PICK&PACK

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A New Park County Gem Discovery: Tarryall Fire Agate

By Steven Wade Veatch, CSMS

Exceptional specimens of iridescent fire agate have recently been found in Park County, close to Tarryall Creek and near the Tarryall Reservoir. Fire agate is a variety of chalcedony (kal SED' uh nee), a form of microcrystalline or cryptocrystalline (crystals too small to be seen without high magnification) quartz (SiO_2) containing inclusions of limonite, producing an iridescent effect or "fire." Chalcedony is generally formed near the surface of the Earth, where temperatures and pressures are low. The Tarryall fire agate has a botryoidal (grape-like) growth form. The agate is also layered: it contains thin layers of plate-like crystals of iron oxide (limonite) in various planes. When light travels through these thin layers, the planes produce the iridescent color play of red, gold, and green.

CHALCEDONY	
Variety	**Color**
Agate	Variegated, banded
Carnelian	Red to brownish red
Chrysoprase	Apple green
Flint	Black dull gray
Jasper	Red yellow brown
Onyx	Black and white
Sard	Translucent, light to chestnut brown

Table 1.

The fire agate specimens were found as seams in granite near the Tarryall Creek. The Tarryall Creek is a tributary of the South Platte River, approximately 25 miles (40 km) long, in Park County in central Colorado. It drains a portion of north and central South Park, an intermontane grassland southwest of Denver. Tarryall Creek runs in several forks along the continental divide in the Pike National Forest and then flows to the southwest through a canyon where it enters South Park near the small town of Como and then crosses U.S. Highway 285 northeast of Fairplay. Tarryall Creek then meanders roughly southeast, later joining the South Platte River in the southeastern corner of South Park.

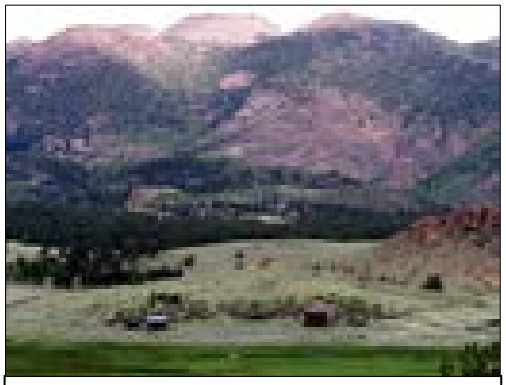

Fig. 1. View to northeast from Tarryall Creek Valley. Park County. Colorado. Photo date June, 2007, © by S. W. Veatch.

Dreams of gold and silver strikes lured early prospectors into the area. The Tarryall Creek, north of the present town of Como, was an active location for gold prospecting in 1859. The "Tarryall Diggings" and other nearby sites brought in thousands of prospectors over Kenosha Pass, and the town of Tarryall (now gone) was soon founded near the creek (McConnell, 1966). Failing to get rich quick, many of the gold seekers moved

(See "Tarryall Fire Agate" on page 4)

Inside this issue:

CSMS is an incorporated non-profit organization with these goals:

- **To promote and disseminate knowledge of the earth sciences, especially as they relate to mineralogy, lapidary, and fossils.**
- **To encourage study, collection and fashioning of minerals.**
- **To accomplish the same through social meetings, lectures, programs, displays, shows, and field trips.**
- **The Pick&Pack is published monthly to assist and promote the above.**

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Rocky Mountain Federation of Mineralogical Societies (RMFMS) www.rmfms.org

Colorado Federation of Gem & Mineral Societies (CFMS) www.coloradorocks.org

Colorado Springs Mineralogical Society
Founded in 1936

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JULY 2007

PICK&PACK

Our Staff...

Betty Cain — *Editor*
Brenda Malin — *Mailer*

We encourage everyone to submit articles, photos, illustrations or observations.
Share your experiences, trials and tribulations, your new finds, or simply your experience at our last field trip.
The ability to write well is NOT a requirement. We will fix the grammar while keeping the author's voice, style, and work intact.
Handwrite it, type it, or email it. Format does not matter. All submissions are welcomed.

DEADLINE for items to be included in the next month's issue is the third (3rd) Friday of every month. To submit an item, please use the following:

Photos:
For hardcopy photos, mail to the address below or bring them to the General Assembly Meeting. All photos remain the property of the submitter and will be returned. Electronic photos should be submitted at resolutions above 200 dpi in TIF, BMP, JPG, or PIC format.

Articles:
Mail or email to the addresses below.
ALL FORMATS ARE WELCOMED.

Email: bcain2@earthlink.net or Info@csms.us
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Phone:
(719) 634-8205

PICK&PACK is published ten (10) times per year. 250-275 mailed per month.

