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APRIL 2010

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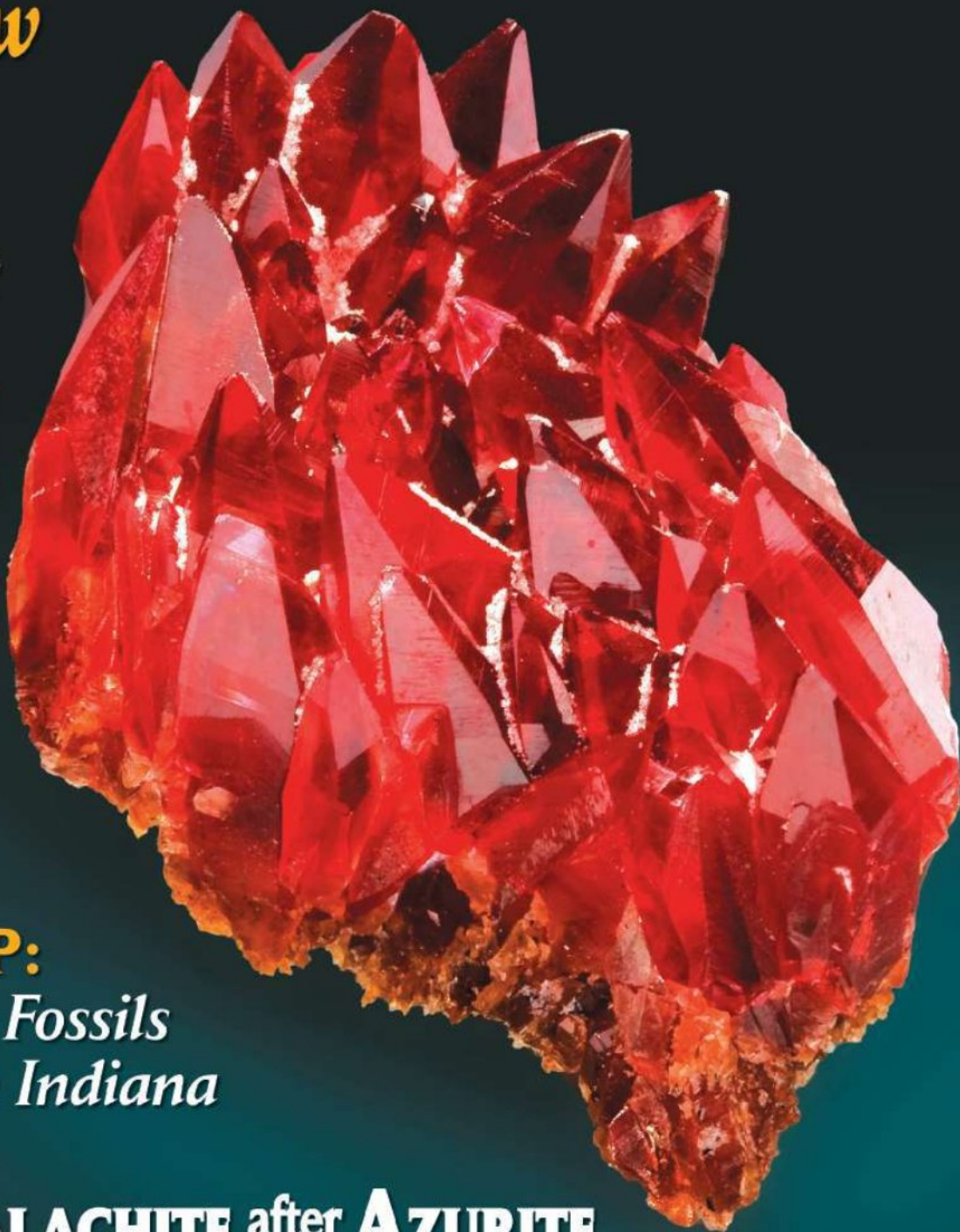
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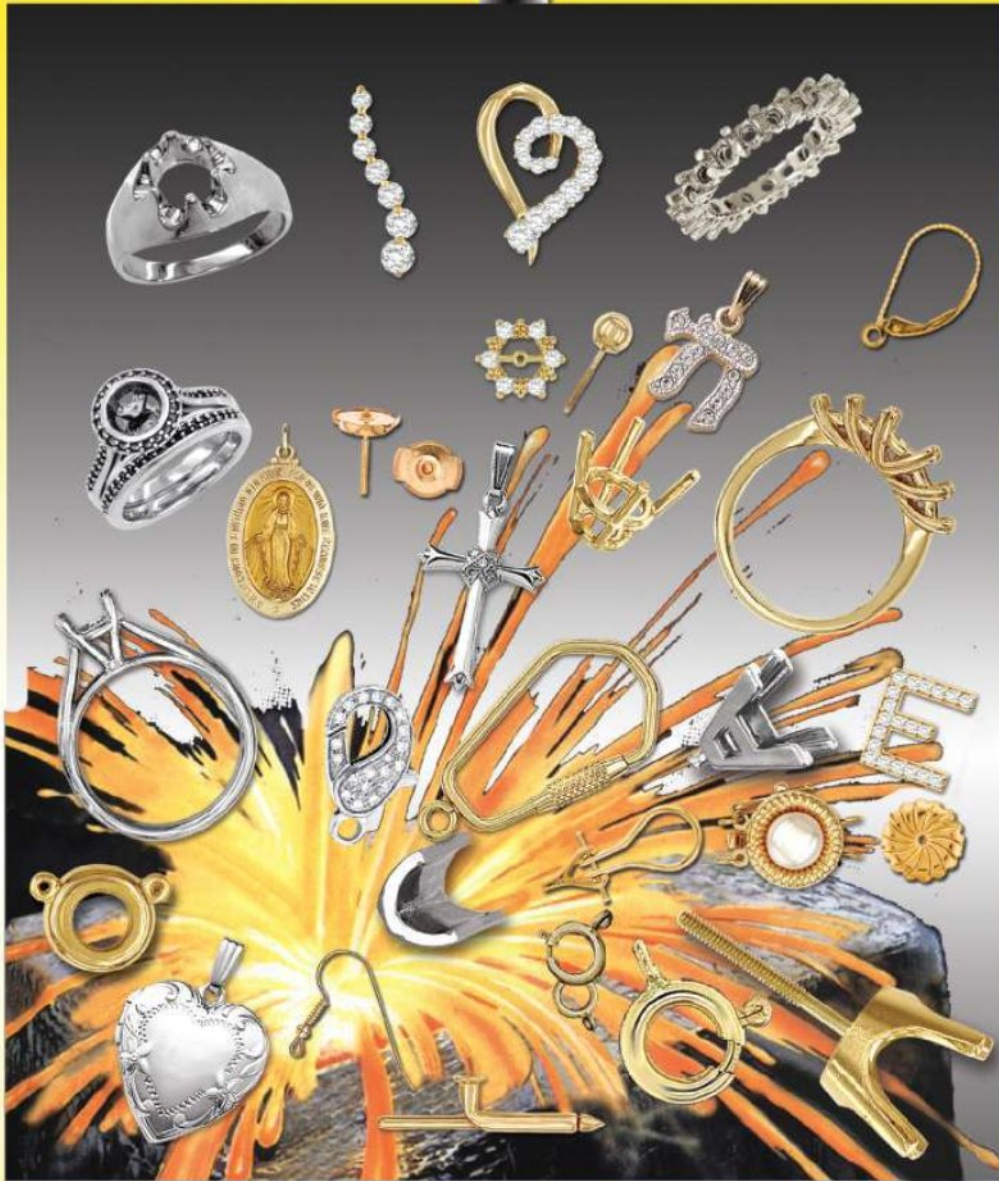
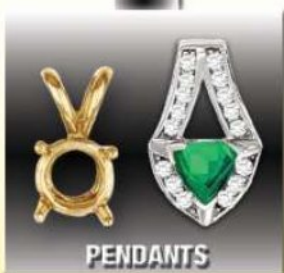
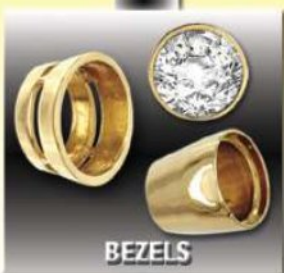


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Rhodochrosites from the N'Chwaning mine in South Africa's Black Rock district can be considered modern classics. This 4.5cm by 6cm specimen is from the Keith and Diane Brownlee Collection. (Joe Budd photo)

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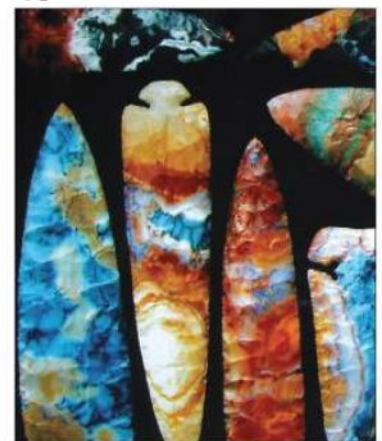
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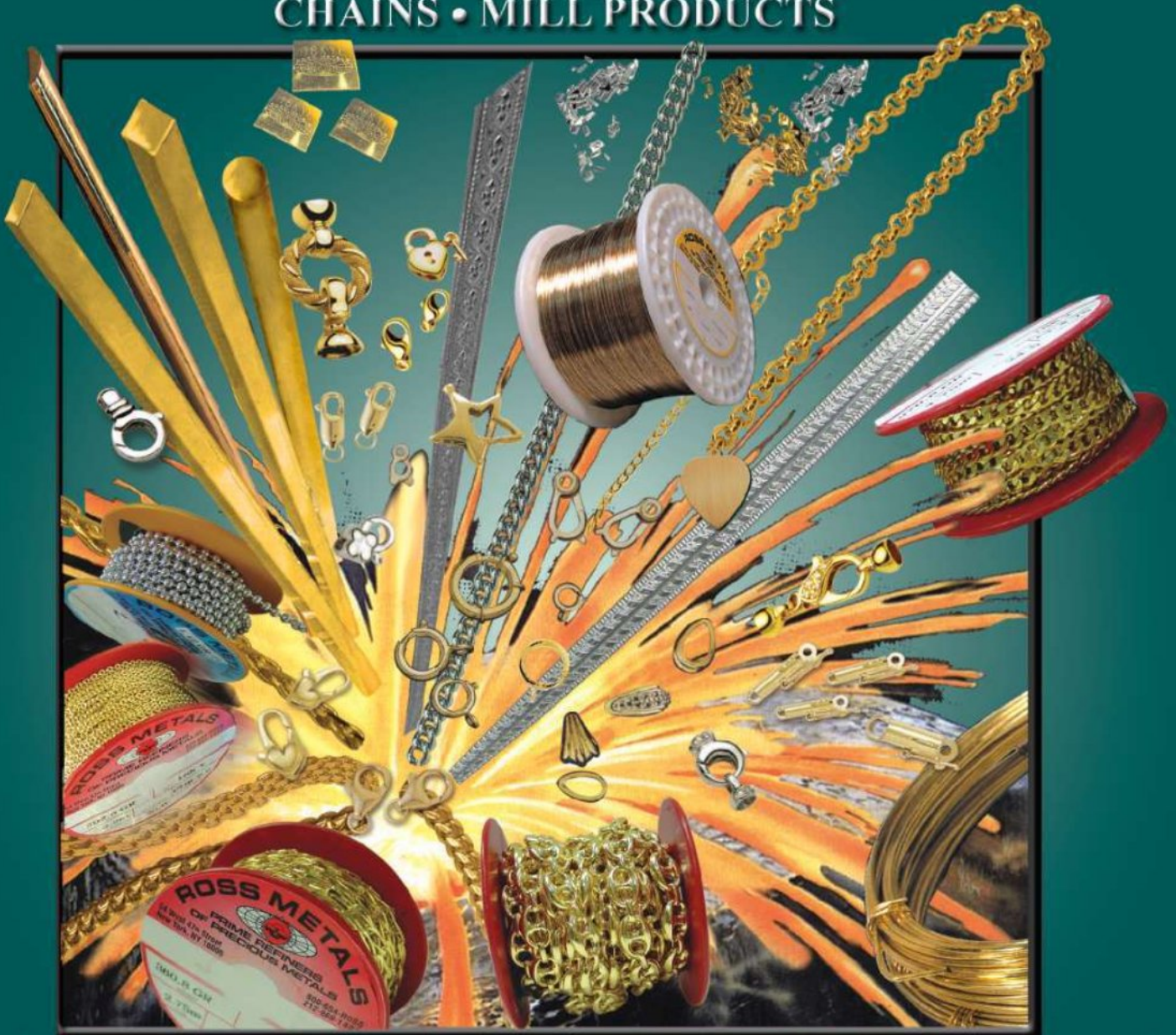
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## Journeys of Discovery

"The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' but 'That's funny' ..."

—Isaac Asimov

Discovery seems to be at the heart of the lapidary and mineral collecting hobbies: rockhounds discovering specimens in the field, lapidaries discovering a beautiful pattern in an slab of ordinary-looking rock, collectors discovering new information in a reference text. Discovery often involves a journey, whether it be one of miles or of mentality. It takes us out of our normal sphere, exposes us to new people and ideas, and helps us develop new skills.

This month, Barbara L. Miller shares with us her journey to track down specimens of a beautiful stone she discovered on a table at a rock show in "My Quest for Keswick Agate" (p. 20). While curiosity set her on the path, her dedication and patience were the keys to achieving success. On her travels, not only did she add specimens of an exciting variety of agate to her collection, she made new friends and enjoyed new experiences.



STEVEVOYNICK PHOTO

Roy Miller's journey of discovery took him from an Ohio farm, where he collected arrowheads as a boy, to a flint quarry that produces stone with amazing colors and patterns. He developed his skills to become one of the foremost knappers of Ohio flint. In "Ohio Flint and Its Master Knapper", Tom Towles describes how a chance viewing of Roy's work, again at a rock show, set him on a journey to meet Roy and find out where to collect pieces of his colorful stone (p. 48).

It is with the goal of helping you discover a bargain on a dealer's table that Bob Jones writes about "Modern Mineral Classics" (p. 12). These currently available and abundant specimens will one day be spoken of with the reverence due such unobtainable treasures as Graveyard Point agate and English barites. As you visit rock shows armed with knowledge about these significant minerals, you empower yourself to make purchases that will help you build a collection of scientific and historic—as well as monetary—value.

Visitors to the Denver area can journey through geological time when they enjoy the attractions at the Dinosaur Ridge track site. Steve Voynick describes how scientists discovered a great deal about mid-Cretaceous Era dinosaurs and the environment in which they lived from the fossilized footprints and bones they left behind in his article "Walking with Dinosaurs" (p. 34).

There are many other opportunities for journey and discovery. Some folks will join Bob Jones on the CRIZMAC Mineral Tour of England in May, and I anticipate receiving many new entries for our Craftsman of the Month contest from the participants of the Eastern Federation of Mineralogical and Lapidary Societies' lapidary retreat at Wildacres this month. Where will your journey take you?



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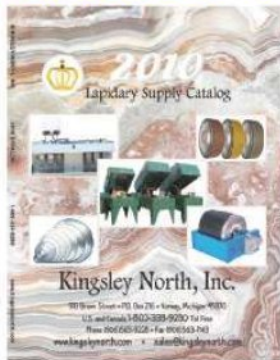
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# CRAFTSMAN OF THE MONTH

April Craftsman of the Month Dan Heuer, of Portland, Oregon, writes, "For this project, I selected a slab of Blue Biggs Picture jasper from Biggs Junction, Oregon, to use as my intarsia centerpiece. I also picked out a slab of Badger Pocket petrified wood (Sycamore) from Washington to use as the intarsia borders.

"The first step was to trace and cut out the centerpiece. I used a ruler and an aluminum pencil to template a triangle on the slab, centering its peak above the best pattern. I then drew parallel lines, spaced 20 millimeters apart, on the petrified wood slab. These strips were drawn to be at least 25 millimeters longer than the edges of the triangular centerpiece. Next, I used a trim saw to cut the center and borders to within 3 millimeters of the templates.

"The next step was to prepare the materials for assembly. I started by using a 280-grit flat lap to sand the centerpiece edges down to the template line. Then I lapped the border edges until the saw marks were completely gone.

"The pieces were then ready for assembly. I started by gluing one petrified wood border strip to the bottom of the center with low-viscosity cyanoacrylate glue. The strip overhung the center on both sides by roughly 1/2 inch. I pushed the pieces firmly together to squeeze all the excess glue from the gap and held it until the glue had hardened enough to set it down on wax paper. Once the glue was cured, I flat lapped one of the remaining edges on a 280-grit lap until the overhanging bottom border was flush with the center piece. I then glued on another border strip allowing for overhang on the final remaining edge. The two border overhangs on the final edge were then lapped flush and the final border strip was glued on.

"The intarsia was then ready for the final assembly step. I flat lapped both the front and back on the 280-grit flat lap. Next, I selected a 1/8-inch basanite slab for backing material and cut it on the



trim saw to the size of the intarsia. This backing slab was flat lapped out to 280-grit and glued to the intarsia with cyanoacrylate glue.

"Using a ruler, I templated a triangle on the front of the border pieces roughly 8 millimeters from the edges of the center. Next, I flat lapped the edges down to the template on a 280-grit flat lap. The assembly was then marked with bezel lines and heated on a coffee cup warmer. Next, I dopped the assembly using a wooden dowel and hot-glove gun.

"The intarsia was then domed on a 100-grit diamond wheel. I sanded and pre-polished on 220, 280, 600, 1200 and 3000 grit diamond wheels. The final step was to polish using optical grade cerium oxide on a damp leather pad."💎



## Would you like to be named Craftsman of the Month?

To enter the contest:

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

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

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



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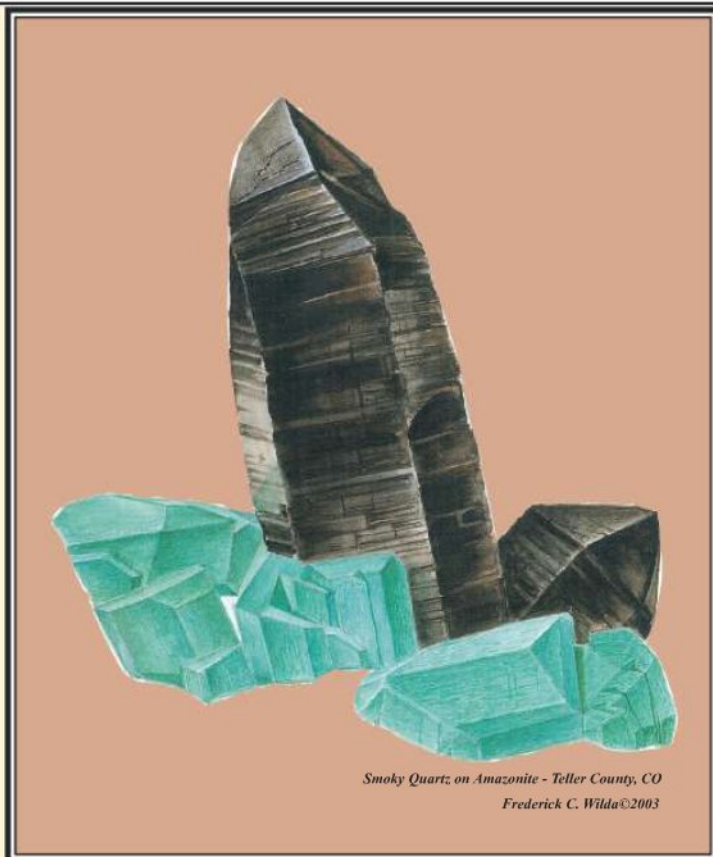
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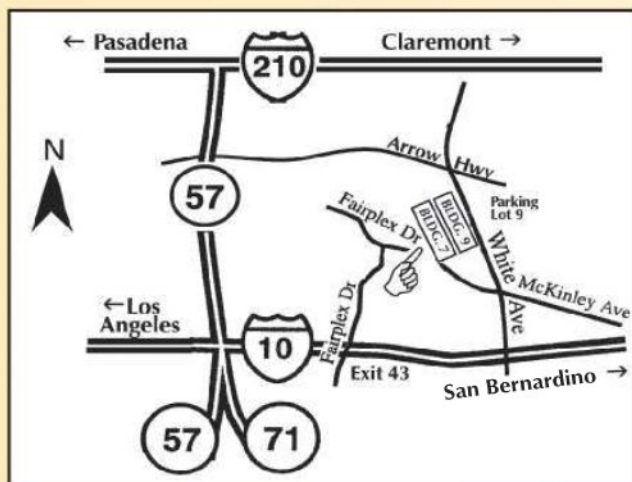
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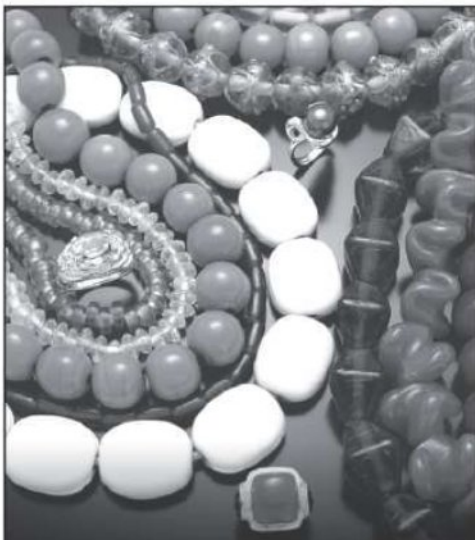
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# SHOW DATES

Send show information at least four months in advance to *Rock & Gem Show Dates*, 290 Maple Ct., Suite 232, Ventura, CA 93003-3517; fax (805) 644-3875; e-mail: editor@rockngem.com, or use the electronic form at [www.rockngem.com/showdates.asp](http://www.rockngem.com/showdates.asp).

## APRIL 2010

**2-4—EUGENE, OREGON:** Show, "Gem Faire"; Gem Faire Inc.; Lane County Events Center/Exhibit Hall, 796 W. 13th Ave.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: [www.gemfaire.com](http://www.gemfaire.com)

**3—MISSOULA, MONTANA:** Show, "Rings & Things BeadTour"; Rings & Things; Hilton Garden Inn, 3720 N. Reserve St.; Sat. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: [www.rings-things.com](http://www.rings-things.com)

**3-4—LINCOLN, NEBRASKA:** Show, "Gems Galore - and More!"; Lincoln Gem & Mineral Club; Lancaster Event Center, 4100 N. 84th St.; Sat. 9-7, Sun. 9-5; adults \$5, children under 12 free; local special displays, exhibits, minerals, rocks, gemstones, beads, jewelry, demonstrations, dealers, youth activities; contact Charles Woodriddle, Lincoln Gem & Mineral Club, P.O. Box 5342, Lincoln, NE 68505, (402) 416-3233; e-mail: lgmsecretary@yahoo.com; Web site: [www.lincolngemmineralclub.org](http://www.lincolngemmineralclub.org)

**9-11—ABBOTSFORD, BRITISH COLUMBIA, CANADA:** Show; Ag-Rec Bldg., CFV Fairgrounds, 32470 Haida Dr.; Fri. 10-8, Sat. 10-6, Sun. 10-6; adults \$6, students (6-17) \$2, children under 6 free with adult; more than 35 dealers, beads, crystals, minerals, gifts, lapidary supplies, club displays, demonstrations, grab bags, children's creative workshop, gold panning, door prizes; contact Jennifer Moore, (604) 328-9766; e-mail: jenmac02@telus.net

**9-11—ALBUQUERQUE, NEW MEXICO:** 41st annual show, "Treasures of the Earth"; Albuquerque Gem & Mineral Club; Creative Arts Center, New Mexico State Fairgrounds (Expo NM), San Pedro entrance, across the street from the Lujan Bldg.; Fri. 10-6, Sat. 10-6, Sun. 10-5; adults \$1 Fri., \$3 Sat. and Sun., children under 13 free; more than 40 dealers, displays, door prizes, kids' booth, silent auctions, faceting demonstrations, gold panning, gem setting, free mineral/gem identification; contact Paul Hlava, (505) 255-5478; e-mail: hp5@qwest.net

**9-11—EUREKA, CALIFORNIA:** 9th annual show, "Lost Coast Jewelry, Gem, Bead & Mineral Show"; Kasey Enterprises; Redwood Acres Fairgrounds, 3750 Harris St.; Fri. 12-7, Sat. 10-7, Sun. 10-5; adults \$3, students and seniors \$1.50, children free; minerals, gemstones, crystals, beads, pearls, gold nuggets, fine jewelry, gold, quartz, fossils, tools, door prizes; contact Diana, Kasey Enterprises, P.O. Box 2927, McKinleyville, CA 95519, (707) 839-1358; e-mail: kaseyent@sbcglobal.net

**9-11—OGDEN, UTAH:** 59th annual show, "2010 Gemstone Junction"; Golden Spike Gem & Mineral Society; Golden Spike Event Center, Weber County Fairgrounds, 1000 N 1200 W; adults \$2, students \$1.50, children under 12 free with adult; Fri. 9-6, Sat. 10-6, Sun. 10-4; more than 25 dealers, more than 30 display cases, geodes, faceted stones, dinosaur bones, fossils, minerals, beads, jewelry, healing stones and crystals, petrified wood, lapidary tools and equipment, demonstrations, rock bags, Wheel of Fortune, door prizes, silent auction; contact Cindy Aeschlimann, P.O. Box 12835, Ogden, UT 84412-2835, (801) 648-5060; e-mail: club@goldenspikegem.org; Web site: [www.goldenspikegem.org](http://www.goldenspikegem.org)

**9-11—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](http://www.frankcoxproductions.com)

**9-11—TACOMA, WASHINGTON:** Show, "Gem Faire"; Gem Faire Inc.; Tacoma Dome/Exhibition Hall, 2727 E. "D"

St.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: [www.gemfaire.com](http://www.gemfaire.com)

**10-11—ABILENE, TEXAS:** Show; Central Texas Gem & Mineral Society; Abilene Civic Center, 1100 N. 6th St.; Sat. 9-5, Sun. 10-5; adults \$5, children \$3; vendors, rock, fossils, tools, gems, sand art, wheel of fortune, raffles, club member demonstrations, geode cracking; contact Betty Scarborough, 422 CR 606, Tuscola, TX 79562, (325) 668-2374; e-mail: waltswife1029@yahoo.com; Web site: [www.txl.net/rockclub](http://www.txl.net/rockclub)

**10-11—BELLINGHAM, WASHINGTON:** 49th show; Mt. Baker Rock & Gem Club; Bloedel-Donovan Park, 2214 Electric Ave.; free admission; Sat. 10-6, Sun. 10-5; rocks, fossils, gems, jewelry, dealers, door prizes, club sales, silent auction, raffle, demonstrations, exhibits, special kids' activities; contact Candi Gerard, (360) 384-3187

**10-11—CANTON, ILLINOIS:** 50th annual show; Fulton County Rockhounds; Wallace Park; Sat. 10-6, Sun. 10-5; free admission; contact Steven Holley, (309) 231-8861; e-mail: iflossil@hotmail.com; or George Coursey, (309) 368-2947; e-mail: courseyfarm@hughes.net

**10-11—DES PLAINES, ILLINOIS:** 45th annual show; Des Plaines Valley Geological Society; Des Plaines Park District Leisure Center, 2222 Birch St. (just west of River Rd. off Touhy); Sat. 9:30-5, Sun. 10-4; adults \$3, students \$1 with school ID, seniors \$2, children under 12 free with adult; educational exhibits, live demonstrations, kids' room, silent auction, dealers, raffles, door prizes; contact Lois Zima or Jeanine Mielecki; (847) 298-4653; e-mail: joyaine9@aol.com; Web site: [www.desplainesgeologyclub.org](http://www.desplainesgeologyclub.org)

**10-11—GOODING, IDAHO:** Annual show; Petrified Watermelon Pickers; Idaho State School for the Deaf and Blind, Recreation Gymnasium, 1500 Main St.; Fri. 9-5, Sun. 10-4; free admission; rock, fossil, jewelry, gemstones, door prizes, grab bags, silent auction, demonstrations, educational displays, club member specimens and lapidary demonstrations; contact Dixie Reale, P.O. Box 402, King Hill, ID 83633, (208) 293-4340; e-mail: dixiereale@mac.com; Web site: [www.kountinghouse.com/club](http://www.kountinghouse.com/club)

**10-11—GREEN BAY, WISCONSIN:** Show, "Green Bay is Rockin' on the Fox"; Green Bay Neville Public Museum Geology Club; Neville Public Museum, 210 Museum Pl., downtown; Sat. 9-5, Sun. 10-4; adults \$2, children under 14 free; 14 dealers, fossils, minerals, gemstones, jewelry, free polished stones for children, grab bags, working and special exhibits, wire wrapping demonstrations; contact Randy Westberg, 1815 E. Shore Dr., Green Bay, WI 54302, (920) 619-6060; e-mail: randy.westberg@rhccgb.com

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**10-11—KINGMAN, ARIZONA:** Show, "Gems of Arizona"; Mohave County Gemstoners; Kingman Academy of Learning High School, 3420 N. Burbank St.; Sat. 9-5, Sun. 9-4; free admission; demonstrations (obsidian knapping, faceting, wire wrapping), mineral displays, silent auction, dealers, cash raffle, hourly door prizes, children's activities; contact Nan Russell, (928) 846-0927, or Donna Robinson, 3202 E. Leroy Ave., Kingman, AZ 86409, (928) 263-1480; e-mail: gemstoners@live.com; Web site: [www.gemstoners.org](http://www.gemstoners.org)

**10-11—LANCASTER, CALIFORNIA:** Show; Antelope Valley Gem & Mineral Club; Lancaster High School, 44701 32nd St. W, between Lancaster Blvd. and Ave. J; Sat. 9-5, Sun. 9-5; free admission; demonstrations, vendors, tailgaters, silent auction table, raffle drawing, games; contact

continued on page 32

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# Modern Mineral Classics

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## PART I: The Best Specimens Are Yet to Come

Story and Photos by Bob Jones

There is established precedent for what constitutes a classic mineral: it had to have come out of the ground centuries—or at least multiple decades—ago; it had to have been found in great enough quantity to create a market; and it had to have been the best—or at least a very significant—example of the species at the time. To cite one example, stibnite has been found in Mexico, China, Bolivia, the Western United States, and Romania, among other places, but the stibnites from Japan are considered *the* classic specimens. They were discovered over 100 years ago in superb crystals that were so huge they have never been equaled.

