seems to have been for silver-bearing lead elsewhere in England.

By 1500 BCE, bronze, usually a copper-tin alloy, was being produced in the ancient world in significant amounts. Bronze artifacts have been found in England that date to that time, but whether they

were cast in England or elsewhere has not been firmly established.

We do know the Cornish alluvial tin deposits were being actively worked by the 1500s. It was tin that first stirred interest in metal mining simply because it was easily found in the stream gravels. Gradually, tin veins that either outcropped on Cornish cliffs or were uncovered on land were worked. This, of course, eventually led to deep underground mining starting in the 1500s. During the next two and a half centuries, Cornish mines were among the more important in the world. While the mines were producing and after they shut down, their influence, through the migration of Cornish miners known as "Cousin Jacks", continued well into the 20th century!

Cassiterite, a simple oxide of tin, is not very difficult to smelt, unlike sulfide minerals, which require a multistage smelting process. Oddly, tin does not lend itself readily to forming common secondary species with stannite, the only type-locality tin mineral from Cornwall. Any discussion of Cornwall's minerals does not include secondary tin species. Copper, on the other hand, has supplied us with a lovely suite of fine and rare copper species by combining either with the arsenate radical or the phosphate radical in most cases.

Copper became as important as tin in Cornwall's metal production. Tin was the metal initially mined, since it was discovered first. As mining proceeded to depth, veins of copper were eventually hit and proved to be exceedingly rich. Therefore, copper mining in Cornwall was not significant until the late 1600s. This coincided with the growth of the British Navy and its copper-bottomed sailing ships.

Unlike tin, which is seldom found combined with other elements, the copper of Cornwall combined with a variety of other elements to form a wonderful suite of secondary species that differs from what

most American copper mines produced. In America, many copper deposits are rich in the secondary carbonate minerals azurite and malachite. This results from dry climatic conditions and an abundance of available limestone. Cornwall's mines, however, are world renowned for their wonderful suite of secondary arsenates and phosphates.

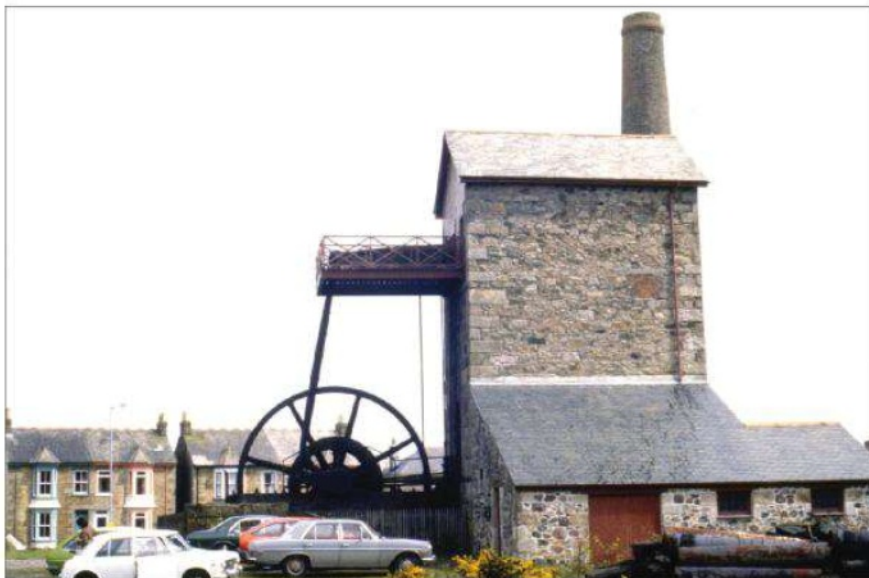
Like most metal deposits, the Cornwall deposits started with the common sulfide minerals from deep within the earth: sphalerite, galena, chalcopyrite and uraninite. In Cornwall, cassiterite was also present. The original solutions were rich in tin and copper sulfides, which were broken down through weathering. The tin formed tin oxide, cassiterite. The copper sulfides broke down and formed a suite of species. Copper, that most promiscuous of metals, joined an assortment of chemical radicals—arsenates, phosphates, uranium and carbonates—to create one of the world's great copper mineral suites. Even rich deposits of copper sulfides were mined, including chalcocite and bornite. Yet, no other copper source has produced such a quantity of specimens of uncommon species, including liroconite, clinoclase, chalcophyllite, olivenite, bournonite, ceruleite, clinoclase, libethenite, cornwallite, curnubite and connellite.

That these species from Cornwall, which we collect today, came to grass in the 1700s and 1800s explains their limited availability. It also explains the excitement when a large suite of some of these species, selected from the Caerhays Castle collection, made a sudden public appearance after more than 200 years.

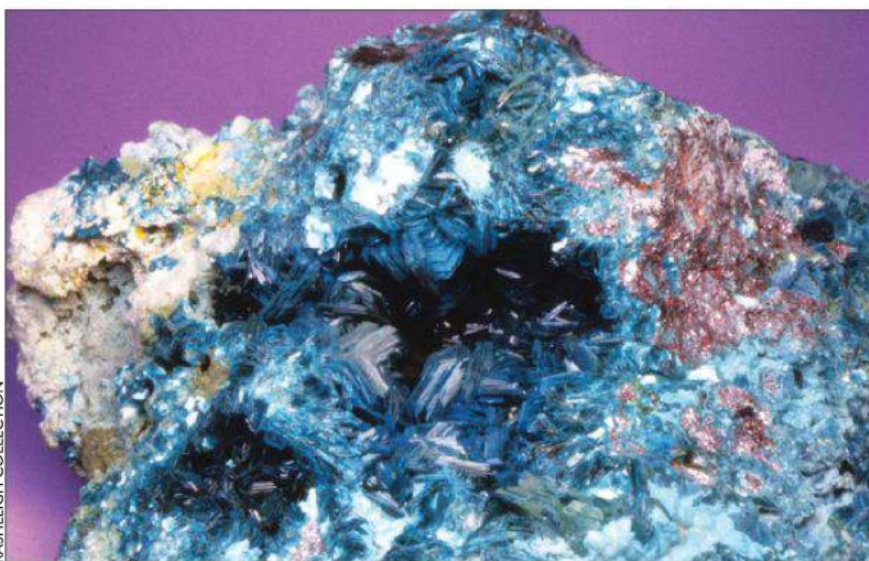
I would be remiss if I did not acknowledge the several non-copper arsenate and phosphate species that are found in Cornwall. This group includes apatite, ludlamite, bassetite, childrenite, mimetite, wavellite and liskeardite. In some cases, these minerals were first found in Cornish mines.

Two minerals that were first found in the neighboring county of Devonshire are the aluminum phosphate mineral wavellite, found in a mine in Barnstaple, and childrenite, an aluminum iron phosphate. Certain uncommon members of both the arsenate and phosphate suites stir the hearts of most advanced mineral collectors. Other localities have produced specimens of the species listed above, sometimes in more spectacular specimens.

Most of the minerals cited above are colorful, with a couple of exceptions. Bournonite, for example, is a gray-black sulfide composed of copper and lead. In recent months, spectacular bournonite specimens have been mined in China. This is the first time any locality has produced bournonite that rivals the superb cogwheel crystal twin specimens that were found in the Herodsfoot mine at Liskeard in the last half of the



This engine house has been rebuilt to represent the importance of the Cornish pump engine in keeping the area's mines free of water, an innovation that benefited mining around the world.



This closeup view is of micaceous crystals of chalcophyllite, one of the beautiful rare copper arsenates from Cornwall.

1800s and at the type locality, Wheal Boys, at St. Endellion, Cornwall.

Several mines in an area around the town of Gwennap are particularly well known for producing the best of these rare species. Keep in mind that the Williams family, of Caerhays Castle, were major mine owners in the Gwennap area during its most productive years and at a time when the thing to do was to have a cabinet of natural curiosities. Earlier members of the Williams family undoubtedly owned mineral specimens from their mines, but it was John Williams IV who emerged as the major collector of the family's minerals.

Of the mines in the Gwennap area, the Williams family owned the Levant mine, which may well have produced a majority of these species in quantity and quality,

and Wheal Gorland. During mining, Wheal Muttrell was swallowed up by Wheal Gorland. It would be impossible to attempt to separate these two sources when labeling specimens, as each could have produced a given species.

You might ask what was the source of the arsenic that formed the arsenate radical, which is so prominent in the formation of the copper arsenate species. Enter arsenopyrite, one of the important metal ores of the region. While tin and copper were the major ores, arsenic and even uranium were found often enough to warrant mining them.

The arsenic itself came primarily from the mineral arsenopyrite, an iron, arsenic sulfide. When this mineral breaks down, arsenic combines with oxygen to form a chemically active radical that readily combines with

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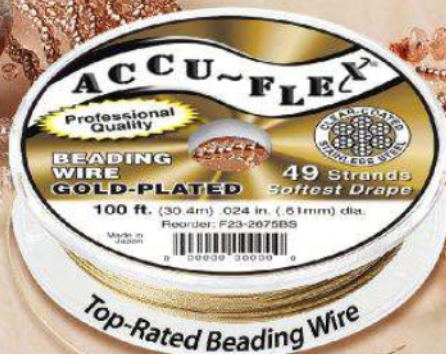
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CORNWALL'S Secondary Minerals from page 14

copper under the right conditions. The end product can be bayldonite, olivenite, clinoclase or, in unusual circumstances, bournonite!

Wheal Gorland and Wheal Muttrell were excellent producers of olivenite and clinoclase. Even today, specimens of these two species rank among the finest ever found. The Williams collection holds what may be the largest spherical aggregate of clinoclase crystals. This ball-like, dark-green group measures nearly 3 inches across, just eclipsing the large spherules in the Rashleigh collection in the Royal Cornwall Museum in Truro.

It is interesting to note that the ore lode that was being worked at Wheal Gorland had several offshoots, i.e. the Levant mine and Wheal Muttrell. Just as happens today, a particular specimen may be found in one lode or vein, but may reach the surface through a shaft associated with another mine. So which wheal, or mine, is actually the source of Cornwall's clinoclase is open to question.

Olivenite, a green copper arsenate, is well named. The finest specimens ever found also came from Wheal Gorland. Other localities around the world have produced olivenite, but the Cornish specimens still hold the top position, with needlelike crystals to nearly 1/2-inch in radiating sprays completely lining open vugs. Again, the Williams collection holds a trove of superb olivenites from Wheal Gorland.

An important source of phosphorous at Cornwall was the breakdown of the primary species apatite. As it broke down, it released phosphorous atoms, which combined with oxygen to form PO₄, the phosphate radical. This, in turn, could form the common lead mineral pyromorphite, which was found at Wheal Alfred and elsewhere.

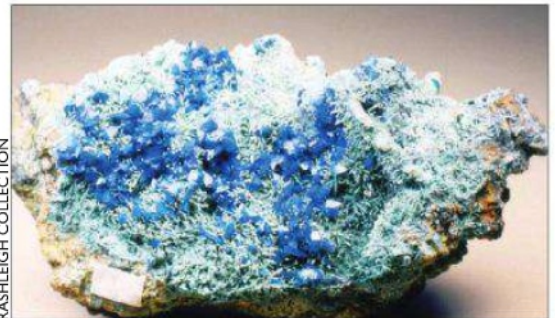
More important for collectors of Cornish minerals was the formation of childrenite, vivianite and ludlamite, all of which are types of iron phosphate. Childrenite in small pyramidal crystals was first found at Tavistock, Devon, close to the western border of Cornwall. The crystals were small, seldom reaching 1/4 inch. These are exceeded by crystals from Linopolis in Minas Gerais, Brazil, some of which were 8 inches long!

Cornwall's vivianite and ludlamite, both hydrous iron phosphates, have also been exceeded in size and quality by crystals from Bolivia, the Blackbird mine in Idaho, and several other localities. However, the type localities for these species are in Cornwall, so they deserve mention here.

The one species from Cornwall that has probably stirred the hearts of more collectors than any other is bournonite, a lead, copper, antimony sulfide known as a sulfo-



The breakdown of arsenopyrite, an ore of arsenic, releases the element for the formation of Cornwall's rare arsenate minerals.



Fine, small, blue crystals of the rare copper arsenate lironite have formed among hairlike crystals of olivenite.

salt. Bournonite specimens from Wheal Boy and the Herodsfoot mine are exceptional. The twinned crystals from the Herodsfoot mine formed radial discs measuring over 4 inches across. The re-entrant angles between the several crystals in such a twin are angular notches that give it the appearance of a gear; hence, it is called "cogwheel" bournonite. These remarkable twins have long been held as the finest examples of the species. For a period of 25 years, choice bournonites were encountered at the Herodsfoot mine. These specimens are still considered the finest ever found.

Wheal Boys is best remembered for producing a most unusual twin: two crystals at right angles forming a crosslike twin. These are rare.

Of late, China has produced superb bournonites that rival those from Cornwall; time will tell whether specimens exceeding them come to grass. Though the mines of Cornwall have been shuttered for well over a century, with a couple of exceptions, small examples of the region's minerals do surface for sale occasionally. They come from old collections or museum drawers in trade. Any good Cornish mineral is worth adding to your collection for two reasons: There is historical value of the minerals from Cornwall and Cornwall itself played an exceptionally significant role in the development of mining around the world. Not only did it send talented miners to mines around the globe, but it also developed advances in mining equipment that persisted into the 20th century! ♥

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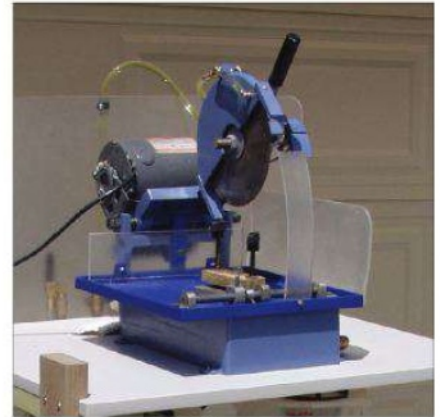
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One of the things that all our saws, grinders, flat laps, and other machines do is spray coolant where we don't want it. With most commercial lapidary machines, the spray is pretty well controlled, but the machine often needs a little tweaking to keep us totally dry. Those of us who enjoy building our own machines have to come up with ways of controlling that spray.

The first step in controlling spray is to identify the source. Once the source is determined, something suitable for blocking it needs to be put in place. Large slab saws nearly always have a metal or plastic hood that covers the whole works while the saw is running. This, of course, is the very best way to keep the surrounding territory clean and dry. If your saw has a power feed, you can fabricate such a hood out of metal, clear acrylic, or plywood, with or without fiberglass.

If you are trimming and have to have your hands near the blade, a full hood won't work, of course. It would be possible to rig up a hood that covers the back, top and sides, though. This will leave the front open so you can hand feed the vise. Such a hood could even be made out of a plastic wash pan or a clear acrylic storage box with the front cut out.

For blocking specific points of spray, hardware stores and the plumbing section of home centers carry rubber sheets of varying thicknesses that plumbers use for making gaskets. These sheets are usually about a foot square. If there is a place on your machine to fasten a bracket, you will just have to cut a piece to the size and shape you need and fasten it in place. Take care to place the sheet so that the spray that hits the back side drains back into the tank (on a saw) or the catch tray (on a grinder). If it runs onto the floor, you've missed the point.

To illustrate some of the more unusual spray problems, I'll refer to my little 8-inch chop trim saw. The first spot I tackled was the drive belt. It came with a small piece of sheet aluminum that was not long enough, so I got a lot of spray from the coolant being dropped onto the belt.

I was able to adapt a piece of aluminum channel, salvaged from a travel trailer we had years ago, to solve the problem. It was even curved to the contours of the pulleys on both the blade and the motor ends.

Pieces cut from an old plastic chair mat block any side spray on the right side of the blade and spray from the back of the blade. A 2-inch-wide strip of the chair mat fastened to the front of the table and slightly curved upward catches all the spray from the front of the blade as it moves up and down. Sometimes, being a pack rat pays off.

In a recent column, I wrote about using a glass or clear quartz cap to make a doublet or triplet in order to salvage a "leaverlet". When I first started making these things, the trick was to find a water-clear adhesive that would be bubble free. One day, I came across a water-clear ultraviolet-curing adhesive made for repairing glass. It came in a small syringe, was a one-part material that did not require mixing, and, best of all, did not cure until it was exposed to UV light (including sunlight). This last quality allowed me to move the cap around, remove and replace it, and work out all the bubbles.

One thing I did not mention in that column was where to get the stuff. It no longer seems to be available at hardware stores and home centers. I dug around and finally found it online at www.drillspot.com/products/562522/super_glue_gr-48_uv_cure_adhesive_glass_glass_adhesive?s=1. One syringe will do 30 to 40 cabs. ♥

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



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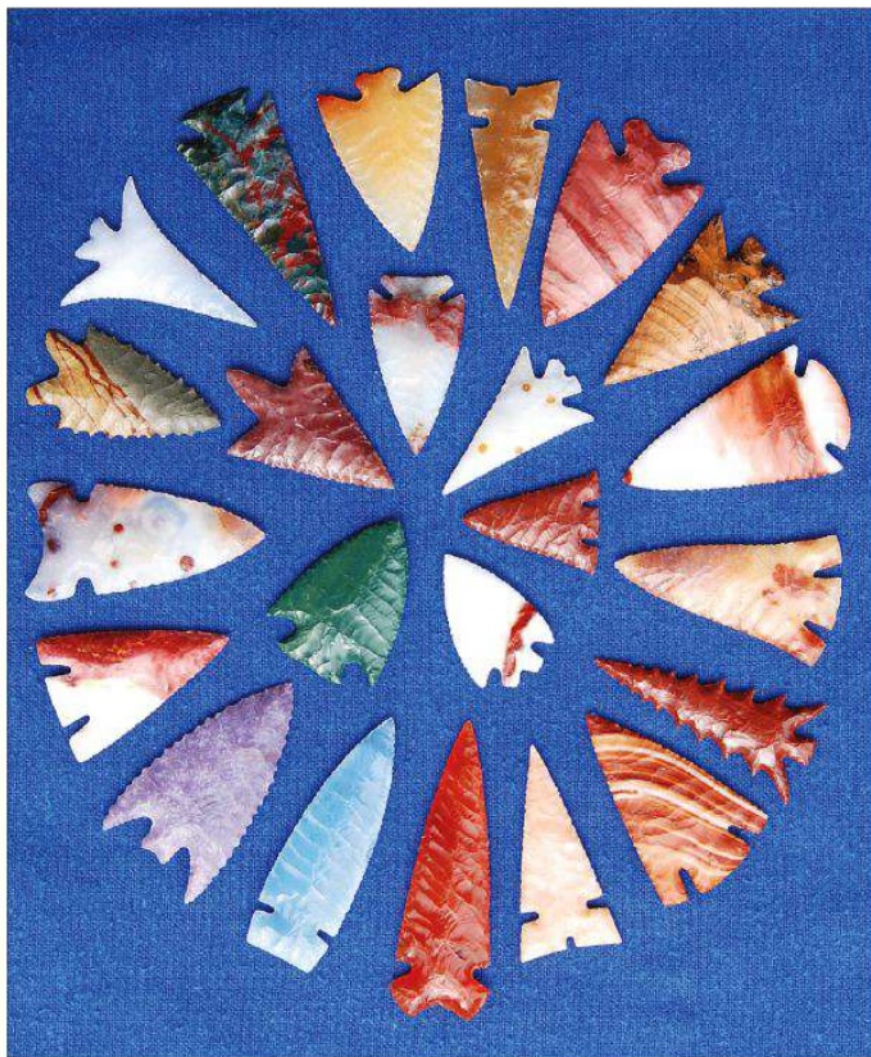
KNAPPING

through the Ages

Stone-Working Skills Helped Our Species Survive

Story, Stone Points and Photos by James A. Miller

All of us have descended from Stone Age ancestors. Over hundreds of thousands of years, our species relied on stone resources to provide essential tools for survival. Our modern technological and industrial culture occupies but a tiny fraction of human history on Planet Earth. For nearly all of our existence, stone and stone-working technologies were an essential element of the advancement and adaptation of our species. Stone materials and tools often are the most visible and lasting evidence of prehistoric settlements and trading routes because of the relative permanence of this valuable resource. Although stone was used in antiquity for many purposes, sharp-edged stone tools that were used for cutting, warfare and hunting (collectively termed “points”) are the types of artifacts that perhaps most distinguish humans from other members of the animal kingdom.



This attractive group of “gem points” includes colorful varieties of chert, chalcedony, common opal, agate and jasper.

Besides being a rockhound, a geologist, and an engineer, I am a modern flintknapper. I and other flintknappers have mastered many of the skills that our ancestors used to make sharp-edged stone tools like arrowheads, spearheads, and stone knives. It’s not a stretch for me to believe that an interest in flintknapping is contained in our human genome. With stone being essential to the survival of our species for eons, developing an awareness of stone resources is perhaps innately human. To carry the conjecture further, rockhounding may be the modern

manifestation of a primeval need to collect specific types of stone for basic survival.

This article describes the various types of natural stone materials that can be flaked (or “knapped”) into sharp-edged tools. But more than that, this article describes how flintknapping has progressed beyond the replication of ancient tools to a highly skilled art form. Modern knappers can transform a rough piece of rock into a treasured keepsake through the imaginative application of style, symmetry, color, texture, transparency, and flaking pattern to their finished

works, linking the craft of flintknapping to the creative lapidary arts.

Modern flintknappers are often interested in working with the same types of stone used by lapidary enthusiasts. While the goal of a lapidary may be to create a colorful and highly polished jasper cabochon, the flintknapper may seek to create a stylish and sharp-edged arrowhead out of the same piece of stone. Both artists work by hand to create their stone treasures. The flintknapper may even use some of the same tools as a cabochon maker. Many knappers use diamond saws to slab rock, both for conservation of material and to produce slabs that are oriented for maximum attractiveness. Some knappers also use diamond grinding wheels to shape a slab prior to final flaking. But while the lapidary generally attempts to produce finished pieces with a high degree of polish, the final surface of a knapped stone will show the actual texture of the stone, along with rippled flake scars that mark the locations of flake removals.

While there are many types of knappable stone, these materials usually represent only a very small fraction of the rock that exists in the local environment. Out of necessity, ancient peoples were very skilled at locating and developing sources of knappable stone. In fact, numerous prehistoric settlements were located in proximity to quality stone resources.

So what makes an ordinary rock a potential resource for flintknapping? The two most important characteristics are a smooth, conchoidal fracture and brittleness. Conchoidal fracture allows curved flakes to be detached from the stone in any direction, with minimal "grain" or interfering internal structure. Glass is the classic example of a material with conchoidal fracture. Stone types like slate tend to split only in one plane and along flat surfaces. Consequently, slate is not knappable. When the stone is fine-grained with a smooth, conchoidal fracture, the edges of the "flakes" from the parent stone can be sharper than a razor blade.

The kind of brittleness that is good for flintknapping is when the stone can be fractured intentionally with the application of relatively little energy. In percussion knapping, flintknappers intentionally break (or flake) rock through the application of impact energy, while pressure flaking involves the direct application of force with a pointed tool. If these hand methods are to be successful, the rock must be brittle enough to break in a controlled manner. For example, although granite breaks with a conchoidal fracture, its fracture surface is rough, and granite is



The dovetail-type blade at the top of this photo is made out of banded flint from Poland, while the material that was used to make the Clovis-style blade at the bottom is from central Texas.

very tough and difficult to break. Therefore, granite is not knappable.

Stone that breaks with a smooth, brittle conchoidal fracture is knappable. But there's more! To be highly useful, the sharp edges of a stone tool must also be durable. Edge durability can be roughly correlated with the hardness of the stone. Common opal has a smooth, brittle conchoidal fracture and is quite knappable, but its hardness is typically only about 4.5 to 5.5 on the Mohs hardness scale. The sharp edges of opal flakes or tools tend to dull rapidly with use because of the excessive brittleness and softness of this type of stone. Nevertheless, common opal was sometimes used by ancient knappers in some areas, particularly for one-time uses such as arrowheads. For

modern flintknappers, who are more interested in the color and style of a finished point, edge durability is not so important. Common opal, with its myriad colors and patterns, is therefore a favorite material for modern knapping enthusiasts.

A broad class of rocks known as cryptocrystalline silicates (CCS) is the most common rock type that was used in antiquity for the manufacture of knapped stone tools. The many well-known rock types in the CCS group include agate, chalcedony, jasper, chert and flint. Although these rocks occur in a wide variety of locations and geologic settings, they have one thing in common: they consist almost entirely of microscopic crystals of quartz. The tiny crystal size gives the CCS rocks a smooth, conchoidal



Although obsidian is usually black, volcanic glass also occurs in a dazzling variety of colors and patterns.

fracture. Quartz, with its Mohs hardness of 7.0, provides the desired edge durability.

Knappable stone occurs in all three major rock types: igneous, metamorphic and sedimentary. However, stone that is useful for knapping is not evenly distributed in the environment. For instance, the New England area of the United States is underlain primarily by very old metamorphic rocks and coarsely crystalline igneous rocks. While pegmatite rocks may be plentiful in New England, CCS materials are few and far between. In contrast, much of the central portion of the United States is underlain by sedimentary rocks that contain layers and nodules of chert. And in the geologically recent western portion of the country, volcanic deposits containing obsidian, chalcedony and jasper are locally abundant.

The terms "flint" and "chert" are often used interchangeably when describing CCS materials that are derived from limestone. Is there a difference? Some writers insist that the only "true" flint forms in the chalk beds of Europe. Chalk is a very pure variety of white limestone that contains nodules of brown, black, or dark-gray flint. However, I've seen brown to dark-gray CCS material from Texas that looks, feels and works just like the flint from Europe. From a flintknapper's perspective, there is no significant difference between European flint and some of the CCS materials from the United States. Chert forms in similar geologic environments as flint, but chert contains more non-quartz impurities. Although flint and chert are both derived from limestone host rock, I usually refer to slightly translucent, darker-colored CCS material as "flint" and reserve the name "chert" for opaque, lighter-colored stone. But the distinctions are not really important for knapping.