PRESIDENT'S CORNER

Drew Malin

What a show! I can't say enough about how well I think our show went this year. Special thanks to **Kaye** & **Jack Thompson**, **Linda** & **Nick Morales**, **Pat** & **Roger Pittman**, **Bob** & **Barb Landgraf**, and everyone else who helped make this year's show a success! We will be reporting all the final numbers in the coming weeks, but all indications are that this year's show was a great success. We surpassed last year's numbers in admissions and in vendor sales, and thanks to Kaye's careful management, costs went *down* substantially!

Now that the show is over, we can settle down to a summer of rockhounding. By the time you read this, we should have the first club claim field trip scheduled, (Thanks, **John**!) as well as the club picnic (Thanks, **Linda**!). As the summer progresses, I *KNOW* that a lot of you members are going forth on your own field trips. Remember that if you have just a bit of forewarning, and if you're willing to take a few extra folks with you, I can broadcast your trip to the troops via email, just send the into to: info@csms.us, and I'll get it right out.

Finally, a reminder that there *will not be a lapidary meeting in July or August.*; we will pick it up again in September. Be sure and check with your leader of other subgroups for summer changes to the regularly scheduled meetings. Don't forget that there is also *NO* August General Assembly meeting.

Everyone have a fun and successful summer. I'll see you all in September (after the July 19th General Assembly).

GENERAL ASSEMBLY PRESENTATIONS

Richard Parsons, President of the Colorado Chapter, Friends of Mineralogy, will be our speaker in **July**. Richard is a long-time mineral collector whose fascination with crystals was ignited by a cluster of La Garita Quartz Crystals received as a gift over 50 years ago.

Since retiring,, Richard has become a more active student of mineralogy, whose understanding of the world of minerals is honed and clarified by sharing knowledge with other collectors through articles, presentations, and participation in a mineral study group. Richard currently benefits from membership in the Lake George, North Jeffco, and Littleton Gem and Mineral Clubs, and is currently President of the Colorado Chapter, Friends of Mineralogy.

Richard's presentation will be captioned "Among us Amateurs—the Basics of Crystal Symmetry". Not only is symmetry an important element in the beauty and fascination of crystals, it is a valuable took in identifying minerals. The presentation will start from "ground zero", while still attempting to have something of interest for the more advanced collectors.

No meeting in **August** (just our Annual Picnic). We're planning a **tailgate/swap party** for those great summer finds to trade or sell and **Pot Luck Picnic** for CSMS members at WMMI on August 25, Noon. So, please bring a dish to share. Soft drinks & water will be provided. All members are invited to join the Museum Tour at 1:00p. Contact Linda @ 964-6222 for more detail to be discussed at the July General Assembly.

Want to know more about what goes on at the subgroup meetings? Each group will present a 10-minute "What I did on My Summer Vacation" show & tell table at the **September** meeting. So everyone ~ get out into the fresh air or go on one of the several field trips offered this summer to find some goodies to share with the club. For more information, contact Linda Laverty at (719) 964-6222 cell or (719) 520-5939 home or log on to the club web site for current list of activities and field trips.

AFMS & RMFMS NEWSLETTERS ARE NOT PUBLISHED IN JUNE; NO PRESIDENTS' REPORTS

WE'RE HEAD'EN TO "AGATE 2007"

FROM MAY 07 RMFMS NEWSLETTER

The "Chaparral Rockhounds" and the "Rocky Mountain Rockhounds" would like to cordially invite all Rockhounds to "AGATE 2007", our annual ten-day, nine-night fieldtrip campout through the Labor Day weekend at **Apache Creek, New Mexico**, from **August 25th to September 3rd, 2007**.

We have interesting fieldtrips every day, to collect a very wide variety of rocks, minerals and/or crystals that can include: Banded Agate, Blood Stone, Bytownite, Chalcedony, Crystaline, Fire Agate, Geodes, Golden Luna Agate, Hypersthene, Labradorite, Lava's, Luna Blue Agate, Obsidian, Perlite, Plume Agate, Quartz Crystals, Spotted Agate and Thunder Eggs, just to name only a few.

The very small town of Apache Creek is located in the central-western part of the state about 117 miles west of Socorro, NM, on NM-12 southwest of the small town of Datil, NM. Apache Creek campground, used as our base camp, is a beautiful and tranquil camping area with tall majestic pine trees towering over the entire camp area for plenty of cool shade during the warm days of August.

The area is large and spacious enough for the largest of RV's to the smallest of pup tents and everything in between. Being a rustic camp area, there are no facilities, water or electricity, just one coed chemical toilet, so you must come prepared. There is no cost or camping fees at Apache Creek campground. The weather in August has warm days in the upper 70's to 80's and cool nights in the 50's with some possible 40's and even 30's.

Lodging: For those folks who do not wish to camp out, or need electricity and water for their RV, there are several alternatives.

If you are planning on coming to AGATE 2007, please try to RSVP by mid August. For any additional information about Apache Creek or the camp out, please contact **Yonis Lone Eagle**, RMFMS New Mexico/Texas State Director at 505-860-2455 or via e-mail at: rockymountainrockhounds@yahoo.com. All rockhounds that attend Agate 2007 will abide by the American Federation of Mineralogical Societies "Code of Conduct". The Chaparral Rockhounds, Roswell, New Mexico www.chaparralrockhounds.com.