COLLECTOR'S EDGE SPECIMEN



Some superb blue, remarkably gemmy aquamarines have recently been mined from pegmatite deposits on Mount Antero in Colorado.

Today, through normal ore mining and specimen mining, some species are being recovered that are already recognized as something special and will surely be considered classics decades from now. These are what we call “modern classics”. The importance of describing modern classics now is so that collectors will realize that this is the time to add them to their collection and preserve them, as they will surely remain among the best examples years from now. Following are some examples.

The red mineral rhodochrosite has been found in huge quantities in Romania, Mexico, Japan, Africa, Peru and China. In the United States, it has occurred at Butte, Montana, at the American Tunnel, Climax, and John C. Reed mines in Colorado, and elsewhere. Out of all those occurrences, only two localities have produced specimens that should be considered modern classics: the Sweet Home mine at Alma, Colorado, and the N’Chwaning mine, in the Black Rock district of South Africa’s Kalahari Desert.

The rhodochrosites from these two classic deposits are markedly different in crystal form—so much so that you would never confuse one with the other. Each locality produces the finest examples of rhodochrosite of a particular crystal habit. The Sweet Home



The cassiterites now coming from China far exceed anything ever found in the ancient Cornish tin mines.

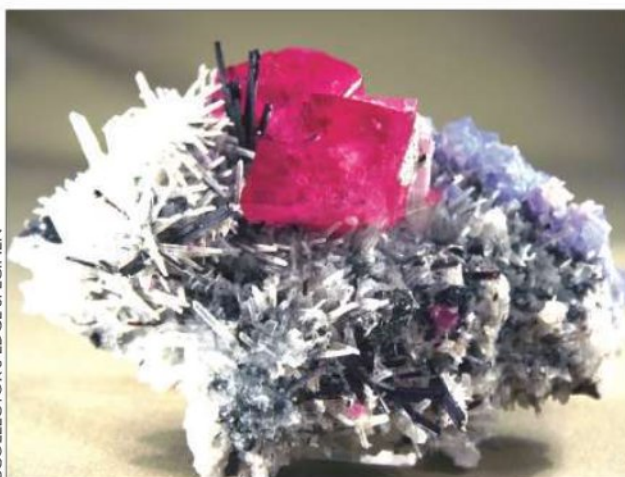
mine, for instance, is famous for its rhombohedral rhodochrosites, while the Kalahari Desert deposit produces superb scalenohedral, or dog-tooth, crystals. The vibrant red color, superb crystal form, and large supply of these exceptionally choice specimens make the Sweet Home and N'Chwaning rhodochrosites true modern classics.

Everyone loves gold. Its vibrant yellow color, thanks to its ability to selectively reflect light, makes it special in the eyes of humans. While humans have collected gold for centuries, the smelting furnace has seen more crystallized gold than any collector has. In decades past, some prime examples of beautifully crystallized gold have survived, particularly from California's gold fields and Colorado's Breckenridge area, but they were treated more as novelties and museum artifacts than collector goods. This was due to the limited number and high cost of specimens.

At the Denver Museum of Nature and Science, you can enjoy stunning crystallized gold specimens from Farncomb Hill in Breckenridge. If that deposit were still producing such beauties in the 20th century, they would have been voted modern classics of the century, but time, a modest price for gold, and a very limited number of specimens disqualified gold as a classic collector specimen.



Remarkable crystallized gold is being recovered from the huge open-pit mine at Round Mountain, Nevada.



The Sweet Home mine at Alma, Colorado, is the source of the world's best rhombic rhodochrosite. This specimen is paired with fluorite and quartz.

All that changed when serious specimen mining began in the last 60 years. Through the efforts of several mineral dealers and a lot of entrepreneurial miners, old mines were opened, not for bullion gold, but for specimens. Among them were the Colorado Quartz mine, the Eagle's Nest mine, and the gold-mining operations at Round Mountain, Nevada. Gradually, superb, branching masses of crystallized gold began coming to market at prices the advanced collector could afford. The mineral market was really excited by these specimens. The dramatic rise in the price of gold in the 1980s contributed to the enthusiasm for gold specimens.

Having lived and collected minerals in Arizona for over 50 years, I have a spot in my heart for good wulfenite! Granted, it is often a fragile mineral, but no one can deny it is one of the more aesthetically pleasing and colorful minerals you can own. Most collectors will name the big, red, tabular crystals from the Red Cloud mine in La Paz County, Arizona, among the very best ever found based on early finds made at the mine in the 1880s. Some of these specimens ended up in the collection of Harvard



Amazing bournonites like this 4-inch crystal are among the world's best and are currently coming from China.

University. It wasn't until the 1930s that professional specimen collector Ed Over broke into a pocket that produced specimens equal to those of the 1880s find.

For several decades after that, local collectors, including me, searched and dug and breathed copious amounts of Red Cloud's brown dust trying to find another such pocket, without much luck. Finally, a group of investors put together a serious surface mining project and attacked the ground fault suspected of holding the red treasures. They were successful, bringing to light thousands of spectacular orange-red wulfenite crystals in groups measuring up to a foot across. Those early blades were single crystals that lacked matrix. None of the new crystals matched the earlier finds for size, but they were superb matrix specimens, fine enough to grace any collection, and in quantity. Together, the earlier spectacular single crystals and the recently mined spectacular matrix specimens have moved the Red Cloud mine wulfenites to the modern classic list.

The several varieties of beryl that have been found in recent decades have certainly put America on the map of classic sources. There have been three exceptional finds: emeralds in North Carolina; aquamarines on Mount Antero, Colorado; and rare red beryls in the Wah Wah Mountains of Utah.

It has been known for over 100 years that there are emeralds around the village of Hiddenite, North Carolina. Sporadic mining and rockhound efforts have brought to light some quite large, reasonably gemmy hexagons of this green beryl, but none of the specimens ever approached the quality of Colombian emeralds. Still, the presence of the gem encouraged repeated efforts to develop mines there.

This effort bore fruit when Jim Hill, a local lad, broke into pockets of emeralds as richly green as anything from South America. The gem crystals were up to several inches long, and many were on matrix. Jim's success stunned the collecting world, made national news, and put North Carolina emeralds on the list of modern classics. If there is a drawback to this story, it has to be the limited supply of emerald specimens coming from the region. Let's hope that further mining effort will improve the supply.

Some superb blue aquamarines were recently mined on Mount Antero in Colorado. The area has been known for decades as a source of aquamarines whose quality was marginal at best. The small crystals found here tended to be very slender and only an inch or two long, and their color tended to be very pale. In the last two decades, a concerted mining effort has opened amazing pegmatite deposits on the mountain, including some that produced 4- and 5-inch-long gemmy, blue prisms of aquamarine on matrix.

These are the finest aquamarines ever found in America, and they certainly suggest that mining in this high-altitude deposit would be profitable. Like the North Carolina emeralds, these remarkable aquamarines are in really limited supply, which is the only drawback to considering them modern classics.

The lack of crystals has not been a deterrent to awarding classic status to the gemmy red beryls that have been mined in the Wah Wah Mountains, near Milford, Utah. This deposit was found during the uranium boom days of the 1950s and was worked mainly as a fun dig, with little effort made to turn it into a commercial en-



JIM AND GAIL SPANN SPECIMEN

**This remarkable spray of the antimony sulfide kermesite comes from the Caiwa antimony mine in Danfeng District, Shangxi Province, China.**

terprise. That changed in the latter part of the 20th century.

The deposit ended up as two separate quarries in the white rhyolite rock. The crystals produced are small, seldom over 1 inch long, but often gemmy. With astute marketing and a lot of hard work, the owner/marketers of one quarry introduced the world to red beryl as a collector mineral and a gem of quality. This resulted in red beryl becoming the darling of the gem market worldwide. Large quantities of non-gem crystals, many on matrix, were offered to the collector world and have become the standard for red beryl crystals.

The quantity of red beryls contained in this huge deposit can only be guessed at, but there is no reason not to assume the rhyolite will continue to produce fine specimens for both the gem trade and the specimen collector world for years to come. As Utah is the only reliable source for this rare member of the beryl family, the crystals can certainly be considered modern classics.

For well over 150 years, the basalt quarries of northern New Jersey produced a wonderful variety of zeolites and associated species. Whenever a railroad cut was quarried, a tunnel dug, or a highway enlarged, zeolite minerals were there for the taking. Ordinary quarry operations for road metal exposed pocket after pocket of these common species. As prolific as these species were and as frequently as they were unearthed, none of the specimens really stand out, and as far as I can ascertain, they were not considered exceptional by collectors of the day.

The same might be said of the early finds of zeolites in India. Again, quantities of prehnite, stilbite, apophyllite, datolite and others were found during quarrying for construction and road materials. I venture to say the collecting world, while acquiring such minerals, never put them on the same plane as so many other species. In recent years, however, that has changed thanks to extensive quarrying and very active collecting and marketing by dealers from India. Vast quantities of zeolites and associated minerals are pouring out of India, and some species are

truly spectacular, among them apophyllite. It is not a zeolite, but is almost always associated with zeolite minerals.

Normally, apophyllite, of which there are three varieties, is a colorless, relatively modest crystallized species, but some remarkable apophyllites are pouring forth from India. Crystals 2 inches or longer, often colored a lovely green, are now commonly encountered during quarrying there.

One recently unearthed form of this lovely mineral occurs in ball-like clusters of pseudocubic crystals. The shape is what makes them so unusual, and a lovely phantom green shade in each crystal adds to their appeal. I doubt there will ever be finer, more appealing apophyllites found than these modern classics from India.

Among American collectors, the luscious green pyromorphites from Kellogg, Idaho, are much prized and will always be considered special. Now, pyromorphite is a common species, found in a host of mines all over the world. Many of these mines produced wonderful clusters of small, hexagonal crystals ranging from vibrant lime green to green in color. All are exceptionally attractive, and those from early German mines are definitely considered classics.

During the last days of mining for silver in Kellogg, a remarkable find of exceptionally bright and large crystal masses of pyromorphite was made. The quantity was huge and the quality of the specimens equaled or exceeded anything ever found for the species. There is little doubt in my mind that the Kellogg pyromorphites are already modern classics and will still be much prized by collectors years from now.

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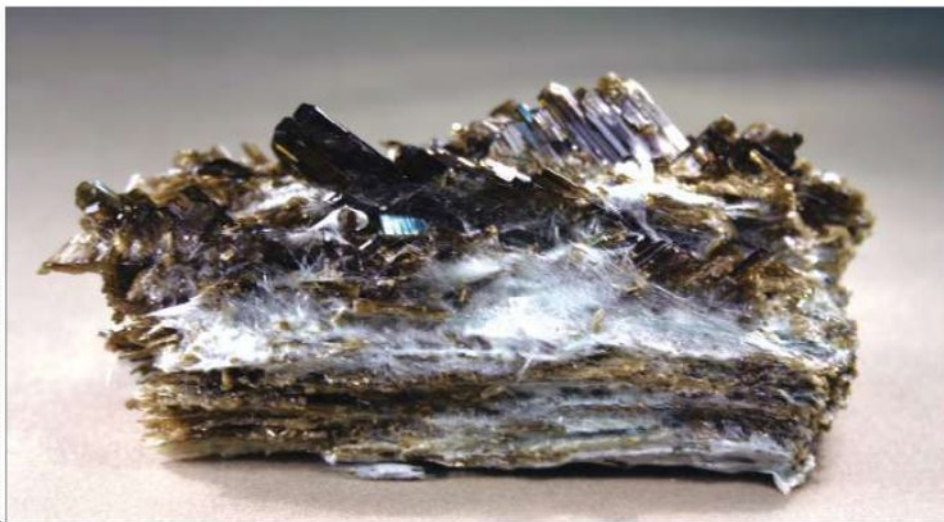
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JIM AND GAIL SPANN SPECIMEN

The epidotes currently coming out of Pakistan rival the world's best specimens from Austria, which have been the standard for the species for decades.

Few would argue that the superb epidotes from Untersalzbachtal, Austria, are the finest epidotes ever found, and are therefore bona fide classics. It came as something of a surprise, then, when Pakistan suddenly began producing epidotes that could easily be mistaken for the Austrian classics. The crystals from Pakistan are dark green and lustrous, and grouped in subparallel clusters sometimes as long as 7 inches. Quantities of these remarkable epidotes have come from Pakistan and are eagerly sought by collectors. They are truly modern classics.

Of all the countries producing minerals now, China seems to have taken the lead in producing potentially classic species. Specimens of several of its minerals are the equal of what we consider the best of species. A few of the exceptional Chinese species that have stirred the collector world are scheelite, cassiterite, bournonite, kermesite and cinnabar. Even the common mineral calcite has been found in remarkable crystals.

As expected, China has produced superb cinnabar crystals. Lovely, red twinned and single crystals on contrasting white matrix are the world standard for the species. They are definitely classics now that large quantities have come onto the world market.

The cassiterites from China far exceed anything ever found in the ancient Cornish tin mines. German sources produced excellent crystals, and those from Araca, Bolivia, are considered by most the world's best for the species. Now China has started producing cassiterites, single crystals and twins on matrix that can be as much as 4 inches on an edge. That's remarkable for the species.

In the years to come, these giants will be prized as much as they are now.

The kermesite from China is nothing short of remarkable. The few localities in which the mineral was found years ago produced small, radiating sprays of crystals that might be an inch long. They are a deep reddish color and have a high luster. Now, China is not only producing quantities of this uncommon mineral, but the major specimens are sprays of crystals as much as 4 inches long! Nothing like this has been encountered anywhere before. This assures the Chinese kermesites of classic status.

China's calcites are not only abundant but, in some cases, stunningly beautiful. The better ones are twinned, with blades to several inches long. A light dusting of reddish iron oxide, probably hematite, adds to their beauty. These calcites are among the more attractive examples of calcium carbonate ever found. Surely, they will end up in the ranks of highly prized classics in the future.

The world-class bournonites are from England, found as cogwheel twins in Cornwall. I doubt these will ever be equaled; however, China is producing bournonites of a different crystal habit: remarkable, single, orthorhombic crystals up to 4 inches long and over 1 inch wide. Nothing like this has been known until now.

If you are going to collect minerals, you might as well collect the best available, according to your personal tastes! The minerals described in this article will, in the future, will be treasured more than many of their contemporary species. ♦



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# SHOP TALK

by William A. Kappeler

## Motors Matter

If you have decided, as so many others have, to build a lapidary machine yourself, one of the most important parts of your project—but one that is often given the least thought—is the motor that will make your machine run. Electric motors come in two basic flavors: those that run on alternating current (AC) and those that run on direct current (DC). Without getting too technical, AC is the house current that runs your microwave, your lights, your flat-screen TV, and most of the other electrical equipment around the house, garage and shop. DC is the stuff that runs your flashlight and your portable emergency radio, and starts your car. If you are the type who likes to walk without actually going anywhere, your powered home treadmill probably uses a DC motor, even though you plug it into the AC outlet in the wall. More about this in a minute.

Before you go looking for a motor, it is good to know that AC motors are among the longest-lasting devices around and the few things that might go wrong with them are usually rather easy and inexpensive to repair, so don't be afraid to look around for a used one. Suitable motors of about 1/4 horsepower are used in things like furnace blower fans, washing machines and dryers, table saws, drill presses, and a whole host of other common items. Used ones are often available from dealers who replace things like furnaces. They take in lots of old motors and are a good source for motors with a lot of life left in them.

One drawback to AC motors for some folks is the lack of a cost-effective way to control their speed. There are AC-motor speed controllers on the market, but they are very expensive. There are lots of folks who recommend using a standard lamp dimmer from the home center to control AC motor speed, but I would advise you not to try it unless you live next to the fire station. These gadgets are great for dimming your reading lamp, but they won't safely control AC motor speed.



The most common shaft speeds for these motors are either 1750 rpm or 3450 rpm. For most lapidary applications, 1750 rpm is the best bet; 3450 is usually too fast and will wear out wheels, disks and blades too quickly. It can also create too much heat and can ruin some heat-sensitive stones. (It will also take off more of your knuckle if you slip.) Of course, this assumes that you are using the motor in a direct drive configuration. For most machines, it is relatively cheap and easy to get just about any speed you want at the blade or the wheel with the use of suitably sized pulleys.

Finally, if you want to control the motor speed on your cabber, for instance, you can use one of those DC treadmill motors and an AC-to-DC-converting speed controller. A good place to get a setup like this is at [www.surpluscenter.com](http://www.surpluscenter.com). You can view the stuff online or request that they send you a catalog. They are really nice people and will answer your questions and help you any way they can with your project.💎

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



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# My Quest for KESWICK AGATE

## How I Tracked a Mystery Stone to Its Source

Story by Barbara L. Miller

It has been an avid interest of mine since childhood to pick up “pretty rocks,” even to the extent of getting off the colt I was breaking to pocket the rock treasure I had spotted while riding in our prairie pasture. That interest has remained with me throughout my life.

My husband, Keith, and I have decorated our home with rock favorites and landscaped our yard with field trip treasures and large, moss-covered granite boulders weighing several tons each. We progressed to stopping at rock shops, and noticed the exceptional beauty in agates and jaspers. The lapidary field was introduced to us by a rock pioneer from Homedale, Idaho, in 1992 and has been a source of pleasure ever since.

During a rock hunting trip to various points in Wyoming in the summer of 1996, we noticed a signboard for the Norman Rock Shop on the outskirts of Lander and headed for the shop. It was a pleasure to meet Margaret Norman. Mick, the other half of the “rock-loving duo,” had passed away in 1986 and she continued to carry on the business. It was what she had enjoyed for many years.

Margaret told me how she had become interested in lapidary. Her family lived in Jeffrey City, Wyoming, which is near the well-known jade area. Her first recollection of rock hunting was when she was 7 years old. Her mother took the family to the Sweetwater agate beds southeast of Jeffrey City for outings many times during the spring and summer months. There were many agates to find in those days. Margaret was hooked on rocks from that early initiation.

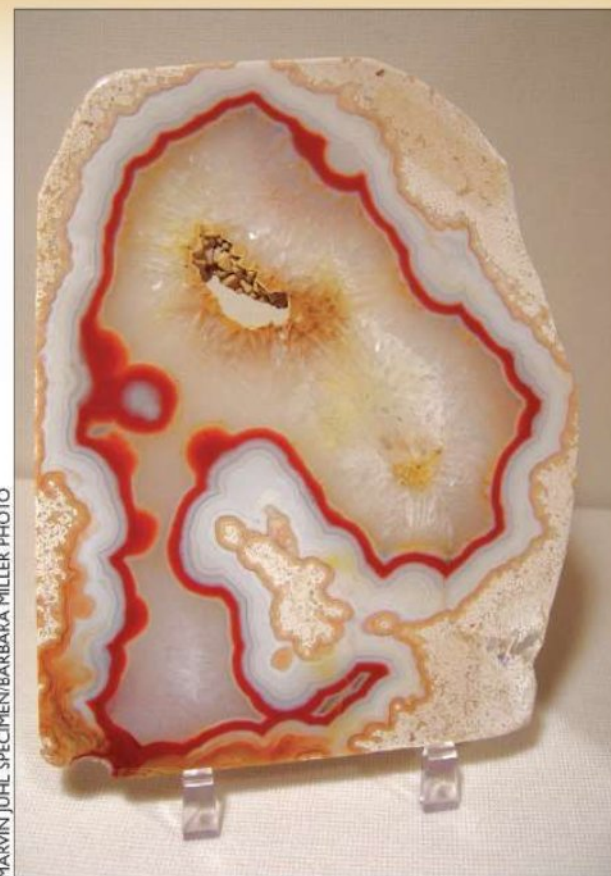
After she and Mick Norman were married, they continued bringing home jade, lysite, Spanish Point agate, and other stones found in Wyoming. They traveled to bordering states to find other treasures. But what could they do with so much rock? Mick learned silversmithing and set the free-form cabochons Margaret had cut and polished

into his personally designed mountings. For 22 years, they sold rough rock, slices and jewelry at their home and in the Lander and Riverton, Wyoming, rock shows.

After we had visited, looked at rocks, and purchased some, Margaret showed us the beautiful jewelry they had made. I was familiar with the various kinds of stone in the mountings, but I had never seen any cabs like the ones in one bracelet, ring and earring set. It was a cream-colored agate with peach-tinted fortifications. Margaret said it was Keswick agate from the Midwest. She had purchased the rough rock from a dealer who was not sure in which state it had been found. The sterling silver bracelet mounting around the polished cabochon was of superior design and quality.

After seeing an agate of which I had no prior knowledge, I came to a rapid decision: I would begin “The Quest for Keswick Agate”! Living in Longmont, Colorado, we attended many rock shows: Denver, Buena Vista, and Delta, Colorado; Moab, Utah; Madres and Prineville, Oregon; Tucson and Quartzsite, Arizona; Deming and Lordsburg, New Mexico. It became a ritual to ask knowledgeable rock people whether they knew of Keswick agate, describing its

MARVIN JUHL SPECIMEN/BARBARA MILLER PHOTO



The most sought after Keswick specimens consist of white or cream agate with red fortifications around a botryoidal, drusy crystal center.

DAVE MALM SPECIMEN/BARBARA MILLER PHOTO



TOP: A Keswick agate specimen with a reddish, botryoidal crystal center is a treasured find among mineral collectors.

BARBARA MILLER PHOTO



MARGARET NORMAN JEWELRY/BARBARA MILLER PHOTO



BOTTOM LEFT: I made my first purchase of Iowa's Keswick agate from Maynard Green at the Moose Lake Agate Days in Minnesota.

BOTTOM RIGHT: My "quest" began when I saw Margaret Norman's bracelet and earrings set with peach-colored Keswick agate cabochons.

appearance, as I had none to show them. No one had heard of the agate.

I decided we were asking in the wrong part of the country. We were going to Minnesota in 1998 to visit Keith's family. Fortunately, we read in *Rock & Gem's* Show Dates column that the Moose Lake, Minnesota, Agate Days would be held in July, while we were in the area.

It was a pleasure to attend this annual rock show. It has Lake Superior agate dealers with specimens beyond belief. Long-time gemstone picture designer and creator Gladys Clark designs and makes beautiful pictures using tiny, polished pieces of agate for flowers, Wyoming green jade for stems, and small Lake Superior agate slices shaped into butterflies.

While enjoying the Agate Days, we were drawn to a booth with many beautifully polished agate and jasper specimens for sale and met Maynard Green of Grand Meadow, Minnesota. In between customers, I learned he had been a rock lover and

dealer for many years. He had a special way of tumble polishing his specimens that was above and beyond anything I had previously seen. He had written an instruction manual on tumble polishing that has very good suggestions to accomplish the art. The book is no longer in print, as Maynard's health and age do not allow a second printing.

After seeing so many of his beautiful specimens and buying a few, I had almost forgotten to ask Maynard whether he knew of Keswick agate. He said, "Yes, I had quite a bit and just sold my last slices a week ago!" He then showed me a red-and-white banded Keswick agate in a silver bola mounting, which I quickly bought. I finally had a piece of Keswick agate!

What a relief to find someone that knew about the agate. Maynard said it was from the limestone quarry northwest of Keswick, Iowa. He had been there when rockhounds were allowed to go in and dig the agate nodules during the hours the quarry was not in operation.

Anxiety to see the agate Maynard had described was running high. He said the most sought after specimens were white or cream agate with red fortifications around a botryoidal drusy crystal center. The peach fortification is also a favorite, but not as rare.

Hoping to see more Keswick agate, I asked Maynard whether anyone had a few pieces that we might be allowed to see. I learned that friends of his lived in northern Iowa and would most likely be happy to have us stop on our way back to Colorado. He said he would arrange it for us, which he did. We stopped in Forest City, Iowa, to meet Marvin and Doris Juhl.