Rivers that traverse limestone deposits often have gravel bars that contain nice pieces of chert and flint. Rock collecting can be good on these gravel bars, particularly after a flood. Knappable stone on gravel bars typically occurs as irregular nodules or as relatively flat, tabular pieces of stone that are termed "tabs". Large nodules and thick tabs often contain tough inclusions near the center that render the stone unusable for knapping, so my preference is to collect tabs or relatively thin nodules that do not contain the nuisance "concrete" inclusions.

Limestone weathers away slowly by solution from slightly acidic rainwater. This is the process that creates caves and caverns over millennia. Chert and flint, consisting primarily of silica, do not dissolve. The result is that the weathering process may concentrate chert nodules in the upper soil profile in many limestone areas. These can



The bands of yellow and brown jasper in this point (left) changed color after heating the stone to 550°F.



The original polyp structure of a coral head is captured in this dovetail blade, which I crafted out of agatized coral from Indonesia. Complete silica replacement of the organic material makes this possible.

be a nuisance to farmers, so some fields in limestone terrain may have piles of chert nodules waiting to be harvested by the rockhound or flintknapper.

The highest quality CCS materials show a smooth, satinlike conchoidal fracture surface right out of the ground, but many, if not most, CCS materials tend to be a little tough. For instance, many types of agate, chert, chalcedony and jasper are difficult to break even with a rock hammer. But the brittleness of these materials often can be improved dramatically with heat treatment. Our Stone Age ancestors understood this, and they commonly employed heat treatment to improve the workability of lower quality knappable stone. Depending on the type and thickness of stone, heating temperatures may range from 350°F to 950°F. Thicker pieces typically require less heat. I use a programmable kiln for cooking my rock, but tried-and-true low-tech options also are available.

Besides improving brittleness, successful heat treatment changes the texture of the flake scars on the treated stone from rough to smooth and silky. As an added bonus, heat treatment often produces a pleasing color change in some rock types. Dull, beige chert from the middle of the continental United States will often change to pink or even red. But jasper shows the most dramatic change. The yellows and browns of many types of jasper can change to bright reds or purples with heat treatment, typically at temperatures of about 550°F. The color change results from the oxidation of trace amounts of iron in the stone.

Often, the color change from heat treatment occurs only on the outermost veneer of the stone. This offers another interesting opportunity with jasper and some varieties of agate. The first stage of heat treatment may produce the desired brittleness in the stone, along with a skin-deep color change, but the outer color layer will typically be

removed in the process of making a flaked stone tool. Once the knapped tool is finished, however, the color change can be re-created with re-heating! Lapidaries also can use this technique to improve the color contrasts in some jasper and agate cabochons. (Depending on rock type, the surface of the cab may need to be re-polished after heat treatment.)

Some varieties of chert contain visible fossils that enhance the appeal of finished points. One example is chert from the border area of Kansas and Oklahoma that contains small fossils of extinct marine organisms known as "fusulinids". These creatures lived in shallow seas and are shaped like tiny footballs. The fossil preservation sometimes is so perfect that the internal structure of the fusulinids is clearly visible. Other knappable varieties of chert may contain fossils of brachiopods, crinoids or bryozoans.

Fascinating points also can be made out of materials that *are* a fossil. Silicified (petrified) wood is an excellent example. Silica replacement of the original structure of the wood can be so detailed that the annual growth rings of the wood are clearly visible, sometimes even allowing for identification of the species of the long-dead tree. Petrified palm wood from Texas and Louisiana also can produce spectacular arrowheads. Another example of a knappable fossil is agatized coral, with notable varieties from Florida and Indonesia. Most agatized wood and coral contains remnants of the internal structure of the original living organism, thus presenting a real challenge for the knapper. But when the silica replacement is very complete, the results can be incredible.

Moving beyond CCS materials, orthoquartzite is an interesting variety of knappable stone that was used frequently by Native Americans for the manufacture of flaked stone tools. This sedimentary rock begins as sandstone consisting primarily of quartz sand grains. Typical sandstone is too soft and crumbly for knapping, but in orthoquartzite, the sand grains have been cemented tightly together with silica (chalcedony). The cementation is so effective that flakes travel *through*, rather than *around*, the individual quartz grains in the sandstone. Nearly white varieties of orthoquartzite are also called "sugar quartz" because the stone so closely resembles solidified granular sugar, but orthoquartzite is a lot harder and not nearly so tasty! I have personally made arrowheads out of orthoquartzite from New



Porcellanite is an interesting type of metamorphic rock that is created from natural underground coal fires baking layers of shale.

Jersey, Alabama, Texas, Missouri, Wyoming, Wisconsin, Colorado, and New Mexico. Silver Mound, Wisconsin, is perhaps the most famous source location for orthoquartzite that was used by Native Americans. This very pure quartz sandstone produces beautifully translucent flaked tools.

While CCS materials and orthoquartzite are composed of tiny crystals of quartz, whole quartz crystals can also be used for the manufacture of flaked stone tools. Milky quartz was commonly used in antiquity for arrow points in the eastern and southeastern United States. Water-clear, optical-grade quartz from Brazil and Arkansas can produce knapped points that look like glass, but are much harder. Crystal quartz has some structure along the internal crystal lattice of the stone. This internal structure makes whole quartz crystals somewhat challenging to flake predictably and results in tiny stair-step waves on some of the flake scars.

Metamorphic rock is stone that has changed its mineral composition or structure from the application of heat and/or pressure. "Porcellanite" is an interesting type of knappable metamorphic rock that occurs in some coal-bearing areas. This rock forms very differently from metamorphic rocks like schist and slate. Underground coal fires started by lightning or forest fires can generate intense heat around the burning coal. In some locations, the coal layers are sandwiched between layers of claystone (shale). The confined heat of the burning coal literally bakes the surrounding claystone to a hard rock that is similar to porcelain, hence the

name porcellanite. Native Americans in parts of Montana and Wyoming often used porcellanite for the manufacture of flaked stone tools. Commonly gray, black, or dark red, some porcellanite has fantastic color patterns that accentuate a finished point. This material flakes well, but it does not take a good polish.

Obsidian, or volcanic glass, is a variety of igneous rock that was highly utilized in antiquity. Obsidian occurs only in areas of relatively recent (geologically speaking) volcanic activity. In the United States, obsidian is only found west of the Rocky Mountains, but obsidian artifacts have been found as far east as Cape Cod, Massachusetts. This demonstrates the value of obsidian to ancient peoples: This stone was traded over thousands of miles before horses arrived in the Americas, transported on people's backs.

Many modern flintknappers acquire their skills by working obsidian. Its natural brittleness and glossiness, its relative abundance and accessibility (in specific areas), and the relatively large size of available pieces make obsidian very popular for modern knappers. Obsidian most often occurs in shades of black, but it is also found in a dazzling variety of colors and patterns. Spectacular points can be created from the more unusual varieties of obsidian, such as rainbow, fire, gold sheen, silver sheen, mahogany, and midnight lace.

"Gem points" refer to finely crafted arrowheads that are made out of colorful varieties of stone. Some of the most beautiful gem points in antiquity were made out of jasper, agate, common opal, and colorful varieties of chalcedony. My favorite material for making gem points is Montana agate. This incredible stone from Yellowstone River gravel bars comes in an amazing assortment of colors and patterns, ranging from dendritic moss agate to banded carnelian. I've seen entire frames of gem points made exclusively of Montana agate, with each point unique in color and pattern.

With the collection and use of interesting and colorful stone materials, flintknapping has moved past the academic interests of archeologists to find a home among rock-hounding and lapidary enthusiasts. The process of transforming a pretty rock by hand into a sharp and stylish arrowhead is both challenging and rewarding. It links ancient, primal skills with modern creativity. Like the stone tools of the distant past, these modern creations will endure long after the artisan has departed this world. 🍷

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Show Dates from page 10

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11-13—LOGAN, UTAH: Show and sale; Cache Geological & Archeological Society; Riverwoods Conference Center, 600 S. Main; Fri. 10-7, Sat. 10-7, Sun. 10-5; free admission; door prizes, club displays, demonstrations, dealers, handcrafted jewelry, silent auction, fossils, crystals, mineral specimens, rough rocks, slabs, grab bags, kids' activities, faceting rough, artifacts; contact Gary Warren, (435) 720-1775; e-mail: rock_hunter1@hotmail.com

11-13—PLEASANTON, CALIFORNIA: Show; Gem Faire Inc.; Alameda County Fairgrounds, 4501 Pleasanton Ave.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yoo Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

11-13—VICTORVILLE, CALIFORNIA: 35th annual tailgate; Victor Valley Gem & Mineral Club; Stoddard Wells Rd., 12 miles east of I-15; Fri. 9-5, Sat. 9-5, Sun. 9-5; rough materials, gems, jewelry, findings, equipment, Sat. field trip, silent auctions; contact VVGMC, (760) 243-2330, or Brett Ward, (760) 954-4323; Web site: www.vvgmc.org

11-14—DEMING, NEW MEXICO: 46th annual show, "Rockhound Roundup Gem & Mineral Show"; Deming Gem & Mineral Society; SWNM State Fairgrounds, Raymond Reed Blvd.; free admission; more than 100 dealers, display cases, geode cutting, gold panning, spinning wheel, silent and live auctions, door prizes, raffle, guided field trips; contact Terry Dellinger, PO Box 1459, Deming, NM 88031, (936) 433-0108; e-mail: theDGMS@gmail.com; Web site: www.dgms.bravehost.com

12—BARTOW, FLORIDA: Show and sale; Bone Valley Gem, Mineral & Fossil Society; Stuart Center (Polk County Ag Bldg.), 1702 US Hwy. 17S; Sat. 10-5; adults \$1; children's sandbox, demonstrations, raffle, silent auction; contact Jim Reed, 5740 Hebron Ln., Lakeland, FL 33812, (863) 644-6665; e-mail: rocks57@tampabay.rr.com; Web site: www.bonevalley.net

12—BATON ROUGE, LOUISIANA: 2nd show, "Rockin' at the Swamp"; Baton Rouge Recreation Commission; Bluebonnet Swamp Nature Center, 10503 N. Oak Hills Pkwy.; Sat. 9-4; adults \$5, children \$4; activities, displays, rocks, gemstones, minerals, fossils, vendors, exhibits, rough and polished mineral specimens, fossils, geode-busting station; contact Claire Cocco, 10503 N. Oak Hills Pkwy., Baton Rouge, LA 70810, (225) 757-8905; e-mail: ccoco@brec.org

12—SKOKIE, ILLINOIS: 62nd annual silent auction; Chicago Rocks & Minerals Society; St. Peter's United Church of Christ, 8013 Laramie Ave., across from the Skokie Public Library at Oakton; Sat. 6-9; free admission, children must be accompanied by an adult; rocks, minerals, crystals, fossils, handmade jewelry, lapidary treasures, books, magazines; contact Jeanine N. Mielecki, (773) 774-2054; e-mail: jay nine9@aol.com; Web site: www.chicagorocks.org

12-13—CHARLOTTE, NORTH CAROLINA: Retail show; Intergalactic Bead & Jewelry Shows; Metrolina Tradeshow Expo, Bldg. B, 7100 Statesville Rd.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicats; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

12-13—FILER, IDAHO: 60th annual show; Magic Valley Gem Club; Twin Falls County Fairgrounds, U.S. Hwy. 30, east side of Filer; Sat. 9-6, Sun. 9-5; contact Harold Waggoner, (208) 423-9668, or Shirley Metts, (208) 423-4827; e-mail: rmetts@cablone.net

12-13—KLAMATH FALLS, OREGON: Annual show; Rock and Arrowhead Club; Klamath County Fairgrounds, 3531 S. 6th St.; Sat. 9-5, Sun. 10-4; Petrified Wood; contact Jennifer Zimmerlee, (541) 545-6773; e-mail: jlazys@hotmail.com; or Marv Stump, (541) 882-8341

12-13—MACOMB, ILLINOIS: 31st annual show; Geodeland Earth Science Clubs; Western Illinois University Union Ballroom, Murray St.; Sat., 10-6, Sun. 10-5; free admission; dealers, minerals, fossils, jewelry, equipment, displays, fluorescent minerals, geodes, meteorites, fossils, minerals, artifacts, demonstrators, shell engraving, fossil preparation, mineral identification, egg and rock painting, wire-wrapping, sphere-making, scrimshaw, geode cracking, flint knapping, glass bead making, lampwork, gemstone faceting, kids' activities; contact Regina Kapta (217) 433-9585; e-mail: cigmc@comcast.net; or Jim Travis; e-mail: boatnick@aol.com

12-13—SAN MARINO, CALIFORNIA: Show, "Tournament of Gems, Rocks to Art"; Pasadena Lapidary Society; San

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12-13—SPRECKELS, CALIFORNIA: Show, "Parade of Gems"; Salinas Valley Rock & Gem Club; Spreckels Veteran's Hall, 5th St. and Llano St.; Sat. 10-5, Sun. 10-5; free admission; demonstrators, cab making, bead enameling, youth beading and rock painting, fluorescent display, rock bags with prizes, "wheel of fortune", raffles, free drawings, auction, dealers, jewelry, beads, fossils, craft supplies, minerals, crystals; contact Karen Jones, PO Box 668, Soledad, CA 93960, (831) 678-0337; e-mail: kenkaren0337@att.net

12-13—TURLOCK, CALIFORNIA: 45th annual show; Mother Lode Mineral Society; Turlock Fairgrounds, 900 N. Broadway; Sat. 10-6, Sun. 10-5; adults \$5, children 12 and under free with adult; minerals, rocks, beads, jewelry, fossils, dinosaurs, fluorescents, tools, books, educational material, large children's area, 40 vendors, 80 exhibits, 20 demonstrations, jewelry making, lapidary arts, gold panning, rock sale, fluorescent tent, speakers (Bob Jones, Dr. Gregg Wilkerson), fossil display, life-size T-rex skull; contact Bud & Terry McMillin, (209) 524-3494; e-mail: terry.mcmillin@yahoo.com; Web site: www.turlockgemshow.com

18—HOUSTON, TEXAS: Show; Rings & Things; Hilton Houston Southwest, 6780 Southwest Fwy.; Fri. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

18-20—ALBUQUERQUE, NEW MEXICO: 42nd annual show, Treasures of the Earth; Albuquerque Gem & Mineral Club; Creative Arts Center Bldg., State Fair Grounds, EXPO NM (San Pedro entrance); Fri. 10-6, Sat. 10-6, Sun. 10-5; adults \$1 Fri., \$3 Sat. and Sun., kids 12 and under free; more than 40 dealers, displays, door prizes, silent auctions, mineral and gem identification, juniors' booth, live wolf, geode cracking, faceting demonstration, gold panning and more; contact Paul Hlava, (505) 255-5478; e-mail: paulhlava@q.com

18-20—HICKORY, NORTH CAROLINA: 41st show, "Unifour Gem, Mineral, Bead, Fossil and Jewelry Show"; Catawba Valley Gem & Mineral Club; Hickory Metro Convention Center, I-40 Exit 125; Fri. 9-6, Sat. 9-6, Sun. 10-5; adults \$4, children and school groups free; contact Baxter Leonard, 2510 Rolling Ridge Dr., Hickory, NC 28602, (828) 320-4028; e-mail: gailandbaxter@aol.com

18-20—HILLSBORO, OREGON: Show; Gem Faire Inc.; Washington County Fairgrounds, 873 NE 34th Ave.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

18-20—JACKSON, MICHIGAN: 49th annual show; Michigan Gem & Mineral Society; Jackson County Fairgrounds, 200 W. Ganeson St.; Fri. 10-7, Sat. 10-7, Sun. 10-5; jewelry, minerals, fossils, dealers, demonstrations, silent auctions, geode cracking; contact John LaMont, (765) 647-4894, or Dan Hovater, (517) 518-1045

18-20—SPANISH FORK, UTAH: 52nd show, "Spring Parade of Gems"; Timpanogos Gem & Mineral Society; Spanish Fork Fair Grounds, 475 S. Main St.; Fri. 10-7, Sat. 10-7, Sun. 10-5; free admission; displays, dealers, jewelry, fossils, equipment, Mr. Bones, door prizes, touch table, rock sales, kids' grab bags, Wheel of Fortune, instructions on polishing rocks, metal detectors, lapidary equipment, demonstrations, faceting, knapping, wire wrapping, beading, fluorescent mineral display, silent auction; contact Keith Fackrell, 2295 East 700 South, Springville, UT 84663, (801) 489-7525; e-mail: krfackrell@msn.com; Web site: http://timrocks.weebly.com

19—SAN ANTONIO, TEXAS: Show; Rings & Things; Aggie Park & Banquet Hall, 6205 West Ave.; Sat. 2-6; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

19-20—BAKERSFIELD, CALIFORNIA: 10th annual show, "Rendezvous"; Lewis M. Helfrich; Kern County Shriners, 1142 S. P St.; Sat. 9-5, Sun. 9-5; free admission; free drawings, demonstrations, sphere making, cabochon making, silver-smithing, wire wrapping, grab bags, Wheel of Fortune, raffle, silent auction, General Store, dealers, rocks, fossils, gems,

continued on page 36

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The Caerhays Castle Mineral Collection



WILLIAMS COLLECTION

The Caerhays collection specimens I found the most remarkable were the micaceous, bright-green torbernites from the Old Gunnislake mine in Cornwall.

It Features Cornish Specimens from Centuries of Mining

Story and Photos by Bob Jones

Unless you are a lover of fine exotic flowers, you've probably never heard of Caerhays Castle, a Norman-style gray stone castle overlooking lovely Porthluney Cove, a small bay of the Atlantic Ocean near St. Austell in Cornwall, England. The bay and all the land in view are part of the huge Caerhays Estate, which has been owned by the Williams family for over 150 years.



Caerhays Castle is a beautiful Norman-style edifice that was built in the 19th century. This fortress protects the Williams family collection of Cornish minerals.

Caerhays Castle is internationally noted for its superb plants and gardens. Its 60 acres of woodlands and gardens hold fantastic growths of rhododendrons, magnolias, oaks and camellias. Many of these exotic plants were collected in China by J.C. Williams over 100 years ago.

The public can tour the castle and gardens and can even book lodgings in the castle, especially during the pheasant hunting season, where ring-necked birds are brought in to create a successful hunt. Soon, you will also be able to see an amazing, historically important mineral collection when you tour the castle. The specimens you'll see largely date from the 18th and 19th centuries.

Much to the surprise of the mineral world, the estate recently brought to light this phenomenal family collection and is currently preparing to make it a part of the public castle tour. This collection holds some of the best Cornish minerals ever brought to grass. The minerals are old by American standards, having been mined at least 200 and perhaps 300 years ago when Cornwall's mines were in full sway. Yet, in spite of their age, some of these mineral specimens still rank among the world's best, while others hold their position as type locality minerals first found in Cornwall.

A selection of specimens from the Caerhays Castle mineral collection was displayed at the 2011 Tucson Gem & Mineral Show™, adding to the excitement of the show. The exhibit of rare Cornish minerals from centuries ago was exceptional. Owner Charles Williams planned this exhibit of historically important Cornish phosphate and arsenate minerals, and Courtenay Smale, a key figure in the recent preparation of the Caerhays collection, brought the exhibit to Tucson and gave an excellent talk about the collection. He has been preparing the collection for display for several years now. Because of the work he is doing, Courtenay



This lovely example of the copper sulfide chalcocite, collected from the Tincroft mine at Illogan, Cornwall, boasts a bright blue patina, perhaps of the mineral bornite!



Olivenite is a copper arsenate that was first identified in Cornwall in 1820. This specimen is from Wheal Unity.

knows more about the collection than anyone else. He is also more knowledgeable about Cornish mines, their histories, and the minerals they yielded than anyone else I know. He is also preparing a book about the minerals and their provenance.

Caerhays Castle is very impressive and one of the few surviving Norman-style castles in England. It was never a royal castle like Neuschwanstein or Windsor Castle. It is a privately owned gray stone fortress that dominates a hillside overlooking the ocean. At first glance, you'd swear it is an impenetrable stronghold like those built by the Normans all over England, but it dates from only the 19th century. The Trevanion family commissioned noted architect John Nash to design and build this impressive edifice. John Trevanion, however, could not afford to maintain and live in the castle, and by 1840 he abandoned the place, stripping it of its lead roof for scrap.

When the castle came up for sale, it was bought by Michael Williams in 1853. The Williams family had a huge task to rebuild the castle and repair the ruined interior. The castle has been in the Williams family ever since.

This family has been involved in mining and smelting in Cornwall since the 1600s! The current mineral collection was moved into the castle in 1865, but prior to that it was housed at the Williams family residence, Scorrier House, which in its day was considered one of the finest Cornish homes.

The Williams family made its fortune in mining, primarily in the Gwennap area of Cornwall. Because of the family's extensive mine holdings, John Williams III was known as the "King of Gwennap" when that region was one of the world's leaders in the production of copper and tin.

The family had interests in several Cornish mines that are noted for fine specimens, including Wheal Jane, Wheal Unity, Wheal Gorland, and Wheal Levant. Each is noted as a superior source of arsenate and phosphate mineral species. Specimens of liroconite, clinoclase, olivenite and chalcophyllite from these mines are considered unrivaled, and the Williams collection has many examples of these species! For example, it contains more than 20 well-crystallized liroconites, a very rare species.

The mines of Gwennap were some of Cornwall's great copper producers. The Tresavean mine, for example, was producing 9 percent of all Cornwall's copper in the early part of the 1700s. Gwennap became known as "the Copper Parish" and the Williams family benefited immensely in the 1700s and 1800s, first from tin, and later from copper production and smelting.

Work in the Cornish mines proceeded until the water level blocked progress. In deep mines, water is a real problem, as it



This tangled mass of bright red needles is typical of the copper oxide cuprite, variety chalcotrichite, also called "plush copper". The specimen hails from the Gwennap mines in Cornwall.



Editor Bob Jones holds an exceptional example of pyrrargyrite, which probably came from a German mine, that was recently re-discovered in the Williams mineral collection at Caerhays.

can be virtually impossible to lift it to the surface. The Williams family led the effort to develop a drainage system called the Great County Adit, a 30-mile-long tunnel dug below the water table that drained the mines and emptied into the ocean. Started in 1748 and dug completely with hand tools and black powder, the project took miners 50 years to complete and enabled deep shaft mining to continue. Dynamite was not invented until 100 years later.

By that time, several important inventions—the Blake jaw crusher, the Bickford safety fuse, and the Cornish pump engine—had come into being. This last device was adapted as a man engine and, along with pumping water, it could lift miners to the surface so they did not have to climb out after working all day. The Trevanion mine was the first Cornish mine to employ a man engine.

In the 1700s, John Williams II (b. 1685) emerged as a major force in Cornish min-

ing. He was followed by John Williams III. The Caerhays Castle mineral collection didn't get its organized start until John Williams IV (1777-1849). He turned a casually collected group of minerals into a serious specimen collecting effort.

Owning a cabinet of natural objects was a common practice among the wealthy in the 17th and 18th centuries. John III's love of minerals prompted him to vigorously acquire specimens from the Williams holdings. He assembled a huge collection that numbered in the thousands.

To give you a small idea of the dedication of John IV to mineral collecting, work at the Old Gunnislake mine exposed a huge cache of jackstraw cerussite. Some of these crystal needles were 9 inches long and all were brittle! When a specimen of jackstraw cerussite measuring several feet across was brought to light, John wanted to add this huge beauty to his collection, but the mine



Caerhays Castle is internationally noted for the superb exotic plants that grow in the estate's 60 acres of gardens and woodlands. Many of them were imported from China over 100 years ago.



Caerhays Castle owners Charles and Elizabeth Williams were gracious hosts to our May 2010 tour group, led by Editor Bob Jones.

was 30 miles from Scorrier House! What to do with this fragile giant?

The solution, which would probably be impossible today, was to attach two long poles to the sides of a blanket, making a stretcher to cradle the piece, and hire two men to carry it the 30 miles to Scorrier House. Remarkable!

Once Caerhays Castle was acquired by the Williams family, the collection was housed there and continued to grow. When John IV was succeeded by John Charles, it was decided the collection was getting too big, even for the castle! John Charles Williams invited representatives of what was then the British Museum of Natural History, now the Natural History Museum, London, to select 550 specimens from the collection for their museum. He then invited the curators of the Cambourne Mining School, the Royal Institute of Cornwall, and Robert Hunt Memorial museums to help themselves to several thousand specimens!

To top it off, specimens went to Britain's dean of mineral collectors, Sir Arthur Russell, for whom the Russell Society is named. You'd think such wholesale stripping of specimens from the Williams collection would deplete it dramatically. In fact, the collection remains significant in size and was later consigned to storage in the castle, only to emerge once again in 2008!

It is not unusual, as interests change, for a mineral collection to be stored away. In the late 1700s, Georgiana, Duchess of Devonshire, found herself in the family way, much to the surprise of the Duke! In addition, her outrageous gambling habit had put her into considerable debt. She was packed off to Europe, where she became fascinated by minerals and collecting. Upon her return to Chatsworth, she brought quite fine collec-

tion with her. The collection was not put on display, but was stored and forgotten. Luckily, it was "found" a few years ago and is currently on display at Chatsworth House, thanks to the Russell Society members who prepared the collection for display.

How I heard about the Caerhays collection is, in itself, quite a story. For the last several decades, I've been friendly with Courtenay, a delightful fellow who lives in Newquay, Cornwall. I met him in the 1980s through Pete Embrey, Curator of Minerals at the Natural History Museum, London. Courtenay was chief geologist of the Cornish clay pits, which supplied pure white feldspar clay to Wedgewood and other potters. In 2008, I was planning a trip to England and contacted Courtenay. He replied that he could take me to see a "secret" mineral collection he was working on. For the next several months, I kept hearing about this "secret" collection. As each new "discovery" was made by Courtenay, I got more and more excited to see these rare individual specimens.