CSMS AWARD-WINNING AUTHORS

Two CSMS members were selected as winners in the Rocky Mountain Federation of Mineralogical Societies (RMFMS) 2007 Articles Contest. They are **Terry Beh,** 3rd place in Adult Articles for "Magic Bus Ride with Steven Veatch" and **Steven Veatch**, 1st place in Adult Articles-Advanced for "Fossil Spiders from Florissant". Both articles were published in the October 2006 edition of the Pick&Pack. If you missed these articles, please visit our web site at www.csms.us and view the on-line copy. Terry placed 9th and Steven placed 7th in the American Federation of Mineralogical Societies (AFMS) . Congratulations, and thank you for representing CSMS so well!

Jack and Kaye Thompson were in attendance at the Editors Breakfast at the annual AFMS Show recently held in Roswell, NM and were kind enough to accept the awards on behalf of Terry and Steve.

CSMS is very fortunate to have such talented authors who are willing to share their experiences and knowledge. Several articles from other authors have been printed in the 2007 Pick & Pack editions to date and will be submitted as entries in the 2008 contest. I know we have many more members out there who could be next year's winners. It's fun; give it a try!

UPCOMING SHOWS

July 6-8
Four Corners Gem & Mineral Show, Durango, CO, La Plata Co. Fairgrounds, www.durangorocks.org

FIELD TRIPS

July 14
CSMS Crystal Group April Fool's Lode Claim Grand Opening Party, 9a. See info on page 2.

July 13-14
Mt. Antero, contact Alan & Amanda Schaak, (719) 568-0373 or amandaalece@msn.com.

July 23
CSMS Claim, contact Ray Berry.

August 17-19
Lake George, CO.

August 9-12
CONTIN-TAIL 2007. Contact: Carolyn Tunnicliff, 303-833-2939 ctunnicliff@comcast.net.

August 18
CSMS new April Fool's Lode Claim, 9a, Lake George Forest Service Station, John Casto (719) 209-9376.

August 24-26
Leadville Field Symposium, see registration form for details.

WMMI EVENTS

AUGUST 7
Outside Machinery Day, 10a-1p, featuring the 1928 Osgood Steam Shovel and a Porter compressed Air Locomotive.

August 18
2nd Burro Birthday Concert, 9a-8p, featuring museum tours, gold panning, and outside machinery operations. Stay for an evening concert by Coal Creek Bluegrass Band. Food & drink vendor will be onsite; picnics and lawn chairs/ blankets encouraged. Tickets are $5 members, $10 non-members, 15 & under free!

WESTERN MUSEUM OF MINING & INDUSTRY WMMI

TARRYALL FIRE AGATE—(continued from pg 1)

on to other goldfields and mining camps while a few stayed on to ranch and log. The valley was rich in water and lush meadows. These early homesteaders cleared land, built cabins, strung up fences, broke ground for planting, and dug irrigation ditches in order to raise hay, barley, oats, and rye. Potatoes, turnips, carrots, and cabbage did well. Cattle ranching was the main economic activity. Several ranchers set up sawmills to provide lumber to other homesteaders along Tarryall Creek.

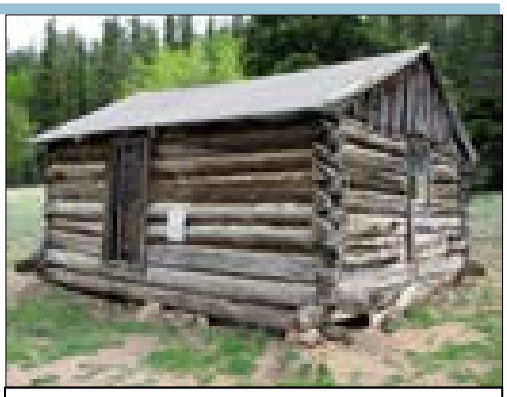

Figure 3. This simple log cabin was built by William A. Derby along the Tarryall Creek. He spent long days riding fence and checking for holes and repairing wire while ranching in the valley. Photo date June, 2007, © by S. W. Veatch.

Prospecting still continues in the area today, chiefly for topaz crystals. A recent weekend trip to explore parts of the Tarryall Valley resulted in this new discovery of gem-quality fire agate. The fire agate was removed, in varying widths, from seams in granite rocks. The gem is thought to be formed when hot water, saturated with colloidal silica and iron oxide, invades cavities in country rock and then cools. As the solution begins to precipitate and grow layers of silica, iron oxide is deposited. These layers of silica and iron oxide cause the brilliant fire in the gem. As iron oxide is depleted in the solution, colorless chalcedony forms. This depletion of iron oxide can be seen along the edges of the specimen in figure 5.