Since seeing Margaret Norman's bracelet, this was the first time I saw Keswick agate in rough slices or nodules, polished slices, and cabochons. The "quest" had been worthwhile; the Juhls had a good representation of the beautiful agate. They had gone to the quarry to gather geodes and nodules, and traded or purchased specimens from Maynard and another Keswick lover, Gene Burry. We bought several specimens of Iowa's Keswick, Ollie, Harper and Coldwater agates.

We enjoyed our visit with Marvin and Doris. I learned that they had seen Keswick agate for the first time at the annual All Iowa Rock Round-up in 1960, but had not made a purchase. They attended the American Federation of Mineralogical Societies (AFMS) show in Des Moines, Iowa, in 1961 and bought several pieces. Naturally, Marvin had to have some equipment, so he bought a grinding and polishing unit. His interest in the lapidary field began, and he was hooked on attending shows, cutting and polishing, joining a rock club, and going on field trips.

Doris told me they will never forget their trip to various hunting areas in Wyoming. During one search, they had to walk across a rain-swollen stream that was up to her waist. She shivered, saying that was the coldest water she had ever experienced. A much happier memory was of the gemstones she had faceted and set into very attractive gold and silver mountings.

Marvin cut and polished petrified wood and made cabochons out of jasper and agate, including Argentina's Condor agate. He entered them in competition at the South Bend, Indiana, and St. Louis, Missouri, AFMS shows. His Condor agate presentation won first place in the 1998 Houghton, Michigan, show.

About 20 years ago, the Juhls spent six weeks in Australia touring opal, chrysoprase, and other rock mining areas. Marvin entered a Bruneau jasper cabochon in his club's annual show competition and won third prize.

My interest in Keswick agate continued after I had cut and polished several peach-colored fortification cabs and set them into personally designed sterling silver pendant and earring mountings. The peach color was my favorite because it is such an unusual stone color.

Having acquired some specimens, I now wanted to know where Keswick agate had been found. In 2003, Keith and I made another trip to the Midwest and to Keswick. We stopped at the service station for information and learned the limestone quarry in which the agate nodules are found was northwest of town. We obtained directions to the quarry and were on our way.

Even though it was a weekday, there was no one in the quarry office. One truck driver stopped to talk to us and gave us a few tips on who to contact in town to learn about the agate. I wish we had asked if we could see the ridge where the agate was found in the open-pit mine, but at the time we felt it might be trespassing. We drove back to the service station to possibly find someone to ask about Keswick agate. Two

customers were happy to tell us they had a silver mounted Keswick cabochon, one set in a ring, the other in a belt buckle, both made by Joe Grove of South English. We made a call to Mr. Grove and explained our interest in the agate. He invited Keith and me to drive to his home.

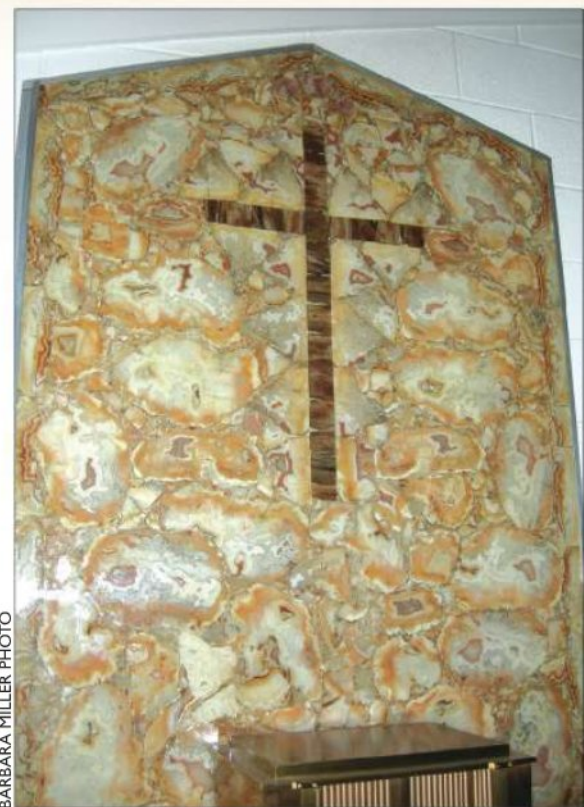
Joe told me a little of the history of Keswick agate. There is only one limestone ridge in which it is found in the open-pit quarry. He told me there was a thick layer of rocky material that had to be dynamited and hauled away in order to mine the underlying limestone. The scarce agate nodules were in the rocky layer, and ranged in size from a few pounds to several hundred pounds. Some were filled with quartz crystals, others with agate. In the early years, Joe said, agate hunters were allowed to come in and dig out the large nodules after the company had dynamited the rocky area.

When Joe told me about his first trip to the agate quarry in the early 1960s, a smile appeared on his face. He had become interested in rocks and was invited to go hunting with a friend. While hunting, Joe found his first nodule and asked if it was a Keswick agate. They cracked it open and he learned the meaning of "leaverite" (leave 'er right where you found it!).

During his lapidary career, Joe set many Keswick cabs into sterling silver mounts. He had no trouble selling them or his rough rock and slices. Also during his career, he served as president of the Keota Gem & Mineral Club and was a member of the Iowa City Gem & Mineral Club.

I learned that Ollie and Harper agates are akin to Keswick agate. Ollie agate has a grey background with darker-colored fortifications, while Harper agates have a few colors integrated among the shades of grey. They are found in limestone quarries about 20 miles southeast of Keswick.

The Juhls had told us about Gene Burry, a Keswick agate collector in Waterloo, Iowa, but we did not have time on this trip to backtrack and make contact. A few years later, we were at the Buena Vista, Colo-



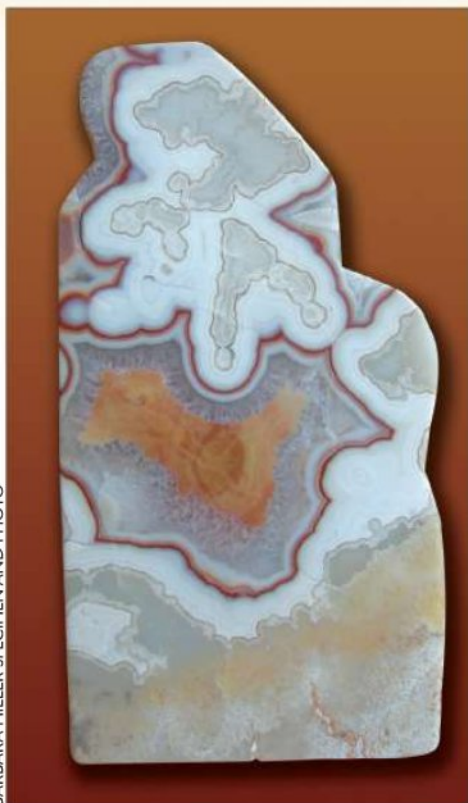
BARBARA MILLER PHOTO

**Parishioners are still proud of Fr. Pacha's Keswick agate mosaics in their North English, Iowa, church.**

rado, rock show enjoying the good rock the exhibitors had for sale when I saw a display of Keswick agate. My interest was piqued and I began talking to the fellow with the display. Surprisingly, it was Gene Burry. He had gone to the limestone quarry near Keswick to retrieve the agate nodules and beautiful crystal geodes, some weighing up to 200 pounds, in the earlier collecting years.

Since we met Gene, he has sent me additional information about Keswick agate. Reading the articles, I learned that he began rock hunting in 1965, going to local creeks, sand pits, and quarries, and finding quality specimens of Lake Superior, Coldwater and Keswick agate. He found many minerals, including brown barite cubes, calcite crystals and pyrite at the Pint's Quarry near Raymond, Iowa. He sadly reports that the quarry is now underwater, making collecting impossible. Gene has been a member of the local Blackhawk Gem & Mineral Club for many years.

Gene has loaned me his personal copy of "The Minerals of Iowa", by Paul J. Horick, a geologist with the Iowa Geological Survey (State of Iowa, 1974). It is a marvelous reference to the many minerals found in the state, including petrified wood and various agates. The publication is available



An Iowa Keswick agate slice was the second treasure I purchased when I started my collection.

from the Iowa Geological Survey in Iowa City, Iowa.

Gene's article "Autobiography of an Iowa Agate Lover" (*Lapidary Journal*, September 1979) included tales of his Keswick and Lake Superior agate field trip experiences. He told of meeting some of the "old-timers" in the rock hunting and jewelry making fields, which intensified his interest.

During a Keswick agate field trip, he and a friend, Jeff Groff, saw a beautiful agate in a cliff, about 25 feet from the rim. It was winter, and icicles were hanging from the wall. Jeff began working his way down a thin ledge to the nodule. The icicles were melting as the sun heated them, making the narrow path descent slippery. Jeff reached the nodule, was thrilled to see its wide fortification bands, and began to pry it out. The entire agate nodule fell into his lap, rolled off, and dropped into the frozen pond below. Gene said when he heard the loud splash, he was terrified his friend had fallen into the pond with the agate and been killed! Fortunately, Jeff was not injured, but the agate went on through the ice and into the freezing water, never to be found again.

Gene also found Coldwater agates in the banks of the Cedar River at Pork

Chop Hill, near Urbana, Iowa, and says one may still have good luck hunting in the area. One rarely sees Keswick, Harper, Ollie or Coldwater agates in museums or personal collections. They are very beautiful and a prized addition to any rock lover's specimens.

On our way to the Agate Seminar in Menasha, Wisconsin, in July 2008, Keith and I stopped in Iowa to investigate Keswick agate a bit further. We were lucky to have found a very nice campground, north of Amana, Iowa, that had not been closed due to the recent, terrible floods.

Gene had given me a copy of an article written by Fr. Ray J. Pacha entitled "Iowa Has Its Rock Treasures" (*Lapidary Journal*, December 1966) that told about his love of rocks. He described looking for rocks as a youngster to decorate around the family flower gardens. He wanted to build a small shrine at St. Joseph's Catholic Church in North English, Iowa, using geodes found in the state and had been driving quite a distance to gather them. During a meeting of parishioners, he showed his collection. One of the ladies told him he need not drive so far; he could get all the agates he wanted at a quarry near Keswick. Thus began his love of cutting and polishing the beautiful agate, designing and making unique pieces from it. He began going to the quarry in 1962 and said rockhounds had been finding agates there for several years.

After reading the above information, we drove to North English to see Fr. Pacha's unique Keswick agate items. We saw his beautiful mosaics (polished slices joined together seamlessly) on each side of the pulpit. On the east lawn is a unique "grotto" Fr. Pacha built using Keswick agate geode slices and various polished slabs of petrified wood. The grotto was dedicated on May 1, 1966. We visited with several parishioners, who were very proud of the grotto and mosaics.

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stone quarry from the original company or lessee and does not allow the hunting of Keswick agate. This happens too often, lately, which is not good news for rockhounds. Some rock clubs carry insurance to cover accidents so that the landowner will not be held liable. There would be a great amount of goodwill created throughout the area and among rock hunters if they were allowed to search for Keswick agate during company down time. Everyone hopes this will eventually happen.

Gene had made arrangements to take Keith and me to visit his friend Dave Malm in Cedar Falls, Iowa. Malm was introduced to the Keswick agate 30 years ago when Gene had taken him on a field trip to the Keswick quarry. He is now an avid gatherer of Keswick agate and says it is his favorite. Dave said he was told Lloyd Rugg was one of the first finders of Keswick agate and that the early finds resembled white quartz cycads with red fortification. Rugg was reported to have had one of the finest collections of Keswick in existence. Dave's collection is one of a kind, and includes the local Harper, Ollie and Coldwater agates. Gene told us Dave had purchased most of his favorite pieces several years ago and now has one of the best southern Iowa and Pint's Quarry specimen collections around. Dave has been a member of the Blackhawk Gem & Mineral Society for about 20 years.

As I look back over the years of my quest, I cannot find enough words to express my thanks to the dedicated rock lovers who helped to bring this adventure to a marvelous conclusion. 💎

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MARVIN JUHL SPECIMEN/BARBARA MILLER PHOTO

This spectacular slice of Keswick agate has reddish-orange fortifications on a cream-colored background.



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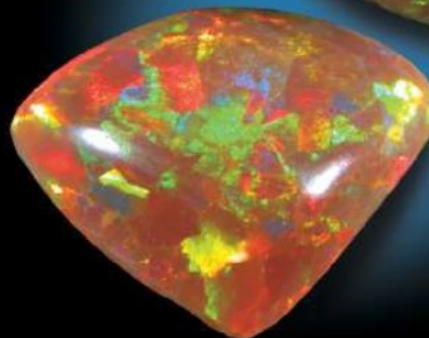
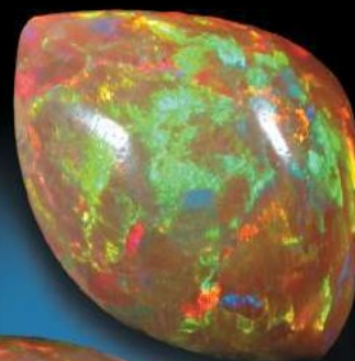
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**R**OCK SCIENCE**SiO<sub>2</sub>: It's Not Just Quartz**

Mineral collectors know that quartz consists of silicon dioxide (SiO<sub>2</sub>). What they may not know is that, while all quartz is silicon dioxide, not all silicon dioxide is quartz. SiO<sub>2</sub> molecules can actually form crystals or mineraloid masses nine different ways, resulting in six different mineral species, a possible species, a mineraloid, and a synthetic material. The six silicon-dioxide minerals are mutual polymorphs with identical chemistries, but different crystal structures. They are quartz, cristobalite, tridymite, coesite, stishovite and melanophlogite. When pure or nearly pure, all these polymorphs are colorless or white, but differ in their other physical properties.

Cristobalite crystallizes in the tetragonal system, is slightly softer than quartz at Mohs 6.5, and is much less dense, with a specific gravity of 2.27. It is a high-temperature quartz polymorph that forms in solidifying rhyolitic magma.

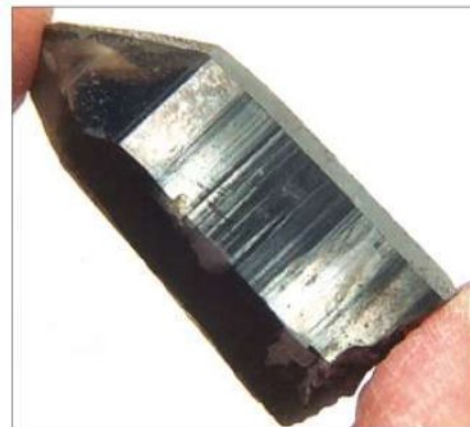
Tridymite is also slightly softer than quartz, has a specific gravity of 2.3, and crystallizes in the triclinic system. It also forms in solidifying magma, but at a lower temperature than cristobalite.

Coesite was synthesized in 1953, then discovered in nature in 1960 at northern Arizona's Meteor Crater. This rare polymorph crystallizes in the monoclinic system at very high temperatures and pressures, and occurs in crater impact sites and kimberlite pipes. Coesite is considerably harder than quartz at Mohs 8 and has a slightly greater density.

Stishovite, which also forms at very high temperatures and pressures, was synthesized in 1961, then discovered seven years later as tiny, natural crystals, also at Meteor Crater. It crystallizes in the tetragonal system and its close atomic packing results in a high specific gravity of 4.35, nearly twice that of quartz. A bit softer than quartz, stishovite occurs only in meteor-impact craters. Well-developed crystals are rare because their split-second impact creation provides little time for development.

Melanophlogite consists of silicon-dioxide molecules attached to organic molecules containing carbon, nitrogen and hydrogen. Melanophlogite forms microcrystals in the monoclinic system, has a specific gravity of 2.0, and is slightly softer than quartz at Mohs 6.5.

All these natural silicon-dioxide polymorphs are metastable at normal tempera-



**Silicon dioxide, most familiar as common quartz, also occurs as five other distinct minerals.**

tures and will eventually, over very long periods of time, transform into quartz. Furthermore, quartz, cristobalite and tridymite have alpha (low) and beta (high) temperature phases, meaning that their structures differ at low and high temperatures. Both alpha- and beta-quartz crystallize in the hexagonal system, with the beta phase showing less symmetry. Beta-cristobalite is isometric, while alpha-cristobalite is tetragonal; beta-tridymite is hexagonal, but its alpha phase is monoclinic.

The natural pseudomorph moganite (Mohs 6) forms tiny, monoclinic crystals and occurs in association with chalcedony or microcrystalline quartz. Moganite was once considered a distinct species, but recognition has been withdrawn pending further study.

Lechatelierite, a natural, rare polymorph, has an amorphous structure and is thus technically a glass. It is considered a mineraloid and classified with opal.

Synthetic keatite crystallizes in the tetragonal system. Some mineralogists believe that keatite exists in nature, though it has not yet been discovered.

Therefore, while the terms "silicon dioxide" and "quartz" are often used interchangeably, there is actually much more to silicon dioxide than just quartz. ♦

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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# MEXICO'S MALACHITE AFTER AZURITE

## The Milpillas Mine Is Producing the World's Best Specimens

Story and Photos by Bob Jones



Choice examples of recently mined malachite after azurite from the Milpillas mine at Sonora, Mexico, rival those that were previously found in nearby Bisbee and Morenci, Arizona.



Very fine azurite crystals often form in thin fracture seams in the rhyolite around the Milpillas ore body.

It has been well over a year since I reported on the Milpillas mine in Sonora, Mexico, a new source of superb azurites and malachites. Current production has yielded some stunning specimens of these two carbonate minerals. Mexico is not well known for its azurite and malachite, having long been eclipsed by nearby Bisbee and Morenci, Arizona. Now, the Milpillas mine specimens rival those from Arizona's best sources!

The Milpillas mine deposit has been known of for decades, but it wasn't until 2006 that a mine was formally opened there. Because the ore body was buried under more than 1,000 feet of sediments, it was necessary for it to be shaft mined, not open pitted, which is a less expensive process. The mine, operated by the Penoles Mining Co. opened when an increase in copper metal prices made it viable.



Superb, dark-blue, 1-inch azurite crystals show some minor damage due to blasting the rhyolite matrix at the Milpillas mine.

Once mining started, it was clear there were unusual circumstances connected with the deposit. For one thing, the copper-rich porphyry, though a typical copper-molybdenum deposit, was not in broad contact with limestone, as at Bisbee. Instead, the host rock was heavily fractured rhyolite, a gray, tough, silica-rich volcanic rock.

As weathering proceeded through the millennia, copper-rich solutions penetrated the volcanic rock. Luckily, they contacted enough limestone to provide the carbonate radical necessary to form the copper carbonates azurite and malachite.

Also unlike that of Bisbee specimens, the matrix of most Milpillas specimens is a high-silica, gray, tough rhyolite that is brecciated and fragmented. In some cases, the azurite actually contains crumbs and bits of rhyolite. The azurite and malachite is found in thin fracture seams in the rhyolite, mainly around the perimeter of the sulfide ore body. The available solutions spread throughout the host rock of rhyolite, filling cracks and small openings before depositing its rich load. This is where today's secondary oxide minerals—azurite, malachite, native copper, plancheite, antlerite, brochantite, and the like—have developed.

In the summer of 2007, Milpillas began yielding superb azurites, along with choice malachite pseudomorphs after azurite in quantity. These lovely, shimmering, velvet green specimens are the best to ever come from Mexico, and many exceed or at least rival specimens from other well-known sources.

The fascinating thing about the velvet malachite-after-azurite pseudomorphs is that the better specimens show no damage or bruising at all. One can only assume that the initial azurite formed under circumstances that allowed ample space for complete crystal development. This may be due to the action of weathering, which created openings in the limestone that were larger than those found in the rhyolite.

These *lovely, shimmering, velvet green* specimens are the best to ever come from Mexico, and many exceed or at least rival specimens from other well-known sources.



Choice velvet malachite pseudomorphs after azurite with just a hint of rhyolite peaking around the lustrous green beauties.

Most fine specimens develop in the secondary zone of a deposit, so when work descends into the unaltered sulfide zone, where few openings and little alteration has occurred, specimen production drops off. So far, this has not happened at Milpillas! The Milpillas mine is currently encountering oxide ores with their accompanying fine collector specimens and producing the finest azurites and malachite pseudomorphs available on the market today! How long this will last remains to be seen.

Oddly, the current ore production is in a very rich chalcocite zone. Chalcocite is usually a secondary enrichment mineral, but in this case it may be a primary ore. This unusual circumstance was first identified at the Bristol, Connecticut, copper mine in 1922.

Specimen collecting at Milpillas was difficult for several reasons: The rhyolite was hard and brittle. Most crystals had formed in the



These 2-inch malachite after azurite crystals are typical of the finest such specimens coming from the Milpillas mine at Sonora, Mexico.



Heavily fractured rhyolite, a gray, tough, silica-rich volcanic rock, is the matrix on which these 1-inch, razor-sharp azurites formed.

narrow seams between rock fragments, so it was not unusual for crystals to become attached to the opposite walls of the seams. This created collecting problems which were exacerbated by a restrictive collecting policy, so damage to collected crystals was inevitable! Many azurites show very minor damage, but the crystals are so brilliant, sharp and often exceptionally large that it is overlooked by collectors. After all, Milpillas azurites are certainly the best ever found in Mexico, rivaling those from Bisbee, Tsumeb, and other specimen sources.

Part of the extraction problem was solved to some degree through experience; still, the ban on collecting of any mineral specimens was tough. Supervisors were instructed to fire any miners they caught collecting. This forced miners, in effect, to grab whatever specimens they could after a blast, with little or no time to exercise care. They put specimens in pockets or hid them in the mine for later removal. This really limits how many specimens this can produce and modest size of most Milpillas specimens. It also accounts for some of the very minor damage seen on some Milpillas azurites.

During working hours underground diggers as expected to produce ore, not wander off to collect specimens! For that reason, the mining company has really put a clamp on specimen mining of any sort. They have installed metal detectors that off-shift miners go through when leaving the site. While such devices may not detect most mineral species, native copper being the exception, they serve as a stark

reminder to the miners they are not allowed to bring anything out of the depths! This certainly inhibits some miners in their search for specimens.

Before the installation of the detectors, a small number of finely crystallized native copper specimens were brought to grass at Milpillas, but none have reached the market lately. The detectors are probably one reason specimen production has tapered off here. Considering the economy, most miners want to keep working, so they refrain from specimen collecting. Given the value of fine specimens these days, however, any miner who manages to collect even one specimen can make really good money once away from the mine. This makes the risk worthwhile for some.

Another major cause of crystal damage is the blasting itself. It is destructive and undoubtedly does great damage to many specimens. Luckily, enough specimens survive and are gathered in excellent condition to sell.

The formation of azurite in the fractured rhyolite is also a problem. Some specimens are attached to large chunks of rhyolite, cemented together by thin azurite seams. This is clear evidence that the solutions filled cracks in the rhyolite. The hard rhyolite, which blasting shatters into shards with sharp edges, doubtless damages nearby azurites. Further damage can occur when miners try to break away azurite-rich rhyolite. Luckily, damage is usually minor, virtually insignificant. The large size, brilliance and breath-

taking crystal form of the better specimens simply obscures any small defects.

Since the host rhyolite was fractured long before any mineral deposition, the rock is a true breccia. Once solutions invaded and deposited their specimen load, the gray rock fragments became attached to the crystals, so they form the matrix. It takes very careful collecting and preparation to remove the detracting chunks of rhyolite and produce a specimen that is aesthetic, showy and undamaged. This task often falls to the dealer who purchases the specimens.

In spite of all the restrictions and the difficulty of collecting anything underground, a small but steady flow of superb specimens, mainly azurite and malachite pseudomorphs after azurite, are forthcoming. In 2008, my son Evan and I ventured into Sonora, Mexico, and bought specimens directly from the main supplier, who lives near the mine (see "Milpillas Azurite and Malachite", May 2008 *Rock & Gem*, p. 12). Evan still buys from the fellow, but instead of going into Mexico, which is not particularly safe these days, the supplier brings his specimens to our area and arranges a rendezvous with Evan. This accounts for Evan Jones Minerals being recognized as a major supplier of Milpillas minerals, especially superb azurites and malachites.

For some reason, the malachite pseudomorphs after azurite usually show little or no damage. I suspect it is because they formed in areas that had openings large enough for azurites, later replaced by



Large, striated azurite crystals, some of them measuring over an inch, rest on fibrous green malachite from Mexico's Milpillas mine.

malachite, to develop unhindered. These pseudomorphs are astounding. They are found as radiating fans of 1-inch blades, or they are thick, tabular, 1- to 2-inch crystals with a blocky form. Others are sharp, free-standing blades in lovely clusters. The better clusters are 6 inches or more across, with crystals at least an inch wide and 1 to 2 inches long. Almost all specimens show a very lovely chatoyant, velvety luster and light to deep green color. These are the finest malachite pseudomorphs I've ever seen from anywhere.

The Milpillas mine is just about 45 kilometers south of the border and is akin to the famous porphyry deposit at Bisbee, a couple dozen miles away. While Bisbee was mainly a porphyry whose major ore was chalcopryite, the Milpillas ore is primarily chalcocite. Could it be that the Milpillas chalcocite ore is a primary ore, not a secondary ore? Only extensive studies will answer that intriguing question.