Since Caerhays Castle is open to tours, Charles Williams, the current manager of the family estates, determined to add the Caerhays mineral collection to the castle tour. Charles asked Courtenay to unpack the collection and prepare it for public display.

So what are the more notable specimens in the collection? After the distribution of 550 specimens to one museum and several thousand more to others, you'd think there would not be much left. Wrong! Someone in the family was wise enough to set aside the better specimens. Along with the 20 examples of lironite, a rare copper arsenate first found in Cornwall, there are 30 chalcophyllites, an even more uncommon copper arsenate, sulfate; 60 olivenites (cop-

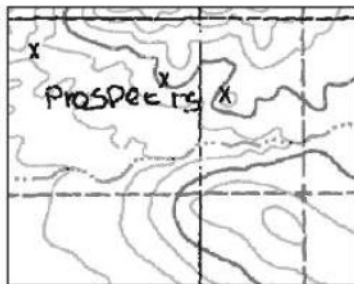
per arsenate); and an exceptionally rare connellite (copper chlorosulfate), a mineral first identified in Cornwall.

The specimens I found particularly amazing are the torbernite crystal specimens from Old Gunnislake mine. Prior to this, the best I had seen were fine bladed green crystals on gray quartz an inch or so on edge housed in the Natural History Museum, London. I suspect these had been part of the original 550 specimen lot acquired from Caerhays! I thought they were the best ever until I saw the Caerhays specimens, crystals approaching 2 inches and 3 inches on an edge in hand-size clusters the likes of which I did not know existed. These are the world's finest Cornish torbernites. Also a surprise to me were several azurites from the classic copper mine at Chessy, France, including a huge, 8-inch by 10-inch crystal beauty!

In May 2010, I was privileged to guide a tour group of 29 people to Caerhays Castle. We saw the collection and enjoyed a lovely lunch and wine hosted by Charles and Elizabeth Williams! Just as I was preparing to board our tour bus, Courtenay brought out a specimen he had just unwrapped, a fine German pyrrargyrite with 2-inch crystals, that was surely the finest I'd ever seen. At the time of our tour visit, the entire collection had not yet been unpacked, so who knows what secrets remain to be uncovered?

If you ever plan a visit to Cornwall, be sure to visit Caerhays Castle to see one of the great collections of Cornish minerals, including some of the world's finest examples of rare arsenate and phosphate species, stunning emerald-green torbernite crystals, and remarkable blue azurites. For more information about the Caerhays estate, go to www.caerhays.co.uk.

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ROCK SCIENCE

by Steve Voynick

Pre-Columbian Goldwork

In 1520, after viewing a treasure of golden artwork brought to Spain from the New World, German artist and engraver Albrecht Dürer "marveled over the subtle ingenuity of the men in these distant lands." Dürer, a master goldsmith, was astounded not by the quantity of the golden art, but by the brilliant metallurgical techniques used to create it—techniques far more advanced than any then known in Europe.

The achievements of the pre-Columbian metallurgists of South and Central America are all the more remarkable considering that they had neither iron implements nor any modern concept of science. With only drafted charcoal furnaces, stone tools, ceramics, wax, blowpipes, and a few natural chemical reagents, their most valuable resource was an almost uncanny understanding of the yellow metal itself.

Their basic gold-working technique was hammering the metal into thin sheets, which is more complex than it might seem. Because hammering made the sheets brittle and subject to cracking, gold workers devised an annealing, or tempering, process. After hammering the gold, they heated it, then cooled it quickly in water to effectively alleviate the accumulated molecular stresses. In this way, they fashioned large, smooth, uniformly thick gold sheets ready for etching, embossing or folding into myriad shapes.

These gold sheets were joined using golden nails or staples or by hammering and annealing double-folded seams. Simple fusion in drafted charcoal furnaces produced a less visible seam, but welding was the most artistically perfect joining technique. Gold workers would heat the edges of two adjoining sheets almost to the melting point, then add a chemical flux such as copper acetate, obtained by the action of vinegar on native copper. This flux made possible an actual molecular fusion of the two gold sheets, producing strong, nearly invisible welds identical to those produced by modern gas-welding methods.

Lost-wax casting was the most creative pre-Columbian gold-working technique. Detailed carvings in palm-frond wax were encased in clay and fired to burn off the wax, leaving a hollow ceramic mold. After molten gold was poured into the mold and allowed to set, the exterior ceramic material was removed to reveal a solid piece of gold in the precise shape of the original wax carving. Hollow gold sculptures were crafted by



preparing the original carvings from clay-charcoal mixtures in a similar process.

These gold workers also created *tumbaga*, a 2:1 copper-gold alloy with a rich, reddish color and important metallurgical advantages. *Tumbaga* melted at a lower temperature than pure gold, so it was much easier to cast. It was also harder than either of its metallic components and could replicate even the most delicate details of a mold.

Gilding, another innovative metallurgical technique, was used to decorate *tumbaga* with a pure-gold surface. Goldsmiths first heated finished *tumbaga* artwork to incandescence to oxidize the alloy's surface copper, then removed the resulting black copper-oxide film with organic acids, leaving behind a bright-yellow surface of pure gold.

Native goldsmiths combined these techniques to produce an extraordinary array of masks, statuettes, jewelry, breastplates and goblets. Tragically, most of this gold work was destroyed during the Spanish conquest, which also abruptly ended the 2,000-year-old gold-working tradition. The surviving pre-Columbian gold work is the material legacy of its creators' intimate knowledge of gold—a metallurgical understanding that the modern world has never quite matched.

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



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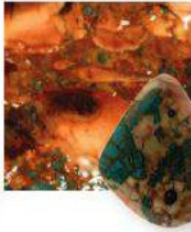
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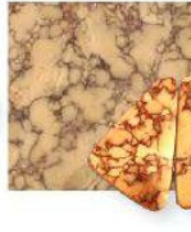
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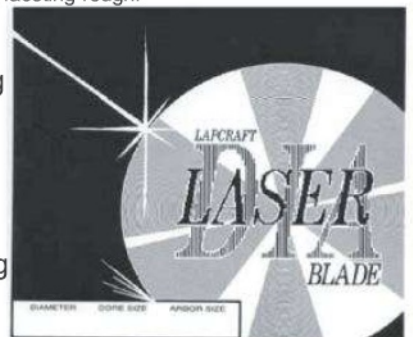
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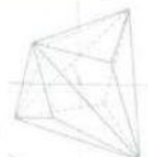
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The Perfect Setting

Recreation Centers Offer Low-Cost Silversmithing Classes

Story and Photos by Betsy Lehdorff



Beginning silversmiths make a lightning bracelet during their 10-week class and wear it as a badge of honor.

In a rundown Denver neighborhood, a dozen of us arrive at a youth center on a Sunday afternoon. Weighed down by tool boxes, we enter through the steel doors. We sign in, tuck a \$10 bill into the pocket of a

three-ring binder, and claim space on one of the many folding tables. The overhead fluorescent lights flicker. We lay out our projects and think about what we are going to accomplish in the next four precious hours.

Despite the institutional feel, the building houses a silversmithing and lapidary program run through the Hyland Hills Parks and Recreation District. That title is a mouthful, so some people call it “the Baker Community Center silversmithing program”. Regardless of its name, in its 29 years of existence, 1,000 people have learned jewelry making and stone cutting. They have experienced the thrill of seeing silver solder flow for the first time. They have shown off with pride their first sterling silver works, rock slabs, and cabochons.

They also understand just how hard it is to master the age-old skills of lapidary and silversmithing. They know that a finished setting can melt into a puddle if the torch is set too high. They’ve dropped tiny, hand-cut gemstones onto the floor, never to find them again. Maybe they have even been hollered at once or twice about a safety mistake. And, of course, they are constantly exposed to the dangers of high-speed grinding wheels and molten metal.

Experiences like these cement like-minded people together. With so much knowledge gathered in one place, if one of us has a problem with a stone or soldering task, we can always ask someone more experienced for ideas. It is a perfect setting.

Back in the studio on a Sunday, some of the participants are making one-of-a-kind gifts for their friends, gifts they probably couldn’t otherwise afford. Like Kris Johnson. A drug and alcohol abuse counselor, she recently made a sterling silver cross and a brooch as gifts for family. She also cut a cabochon out of a piece of rock and set it in a silver pendant. In an art gallery or jewelry store, the items would probably retail for at least \$100 each.

“Yeah, I’ve kind of spoiled the crap out of them,” Kris says. “Oh, well, such is life.”

Another studio participant is Carol Weir, an enamel artist. Working from home, she kiln fires dozens of layers of glassy color onto sheets of patterned silver. Then, at the Hyland Hills studio, she pays her \$10,

picks up a torch, and completes mountings for each miniature artwork. At juried crafts shows, she sells her larger pieces for up to \$650 a pop and considers it her career.

I go to the center because I love making jewelry that showcases Colorado gems and minerals. I slab and shape Colorado turquoise, rose quartz, and smoky quartz at the studio. I cast tiny animals and human figures in sterling silver and combine all these elements with moonstones, peridots and diamonds in quirky, story-telling pieces.

My passion was sparked during the 2008 recession, when I found myself unemployed. For distraction, I went rock hunting with the members of Boulder’s Flatiron Mineral Club. Soon, I wanted to turn my finds into jewels and wound up at Hyland Hills because its classes were inexpensive. A 10-week session is about \$100. Studio time is \$10 for a two- to four-hour session.

Although I now have a fairly well equipped studio at home, I go back to



Bill Whitehead, surrounded by his turquoise cabochons, has been operating the lapidary and silversmithing program for almost 30 years.



A group of enameled discs Carol Weir kiln fired at home rest on a sheet of silver while she fabricates silver settings for them in the community center studio.

Hyland Hills at least once a month to use the tools or simply to be among fellow silversmiths. A ventilated back room is full of oil- and water-cooled rock saws, grinders and polishers. In another corner is an investment and casting area, complete with scales, a burnout kiln, vacuum machine, crucibles and flasks. Five or six soldering stations have been set up on a long, steel-covered bench in the room.

The studio also is stocked with waxes, chemicals, powders, anvils, hand tools, and other items essential to this industry. Vises, anvils, a Flex-shaft, and other handy items are also available.

Then there are the intangibles: Run out of solder, and someone always has a bit to loan. Get hungry, and another person has brought a huge bag of pretzels for everyone.

The main force behind the program is Bill Whitehead, a bear of a man with long white hair. And the first thing out of his mouth is the word "safety."

"We really stress safety here," he says. "The polishing machines are the most dangerous piece of equipment here. They rotate at 3,000 rpm and they don't care if they grab your finger, your hair, or your scarf. And if you ever stop being afraid of a torch," he pauses for dramatic effect, "take up another hobby."



Johnny G., left, and Carol Weir, right, work on projects at one of the studio's six soldering stations.

These are just a few of the many homilies he repeats each time he greets a new group of students in his beginning silversmithing class.

"We try to keep it very friendly and we try to keep it very safe—physically and emotionally," Bill says. "The only way you can get kicked out of a class is to abuse your

privileges, abuse the equipment, or abuse the instructors."

Bill got his own introduction to silversmithing in the 1960s while working on a graduate degree in anthropology. A research project took him to Navajo and Hopi reservations, where in his spare time he watched local silversmiths work. Eventu-

I wound up at **Hyland Hills** because its classes were inexpensive. A **10-week session** is about **\$100**. **Studio time** is **\$10** for a two- to four-hour session.

ally, he became close enough to one family to watch their children and grandchildren grow up.

"These people gave me the gift of silversmithing," Bill says. "They taught me the metaphysical side, too, like the prayers you say before you work on silver or stones. So I felt I had an obligation to pass it along to others."

The opportunity to teach arrived when his wife, Peggy, began taking a silversmithing class in Denver with Tony Mesquida. The owner of a jeweler's supply shop, Tony held his classes in a mobile home studio and asked Bill to help.

"We had a torch. We had a saw," Bill says. "That was about it."

Soon, Tony wanted more from his volunteer. His business was taking up more and more of his time and he asked Bill to handle the budding silversmithing program.

Bill soon added another instructor, Buzz Baker, an electronics technician. Then another and another as the program grew. Eventually, classes were moved to the present studio at 6755 Irving Street in Denver. On Tuesday nights, Bill teaches beginning silversmithing and Will Nelson, a general contractor, heads the lapidary program. On Wednesdays, Buzz teaches advanced

silversmithing, and Ben Montoya, a TV repairman, teaches casting on Thursdays. In exchange for their efforts, these instructors are paid \$250 per semester or about \$10 an hour.

Despite living on a fixed income, Bill has acquired tons of used silversmithing, casting, lapidary and ventilation equipment for the studio. Through Bill's efforts and help from others, each tool has been restored and installed and is kept in running condition. Bill has also assembled a large group of volunteer teaching assistants, rewarding them with an occasional plate of chicken fried steak at a local restaurant, so the ratio of teachers to students is higher than in most professional programs.

The Denver area has two other programs associated with city recreation centers, but they are filled to capacity and it is hard to get information on them. Several private schools also offer silversmithing and casting instruction. One of the best is Clear Creek Academy, where fees range from \$375 to \$950, plus tools and supplies. Of course, you *do* get more for that kind of money. You are assigned a professional jeweler's bench equipped with a good chair, lighting, and a Flex shaft. The instructors are highly recognized in their fields, including inter-



After taking classes at the studio, Carlene Hughes began to specialize in creating sterling silver jewelry decorated with African beads.

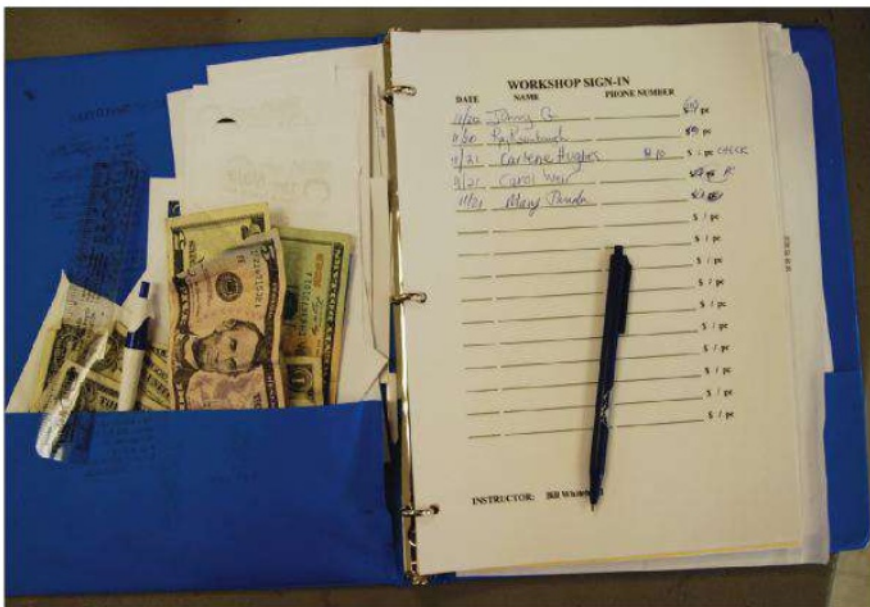
national superstars who drop by to teach creative stone setting, enameling, or other specialty workshops.

Bill defends his simple curriculum. "I want students to learn the basics," he says. "We use sandpaper, we use files. You get out of the classes what you put into it."

"The hardest thing to teach is confidence. People have come to me and say they can't do it. And I say, 'Don't quit until you complete the first three projects.' Silversmithing is totally alien to them. They're not used to working with a saw. They are not used to working with a torch, and they are not used to polishing."

At the first class of a new session, Bill and his volunteers stress safety issues and show students through the studio. The next task is to teach beginners about the importance of the bench pin, a clamp-on anvil with a forked wooden tongue that extends out like a miniature ironing board. This essential jeweler's standby allows students to cut, shape and file silver sheet with ease. The bench pin also is an important tool they will need for their first project, a sterling silver cabochon pendant trimmed with twisted wire rope.

No mistakes, please. Each step is carefully demonstrated by Bill to avoid errors and disappointment, especially since—at



When students sign in to use the Hyland Hills program's studio, they leave \$10 in the pocket of the folder.

Rec Center Silversmithing Programs

Despite an extensive online keyword search for “rec center silversmithing,” “rec center lapidary,” and other combinations, I’ve been unable to dig up much. Perhaps one reason is because some of these organizations have little staff time for online marketing. Also, I have heard from several instructors that they do not publicize classes that are full.

Don’t give up. Use your computer search engine to do local searches and fan out from there. Check art centers and museums for inexpensive classes. Even better, contact your local rock club. Members may be able to give you some direction. Here are a few programs I’ve come across:

The 92nd Street Y, New York City This long-time program offers a roster of creative classes to area residents. Beginning silversmithing classes are \$485 to \$510, depending on the instructor, not including metals and tools. (212) 415-5564; www.92y.org

Clements Community Center Classes are for participants 50 years and older. Weekdays, \$41 to \$43 per class. 1580 Yarrow St., Lakewood, CO 80214, (303) 987-4820

Green Valley Lapidary & Silversmith Club An extensive list of lapidary and jewelry making classes, inspired by its proximity to Tucson, Arizona, and the big gem show there. (520) 625-3440; www.gvrec.org/Information/12.htm

Johnson Recreation Center Lapidary Club The club is bright and clean and has a wealth of equipment. Membership is \$20; lapidary class is \$75. Faceting, intarsia and inlay instruction available. 19802 R.H. Johnson Blvd., Sun City West, AZ 85375, (623) 584-8952

Metro Arts Center Silversmithing and casting classes around \$60. 8360 Dixie Highway, Louisville, KY 40258, (502) 937-2055; www.louisvilleky.gov/metroparks/recreation/metroarts

Pima County (AZ) Natural Resources, Parks and Recreation Hilary Jones-Wujcik teaches casting and fabrication classes for \$35 to \$80 per session. E-mail LeisureClasses@pima.gov for information.

Pyle Adult Recreation Center Beginning silversmithing class is \$65 and is open to residents 50 years and older. Tempe, AZ, (480) 350-5211; www.tempe.gov/pyle

the time of this writing—sterling silver sheet costs as much as \$60 an ounce.

“We use sterling because students are going to focus more on what they are doing,” Bill says. “At the very least, I’m going to change their appreciation of silver and they end up with a fairly nice piece of jewelry.”

Another project involves cutting a piece of stone and setting it into a box ring. “It’s an introduction to what you can do in the future. It’s also an introduction to lapidary,” Bill says.

The most challenging project is the overlay lightning bracelet, a heavy hunk of sterling silver that both men and women covet. Using Bill’s Southwestern techniques, students use fine saw blades to cut zigzags lengthwise through a 7-inch strip of heavy, low-dome sterling silver.

“It is the most difficult sawing job most of my students will do,” says Bill. “It’s thick metal, [the design] has a lot of straight lines, and it has a lot of sharp corners. ... You have to remember the Hopi have a two-year apprenticeship in sawing,” Bill says. “In this class, I give you 20 minutes.”

Another tough step is to solder the two halves of the domed strip onto a backing of sheet silver while stick feeding the solder under high torch heat. Then there is the bending and high-speed polishing that must be completed.

“It has kind of evolved into the badge of completion for the class,” Bill says. “Go into any gem and jewelry show and you are going to find a dozen people wearing them.”

Carlene Hughes, 57, senior buyer for a major Denver hospital, has a lightning bracelet and remembers what it was like when she first started silversmithing in 2004 as a student in Bill’s class.

“It was a struggle. It was much more difficult than I had ever anticipated,” she says. “I was very afraid of fire. I was totally unfamiliar with any of the tools. I had never been around a torch. But I was just determined, because I knew what I wanted to do.”

Her first project was a large agate pendant, “and you know, I succeeded in putting it together,” she says. “I was quite surprised at how stunningly beautiful the piece turned out.”

Anytime a task seemed impossible to complete, Carlene would seek out an instructor and ask for help. “The instruction was very good,” she says. However, she shudders when she recalls her effort to make her lightning bracelet.

“It’s very difficult. The sawing was overwhelmingly challenging, because every three or four strokes I broke a blade. The

instructors recommended buying a dozen blades and that is how they are packaged.” She laughs. “It probably took me two or three dozen blades.”

Carlene persevered, though, and these days she creates African-inspired jewels that she sells for as much as \$1,500. She gets her clients by referral and wears her stunning pieces to work.

“I wanted to give myself the opportunity to have the pieces I always craved—that you can’t go into Tiffany’s and buy,” Carlene says.

In addition to working on her projects at the studio, Carlene comes in to help teach. “I love the beginners because they’re so busy. They just want to learn and they are in such awe of every piece they see that someone has created. The excitement—it’s contagious. I like that energy.”

Although I started at Hyland Hills as an unemployed rock hunter, the classes I took there were enough to change my situation in a tight job market. Based on my quirky silversmithing and rock cutting, I got a job at Desert Gems, a Lakewood bead and mineral business. On the side, I handle custom silversmithing repairs and occasionally sell my jewelry at shows.

The best part of my job is helping customers who are looking for a good silversmithing program. I often recommend Hyland Hills, but I never give it a ringing endorsement. No, I’m a realist. I mention the drawbacks, like the run-down neighborhood in which the studio is located. I tell potential students they will make three specific projects in the Southwestern style, whether they like it or not. I warn that the studio is run by “good old boys”. I say the place is equipped with plastic chairs, folding tables, fluorescent lights, and used equipment. I mention that silversmithing is really, really tough to learn. Time consuming. Dangerous.

If they still reply in awe, “Oh, but I’ve just always wanted to learn silversmithing,” I hand them a schedule of classes and give them my best wishes. For the right person, it is the perfect setting. May they have as much fun as I’ve had.

For additional information on Hyland Hills silversmithing and lapidary programs, call (303) 428-7488 or visit www.hylandhills.org.

Betsy Lehndorff is a sales associate at Desert Gems, Lakewood, Colorado, and the author of several articles on silversmithing. See her work at www.made-by-angels.com.