Figure 2. This one-room schoolhouse was the Tarryall School from 1921-1949. Photo date June, 2007, © by S. W. Veatch.

Fire agate is also found in occurrences within the Sonora Desert region of northern Mexico and southern Arizona (e.g., on Saddle Mountain, near Tonopah, Maricopa County and near Safford, Graham County), as well as in the Central Basin of Mexico.

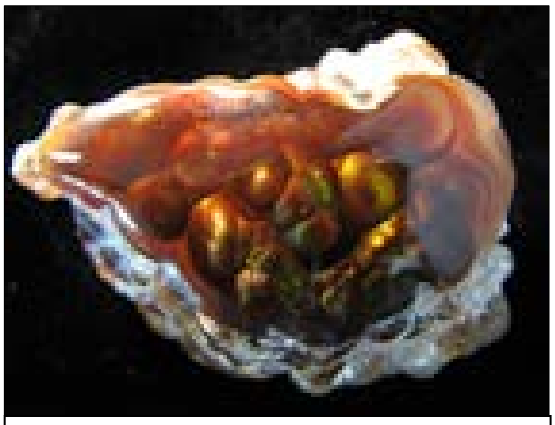

Fig. 4. A mid-to high end cutting fire agate specimen from the Tarryall Creek locality. Iridescent fire comes from thin layers of iron oxide crystals. This specimen measures 3.5 cm across. Lee Magginetti specimen. Photo date June, 2007, © by S. W. Veatch.

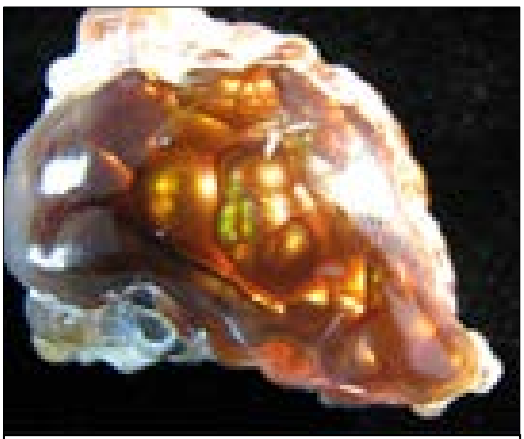

Fig. 5. Good fire agates are impressive in their rich and dramatic color play. They form in cavities and cracks in the country rock from low temperature, silica-rich waters, similar to how black opal forms. Lee Magginetti specimen. Photo date June, 2007, © by S. W. Veatch.

Physical Properties of Fire Agate (Table 2)	
Color	reddish brown, yellowish brown
Hardness	7
Specific Gravity	2.59-2.67
Light transmission	transparent to subtranslucent
Luster	waxy
Breakage	subconchoidal

References Cited:

National Audubon Society, 1979. *National Audubon Society Field Guide to North American Rocks and Minerals (Audubon Society Field Guide)*. Knopf, New York, 856p.

McConnell, Virginia, 1966. *Bayou Salado: The Story of South Park*. Sage Books, Chicago. 275 p.

DIGGIN DINOS IN GLENDIVE

BY TERRY P. BEH

On a Sunday afternoon in September, 2006, an Iraq War veteran named **Jonathan**, along with several others, was looking for fossils during a "dig-for-a-week" opportunity on a cattle ranch in the Hell Creek Formation east of Glendive, Montana. As he was walking along a dry creek bed, he came across some fossil "float" (loose pieces of bone on the ground surface), which led to bones eroding from approximately six feet up the bank. This event led to the excavation of one of the most complete dinosaurs of its kind ever found, of which I was a part.

Following the discovery, the ranch owner contacted **Otis Kline**, who is in the process of building the Glendive Dinosaur & Fossil Museum, requesting an evaluation of the find. Otis subsequently obtained the rights to excavate, prepare and/or sell the fossil. Because the bones were located in a creek bed that drains several hundred acres of badlands, he began excavation almost immediately to minimize the possibility of additional erosional damage to the bones.

The dinosaur, named Jonathan after its discoverer, was found lying on its back at a slight tilt to the right with part of the spine, ribs, and one shoulder blade (scapula) exposed. Along with some hardy volunteers, Otis removed over 10 feet of overburden during September and did some preliminary excavation of the skeleton, jacketing and removing the creature's intriguing, five-fingered left hand. With no skull in sight, the hand presented the possibility that it was a rare *Pachycephalosaurus* (thick-headed dinosaur).

Having helped supervise one of his public dinosaur digs earlier in the year, Otis' then contacted me to help complete the excavation. The two of us worked for about eight days, at which time the fossil was removed from the site and taken to the museum, just before Montana's first snowfall of the season.