The emphasis of underground collecting at Milpillas is on the azurite and malachite, since they bring the greater return to the miner who risks his job to collect. They are also the easiest for miners with little specimen experience to recognize. Eventually, we hope the mining company will realize the value of collector specimens and make provision for some of them to be saved so that these and other minerals will become part of the significant production from Milpillas. After all, fine mineral crystals are Nature's creations and should be preserved! 💎

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**10-11—MARIPOSA, CALIFORNIA:** 10th annual show; California State Mining and Mineral Museum, Mariposa Gem & Mineral Club, California State Mining and Mineral Museum Association; Mariposa County Fairgrounds, Hwy. 49; Sat. 10-6, Sun. 10-4; gems, minerals, crafts, speakers, mineral exhibits, educational activities, raffles, silent auctions; contact Dianne Vereschagin or Darci Moore, (209) 742-7625

**10-11—PARADISE, CALIFORNIA:** Show, "Paradise of Gems"; Paradise Gem & Mineral Club; Elks Lodge, 6309 Clark Rd.; Sat. 10-5, Sun. 10-4; adults \$2; contact Manuel Garcia, 5659 Foster Rd., Paradise, CA 95969, (530) 877-7324; e-mail: mmpg@earthlink.net

**10-11—PARIS, ONTARIO, CANADA:** 38th annual show; Brantford Lapidary & Mineral Society; Paris Fairgrounds, 139 Silver St.; Sat. 10-5, Sun. 10-5; adults \$3, children 12 and under free; dealers, gems, minerals, fossils, stones, lapidary equipment and supplies, fine jewelry, supplies, beads, demonstrations, exhibits, silent auction, "Mine for Gems" display; contact Robert Parry, P.O. Box 29, 138 Sugar Maple Rd., St. George, ON N0E 1N0, (519) 448-1236; e-mail: robert@roberthalloriginals.com; Web site: www.brantfordlapidarymineral.ca

**10-11—POCATELLO, IDAHO:** Show; SouthEast Idaho Gem & Mineral Club; Bannock County Fairgrounds, 10588 Fairgrounds Rd.; Sat. 10-6, Sun. 10-5; contact Martin Rakatansky, (208) 233-2538; e-mail: rak80@cableone.net

**11-12—BLOOMINGTON (MINNEAPOLIS), MINNESOTA:** Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Ramada Inn Mall of America and Convention Center, 2201 E. 78th St. (I-494 at 24th Ave. S. Exit); Sun. 11-6, Mon. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

**11-12—GRESHAM, OREGON:** Show; Mount Hood Rock Club; Mount Hood Community College Gym, 26000 SE Stark (south end of the campus); Sat. 10-6, Sun. 10-5; contact Keene Clay, (503) 558-8500; e-mail: ODROC@comcast.net

**16-18—ALPINE, TEXAS:** Show, "Wonders from our desert and beyond"; Chihuahuan Desert Gem & Mineral Club; Kokernot Lodge, Rte. 223 bypass; Fri. 9-6, Sat. 9-6, Sun. 11-5; free admission; Kids' Corner, door prize, dealer demonstrations, video "What's Hot in Tucson"; contact Mary Brogan, P.O. Box 1111, Alpine, TX 79831, (432) 837-3824; e-mail: marybrogan@rocketmail.com; Web site: www.agates123.com/cdgm/c

**16-18—LIVONIA (DETROIT), MICHIGAN:** Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Embassy Suites, Livonia/Novi, 19525 Victor Pkwy.; Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

**16-18—RICKREALL, OREGON:** Show, "Rocks of Oregon"; Willamette Agate & Mineral Society of Salem; Polk County Fairgrounds, 520 S. Pacific Hwy. W; Fri. 9-6, Sat. 10-6, Sun. 10-4:30; contact Kristi Edwards, 1236 SE Seaport Circle, Corvallis, OR 97333, (541) 738-6811; e-mail: edwardskk@gmail.com

**16-18—ROSEVILLE, MICHIGAN:** Annual show; Mount Clemens Macomb Gem & Lapidary Society; Roseville Recreation Center, 18185 Sycamore; Fri. 9-7, Sat. 10-7, Sun. 11-4; adults \$3, students \$1, children under 12 free; contact Jacqueline Swain, 20719 Wendy Ln., Grosse Pointe Woods, MI 48236, (313) 469-7868; e-mail: jacswain018@aol.com

**16-18—SAN JOSE, CALIFORNIA:** Show, "The Art of Stone"; Santa Clara Valley Gem & Mineral Society; 344 Tully Rd.; Fri. 9-5, Sat. 10-5, Sun. 10-5; adults \$6, children under 12 free; dinosaur speaker, antique appraiser, kids' education program, demonstrators, flint knapping, fluorescent minerals, dealers, displays; contact Marc Mullaney, (408) 691-1584; e-mail: geologistm@aol.com; Web site: scvgms.org

**16-18—SARASOTA, FLORIDA:** Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Trail (Hwy. 41); Fri. 10-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave. #203, Sarasota, FL 34236, (941) 954-0202; e-mail: frankcox@comcast.net; Web site: www.frankcoxproductions.com

**17—NORTH LITTLE ROCK, ARKANSAS:** Annual swap; Central Arkansas Gem, Mineral & Geology Society; Burns Park, Elder Johnson Pavilion, I-49 Exit 150, Military Dr.; Sat. 8-5; free admission; bring your own table or tailgate; contact Pat Kissire, 4900 Sparks Rd., Little Rock, AR 72210, (501) 821-2346; e-mail: pkissire@sbcglobal.net; Web site: www.centralrockhound.org

**17-18—COLUMBUS, OHIO:** Show, "Central Ohio Mineral, Fossil, Gem & Jewelry Show"; Columbus Rock & Mineral Society, Licking County Rock & Mineral Society; Veterans Memorial, 300 W. Broad St.; Sat. 10-6, Sun. 11-5; adults \$7, seniors \$6, ages 6-16 \$3, children under 6 and Scouts free; exhibits, speakers, demonstrators, ID booth, silent auctions, swap area, 27 dealers; contact Ken Harsh, 297 E. Selby Blvd., Worthington, OH 43085; e-mail: karmakenha@aol.com

**17-18—DAVENPORT, IOWA:** Spring show; Black Hawk Gem & Mineral Club; Putnam Museum and IMAX Theatre, 1717 W. 12th St.; Sat. 10-5, Sun. 10-4; free admission; rocks, minerals, fossils, agates, geodes, tumbled stones, carved stone, beads, silver and beaded jewelry, spheres, arrowheads, demonstrations, bead making, faceting, flint knapping, arrowhead making; contact Craig or Kellie Moore, 718 Franklin Ave., Davenport, IA 52806, (563) 445-3034; e-mail: blackhawkgemandmineral@aol.com; Web site: www.blackhawkgemandmineralclub.com

**17-18—DOTHAN, ALABAMA:** 3rd annual show; Dothan Gem & Mineral Club; Westgate Park James Grant Center, 501 Recreation Rd.; Sat. 9-5, Sun. 10-4; free admission; door prizes, silent auction, jewelry, minerals, cutting rough, slabs, gem trees, tumbled stones, mineral displays, equipment demonstrations; contact Arnie Lambert, 920 Yorktown Rd., Dothan, AL 36301, (334) 792-7116; e-mail: arnlambert@comcast.net

**17-18—EAU CLAIRE, WISCONSIN:** 47th annual show; Chippewa Valley Gem & Mineral Society; Eau Claire County Expo Center, Lorch Ave. (Hwy. 93 and I-94); Sat. 9-5, Sun. 10-4; silent auction, minerals, fossils, crystals, gems, rocks, artifacts, jewelry, demonstrations, hands-on booth; contact Mike Schoenfess, (715) 456-0664

**17-18—FREEPORT, NEW YORK:** Show; Freeport Recreation Center; 130 E. Merrick Rd., Meadowbrook Pkwy. to exit M9 west (Merrick Road); Sat. 10-5, Sun. 10-5; adults \$5.50, children under 12 free with adult; dealers, minerals, gems, jewelry, fossils, beads, a goldsmith to set stones and do repairs, save 50 cents with this ad; contact Ralph Gose, P.O. Box 1418, Melville, NY 11747, (631) 271-8411; e-mail: kaleidoscopegemshows@yahoo.com

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**17-18—IDAHO FALLS, IDAHO:** 45th annual show; Idaho Falls Gem & Mineral Society; Idaho Falls Recreation Center, B St.; Sat. 10-6, Sun. 10-5; adults \$2, children under 12 free; contact Greg Hayes, (208) 521-8885

**17-18—KENNEWICK, WASHINGTON:** Annual show; Lakeside Gem & Mineral Club; Benton County Fairgrounds, 1500 S. Oak; Sat. 10-5, Sun. 10-4; contact Mickie Madden, (509) 582-8599; e-mail: Mickiemadden@charter.net

**17-18—PITTSBURGH, PENNSYLVANIA:** Show; Monongahela Rockhounds; West Mifflin Volunteer Fire Co. #4 Skyview Hall, 640 Noble Dr.; Sat. 10-6, Sun. 10-4; free admission; contact Bret Howard, (724) 327-8618; e-mail: show@monongahelarockhounds.org; Web site: www.monongahelarockhounds.org

**17-18—WALNUT CREEK, CALIFORNIA:** Show, "Contra Costa Crystal Fair"; Pacific Crystal Guild; Civic Park Community Center, 1375 Civic Dr. at Broadway; Sat. 10-6, Sun. 10-4; admission \$6; contact Jerry Tomlinson, (415) 383-7837; e-mail: sfxtl@earthlink.net; Web site: www.crysalfair.com

**17-18—YAKIMA, WASHINGTON:** 49th annual show, "Parade of Gems"; Yakima Rock & Mineral Club; Central Washington State Fairgrounds, Modern Living Bldg., Fair Ave. and E. Nob Hill Blvd.; Sat. 10-6, Sun. 10-4; dealers, demonstrations, gold panning, silent auction, junior activities, grab bags, door prizes, raffle, Spin A Wheel; contact Marti Sondgeroth, (509) 248-6401 or (509) 910-3484; e-mail: marthams@q.net

**23—WICHITA, KANSAS:** Show; 57th annual show; Wichita Gem & Mineral Society; Cessna Activity Center, 2744 George Washington Blvd.; Fri. 9-7, Sat. 10-7, Sun. 10-5; adults \$5, children \$1; annual Rocky Mountain Federation meeting; contact Gene Maggard, 8318 S.E. Hwy. 77, Leon, KS 67074-9026, (316) 742-3746

**23-25—DECATUR, ILLINOIS:** 58th annual show; Central Illinois Gem & Mineral Club; Macon County Fair Grounds, 3700 N. Westlawn Ave.; Fri. 11-6, Sat. 9-6, Sun. 10-4; adults \$5 (good all three days), seniors \$2, kids under 15 free; dealers, demonstrators, displays, Illinois DNR Oil & Gas Trailer, gemstones, fossils, jewelry, beads, minerals, findings, door prizes, kids' corner, "Running Water Sluice"; contact Tony Kapta, (309) 830-6516; e-mail: cigmc@comcast.net

**23-25—DENVER, COLORADO:** Spring show, "Colorado Mineral & Fossil Show"; Martin Zinn Expositions LLC; Holiday Inn - Denver Central, 4849 Bannock St.; free admission; 80 wholesale and retail dealers, minerals, fossils, gems, jewelry; Fri. 10-6, Sat. 10-6, Sun. 10-5; contact Martin Zinn Expositions, P.O. Box 665, Bernalillo, NM 87004-0665, fax (303) 223-3478; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

**23-25—GRANTS PASS, OREGON:** Show; Rogue Gem & Geology Club; Josephine County Fairgrounds, Redwood Hwy.; Fri. 9-5, Sat. 9-5, Sun. 9-4; adults \$1, children free; dealers, displays, demonstrations, door prizes, games, silent auction; contact Mary, P.O. Box 1224, Grants Pass, OR 97528, (541) 479-1045; e-mail: rockhoundclub@yahoo.com; Web site: www.roguegemandgeology.com

**23-25—IRVINE, KENTUCKY:** Show, "3rd annual Mountain Mushroom Festival Rock, Gem & Mineral Show"; City of Irvine, 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, Kentucky agate, jewelry, fossil and mineral sales, Kentucky agate field trips Apr. 20-22, register online; contact Phil Daly, 10330 Forkland Rd., Parksville, KY 40464, (859) 854-0418; e-mail: philipdaly@bellsouth.net; Web site: http://mountainmushroomfestival.org/

**23-25—LINCOLN, GEORGIA:** Graves Mountain Rock Swap and Dig; Junior Norman; Graves Mountain Mine; Fri. 8-6, Sat. 8-6, Sun. 8-6; admission by donation; collect from 8 am to 6 pm each day, sell and trade minerals; contact Junior Norman, (706) 401-3173; e-mail: rick@wncrocks.com; Web site: www.wncrocks.com/resources/Collecting%20sites.htm

**23-25—SALT LAKE CITY, UTAH:** Show, "Festival of Gems"; Wasatch Gem Society; Utah State Fair Park, 115 North 10th West, Zion Bldg.; Fri. 10-6, Sat. 10-6, Sun. 10-5; adults \$2, children free; displays, lapidary demonstrations, grab bags, Wheel of Fortune, silent auction, door prizes, gem and mineral dealers; contact Jeff Huefner, (801) 467-6850; e-mail: WGSshow@gmail.com; Web site: wasatchgemsociety.com

**23-25—SAN DIEGO, CALIFORNIA:** Show, "Gem Faire"; Gem Faire Inc.; Scottish Rite Event Center, 1895 Camino del Rio S.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (603) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**24-25—CUYAHOGA FALLS, OHIO:** Show, "Gemboree"; Akron Mineral Society & Summit Lapidary Club; Emidio & Sons Expo Center, 48 E. Bath Rd.; Sat. 10-6, Sun. 10-6; adults \$5, students and seniors \$4, children \$1; lapidary demonstrations, art and educational displays, gem identification, geode cracking, gem mine, make-and-take projects for children, dealers, door prizes, silent auction; contact Evelyn Tryon, 2028 Tallmadge Rd., Kent, OH 44240, (330) 673-9664; e-mail: etjtryon@juno.com; Web site: www.LapidaryClubofOhio.org

**24-25—ELMA, WASHINGTON:** Show, "Earth's Treasures"; Grays Harbor Gem & Geology Society; Gray's Harbor County Fairgrounds, 32 Elma-McCleary Rd.; Sat. 10-5, Sun. 10-5; contact Gary Emberly, 624 Fairmont Place, Aberdeen, WA 98520, (360) 533-6196; e-mail: Melissa624@hotmail.com

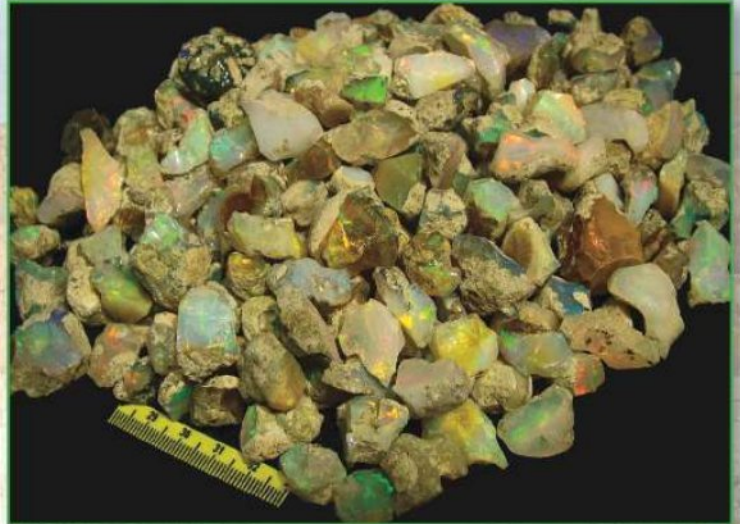
**24-25—FORT DODGE, IOWA:** Annual show; River Valley Rockhounds; Webster County Fairgrounds, Old Hwy. 169; Sat. 9-5, Sun. 11-4; admission \$1; displays, dealers, door prizes, free specimens for children; contact Robert Wolf, 3521 10th Ave. N, Fort Dodge, IA 50501, (515) 955-2818; e-mail: midnightrwriter@frontiernet.net

**24-25—FRANKLIN, NEW JERSEY:** 38th annual show and swap; Franklin-Ogdensburg Earth Science Association, New Jersey Earth Science Association, Sterling Hill Mining Museum; Franklin School, 50 Washington Ave.; Sat. 9-5:30, Sun. 9-5; adults \$5, children under 14 free with paying adult; contact Sterling Hill Mining Museum, (973) 209-7212

continued on page 46

# Opals: The Queen of Gems

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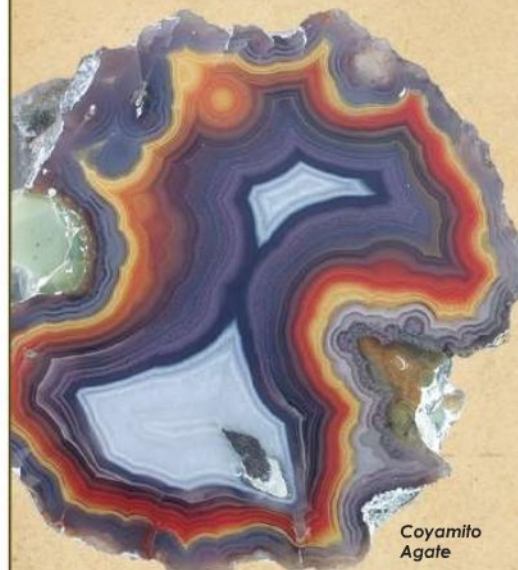


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# Walking with DINOSAURS

## Follow Their Tracks at Denver's Dinosaur Ridge

Story and Photos by Steve Voynick

**H**ad real-estate agents been around 95 million years ago, they could have listed a lot of prime, beachfront properties near what is now Denver, Colorado. At the time, the region around Denver was on the edge of the Western Interior Seaway, a large, shallow body of warm water that divided the North American continent. The beachfront property that existed back then seems to have been quite popular—at least among dinosaurs, thousands of which migrated along this ancient shoreline.

Today, the lithified sediments of this Cretaceous shoreline form the slickrock on the eastern slope of Dinosaur Ridge, a steeply tilted “hogback” just 12 miles west of downtown Denver and minutes from the Morrison exit of Interstate 70. Although the dinosaurs are long gone, they did leave their mark: a concentration of more than 300 well-preserved impressions that make up one of our nation's largest dinosaur trackways. With its easy roadside accessibility, the Dinosaur Ridge track site now attracts nearly 100,000 visitors each year.

Dinosaur Ridge is a showcase of geology, history and paleontology tied up in one remarkable package. Along with its track site, Dinosaur Ridge has in situ deposits of dinosaur bones, self-guided trails, interpretive



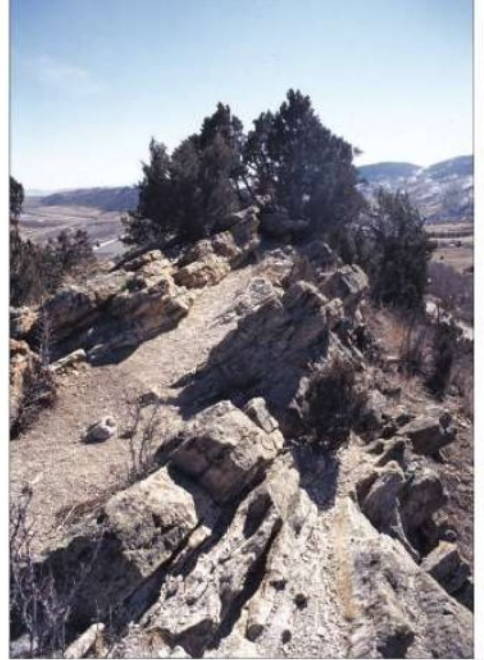
**The adult iguanodontid dinosaur that made this 15-inch-wide track probably stood about 10 feet high and was approximately 30 feet long.**



**These fossilized ripple marks indicate that this Dinosaur Ridge sandstone formed from sediments that once made up the sandy bottom of a shallow sea.**



**This fossilized bone of the sauropod *Camarasaurus* is visible in Morrison sandstone, which formed from the sediments of a late-Jurassic river channel, near a historic Dinosaur Ridge fossil quarry that dates from 1877.**



**A foot trail winds along the crest of Dinosaur Ridge through steeply tilted and exposed fossiliferous sandstone strata.**

signs, historic fossil quarries, and several observation points. There's also a museum, visitor center, and exhibit hall. All these attractions are the result of years of work by paleontologists and volunteers. Their efforts have paid off, for Dinosaur Ridge now ranks as one of the West's the most visitor-friendly and educational paleontological points of interest.

Dinosaur Ridge is a typical hogback (named for their resemblance in shape to the backs of razorback hogs) with steeply tilted strata and a sharp, linear crest. It is part of the Dakota Hogback, the long, north-south-trending ridge that abruptly divides Colorado's eastern plains from its western mountains. The strata of lithified sediments within the Dakota Hogback were deposited over a period of 45 million years. On the west side of the ridge, the lowest exposure consists of 140 million-year-old Morrison Formation sandstone, but the slickrock on the ridge's eastern slope is a much younger 95 million-year-old Dakota sandstone. The hogback itself was formed some 70 million years ago during the uplifts associated with the Laramide Orogeny, the mountain-building episode that created the modern Rocky Mountains.

There is no question as to what Dinosaur Ridge's interior strata look like. Thanks to a huge, nearby road cut, the ridge is an open, geologic textbook. Visitors can actually view, touch and study these strata. Representing more than 40 million years of geologic time, the sharply delineated strata within the half-mile-long, 400-foot-high road cut display a rainbow of colors ranging from red and bright yellow to green, tan, brown, gray and coal-black.

After the road cut was completed, the Colorado Scientific Society built paved walkways into the steep slopes on both sides of the cut. Volunteers erected inter-

pretive signs that identify the various strata of sandstone, mudstone, limestone, siltstone and shale and explain their origins in such paleoenvironments as freshwater marshes, beaches, tidal flats, and sea bottoms.

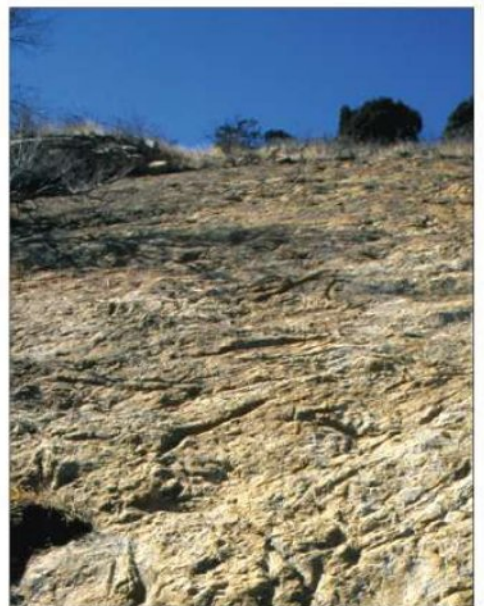
Although only a quarter-mile long, the road-cut walkways lead visitors on a literal journey through time. The detailed interpretive signs not only identify strata, they even enable visitors to locate and touch, as one example, the sharp, 135 million-year-old contact sediments that represent the exact transition between the Jurassic and Cretaceous periods.

Dinosaur Ridge has a rich history to match its unusual geology. The West's great adventure in dinosaur paleontology began here in 1877 when Arthur Lakes, a geology professor from the Colorado School of Mines at nearby Golden, was searching for leaf fossils in the low, exposed strata on the west side of the hogback. Lakes discovered something of far greater paleontological significance: the well-preserved fossils of a 14-inch-thick dinosaur femur and several huge vertebrae.

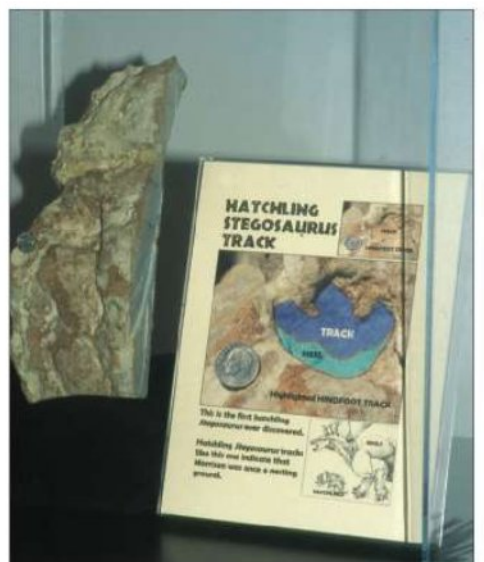
Lakes shipped a ton of bones to paleontologist Othniel Marsh at Yale's Peabody Museum in New Haven, Connecticut. When Marsh failed to respond, Lakes sent a second shipment to Marsh's professional and personal rival, Edward Drinker Cope at the Philadelphia Academy of Science. Upon hearing of this, Marsh quickly responded, paying Lakes \$100 for the bones to "claim" his fossil deposit.

The formation in which Lakes had found his fossils—a thick layer of reddish sandstone—was named for the nearby town of Morrison. Scientists soon realized that the Morrison Formation was one of the world's most prolific sources of dinosaur fossils.

Earlier excavations in Europe and the eastern United States had already proven



**These fossilized remains of a mangrove swamp extend nearly to the top of the sandstone slickrock on the east side of Dinosaur Ridge**



**This display at the Morrison Natural History Museum highlights a recent find—the world's first hatchling *Stegosaurus* track.**

the existence of dinosaurs, but the Dinosaur Ridge fossils exhibited a degree of preservation and skeletal completeness never before seen. Author Adrian Desmond, in his 1975 book *The Hot-Blooded Dinosaurs* (Double-Day), wrote: "[A]t Dinosaur Ridge the monsters sprang fully formed from the earth. It was as if a veil was dramatically lifted ... no longer would paleontologists be forced to cope with crumbling fragmentary remains; from now on they were to unearth whole specimens perfectly preserved in a veritable giants' graveyard" (page 24).

Within just two years, Marsh used the thousands of fossilized bones from Dinosaur Ridge to mount nearly complete skeletons of the sauropods *Diplodocus* and *Apatosaurus* (formerly *Brontosaurus*), the carnosaur *Allosaurus*, and the plate-backed *Stegosaurus*. These fossils facilitated a quantum leap forward in the awareness and understanding of dinosaurs, firing a scientific and public interest that continues today.

Marsh, Cope, and their contemporaries found exposures of the Morrison Formation sandstone across five Western states and made a remarkable succession of fossil recoveries that earned American dinosaur paleontology worldwide recognition.

As it turned out, Dinosaur Ridge had much more to offer than fossilized bones. During the 1930s, construction of Alameda Parkway across the ridge revealed dinosaur tracks in the Dakota Sandstone slickrock on the eastern slope. This find initially attracted almost no interest at all, for at the time dinosaur tracks were considered little more than paleontological oddities with limited scientific value.

Dinosaur Ridge faded from public attention until the 1970s; both scientific and public interest in dinosaurs began to boom as radical new ideas, especially regarding dinosaur behavior and warm-bloodedness, displaced many traditional theories. In 1973, the National Park Service designated Dinosaur Ridge a National Natural Landmark in recognition of its special place in the annals of American dinosaur paleontology.

The attendant publicity drew increasing numbers of visitors to the Dinosaur Ridge track site. Unfortunately, it also attracted the attention of vandals and "collectors", who destroyed a number of track impres-



**The sandstone that hosts the tracks at Dinosaur Ridge formed from the lithification of sediments in a 95 million-year-old, swampy coastal plain on the shore of the Western Interior Seaway.**

sions and crudely removed others, carrying them off to use them as yard decorations.

In the late 1980s, the volunteer group Friends of Dinosaur Ridge, began to address the need for preservation of the various paleontological attractions at the site. Their first project was to erect a high chain-link fence to protect the main track site. The second was to plan to transform a 1.2-mile-long section of Alameda Parkway into the Dinosaur Ridge Interpretive Trail.

When first discovered, the main Dinosaur Ridge track site had about 100 visible impressions, some of which were subsequently lost to vandalism. Friends of Dinosaur Ridge volunteers tediously removed some of the thin, overlying sandstone strata to reveal more of the main track layer. Today, more than 300 distinct dinosaur foot impressions are visible. Paleontologists believe that these tracks were made some 95 million years ago when the sediments were part of a swampy coastal plain on the ancient shore of the Western Interior Seaway.

Today, a raised observation platform provides a great view of all the tracks, which were made by two different types of dinosaurs. The largest were made by herbivorous, iguanodonlike, duck-billed dinosaurs, including 30-foot-long adults and 10-foot-long juveniles. These iguanodontids walked on all four feet at a rate of about two miles per hour, leaving behind broad, three-toed impressions in what was then soft mud. The iguanodontid tracks are interspersed with the much smaller impressions of bipedal, carnivorous dinosaurs. Adults of this species were about the size and shape of a modern ostrich. Their birdlike tracks have three slender toes tipped by sharp, pointed claws.