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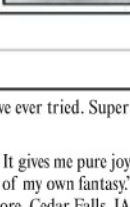
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Show Dates from page 25

MARCH 2011

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19-20—ESCONDIDO, CALIFORNIA: Show and sale; Palomar Gem & Mineral Club; Orfila Vineyards, 13455 San Pasqual Rd.; Sat. 10-5, Sun. 10-4; free admission; dealers, gems, jewelry, minerals, demonstrations; contact Michael Nelson, 1341 Rincon Villa Dr., Escondido, CA 92027, (760) 580-5902; e-mail: manelson1@cox.net; Web site: <http://palomargem.org/index.html>

19-20—GAITHERSBURG, MARYLAND: 47th annual show; Gem, Lapidary & Mineral Society of Montgomery County; Montgomery County Fairgrounds, 16 Chestnut St.; Sat. 10-6, Sun. 10-5; adults \$6, children under 12 free; 45 exhibits, demonstrations, free cabochon-polishing workshop, door prizes, raffles, fossils, kids' Touch Table with specimens, fluorescent display tent, kids' mini-mine, more than 20 dealers; contact George Durland, 8600 Bunnell Dr., Potomac, MD 20854; e-mail: GDurland1@verizon.net; Web site: www.glmsmc.com

19-20—LIVE OAK (SAN ANTONIO), TEXAS: 50th annual show, "Fiesta of Gems"; San Antonio Gem & Mineral Society; Live Oak Civic Center, 8108 Pat Booker Rd.; Sat. 10-6, Sun. 10-4; adults \$5, seniors \$3, students \$2, children 50 cents; 25 dealers; minerals, fossils, jewelry, gemstones, crystals, club exhibits, silent auction, games, hourly door prizes, silent auction; contact Robert Bowie, 1324 Kings Point Dr., Canyon Lake, TX 78133; e-mail: krbotx@gvtc.com; Web site: www.swgemandmineral.org

19-20—SEATTLE, WASHINGTON: 57th annual show; North Seattle Lapidary & Mineral Club; Lake City Community Center, 12531 28th Ave. NE; Sat. 10-5, Sun. 10-5; free admission; junior activities, demonstrations, club member displays, grab bags, Rockosaurus rides, Rockhound Dinner, dealers, door prizes; contact Susan Gardner, 15428 62nd Ave. NE, Kenmore, WA 98028, (425) 483-2295; e-mail: sgardner3@mindspring.com; Web site: www.NorthSeattleRockClub.org

19-20—VALLEJO, CALIFORNIA: Show, "Spring Bling"; Vallejo Gem & Mineral Society; Solano County Fairgrounds, 900 Fairgrounds Dr., County Bldg.; Sat. 10-5, Sun. 10-5; adults \$5, children under 14 free with adult; gems, jewelry, minerals, fossils, beads, findings, hourly door prizes, silent auction, "wheel of fortune", grab bags; contact Dan Wolke, PO Box 706, Vallejo, CA 94590, (707) 644-9764; e-mail: vgm01@yahoo.com; Web Site: www.iwired.org

19-20—WEST PALM BEACH, FLORIDA: Show; Frank Cox Productions; South Florida Fairgrounds, 9067 Southern Blvd. (Hwy. 92); 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

19-20—YORK, PENNSYLVANIA: Retail show; Intergalactic Bead & Jewelry Shows; York Expo Center, Horticultural Hall, 334 Carlisle Ave.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicas; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

20—AUSTIN, TEXAS: Show; Rings & Things; Crowne Plaza Hotel Austin; Sun. 1-5; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

22—DALLAS, TEXAS: Show; Rings & Things; Best Western Dallas Hotel and Conference Center, 8051 LBJ Fwy.; Tue. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

25-27—ADA, OKLAHOMA: Show, "A Festival of Gems, Minerals & Fossils 2011"; Ada Gem, Mineral & Fossil Club; Pontotoc County Agri-Plex, Main Bldg. #1, NE corner of state Rte. 99/U.S. 377 and the Richardson Bypass/S. Hwy. 1/3E; Fri. 9-5, Sat. 9-5, Sun. 10-4; free admission; demonstrations, displays, fluorescent rocks, minerals, fossils, lapidary, jewelry, silent auctions, raffle Sun., kids' fossil dig and petting zoo, dealers; contact Ed Vermillion, PO Box 782, Purcell, OK 73080, (405) 527-6431; e-mail: okied42@windstream.net; Web site: www.freewebs.com/agmfc/index.htm

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25-27—INDIANAPOLIS, INDIANA: 13th annual show, "Spring Indianapolis Gem, Mineral & Jewelry 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 and Indiana Bead Society displays, 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: van@toteshows.com; Web site: www.toteshows.com

25-27—LOVELAND, COLORADO: 50th annual show; Fort Collins Rockhounds; The Ranch, Larimer County Fairgrounds, Thomas M. McKee 4-H, Youth & Community Bldg.; Fri. 4-8, Sat. 9-6, Sun. 10-5; adults \$4 (\$7 weekend pass); under 18 \$1, children under 12 free with adult; pyrite, exhibits, door prizes, grab bags, silent auction, demonstrations, dealers, gems, minerals, fossils, beads, rough rocks, equipment; contact Dave Halliburton, Fort Collins Rockhounds, PO Box 482, Fort Collins, CO 80522, (970) 493-6168; e-mail: fcrockhounds@yahoo.com; Web site: www.fortcollinsrockhounds.org

25-27—MORGANTON, NORTH CAROLINA: Wholesale and retail show; Morganton Parks & Recreation Dept.; Collett Street Recreation Center, 300 Collett St.; Fri. 10-6, Sat. 10-6, Sun. 12-5; adults \$3, students \$2; exhibitors, minerals, gems, jewelry, dealers, specimens, lapidary supplies, interactive gem mining booth; contact Gary Leonhardt, 304 College St., Morganton, NC 28655, (828) 439-1866; e-mail: recreation@ci.morganton.nc.us; Web site: www.ci.morganton.nc.us

25-27—ORLANDO, FLORIDA: Annual wholesale and retail show; Central Florida Mineral & Gem Society; Central Florida Fairgrounds, 4603 W. Colonial Dr.; Fri. 1-6, Sat. 10-6, Sun. 10-5; adults \$5, students \$2, children free; beads, minerals, metaphysical stones, custom jewelry, fossils, artifacts, lapidary supplies, door prizes, silent auction, children's activities, demonstrations of cabochon cutting and faceting; contact Gordon Oakley, 5032 Lido St., Orlando, FL 32807, (407) 592-4358; e-mail: oakleysmall@gmail.com; Web site: www.cfmgss.org

25-27—SANDY (SALT LAKE CITY), UTAH: Show; Gem Faire Inc.; South Towne Exposition Center/Exhibit Hall 5, 9575 S. State St.; Fri. 10-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

25-27—SARASOTA, FLORIDA: Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Tr. (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

25-27—SAVANNAH, GEORGIA: Wholesale and retail show; AKS Gem Shows; Alee Temple, 100 Eisenberg Dr.; Fri. 10-6, Sat. 10-6, Sun. 10-4; weekend admission \$5; beading classes and demonstrations; contact Kay Schabillon, 5000 W Esplanade Ave., Metairie, LA 70006; e-mail: info@aksshows.com; Web site: www.aksshows.com

26-27—ANGELS CAMP, CALIFORNIA: Show, "Jump for the Gold"; Calaveras Gem & Mineral Society; Calaveras County Fairground, 101 Frogtown Rd.; Sat. 10-5, Sun. 10-4; adults \$4, children 12 and under free with paying adult; exhibits, demonstrations, kids' activities, silent auction, sales, raffle, door prizes, dealers, fossils, jewelry, meteorites, books, lapidary supplies, slabs, gems, beads; contact Tak Iwata, 18310 Coyote Meadow Rd., Sonora, CA 95370, (209) 928-5579; e-mail: Tak2me@msn.com; Web site: www.calaverasgemandmineral.org

26-27—CHAMBERSBURG, PENNSYLVANIA: 33rd annual show; Franklin County Rock & Mineral Club; Shalom Christian Academy, 126 Social Island Rd.; Sat. 10-5, Sun. 10-4; contact Mike Mowen, 5979 Altenwald Rd., Waynesboro, PA 17268, (717) 264-9024; e-mail: mimo@ininternet.net

26-27—HAMBURG, NEW YORK: 43rd annual show, "Pre-Historic Mammals: Elephants in Our Back Yard"; Buffalo Geological Society; The Fairgrounds, Market and Grange Bldgs., 5600 McKinley Blvd., South Park Ave. entrance; Sat. 10-6, Sun. 10-5; adults \$5; demonstrations, minerals, fossils, beads, jewelry, private collections, unique gifts, drawings; contact Don Lapham, 6802 Erica Ln., Lockport, NY 14094, (716) 879-0457; e-mail: donald_lapham@fmc.com; Web site: www.bgsny.org

continued on page 40

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BLACK SPINEL, (black diamond subst.), fine cut, 2 mm round brilliant	\$1.00 each
SILVER TOPAZ, fine cut, 3 mm round brilliant cut, \$0.75 each, 6 mm round	\$3.60 each
SKY BLUE TOPAZ, fine cut, 3 mm round	\$2.00 each
AMETHYST, dark purple, fine cut, 3 mm, round brilliant cut	\$1.25
CITRINE, Madiera, fine cut, 3.5 mm round	\$1.50 each
GARNET, fine cut, 4 mm round	6 pcs for \$7.50
RHODOLITE GARNET, fine cut, 4 mm round, \$2.50 each, 2.5 mm	round \$.80 each
HESSONITE, 3 mm, round brilliant, root beer color	\$1.75 each
MEXICAN OPAL, fine cut, orange, 4x6 mm oval	\$3.00 each
PERIDOT, Arizona, fine cut, green 3 mm round	\$1.25 each
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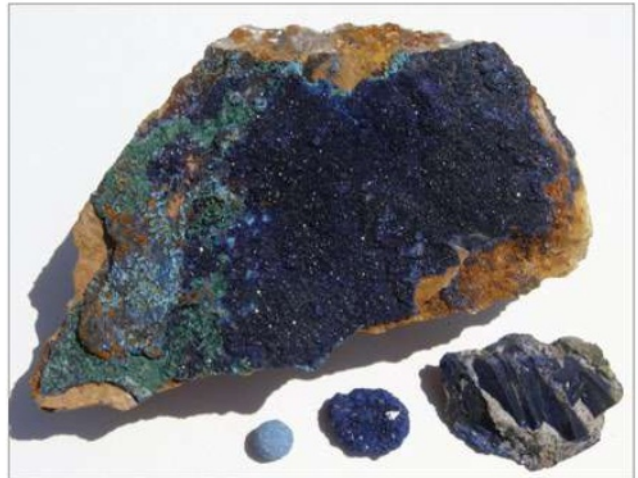
$\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$

Some minerals come in a variety of colors, so color isn't always the best way to identify them. But azurite is always blue and leaves a light-blue streak. The name is derived from *lazhuward*, the Persian word for "blue". It forms either as deep-blue tabular crystals or pale- to dark-blue masses, nodules and crusts. Its luster tends to be earthy or velvety when in massive form, but glassy in crystal form.

Azurite forms from the weathering of copper. When cool, oxygen-rich groundwater seeps into rocks and veins containing metals near the earth's surface, it creates what's called an "oxidation zone" that alters the metals. Thus, azurite is referred to as a secondary ore of copper, and it's typically found in the upper levels of copper mines. If weathering continues, azurite turns into malachite. The two minerals often occur together in such close combination that intergrown specimens of blue and green are called azur-malachite.

Because azurite is composed of up to 55 percent copper, its primary use has been as copper ore. Famous deposits have been mined in France, Namibia, Russia, Zaire, Mexico, and the American Southwest, particularly Arizona and Utah. Although it's a soft mineral (Mohs 3.5-4), azurite is sometimes cut into cabochons for jewelry. It has also been ground to produce a bright blue pigment. Renaissance artists favored it, but it had one disadvantage: if kept in a humid environment, the azurite absorbs water and turns to malachite. Over the years, an azure-blue sky in a painting slowly fades to green.

—Jim Brace-Thompson



Azurite



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We've all had fun with magnets: those little bars that stick to refrigerators and pick up paperclips. They also attract and repel other magnets; you can use one to flip and push around another without them touching. Magnets perform these fun stunts because they produce a field of force—a magnetic field—caused by the movement of electrons.

Some minerals react when placed near a magnetic field. Such minerals are referred to as "magnetic" minerals. They have one common denominator: iron. A simple test will help you identify a magnetic mineral. Pass it over a compass, and the compass needle will move.

Magnetic minerals come in two basic sorts. Most common are those that are attracted, either strongly or weakly, to a magnet. The most strongly magnetic is magnetite (iron oxide), but there's also pyrrhotite (iron sulfide), ilmenite (titanium-iron oxide), hematite (another iron oxide), and franklinite (zinc-iron oxide). Minerals like limonite (hydrated iron oxide) or siderite (iron carbonate) may become weakly magnetic if heated.

A second sort of magnetic mineral is one that is naturally magnetized. That is, it's a magnet itself, generating a magnetic field that will attract iron to it. There's just one mineral of this sort, a specific variety of magnetite called "lodestone".

Magnetism has long fascinated people. For centuries, ships carried lodestones to magnetize compass needles for navigation. Magnetism has helped prospectors distinguish iron ore look-alikes; for instance, magnetite and chromite are outwardly similar, but magnetite is much more strongly magnetic.

The word "magnet" comes from Magnesia, an area in Greece where lodestone was discovered long ago. It was called *magnitis lithos*, or "magnesian stone". According to another, more interesting legend, a Greek shepherd boy named Magnes discovered lodestone when iron nails in his shoes stuck to a rock. Sounds like a good excuse for being late to school!

—Jim Brace-Thompson



Magnetite

Lodestone

Lapidary Word Search

Find the names of these tools, materials and techniques that are used by lapidaries. Words may run forward or backward, up, down or diagonally.

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FILE
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GRIT
INVESTMENT
JEWELERS SAW
LOST WAX
POLISH
ROUGE
ROUND-NOSE PLIERS
SILVER SHEET
SOLDER
TRIM SAW
TUMBLER



The Quiz is open to U.S. residents 17 and younger. Mail your answers to **March Quiz, Rock & Gem magazine, P.O. Box 6925, Ventura, CA 93006-9899**. Five winners will be drawn from the valid entries received by **Mar. 31, 2011**. 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 U-Dig-It mini folding shovel, generously donated by Amateur Geologist (www.amateurgeologist.com; see ad on page 45.)

The Quiz

1. Azurite contains up to _____ percent copper.
2. Weathering can turn azurite into _____ .
3. Ground azurite has been used as a _____ .
4. A magnet's field of force is caused by _____ .
5. The naturally magnetized variety of magnetite is called "_____".



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- Srimshaw - Silver
- Stained Glass
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- Wire Sculpture

Show Dates from page 37

26-27—HICKSVILLE (LONG ISLAND), NEW YORK: Annual show; Island Rock Hounds; Holy Family Auditorium, intersection of Rte. 106 (Newbridge Rd.) and Fordham Ave.; Sat. 10-5, Sun. 10-5; adults \$4.50, children under 12 free with adult; dealers, gems, minerals, fossils, lapidary, beads, findings, children's games, exhibits, grab bags, door prizes, grand prizes; contact Nancy Colburn, 9 Northcoate Rd., Westbury, NY 11590; e-mail: nileda55@yahoo.com

26-27—HOLYOKE, MASSACHUSETTS: Show; Connecticut Valley Mineral Club; Holiday Inn at Ingleside, I-91 Exit 15; Sat. 10-5, Sun. 10-4; adults \$4, children 12 and under free with adult; minerals, gemstones, jewelry, crystals, beads, fossils, lapidary, demonstrations, exhibits; contact Lee Champigny, (413) 320-9741; e-mail: pullG4fun@verizon.net; Web site: www.cvmineralclub.org

26-27—NEW CASTLE, DELAWARE: Retail show; Intergalactic Bead & Jewelry Shows; Nur Shrine Temple, 198 S. DuPont Hwy.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicias; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

26-27—MONROE, WISCONSIN: 41st annual show and sale; Badger Lapidary & Geological Society; Monroe Senior High School, 1600 26th St.; Sat. 9-5, Sun. 9-5; free admission; 10 dealers, speakers, club displays, Earth Haven Museum display, fluorescent mineral tent, lapidary demonstrations, club sales, hourly door prizes, educational films, kids' fishpond, spinner game, treasure hunt, quarry chest, rock polishing, roving rock wizard; contact Teri Marche, (608)835-2653; e-mail: tmarche@education.wisc.edu

26-27—PORT ANGELES, WASHINGTON: 1st annual show; City of Port Angeles; Vern Burton Community Center, 308 E. 4th St.; Sat. 9-7, Sun. 10-5; contact Cindy Lou Kochanek, City of Port Angeles, Recreation Division, 308 E. 4th, PO Box 1150, Port Angeles, WA 98362, (360) 417-4550; e-mail: ckochane@cityofpa.us

26-27—ROSEVILLE, CALIFORNIA: 49th annual show; Roseville Rock Rollers; Roseville (Placer County) Fairgrounds, 800 All America City Blvd.; Sat. 10-5, Sun. 10-4; adults \$6, seniors (60+) \$5, kids 12 and under free; more than 35 vendors, crystals, gold, geode cracking, beads, gemstones, fossils, polished stones, handcrafted jewelry, opal, world-class mineral specimens, tourmaline, sunstones, amber, mineral identification, "Kids' Junction" demonstrations, silent auctions, more than 40 exhibits, raffle, lapidary shop open house; contact Gloria Marie, (916) 216-1114; e-mail: gloriarosevillerockrollers@gmail.com; Web site: www.rockrollers.com

26-27—SAYRE, PENNSYLVANIA: 42nd annual show; Che-Hanna Rock & Mineral Club; Athens Twp. Volunteer Fire Hall, 211 Herrick Ave.; Sat. 9-5, Sun. 10-5; adults \$3, students \$1, children under 8 free; club demonstrations and displays, dealers, fossils, minerals, gems, junior activities, miniature, geode cutting, Carnegie Museum and Paleontological Research Institute displays; contact Bob McGuire, PO Box 224, Lopez, PA 18628, (570) 928-9238; e-mail: uvbob@epix.net; Web site: www.chehannarocks.com

26-27—SWEET HOME, OREGON: 63rd annual show; Sweet Home Rock & Mineral Society; Sweet Home High School Activity Gym, 1641 Long St.; Sat. 10-6, Sun. 10-5; fossils, rocks, gems; contact Joe Cota, PO Box 2279, Lebanon, OR 97355, (541) 451-4027

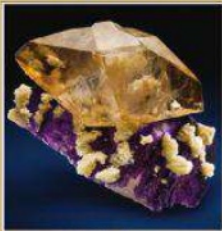
26-27—TORRANCE, CALIFORNIA: 62nd annual show and sale; South Bay Lapidary & Mineral Society; Ken Miller Recreation Center, 3341 Torrance Blvd., entrance on Madrona Ave.; Sat. 10-5, Sun. 10-4; free admission; door prizes, special guest exhibitors and demonstrators from the American Opal Society, fluorescent mineral show, Petrified Forest display, polished stones, slabs, Artisans Store featuring handmade jewelry, rough rocks; contact Craig & Kathy Polliard, 1839 Marinette St., Torrance, CA 90501, (310) 533-4931; e-mail: craigpolliard@yahoo.com; Web site: www.palosverdes.com/sblap

27—WEST DES MOINES, IOWA: Show; Rings & Things; Sheraton, 1800 50th St.; Sun. 1-5 free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: droberson@rings-things.com; Web site: www.rings-things.com/Show/index.html

28—OMAHA, NEBRASKA: Show; Rings & Things; Holiday Inn Central, 3321 S. 72nd St.; Mon. 1-5 free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands,

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1-2—COLVILLE, WASHINGTON: Annual spring show; Panorama Gem & Mineral Club; Fort Colville Grange Hall, Hwy. 20; Fri. 8:30-6, Sat. 9-5; contact Bill Allen, (509) 935-8779; e-mail: sago@theofficenet.com

1-3—EUGENE, OREGON: Show; Gem Faire Inc.; Lane County Events Center/Exhibit Hall, 796 W. 13th Ave.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

2-3—GRESHAM, OREGON: Show, "The Rock, Gem and Craft Show"; Mount Hood Rock Club; Mount Hood Community College Gym, 2600 SE Stark; Sat. 10-6, Sun. 10-5; free admission; free Easter Thunder egg Hunt Sat., Auction Sun.; contact Mary Jean Dowell, (360) 721-9095; e-mail: mjdowell@fs.fed.us

2-3—HELENA, MONTANA: 64th annual show; Helena Mineral Society; Helena Civic Center, corner of Neill Ave. and Park Ave.; Sat. 9-6, Sun. 10-5; adults \$1, children 12 and under free with adult; 25 dealers, jewelry, mineral specimens, rough and faceted gemstones, fossils, cutting rough, beads, equipment, children's activities (garnet hunt, ball toss, grab bags, silent auction), fluorescent mineral display, 20 show-cases; contact Gary Parisi, PO Box 736, Helena, MT 59624, (406) 442-1226; e-mail: gjparisi72@yahoo.com; Web site: www.helenamineralsociety.org

2-3—LEMOORE, CALIFORNIA: Show; Lemoore Gem & Mineral Club; Lemoore Trinity Hall, 470 Champion St.; Sat. 10-6, Sun. 10-6; free admission; contact Judy Pereira, (559) 924-4052

2-3—LINCOLN, NEBRASKA: 53rd annual show, "Wonders of the Earth"; Lincoln Gem & Mineral Club, Nebraska Association of Earth Sciences Clubs; Lancaster Event Center, 84th and Havelock; Sat. 9-6, Sun. 10-5; adults \$5, children 11 and under free with adult; contact James Marburger, Box 64, Hickman, NE 68372; Web site: www.lincolngemmineralclub.org

2-3—MIAMI, FLORIDA: Retail show; Intergalactic Bead & Jewelry Shows; Mahi Shriners, 1480 NW North River Dr.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicats; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

2-3—PARIS, ONTARIO, CANADA: 39th annual show; Brantford Lapidary & Mineral Society; Paris Fairgrounds, 139 Silver St.; Sat. 10-5, Sun. 10-5; adults \$5, children 12 and under free; dealers, gems, minerals, fossils, stone, lapidary equipment, supplies, fine jewelry, supplies, beads, demonstrations, exhibits, silent auction, "Mine for Gems" display; contact Robert Parry, 138 Sugar Maple Rd., St. George, ONT, N0E 1N0, (519) 448-1236; e-mail: robert@roberthalloriginals.com; Web site: www.brantfordlapidarymineral.ca

2-3—PLYMOUTH MEETING, PENNSYLVANIA: Show, "Mineral Treasures and Fossil Fair"; Philadelphia Mineralogical Society, Delaware Valley Paleontological Society; Lulu Temple, 5140 Butler Pike; Sat. 10-5, Sun. 10-4; adults \$5, children under 12 \$1, uniformed Scouts free; fossils, minerals, gems, speakers, exhibits, Fossil Dig, Kid's Corner, door prizes, Scouting merit badge information; con-

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Eighteen Mile Creek FOSSILS

Cliffside Collecting on Lake Erie in New York State

Story and Photos by Robert Beard



This Lake Erie coral fossil is nearly entirely composed of limestone. It exhibits a columnar pattern and has a distinct hexagonal pattern on its surface.

New York is a great state for fossil collecting, but as in most states in the Eastern United States, it is a challenge to find areas that have the combined features of parking, access and fossils. Collecting along road cuts is often dangerous and illegal, and quarries almost always require significant advance notice for access. It is always exciting to find a site that offers good access for both parking and collecting.



Coral fossils are most easily found in the large, blocky rocks that lie along the shoreline of Lake Erie.

Eighteen Mile Creek is a well-known fossil-collecting locality near Buffalo, New York. I have had the opportunity to visit this site during trips to the Buffalo area, and have found that it is a worthwhile trip if you are in the area. The site has adequate space for reasonably secure parking and the fossil collecting sites along the cliffs of Lake Erie can be reached by a trail.

The cliffs along the shoreline of Lake Erie at the mouth of Eighteen Mile creek consist of sediments of the Middle Devonian Hamilton Group. The Hamilton Group rocks along the base of the shoreline are mainly Wanakah shale and Tichenor limestone. Wanakah shale consists of medium gray, soft, fossiliferous shale and shaly mudstone with calcareous bands and zones of concretions. Tichenor limestone is much thinner, and is a resistant, ledge-forming unit above the Wanakah shale. Trilobites and smaller brachiopods can be found in the shale, while corals, crinoids, and larger brachiopods are abundant in the limestone.

My first trip to Eighteen Mile Creek was in July 2009. Unfortunately, Lake Erie plays a major role in weather for the Buffalo area, and my visit coincided with steady rain and the potential for large thunderstorms. Any normal person would have conceded that this was not a good day for fossil collecting, but rock collecting is often like fishing—you go when you can, especially if you are at a site that you do not often have the opportunity to visit.

Lots of information about Eighteen Mile Creek fossils is available online, but I was unable to find any that could confirm safe access and where to park. The best information I had seemed indicate that parking and a trail might be available at Old Lake Shore Road where it crossed Eighteen Mile Creek. My car GPS was quite useless when it came to such vague directions, so I purchased a Buffalo area map to find how to get to Old Lake Shore Road and identify where it crossed Eighteen Mile Creek.

I went to the site in the late afternoon, driving through heavy rain, punctuated by

very brief episodes of strong sun. A series of storms was blowing across the lake, and I hoped that I could do some collecting in between rainstorms. I exited state Route 5, and found my way to Old Lake Shore Road. I soon came down a long hill to Eighteen Mile Creek. I was extremely pleased to see a small parking area on the south side of the creek, east of Old Lake Shore Road. This was a public access area for the creek and, despite the rain, a couple cars were parked here. The rain had let up some, so I parked the car and looked for a trail to the site.

The south side of the creek had a trail that was next to the creek and it did not look like I could easily reach the cliffs of Lake Erie from this area. I thought it might be easier to find a trail on the opposite bank, which was higher and looked like it would provide better access. I crossed Eighteen Mile Creek via the bridge and looked for signs of a trail. Sure enough, there was an obscure

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.



Some of the trilobite fragments that can be found in the shale rocks have well-defined features.



Well-defined brachiopods are often found on the surfaces of weathered pieces of limestone at the site.

trail along the northern side of the creek. I started down the trail toward Lake Erie.

It had stopped raining, but the vegetation was quite thick and wet, and I was soon completely soaked. Fortunately, it was July and was still reasonably warm. I soon crossed a small drainage that led into the creek and soon found myself at the mouth of the creek looking at Lake Erie.

The trail at this point was largely gone, but one could walk along the shoreline. This area might not be accessible during times of high water, but even with the rains that day I did not have any problems with access. The shoreline paralleled a cliff of soft shale, and I immediately began to scan the rocks for signs of fossils.

At first, the shale seemed to be barren, but upon close inspection I could see small fragments and curled bodies of trilobites. Most were quite small, only about ¼ inch long, but you could still distinguish the heads and bodies. Some small brachiopods could also be found in the shale.

I continued along the shoreline, and the northern side of the creek soon opened up into a much broader shoreline. The shore here had many much larger rocks and included blocks of limestone and concrete with rebar. Some steps had been built into the shore from the cliffs above, but the constant beating from the lake had nearly destroyed them and they could not be used for access to the shoreline.

I continued to find trilobites in the shale, and I found several brachiopods and horn corals loose in the talus at the base of the cliffs. Many of the larger rocks, which had either tumbled from the upper parts of the cliffs or been placed in the area for erosion control, had several fossils as well, and these were mostly larger coral pieces.

It was tricky walking along the larger rocks and it could have been very easy to slip and twist an ankle or have a worse accident. The risk was compounded by the weather. It soon began to rain again, and I watched gigantic storms building over Lake Erie as the sun got lower in the horizon. The storms were awesome to watch, but my enjoyment was rapidly tempered by the fact that I knew they were coming at me. I did not want to get caught in an electrical storm along the cliffs of Lake Erie, as I would be fully exposed to the lightning. Once I heard thunder, I decided it was time to get out of there. Moving as quickly as I could, I was able to make it back to the trail just as the rain began again. The rains became torrential and I could see flashes of lightning, but I made it to my car fairly easily. By then, mine was the only car left in the parking lot.

Since my trip had been cut short, I really wanted to make it back, but I would not have the opportunity again until the follow-



The shoreline along the cliff is littered with blocks of rebar-embedded concrete, as well as limestone.



This fossil was in a large block of limestone and could not be removed with only a rock hammer.



Some of the darker pieces of limestone must be split with a hammer to expose the pyritized fossils.

ing year. Fortunately, my return trip was in mid-June and the weather was much more cooperative. The parking area was still accessible and, with better weather, there were many more cars. Nearly all the people at the site were there for fishing or hiking, not fossil collecting. I did not see anyone with a backpack or hammer, but lots of people with fishing rods and tackle boxes.

I returned to the Lake Erie cliffs via the same trail I had taken before. It was much easier and more enjoyable without the rain. I soon came to the shale cliffs that held the small trilobites and brachiopods. Once again, I found several small trilobites. I found that the shale could be split with a screwdriver and hammer to expose trilobites. Unfortunately, nearly all of the trilobites I found were still small.

I walked around the northern edge of the creek mouth along the shoreline of the lake. I checked some of the larger rocks along the shoreline and soon found that many of them had very large corals. The best pieces required a lot of trimming with my hammer, and I was soon able to break out some large (6 inches to about 1 foot long) pieces of coral. Much of the coral had a honeycomb appearance, but some of the coral had circular patterns when exposed on the rock surfaces, and I assumed these were horn corals.