Of course, we had hoped to find the entire skeleton, especially the skull. However, once the fossil was fully exposed, it became obvious that the animal wasn't all there. Indeed, missing were the head, neck, most of the scapulas, right arm and hand, left humerus and the last few feet of the tail. The left arm and hand were there, along with the rest of the bones—ribs, vertebrae, limbs, ischium, pelvic girdle, etc.—going back through the tail. As it had come to rest, the creature's right leg was extended out and away from the body in a fairly "natural" position, with his left leg pushed up against the backbone. The femur was out of place, pointing toward where the left arm would have been, with the tibia and fibula on top.

Exposing five tail (caudal) vertebrae gave a second clue to the identity of the dinosaur—horizontal striations at the ends of each vertebra. Noticing these grooves during her periodic visits to the dig site, **Marge**, the ranch owner's mother, went home, looked through her research material, and told us she felt it was either a *Pachycephalosaurus* (Pachy) or a *Thescelosaurus*, as only their vertebrae possess such markings.

The following day's excavating revealed more of the tail, which was trending vertically up the hill, and more striations. Then, to our surprise, it came to an abrupt end, with the last two vertebrae twisted around 180 degrees, which made us speculate about what had happened. Had the end of the creature's tail (not to mention its other missing parts) been devoured by another dinosaur? Did the animal's corpse get whipped around violently before it came to rest on its back…? Perhaps, when the skeleton is fully prepared, we may find out.

With the help of the ranch owner and his front loader, the skeleton was then removed in three plaster field jackets—the right tibia, fibula, and complete 4-toed foot (three main toes with the fourth high and behind) in one; the second included the last 23 inches of the tail and the third and largest containing the main body; complete left leg and foot, right femur and a few tail vertebrae.

Though Marge was confident that we had a *Thescelosaursus*, Otis and I had high hopes it would turn out to be a Pachy. Both dinosaurs are found in the Hell Creek Formation, are bipedal, have a skeletal size of 12–15 feet,

(SEE "JONATHAN" ON PAGE 6)

JONATHAN—CONTINUED FROM PAGE 5

possess five fingers and four toes and exhibit vertebrae with grooves or lateral surface striations. However, of the two, Pachys are much more rare and valuable, with only a partial skull and a few bones previously found, most of them by **Mike Triebold** of Triebold Paleontology and the Rocky Mt. Dinosaur Resource Center in Woodland Park, Colorado.

Triebold also had extensive experience with thescelasaurs, and Otis soon contacted him for assistance with obtaining a positive identification. Thus, Jonathan was transported to the Colorado facility just after Thanksgiving for a "mini-prep."

After some initial cleaning, a positive identification was made, proving Marge right. While the skeleton turned out to be a *Thescelosaurus*, instead of a Pachy, it is a very large specimen and could prove to be *T. garbanii*, the larger and rarer of the two known species. Triebold Paleontology, which now owns the dinosaur, plans to have it fully prepped sometime later this year. They will also be making a cast of it (with head and other absent parts) for the Glendive Dinosaur & Fossil Museum.

A wet spring in southeastern Montana has prevented Otis from doing much fieldwork this year, but you can bet that when he does he'll be looking for that missing skull—and if he finds it, maybe I'll be getting another call . . .

Thescelosaurus ("Marvelous Lizard") is a bipedal, plant-eating, ornithischian (bird-hipped) dinosaur about 10 to 13 feet long and 3 feet tall at the hips that probably weighed under 700 pounds. From the late Cretaceous period, it had a small head, bulky body, short arms, five-fingered hands, four-toed feet and a long, stiff tail supported by ossified tendons. The type species is *T.* neglectus, and it was most likely herbivorous, but possibly omnivorous. Aside from the long narrow beak, the skull also had heavy, boney eybrows. One complete and 8 incomplete skeletons have previously been found in Wyoming, Montana, South Dakota and Alberta, Canada. (Enchanted Learning, www.enchantedlearning.com/subjects/dinosaurs/dinotemplates/Thescelosaurus).

Pachycephalosaurus ("Thick-headed Lizard") is also a bipedal, plant-eating, ornithischian dinosaur of the late Cretaceous. With an estimated length of 12-15 feet, it had short fore limbs with five-fingered hands, four-toed feet, a bulky body and a heavy, rigid tail with ossified tendons. The mouth was beaked, and it is believed to have had binocular vision and an acute sense of smell. "Pachys," as they are commonly known, are distinguished by their heavy, dome-shaped skulls that were up to 10 inches thick and covered with spikes or "bumps." Fossils of this dinosaur have come from Montana, South Dakota and Wyoming; however, no complete or mostly-complete skeletons have ever been found. (Answers.com, www.answers.com/topic/ Pachycephalosaurus; Wikipedia,http://en.wikipedia.org/wiki/Pachycephalosaurus).

SHOW PICTURES

BY AMANDA SCHAAK

Those are garnets in there!

Have you found any gold yet?

Dave Wilson shows us how to do it.

Schaak Show Display Case

A BIG THANKS . . .