The study of dinosaur tracks is a relatively new discipline. Before the 1980s, pale-

ontologists had interpreted dinosaur tracks only in terms of paleobiology, studying them for clues to taxonomic identification, paleogeographic species range, nature and approximate speed of locomotion, and insight into such basic behavioral patterns as herding tendencies and adult-juvenile associations. Track studies also provided perspective into paleopathology, the study of diseased, wounded, or otherwise physiologically abnormal dinosaurs, and even

revealed that, contrary to earlier belief, no known dinosaurs actually dragged their tails as they walked.

Today, however, paleontologists agree that dinosaur tracks are a much more important part of the fossil record. Dinosaur ichnology—the study of dinosaur tracks, now a recognized subspecialty of paleontology—provides many vital clues about the physical nature of the paleoenvironment. Dinosaur ichnologists study impressions for clues to water depth, water-current direction, and even the approximate water content and gradient of the sediments at the time the tracks were made.

Other paleoenvironmental information comes from the study of dinoturbation, or the effects of sediment trampling. Through the sudden compacting of sediments by the passing of these bodies, conditions were created for the preservation of small plant and animal life forms that might not otherwise have fossilized. This has created a definitive record of the small life forms that existed at the precise moment the track was made.

Dinosaur ichnology has even painted geographically broad pictures of the paleoenvironment. Most known dinosaur track sites were originally created in relatively narrow zones of moist, vegetation-free sediments that are typical of mudflats and marine shorelines. Dinosaur ichnologists have now correlated the locations of many different trackways to plot the trend of Cretaceous shorelines.

Of the more than 30 known dinosaur track sites in Colorado, most occur within the same stratigraphic horizon of the Dakota sandstone. When geographically correlated, these individual sites in Colorado, and others in nearby states, form a major trackway system that extends hundreds of

*continued on page 40*

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## Apophyllite

$(K,Na)Ca_4Si_8O_{20}(F,OH)\cdot 8H_2O$

Apophyllite is one of the most beautiful minerals you may never have heard of. This hydrated potassium calcium sodium silicate fluoride hydroxide is actually a group of minerals: fluor-apophyllite, hydroxyapophyllite and natroapophyllite. Crystals within this group have a clear, glassy luster that's usually colorless or white, but is often tinted blue, green, yellow or pink. It forms nice, blocky crystals in various forms, including rectangular prisms capped by steep pyramids and a "pseudo-cubic" form that occurs when the prisms have flat terminations rather than pyramids. Related to micas, apophyllites lose water content and flake if they are heated.

Most apophyllite is found in amygdules (almond-shaped cavities) in basalt that were created by gas bubbles as molten lava cooled. Apophyllite and other minerals (quartz, calcite, zeolites, prehnite, etc.) grew together in such amygdules. It's also found in hydrothermal (hot-water) veins and in pockets in low-temperature,



JIM BRACE-THOMPSON PHOTO

Apophyllite crystal forms include rectangular prisms capped by steep pyramids (left) and a "pseudo-cubic" form with flat terminations.

low-pressure contact metamorphic zones surrounding intrusive igneous rocks.

Some of the world's best-known mineral localities yield apophyllite, including the Deccan Traps around Poona, India, the Harz Mountains of Germany, Mont Saint-Hilaire in Canada, and the gem districts of Brazil. In

the United States, it has been found at Centreville, Virginia; Lebanon, Pennsylvania; Paterson, New Jersey; and Ashe County, North Carolina.

Though it is sometimes faceted into gemstones, apophyllite's Mohs hardness (4.5 to 5) is just below the preferred hardness for lapidary material, so it is mainly kept as display specimens. It is not as well known as quartz, calcite, fluorite, and other common minerals, but apophyllites are slowly gaining in popularity due to their beauty and growing abundance in the marketplace, particularly as specimens flood in from India.

—Jim Brace-Thompson

## Introducing Heaven R.

She is digging and collecting minerals now, but someday Heaven R., from Maine, may very well own her own mine and mineral shop. Heaven is 8 years old. Her interest in "shiny rocks" began when she was about 1 or 2 years old, while taking walks in her neighborhood with her parents and siblings. She is very interested in minerals from Maine. Her favorite is garnet, which is also her mom's birthstone. When she joined a local mineral club a little over a year ago, she was the only girl in the group. She reads articles online and researches the minerals of Maine. She wants to own a gem store someday. She also dreams of owning a mine in which she can hunt for gems and making jewelry out of them.

—Darryl Powell



DARRYL POWELL PHOTO

## Wisconsin's State Rockhound Symbols

Wisconsin named a state mineral and a state rock in 1971, then took time off before designating a state fossil in 1986. Galena (lead sulfide) was named state mineral due to its abundance in Wisconsin and the historical significance of its contribution to the state's economy, as well as the efforts of the Kenosha Gem & Mineral Society (KGMS), which filed proposal under criteria set by the Wisconsin Geological Society for designating a state mineral. Galena is the primary ore of lead and occasionally produces silver as a byproduct. Galena crystallizes as heavy (specific gravity 7.5+) silver-gray cubes.

The state rock, also originally proposed by the KGMS, is red granite. An intrusive igneous rock, granite forms at great depth and pressure. The minerals composing it are primarily feldspar and quartz. The grains are easily visible to the naked eye, a fact that is responsible for its name: "granite" is from the Latin word *granum*, meaning "grain." Granite seems to be popular; five other states have named it their state rock! With granite mines in several parts of the state, Wisconsin chose it for its economic importance. Granite is hard and durable and takes a glassy-fine polish. It is used as a building stone, for monuments, and for decorative touches, as in columns and countertops.

It took three votes of the legislature, but finally the trilobite *Calymene celebra* was crowned Wisconsin's state fossil due to its popularity among fossil collectors. Trilobites were arthropods (segmented creatures with jointed legs and an exoskeleton); insects, crabs and shrimps belong to the same phylum. Unlike those relatives, however, trilobites became extinct with the end of the Paleozoic Era. *Calymene celebra* swam in a shallow tropical sea that covered Wisconsin during the late Ordovician and Silurian Periods, 450 million to 400 million years ago, and are most commonly found in limestone and dolomite deposits in the southern part of that state.

—Jim Brace-Thompson



JIM BRACE-THOMPSON PHOTO

Wisconsin's three rockhound symbols are red granite, the trilobite, and silvery gray galena.

## Take the Quiz, Win a Prize!

The Quiz is open to U.S. residents 17 and younger. All the questions can be answered by carefully reading *Rock & Gem Kids*. Mail your answers to **April Quiz, Rock & Gem magazine, P.O. Box 6925, Ventura, CA 93006-9899**. Five winners will be drawn from the valid entries received by **Apr. 30, 2010**. Valid entries must include the correct answers, the entrant's name, age and address, and the signature of a parent or guardian. This month's prize is a Mineral Bingo set, generously donated by Darryl Powell of Diamond Dan Publications ([www.diamonddanpublications.net](http://www.diamonddanpublications.net)).



1. When heated, apophyllites lose \_\_\_\_\_ and flake.
2. Most apophyllite is found in almond-shaped cavities that are called \_\_\_\_\_.
3. Apophyllite's \_\_\_\_\_ is the reason the mineral is mainly kept as display specimens.
4. Galena is the primary ore of \_\_\_\_\_ and occasionally produces \_\_\_\_\_ as a byproduct.
5. Granite is composed primarily of \_\_\_\_\_ and \_\_\_\_\_.



miles in a north-south direction, from North Dakota all the way to New Mexico. This trackway system accurately delineates the western shoreline of the Western Interior Seaway as it existed 95 million years ago.

The main track site at Dinosaur Ridge is adjacent to two other fossil features that provide additional insight into the mid-Cretaceous paleoenvironment. One section of the Dakota sandstone slickrock reveals the sharp impressions of a maze of tree trunks and branches that are the fossil record of a dense, ancient mangrove swamp. Alongside these mangrove fossils are a pattern of lithified impressions of ripple marks that formed from the wave action of water on a shallow, sandy sea bottom.

Other points of interest along the Dinosaur Ridge Interpretive Trail are a sandstone overhang with an unusual cross-sectional view of large, *Apatosaurus*-size dinosaur tracks and in situ trace fossils that record the movements of invertebrate worms and crustaceans. At the site of one of the 1877 dinosaur quarries, visitors can study, photograph, and touch 140 million-year-old, in situ, fossilized bones of the sauropod *Camarasaurus*. The Morrison sandstone from which these fossils protrude formed from the sediments of a late-Jurassic river channel. Although many fossils can be touched and photographed at Dinosaur Ridge, fossil and mineral collecting is prohibited.

From parking areas at the summit of the ridge, trails lead along the hogback crest, offering panoramic views of the Rockies to the west, the plains to the east, and the Dakota Hogback itself, trending away to the south. These views help to illustrate the tectonic forces that, 70 million years ago, uplifted the Dakota Hogback from the deeply buried strata of the plains.

The Dinosaur Ridge Visitor Center is at the base of the eastern side of Dinosaur Ridge. Greeting visitors at the parking area are dinosaurs of a different kind: whimsical, 12-foot-long *Stegosaurus* models painted in bright colors. The Visitor Center houses fossil and mineral displays and a gift shop with a large selection of dinosaur-related books, including outstanding guides to all the natural attractions on Dinosaur Ridge.

Adjacent to the Visitor Center is the Dinosaur Ridge Exhibit House. It is filled



**A paleontological workstation at the Morrison Natural History Museum gives visitors a hands-on opportunity to learn basic fossil preparation and preservation techniques.**

with interactive educational displays, fossils, dioramas, and spectacular wall murals depicting various dinosaurs in their paleoenvironments. These educational murals are fine examples of modern "dinosaur art", in which the murals reflect not merely artists' imaginations, but the very latest in paleontological knowledge and interpretation.

Alameda Parkway is closed once each month (except in winter) so that visitors can enjoy "Dinosaur Discovery Days" without the distraction and danger of traffic. Although many visitors hike along the Dinosaur Ridge Interpretive Trail, shuttle buses are also available. Knowledgeable volunteer guides are on duty at each of the various stops along the trail to give talks and answer questions about geologic and paleontological features.

Another not-to-be-missed dinosaur museum is the Morrison Natural History Museum, located just south of Dinosaur Ridge in the town of Morrison. A microcosm of major paleontological museums, the Morrison museum features everything from full skeletal mounts of dinosaurs to a paleontological workstation where visitors can experience the hands-on feel of fossil preparation and preservation work.

The Morrison museum, which is also an active research center, recently demonstrated that, even after more than 130 years of fossil exploration, Dinosaur Ridge still maintains paleontological secrets. In 2003, the museum's paleontologists began to re-explore the ridge. They have since discovered two new dinosaur track sites, one with the first *Stegosaurus* tracks ever found in Colorado.

One recent, major find is now the focus of a new display: the world's only known hatchling *Stegosaurus* footprints. Museum

director Matthew Mossbrucker discovered these tracks near the historic quarry that yielded the world's first *Stegosaurus* fossils in 1877. Surprisingly, these tiny tracks, each not much larger than a silver dollar, were visible in a sandstone boulder that stood in plain sight. From fossil evidence, paleontologists know that an adult *Stegosaurus* was about 10 feet tall and 30 feet long, and weighed six tons. Based on track size, they calculate that the hatchling's length at just under 3 feet.

Adjacent to the hatchling-track exhibit is the world's first complete set of adult *Stegosaurus* hind and forefoot tracks that partially cover the smaller hind footprints of a juvenile *Stegosaurus*. Paleontologists interpret this occurrence of adult, juvenile and hatchling tracks as evidence that Dinosaur Ridge was once a *Stegosaurus* nesting ground.

"You don't have to globe-trot to find important new fossils," Mossbrucker explains. "We look no further than our own backyard. When I look at these tracks, I can almost hear the sounds of dinosaur feet grinding into wet river sand."

To reach the Dinosaur Ridge area from I-70 west of Denver, take Exit 259 immediately west of the hogback road cut. Then follow the "Geologic Point of Interest" signs to the nearby parking areas that access the road-cut walkways.

After viewing the exposed strata of the hogback ridge, follow state Route 93 south for 1.5 miles, then turn left (east) onto Alameda Parkway, which is well-marked with Dinosaur Ridge signs. Although the Dinosaur Ridge Interpretive Trail section of Alameda Parkway is only 1.2 miles long, it traverses 45 million years and two periods of geologic time. After cresting the ridge, the Interpretive Trail descends past the main track site to the Dinosaur Ridge Visitor Center and Exhibit Hall; call (303) 697-3466 and visit [www.dinoridge.org](http://www.dinoridge.org) for information and hours.

To reach the Morrison Natural History Museum, return to state Route 93 on the west side of Dinosaur Ridge, then proceed south for three miles to the town of Morrison and follow the signs to the museum at 501 Colorado Highway 8. For museum information and hours, call (303) 697-1873 or visit [www.mnhm.org](http://www.mnhm.org).

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# Shadow Boxes

## Telling Stories with Rocks and Pictures

Story and Photos by Kathleen Fink

There are many ways to share our love of rocks, the environments in which they are found, and the stories they have to tell. Recently, I have been experimenting with placing a rock and a photograph in a small shadow box. I find that displaying the image and object together in a way that tells a story adds a dimension to the appreciation of each.



**With this box, I wanted to tell a story about the surprising contrast between the bold egg pattern and the delicate “water color” close-up I took from the top of this pattern.**

Although I used a purchased shadow box, it is clear to me that expensive materials are not required. For example, a child might enjoy taking a beach picture and placing that inside a cardboard box, together with a rounded pebble or two. An Internet search will reveal sources for purchasing shadow boxes, as well as instructions for making them. A frame shop may be able to make a custom shadow box in the exact dimensions needed to accommodate a specimen.

Before turning to the challenges I encountered with these boxes, I would like to

share two related projects that were particularly satisfying. A lapidary friend agreed to help create a photographic record of the whole process from locating a new picture jasper source to creating finished cabochons. It turns out I made the request of the right person, as he told me that making custom cabochons from rough he finds himself is one of his favorite things to do. As a result of this project, I have the first cabochons cut from Coyote Ridge claim jasper. My pendant may look like a sandy beach, but my friend and I both know it also carries the sound of coyotes singing in

For those of us who love taking pictures, collecting rocks, and sharing the special stories certain stones have for us, a **shadow box** is a natural creative outlet.

the Idaho hills. What is more, I have pictures of that original outcrop in its beautiful surroundings and of the slabs from which the cabochons were cut.

Particular sections of colorful, highly-patterned Morrisonite jasper look like art to me. I began taking a series of close-up photos using a digital camera with super macro capability, and was able to capture an amazing level of detail. Folks found all kinds of images, from baby bonnets to demons, in these patterns. When the opportunity presented itself to show three of my framed close-ups at an open studio event, I decided to use a shadow box so that those attending could see how the enlargement related to its specimen source.

After that show, I kept thinking of new ideas for shadow boxes using stones in my collection. Instead of making lots of boxes, I made a series of interchangeable fittings and took a picture of each assembly as I completed it.

Each variation presented its own challenges. For example, the object and the photograph needed to be of similar levels of aesthetic interest to balance each other. I found that focused images worked better than those with too much variety. The way the stone sat in the box mattered, as did the position and size of the photographic image. In a number of cases, I needed to try three or four times before the overall composition came together. In the end, these "difficult" shadow boxes were among my favorites.

Taking the photographs presented its own set of challenges. When polished specimens were involved, I carefully positioned them



**TOP:** There are many ways to combine a shadow box with framed pictures to create an interesting wall display. Here, the theme is Morrisonite jasper close-ups.

**CENTER LEFT:** This variation of a shadow box shows Whidbey Island beach and the first stone I collected there many years ago.

**CENTER RIGHT:** It took several tries to crop and position the Japanese garden photograph, but then everything suddenly clicked. A natural, uncut Japanese hut stone is in the foreground.

**BOTTOM:** The interchangeable fittings that I use allow me to display this Bubble Lace agate two ways, with the appropriate close-up for each side.



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## Shadow Boxes *from page 43*



**TOP LEFT:** This Chinese Scholar's Rock resembles a camel with its neck angled to look backward. Michael Wu's photo of Fire Mountain is used with permission.

**TOP RIGHT:** The painting by Thom Lane (right) was inspired by the dragon energy he found in a slab of Morrisonite, as seen in the close-up image (left). The sculpture carries through the dragon energy theme.

**LEFT:** I only became aware of how shapes in the overall jasper specimen were repeated in the close-up photo after I completed this box.


to minimize light splashes and reflections, and sometimes waited for an overcast day. For those interested, *Photographing Minerals, Fossils, & Lapidary Materials*, by Jeffrey Scovil (Geoscience Press, 1996), provides expert assistance on how to use rigs and polarizing filters to achieve consistently good results.

One of the considerations composing shadow boxes was whether I already had an appropriate photograph or could take one to support my idea. For the most part, I limited image manipulation to basic cropping, size adjustments, and placement on the page. I saved images using recognizable file names and found a separate draft folder was very useful for making experiments. If I plan to publicly exhibit my shadow box, I always get permission before using another photographer's work. After printing the final format on heavy paper, I carefully cut out the 7½-inch square that fits the back of my shadow box. I used a cardboard template to assist with this, but a cutting line could easily be added to the format.

Final assembly was the simplest part of making these shadow boxes: I placed the

image in the back of the shadow box before placing the rock or other object on the surface in front. If I want to keep a particular version up on my wall for a while, I add two thin strips of wood to either side of the square to hold it in place. These strips of wood fit tightly, so no glue is required.

Field trips and lapidary projects are just two of the more obvious subjects around which to create a shadow box. The relationship between the image and the object need not be immediately obvious to others for a shadow box to be highly meaningful to you. If I could locate a photograph of a coyote singing that I liked, I could make a most interesting shadow box with that and a piece of Coyote Ridge jasper. If anyone asked about this unusual combination, I would have a most interesting story to tell.

For those of us who love taking pictures, collecting rocks, and sharing the special stories certain stones have for us, a shadow box is a natural creative outlet. 

*Kathleen Fink is the author of "King of Jaspers" (May 2008 Rock & Gem).*

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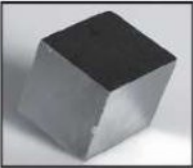
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## Show Dates from page 32

### APRIL 2010

**24-25—JACKSON, MISSISSIPPI:** Show and sale; Mobile Rock & Mineral Society, The Mississippi Gulf Coast Gem & Mineral Society, Nature's Society of Majestic Arts; Mississippi Fairgrounds, Trademark Bldg.; Sat. 9-6, Sun. 10-5; gems, minerals, fossils, beads, crystals, rough and cut stones, finished jewelry, tools and lapidary supplies, fossils, minerals, stone vases and carvings, loose precious stones, mobile gem mining, gold mining, pearls, knapping, faceting, jewelry repairs; contact Sharon McClanahan or Stan Bennett, (601) 898-0407; e-mail: stan@tompkinsbarron.com

**24-25—MEMPHIS, TENNESSEE:** 32nd Memphis Mineral, Fossil, Jewelry Show; Memphis Archaeological & Geological Society; Memphis International Agricenter, Expo Center, West Pavilion, A and B wings, 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

**24-25—NEWBURY PARK, CALIFORNIA:** 36th annual show, "Pageant of a Thousand Gems"; Conejo Gem & Mineral Club; Borchard Park Community Center, 190 Reino Rd., at Borchard Rd.; Sat. 9-5, Sun. 10-4:30; free admission; exhibits, sales, gems, jewelry, rocks, minerals, fossils, special youth activities, lapidary and jewelry making demonstrations, silent auction, door prizes; contact Robert Sankovich, (805) 494-7734; e-mail: rmsorca@adelphia.net; Web site: www.cgamc.org

**24-25—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

**24-25—SANTA CRUZ, CALIFORNIA:** Annual show; Santa Cruz Gem & Mineral Society; Santa Cruz Civic Auditorium, corner of Church St. and Center St.; Sat. 10-5, Sun. 10-5; adults \$6, children under 12 free; fluorescent room, treasure wheel, exhibits; contact Dean Welder, P.O. Box 343, Santa Cruz, CA 95061; e-mail: dwdeanwelder@yahoo.com; Web site: www.scmgs.org

**24-25—TROY, OHIO:** Show, "Minerals, Meteorites and More"; Brukner Center Gem & Mineral Club; Miami County Fairgrounds, Activities Bldg.; Sat. 10-6, Sun. 10-5; adults \$1, small children free; mineral identification, specimens, gems, jewelry, rough stone, demonstrations, displays, silent auction, dealers, raffles, free rock for children, children's activities; contact Tom Dilworth, (937) 602-1929

**24-25—WACO, TEXAS:** 50th annual show; Waco Gem & Mineral Club; TSTC Industrial Trade Center; Sat. 10-5:30, Sun. 10-5; adults \$5 (both days), students \$1; contact Kay Coleman, 118 County Rd. 540, Fairfield, TX 75840, (903) 389-8311

**25—BLOOMINGTON, MINNESOTA:** Show, "Rings & Things BeadTour"; Rings & Things; Hilton Minneapolis/St. Paul Airport, Ballroom A, B, C & D, 3800 American Blvd. E; Sun. 12-7; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**25—WATERLOO, IOWA:** Show, "The Lapidary Arts: Nature's Beauty Revealed"; Black Hawk Gem & Mineral Society; Waterloo Center for the Arts, 225 Commercial St.; Sun. 12-5; free admission; demonstrations, silversmithing, gem cutting, rock tumbling, sphere making, faceting, silent auction, special displays, dealers, crystals, agates, geodes, fossils, handcrafted jewelry, minerals, fossil plaster casting, Featured Person: Dr. Lee Potter; contact Dave Malm, (319) 266-6433; e-mail: glenr@forbin.net

**27—GREEN BAY, WISCONSIN:** Show, "Rings & Things BeadTour"; Rings & Things; Suamico Ale House, 2310 Lineville Rd.; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**28—MILWAUKEE, WISCONSIN:** Show, "Rings & Things BeadTour"; Rings & Things; Clarion Hotel Airport, 5311 S. Howell Ave.; Wed. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com



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**29—SCHILLER PARK, ILLINOIS:** Show, "Rings & Things BeadTour"; Rings & Things; Comfort Suites O'Hare Airport, 4200 N. River Rd.; Thu. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**APRIL-MAY 2010**

**30-2—BISHOP, CALIFORNIA:** Eastern Sierra Gem & Mineral Show; Lone Pine Gem & Mineral Society; Bishop Fairgrounds, Sierra St.; Fri. 6-9, Sat. 9:30-4, Sun. 10-3; free admission; demonstrators, displays, gifts, minerals, rough rock, beads, fused glass beads, many vendors, mineral identification, "The Famous Spinning Wheel", geode sales and cutting, tools, door prizes; contact Francee Graham, P.O. Box 667, Lone Pine, CA 93545, (760) 876-4319; e-mail: franceem@qnet.com

**30-2—KISSIMMEE (ORLANDO), FLORIDA:** Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Osceola Heritage Park, 1875 Silver Spur Ln.; Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

**30-2—CARL JUNCTION, MISSOURI:** 3rd annual Outdoor Rock Swap; Tri-State Gem & Mineral Society; Carl Junction's Center Creek Park, corner of York and Valley Ln., 8 miles northwest of Joplin on Hwy. 171; Fri. 8-6, Sat. 8-6, Sun. 9-4; free admission; spaces \$20, first-come basis, overnighters and RVs welcome, no hook-ups; contact Chris Wiseman, P.O. Box 555, Joplin, MO 64802, (417) 623-1180; e-mail: jmc-cwiseman@sbcglobal.net

**30-2—HOUSTON, TEXAS:** 2nd annual show, "Houston Fine Mineral Show"; FineMineralShow; Embassy Suites Hotel, near The Galleria; Fri. 10-6, Sat. 10-6, Sun. 10-5; more than 50 dealers; contact Dave Waisman, P.O. Box 8543, Spokane, WA 99203; Web site: www.finemineralshow.com

**30-2—SANTA ROSA, CALIFORNIA:** Show, "Gem Faire"; Gem Faire Inc.; Sonoma County Fairgrounds/Grace Pavilion, 1350 Bennett Valley Rd.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**30-2—ST. GEORGE, ONTARIO, CANADA:** Spring Open House; Robert Hall Originals; 138 Sugar Maple Rd.; Fri. 10-5, Sat. 10-5, Sun. 10-5; free admission; rocks, minerals, gems, beads, lapidary demonstrations; contact Robert Hall Originals, P.O. Box 29, 138 Sugar Maple Rd., St. George, ON, NOE 1N0, (519) 448-1236; e-mail: robert@roberthalloriginals.com; Web site: www.roberthalloriginals.com

**MAY 2010**

**1—GRAND RAPIDS, MICHIGAN:** Show, "Rings & Things BeadTour"; Rings & Things; Stars Room, 3221 Plainfield Ave. NE; Sat. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**2—NOVI, MICHIGAN:** Show, "Rings & Things BeadTour"; Rings & Things; Sheraton Detroit Novi, 21111 Haggerty Rd.; Sun. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**1-2—AITKIN, MINNESOTA:** Show, "Cuyuna Agate & Mineral Show"; Cuyuna Rock Club; Aitkin High School, 306 2nd St. NW, three blocks west of stop light; Sat. 9-5, Sun. 10-4; free admission; agates, minerals, jewelry, specimens, mineral art, fossils, fluorescents, indoor and outdoor vendors, Ask the Wizard, special "Kids' Korner", free prizes, displays, demonstrations, Wheel-of-Rock-Fortune, door prizes; contact Kat Thomas, (218) 678-3298; e-mail: katmoose@wildblue.net

**1-2—ANAHEIM, CALIFORNIA:** 51st annual show, "Natural Treasures of Planet Earth"; Searchers Gem & Mineral Society; Brookhurst Community Center, 2271 W. Crescent Ave.; Sat. 10-5, Sun. 10-4:30; free admission; gold panning, demonstrations, exhibits, silent auction, hobby supplies, dealers; contact Robert Burson, 11326 Candor St., Cerritos, CA 90703, (562) 860-5938; e-mail: showchair@searchersrocks.org; Web site: www.searchersrocks.org

*continued on page 60*



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# OHIO FLINT

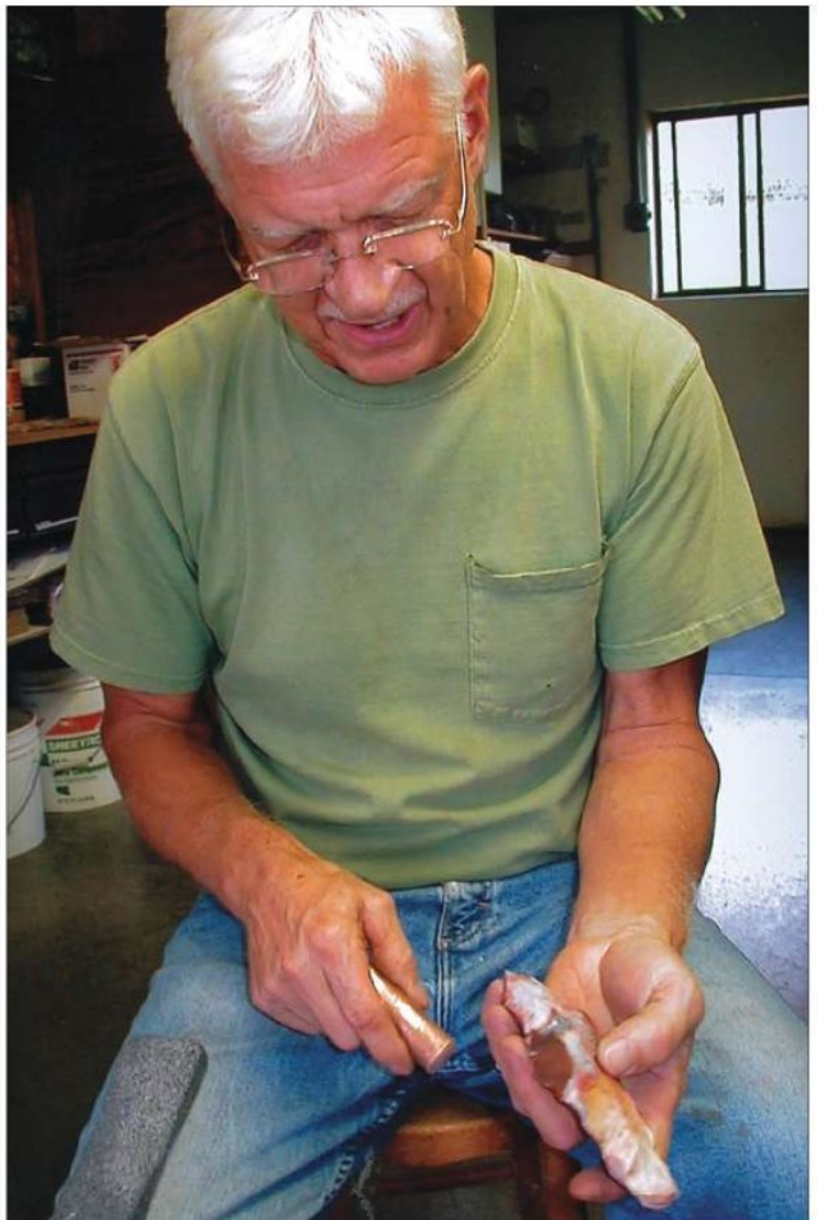
## *and Its* **Master Knapper**

### Roy Miller Quarries and Fires His Own Material

Story and Photos by Tom Towles

**F**inding arrowheads, even broken ones, along with other American Indian artifacts on the family farm near Dundee, Ohio, really aroused the curiosity of a young Amish lad named Roy Miller. This curiosity has turned Roy into one of the top flint-knappers in the country today. Some even call him a “master” at his lithic art.