I also looked for large slabs that contained aggregates of fossils. Rocks with surface exposures of crinoids, bryozoans and brachiopods could be found along the shoreline, and some of these would make interesting display pieces. I focused on finding large blocks that appeared to have planes of weakness for splitting and often found fossils along these planes.

One of the most interesting pieces I found was a piece of dark gray-black limestone, which I split open with my hammer. The sides parted to reveal a beautiful surface of shiny brachiopods, and parts of the shells were covered by a layer of shiny pyrite. I had heard that some of the fossils in this region were pyritized, and this specimen was a good example of pyrite that had replaced some of the original fossil material.

I also found many fossils lying on the ground in shaly areas at the base of the cliffs. Looking at the surface revealed many loose brachiopods and small horn corals; crinoid fragments were also common. It was best to scan broad areas of talus and look for pieces that caught my eye. Most of the pieces were small—no bigger than a quarter—but I could easily find several fossils just by watching the ground.

This was an area in which one could easily spend hours looking for fossils and

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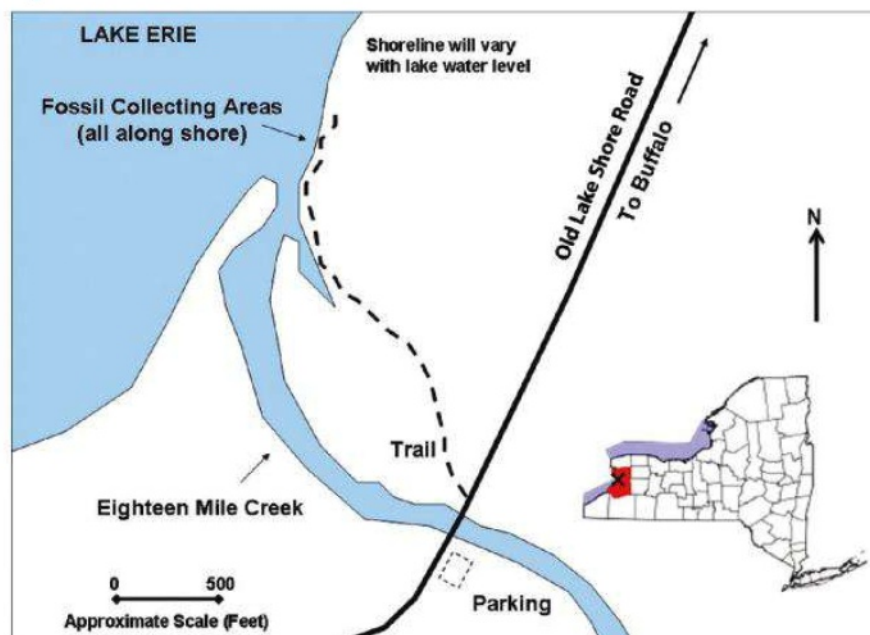
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Eighteen Mile Creek **Fossils** from page 44



interesting cutting material. Farther north along the shoreline was an extensive area of driftwood, which is good for driftwood collectors. Of course, the east side of Lake Erie gets its share of trash, and dead fish were also common along the shoreline. The amount of broken glass, sharp concrete rebar, and dead fish makes both good boots and strong gloves necessary for protection.

I could have spent much more time at this site, but storms were building on the horizon. I did not want to get caught in a bad storm again, so I soon left, but I was very pleased with the large corals and slab of pyritized fossils I had found. The trilobites were a bonus, and though I was disappointed that they were not larger, they were still a nice addition to my fossil collection.

Key coordinates collected with a handheld GPS and through photographs from Google Earth (www.google.com) are as follows. 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: 42° 42' 41.38"N, 78° 57' 59.71"W

Pyritized float fossil area: 42° 43' 05.8"N, 78° 58' 08.0"W

Best trilobite area: 42° 42' 59.6"N, 78° 58' 10.1"W

To get to the site from Buffalo, take Interstate 90 West (south) toward Erie, Pennsylvania, to Exit 57. Go west on state Route 75 and turn south onto U.S. Highway 20. After approximately 4.4 miles, make a slight right onto Lakeview Road. Go west approximately 2.25 miles until Lakeview ends at Old Lake Shore Road. Turn left (south) on Old Lake Shore Road and in about 1.2 miles you will cross Eighteen Mile Creek. The parking area is on the left (east) side of the road on the south side of the creek.

Traveling from Pennsylvania, take I-90 East (north) to Exit 58, which will direct you to the convergence of U.S. Highway 20 and state Route 5, also called Main Road. Turn right (northeast) on Main Road, then left (northwest) onto state Route 5, which merges with Erie Road. After approximately 12 miles, turn left at South Creek Road, which is just before Eighteen Mile Creek. Take South Creek Road approximately 0.25 mile and turn right (northeast) onto Old Lake Shore Road. The parking area will be on the right (east) side of Old Lake Shore Road, approximately 500 feet past the intersection.

I did not see any restrictions to collecting or signs indicating that the land along the trail is private. Unfortunately, since fossil collecting at this area is not officially sanctioned by any government agencies or landowners, there is not anyone to call to check on collecting status. In the event that you encounter posted ground or signs that indicate that fossil collecting is not allowed, be sure to respect the property of the landowner and do not collect any fossils unless you have secured permission. In addition, while you can collect loose fossils along the base of the cliffs, you should never take large rocks out of the steep cliff sides, as this can pose a hazard from falling rocks and cause additional erosion to the cliffs. The shoreline has more than enough rocks that have fallen naturally from the cliffs for fossil collecting.

This is an interesting locality with great views of Lake Erie and it is well worth a visit if you come to Buffalo. Hopefully, you will have cooperative weather. This is certainly not a place to visit in winter, and while the summer rains can be quite strong, they can also wash more fossils out of the cliffs for you to find. ☺

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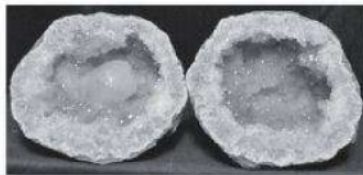
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OFF THE DOP

by Jim Perkins

Index Gears

Those who are new to faceting have likely noticed that most faceting machines now come with a 96 index gear standard. They may also have noticed that other optional index gears, from 32 to 120, are available and wondered why. At various times, the 32 and 64 index gears were the most popular, but as time, technology and techniques progressed, the 96 index gear became the standard.

An index gear is a complete circle (360°) and each tooth on the gear is spaced so that the distance from tooth to tooth is equal. There are 96 teeth on a 96 index gear. If we divide 360 by the number of teeth, we will get the distance from one tooth to another: $360 \div 96 = 3.75^\circ$. Each tooth is 3.75° from the next and this is called the "rotational angle" of the teeth. Since a round brilliant usually has 16 break facets that are spaced six teeth apart (3, 9, 15, 21, etc.), we can calculate the rotational angle from one break facet at 22.5° ($3.75^\circ \times 6 = 22.5^\circ$). We also know that the mains are spaced 12 teeth apart (0, 12, 24, 36, etc.), so we can calculate that they are 45.0° apart ($12 \times 3.75^\circ = 45.0^\circ$).

From this, we can see how a gem is made up geometrically. Faceters have found that angles with less than 5° of angle separation can be difficult to cut and polish accurately, so if a facet is split vertically or horizontally, designers try to make the angle difference at least 5° or greater. One advantage of the 96-tooth index gear is its versatility. We can divide 96 by 1, 2, 3, 4, 6, 8 or 12, which reveals the design symmetries which will work using this index gear. Therefore, many hearts, pears, square, trillions, rectangles, hexagons, octagons, ovals and rounds can be produced using this index gear. However, it wouldn't be good for round shapes with symmetry that would not divide evenly into 96. An example is my design The Robusto Brilliant (January 2011 Many Facets). The 72 index is ideal for designs like this one and, although index gears other than the 96 may seldom be used, I believe it is nice to have these other index gears in order to be able to produce designs that are uncommon in commercially cut stones. Another index gear I find useful is the 80 index, which is ideal for Texas-type stars and other designs with symmetry that divides equally into 80.

The 96, 80 and 72 index gears are the most useful index gears I own in my opin-



ion. However, I also have other index gears for special design requirements, such as the 64 and 120 index gears. For instance, it isn't possible to design an accurate replica of the Hope diamond with anything other than a 64 index. I tried and, while one can make compromises and get somewhat close, if you want the design to be precise, you must use a 64 index. There are other designs that may require a 120 index and so forth. I purchase these index gears as I have a need for them, as they aren't used that often nowadays.

Glenn and Martha Vargas taught that a faceter should use the gear with the lowest possible number of teeth to cut a pattern so that there would be less likelihood of making an indexing error. It makes sense to me, but I still use a 96 index for round brilliants rather than a 32 index.

Some faceting companies made special gears dedicated for specific shapes. These often had letters rather than numbers on the index gears that usually were the designated index for the main facets. I suppose that, at one time, there were hand-drawn patterns for these types of gears, but in GemCad, all the designs use index numbers, not letters, so I believe these dedicated gears are now obsolete.

Periodically, I remove my index gear, clean any accumulated dirt and grime out of the teeth with a toothbrush and clean the area on which the gear mounts, and then re-install and align it. Other than that, index gears go relatively unnoticed. 💎

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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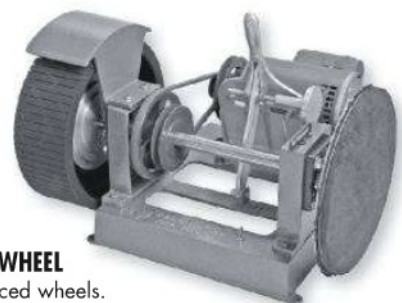
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ARAÇUAÍ

Pegmatite Minerals

Mining in the Heart of Brazil's Gemstone Country

Story and Photos by Bob Farrar

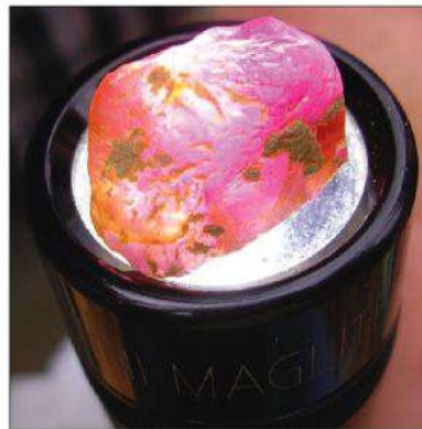


The mining area at the Pirineus mine consists of a series of open pits dug into the side of a hill. This is a primary pegmatite deposit with little weathering.

To a rockhound, Brazil, particularly the state of Minas Gerais, means a vast wealth of minerals and gemstones. And within Minas Gerais, one of the greatest concentrations of gem-bearing pegmatites is located in the district surrounding the town of Araçuaí. Literally millions of carats of tourmaline, beryl, and other gemstones have been mined in this area. In 2009, I had the opportunity to visit Araçuaí and see for myself how some of those gemstones are mined.



The main objective of operations at the Pirineus mine is tourmaline, variety indicolite. This gem-quality crystal had been found not long before I visited the mine.



This gemmy piece of rubellite was found during our visit to Ponte do Piauí.

I have been traveling to Minas Gerais and other parts of Brazil for over 20 years through the efforts of tour leader Sara Mount of Silver Spring, Maryland. I have had the privilege of visiting some of the world's great gem and mineral localities. In all those years, I have never had a bad experience, nor has anyone who has traveled with me. Yet, I have read a recent report in a respectable publication that Minas Gerais is no longer worth visiting, that they are not finding anything new, that prices are too high, and that the place is dangerous. I would beg to disagree on all these points.

While there may not be as much material coming out as at times in the past, there is still a lot of material being found. On my most recent trip in August 2009, I saw museum-quality pieces that had recently been mined. And though prices may be higher in Brazil than they were years ago, prices are higher everywhere. I was still able to acquire material in Brazil for a fraction of what it would have cost me in the U.S. Furthermore, a lot of what I was able to see there I probably would never have seen in the U.S. And Minas Gerais is safe for visitors. While there is some street crime in Rio de Janeiro, we have never had a problem in Minas Gerais, and I feel safer carrying cash there than I do many places in the U.S. In short, I believe that Minas Gerais is still worth visiting, and I intend to keep doing so.

Araçuaí (pronounced ah-rah-swah-EE) is a small town located about 230 miles north-northeast of Belo Horizonte, the capital of the state of Minas Gerais. The pegmatite area of eastern Brazil extends for hundreds of miles. The Araçuaí pegmatite area runs roughly from Virgem da Lapa, about 20 miles west of Araçuaí, to Itinga, about 25 miles to the northeast, to Salinas, some 40 miles north. Araçuaí is accessible via a good paved road that connects up with highway BR 116 about 40 miles to the east. BR 116 is the main road between Belo Horizonte and Rio de Janeiro to the south and Salvador, a major



Miners at Ponte do Piauí dig small-diameter holes 6 to 10 feet deep to reach the gem-bearing gravel.

city on the coast. We came to Araçuaí the "hard" way, though; we came from Diamantina, to the west, which required us to negotiate about 25 miles of dirt road. (For more on Diamantina, see the March 2009 issue of *Rock & Gem*.) Araçuaí has very comfortable accommodations and a couple of very good restaurants. There's no need to rough it here.

One only has to look at a map of the area to get an idea of the importance of gemstones in the neighborhood of Araçuaí. Place names such as Rubelita, Berilo and Turmalina hint at what has been found. To those knowledgeable in gems and minerals, the nearby towns of Coronel Murta, Virgem da Lapa, and Barra de Salinas evoke visions of mineral wealth. A review all the specific mines and prospects would be beyond the scope of this article.

The dominant geographic feature of the Araçuaí area is the valley of the Jequitin-

honha River and its tributaries. Undulating hills extend into the distance and numerous rounded granite domes, known as exfoliation domes, sugarloafs or inselbergs, are visible in the area. The dominant vegetation of this area is not the vast, steamy jungle that some envision when they think of Brazil; this area is too dry to support rain forests. Rather, the vegetation, known as caatinga, is dominated by grasses, low brush, small trees, and big cacti. Most of the trees are deciduous, losing their leaves during the dry season, which is the southern winter. Some small-scale farming and ranching contributes to the local economy, along with mining.

The country rock of the Araçuaí area consists largely of mica schists and gneisses of Precambrian age. During the Ordovician period, these formations acted to cap the upward movement of granitic magmas, preventing them from erupting as volca-

noes. However, the upward pressure of the magmas fractured the overlying rocks and pegmatitic magmas were injected into the cracks. These magmas cooled to form the pegmatites in which so many of the gemstones and other minerals mined today crystallized. Larger masses of magma became the exfoliation domes that are so prominent today. Gem-bearing pegmatites are commonly found near exfoliation domes and are theorized by some to have been formed from volatiles flowing outward from the domes. At the time they were intruded, these igneous formations were still buried under some 6,000 to 9,000 feet of overlying rock. Eons of erosion have now exposed them.

Many of the pegmatites of the Araçuaí area are termed "complex" pegmatites and are characterized by zonation of minerals, systems of pockets, or vugs, and secondary alteration and formation of minerals. In a granitic pegmatite, by far the greatest proportion of the rock consists of quartz, feldspar and mica. As these materials crystallized out, the more volatile materials, such as water, fluorine and chlorine, and rarer elements, such as lithium, boron, phosphorus, niobium, tantalum, uranium and beryllium, became more and more concentrated. The volatiles tend to lower the viscosity of the solutions, increase diffusion rates, and reduce nucleation, which leads to the formation of fewer but larger crystals.

In the late stages of the pegmatite's formation, hot volatiles can become concentrated in cavities, where crystals can grow unimpeded by surrounding materials. In many cases, this leads to the formation of cleanly terminated, gem-quality crystals. They are known to us asmiarolitic cavities, but in Brazil they are called *caldeirões* ("caldrons"). It is in these cavities that the finest crystals are found.

Pegmatite deposits mined today can be classified as primary or secondary. "Primary" deposits are those still enclosed in the original metamorphic host rock. These formations are found in varying stages of



Miners at the Pirineus mine dig into the solid rock with hammers and chisels.



The women at the Pirineus mine had found these bits of tourmaline on the dumps.



Women also work at the Pirineus mine, but are relegated to picking through the dumps.

weathering. "Secondary" deposits are those that have been weathered out from primary deposits. Secondary deposits are further divided depending on movement of the material. In "eluvial" deposits, the material is found in soil, weathered out of the host rock, but not having been moved by water. If the material has been moved downslope, but not all the way to a river or stream, the deposit is called "coluvial". Finally, "alluvial" deposits are those in which material has been deposited in streambeds. Both primary and secondary

deposits are mined near Araçuaí.

A vast array of interesting minerals has been found in the pegmatites of the Araçuaí area. Perhaps the most important is elbaite, which is the most important gemstone mineral of the tourmaline family. Beryls, including aquamarine and morganite, are also important. Many spectacular specimens of topaz, most notably of a natural blue color, have been found. Quartz, including clear, smoky, and crystallized rose quartz, is significant. A number of phosphate minerals, such as apatite-(CaF) and hydroxyl-herderite are found.

Many of the pegmatites in the area from Araçuaí to Itinga are particularly rich in lithium, which has resulted in the formation of mineable quantities of such lithium minerals as lepidolite, spodumene, amblygonite and petalite. Lithium is less abundant, but still present in localities west and northwest of Araçuaí, in the areas of Virgem da Lapa and Salinas.

Considering their importance in Araçuaí, a further word about tourmalines is warranted. As most readers of *Rock & Gem* will know, "tourmaline" is not one mineral, but a group of related boro-silicate minerals, with some 14 member species. The most important member of the group, from a gemological perspective, is elbaite, which is a boro-silicate of sodium, aluminum and lithium. Nearly all the tourmaline gemstones on the market are elbaite. As a lithium-bearing mineral, elbaite is common in the lithium-rich pegmatites of Araçuaí. Elbaite

is found in a wide range of colors, upon which their varietal names are based: rubellite (red), verdelite (green), indicolite (blue to blue-green), etc. Red is caused by traces of manganese, while blues and greens are caused by iron. (An exception is the neon-blue "Paraíba" tourmaline from northeastern Brazil, which is an elbaite colored by copper.) Besides elbaite, the only other tourmaline mineral common in Araçuaí is schorl, which is black; it is of minor importance as a mineral specimen.

In the Araçuaí region, the mining of tourmaline and other gemstones is carried out by a variety of methods. At some localities, primary deposits are mined in underground operations using hardrock techniques. At other sites, open pits have been dug. In some cases, secondary deposits are being worked. The degree of weathering of the particular site dictates what methods can be used. When we visited Araçuaí, we were able to visit both a primary and a secondary deposit and to see how they are being worked.

Our local guide for the day was Brazilian gemstone dealer Fernando Onofri. Fernando is a major gem dealer in Teófilo Otoni, Minas Gerais, about 70 miles southeast of Araçuaí, and exhibits in Tucson. Sara has known him for years and has built up an excellent working relationship with him. Fernando owns a *fazenda* (ranch) near the village of Taquaral, a few miles northeast of Araçuaí. He arranged for us to visit two mining areas nearby.

The first area we visited is known as Ponte do Piauí, which translates to "Bridge over the Piauí River", a tributary of the Jequitinhonha River. (This locality is not to be confused with the state of Piauí, in northeastern Brazil, where opal is mined.) Here, *garimpeiros*, or independent prospectors, were working an alluvial deposit for pink tourmaline, or rubellite. This is mining at its simplest. Each man was working his own little hole, perhaps 4 or 5 feet across and 6 to 10 feet deep. They were seeking a layer of *cascalho*, or gravel. When they found it, they would carefully pick through it, looking for tourmaline. No washing or screening is involved. The dirt apparently does not stick to the tourmaline to such an extent that an experienced eye cannot pick it out. At the time we were there, there were six or seven *garimpeiros* working an area of perhaps a few acres out in



Interesting quartz crystals can also be found at the Pirineus mine.



The rubellite crystal that was found while we were at Ponte do Piauí yielded this 4.55-carat gem.

the woods. There was also a manager who handles sales of material for the group for a 20 percent commission.

While we were watching, a *garimpeiro* named Gilson pulled out a nice chunk of rubellite. I placed it on a small flashlight that I had, and its color and clarity were immediately visible. A member of our group bought it on the spot. While we were in Brazil, he had it cut by Fernando's cutter. It yielded a beautiful 4.55-carat gem.

After leaving Ponte do Piauí, we made our way to the nearby Pirineus mine. Unlike Ponte do Piauí, this mine is in a primary pegmatite deposit. The deposits are still in place where they formed, and there has been limited weathering. The Pirineus mine was worked decades ago and was

deserted for a long time, but recently there has been renewed activity. The main objective at the Pirineus mine is again tourmaline, but of the variety indicolite rather than rubellite.

A short hike up a hill brought us to the mining area. Here, some 20 *garimpeiros* had dug a series of pits. The owner of the land forbids the use of mining machinery, so all the work was being done by hand. Miners were laboriously digging into solid rock with hammers and chisels. Some men had recently done some blasting, but we were told that they were inexperienced miners; the more experienced *garimpeiros* know that blasting can damage the gems and so they try to avoid it. Here there is also a manager who handles sales of the finds.

While we were at the mine, we were shown a beautiful piece of indicolite that had recently been found. A flashlight behind it showed its excellent color and clarity. The price was a bit steep, though, so nobody bought this one. We were also shown a nice smoky quartz crystal, about 6 inches high, that had been found.

The hard-core miners were all men, but there were a couple of women there, as well. However, they were relegated to picking through the dumps looking for bits of tourmaline that had been missed. Sara brightened their day with some samples of fragrances that she was carrying.

Soon it was time to head back into town to visit some of the local mineral dealers. However, we could not say goodbye to Fernando without a stop at his *fazenda* for a nip of *cachaça*, the local sugar cane liquor. We would see him a few days later in Teófilo Otoni, where Lance would pick up his rubellite.