BY KAYE THOMPSON, SHOW CHAIRMAN

TO ALL THE COLORADO SPRINGS MINERALOGICAL SOCIETY MEMBERS WHO WORKED SO HARD ON THE 43RD ANNUAL PIKES PEAK GEM & MINERAL SHOW TO MAKE IT SUCH A BIG SUCCESS!

CRACKING BOULDERS

BY BOB LANDGRAF

What does a person do when a twenty-ton boulder is sitting in the way of the foundation for the new addition to their home? The house is 24 feet to the East, the well is 30 feet to the North, and the electric lines are buried in a slot that was jack-hammered into an upper edge of a rock to which the boulder is loosely connected. Dynamite could be used. In Colorado, the dynamiter must be licensed and bonded and carry a very costly liability insurance. There are not many of them around. Blasting has the potential of ejecting heavy projectiles towards the house. An expensive explosion protection blanket could be used to cover the rock. Three days had just been spent digging out around the rock. The rock could be reburied and the gravel used to protect against the launching of projectiles. The boulder sits on a compacted pedestal in a hole that is ten feet deep. We were not refilling that hole! After the explosion, equipment must be on hand to enable us to determine if the rock blew apart sufficiently to be moved.

Barb Landgraf & Sam (the family pet) inspect the crack in a 20-ton unwanted boulder.

Or maybe there is a simpler way. Gregory's Excavation, a company with large earth moving equipment, was contacted. We were educated on a simple technique using a product called *Dexpan*. The product is an expansive cement, also called demolition cement. The product has the following chemical makeup:

Dexpan

Calcium Oxide	60%+
Silica, amorphous	5-10%
Iron Oxide	1-5%
Aluminum Oxide	1-5%

Expansive cement is recommended to crack reinforced concrete, limestone, flagstone, granite and onyx. The material is rated at 18,000-psi expansive strength. From what I could find in journal articles on the web, the principle agent is calcium oxide, which reacts with water to give calcium hydroxide plus heat to expand 1.96 times in volume. The chemical equation for the reaction is:

$$CaO + H_2O \text{ à } Ca(OH)_2 + \text{heat (16.5 Kcal/mol)}$$

The net result is both a high pressure and substantial thermal stress that also has been studied for the thermal stresses' contribution to internal fracturing. The process can take from 1 to 2½ days. Added benefits are that you do not need a license, insurance or bonding, and the whole process is quiet! The website for the manufacturer shows hole patterns for tunneling, trenching, slabbing, cracking, and general demolition of hard materials. Rectangular slabs can be taken out of marble quarries using expansion cement without blasting or causing fractures where they are not wanted. The manufacturer recommends hole sizes from 1" to 2½". Some articles suggest that any size hole works. How well the process will work may depend upon how much control is desired in the final result. Much of your expense is drilling that hole. The 1½" diamond drills used with a jackhammer are $200 each. I don't know how many holes are drilled from each diamond drill. Since our project cost was directly related to the number of holes drilled, general demolition was the only concern.

As with many chemicals that may be used in our hobby, this one also is hazardous. You do not want skin or eye contact and do not want to breathe in or ingest this material. So gloves, paint respirator, and goggles are a good idea. Also, the material once introduced into the hole is subject to blow-out. There is a strong reaction going on in there and high pressures are created. So don't look down into the hole once you have poured in the material and prodded it with a small diameter dowel!

There are distributors for *Dexpan* in both Durango and Silt, Colorado. The distributor is Concrete Equipment Supply. *Dexpan* is shippable by UPS. The approximate cost is $100 for a 44-lb box. The material is packaged in 4-11 lb pouches. As a disclaimer, the author has not personally used the product but only observed the usage and admired the results. Used with care, the product could be a safe addition to the amateur collector's toolbox.

THE IMPORTANCE OF MOLYBDENUM AND ITS IMPACT ON COLORADO

By Jay Zimmerman

Molybdenum, pronounced **meh-LIB-deh-nem,** is a rare, but important element that can be mined in a few locations around the world. Molybdenum (Mo) is element 42 on the periodic table and has important physical and chemical properties, which allow it to be identified by geologists and rock hounds. However, Molybdenum, like many other elements, does not exist in its pure form in nature. As a result, mining companies identify suitable locations to mine the Molybdenite, the compound that contains "Moly" (Molybdenum). The Colorado Rocky Mountains are an ideal place for Molybdenite; the *Climax* and *Henderson* are Colorado's largest Molybdenum mines, which have placed the United States as the lead country in the world's Molybdenum production. Therefore, Coloradoans impact the important products, like lubricants, steel alloys and protein bars, produced from Molybdenum.