The first I knew about Ohio flint and Roy Miller was through a total stranger I meet at a rock show down in the Rio Grande Valley of south Texas during the winter of 2008. This gentleman, being another Winter Texan, or “snowbird”, was wearing the most beautiful and different bola and hat band I’d ever seen, so I started asking questions. He told me he was Warren Whitmer from Canton, Ohio, and the bola and hat band was made of Ohio flint from the flint quarry of Roy Miller.



Roy Miller has mastered the art of knapping arrowheads from slabs of colorful Ohio flint.

Well, since I am a rockhound who likes beautiful stones, as well as an old, retired Air Force public affairs NCO, I couldn't keep from asking questions about this beautiful stone and where I could get my hands on some. Warren and I talked for over an hour, and he filled me in on all the details.

When I mentioned that my wife, Ayumi, and I had planned a trip to Kentucky and West Virginia in late July and August to visit friends and pick up some more rock, Warren invited us to visit him and his wife, Mary Lou, in Canton. He said that he would be more than happy to introduce us to Roy, who lived in Dundee, down in the Amish Country southwest of Canton.

After picking up some Kentucky geodes near Danville, some limestone rocks from the foundation of the old abandon log house that belonged to my great, great grandfather, and touring a coal mine in Beckley, West Virginia, the wife and I headed north to Canton. We were really looking forward to meeting Roy and picking up some of that gorgeous Ohio flint. The next day, Warren took us to meet Roy. He was waiting in his shop, and what a shop it was. Buckets, cabinets and bins full of flint were all around, along with a number of slab saws. Roy has a number of Highland Park slab saws ranging from 18 to 24 inches, along with other lapidary machines and a kiln.



Roy and his backhoe have dug a number of pits, showing plenty of exposed flint, at the Nethers Quarry site.



The colors seem to jump out of the Ohio flint, and will be even brighter after it is fired in the kiln.



Roy gets some of the best flint he uses to make his famous dovetails and other points from his seven-acre quarry on Flint Ridge Road.



After slabbing it, Roy places his flint in the kiln for about three days. This heat treatment enhances the colors.



A slow heating process in the kiln keeps the stones from exploding and brings out their colors, especially the blue and green, or turquoise, shades.



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Roy will use some of the larger slabs stored in his workshop to make dovetails and other points.

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To bring out the brilliant colors he starts firing his flint in a kiln at 200 degrees and increases the temperature 20 degrees every hour until the kiln reaches about 525 or 550 degrees. This slow heating process keeps the stones from exploding and brings out their colors, especially the blues and his famous green, or turquoise.

Aside from all the Ohio flint, which incidentally was named Ohio's official gemstone in 1965, Roy also has in his shop flint from the Carter Cave area in Kentucky, from Arkansas, and from other parts of the United States. He also knaps Mokai from Australia.

Again, I got inquisitive and began asking questions. Roy said his journey began on his father's farm when he was around 9 years old, plowing the fields with horses and finding and collecting arrowheads.

"Around the age of 12, I became interested in trying to make arrowheads and started looking for flint," said Roy. "The first tools that I used to knap out arrowheads were those you most commonly find around a farm tool shed, such as hammers, old pliers, and screwdrivers." Today, Roy is a master with a piece of brass and can turn out a beautiful dovetail or e-notched point in no time.

His first flint came from the Warsaw area of Ohio, and later he heard of the colorful stone from the Flint Ridge area in Licking County approximately 35 miles east of Columbus and about three to four miles north of I-70 at the Brownsville exit (Exit 141). In his late 20s, Roy started knapping arrowheads seriously. "On one of my trips to

Flint Ridge," he related, "I ran in to an older gentleman who was knapping at the diggings and he showed me a few tricks of the trade." He also got his hands on the book *The Art of Flintknapping*, by D.C. Waldorf (Mound Builder Books; [www.dc-waldorf.com](http://www.dc-waldorf.com)), and this got his hobby and future profession off and running.

After visiting and showing us his setup at home, Roy agreed to meet us the next day on Flint Ridge, where we could dig and collect at the public site, and then take us to look at the quarry on his land.

"I liked the colorful flint from the Flint Ridge area so much that in the mid-1990s I bought seven acres of land a couple miles east of the Nethers Quarry site on Flight Ridge Road," Roy said. It's from his quarry that Roy gets some of the best flint he uses to make his famous dovetails and other points.

The Nethers Quarry is on Flint Ridge Road #312 and is open to the public for digging. You pay 50 cents per pound for the flint you take out. Flint Ridge is about an eight-mile long, nearly 2,000-acre ridgetop strip of hardwood forest land. In the springtime, wildflowers are in abundance, and the colors of fall have to be as beautiful as the flint that is buried beneath the 2 to 5 feet of clay topsoil.

There is a Flint Ridge Memorial, which is located four miles north of Brownsville on County Road 668 and just to the right on Flint Ridge Road.

W.H. Holmes, in his "Handbook of Aboriginal American Antiquities" (Smithsonian Institution Bureau of American Eth-



In his workshop, Roy has a number of Highland Park slab saws ranging from 18 to 24 inches in diameter.

nology Bulletin 60, 1919; www.questia.com/PM.qst?a=o&d=23250517), writes, "One of the greatest of the known aboriginal quarries is located on what is commonly called Flint Ridge, a narrow irregular plateau-capped line of hills" (p. 173). The flint from this area is truly some of the most colorful in the United States, and possibly the world. The yellows, reds, blues and greens just jump out at you, especially when the stone has been fired.

Upon arrival at the Nethers site, we saw that a number of pits had been opened recently by Roy and his backhoe, and plenty of flint was exposed. We immediately set about digging and filling buckets of flint that we could take back to Colorado.

While at the Nethers Quarry, Warren and I watched Roy unearth a flint nodule about half the size of a VW Bug with his backhoe, but after closer inspection it was determined that it did not have enough colors in it to continue digging. It should be noted, however, that some beautifully colored flint has been taken out of the Nethers Quarry. Roy says, "It's there, you just have to locate it."

Some nodules have been unearthed that measure 2 to 4 feet in diameter and 2 to 4 feet high. All around the area, you can see pits where others have dug, and Roy informed me that some pits and mounds have been there for hundreds and thousands of years. Indians came to the area to dig out the flint for arrowheads, knives, scrapers, and other tools. Some of the flint has been discovered along the Atlantic

Coast, south in Louisiana, and westward near Kansas City. Early American settlers also used to collect the flint. They used it to make stone grinding wheels, which were used in flour mills, to ignite the gunpowder in their rifles, and to start fires. Today, the flint is used mostly for jewelry.

Roy uses a backhoe, a hydraulic drill, and hand tools to get his flint out of the ground. No explosives are used, as they cause the flint to develop cracks. He told me that, at first, he let his good friend and "buddy" Warren do the hand work down in the hole, but now he lets Warren "supervise" while he gets the flint out. Warren, by the way, also makes arrowheads for bolas and hat bands, but he uses his lapidary grinder and tumbler.

Roy enjoys knap-ins, where he meets fellow knappers or those interested in getting started in knapping. He likes to instruct others and passes on numerous tips. He belongs to the Flint Ridge Lithic Society in Ohio, which has about 75 to 100 members, not all of whom are knappers. The group meets twice a year. He also attends other knapping events in surrounding states.

After a full day's digging down in the pits, Ayumi and I loaded our car with a few hundred pounds of beautiful Ohio flint, said our goodbyes, and headed westward back toward Colorado Springs. The trip had been one of the most joyful and fruitful ones we've had in years, although the rock collecting didn't end in Ohio. We added Nebraska blue agate and Tipi agate at a stop in Lincoln, Nebraska.💎



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BOOK REVIEW:

## *Nuggets to Neutrinos: The Homestake Story*

by Steven T. Mitchell

Anyone who is interested in American gold mining is familiar with the Homestake Mine. From 1876 until its closing in 2001, the Homestake, located at Lead in the Black Hills of South Dakota, produced some 40 million troy ounces—that's 1,290 metric tons—of gold with a cumulative, year-mined value exceeding \$4 billion. Of a number of books



that have been written about the Homestake, Steven Mitchell's self-published tome *Nuggets to Neutrinos* (2009) is clearly the finest and most detailed.

Mitchell, who worked as a Homestake mining engineer from 1977 until 2001, is eminently qualified to write the definitive history of the mine. After the Homestake's closure, Mitchell was involved in its decommissioning and reclamation programs. He is currently helping to transform the mine into an underground science and engineering laboratory that will study dark matter, astrophysics, and solar neutrinos.

In a very readable style, Mitchell recounts the Homestake story, which spans a period of over 130 years. Details include the geological genesis of the ore, general regional history, the 1876 Black Hills Gold Rush, the filing of the original claim, and the eventual development of the Homestake as North America's deepest producing mine. Along the way, the author details more than a century of technological advancements that have transformed underground gold mining and milling.

Mitchell's book is extensively indexed and footnoted, and has a very useful glossary of geologic and mining terms. This 740-page book includes more than 230 black-and-white photographs, plus maps, tables, and diagrams. This is a book worthy of the rich history of America's greatest underground gold mine.

*Nuggets to Neutrinos* is available online at [www.MitchellsBlackHillsBooks.com](http://www.MitchellsBlackHillsBooks.com) for \$34.99 (hardcover) or \$23.99 (softcover).

—Steve Voynick

## Rock Tumbling Championship

The Feather River Lapidary & Mineral Society (FRLMS) of Oroville, California, has announced its second annual Rock Tumbling Championship. This contest is open to anyone, of any age, worldwide, who enjoys tumbling rocks and wants a shot at being the best in the world.

To enter, send in a completed application and your \$40 entry fee, postmarked no later than May 1, 2010.

By May 14, the club will send each participant about four pounds of Royal Nevada jasper tumbling rough from a private mine in Nevada. Every tumbler is encouraged to try. Rock clubs might consider sponsoring one of their members, especially a junior member.

Entrants will have over three months to tumble the rock in a rotary or vibratory tumbler and mail a half-pound of their best pieces back for judging. The entries must be received no later than Sept. 25, 2010.



Steve Hart, author of the book *Modern Rock Tumbling*, has agreed to evaluate each entry on the basis of smoothness, shape, shine, and overall appeal. He will select the top five entries to be displayed at the FRLMS Rock & Gem Show held in Oroville, California, the first weekend of October. Everyone who attends show will have a chance to cast a ballot. The results will be announced at the end of the show.

This year's first-place winner will receive \$250, plus an inscription on the perpetual trophy; second place wins \$100; and third place wins \$50. For more information or to print an application, visit [www.oroveryrocks.com](http://www.oroveryrocks.com).

## 2009 Carnegie Mineralogical Award Winner

The Carnegie Museum of Natural History has announced that Peter K. M. Megaw, PhD, of Tucson, Arizona, is the 2009 Carnegie Mineralogical Award winner. The award was presented by Carnegie Museum of Natural History Director Samuel Taylor, PhD, on Feb. 13 at the 2010 Tucson Gem & Mineral Show.



The Carnegie Mineralogical Award honors outstanding contributions in mineralogical preservation, conservation and education, and is considered one of the most prestigious awards in the fields of mineralogy, lapidary art, and geology.

Megaw has long been a leader and innovator in the fields of mineralogy and geology. He co-founded the geological consulting firms Minera Cascabel and MAG Silver, and is consulting geologist and president of their parent company, IMDEX Inc. A member of the prestigious Tucson Gem & Mineral Society since 1979, he focuses his collecting almost exclusively on Mexican mineral specimens. Megaw won the Desautels Trophy in 2006 for "Best Case of Minerals," awarded at the Tucson Gem & Mineral Show. Megaw enjoys working on his gem and mineral collections with his wife, Allison, and 16-year-old daughter, Lauren—herself a budding collector.

Nominations are now being accepted for the 2010 award. Private mineral enthusiasts and collectors, educators, curators, mineral clubs and societies, museums, universities, and publications are eligible. For a nomination form, go to [www.carnegiemnh.org/minerals/hillman/Award.html](http://www.carnegiemnh.org/minerals/hillman/Award.html) or contact Marc L. Wilson, Section of Minerals and Gems, Carnegie Museum of Natural History, 4400 Forbes Ave., Pittsburgh, PA 15213-4080, (412) 622-3391; e-mail: [wilsonm@carnegiemnh.org](mailto:wilsonm@carnegiemnh.org)

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**April 9 - 11, 2010**
- Houston Fine Mineral Show,  
Embassy Suites Hotel, Room 201, Houston Texas.  
**April 30 - May 2, 2010**
- Springfield, Massachusetts - Eastern States Exposition Center  
**August 13 - 15, 2010**
- Denver, Colorado - Holiday Inn North, Room 115  
**September 15 - 19, 2010**
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# Indiana ARCHIMEDES

## Collecting Bryozoan Fossils Off Interstate 64

Story and Photos by Robert Beard



This Archimedes fossil is surrounded by fragments of other fossil bryozoans.

**F**ossil collecting is often at its best when you are collecting the remains of strange creatures that are far removed from your everyday experience. Many fossils are unusual looking, and for many kids and new hobbyists, the strangest fossils make the best fossils.



**TOP LEFT:** Bryozoan fossils can be easily found along this terrace on the west side of state Route 37.

**BOTTOM LEFT:** Archimedes fossils look almost exactly like miniature copies of Archimedes' screw.

**TOP RIGHT:** The stretch of state Route 37 near I-64 is wide and makes for easy parking and access to the outcrops.

**CENTER RIGHT:** The crinoids often occur as broken aggregates on the surface of loose rocks.



**BOTTOM RIGHT:** This example of an Archimedes fossil is a trace fossil; all that is left is the impression of the screw.

While the fossil record certainly has some unusual creatures, few fossils are as strange-looking as the Archimedes. The Archimedes fossil not only resembles a large screw, but it actually looks like the device invented by Greek mathematician and inventor Archimedes (287-212 B.C.E.). It was primarily used to convey water from low-lying areas to higher levels for irrigation. As the screw turns, it lifts the water along the planes of the screw. Archimedes' screw is also commonly referred to as a screw conveyor.

An excellent summary of the Archimedes fossil can be found in "Study and Revi-

sion of Archimedes (Hall)", by G.E. Condra and M.K. Elias (Geological Society of America Special Paper 53). You can likely find a copy in university libraries and state geological survey libraries. I purchased my copy on eBay. This paper, though published in 1944, remains a good source of general information on the Archimedes fossil.

The Archimedes fossil became an important index fossil for paleontologists. An index fossil is one that is known to be present in rocks of a particular geologic age. Geologists can then make deductions about the likely age of other rocks based on the fossils that are observed in them.

The Archimedes fossil is easily identifiable and abundant in Late Mississippian-age rocks (approximately 359 million to 318 million years ago). However, isolated occurrences of fossils similar to Archimedes have also been found in rocks as old as lower Devonian (about 416 million years ago) and as young as lower Permian (about 299 million years ago). Therefore, paleontologists must take information such as geographic location, faults, and adjacent rocks into account when correlating rock ages using Archimedes fossils.

The Archimedes were bryozoans, tiny colonial animals that build skeletons of

calcium carbonate. Bryozoans lived in mats on the seafloor, were attached to rocks and seaweed, and had a superficial resemblance to coral. The coil shape of the Archimedes was believed by Condra and Elias to be due to the influence of encrusting algae growth and associated currents pulsating through the masses of Archimedes spirals as they grew toward the water's surface. However, no modern bryozoans produce coiled outgrowths similar to that of the Archimedes, so this is apparently an evolutionary trait that ultimately proved unsuccessful.

Bryozoans first appeared in the fossil record in the Ordovician Period (about 488 million years ago) and they still live today. The Archimedes bryozoans, however, have been extinct since the end of the Permian period (about 248 million years ago). This was also the end of the Paleozoic Era and the time of the Permian mass extinction. The Archimedes was among the species that were wiped out by this catastrophe.

In May 2006, I was in the Louisville, Kentucky, area and had to drive to St. Louis, Missouri. I stopped at the Falls of the Ohio State Park ([www.falloftheohio.org](http://www.falloftheohio.org)) and had the opportunity to walk along the Indiana bank of the Ohio River. According to a bedrock geologic map of Indiana, available from the National Geologic Map database ([http://ngmdb.usgs.gov/Prodesc/prodesc\\_16538.htm](http://ngmdb.usgs.gov/Prodesc/prodesc_16538.htm)), the rocks in this area are limestones and dolomites of the Devonian-age Muskatatuck Group that are abundant in fossils. The park also has a large fossil museum. It is well worth a visit, but not surprisingly, no collecting is allowed there. The sheer numbers of people who visit the museum would undoubtedly pick the fossil beds clean in a relatively short time.

The weather was perfect, and I was anxious to see whether I could find any fossil localities during my drive to St. Louis. The Falls of the Ohio State Park Web site includes a page of local collecting sites ([www.falloftheohio.org/collecting.html](http://www.falloftheohio.org/collecting.html)). I found a site at the intersection of Interstate 64 and state Route 37 (Exit 86) that I would drive right past on my way to St. Louis. On the way, I took the scenic back roads near and along the Ohio River, looking for additional outcrops, but to my surprise, I was not able to find any good places for fossils or rocks.

It was good that the exit number was referenced, as Interstate 64 intersects state



The beds of limestone are flat and well exposed on all sides of the road.

Route 37 in two places. Exit 86 is the easternmost of the two exits and serves the towns of English, to the north, and Sulphur, to the south. I turned south off the exit, then did a U-turn and parked on the east side of state Route 37, south of I-64. There is plenty of parking space, and I had no trouble finding a place to pull off. The surrounding area, according to my highway map, is part of Hoosier National Forest. According to the U.S. Forest Service Web site ([www.fs.fed.us/r9/hoosier/docs/collecting.htm#rocks](http://www.fs.fed.us/r9/hoosier/docs/collecting.htm#rocks)), small quantities of rocks may be collected for personal use on this land.

I had excellent weather for collecting and was able to easily climb to the outcrops. I started my collecting on the western side of state Route 37, south of I-64. The area is terraced and there is a nice, flat area for walking above the road. I began by looking at the broken rocks along the highway. I soon began to find several small slabs, generally of a light tan, sandy limestone, containing crinoids. Upon closer inspection, I saw that many had small horn corals and oval fossils that I later learned were blastoids.

I soon came across a large boulder that had tumbled from the terrace highwall. This boulder had some long linear patterns that I soon realized were actually screw-like features that were fossils. These were Archimedes fossils. I had never seen them before and was quite intrigued by their appearance. They looked exactly like an Archimedes' screw. I tried to break off a piece containing a fossil, but the boulder was too broad. It was obvious that other rockhounds had had the same idea, as the boulder was covered with hammer marks.

I continued looking for fossils, and mostly found crinoids, horn corals, and blastoids. I had hoped to find some larger loose pieces with Archimedes, but I did not find any in this area. I soon moved on.

I drove north of I-64 and parked along the east side of state Route 37. This area is quite a bit different; although it is terraced, it requires more climbing. The outcrops were well exposed and I thought this would also be a good area for fossils. One of the first pieces I found in this area was a large Archimedes on a loose piece of rock. This area had many more sections of broken rock along the slopes, and offered many more rocks to turn over and inspect for fossils than the outcrops south of I-64, but it required much more climbing.

The trip was a nice break from the relatively monotonous drive from Louisville to St. Louis, and I was really pleased to get to do some collecting after my visit to the Falls of the Ohio State Park. I liked the outcrops so much that I stopped again during my return drive to Louisville.

I visited the site again in December 2008 on a drive from Pennsylvania to St. Louis. On the way out, it was just me and our Chihuahua, Nema. It was the first time I had taken Nema rock collecting. I thought the outcrops along the west side of state Route 37, south of I-64, would be a relatively easy place for Nema to get around, as most of this area was flat.

I carried Nema up to the first level, which was also the main terrace, as the slope was just a little too steep. I then let her walk around on her leash while I looked for fossils. I found that the large boulder with the Archimedes fossils was still in place and saw that it had many more hammer marks. Since it was December, the ground was very cold and wet, and we had to watch out for soft ground and mud puddles. I found many pieces of rock loose on the ground. Many of the best pieces were light- to dark-gray, silty limestone, and I found a very nice Archimedes screw in a piece with some blastoids. Unfortunately, I

was not able to find any large Archimedes in this area.

I also explored the outcrop on the east side of state Route 37. I found some small fossils and a nice fossil cast of an Archimedes in a sandy limestone. While this area is worth exploring, it did not seem to have the same quantity of fossils as the west cut.

I later explored the outcrops on the east side of state Route 37, north of I-64, like I did during my first visit. This area seemed to be less visited than the areas south of I-64, as it takes some climbing to get up the hill. However, it was certainly not virgin territory, as evidenced by the plastic bottles and beer cans on the hill slope.

The terraces are more numerous, but narrower in this area when compared to the outcrops south of I-64, and there are a lot more trees and brush. The collecting is similar and there are a lot of broken rocks to inspect for Archimedes and other fossils. During my 2008 visit, I found lots of crinoids in this area, but I did not find any large pieces with Archimedes fossils. I soon returned to the car to finish the drive to St. Louis.

On my return trip to Pennsylvania, I was with my wife and two kids, as well as our Chihuahua, and we stopped at the outcrop for one last shot at Archimedes. I quickly found some nice slabs with crinoids and blastoids, but the Archimedes proved elusive once again.

The geologic map of Indiana indicates that the rocks in this area are Mississippian limestones, with some sandstones and shales, but the scale of the map and the lack of marked

roads on this map made it difficult to determine precisely where the locality is in the geologic section. However, this was not as important as knowing that the rocks were Mississippian, as opposed to Devonian. This meant that the rocks were younger than the rocks at the Falls of the Ohio State Park, and Mississippian-age rocks have good potential for finding Archimedes fossils.

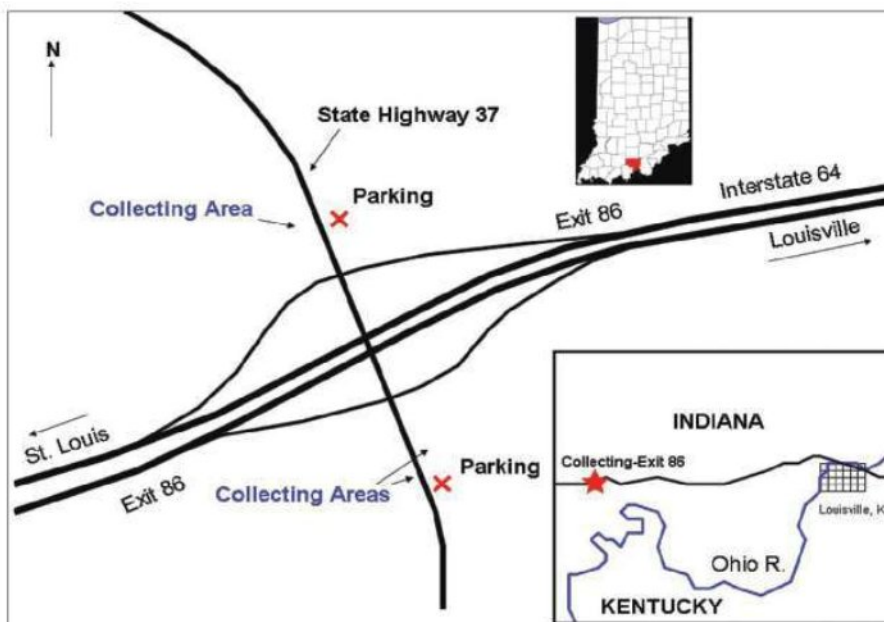
For reference, I collected the following coordinates in the field, and later checked them using aerial photographs from Google Earth, which can be downloaded through [www.google.com](http://www.google.com). All coordinates are referenced using the North American Datum 83 and World Geodetic System 84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

**Parking area on state Route 37, south of I-64:** 38° 14' 19.2"N, 86° 28' 00.9"W

**Boulder with Archimedes fossils:** 32° 26' 58.13"N, 108° 30' 13.69"W

The parking area on state Route 37, north of I-64, is at 32° 26' 59.01"N, 108° 32' 27.29"W. I got these coordinates directly from Google Earth, as I did not collect a waypoint in the field. You do not need a GPS or topographic map to find this site, but an Indiana highway map is useful to make sure that you go to the correct exit.