Araçuaí has long been a major center for gem and mineral mining in Brazil. It may be true that the quantity of material coming out these days does not quite match the flood that has been produced in the past. However, with the huge number of gem-bearing pegmatites in the area, even a reduced rate of flow is still quite impressive. A number of mineral dealers maintain businesses in and around Araçuaí, and the quantity and quality of their offerings attest to this. It is thus with confidence that I can say that I believe that this heart of Brazil's gemstone country will continue to beat for years to come. ♦



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2-3—SILOAM SPRINGS, ARKANSAS: Spring show; Northwest Arkansas Gem & Mineral Society; Community Bldg., Mt. Olive Rd.; Sat. 9-5, Sun. 10-4; adults \$3, students \$1, children free; contact Charlotte Leininger, (479) 721-3882; e-mail: TheSwankyStone@aol.com; Web site: www.nwrockhounds.org

3—BOISE, IDAHO: Show; Rings & Things; Best Western Vista Inn at the Airport, 2645 Airport Way; Sun. 11-3; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: dorbertson@rings-things.com; Web site: www.rings-things.com>Show/index.html

7-9—WYOMING, MICHIGAN: Show, "Unburied Ancient Treasures"; Indian Mounds Rock & Mineral Club; Rogers Plaza Town Center, 972 28th St., 0.25 mile west of US 131; Thu. 9:30-9, Fri. 9:30-9, Sat. 9:30-8; free admission; Science Museum of Minnesota display, museum-quality exhibits, mineral and fossil identification, club sales, children's collectibles, demonstrations, dealers, micromounts, crystals, stone beads, carvings, meteorites, jewelry, specimens; contact Don Van Dyke, 4296 Oakview, Hudsonville, MI 49426, (616) 669-6932; e-mail: donvandyke@tm.net; Web site: <http://indianmoundsrockclub.com/index.htm>

8-10—ABBOTSFORD, BRITISH COLUMBIA, CANADA: Show, "Shades of Jade"; B.C. Lapidary Society; Ag-Rec Bldg., CFV Fairgrounds, 32470 Haida Dr.; Fri. 10-8, Sat. 10-6, Sun. 10-5; adults \$6, students \$2, children under 6 or Boy Scouts and Girl Guides with ID free with adult; displays and demonstrations by jade sculptor Deborah Wilson; contact Jennifer Moore, (604) 328-9766; e-mail: Jenmac02@telus.net

8-10—EUREKA, CALIFORNIA: 10th annual wholesale and retail show, "Lost Coast Jewelry, Gem, Bead and Mineral Show"; Kasey Enterprises; Redwood Acres Fairgrounds, 3750 Harris St.; Fri. 12-7, Sat. 10-7, Sun. 10-5; adults \$3, seniors and students \$150 (free on Fri.), children 12 and under free with adult; minerals, gemstones, crystals, beads, pearls, gold nuggets, fine jewelry, gold and quartz, fossils, tools, door prizes; contact Diana, Kasey Enterprises, PO Box 2927, McKinleyville, CA 95519-2927, (707) 839-1358; e-mail: kaseyent@sbcglobal.net

8-10—OGDEN, UTAH: Show; Golden Spike Gem & Mineral Society; Golden Spike Event Center, Weber County Fairgrounds, 1000 N. 1200 W.; Fri. 9-6, Sat. 10-6, Sun. 10-6; adults \$2, children free; Mr. Bones, demonstrators, dealers; Cindy Blanchard, (801) 648-5060; e-mail: cindy@creativemetals.com; Web site: <http://goldenspikegem.org>

8-10—SPOKANE, WASHINGTON: 52nd annual show; Rock Rollers Club; Spokane County Fair & Expo Center, North 604 Havana at Broadway; Fri. 10-6, Sat. 10-6, Sun. 10-5; adults \$6, seniors \$5, children 12 and under free; more than 40 dealers, 60 display cases, fossils, gemstones, mineral specimens, handcrafted jewelry, lapidary supplies and demonstrations, hourly door prizes, youth activities, grand prize; contact Gerry Pfeiffer, (509) 294-1927; e-mail: pfeiffer@webband.com

8-10—TACOMA, WASHINGTON: Show; Gem Faire Inc.; Tacoma Dome/Exhibition Hall, 2727 E. "D" St.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

8-10—ST. PETERSBURG, FLORIDA: Show; Frank Cox Productions; The Coliseum, 535 4th Ave. N.; 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

8-10—VISTA, CALIFORNIA: Annual show; San Diego County Council; Antique Gas and Steam Engine Museum, 2040 N. Santa Fe Ave.; free admission; Fri. 9-5, Sat. 9-5, Sun. 9-4; more than 40 dealers, gems, minerals, slabs, jewelry, raffle; contact Ray Pearce, (760) 726-7570

9—SEATTLE, WASHINGTON: Show; Rings & Things; Seattle Center Pavilion, 305 Harrison St.; Sat. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: dorbertson@rings-things.com; Web site: www.rings-things.com>Show/index.html

9-10—ABILENE, TEXAS: Show and sale; Central Texas Gem & Mineral Society; Abilene Civic Center, 1100 N. 6th; Sat. 10-6, Sun. 10-5; adults \$3, children \$1.50; geode cracking, fossils, minerals, gems, jewelry, lapidary demonstrations, findings, beads, tools, supplies, rough; contact Betty Scarborough, 422 CR 606, Tuscola, TX 79562, (325) 668-2374; e-mail: waltswife1029@yahoo.com; Web site: www.txol.net/rockclub

9-10—BELLINGHAM, WASHINGTON: 50th anniversary show, "A Golden Family Affair"; Mt. Baker Rock & Gem Club; Bloedel Donovan Park, 2214 Electric Ave.; Sat. 10-6, Sun. 10-5; free admission; raffle, exhibits, rocks, fossils, gems, jewelry, dealers, door prizes, silent auction, lapidary, gold panning, black light, gem cutting, demonstrations, kids' activities; contact Wes Gannaway, (360) 384-4209; e-mail: debnwes@comcast.net

9-10—CANTON, ILLINOIS: 51st annual show; Fulton County Rockhousers; Wallace Park; Sat. 10-5, Sun. 10-5; free admission; contact Steven Holley, (309) 231-8861; e-mail: ifossil@hotmail.com; or Deb Coursey, (309) 368-8451; e-mail: courseyfarm@gmail.com

9-10—DES PLAINES, ILLINOIS: 46th annual show; Des Plaines Valley Geological Society; Des Plaines Park District Leisure Center, 2222 Birch St.; Sat. 9:30-5, Sun. 10-4; adults \$3, seniors \$2, students \$1, children under 12 free; dealers, gems, jewelry, fossils, minerals, Kids' Room, demonstrations, exhibits, door prizes, raffles, silent auction; contact Frank Lavin, 9942 Montrose Ave., Schiller Park, IL 60176, (815) 298-9178; e-mail: nival42@hotmail.com; Web site: www.desplainesgeologyclub.org

9-10—DOTHAN, ALABAMA: 4th annual show; Dothan Gem & Mineral Club; Westgate Park, James Grant Recreation Center gym, 501 Recreation Rd.; Sat. 9-5, Sun. 10-4; free admission; door prizes, silent auction, mineral display, flintknapping demonstration; contact Arnie Lambert, (334) 792-7116; e-mail: arlambert@comcast.net

9-10—DOVER, NEW HAMPSHIRE: 5th annual show; Southeastern New Hampshire Mineral Club; Veterans Community Center, 156 Back River Rd.; Sat. 9-4, Sun. 10-3; adults \$3, seniors \$2, children 12 and under free; silent auction, dealers, kids' corner, fluorescent mineral room, finished jewelry, gemstones; contact Earl Packard, 20 Anita St., Rochester, NH 03867, (603) 332-3988; e-mail: esmineral@myfairpoint.com; Web site: <http://senhmineralclub.org/>

9-10—JOHNSON CITY, NEW YORK: 42nd annual show; New York Southern Tier Geology Club; Johnson City Senior Center, 30 Brocton Ave.; Sat. 9-5, Sun. 10-4; adults \$3, children under 12 free; dealers, minerals, fossils, beads, jewelry, exhibits, door prizes, ultraviolet display; contact Al Conklin, 187 Forest Hill Rd., Apalachin, NY 13732, (607) 625-4140; e-mail: allanconklin@aol.com

9-10—KINGMAN, ARIZONA: Show and sale; Mohave County Gemstoners; Kingman Academy of Learning, 3420 N Burbank; Sat. 9-5, Sun. 9-4; free admission; rough rock, slabs, cabs, jewelry, wire wrapping, silver and gold smithing, lapidary and jewelry fabrication equipment and supplies, demonstrations, raffles, prizes, children's activities, educational information, displays, crafts, fossils, minerals, silent auction, door prizes, cash raffle prizes; contact Mary Gann, PO Box 3992, Kingman, AZ 86402; e-mail: quadpol@aol.com; Web site: www.gemstoners.org

9-10—MARION, ILLINOIS: Show; Southern Illinois Earth Science Club; Williamson County Pavilion, 1602 Sioux Dr.; Sat. 10-6, Sun. 10-5; adults \$2, ages 18 and under free; gems, minerals, fossils, lapidary, shells, silent auctions, door prizes, fluorescent demonstrations; contact Mike Chontofalsky, 1019 E. Broadway, Centralia, IL 62801, (618) 532-0455; e-mail: chontofalsky@att.net

9-10—MARIPOSA, CALIFORNIA: 11th annual show, "Mountains of Minerals"; California State Mining & Mineral Museum; Mariposa County Fairgrounds, Hwy. 49, 2 mi. south of Mariposa; Sat. 10-6, Sun. 10-4; free admission; vendors, mineral specimens, jewelry, lapidary, mineral exhibits, demonstrations, children's activities, speakers, raffles, silent auctions; contact Randy J. Bolt, (209) 742-7625; e-mail: rockmuseum@stii.net

9-10—PARADISE, CALIFORNIA: Show and sale, "Paradise of Gems"; Paradise Gem & Mineral Club; Elk

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Lodge 6309 Clark Rd.; Sat. 10-5, Sun. 10-4; adults \$2, seniors \$1, under 16 free; contact Manuel Garcia, 5659 Foster Rd., Paradise, CA 95969, (530) 877-7324; e-mail: mmpg@earthlink.net; Web site: www.Paradisegem.org

9-10—RICHMOND, VIRGINIA: Retail show; Intergalactic Bead & Jewelry Shows; Richmond Raceway Complex, Colonial Bldg., 600 E. Laburnum Ave.; Sat. 10-5, Sun. 10-5; Saturday \$5, Sunday \$4, children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicacies; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

9-10—ROSEVILLE, MINNESOTA: Show; Anoka County Gem & Mineral Club; Har Mar Mall, 2100 Snelling Ave.; Sat. 10-6, Sun. 12-5; free admission; gems, minerals, jewelry, fossils, agates, collectibles; contact Martha Miss, 8445 Grange Blvd., Cottage Grove, MN 55016; e-mail: rockbiz@cs.com

9-10—WAUKESHA, WISCONSIN: 49th annual show; Kettle Moraine Geological Society; Waukesha County Expo Center, 1000 Northview Rd.; Sat. 10-5, Sun. 10-4; adults \$2.50, children 50 cents; demonstrations, displays, sales; contact Richard Rosenberger, (262) 691-3130; e-mail: rosenber.w@sbcglobal.net

10—MOUNT VERNON, WASHINGTON: Show; Rings & Things; Best Western Cotton Tree Inn, 2300 Market St.; Sun. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

15-17—ALPINE, TEXAS: Show, "Alpine Agate Festival"; Chihuahuan Desert Gem & Mineral Club; Alpine Civic Center, Hwy. 90W and 13th St. N.; Fri. 9-6, Sat. 9-6, Sun. 11-5; free admission; South Central Federation convention, grand prize, door prizes, silent auctions, field trips, kids' corner, demo dealers; contact Mary Brogan, PO Box 1111, Alpine, TX 79831, (432) 386-2340; e-mail: marybrogan@rocketmail.com; Web site: www.cdgmcc.org

15-17—RICKREALL, OREGON: 56th annual show; Willamette Agate Mineral Society; Polk County Fairgrounds, 520 S. Pacific Hwy. W.; Fri. 9-6, Sat. 10-6, Sun. 10-4:30; contact Kristi Edwards, (541) 738-6811; e-mail: edwardskk@gmail.com

15-17—SAN DIEGO, CALIFORNIA: Gem Faire—Scottish Rite Event Center, 1895 Camino del Rio S. Gem Faire hours: Fri. 12pm-6pm, Sat. 10am-6pm, Sun. 10am-5pm. Admission \$7 weekend pass; contact Yoyo Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

15-17—SARASOTA, FLORIDA: Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Tr. (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

15-17—WICHITA, KANSAS: Show and sale, "World of Wonders"; Cessna Activity Center, 2744 George Washington Blvd.; adults \$5, ages 12-17 \$1, children under 12 free with adult; gemstone jewelry, gems, crystals, beads, agates, polished stones, fossils, rocks, minerals, children's programs; contact Gene Maggard, (316) 742-3746; e-mail: gandpmaggard@wildblue.net

16—BELLEVUE, WASHINGTON: Show; Rings & Things; Bellevue Community College, 3000 Landerholm Circle SE; Sat. 11-3; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

16—WOODBURY, MINNESOTA: Show; St. Croix Valley Rock Hounds; Valley Creek Mall, 175 Weir Dr.; Sat. 9-3; free admission; educational show, no vendors, rock and mineral identification; contact Bill Cordua, (715) 425-3139; e-mail: william.s.cordua@uwr.edu

16-17—BENTON HARBOR, MICHIGAN: Show and sale; Blossomland Gem & Mineral Society; Orchards Mall, 1800 Pipestone Rd.; Sat. 10-7, Sun. 11-4; free admission; special presentations on gem faceting and gold panning in Michigan; contact Nancy Wolff, 2816 Thayer Dr., St. Joseph, MI 49085, (269) 983-4900; nancyswolff@hotmail.com

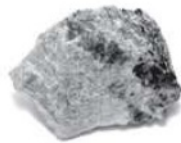
16-17—COLUMBUS, OHIO: Show, "Many Facets of Quartz"; Columbus Rock & Mineral Society, Licking County Rock & Mineral Society; Veterans Memorial, 300 W. Broad

SIZE: Random sizes ranging from about 1/2-inch to 1x1-1/4-inch, unless otherwise noted below. Starred (*) items are chips, fibers, sands, etc., packaged in plastic bags. The fossils and crystals range from about 1/4-inch to 1/2-inch.
LABELS: Each specimen is packaged in a resealable plastic bag with a label that includes the name of the material, the locality, composition, and major associated minerals. Rock labels include the classification (sedimentary, metamorphic or igneous) rather than the composition.

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GROUP NO. 1—MINERALS OF ECONOMIC INTEREST 60 Specimens

Bauxite	*Bentonite	Rhodochrosite	Enargite	Chalocite	Cuprite
Chromite	Diatomite	Feilkechite	Cinnabar	Tripoli	Azurite
Fluorite	Galena	Oolitic Hematite	Corundum	Lepidolite	Bornite
Hematite	Quartz	Gypsum (Satin Spar)	Celestine	Sphalerite	Calcite
Limonite	Sulfur	Wollastonite	Andalusite	Polyhalite	*Kernite
Stibnite	Baryte	Goethite	Pyrolusite	Collophane	Alunite
*Columbite	Pyrite	Hausmannite	Covellite	Chalmanite	Braunite
Magnetite	Halite	Tetrahedrite	Willemite	Garnierite	Talc
Magnesite	Vanadinite	Arsenopyrite	Spodumene	Kyanite	Emerald
Scheelite	Chalcopyrite	Skutterudite	1/4" Rutile	Brucite	Beryl



GROUP NO. 2—GEMS & MINERALS (not for cutting: study specimens) 60 Specimens

Wavellite	Rose Quartz	Hydrozincite	Orbicular Felsite	Siderite	Jasper
Alabaster	Wunderstone	Smoky Quartz	Indian Moss Agate	Selenite	Citrine
Andradite	Romanechite	Blue Calcite	Flowering Obsidian	Sunstone	Ulexite
*Turquoise	Apophyllite	Pyrophyllite	Pisolithic Limestone	Jarosite	Emerald
Grossular	Silbiconite	Manganaxinite	Mizzonite-Scapolite	Melanite	Opal
Honey Onyx	Chrysocolla	*Sapphire Sand	Limonite-Pseudomorph	Amethyst	Chalk
1/4" Peridot	Spessartine	Petrified Wood	Baryte—"Rose" Form	1/4" Moonstone	Variscite
Vesuvianite	Dumortierite	Dyurmagnessite	1/4" Amber	Piemontite	*Fancy" Jasper
Desloizite	Aventurine	Carrara "Marble"	Rhodonite	Agate	Lawsonite
Forsterite	Franklinite	Ganiobasis Agate	Nephrite	Prase	Purpurite



GROUP NO. 3—ROCKS & ROCK-FORMING MINERALS 60 Specimens

Black Obsidian	*Adobe	Omphacite	Basalt	Rhyolite	Albite
Nepheline Syenite	Chert	Sandstone	Gabbro	Sodalite	Biotite
Black Tourmaline	Anhydrite	Limestone	Marble	Glaucocite	Epidote
Hornblende Schist	Anorthite	Almandine	Augite	Oligoclase	Diorite
Radiolarian Chert	Nepheline	Greenstone	Gneiss	Microcline	Granite
Barkevikite Syenite	Greywacke	Serpentinite	Pumice	Travertine	Okenite
Hornblende	Enstatite	Hypersthene	Fiint	Mica Schist	Tuff
Actinolite	Muscovite	Hedenbergite	Andesite	Anthracite	Tufa
Quartzite	*Kaolinite	Cummingtonite	Dolomite	Phlogopite	Shale
Glaucophane	Geysirite	Jasper Breccia	Diopside	Novaculite	Slate

GROUP NO. 4—ROCKS, MINERALS, CRYSTALS & FOSSILS (Crystal abbreviated as xl) 60 Specimens

Sandstone	Trachyte	Zircon - xl portion	Hanksite - xl portion	Barite - nodule portion	*Hexahydrate (Epsomite)	Gryphaea (Felicypod)	Danburite - xl portion	Microsporifer (Brachiopod)	Glabrocingulum (Gastropod)	Rhynchonella (Brachiopod)	Fossilized Dinosaur Bone	*Brazilianite - xl fragments	Scoria	Bryozoa	Olivinite	*Dune Sand	Heulandite	Shark Tooth	Hemimorphite	Crinoid Stem	Conglomerate	Star Crinoid	Oil Sandstone	Pirssonite - xl	Arsenic	Caliche	Diabase	Coquina	*Sylvite	Chlorite	Phyllite	Liparite	Peperino	Stilbite	Natrolite	Oil Shale	Gilsonite	Concretion	*Coquimbite	Chalcedony	Topaz - xl	Garnet - xl	Chondrodite	Stipnomelane	Ostrea (Pelecypod)	Fossilized Coral	Gedrite	Ruby Corundum - xl	Rock Crystal Quartz	Hustedia (Brachiopod)	Orthoclase - xl portion	Tourmaline - xl portion	Blue Barite - xl portion	Admetopsis (Gastropod)	Calcite (Satin Spar type)	Clinozoisite - xl portion	Obsidian - "Apache tear"	*Isemanite with jordanite	1/4" Aeschynite - (Y)	Sulphohalite - xl portion
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- 100 Specimens, your choice \$99.00
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Show Dates from page 57

St.; Sat. 10-6, Sun. 11-5; adults \$7 (2-day pass \$12), ages 6-16 \$3, under 6, Scouts in uniform, and 4-H free; 27 retail dealers, demonstrations, educational and display exhibits, ID booth, demonstrations, swap area, silent auction, speakers, children's games, free specimens for children, gold panning; contact Ken Harsh, (614) 433-9778 e-mail: karmakenha@aol.com

16-17—EAU CLAIRE, WISCONSIN: 48th annual show; Chippewa Valley Gem & Mineral Society; Eau Claire County Expo Center, Lorch Ave., corner of Hwy. 93 and 194; Sat. 9-5, Sun. 10-4; free admission; silent auction, minerals, fossils, crystals, gems, rocks, artifacts, jewelry, demonstrations, hands-on booth for kids; contact Mike Schoenfeess, (715) 456-0664

16-17—IDAHO FALLS, IDAHO: 46th annual show; Idaho Falls Gem & Mineral Society; Idaho Falls Recreation Center, Memorial St. and B St.; Sat. 10-6, Sun. 10-5; adults \$2, children under 12 free; contact Kevin Landon, (208) 357-3847; e-mail: sklandon@bridgemail.com

16-17—KENNEWICK, WASHINGTON: Annual show; Lakeside Gem & Mineral Club; Benton County Fairgrounds, 1500 S. Oak; Sat. 10-5, Sun. 10-4; adults \$5, children 14 and under free; door prizes, exhibits, dealers, fluorescent display, Kids' Korner, silent auction, geode cracker, demonstrations, gold panning, cabbing, faceting, intarsia, sphere making, wire wrapping; contact Dom Cataldo, PO Box 6652, Kennewick, WA 99336; e-mail: dac@bioguardtech.com

16-17—LOUISVILLE, KENTUCKY: Retail show; Intergalactic Bead & Jewelry Shows; Louisville Executive Hotel & Suites, Grande Belle Hall, 9700 Bluegrass Pkwy.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicas; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

16-17—NEWBURY PARK, CALIFORNIA: Show; 37th annual show, "Pageant of a Thousand Gems"; Conejo Gem & Mineral Club; Borchard Park Community Center, 190 Reino Rd., corner of Reino Rd. and Borchard Rd.; Sat. 10-5, Sun. 10-5; free admission; club member exhibits and sales, gems, jewelry, rocks, minerals, fossils, youth activities, lapidary and jewelry-making demonstrations; silent auction, door prizes; contact Richard or Mary Pat Weber, 4290 Misty Meadow St., Moorpark, CA 93021, (805)529-2524; e-mail: rewnews@sbcglobal.net; Web site: www.wcgm.com

16-17—PORTLAND, MAINE: Show and sale; Maine Mineralogical & Geological Society; University of Southern Maine, Sullivan Gymnasium, 96 Falmouth St.; Sat. 10-5, Sun. 10-4; adults \$4, seniors and students \$3, children under 12 free; gold panning, gem cutting, microscope table, silent auctions, kids' mini-mine and spin table, door prizes, grand prize; contact Chad Cramer, (207) 324-8610; e-mail: rocks0102@myfairpoint.net; Web site: mainemineralclub.org

16-17—WACO, TEXAS: Annual show; Waco Gem & Mineral Club; Texas State Technical College, Industrial Tech. Bldg., Crest Dr., off I-35, north of Waco; Sat. 10-6, Sun. 11-5; adults \$5 (both days); contact Karen Wood, 2315 Colcord, Waco, TX 76707, (254) 755-7274; e-mail: kwood@hot.r.r.com; Web site: www.wacogemandmineral.org

16-17—WALNUT CREEK, CALIFORNIA: Show, "Contra Costa Crystal Fair"; Pacific Crystal Guild; Civic Park Community Center, 1375 Civic Dr.; Sat. 10-6, Sun. 10-4; adults \$6, ages 12 and under free; 30 dealers, minerals, gems, crystals, beads, metaphysical healing tools; contact Jerry Tomlinson, PO Box 1371, Sausalito, CA 94966, (415) 383-7837; e-mail: jerry@crystalfair.com; Web site: www.crystalfair.com

16-17—YAKIMA, WASHINGTON: 50th annual show, "Parade of Gems"; Yakima Rock & Mineral Club; Yakima National Guard Armory, 2501 Airport Ln.; Sat. 10-6, Sun. 10-4; adults \$3, kids 12 and under free with adult, military free with uniform and military ID; dealers, demonstrations, gold panning, silent auction, junior activities, grab bag, door prizes, raffle, spin-a-wheel; contact Marli Sondgeroth, 55 W. Washington Ave. #89, Yakima, WA 98903, (509) 248-6401 or (509) 910-3484; e-mail: marthms@q.com

17—WATERLOO, IOWA: Show, "Geodes: Iowa's Rolling Stones"; Black Hawk Gem & Mineral Society; Waterloo Center For The Arts, 225 Commercial St.; Sun. 12-5; free admission; demonstrations, silversmithing, rock tumbling, sphere making, faceting, cab making, silent auction, special displays, dealers, crystals, agates, geodes, fossils, handcrafted jewelry, minerals, fossil plaster casting, pebble pit, fish pond; contact Dave Malm, (319) 266-6433; e-mail: davidmalm@cfu.net

22-24—DECATUR, ILLINOIS: 59th annual show; Central Illinois Gem & Mineral Club; Macon County Fairgrounds, 3700 Westlawn Ave.; Fri. 11-6, Sat. 9-6, Sun. 10-4; adults \$5, seniors (59+) \$2, children under 15 and Scouts or Armed Forces in uniform free; school groups and home schoolers admitted free Sat. 9-3; exhibitors, dealers, demonstrators, Running Water Sluice, door prizes, exhibits, silent auctions; contact Tony Kapt, (217) 233-1164; e-mail: cigmc@comcast.net; or Larry Albro, (217) 520-3394

22-24—DENVER, COLORADO: 2011 spring wholesale/retail show, "Colorado Mineral & Fossil Show"; Martin Zinn Expositions; Holiday Inn - Denver Central, 4849 Bannock St.; Fri. 10-6, Sat. 10-6, Sun. 10-5; free admission; 80 wholesale and retail dealers, minerals, fossils, jewelry; contact Martin Zinn Expositions, PO Box 665, Bernalillo, NM 87004-0665; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

22-24—GRANTS PASS, OREGON: Show; Rogue Gem & Geology Club; Josephine County Fairgrounds, 1451 Fairgrounds Rd.; Fri. 9-5, Sat. 9-5, Sun. 9-4; adults \$1, children free; dealers, silent auction, door prizes, displays, demonstrations, kids' games; contact Mary Blankeship, PO Box 1224, Grants Pass, OR 97528, (541) 862-2989; e-mail: rockhoundclub@yahoo.com; Web site: www.roguegemandgeology.com

23-24—CUYAHOGA FALLS, OHIO: Show and sale, "Gemboree: A Celebration of Spring"; Akron Mineral Society, Summit Lapidary Club; Emidio & Sons Expo Center, 48 E. Bath Rd.; Sat. 10-6, Sun. 10-6; adults \$5, seniors and students \$4, children \$1; vendors, door prizes, silent auction, lapidary demonstrations, Gem Mine, make-and-take crafts for children, Easter Egg display; contact Evelyn Tryon, 2028 Tallmadge Rd., Kent, OH 44240, (330) 673-9664; e-mail: gemboree76@yahoo.com; Web site: www.lapidaryclubofohio.org

23-24—ELMA, WASHINGTON: Show, "Earth's Treasures"; Grays Harbor Gem & Geology Society; Grays Harbor County Fairgrounds, 32 Elma/McCleary Rd.; Sat. 10-5, Sun. 10-4; contact Gary Emberly, 624 Fairmont Place, Aberdeen, WA 98520, (360) 533-6196; e-mail: Melissa624@hotmail.com

23-24—JACKSON, MISSISSIPPI: Show and sale, "Greater Southern Event"; Mobile Rock & Mineral Society, Mississippi Gulf Coast Gem & Mineral Society, Nature's Society of Majestic Arts; Trademart Bldg., Mississippi Fairgrounds; Sat. 9-6, Sun. 10-5; dealers, gemstones, minerals, fossils, beads, crystals, rare coins, rough and cut stones, finished jewelry, tools, lapidary supplies, stone carvings, loose precious stones, pearls, gem and gold mining, knapping, faceting, opals, jewelry repairs, demonstrators; contact Sharon McClanhan or Stan Bennett, (601) 898-0407; e-mail: stan@tompkinsdesigngrp.com

23-24—MEMPHIS, TENNESSEE: 32nd show; Memphis Archaeological & Geological Society; Memphis International Agricenter, 7777 Walnut Grove Rd.; Sat. 9-6, Sun. 10-5; adults \$5, children 12 and under \$2, Scouts free; dealers, exhibits, kids' area, speakers; contact W.C. McDaniel, (901) 274-7706; e-mail: info@theearthwideopen.com; Web site: www.TheEarthWideOpen.com

23-24—TROY, OHIO: Show; Brunker Center Gem & Mineral Club; Miami County Fairgrounds, North End Activity Bldg., County Road 25-A; Sat. 10-6, Sun. 10-4; adults \$1, children free; dealers, specimens, gems, jewelry, demonstrations, displays, silent auction, door prizes, free rock for children, mineral identification, children's activities; contact Gene Davis, (937) 667-4160

APRIL-MAY 2011

29-1—IRVINE, KENTUCKY: 4th annual show; City of Irvine, Mountain Mushroom Festival Committee, Blue Grass Gem & Mineral Club; Estill County School's Central Office, 253 Main St.; Fri. 9-3, Sat. 9-7, Sun. 10-5; free admission; Kentucky agate display, fossil and mineral sales, Kentucky agate field trips (register online), 21st Annual Mountain Mushroom Festival; contact Jane Volk, 3133 Dale Hollow Dr., Lexington, KY 40515, (859) 263-9879; e-mail: Jane.volk@insightbb.com; Web site: <http://mountainmushroomfestival.org/>

29-1—SANTA ROSA, CALIFORNIA: Show; Gem Faire Inc.; Sonoma County Fairgrounds/Grace Pavilion, 1350 Bennett Valley Rd.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

30-1—ANAHEIM, CALIFORNIA: Show; Searchers Gem & Mineral Society; Brookhurst Community Center, 2271 W. Crescent Ave.; Sat. 10-5, Sun. 10-4:30; free admission; special exhibit, gold panning, jewelry making for kids, silent