Properties

By observing the periodic table many important physical and chemical properties are noticed about this element. The first is the symbol (Mo) and name (Molybdenum), which are derived from the Greek word ***molybdos***, meaning lead. This is due to the fact the Molybdenum was discovered in 1778 by Carl Welhelm Scheele, a Swedish chemist, who thought he had a sample of lead. However, he was wrong and Molybdenum was later isolated and verified by Peter Jacob Hjelm in 1781, yet the name stayed even though it was not lead (Powell, 1999). Another important characteristic is the atomic Number of 42, showing that this element contains 42 protons and 42 electrons. Of those 42 electrons it is important to know that 6 of them are valence electrons. In its elemental state (pure Mo), it is a silvery-white element (See figure 1) that melts at 2890 Kelvin (2617°C and 7473 °F), which is about twice the temperature required to melt steel (~1800 Kelvin, 1527°C and 2781°F), and vaporizes at 4912 Kelvin (4639°C and 8382°F). In addition, this element is located in the "d" block of the periodic table, otherwise known as the transition metals. This is very important because the "d" block elements have multiple oxidation numbers, which are used to predict the chemical bonding that will occur between elements. As a result, Mo can form compounds like, Mo_2O_3 (+3 oxidation number) and MoS_2 (+4 oxidation number), and it often found as the polyatomic ion Molybdate (MoO_4^{-2}), which has the most common oxidation number of +6. Moreover, being a transition metal makes Molybdenum chemically stable and does not react with many elements. There are a few exceptions to this since pure Molybdenum does not occur in nature; it is found in the mineral Molybdenite (Molybdenum (IV) sulfide, MoS_2). Molybdenum can also be found in the minerals Wulfenite (Lead (II) molybdate, $PbMoO_4$) and Powellite (Calcium molybdate, $CaMoO_4$) (Ganon, 2007). These minerals differ from a dull gray Molybdenite to the shiny yellow crystals of Wulfenite (See Figure 2 and Figure 3). Consequently, Molybdenum minerals must be mined and processed in order to obtain the pure element or to concentrate the Molybdenite "Moly" ore.

Figure 1: Sample of pure Molybdenum. Picture courtesy of the Journal of chemical Education.

Figure 2: Sample of Molybdenite

Figure 3: Sample of Wulfenite.

Pictures courtesy of the Mineral Information Institute

Mining History

The mining of Molybdenum has had an interesting history, especially in Colorado. In 1884 a small settlement, named Climax, was established near Fremont pass. During the next 10 years Molybdenum was added to steel to make it harder and more resistant to chemical change. As a result, the little settlement of Climax enlarged with extra prospectors and businessmen trying to make a fortune. Since Molybdenum was not extensively used, prospecting for this metal did not produce a lot of ore or money. This caused many prospectors to bust and leave the area. As World War I approached, the military needed Molybdenum to strengthen machinery for the war. The result was that Molybdenum mines sprang up to provide the needed materials. In Colorado, this boom for Molybdenum originated in the Leadville area, in Lake County, CO., in the early 20th century. (Hagen, 2004) As time passed, larger sources of Molybdenum were needed for strengthening armored equipment. Consequently, geologists searched and the Climax Molybdenum deposit was rediscovered. Subsequently the *Climax* mine began production in 1918. The supply, demand and profit for Molybdenum fluctuated for many years until the onset of World War II. Consequently, the mine experienced profit and growth beginning in the early 1940's (Cappa, 2001). Production increased as technology advanced for mining and as the US experienced population growth and war. Miners continued to find Moly" (the mining term for Molybdenum or Molybdenite), which made profits for themselves and for the *Climax* mine. The mine continued to grow until 1977, where production peaked just over 60,000,000 pounds in one year. After this peak came a sharp decline, and in the next 7 years production steadily decreased, until 0 pounds

were produced in 1984 (Mentzer et al., 2006). The demand decreased, the supply was supersaturated with "Moly" and the market price was too low for economical mining to continue. According to Kaufmann, "It has abandoned its resources and closed most of its operations" (Kaufmann, 1990). *Climax* was affectively dead, at least for a while. During *Climax*'s prosperous growth and decline other ore bodies were being discovered. The Phelps Dodge Corporation identified the Henderson ore body in 1965 near Berthoud Pass. By 1976 the *Henderson* mine was born and began extracting Molybdenite from *Red Mountain*.

In the past twenty years the Henderson mine has become the World's largest producer of Molybdenum. This is due to the mines unique "Block Fault" mining procedures, the conveyor (used to transport ore over 10 miles underground to the concentrator) and the *Henderson Concentrator,* which uses the rough ore and concentrates it into "pure" Molybdenite through a series of crushing, floatation, leaching and grinding. The success of the mine may also be attributed to the World's growth and demand for Molybdenum, especially in China. This high demand and increased value of Molybdenum has also arisen a "dead" mine. The *Climax* mine, which is now operated by Phelps Dodge, the same company that owns the *Henderson* mine, plans to reopen in 2009 (Starr et al., 2006). This would continue Colorado's dominance as a major player in the World's Molybdenum market. Currently, the United States also has major mines in Arizona, Utah, Idaho and New Mexico (*Molybdenum, Ferromolybdenum and Ammonium Molybdate*, 2007). As a result of these mines, the United States is the leading producer of Molybdenum and Molybdenum products with Chile, China, Peru and Canada following close behind. Moreover, these countries have over 16,000,000 metric tons of "Moly" in reserves, of which over 8,000,000 metric tons can be found in the US (*Mineral Commodity Summaries, 2005)*. From this data, it is evident that Colorado will have a large future impact on Molybdenum mining and the products that are produced from it.