This site is well worth a stop, as it is easily accessible and safe, and you and your kids are definitely going to find some fossils. While the Archimedes fossils can be tough to find, this site offers you access and ease of collecting. ♦



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## Show Dates from page 47

### MAY 2010

**1-2—CINCINNATI, OHIO:** 45th annual show and sale, "Geofair 2010"; Cincinnati Mineral Society, Cincinnati Dry Dredgers; Cincinnati Gardens, 2250 Seymour Ave.; gems, minerals, fossils, jewelry; contact Terry Huizing, 5341 Thrasher Dr., Cincinnati, OH 45247, (513) 574-7142; e-mail: [tehuizing@fuse.net](mailto:tehuizing@fuse.net); Web site: [www.geofair.com](http://www.geofair.com)

**1-2—FOUNTAIN HILLS, ARIZONA:** Show, "Fountain Hills Gem & Mineral Show"; O.B. Rocks & Minerals; Fountain Hills Community Center, 13001 N. La Montana Dr.; Sat. 10-6, Sun. 10-5; free admission; contact Rick Obermiller, 1332 N. Jesse St., Chandler, AZ 85225, (602) 826-2218; e-mail: [obrocks@gmail.com](mailto:obrocks@gmail.com)

**1-2—LUBBOCK, TEXAS:** Show; Lubbock Gem & Mineral Society; Lubbock Civic Center, 1501 Mac Davis Ln.; Sat. 10-6, Sun. 10-5; adults \$4, students (6-12) \$2, children under 6 free with adult; door prizes, children's "Spinning Wheel", demonstrations, sphere making, wire wrapping, silent auction, club displays, dealers, beads, jewelry, minerals, carvings, rough and polished rocks; contact Archie Scott, 2709 Belvedere Rd., Levelland, TX 79336, (806) 894-1584; e-mail: [archie.scott73@yahoo.com](mailto:archie.scott73@yahoo.com); Web site: <http://lgmstx.org>

**1-2—MARSHFIELD, WISCONSIN:** 37th annual show; Heart of Wisconsin Gem & Mineral Society; Marshfield High School Fieldhouse, 1401 Becker Rd.; Sat. 10-5, Sun. 10-4; free admission; displays, speakers, "Wisconsin Earth Treasurers", dealers, demonstrations, silent auctions, kids' activities; contact Cynthia Kelman, 1403 N. Broadway Ave., Marshfield, WI 54449, (715) 387-8782; e-mail: [kelman@tznnet.com](mailto:kelman@tznnet.com); Web site: [www.fromtherockroom.com](http://www.fromtherockroom.com)

**1-2—MEDFORD, OREGON:** 55th annual show; Roxy Ann Gem & Mineral Society; Medford Armory, 1701 S. Pacific Hwy.; Sat. 9-5:30, Sun. 10-4:30; exhibits, dealers, demonstrations, silent auction, children's activities, door prizes; contact Tricia Caulkins, 926 Hopkins Rd., Central Point, OR 97502, (541) 821-0883

**1-2—NORTH CHARLESTON, SOUTH CAROLINA:** Show; Lowcountry Gem & Mineral Society; Charleston Area Convention Center Complex, 5001 Coliseum Dr., Exhibit Hall A; Sat. 10-5, Sun. 10-5; free admission; dealers, lapidary demonstrations, door prizes, fossil dig, geode cracking; contact Karen Havenstein, 518 Woodland Shores Rd., Charleston, SC 29412, (843) 795-2956; e-mail: [fosils@comcast.net](mailto:fosils@comcast.net); Web site: [www.lowcountrygemandmineralsociety.org](http://www.lowcountrygemandmineralsociety.org)

**1-2—PITTSBURGH, PENNSYLVANIA:** 7th annual show and sale, "Treasures of the Earth"; Mineralogical Society of Northeastern Pennsylvania; Oblates of St. Joseph, 1880 Hwy. 315; admission \$3, children 12 and under and uniformed Scouts free; Sat. 10-5, Sun. 10-4; minerals, fossils, crystals, gems, meteorites, jewelry, beads, geological supplies, kids' activities, door prizes, raffles, programs, demonstrations, exhibits; contact George Walko, (800) 473-3602

**1-2—SEATTLE, WASHINGTON:** 44th annual show; West Seattle Rock Club; Alki Masonic Temple - West Seattle, 4736 40th Ave. SW; Sat. 10-5, Sun. 10-5; contact Rachel Miller, P.O. Box 16145, Seattle, WA 98116; e-mail: [westseattlerockshow@hotmail.com](mailto:westseattlerockshow@hotmail.com); Web site: [www.westseattlerockclub.org](http://www.westseattlerockclub.org)

**1-2—TOPSFIELD, MASSACHUSETTS:** 47th annual show, "New England Mineral & Gem Show"; North Shore Rock & Mineral Club; Topsfield Fairgrounds, Rte. 1; Sat. 9-5, Sun. 10-4; adults \$5 (\$1 off with ad), seniors \$3, children under 12 free; retail and wholesale dealers, door prizes, exhibits, mineral and fossil identification, gold panning, geode cracking, spin-a-gem, mineral sifting; contact Joe Weisberg, 29 Justin St., Lexington, MA 02420, (781) 861-6653; e-mail: [nsrcm@verizon.net](mailto:nsrcm@verizon.net); Web site: [www.nahant.com/nsrcm](http://www.nahant.com/nsrcm)

**1-2—WASHINGTON, PENNSYLVANIA:** Annual spring show, "Greater Pittsburgh Area Gem, Mineral, Bead & Jewelry Show"; F.M. Minerals; Washington, County Fairgrounds, 2151 N. Main St.; Sat. 10-6, Sun. 10-5; adults \$4, children 12 and under free with adult; dealers, jewelry, metaphysical minerals, bench jeweler, beads, gemstones, wire wrapping; contact F.M. Minerals, P.O. Box 252, Farmington, WV 26571, (304) 825-6845; e-mail: [frankoz@juno.com](mailto:frankoz@juno.com)

**4—LOUISVILLE, KENTUCKY:** Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn Hurstbourne, 1325 S. Hurstbourne Pkwy., at I-64; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: [drobotson@rings-things.com](mailto:drobotson@rings-things.com); Web site: [www.rings-things.com](http://www.rings-things.com)

**7-9—COLUMBIA, MISSOURI:** Show and sale; Central Missouri Rock & Lapidary Club; Boone County Fairgrounds, 5212 N. Oakland Gravel Rd.; Fri. 1-8, Sat. 8-5, Sun. 9-3; adults \$5, students \$3, good all three days, children 11 and under free; demonstrations, mineral exhibits, special kids' mine; contact Robert McConnell, 1601 N. Earthland Rd., Columbia, MO 65202, (573) 445-5415; e-mail: [bobmc@socket.net](mailto:bobmc@socket.net)

**7-9—COSTA MESA, CALIFORNIA:** Show, "Gem Faire"; Gem Faire Inc.; OC Fair & Event Center/Bldg. 10, 88 Fair Dr.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: [info@gemfaire.com](mailto:info@gemfaire.com); Web site: [www.gemfaire.com](http://www.gemfaire.com)

**7-9—FRANKLIN, NORTH CAROLINA:** 9th annual show, "Mother's Day GemBoree"; Franklin Area Chamber of Commerce; Macon County Community Bldg., 1288 Georgia Rd.; Fri. 10-6, Sat. 10-6, Sun. 10-4; adults \$3, under age 16 free; fine gold and silver jewelry, rough and cut gemstones, beads, minerals, lapidary, wire wrapping, custom-made jewelry, jewelry repairs, tools, demonstrations, door prizes; contact Linda Harbuck, 425 Porter St., Franklin, NC 28734, (888) 337-7529; e-mail: [lindah@franklin-chamber.com](mailto:lindah@franklin-chamber.com); Web site: [www.visitfranklinnc.com](http://www.visitfranklinnc.com)

**7-9—FRANKLIN, NORTH CAROLINA:** Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Watauga Festival Center, 426 Watauga Rd. (Hwy. 441N); Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: [info@glwshows.com](mailto:info@glwshows.com); Web site: [glwshows.com](http://glwshows.com)

**7-9—HENRIETTA, NEW YORK:** Show and sale; GemStreet USA; The Monroe Fair & Expo Center, 2695 East Henrietta Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; fine gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: [www.gemstreetusa.com](http://www.gemstreetusa.com)

**7-9—McPHERSON, KANSAS:** 18th annual McPherson Gem & Mineral Club Sale and Swap; McPherson Gem & Mineral Club; McPherson 4-H Bldg., 710 W Woodside; Fri. 9-7, Sat. 8-6, Sun. 10:30-3; free admission; buy or swap rocks, gems, minerals, fossils, jewelry, hourly door prizes, displays, collections, free rock identification, kids' spin-and-win, potluck and rock auction Fri.; contact Jim Nutter, 1611 Jody Ln., McPherson, KS 67460, (620) 241-2433

**8-9—BOZEMAN, MONTANA:** Show, "Montana's Treasures"; Bozeman Gem & Mineral Club; Gallatin County Fair Grounds, Black and Tamarack (I-90, exit at N. 7th St.); contact Dan Carter, (406) 586-4552, or Sally Griffin, (406) 451-4248; e-mail: [griffin830@yahoo.net](mailto:griffin830@yahoo.net)

**8-9—RENO, NEVADA:** Show, "Jackpot of Gems"; Reno Gem & Mineral Society; Reno Livestock Events Center Exhibit Hall, 1350 N. Wells Ave.; Sat. 10-5, Sun. 10-4; adults \$5, seniors \$4, children \$3; more than 60 exhibit booths, demonstrations, gold panning booth, silent auction table, door prizes, \$250 Grand Prize raffle; contact Ann Johnson, 6530 Oglala Ct., Sun Valley, NV 89433, (775) 544-4937; e-mail: [ann.johnson.e@gmail.com](mailto:ann.johnson.e@gmail.com); Web site: [www.reno.rockhounds.com](http://www.reno.rockhounds.com)

**12—McCLELLAN, CALIFORNIA:** Show, "Rings & Things BeadTour"; Rings & Things; Garden Pavilion, 5640 Dudley Blvd.; Wed. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, McClellan, CA 95652, (800) 366-2156; e-mail: [drobotson@rings-things.com](mailto:drobotson@rings-things.com); Web site: [www.rings-things.com](http://www.rings-things.com)

**13—SAN MATEO, CALIFORNIA:** Show, "Rings & Things BeadTour"; Rings & Things; San Mateo County Event Center (Event Center Meeting Pavilion), 2495 S. Delaware St.; Thu. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: [drobotson@rings-things.com](mailto:drobotson@rings-things.com); Web site: [www.rings-things.com](http://www.rings-things.com)

**14-16—ANDERSON, CALIFORNIA:** Show, "Northern California Treasures"; Superior California Gem & Mineral Association; Shasta County Fair Grounds, 1890 Biggs St.; Fri. 9-5, Sat. 9-5, Sun. 10-4; free admission; contact Bob Davis, 5810 Olive Rd., Corning, CA 96021, (530) 824-6214; e-mail: [rnccavis@hughes.net](mailto:rnccavis@hughes.net); Web site: [www.superiorcal.com](http://www.superiorcal.com)

**14-16—ENID, OKLAHOMA:** Annual swap; Enid Gem & Mineral Society; Oakwood Mall, 4125 W. Owen K. Garriott Rd.; silent auction, kids' area, lapidary work, rocks, gems, minerals, fossils, jewelry; Fri. 10-8, Sat. 10-8, Sun. 12-5; contact Stan Nowak, (580) 484-2785; e-mail: [snowak48@yahoo.com](mailto:snowak48@yahoo.com)

continued on page 62

# 2010

## Lapidary Article of the YEAR CONTEST

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### OFFICIAL CONTEST RULES

#### WHO IS ELIGIBLE

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

#### HOW TO ENTER

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

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

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

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

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

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

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

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

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

#### JUDGING

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

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

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

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

#### THE PRIZE

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



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Show Dates from page 60

**MAY 2010**

**14-16—POMONA, CALIFORNIA:** Spring show, "West Coast Gem, Mineral & Fossil Show"; Martin Zinn Expositions LLC; the Fairplex in Pomona, 1101 W. McKinley Ave.; Fri. 10-6, Sat. 10-6, Sun. 10-5; free admission; 20 wholesale and retail dealers; contact Martin Zinn Expositions, P.O. Box 665, Bernalillo, NM 87004-0665, fax (303) 223-3478; e-mail: mzexpos@aol.com; Web site: www.mzexpos.com

**14-16—SACRAMENTO, CALIFORNIA:** Show, "Gem Faire"; Gem Faire Inc.; Cal Expo/Bldg. A, 1600 Exposition Blvd.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**14-16—SARASOTA, FLORIDA:** Show; Frank Cox Productions; Municipal Auditorium, 801 N. Tamiami Trail (Hwy. 41); Fri. 10-5, Sat. 10-5, Sun. 10-5; gems, jewelry, beads; contact Frank Cox Productions, 755 S. Palm Ave. #203, Sarasota, FL 34236, (941) 954-0202; e-mail: frankcox@comcast.net; Web site: www.frankcoxproductions.com

**14-16—SOUTHGATE, MICHIGAN:** Show; Midwest Mineralogical & Lapidary Society of Michigan; Southgate Arena, 14700 Reaume Pkwy.; Fri. 4-8, Sat. 10-6, Sun. 11-5; contact Mike Bomba, 1419 Gregory, Lincoln Park, MI 48146, (313) 381-8455, or Rich Williams, 15816 DuPage, Taylor, MI 48180, (734) 374-2279

**15—BUENA PARK, CALIFORNIA:** Show, "Rings & Things BeadTour"; Rings & Things; Knott's Berry Farm Resort Hotel, 7675 Crescent Ave.; Sat. 10-2; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**15—DANBURY, WISCONSIN:** 3rd annual swap meet; Stone Hinge Rock Shop; 4606-26 Lake Rd.; free admission; free tailgating, agates, minerals, fossils, jewelry, Lake Superior agates, kids' agate pit; contact Ella or Mike, 4606-26 Lake Rd., Danbury, WI 54830, (715) 656-4315

**15-16—CHEYENNE, WYOMING:** Show; Cheyenne Mineral & Gem Society; American Legion Post 6, 2001 E. Lincoln Way; Sat. 9-5, Sun. 9-4; adults \$3, children free; door prizes, gold panning, children's activities, exhibits, club store; contact Carroll Schell, 5006 Foxen Court, Cheyenne, WY 82001, (307) 632-7688; e-mail: cschell@bresnan.net

**15-16—HAMILTON, MONTANA:** Annual show; Bitterroot Gem & Mineral; Ravalli County Fairgrounds, First Interstate Center, 100 Old Corvallis Rd.; contact Steve Vieth, (406) 369-5489; e-mail: viethsteve88@gmail.com

**15-16—HERMISTON, OREGON:** Annual show; Hatrochounds Gem & Mineral Society; Hermiston Conference Center, 4155 Hwy. 395; Sat. 10-6, Sun. 10-5; contact Mike Filarski, (541) 922-5091; e-mail: stonemorlin1@netscape.net

**15-16—LEESPORT, PENNSYLVANIA:** 42nd 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

**15-16—ORANGE, CONNECTICUT:** 37th annual show; The New Haven Mineral Club; Amity Regional Middle School, 100 Ohman Ave., (Sheffield Road off of Rte. 34); Sat. 9:30-5, Sun. 9:30-5; adults \$5, children under 12 free with adult; minerals, gems, jewelry, fossils, exhibits, dealers, door prizes, lectures, demonstrations; contact Lisa Alter, (203) 215-6150; Web Site: www.newhavenmineralclub.org/

**15-16—WAUWATOSA (MILWAUKEE), WISCONSIN:** 53rd annual show; Wisconsin Geological Society; Sat. 10-5, Sun. 10-5; Mueller Bldg., Hart Park, 72nd and W. State St. (about 6 miles west of downtown Milwaukee and 1 mile north of I-94); 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

**16—SAN BERNARDINO, CALIFORNIA:** Show, "Rings & Things BeadTour"; Rings & Things; Hilton San Bernardino, The Inland Ballroom, 285 E. Hospitality Ln.; Sun. 10-2; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

continued on page 66

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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.

Of all the shapes that are used for cut gemstones, I have struggled with creating designs for hearts more than with any other. I'm not sure why—hearts are not that different from pears—but I finally managed to create a design that I am proud to present.

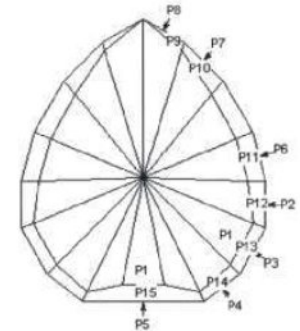
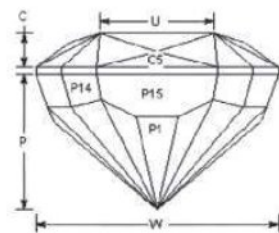
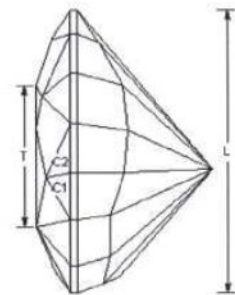
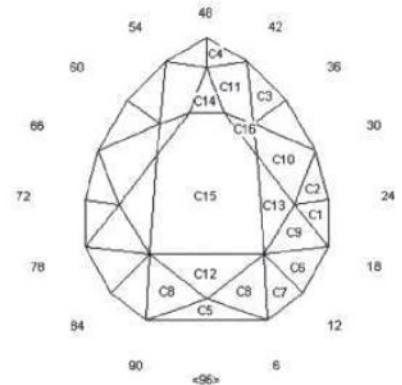


This design is another in my "OMNI" series and is quite easy to cut. Once you cut the OMNI tier at the proper index settings, it is an easy process to establish the proper girdle outline. Please note that while several tiers list the same angles (e.g. the crown breaks), each tier will require its own mast height calibration.

I developed this design for a piece of Georgia amethyst that I plucked from the ground, and it served beautifully to show off the blue and red flashes for which the Georgia material is well noted. I believe this design would do quite well with a variety of other materials, including topaz and garnet.

I hope you enjoy cutting this design and I would love to hear from you if you do. Happy faceting!

—David Groncki  
dijroncki@comcast.net



## PAVILION

P1	41.00°	96-06-08-16-20-27-33-42-45-51-54-63-69-76-80-88-90	OMNI - cut to CP
P2	90.00°	24-72	Establish width
P3	90.00°	16-80	MP @ P1, P2
P4	90.00°	10-86	MP @ P1, P3
P5	90.00°	96	MP @ P1, P4
P6	90.00°	28-32-64-68	MP @ P1, P2 (28 or 68 first)
P7	90.00°	36-60	MP @ P1, P6
P8	90.00°	40-56	MP @ P1, P7
P9	67.00°	40-56	MP @ P1, P8
P10	69.00°	36-60	MP @ P8, P9 (level girdle)
P11	70.15°	28-32-64-68	MP @ P7, P10 (level girdle)
P12	69.34°	24-72	MP @ P6, P11 (level girdle)
P13	68.00°	16-80	MP @ P2, P12 (level girdle)
P14	67.48°	10-86	MP @ P3, P13 (level girdle)
P15	69.23°	96	MP @ P4, P14 (level girdle)

## CROWN

C1	35.00°	24-72	Establish girdle height
C2	35.00°	28-32-64-68	Level girdle
C3	35.00°	36-60	Level girdle
C4	35.00°	40-56	Level girdle
C5	32.19°	16-80	Level girdle
C6	31.60°	10-86	Level girdle
C7	35.00°	96	Level girdle
C8	27.00°	02-94	GMP
C9	28.59°	20-76	GMP
C10	30.93°	30-66	GMP
C11	31.30°	38-58	GMP
C12	22.80°	96	MP @ C7
C13	15.36°	25-71	MP @ C1, C2
C14	18.50°	48	MP @ C4, C4
C15	0.00°	Table	MP @ C5, C6
C16	18.09°	34-62	MP @ C3, C3 & C13 & C14

## DJG "OMNI" Heart

© David Groncki 2009

Angles for R.I. = 1.540

62 + 15 girdles = 77 facets

1-fold, mirror-image symmetry

96 index

L/W = 1.153 T/W = 0.578 U/W = 0.467

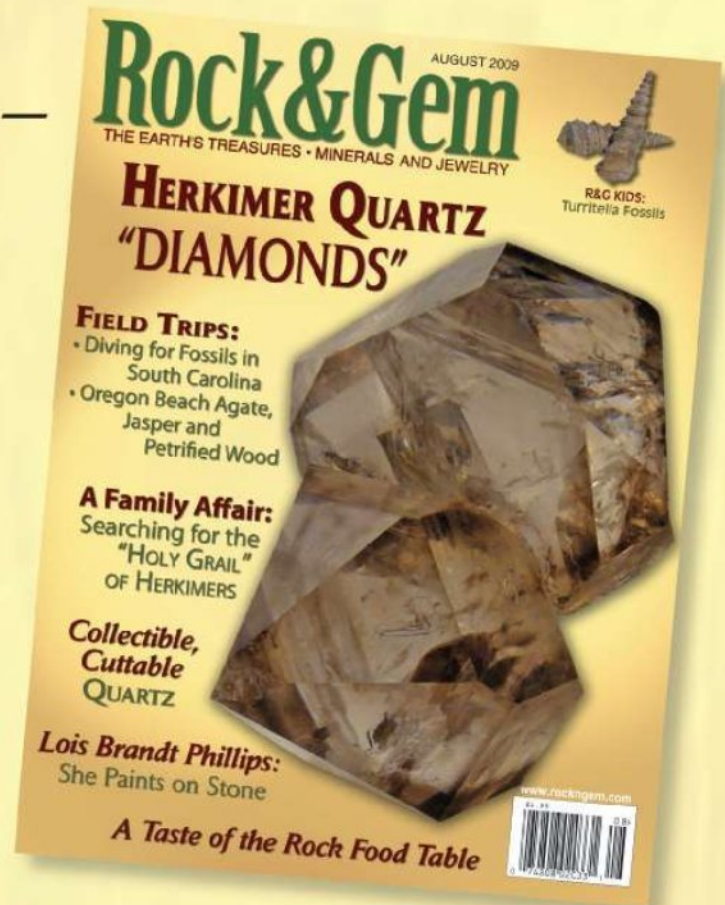
P/W = 0.553 C/W = 0.136 Vol./W<sup>3</sup> =

0.308

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- Opals • Polymer Clay
- Silver • Silver Clay
- Spool Knitting
- Stained Glass
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- Wire Sculpture

Show Dates from page 62

MAY 2010

**18—MESA, ARIZONA:** Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn & Suites (Superstition Ballroom), 1600 S. Country Club Dr.; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**20—ALBUQUERQUE, NEW MEXICO:** Show, "Rings & Things BeadTour"; Rings & Things; MCM Elegante Hotel, 2020 Menaul NE; Thu. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**21-23—ANN ARBOR, MICHIGAN:** Show and sale; GemStreet USA; The Washtenaw Fairgrounds, 5055 Ann Arbor/Saline Rd.; Fri. 10-6, Sat. 10-6, Sun. 11-5; fine gems, jewelry, beads, fossils, minerals; contact Jane Strieter Smith, (216) 521-4367; Web site: www.gemstreetusa.com

**21-23—MARTINSVILLE, VIRGINIA:** 20th annual Martinsville Bead, Gem, Mineral & Jewelry Show; Treasures Of The Earth Gem & Jewelry Shows, National Guard Family Support Group; Martinsville 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 from all over the U.S., gem trees, wire wrap, wire sculpture, pearls, stone beads, stone setting, amber, opal, mineral and fossil dealers, hourly door prizes, grand prize, classes, Rockingham County (NC) Mineral Club sluice; contact Van Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: van@toteshow.com; Web site: www.toteshow.com

**21-23—SANTA BARBARA, CALIFORNIA:** Show, "Gem Faire"; Gem Faire Inc.; Earl Warren Showgrounds/Exhibit Hall, 3400 Calle Real; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**28-30—SALEM, VIRGINIA:** 19th annual show; Treasures Of The Earth Gem & Jewelry Shows; Talianferro Complex/Salem Civic Center, 1001 Boulevard; Fri. 10-6, Sat. 10-6, Sun. 11-6; adults \$4 (3-day ticket), children under 16 free; jewelry makers, goldsmiths and silversmiths size, reconstruct, repair, design or make original jewelry from customer-selected gems, stones, opals and crystals, wire wrap, wire sculpture, stone beads, pearls, stone setting, dealers, amber, opal, fossils, minerals, door prizes, grand prize, wire wrapping classes; contact Van Wimmer Sr., 5273 Bradshaw Rd., Salem, VA 24153, (540) 384-6047; e-mail: vawimmer@verizon.net; Web site: www.toteshow.com

**29-30—FORT WORTH, TEXAS:** 59th annual show, "Fabulous Fossils"; Fort Worth Gem & Mineral Club; Will Rogers Memorial Center, Amon G. Carter Exhibit Bldg., 3401 W. Lancaster; Sat. 9-6, Sun. 10-5; adults \$5, seniors \$4, children under 12 free; 30 dealers, kids' games, hourly door prizes, grand prize, silent auction, exhibits; contact Steve Hilliard, P.O. Box 418, Decatur, TX 76234; (817) 925-5760; e-mail: fvwgmc@embarqmail.com; Web site: www.fortworthgemandmineralclub.org

**28-31—SCOTTSBLUFF, NEBRASKA:** Rock swap; Panhandle Rock & Gem Club; Riverside Zoo and Campground, 1600 S. Beltline Hwy. W; Fri. 8-5, Sat. 8-5, Sun. 8-5, Mon. 8-5; free admission; public auction Sat., demonstrations, raffle; contact Dale Tikalsky, 523 W. 20th St., Scottsbluff, NE 69361, (308) 632-5574; e-mail: tikal sky21@charter.net

**29-30—CASPER, WYOMING:** Show; Natrona County Rockhounds; Natrona County Fairgrounds, Industrial Bldg., 1700 Fairgrounds Rd.; Sat. 9-5, Sun. 9-4; adults \$3, children 12 and under free with adult; displays, demonstrations (flint knapping, wire wrapping, gold panning, faceting), silent auction, raffles, door prizes; contact Randy Sternberg, P.O. Box 123, Mills, WY 82644, (307) 234-6156; e-mail: hmhoff@bresnan.net

**29-30—LAKESIDE, ARIZONA:** Annual show; White Mountain Gem & Mineral Club; Blue Ridge Junior High School, 3050 N. Porter Mountain Rd.; Sat. 9-6, Sun. 9-4; adults \$2, students (15 and under) free with paying adult; dealers, gems, minerals, beads, fossils, lapidary equipment, rough and finished rock specimens, silent auction, spinning wheel, kids' activity area, door prizes, raffle prizes, display cases, fluorescent mineral display; contact Larry Legge/Nanz Marshall, (928) 537-2524; e-mail: larrylegge@yahoo.com; Web site: www.whitemountain-azrockclub.org



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**29-30—TONOPAH, NEVADA:** 40th annual show, "Jim Butler Days"; Tonopah Rock & Mineral Club; Tonopah Convention Center; Sat. 9:30-5, Sun. 9:30-3; gems, minerals, jewelry, fossils, bottles, in conjunction with the Nevada State Mining Championships; contact Robert Otteson, P.O. Box 3493, Tonopah, NV 89049