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30-1—CHARLESTON, SOUTH CAROLINA: 20th annual show; Lowcountry Gem & Mineral Society; North Charleston Convention Center Complex Exhibit Hall A, 5001 Coliseum Dr.; Sat. 10-5, Sun. 10-5; free admission; contact Karen Havenstein, 518 Woodland Shores Dr., Charleston, SC 29412, (843) 795-2956; e-mail: fossils@comcast.net

30-1—FRANKLIN, NEW JERSEY: 39th annual show and swap; New Jersey Earth Science Assn., Franklin-Ogdensburg Mineralogical Society, Sterling Hill Mining Museum; Franklin School, 50 Washington Ave.; Sat. 9-5:30, Sun. 10-5; adults \$5, children under 14 free with adult; contact Sterling Hill Mining Museum, (973) 209-7212

30-1—HAMPTON ROADS, VIRGINIA: Retail show; Intergalactic Bead & Jewelry Shows; Howard Johnson, 1815 W. Mercury Blvd.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicacies; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

30-1—LUBBOCK, TEXAS: 53rd annual gem and mineral show; Lubbock Gem & Mineral Society; Lubbock Memorial Civic Center, 1501 Mac Davis Ln.; Sat. 10-6, Sun. 10-5; adults (13+) \$4, seniors (65+) \$3, ages 6-12 \$2, under 6 free with adult; wire-wrapped stones, precious stones, jewelry, minerals, fossils, rough rock, dealers, demonstrators, exhibits, hourly door prizes, silent auction, grand prizes; contact Archie Scott, 2709 Belvedere Rd., Levelland, TX 79336, (806) 894-1584; e-mail: archie.scott73@yahoo.com

30-1—MARSHFIELD, WISCONSIN: 38th annual show; Heart of Wisconsin Gem & Mineral Society; Marshfield High School Fieldhouse, 1401 Becker Rd.; Sat. 10-5, Sun. 10-4; free admission; displays, dealers, demonstrations, kids' activities, silent auctions; contact Cynthia Kelman, 1403 N. Broadway Ave., Marshfield, WI 54449, (715) 387-8782; e-mail: kelman@tzn.net; Web site: www.fromtherockroom.com

30-1—MEDFORD, OREGON: 56th annual show, "Diamonds Are Forever"; Roxy Ann Gem & Mineral Society; Medford Armory, 1701 S. Pacific Hwy.; Sat. 9-5:30, Sun. 10-4:30; exhibits, dealers, demonstrations, gold panning, silent auction, children's activities, door prizes; contact Janet Fields, 378 Dexter Way, Grants Pass, OR 97527, (541) 476-8937, or Sandy Roney, 1431 Elaine Way, Medford, OR 97501, (541) 734-0838; e-mail: msronney@prodial.us

30-1—SEATTLE, WASHINGTON: Show; West Seattle Rock Club; Alki Masonic Temple, 4736 40th Ave. SW; Sat. 10-5, Sun. 10-5; contact Audrey Vogelpohl, (206) 932-3292; e-mail: avogelpohl@comcast.net; Web site: www.westseattlerockclub.org

MAY 2011

1—BLOOMINGTON, MINNESOTA: Show; Rings & Things; Hilton Minneapolis/St. Paul Airport, 3800 American Blvd E.; Sun. 2-7; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

3—GREEN BAY, WISCONSIN: Show; Rings & Things; Samico Banquet Center, 2310 Lineville Rd.; Tue. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

4—MILWAUKEE, WISCONSIN: Show; Rings & Things; Clarion Hotel Airport, 5311 S. Howell Ave.; Wed. 1-5; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

5—SCHILLER PARK, ILLINOIS: Show; Rings & Things; Comfort Suites O'Hare Airport; Wed. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail:

drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

6-8—BISHOP, CALIFORNIA: 10th annual show, "Eastern Sierra Gem & Mineral Show"; Lone Pine Gem & Mineral Society; Tri-County Fairgrounds, Robinson Bldg., Sierra St. and Fair Dr.; Fri. 6-9, Sat. 9:30-5, Sun. 10-3; free admission; field trips, lapidary demonstrations, lampwork beads, flint knapping, sphere making, displays, world's largest fulgurite, local minerals and fossils, spinning wheel, geodes, vendors, door prizes, children's activities; contact Franee Graham, PO Box 667, Lone Pine, CA 93545, (760) 876-4319; e-mail: franceem@qunet.com

6-8—COSTA MESA, CALIFORNIA: Show; Gem Faire Inc.; OC Fair & Event Center/Bldg. 10, 88 Fair Dr.; Fri. 12-6, Sat. 10-6, Sun. 10-5; \$7 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

6-8—MARIETTA, GEORGIA: 43rd annual retail show; Georgia Mineral Society; Cobb County Civic Center, 548 Marietta Pkwy.; Fri. 10-6, Sat. 10-6, Sun. 12-5; free admission; more than 30 dealers, door prize for students, auction Sat., demonstrations; contact Tom Batcha, PO Box 15011, Atlanta, GA 30333-5011; e-mail: mayshow@gaminerol.org; Web site: www.gaminerol.org

6-8—McPHERSON, KANSAS: 19th annual sale and swap; McPherson Gem & Mineral Club; McPherson 4-H Bldg., 710 W. Woodside; Fri. 9-7, Sat. 9-6, Sun. 10:30-3; free admission; buy or swap, rocks, gems, minerals, fossils, jewelry, door prizes, displays, collections, free rock identification, fluorescent mineral exhibit, kid's spin-and-win; contact Jim Nutter, 1611 Jody Ln., McPherson, KS 67460, (620) 241-2433; e-mail: mcphersongemmineral@hotmail.com

7—LANSING, MICHIGAN: Show; Rings & Things; Ramada Lansing Hotel & Conference Center, 7501 W. Saginaw Hwy.; Wed. 12-4; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; contact Dave Robertson, PO Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com/Show/index.html

7-8—AITKIN, MINNESOTA: Show and sale, "Cuyuna Agate & Mineral Show"; Cuyuna Rock Club; Aitkin High School, 306 2nd St. NW, three blocks west of stoplight at Hwy. 169 and Hwy. 210; Sat. 9-5, Sun. 10-4; free admission; agates, minerals, jewelry, specimens, mineral art, fossils, fluorescents, lapidary equipment, indoor and outdoor vendors, Ask-the-Wizard-of-Rocks, special Kids' Korner with free prizes, displays, demonstrations, Wheel-of-Rock-Fortune, door prizes; contact Kat Thomas, 45962 Tame Fish Lake Rd., Aitkin, MN 56431, (218) 678-3298; e-mail: katmoose@wildblue.net; Web site: www.cuyunarockclub.org

7-8—BOZEMAN, MONTANA: Show; Bozeman Gem & Mineral Club; Gallatin County Fairgrounds, 901 N. Black; Sat. 10-6, Sun. 10-4; contact Sally Griffin, (406) 451-4362; e-mail: griffin830@yahoo.com; or Dan Carter, (406) 586-4552

7-8—CINCINNATI, OHIO: 46th annual show and sale, "Geofair 2011"; Cincinnati Mineral Society, Cincinnati Dry Dredgers; Cincinnati Gardens, 2250 E. Seymour Ave.; gems, minerals, fossils, jewelry; contact Terry Hulzing, 5341 Thrasher Dr., Cincinnati, OH 45247; (513) 574-7142; e-mail: tehulzing@fuse.net; Web site: www.geofair.com

7-8—WASHINGTON, PENNSYLVANIA: Show, "Greater Pittsburgh Area Jewelry, Gem, Mineral, Bead & Gift Show; FM Minerals; Washington County Fairgrounds, 2151 N. Main St.; Sat. 10-6, Sun. 10-5; adults \$4, children 12 and under free with an adult; invited dealers, beads, minerals, fossils, metaphysical items, jewelry, gemstones, hand-made jewelry, wire wrapping; contact FM Minerals, PO Box 252, Farmington, WV 26571, (304) 825-6845; e-mail: frankoz@juno.com

13-15—ANDERSON, CALIFORNIA: Show, "Northern California Treasures CFMS Show & Convention"; Superior California Gem & Mineral Society; Shasta District Fairgrounds, 1890 Briggs St.; Fri. 9-5, Sat. 9-5, Sun. 10-4; adults \$4, seniors \$3, students \$2, children under 12 free; displays, world-class speakers, auction, demonstrations, raffle, dealers, minerals, fossils, jewelry, gems, beads, supplies, gifts; contact Steve Puderbaugh, 19652 N. Hirsch Court, Anderson, CA 96007, (530) 604-2951; e-mail: steve@applyaline.com; Web site: http://superiorcal.com

13-15—JOPLIN, MISSOURI: 5th annual Outdoor Rock Swap; Tri-State Gem & Mineral Society; Schifferdecker Park, 7th and Schifferdecker Ave.; Fri. 8-6, Sat. 8-6, Sun. 9-4; free admission; contact Joplin Museum Complex, 504 Schifferdecker Ave., Joplin, MO 64801, (417) 623-1180; e-mail: jmc-cwiseman@sbcglobal.net

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MAMMOTH Rock Shows

How a Dealer Kept this Club Show Alive

Story and Photos by Lori Carter

For many years, the Georgia Mineral Society (GMS) held two gem and mineral shows per year. The oldest show began in 1967 and is held every Mother's Day weekend in Marietta, Georgia. The second show began in 1993 and was held the second weekend of December in Norcross, Georgia. Dedicated club members worked diligently to make both events premier shows of the Southeast. But after 12 successful years of managing the December show, it was becoming increasingly difficult for club members to do both shows justice, so the club board decided it was time to reduce the burden to just one show per year.



Janice and Richard are highly respected in the rockhound community and in the rock dealer community.

Which show to cut? The board agonized over its decision. Both shows were very successful and very well known. Both shows required about the same level of effort from club members. It was a tough decision, but eventually the board decided to keep the older Mother's Day show and find someone to take on the responsibility of the December show.

Richard Hightower was 8 years old when stooped down in a cornfield to pick up a curious rock. The tiny object was a turitella fossil, and it sparked a lifetime of interest in fossils. The more he learned, the more intrigued he became. As an adult, he had his first exposure to a rock club. He went on field trips and attended rock shows. Family vacations began to be organized around collecting opportunities. The collecting trips took his family as far away as Russia.

Richard's passion for fossils finally became a full-time business. With his wife, Janice, he started a company called Stones & Bones. It specializes in fine fossils and is well known for the quality and integrity of its specimens. Richard is the "go-to guy" when you have a fossil to identify. He

doesn't just buy and sell fossils, he personally collects and prepares fossils from all over the world, which makes him exceptionally qualified to verify the authenticity of specimens.

Richard and Janice are highly respected in the rockhound community, as well as the rock dealer community. The Stones & Bones booth is always a big draw at the GMS's gem and mineral shows. The couple was concerned that the December show could disappear completely and were interested in sponsoring it as they knew the GMS was considering a change. With over 20 years of experience in club shows and trade shows, they were confident they had the experience and knowledge necessary to maintain the high quality of the show.

Most people involved in the hobby are acutely aware that many clubs are aging, with fewer young people becoming involved. Richard and Janice have seen this firsthand as they participated in clubs shows all over the U.S. Shows are essential for attracting new members to clubs and for providing venues for dealers.

Many dealers and professional show organizers were also interested in taking over the December show, so the board had to examine each offer carefully. Richard and Janice were concerned about a private promoter controlling the show because many privately run shows either disappear over time or do not promote club membership as much as club shows do. They were convinced that promoting club membership was important for dealers as well as clubs, and they made their offer to take responsibility for the show with that as their goal.

After a great deal of deliberation, the GMS board of directors chose Stones & Bones. They knew that Richard and Janice would be the right people to continue the legacy begun by the club. One of

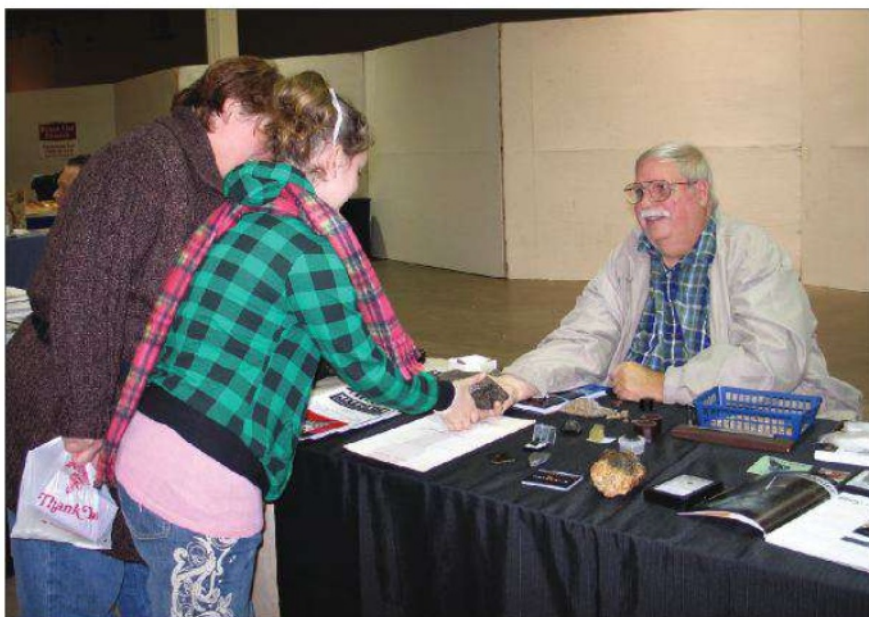


When it comes to fossil identification, Richard Hightower is the “go-to guy” for many people.

the primary goals of the show that GMS members wanted to preserve was educating the public about rocks, mineral, fossils, and earth science. The board was confident that Richard and Janice would do this and that they would be able to maintain the high standards established by the GMS.

As a dealer, Richard had been watching how shows were organized. He made note of what worked and what did not work. He talked to people and studied all the aspects of running a good show. Drawing from his extensive knowledge as a dealer and from what he learned through observation, he formulated a plan for taking on the massive effort of running the December show. Since he couldn't retain the GMS name for the show, he decided to form a company befitting its nature: Mammoth Rock Shows.

It would be a mammoth task indeed. Richard says “determination to succeed” was their motto for the first year. He was determined to prove to the club members and the dealers that he and Janice were capable of running such an important show.



Richard and Janice Hightower encourage club involvement in their shows by setting aside an area for club tables and displays and allowing all club members free admission to the show.

He understood how hard dealers work at shows, from procuring and preparing their specimens to setting and up and taking down their displays. To run a good show, you must have happy and successful dealers, and as promoter of the show, Richard did everything in his power to ensure success for both dealers and clubs.

One of the first considerations was how many changes to make. As a widely known and established show, it had to be what attendees expected. Also, they didn't want to change a successful formula too much. The Hightowers kept most of the dealer list from prior years, only adding a few dealers. They kept dealer locations within the show

consistent with past shows so visitors could find their favorite dealers. They kept the North Atlanta Trade Center as the venue and they kept the show date, the second weekend in December.

Richard knew he would not be able to make a profit the first year and that it might be several years before they made a reasonable profit, but he and Janice were committed to keeping the December show as vibrant as the industrious GMS members had. They decided that every penny the dealers paid was to be used for show expenses and advertising. Only the proceeds from the entrance fees would be theirs.



Premium door prizes like colorful serpentine-jade vases, polished ammonites, and innovative gift certificates help Richard and Janice Hightower attract visitors to their show.

A few years earlier, Richard had seen a club show in Jackson, Mississippi, increase its attendance from about 1,300 people to an astounding 5,000 people in just two years! Visitors to the show were standing six people deep just to see his booth. He asked the show organizers what they did to achieve the amazing boost in attendance. The main thing, they said, was to increase their advertising budget, then leverage that budget to reach as many people as possible through several "mass market" venues. Therefore, for Mammoth Rock Shows' first show, Richard started with the best advertising budget he could afford and sought as much publicity as possible.

A few weeks before the first show in 2007, a prehistoric cave bear skeleton flashed its massive teeth at drivers from a huge billboard over a busy freeway in Atlanta. Though this was very expensive, it was a good investment because more than 250,000 cars would pass the billboard every day.

For subsequent shows, Richard added aggressive and memorable radio ads that were run during the morning and evening commute times when there to a captive audience—some of them under that cave bear billboard! He also invested in some television ads.

Richard had learned that not all advertising has to be expensive. He placed inexpensive newspaper ads in as many local papers as he could find. He got free or inexpensive listings in the "things to do" sections of newspapers, magazines, and on Web sites. He sent postcards and fliers to as many people as possible. He had volunteers distribute postcards and fliers at work, in coffee shops, and anywhere else they were allowed. Every club in the Southeast was notified of the transition in leadership from the GMS to Mammoth Rock Shows, and Richard advertised the show in club newsletters. To continue the legacy of education, he reached out to the Boy Scouts, Girl Scouts, schools, and home school networks.

He created a new Web site dedicated to the promotion of Mammoth Rock Shows. The site lists participating dealers' contact information, which not only helps advertise the dealers for the show, but also gives the dealers a way to reach potential customers. It also has a list of clubs in Georgia and around the country. The dramatic increase in traffic on the Web site during the last 30 days before the show was proof that the advertising was working.



Bill and Lois Patillo's Rock Food Table, a collection of rocks and fossils that resemble various kinds of food, helps advance the educational goals that the GMS hoped Mammoth Rock Shows would preserve.

Premium door prizes like colorful serpentine-jade vases, polished ammonites, and innovative gift certificates helped attract visitors. At many club shows, participating dealers donate the door prizes. People always like to win prizes, but not always the prizes available. Richard and Janice got creative with their door prizes by offering \$20 gift certificates from their own show budget instead of asking dealers to donate. A visitor who won a gift certificate could redeem it with the dealer of her choice on the prize of her choice. This was a huge hit with the dealers and the door prize winners.

Show attendees could also take pictures in front of the magnificent fossil cave bear skeleton featured on the billboard. This was simple and inexpensive, but a lot of fun for visitors.

Another attraction that delighted young and old was the amazing "Rock Food Table", a unique collection of rocks, minerals and fossils that look like food! Exhibitors Bill and Lois Patillo were stationed right by the entrance of the show. Since they are also quite keen on education, their gracious explanations of each specimen on the Rock Food Table was a perfect way to help advance the educational goals that the GMS hoped Mammoth Rock Shows would preserve.

Mammoth Rock Shows also continues to cultivate the show's relationship with local clubs. Richard and Janice encourage

club involvement and all club members receive free admission. An area of the show is always set aside for club tables and displays. Stones & Bones even gives clubs gem and mineral sample cards to hand out to new members who sign up at the show.

Based on his experience with this show and observing others, Richard has some critical advice to offer anyone who is trying to run a rock show. "You want a good show, which means you want good dealers and a large crowd. This will generate door ticket sales for your revenue, bring in new members to the club, and allow the vendors to make money. Getting the large crowds in and getting them to return yearly takes some work on your part."

The following are Richard's "golden rules" for the survival of a show:

1. Keep the same date and location each year. Dealer booth locations should be consistent each year. This helps the visitors who can only vaguely remember the approximate time of the show each year and the approximate location of their favorite dealer.

2. Advertise, advertise, advertise. Be creative and aggressive.

3. Show the dealers you appreciate them being there. Many dealers are willing to do your show, but the success of your show depends on getting and holding the good dealers. Once you have them, tell and show



Richard Hightower, with his wife, Janice, turned his passion for fossils into a full-time business called Stones & Bones. He collects and prepares specimens from all over the world.

them that their participation is appreciated. Good shows get the good dealers and good dealers make good shows. Be sure to keep a good mix of dealers to avoid being labeled as a "jewelry show", "bead show", etc. Have a good of variety of products to appeal to a variety of visitors.

4. Remember that the dealers are there to make money. If people do not come and sales are not good, you will not only lose these dealers, but they will pass the word to other potential dealers and the quality of dealers you can get for your show will decline.

5. Don't rest on your laurels. One show promoter once told me that his club show was close to 30 years old and he did not need to do any advertising, as everybody knew about the show and when it was. This was a very flawed and potentially fatal concept! Number one on the advertising "to do" list is mailing post card notices to your previous shows' visitors. Offer a nice door prize to get visitors to provide their names and mailing addresses, and presto! you have a mailing list of people who will probably come to the next year's show if they are aware of it. Offer them a \$1 discount for bringing the card to the show.

6. Tell your dealers how you have used their show fees to get the crowds in. Dealers will forgive you for a poor show as long as they feel that you tried hard to get the people in. Most dealers will give a show two years to

become profitable for them. If they are not making a profit and it appears that you are not trying very hard, you will lose them. The replacement dealers will probably not be as good as the ones you lose and the quality of your show will decline.

7. Do not hesitate to ask your dealers for opinions and ideas for improving the show. They have a vested interest in the success of the show and years of experience seeing successes and failures. If your club is considering the future of its show, talk to your members, the dealers, and even private promoters to see who is willing to step forward with the ideas, the will, and the drive to keep it going.

The first year of the new sponsorship, 2007, went reasonably well. Many lessons were learned, and the next year, a few adjustments were made. In 2009, attendance increased 33 percent from the previous year. Now poised for future years of the show, Richard and Janice continue to work hard to make the show better. They have stirred the mix of dealers so a good cross section of the hobby is represented. They try to keep the show fresh and interesting by changing the mix every year, while at the same time retaining the things people expect and the things that made the show so successful for the GMS. It is an immensely difficult job—a mammoth job, even—but when you see Richard and Janice working the show, you can tell it is a labor of love. ♡

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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 call this shape my "barrel" design, since this is what its profile brings to mind. It is an "OMNI" design, which means that the initial pavilion tier uses index settings that will produce the meetpoints to follow for cutting the proper girdle outline.

I find OMNI designs preferable to those that use other types of pre-forms, since I don't have to waste time cutting facets that are later cut away. One thing to point out is that the interval between index settings used on PI is *not* regular or symmetrical, as with like many OMNI designs, so be careful to double check each index setting before you cut.

The inner ring of crown facets will line up to produce a "checkerboard" top, although on the piece of citrine I show I guessed wrong on my pavilion and ran out of rough on the crown. Therefore, I needed to make my table larger than was called for in the design.

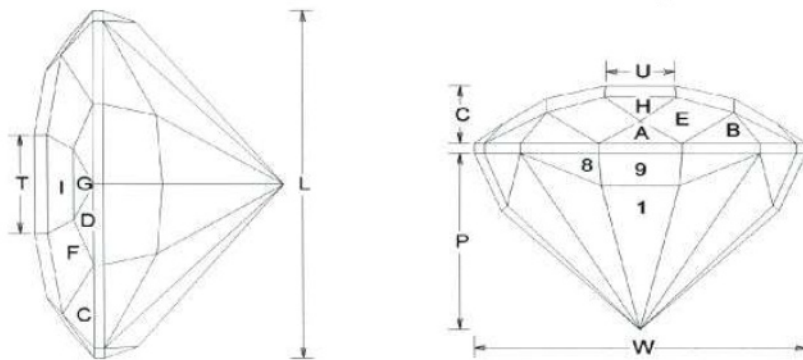
I tried using angles that were "user-friendly" and I think you will find this design not too difficult to follow. As always, I appreciate all feedback.

—David Groncki
digroncki@comcast.net



DJG "OMNI" Barrel

© David Groncki 2010
Angles for R.I. = 1.540
65 + 14 girdles = 79 facets
2-fold, mirror-image symmetry
96 index
L/W = 1.071 T/W = 0.307
U/W = 0.213
P/W = 0.542 C/W = 0.179
Vol./W³ = 0.326

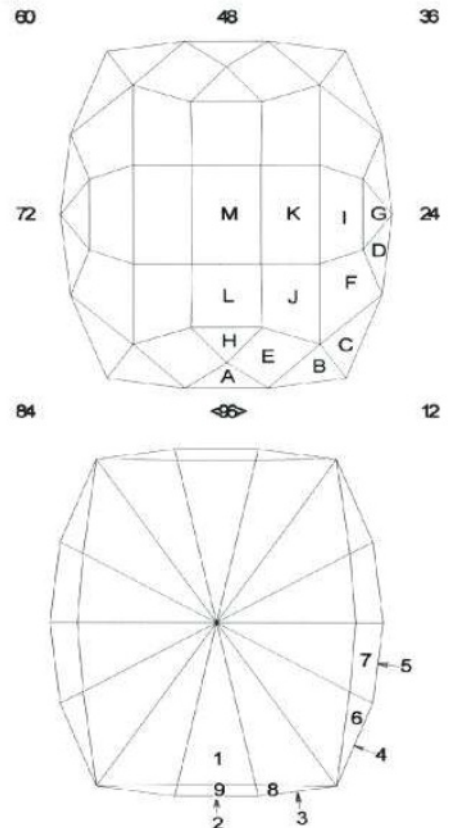


PAVILION

1	41.50°	96-07-12-21- 27-36-41-48- 55-60-69-75- 84-89	PCP
2	90.00°	96-48	Establish length
3	90.00°	02-46-50-94	OMNI
4	90.00°	18-30-66-78	OMNI
5	90.00°	22-26-70-74	OMNI
6	64.00°	18-30-66-78	Level girdle
7	65.35°	22-26-70-74	Level girdle
8	69.15°	02-46-50-94	Level girdle
9	69.55°	96-48	Level girdle

CROWN

A	40.00°	96-48	Set girdle height
B	40.00°	02-46-50-94	Level girdle
C	40.00°	18-30-66-78	Level girdle
D	40.00°	22-26-70-74	Level girdle
E	37.40°	01-47-49-95	GMP
F	34.20°	20-28-68-76	GMP
G	34.80°	24-72	GMP
H	35.50°	96-48	MP @ A
I	30.80°	24-72	MP @ D & D
J	16.10°	14-34-62-82	MP @ B, C
K	12.90°	24-72	MP @ F & F
L	10.00°	96-48	MP @ E & E
M	0.00°	Table	MP @ J



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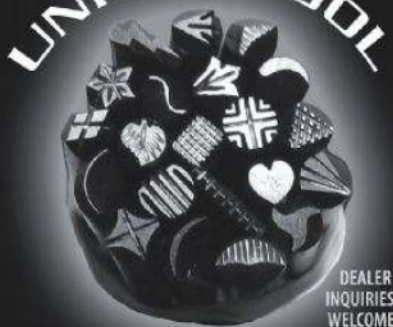
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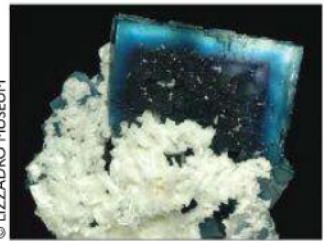
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Lizzadro Fluorite and Fossils

The Lizzadro Museum of Lapidary Art, in Elmhurst, Illinois, announces the special exhibit "Fabulous Illinois Fluorite", featuring a superb private collection of Southern Illinois fluorite specimens. For over 150 years, the state's mines provided this important industrial mineral to our nation. They also yielded some fantastic specimens showing a variety of crystal structure and color. Today, the mineral is highly collectible and good Illinois specimens are becoming rare. The exhibit opens Mar. 1 and runs through June 5, 2011.

In the 1800s, pyritized Devonian-age marine fossils (400 million years old) were being collected from slate quarries in Bundenbach, Germany. The beautifully preserved crinoids, starfish and trilobites remain rare. On Mar. 5 at 2:00 p.m., museum geologist Sara Johnson will present the history, and unique geologic formation of the Bundenbach fossils and the new technology that is used in analyzing them. The 60-minute lecture is for ages Youth to Adult. It is a companion to the special exhibit "Bundenbach's Golden Fossils", which opened Jan. 15 and runs through Apr. 3, 2011. Regular museum admission applies and reservations are recommended. (www.lizzadromuseum.org)



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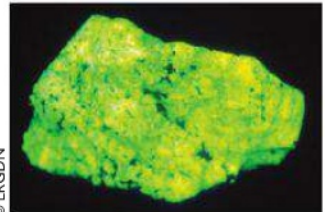
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Fluorescent Minerals Re-Installed

On Jan. 12, 2011, the Lora Robins Gallery of Design from Nature, in Richmond, Virginia, opened the reinstallation of the permanent exhibition Fluorescent Minerals: From the Permanent Collection. This new display contains more than 300 specimens and more than 40 different mineral species from North America and beyond, and it explores the science behind these minerals' ability to fluoresce. Highlights of the installation include numerous bright reddish-orange and green rocks of calcite and willemite from New Jersey, yellow-green hyalite opal slabs from North Carolina, and deep-red rubies from India.

A push of a button turns on 28 new shortwave and longwave ultraviolet lamps that cause the rocks to fluoresce brightly. The lamps run on a timed sequence that exposes the specimens first to long-wave, then shortwave ultraviolet light, and finally longwave and shortwave together to produce a unique and dazzling color show.

The fluorescent minerals were donated to the museum in 1977 by Mrs. Lora McGlasson Robins, and additional minerals were donated in 1982 by the Dulany Hunter Foundation and S.A. Dulany Hunter. Admission to the Lora Robins Gallery of Design from Nature is free and open to the public. (museums.richmond.edu)



KATHERINE WETZEL PHOTO/ © LRGDN

An Afternoon with Gem Carver Glen Lehrer

Auction firm Bonhams and Butterfields will host the presentation "The Artistic Mysteries of Gem Carving" at its San Francisco salesroom on Mar. 19, 2011. From 1 p.m. to 3 p.m., gem carver Glen Lehrer will speak on the history of the art form and answer questions about his work. Lehrer is considered one of the top names in the field of gemstone carving and design. The Larkspur, California, artist has won 13 international gemstone cutting and jewelry design awards. He is internationally recognized for his gemstone carvings and faceted stones and has pioneered some of the world's largest gemstone carvings, including a 5-foot, 450-pound quartz carving, which he worked on with artist Lawrence Stoller. The presentation coincides with auction previews for the firm's upcoming jewelry, watch and estate sales. For reservations to this public event, e-mail lynne.arkin@bonhams.com.

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- Catalogs
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- Fossils
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- Jewelry & Supplies
- Lapidary Equipment
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June	April 15
July	May 15
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(last 3 digits of code on back of card)

Signature _____

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MAY 2011

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13-15—SARASOTA, FLORIDA: Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Tr. (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

14-15—DULUTH, GEORGIA: Retail show; Intergalactic Bead & Jewelry Shows; Gwinnett Center, Hall C, 6400 Sugarloaf Pkwy.; Sat. 10-5, Sun. 10-5; adults \$5 Sat., \$4 Sun., children under 12 free; dealers, precious and semiprecious gemstone beads, sterling silver, findings, freshwater pearls, hand-blown glass, vintage beads, crystals, delicats; contact Angela Couch, (888) 729-6904; e-mail: angela.couch@beadshows.com; Web site: www.beadshows.com

14-15—FOUNTAIN HILLS, ARIZONA: Retail show; Rick Obermiller; Fountain Hills Community Center, 13001 N. La Montana Dr.; Sat. 10-5, Sun. 10-4; adults \$2, children under 12 free; indoor show, mostly Arizona dealers, gems, minerals, jewelry, fossils, kids' activities, drawings, raffles; contact Rick Obermiller, 1332 N. Jesse St., Chandler, AZ 85225-1598, (602)826-2218; e-mail: obrocks@gmail.com

14-15—HAMILTON, MONTANA: Annual show; Bitterroot Gem & Mineral Society; First Interstate Events Center, Ravalli County Fair Grounds, 100 Old Corvallis Rd.; Sat. 9-5, Sun. 9-4; contact Steve Vieth, (406) 369-5489; e-mail: viethsteve88@gmail.com; or Mike McConnell, (406) 360-4944; e-mail: micker1949@yahoo.com

14-15—LEESPORT, PENNSYLVANIA: 43rd annual show, "World of Gems and Minerals"; Berks Mineralogical Society; Leesport Farmers Market Banquet Hall, Rte. 61; Sat. 10-5, Sun. 10-4; contact Jim Woodeshick, 246 State St., Hamburg, PA 19526; e-mail: brwoodpile@yahoo.com

14-15—WAUWATOSA, WISCONSIN: 54th annual show; Wisconsin Geological Society; Muelner Bldg., Hart Park, 72nd and W. State St.; Sat. 10-5, Sun. 10-4; adults \$3 (2 for \$5), children under 16 free with adult; 22 Midwest dealers, lapidary supplies, tools, books, rough material, slabs, finished specimens, cabochons, jewelry, carvings, fossils, children's activities, exhibits, displays, presentations; contact Paul Schmidt, 8213 Red Arrow Ct., Wauwatosa, WI 53213, (414) 771-8668; e-mail: pvs@wi.rr.com

20-22—ANN ARBOR, MICHIGAN: Show and sale; GemStreet USA; Washtenaw Fairgrounds, 5055 Ann Arbor-Saline Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; adults \$7, seniors (60+) and students (12-17) \$5, children under 12 free; gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

20-22—MARTINSVILLE, VIRGINIA: 21st annual show; Treasures Of The Earth Gem & Jewelry Shows; National Guard Armory, 315 Commonwealth Blvd W. (across from Liberty Fair Mall); Fri. 10-6, Sat. 10-6, Sun. 11-5; free admission; jewelry makers, goldsmiths and silversmiths, gem trees, wire wrap, wire sculpture, pearls, stone beads, stone setting, amber, opal, mineral and fossil dealers, door prizes, grand prize, classes, sluice; contact Van Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: van@toteshows.com; Web site: www.toteshows.com

20-22—SANTA ANA, CALIFORNIA: Wholesale/retail show, "Spring West Coast Gem & Mineral Show"; Martin Zinn Expositions; Holiday Inn-Orange County Airport, 2726 S. Grand Ave.; Fri. 10-6, Sat. 10-6, Sun. 10-5; free admission; open to the public, more than 80 wholesale and retail dealers, minerals, fossils, gems, jewelry, lapidary supplies; contact Martin Zinn Expositions LLC, PO Box 665, Bernalillo, NM 87004-0665, (505) 867-0425

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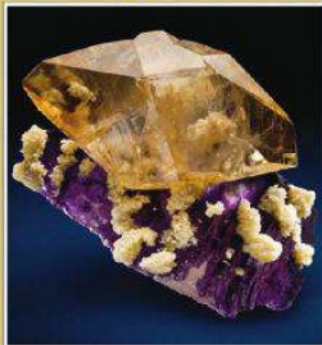
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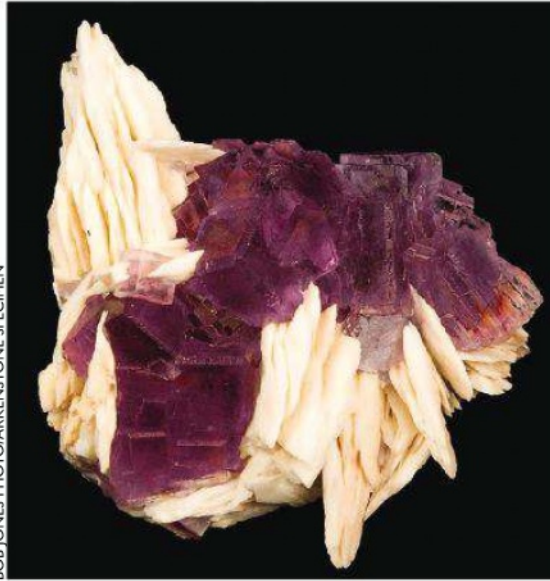
O N THE ROCKS

A Look Back

Now that the dust of the great 2011 Tucson Show has settled, I feel I should pause for a look back at 2010. It was an eventful year for me. Every year seems exciting, but 2010 was exceptional for adventure and mineral activities. My duties for the magazine, coupled with a very active personal schedule, prevent me from planning out every week or every day. The best I can do is to develop an outline of a monthly schedule. I can't stand having nothing to do and enjoy dealing with occasional surprises—some small, some large, all of them exciting! The year 2010 developed as one of the most surprising and exciting I've experienced in recent years.

Along with my usual activities, I can think of five major events that were exceptional, exciting and, for the most part, unplanned. The first exciting 2010 event happened in Tucson when I was invited to become co-host of the DVD series "What's Hot in Tucson". The DVD is hosted by Dave Wilber and produced and distributed by BlueCap Productions in Marina Del Ray, California. I played only a minor part in the overall on-camera action that year, but it was a special treat for me to be in the forefront of a program designed specifically to record and highlight the shows in Tucson every February. You can obtain the excellent three-disc 2010 set at www.whatshotintucson.com.

The next adventure I was involved in was the very special International Mineral Tour. In 2009, Crizmac Tours of Tucson, Arizona, invited me to set up and guide an international mineral tour, so I suggested we take the group to England, a country with which I'm very familiar. I made the necessary contacts during a visit in the summer of 2009, and in May 2010 a group of 29 collectors visited a number of special sites, including museums, mines and digging sites. We ended the tour at Cornwall's Caerhays Castle, where we viewed a lovely collection of classic Cornish minerals few have seen. It was a great tour and I met some great collectors.



BOB JONES PHOTO/ARKENSTONE SPECIMEN

Purple fluorite cubes from China contrasting with attached bladed barite is an example of the specimens on display at The Arkenstone Gallery.

Earlier in the spring, I was visiting the offices of The Collector's Edge in Golden, Colorado. That's when another surprise popped up. I was told about a special mineral exhibition that was scheduled to be held in the Geological Museum of China in Beijing. Collector's Edge was kind enough to invite me to go to Beijing to write about this unique joint venture. This exhibition was the first cooperative effort between an American company and a Chinese government entity. It was really exciting to see these great mineral specimens and something of an adventure to meet the museum's president and an ambassador from the American Consulate.

Another exciting activity of 2010 is worthy of sharing because I consider it an important step in the understanding and growth of our collecting hobby! On Aug. 28, 2010 I flew to Dallas to attend the grand opening of The Arkenstone's new mineral gallery in Richardson, Texas. Now, I've been in plenty of mineral shops and galleries, in this country and in other countries, that offer fine minerals for sale, but this is no ordinary gallery.

Designed by Kevin Brown, The Arkenstone Mineral Gallery is an astounding

10,000 sq. ft., with shelves of minerals in nearly 30 glass display cases, each holding the full range of specimens. Many of the glass cases incorporate lower sections of drawers, numbering approximately 244! The old days of a roadside rock shop are gone and mineral sales have entered the realm of high-end marketing.

The Aug. 28 event had two purposes. Selling minerals is, of course, the prime purpose of any mineral gallery, but it was also intended to create a memorable social event for the dealers and collectors who were invited and to encourage a sense of community within the mineral collecting population. Another such social event is the open house held each year before the fine Denver Show at the Colorado School of Mines Museum, in Golden.

The gallery itself was an eye opener. The display cases, built by Williams Mineral Co., were all specially built to show minerals to their best advantage. The hardwood cases, more properly called "cabinets", feature special LED lighting technology, which is considered the latest trend in mineral specimen lighting.

Keep in mind that, centuries ago when the science of natural history was evolving, it was popular among people of means to feature a natural history cabinet in their palatial homes. These cabinets held fossils, minerals, native artifacts, natural oddities, and the like. The new cabinets at The Arkenstone Mineral Gallery hearken back to those of elegant display cabinets, as they contained mainly minerals, with fossils also on prominent display.

The grand opening of The Arkenstone Mineral Gallery was the brainchild of Dr. Robert Lavinsky, owner of The Arkenstone. Rob has been involved with minerals since he was a kid and has been a formal mineral dealer since 1987. He is among the more active and creative mineral dealers I know. For the opening, he invited some 200 leaders in our hobby, including dealers and collectors, to promote the community aspect of our hobby. In a social setting, we can

all develop a better understanding of each other and our hobby!

This was not a new concept. Old-timers remember those good old days in Tucson when one of the more important aspects of the show season was the informal social events and casual evenings when collectors met, got to know each other, and developed life-long friendships. As the major shows became more formal, more hectic, more scattered, and more numerous, the social part of our hobby has diminished. The Arkenstone event, like the Colorado School of Mines open house, created an atmosphere of cordiality, brought together a cross section of our hobby membership, and brought back some of that old warmth and congeniality.

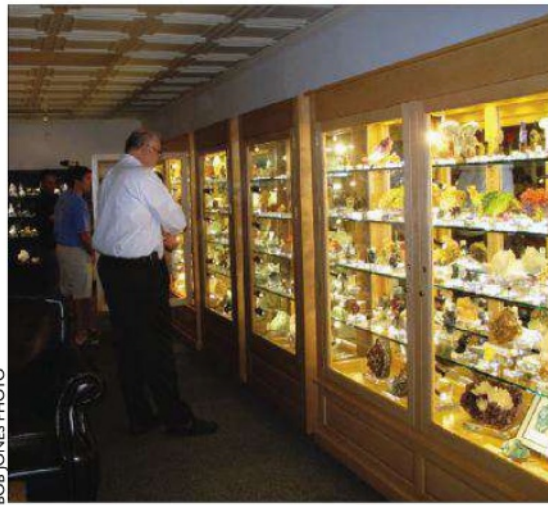
The opening of The Arkenstone Mineral Gallery was topped off with a sensational evening banquet! This enabled dealers and collectors to gather informally away from minerals for a delightful dinner in elegant surroundings. The setting encouraged socializing and sharing and a superb dinner made the evening most cordial.

Dessert was served, of course, but the real dessert was talks by two very special speakers: my friend Dr. Gene Meieran, a retired Intel leader, and Dr. Harrison Schmitt, the geologist-astronaut who went to the moon's surface on Apollo 17.

Gene gave a fine lecture describing how the greatest mineral exhibition, "American Mineral Treasures", was developed at Tucson. Gathering the information needed for the book required an almost overwhelming effort to bring together America's very best minerals. Gene explained how hundreds of people were involved and tens of thousands of e-mails were needed to co-ordinate this undertaking, and that the result was the finest mineral show ever. He really helped enlighten the diners about the massive effort that was needed to coordinate such an event and how the spirit of co-operation was a vital part of venture.

He also highlighted the publication of the instant classic text *American Mineral Treasures* (Lithographie, LLC, 2008), which was based on that 2008 show. The book's chapters were written by a host of people who were actually involved in the mining of many of the minerals featured at the show, including me.

Gene's talk set the stage for the evening, helping everyone feel they were a part of our hobby and part of a significant accomplishment in promoting mineral collecting. Gene also introduced Harrison, his friend and the main speaker of the evening. Har-



The cases in one small section of the Arkenstone Gallery are brilliantly lit by LED lighting.

ison is a skilled geologist who trained as an astronaut and flew in Apollo 17 to the surface of the moon. This was the last lunar mission in the Apollo series and actually the only lunar landing to put a scientist, Harrison, on the moon!

Harrison, who spent nearly two dozen hours on the lunar surface, shared his insights and experiences. The photographs he took on the moon and the scientific expla-



From left to right, Rob Lavinsky, George Elling, Harrison Schmitt, Gene Meieran and Jim Gibbs got together after Harrison's lecture.

nations of much of what we viewed were very educational and made us all feel we played a part in the Apollo space program. After listening to this informative lecture, I think most in the audience were eager to support future efforts to advance the science of space exploration!

Like the day's social gathering, the evening banquet and lectures gave everyone a special feeling of being part of the mineral collecting community. The unanimous decision was that this special day should become an annual event. I really believe it will and am certain it will contribute to the growth of our collecting hobby!

To add to this special weekend, Jim and Gail Spann, two very serious mineral collectors, held a Sunday morning open

house and buffet luncheon at their fine home. Those of us who visited the Spanns enjoyed their amazing collection. The open house put an exclamation point on an exceptional weekend!

The fifth special event in 2010 is one you've read about: the publication of my book, *The Frugal Collector, Vol. I*. The book grew out of a series of articles I had written for *Rock & Gem* between July 2003 and July 2007 to encourage collectors to learn more about minerals so they could make good specimen-buying choices and develop a meaningful collection.

At the behest of readers, I revised and updated those articles to be published as a book. The project ended up being a two-volume effort, the first of which has almost been completed! The book will be distributed by *Rock & Gem*. You can pre-order a copy by sending \$48.95 (add \$10 for shipping outside the United States) to The Frugal Collector, Vol. I, P.O. Box 6925, Ventura, CA 93006. Eventually, you'll be able to pick one up when you visit the *Rock & Gem* booth at a major show. Volume II is "in the mix", as they say.

Volume I describes minerals that are particularly popular, as well some of my favorite species. Chapters are devoted either to groups of minerals, such as the arsenates, or to just one mineral, like azurite. Volume II will continue this pattern.

There are a couple of things I include in the books that you normally don't find in a mineral book. As a retired science teacher, I have a strong interest in the history of chemistry and the native elements. Many of the discoveries of the elements were directly related to minerals, such as fluorine from fluorite. I have woven these stories into the text where possible, along with tales of my personal travels and experiences. By doing this, I wanted to humanize what can often be a dry recitation of the physical and chemical properties of minerals and their sources. Collecting minerals is much more than that. As Rob told me, "Mineral collecting' is really people with a common interest who, as a community, can promote our hobby!"

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.

Neo Valley Finds

"Chrysanthemum Stones", by Tom Elias (December 2010), was very, very interesting. I was born in Gifu Prefecture, Japan, and I have in my collection some interesting rocks and stones from the Neo Valley and the nearby area.

Of course, the chrysanthemum stone (Kikuka-seki) is one of the wonderful stones this area produces, but there are some other interesting stones and rocks from there. For example, there is a stone called "Sazare-Ishi", which is a kind of calcirudite. "Sazare-Ishi" is incorporated into the Japanese national anthem (originally a tanka poem of the Heian period) as a symbol of eternal friendly cooperation and prosperity because it "grows" into a huge rock and gathers moss. It is said that there is a legendary second part to the song in which Sazare-Ishi is said to have been made at the bottom of the ocean and risen to a rock on the beach, and cormorants perch on it.

Here are photos of some interesting stones and rocks from the Neo Valley area.

—Motofumi Kuze
Utsunomiya, Japan



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—Gene Haas
via e-mail

The digital version of *Rock & Gem* requires a separate subscription from your print version. Visit www.zinio.com for details.

—Editor



Mystery Stone

This photo is of a specimen that I picked up in northwest Colorado. In 20 years of rockhounding, I have never seen anything like this. When cut, it takes a great polish. I wonder whether any of your readers can identify it for me?

—Gary Williams
P.O. Box 1806
Hayden, CO 81639-1806
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Aspen's History

In regards to "Aspen's Silver Lining" (December 2010 *Rock & Gem*), for anyone interested in more history of the Aspen, Colorado, area, *Aspen: The History of a Silver Mining Town, 1879-1893*, by Malcolm J. Rohrbough, was published in the mid-1980s. It is a nicely written history.

—Richard Gibbons
Saint George, UT

Rockhound Message Board

I have a new message board at <http://digforcrystals.net/messageboard/> and all rockhounds are invited to join. You're encouraged to post anything you have for sale or trade in the swap/buy/sell area. If you have pictures of anything you have for sale, I encourage you to post them! Be sure to add tags at the bottom of the post in the area provided, such as wavelite, Arkansas quartz, or whatever applies to what you have for sale so that the search engines grab them. Also, if you are a collector and looking to buy or trade things, how about posting that in the same area?

In order for this message board to take off and have active discussions, I need to initially get people to register and make posts! So if you can drop in and contribute, this would be great. Got a rock picture or a field trip photo that you want to share, maybe of your favorite specimen? Is your club hosting a mineral show? You're invited to join and share. Oh! There is a Rockhound Singles Lounge, too!

—Rodney Moore
Jackson, GA

Correction

The price of the MarZee Tutorials DVD "Carving a Jade Bangle", which was reviewed in the January 2011 Picks & Pans column, is \$25, not \$20, as stated in the review.

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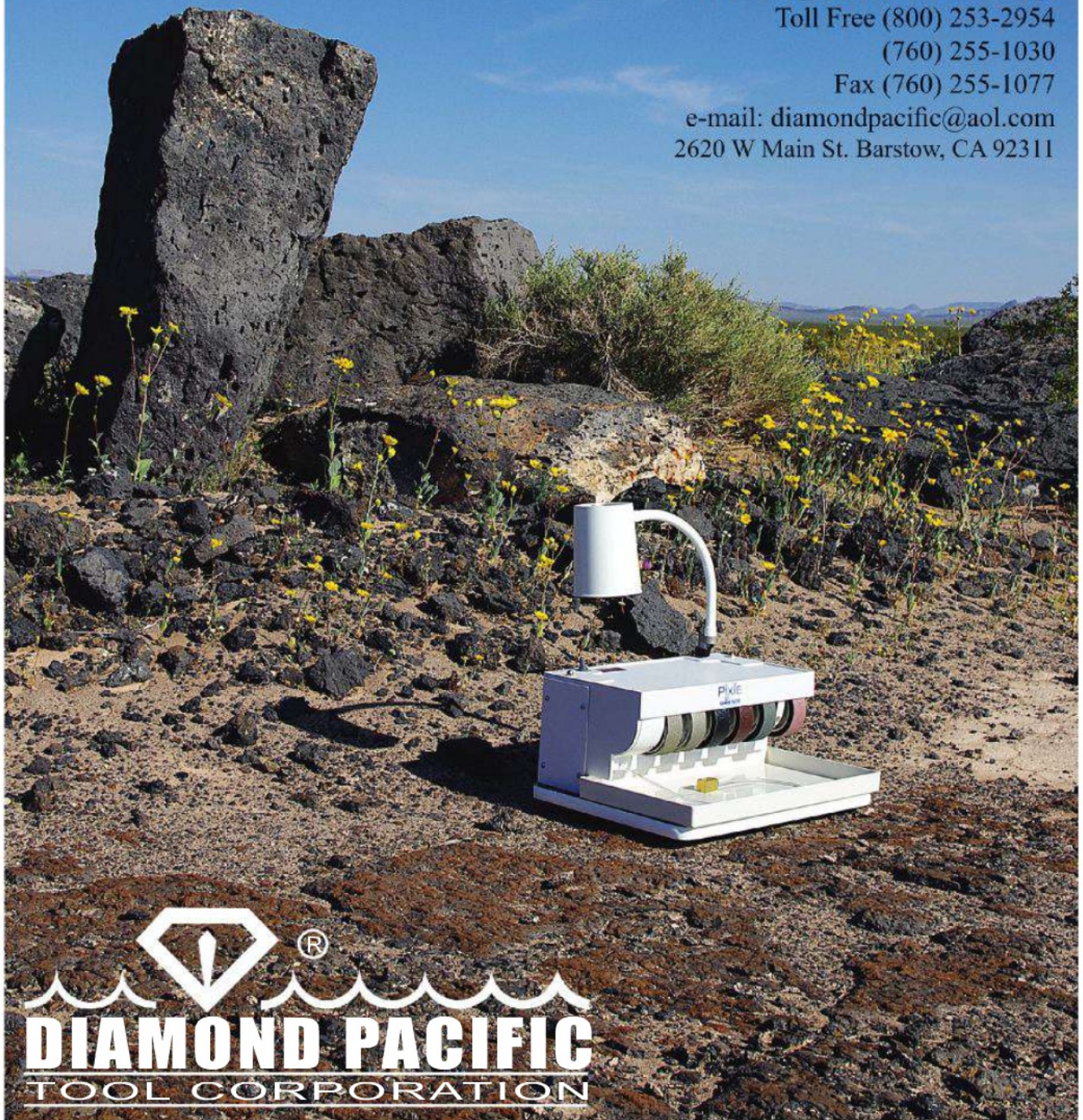
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