## JUNE 2010

**4-6—LAS VEGAS, NEVADA:** Business-to-business gem trade show; Gem & Lapidary Wholesalers Inc.; Bally's Las Vegas Hotel & Casino, Pacific Ballroom, 3645 Las Vegas Blvd. S; Fri. 10-6, Sat. 10-6, Sun. 10-3; contact G&LW, P.O. Box 98, Flora, MS 39071-0098, (601) 879-8832; e-mail: info@glwshows.com; Web site: glwshows.com

**4-6—PUYALLUP, WASHINGTON:** Show; Puyallup Valley Gem & Mineral Club; Fruitland Grange, 112th St. and 86th Ave. E; Fri. 12-6, Sat. 10-6, Sun. 11-4; contact Mark Baumann, (253) 756-8636; e-mail: djbmeb@earthlink.net

**4-6—TULSA, OKLAHOMA:** Show, "Gem Faire"; Gem Faire Inc.; Expo Square/Central Park Hall, 4145 E. 21st St.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**4-6—WAUSEON, OHIO:** Show; State Line Gem & Mineral Society; Fulton County (Ohio) Fair Grounds, 8514 SR 108, Ohio Turnpike Exit 34; Fri. 12-7, Sat. 10-7, Sun. 11-4; free admission; MSHA mine safety class Sat., (\$30 includes book), soapstone carving class, beaded jewelry class, demonstrations (cabochon cutting and polishing, flint knapping, silver casting), micro mounts, fluorescent minerals, wire wrapping, spool knitting, faceting, glass fusing, kids' grab bags, silent auctions, door prizes, raffle; contact Doris Brzezicki, 419 N. Broad St., Adrian, MI 49221, (517) 263-1669; e-mail: rychar@tc3net.com; Web site: www.angelfire.com/mac/rock-club/

**5—DELTA, COLORADO:** Show; Delta County Rock Wranglers; Heddles Recreation Center, 530 Gunnison River Dr.; Sat. 9-5; free admission; dealers, exhibits, door prizes, family activities; contact Harry W. Masinton, (970) 856-3861

**5-6—BIRMINGHAM, ALABAMA:** 37th annual show, "Tannehill Gem, Mineral, Fossil, & Jewelry Show"; Alabama Mineral & Lapidary Society; Tannehill Ironworks Historical State Park, 12632 Confederate Pkwy.; Sat. 9-5, Sun. 9-5; adults \$3, seniors and ages 6-12 \$2, kids under 6 free; door prizes, children's activities, educational exhibits, demonstrations; contact Gene Blackerby, 155 Hwy. 69, Chelsea, AL 35043, (205) 807-6777; e-mail: gene@lapidaryclub.com; Web site: http://lapidaryclub.com

**5-6—COEUR D'ALENE, IDAHO:** Show; North Idaho Mineral Club; Kootenai Co. Fairgrounds and Event Center, Kathleen and Government Way; Sat. 9-5, Sun. 10-4; contact Warren Price, P.O. Box 1543, Hayden, ID 83835; e-mail: genuniegems@gmail.com

**5-6—GLENORA, CALIFORNIA:** Show; Glendora GEMS; Goddard Middle School; 859 E. Sierra Madre; Sat. 10-5, Sun. 10-4; free admission; dealers, demonstrations, displays, door prizes; contact Bonnie Bidwell, 1010 E. Mountain View, Glendora, CA 91741, (626) 963-4638; e-mail: ybidwell2@aol.com

**6—FT. LAUDERDALE, FLORIDA:** Show, "Rings & Things BeadTour"; Rings & Things; Sheraton - Cypress Creek, 555 NW 62nd St.; Sun. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**8—TAMPA, FLORIDA:** Show, "Rings & Things BeadTour"; Rings & Things; Clarion, 2701 E. Fowler Ave.; Tue. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**10—JACKSONVILLE, FLORIDA:** Show, "Rings & Things BeadTour"; Rings & Things; Clarion Hotel Airport Conference Center (Ballroom), 2101 Dixie Clipper Rd.; Thu. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**10-12—PARK HILLS, MISSOURI:** 13th annual swap and sale; Mineral Area Gem & Mineral Society; Greater St. Louis Association of Earth Science Clubs; Missouri Mines

*continued on page 71*

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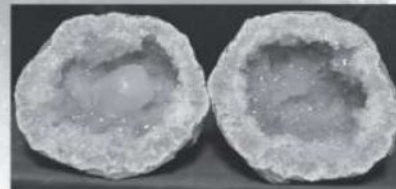
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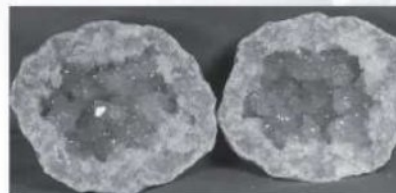
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Advertising Pays

# Rock & Gem

Contact Brian Roberts, Advertising Director: [BRoberts@JMillerMedia.com](mailto:BRoberts@JMillerMedia.com) (623) 327-3525

**JUNE 2010**

State Historic Site, Hwy. 32; Fri. 9-6, Sat. 9-6, Sun. 9-5; free admission; rocks, minerals, fossils, lapidary; contact Lloyd E. Marler, (573) 431-2951, or Missouri Mines State Historic Site, P.O. box 492, Park Hills, MO 63601, (573) 431-6226

**11-12—REDWOOD FALLS, MINNESOTA:** Show and sale; New Ulm Gem & Mineral Club, Minnesota Inventors Congress; Redwood Area Community Center, 901 Cook St.; Fri. 11-6, Sat. 11-6; club displays, grab bags, jewelry, rocks, amethyst, demonstrations, door prizes; contact Ruth Hacker, P.O. Box 37, Morgan, MN 56266, (507) 249-3811

**11-13—ALBUQUERQUE, NEW MEXICO:** Show, "Gem Faire"; Gem Faire Inc.; New Mexico State Fairgrounds, 300 San Pedro NE; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**11-13—RALEIGH, NORTH CAROLINA:** Show; Frank Cox Productions; State Fairgrounds, 1025 Blue Ridge Rd.; 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

**12—KENT, CONNECTICUT:** 8th annual show; Connecticut Antique Machinery Association, Danbury Mineralogical Society; museum grounds, 1 mile north of Kent on Rte. 7; Sat. 9-4; free admission; rocks, minerals, fossils, jewelry, buy and trade, new mining museum exhibits; contact CAMA, (860) 927-0050; Web site: www.ctamachinery.com

**12—SKOKIE, ILLINOIS:** 3rd annual show, "Geode Fest"; Chicago Rocks & Minerals Society; St. Peter's United Church of Christ - Gymnasium, 8013 Laramie Ave.; Sat. 1-5; free admission; geodes from Iowa, Missouri, Indiana, Mexico, Brazil, etc., geode cracking, dealers, educational exhibits, mineral inclusion identification; contact Craig Heinze, (847) 584-8637; e-mail: cheinze@flash.net; Web site: www.chicagorocks.org

**12—NORCROSS (ATLANTA), GEORGIA:** Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn Select - Peachtree Corners, 6050 Peachtree Industrial Blvd. NW; Sat. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**12-13—SAN FRANCISCO, CALIFORNIA:** Show, "San Francisco Crystal Fair"; Pacific Crystal Guild; 99 Marina Blvd.; Sat. 10-6, Sun. 10-4; admission \$6; contact Jerry Tomlinson, (415) 383-7837; e-mail: sfxtl@earthlink.net; Web site: www.crystalfair.com

**13—CHARLOTTE, NORTH CAROLINA:** Show, "Rings & Things BeadTour"; Rings & Things; Renaissance Suites Hotel (Terrace Ballroom), 2800 Coliseum Centre Dr.; Sun. 2-6; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**14—DURHAM, NORTH CAROLINA:** Show, "Rings & Things BeadTour"; Rings & Things; Hilton Durham, 3800 Hillsborough Rd., near Duke University; Mon. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**15—SPOKANE, WASHINGTON:** Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn - Richmond Central, 3207 North Blvd.; Tue. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**16—McLEAN, VIRGINIA:** Show, "Rings & Things BeadTour"; Rings & Things; Best Western Tysons Westpark Hotel (Tysons 1 and 2), 8401 Westpark Dr.; Wed. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**17—TIMONIUM, MARYLAND:** Show, "Rings & Things BeadTour"; Rings & Things; Holiday Inn Timonium, 9615 Deereco Rd.; Thu. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, P.O. Box 450, Spokane, WA 99210, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**18-20—NEWPORT, OREGON:** 47th annual show, "Rock'n the Coast"; Oregon Coast Agate Club; Yaquina View Elementary School, Multipurpose Room, 351 S.E. Harney St.; Fri. 10-6, Sat. 10-6, Sun. 10-4:30; dealers, demonstrations, displays, agate, jasper, gems, fossils; contact K. Myers, (541)265-2514

**18-20—SANDY (SALT LAKE CITY), UTAH:** Show, "Gem Faire"; Gem Faire Inc.; South Towne Exposition Center/Exhibit Hall 5, 9575 S. State St.; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

**18-20—WHITTIER, CALIFORNIA:** AFMS/CFMS show, "Hidden Treasures"; North Orange County Gem & Mineral Society, American Federation of Mineralogical Societies, California Federation of Mineralogical Societies; So. California University of Health Sciences, 16200 E. Amber Valley Rd. (www.scuhs.edu); adults \$6, children under 14 free; Fri. 10-5, Sat. 10-5, Sun. 10-5; speakers, field trips, display cases, raffle, kids' room, demonstrations, vendors, supplies, jewelry, beads, fossils, gems; contact Don Warthen, (626) 330-8974; e-mail: odwarthen@verizon.net; Web site: www.nocgms.com

**19—ESSINGTON, PENNSYLVANIA:** Show, "Rings & Things BeadTour"; Rings & Things; Wyndham, 46 Industrial Hwy.; Sat. 12-4; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**19-20—BUTTE, MONTANA:** Annual show; Butte Mineral & Gem Club; Civic Center Annex, 1340 Harrison Ave. (exit 127 North); Sat. 10-5, Sun. 10-5; 15 dealers, minerals, gems, jewelry, fossils, displays, demonstrators; contact Pete Knudsen, P.O. Box 4492, Butte, MT 59702, (406) 496-4395

**19-20—CAYUCOS, CALIFORNIA:** 46th annual show; Cayucos Gem & Mineral Show; San Luis Obispo Gem & Mineral Club; Cayucos Vets Hall, 10 Cayucos Dr.; Sat. 9-5, Sun. 9-5; free admission; rocks, slabs, minerals, fossils, gems, carvings, lapidary equipment, drawing; contact Mike Lyons, (805) 610-0757; e-mail: jadestar@charter.net

**20—HANOVER, NEW JERSEY:** Show, "Rings & Things BeadTour"; Rings & Things; Ramada Inn and Conference Center (Ballroom), 130 Rte. 10 W; Sun. 1-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

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

**24—ROCHESTER, NEW YORK:** Show, "Rings & Things BeadTour"; Rings & Things; Monroe Community College, Brighton Campus, Bldg. #3, Monroe A & B, R. Thomas Flynn Campus Center, 1000 E. Henrietta Rd.; Thu. 12-5; free admission; gemstones, bead strands, wholesale prices, findings, stringing supplies; contact Dave Robertson, (800) 366-2156; e-mail: drobertson@rings-things.com; Web site: www.rings-things.com

**24-27—PRINEVILLE, OREGON:** Show, "Prineville Rockhound Show and Pow Wow"; Prineville Rockhound Pow Wow Association; Crook County Fair Grounds, 1280 S. Main; Thu. 9-5, Fri. 9-5, Sat. 9-5, Sun. 9-4; free admission; auction, field trips; contact Rich Knight, 1709 SW Hunter Rd., Prineville, OR 97754, (541) 447-5298; e-mail: richknight@yahoo.com

**25-27—BLOOMINGTON, INDIANA:** 45th annual show and swap; Lawrence County Rock Club; Monroe County 4-H Fairgrounds, from IN 37, go south on IN 45S for 1.2 miles, then right (west) on Airport Rd. for 0.7 mile; gems, jewelry, minerals, fossils, rocks, lapidary equipment, supplies, rockhound and prospecting supplies, 4-H project material, science project material; Fri. 10-6:30, Sat. 9-6:30, Sun. 10-4; contact Dave Treffinger, 13101 E. 250 N., Loogootee, IN 47553, (812) 295-3463; Web site: www.lawrencecountyrockclub.org

**25-27—SAN DIEGO, CALIFORNIA:** Show, "Gem Faire"; Gem Faire Inc.; Scottish Rite Event Center, 1895 Camino del Rio S; Fri. 12-7, Sat. 10-6, Sun. 10-5; \$5 weekend pass; contact Yooy Nelson, (503) 252-8300; e-mail: info@gemfaire.com; Web site: www.gemfaire.com

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# O N THE ROCKS

## Bills Target Collecting Areas



Senate bill S-799 could affect many mineral specimen localities, including the La Sal Mountains azurite occurrence.

Looks like the federal folks are at it again, considering bills that will further restrict access to and rockhounding activities on federal lands. They'll do this with new laws that are under consideration and by changing the rules and requirements pertaining to public lands!

While rockhounds of all ages represent a cross section of America, from enthusiastic youths to old-timers, the majority are—and all will eventually become—senior citizens. Seniors and permanently disabled citizens have been entitled to certain privileges, like camping discounts on federal lands. Currently, lifetime Senior and Access passes give these groups free access to U.S. Forest Service lands. The Forest Service is now considering changing the way these passes can be used (see [www.fs.fed.us/special\\_uses/special\\_concession.shtml](http://www.fs.fed.us/special_uses/special_concession.shtml)). They may reduce the 50 percent discount of camping fees to a paltry 10 percent for these groups, while eliminating the free day-use access to such lands that is currently included in the passes. This is nothing more than a hidden or new tax, expressed as an increase in operating fees. The effect is the same: more cost to the public!

The federal properties that will be affected by changes to the passes are those being operated by private concessioners, who bid for and gain control of many federal lands for profit. They not only manage the money-making parts of federal properties, including national parks and monuments, but major areas of Forest Service lands.

Currently, private concessioners control about half the available camping space on federal lands, which contains over 80 percent of the reservable campsites. They also control virtually all the gift shops and concessions in parks and monuments. It should be obvious that these concessioners are using your federal lands for profit. They have objected vigorously to the current discount system, since it infringes on their profits. By convincing the Forest Service to change the rules, they improve their bottom line—at your expense!

Golden Age and Golden Access passes were initially authorized in 1965 by the Land and Water Conservation Fund Act. The Federal Lands Recreation Enhancement Act, authorized by Congress in 2004, created the Interagency Pass Program, which continued the availability of lifetime passes, but eliminated the required 50 percent discount. These passes, known as the America the Beautiful passes, apply to lands administered by the National Park Service, U.S. Department of Agriculture-Forest Service, Fish and Wildlife Service, Bureau of Land Management, and Bureau of Reclamation. Luckily, the Forest Service chose to continue the discount for us—until now! This new effort will eliminate that 50 percent discount, while also effectively eliminating the free Golden passes. If enacted, this new rule will force senior citizens and the disabled to pay a significant fee when entering national parks and monuments and other federal lands under concessioner control. Those who hold America the Beautiful passes will continue to have free access, but Golden pass holders will now get only a 10 percent discount. (For an explanation of the America the Beautiful passes, visit [www.nps.gov/fees\\_passes.htm](http://www.nps.gov/fees_passes.htm).)

It does not take a genius to see that what used to be public recreation areas that benefit us all have now become a profit-making venture for concessioners at public expense. Since the federal departments lease these lands to concessioners, they are making money, too. The argument in favor of this arrangement is that the fees are used to maintain the properties. When some—meaning seniors and the disabled—get in

for free, others must pay more to make up the losses. The Forest Service has deemed this preferential treatment unfair. Since this country has traditionally given special consideration to the old and disabled, it seems unconscionable to deny such special considerations now.

The American Federation of Mineralogical Societies (AFMS) and its regional federations are working with other groups to prevent this kind of action. For example, since such changes affect mostly western lands, the federations are supporting the efforts of the Western Slope No-Fee Coalition ([www.westernslopenofee.org/](http://www.westernslopenofee.org/)). In commenting on this latest effort by the U.S. Forest Service in a Dec. 3, 2009 e-mail, Western Slope President Kitty Benzar said, "No more special honors, no more special breaks [for senior citizens and the disabled]. Pay up or stay home now applies to everyone". Such a bleak assessment ought to stir you into contacting your Congresspeople to stop this insult to the aged and infirm!

Members of the AFMS and the California Federation of Mineralogical Societies (CFMS) keep an eye on federal actions, then pass on information to their members and encourage them to act to protect our rights and lands. For one thing, they watch the appearance of bills being planned for congressional submission that can adversely affect our hobby. The following are a few such bills.

In the February 2010 CFMS newsletter, John Martin writes about a bill entitled The California Desert Conservation and Recreation Act, now The California Desert Protection Act of 2010, introduced by Dianne Feinstein (D-CA) ([http://feinstein.senate.gov/public/index.cfm?FuseAction=NewsRoom.PressReleases&ContentRecord\\_id=b3cb1c7d-5056-8059-7644-b14713dcc1a5](http://feinstein.senate.gov/public/index.cfm?FuseAction=NewsRoom.PressReleases&ContentRecord_id=b3cb1c7d-5056-8059-7644-b14713dcc1a5)). The title sounds really nice and positive, seeming to combine conservation with fun activities. Yes, it does conserve the desert, but in doing so, it sets up restrictions on our recreation access and activities within

the designated areas. This is a common ploy by congressional leaders. They title a bill to make it sound like a positive opportunity or action, but when you read the bill, it turns out to be not so positive—in fact, downright negative sometimes!

As John writes, the Feinstein bill will affect huge acreages of wilderness, from the Avawatz Mountains near Death Valley extending to the largest Sonoran woodland in North America along the Colorado River. It creates two new national monuments that encompass 10 miles on either side of old Route 66 from Barstow to Needles, California. It also affects a dozen or more other areas frequented by rockhounds and recreation vehicle users, for a total of 1.6 million acres!

Title 14 of the Feinstein bill prohibits the use of donated and acquired land for development, off-highway vehicles (except in identified areas), grazing, military use, and other “surface-disturbing” activities, so you can forget about rockhounding in the entire 1.6 million acres. Would you believe my home state of Connecticut isn’t that big? The CFMS reports that some of California’s best rockhounding areas would be made off limits by this bill.

Another bill, this one dealing with areas in Montana, is called the Forest Jobs and Recreation Act ([www.govtrack.us/congress/bill.xpd?bill=s111-1470](http://www.govtrack.us/congress/bill.xpd?bill=s111-1470); <http://tester.senate.gov/Legislation/forestresources.cfm>). Don’t you just love it when a bill carries an attractive title that is actually a smoke screen to its real intent? This bill would swallow up 677,000 acres and facilitate legal action to stop logging (think jobs) where forests have suffered from fires, disease, and the like. So much for forest jobs in the bill’s title. The bill creates no new recreation areas, and in fact would eliminate some existing recreation areas.

One bill, already assigned a number in Congress, is the America’s Red Rock Wilderness Act. It is known as S-799 ([www.govtrack.us/congress/bill.xpd?bill=s111-799](http://www.govtrack.us/congress/bill.xpd?bill=s111-799)) and House of Representatives bill H.R. 1925 ([www.govtrack.us/congress/bill.xpd?bill=h111-1925](http://www.govtrack.us/congress/bill.xpd?bill=h111-1925)). This bill is really something. It will close over 9 million acres of the Great Basin Desert and the Colorado Plateau in Utah. The bill reads like a list of all the more scenic places in the area. It includes large sections of the San Rafael Swell, Canyon Lands Basin, Zion/Mojave Desert, Great Basin, Moab/LaSal Canyons, Canyonlands Basin, Henry Mountains, Grand Staircase/Escalante area, Glen Can-



**The benefits afforded by my Golden Age pass are now in jeopardy of being drastically reduced!**

yon area, San Juan/Anasazi area, and Book Cliffs/Uinta Basin area.

Of course, much of this land is already under federal purview, but being designated Wilderness Areas adds severe restrictions that virtually exclude rockhounding. I can think of the barites of the Book Cliffs area and the azurites formerly found in the La Sal mountain range as superb specimens that may end up off limits to collectors!



**Million of acres of Western lands will be subjected to land-use restrictions if some proposed bills ever reach Congress for passage.**

Oregon is another target for Congressional action. H.R. 3609, the Wetlands Conservation Investment Act, deals primarily with the entire length of Oregon beaches, which are certainly some of the most scenic beach areas we have. For decades, folks in the Pacific Northwest have been enjoying casual rockhounding along the Oregon beaches, searching for jasper, agate, jade and fossils along and in the surf areas. Jade Beach is one well-known spot for collecting this green nephrite gem. If H.R. 3609 is passed by Congress, however, you can cross this area off your rockhound recreation list.

Another bill being proffered for introduction is called the Hidden Gems Wilderness campaign ([www.whiteriverwild.org/](http://www.whiteriverwild.org/)). It will be an attempt to close 600,000 acres of land in Colorado. As of this writing, the bill has not yet been introduced in Congress. Like the other bills cited, this is a good example of the efforts environmentalists are continually making to close federal lands with no thought to how it will

affect the recreation activities of rockhounds, campers, hunters, and other outdoors types!

The CFMS does valuable work in getting this kind of information to its members via its newsletter. Without the federations, which represent rockhounds all over America, we would not have a strong organization to watchdog Congress and government agencies like the U.S. Forest Service. By distributing information, the federations encourage your input and action on pending and potential Congressional and federal department actions that will have a mostly negative impact our hobby and science. The federations perform a valuable service to you, thanks to the small portion of club dues paid to them by member clubs. If your club does not belong to a federation, get involved! Have your club join in the fight to preserve our lands and our hobby.

You can track the progress of this and other legislation through the House and Senate via the Web site [www.govtrack.us](http://www.govtrack.us).

#### UPCOMING EVENTS

One final note for you on events coming up within a couple of weeks: the spring lapidary workshops at Wildacres, in the Smoky Mountains of North Carolina, Apr. 23-29, and the CRIZMAC Rockhound Tour of England, May 4-14. Those who are participating in the tour have already made their reservations. We should have a ball! As for Wildacres, there may still be space for you. Contact the Eastern Federation of Mineralogical Societies Registrar, Pamm Bryant, by e-mail at [pjbryant6@juno.com](mailto:pjbryant6@juno.com). The fee is \$350 for a full week of classes and activities.

The classes cover a broad range of lapidary hobbies, from metalsmithing to faceting. Beginners can learn to cut cabochons, make chain maille jewelry, do wire wrapping, or learn scrimshaw. My wife, Carol, enjoyed doing fused glass on our last visit, and I suspect she’ll make some pretty colorful jewelry in that class on this visit! All in all, Wildacres is a fabulous week and a most pleasant learning experience. I’ll see you there! 🍷

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.

## Recommended Reading

I read Mr. Jones' article on building your library in a recent issue of *Rock & Gem*. I purchased three of the books that he recommended. I felt the need to comment on *Mineralogy for Amateurs*, by John Sinkankas. I am an amateur collector and have stumbled around in the darkness for years trying to understand crystal structure and other "simple" mineralogical concepts. While reading Mr. Sinkankas' book, light bulbs continued to go off, page after page. This is the best book that I have ever read on the subject of mineralogy. The author's ability to make the concepts simple and clear is very refreshing. I'd like to thank Mr. Jones for recommending this book. You have a great magazine.

—Robert Smart  
Columbia, MO

I recently got a book off eBay. I used to check this book out at [the] local library in the '60s. I learned a lot from reading it. Any collector that has collected for a long time probably knows of it. Bet if you ask super collector Bob Jones, he could tell you all about *Getting Acquainted with Minerals*, by George Letchworth English [and David E. Jensen (McGraw-Hill Book Co., 1958)]. ... Back then, collecting in the U.S. was great!

—Donald G. Arrowood  
Rutherfordton, NC

ABE Books ([www.abebooks.com](http://www.abebooks.com)) is one source of this and other out-of-print books on mineralogical topics. For a short biography of George Letchworth English, visit the Mineralogical Society of America Web site ([www.minsocam.org/MSA/collectors\\_corner/arc/english.htm/](http://www.minsocam.org/MSA/collectors_corner/arc/english.htm/)).

—Editor

Please advise your readers that *Minerals and their Localities*, 2nd edition (2007), which sells for \$349-plus in the United States, can be purchased from Granit in the Czech Republic for approximately \$168, including shipping and handling! They will take Master Card or Visa and it can all be done over the Internet!

—Dante Caprara  
Exeter, RI



NICK HENNING PHOTOS

## Mystery Rock

I recently found a 15-pound stone with strange markings on it, so I split it open and it was full of small pieces of wood, ¼ inch to ½ inch wide and 1 inch to 3 or more inches long. It looks as though someone took pieces of busted wood, put them in cookie dough, and put it in the oven. The stone itself is rusty-brown on the outside and sandy-white on the inside. I was curious as to whether I had made a unique find.

I took the rock up to Iowa State University, and today I finally received an answer. A professor there told me that this rock is from Pennsylvania and that it consists of carbonized fossil wood encased in a sedimentary rock that probably formed in a delta or low-lying area.

—Nick Henning  
Meservey, IA

## Article Appreciation

Our Bureau Chief handed me your January 2010 issue, in which I found the article "A New Prospecting Tool: The BLM Geo-Communicator", by Robert Beard (p. 34). I work for the Montana Department of Environmental Quality, Environmental Management Bureau, Hardrock Mining Program. I field a lot of questions about claim status and locations, which I have always referred to the Montana BLM State Office. After reading your article, I now have a Web site to offer.

—Jackie Windon  
Helena, MT

## Coating Quandary

Help! I have just purchased a quantity of agate and jasper mineral samples for display. I know they look best when wet, but can't keep these minerals in a pan of water. My question: Can I spray these mineral pieces with a urethane spray to bring out the colors?

—Richard Gibbons  
Saint George, UT

I am not a fan of coating mineral specimens for display. I have had many letters over the years asking how to remove these coatings, and unfortunately many are nearly impossible to remove. My advice is not to use urethanes, resins, etc. A spray can of gloss lacquer should do the trick, and it can easily be removed with lacquer thinner, if necessary.

—William A. Kappel  
ShopTalk columnist

## Facebook Friend

Hi, Lynn. I see your face every month as I read my *R&G* magazine. And now I get to see you on FB. Nice, very nice.

I have my own techniques when I work on my free form cab material and free form wire wrapping stones. I also have my own way of getting an excellent polish or flat slabs. I am not sure they would work as well in the smaller, 3-pound tumblers that many people use.

I had an article published in a prospecting magazine about panning for gold in Nebraska—where there isn't supposed to be much found. It was not all about prospecting, but the excitement of trying and trials one has to overcome when the tools are not readily available to do what is needed to be done. Persistence won, and I found some gold in the bottom of my pan.

If any one wants to know where I have panned in Nebraska, they can contact me for directions. I always like to pan/sluice there, as there was a lot of red garnet sand that I would save. I am sure there were larger garnet crystals, but I just never had the time to really "prospect" like I would have liked to.

—Larry E. Whittington  
rockhead2u@comcast.net



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