Uses of Molybdenum

There are numerous uses for pure Molybdenum and the mineral Molybdenite. Historically, it was used to make alloys stronger and resistant to chemical change. This includes steel used to erect buildings and armor built for military equipment. In modern times, Molybdenum is still used to strengthen alloys, but it also used for other products. One of these products is burners for stoves, which lengthens the life of the heating elements. Molybdenum is also used in light bulbs, since it has such a high melting point and as a chemical catalyst used in to eliminate sulfur from petroleum refineries. Pure ground Molybdenite is used for a lubricant for machinery (Moore, 2005). Molybdenum is also an essential trace element that is required for all biological organisms; it is an important coenzyme that is needed to transform chemicals in the carbon, nitrogen and sulfur cycles (Hidgon, 2001)**.** Therefore, Molybdenum must be a part of our diets and can be found in legumes, grains and nuts (these obtain Mo from the ground) or through vitamins and nutrition bars (molybdenum is artificially inserted into these).

Conclusion

Molybdenum is an important element that plays and important role of every Coloradoans life. It does not occur in its pure form in nature, but it exists in different compounds due to the fact that it has many oxidation numbers. The ionic compounds that contain Molybdenum are Molybdenite, Wulfenite and Powellite. These minerals, discovered in the 1780's, are mined from ore bodies in several locations around the world. Colorado is one of those excellent sources of Molybdenum; the *Climax* and *Henderson* mines, owned by the Phelps Dodge Company, have been two of the best "Moly" mines in the world. With these mines, the United States is the World's leading producer of Molybdenum and Molybdenum products followed by Chile, China, Peru and Canada. n the early 1900's, Molybdenum was used for improving military equipment for World War I and World War II, which spurred the mining growth. Now the mined Molybdenite has many other important uses, including lubricants and catalysts. When purified, the whitish-grey Mo has an extremely high melting point, which allows it to still be used as an alloy strengthener, but is also used as a component of light bulbs. In addition, Molybdenum is a vital trace element that biological organisms need to survive, which we can get from grains, nuts and protein bars. As the population of the Earth continues to exponentially climb, it is important that ore bodies of Molybdenum be mined and processed in order to enhance life with its products.

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MINI MINERS MONTHLY: MINERAL NAMES—WHERE DO THEY COME FROM? WHAT DO THEY MEAN?

Excerpt from 6/07 edition by Darryl Powell

Have you ever wondered where those mineral names come from? What does *amethyst* mean? Why is fluorite called fluorite? Who is Kunzite names after?

When a baby is given a name, the name usually has a special meaning. Our cats and dogs have names that say something special about their looks or personalities. A dog named "Fluffy" usually has fluffy fur. Can you guess why a dog would be named "Fang"?

Mineral names also tell you a story. If you look closely at mineral names, you can discover all sorts of interesting information. Mineral names sometimes tell their chemical formula. They introduce us to famous and not-so-famous collectors. They can also introduce us to scientists and poets. Some are names after cities and some after regions. When you study mineral names, you will know more about geography, history, and languages.

–lite comes from the Greek work "lithos" which means "a stone."

–ite is nor\t a short version of –lite. It is an ending that was used by ancient Greek and Roman writers.

Some minerals were named after a **special place**, usually where they were first found or where there is a large deposit of the mineral. Muscovite was named after a region in the old country of Russia. Tanzanite was named after the African nation of Tanzania where it was discovered in July of 1967. Vesuvianite was named after Mount Vesuvious in Italy. Benitoite was named after San Benito County, California where it was discovered.

Mineral of the Month—Fluorite

Fluorite is found all over the world. It occurs in many different colors including colorless, blue, purple, green, yellow, white, pink, and brown.

It is number 4 on the mineral hardness scales (called Moh's Hardness Scale).

Fluorite crystallizes in the isometric system (also called the cubic system) and is found mostly as cubes or as octahedral. An octahedron is an eight-sided crystal that looks like a diamond.

The name comes from the Latin word *fluere* which means *to flow*. This name was chosen because when fluorite is added to iron ore, the iron melts (flows) out of the ore at a lower temperature than it does without the fluorite.

Fluorite contains the elements calcium (Ca) and fluorine (Fl). Its chemical formula is CaF_2.

APRIL FOOLS CLAIM RULES & REGULATIONS

AS ADOPTED BY THE CSMS BOARD OF DIRECTORS, 7/5/07

1. Dig at YOUR OWN RISK. CSMS will not be liable for injuries or loss of property.
2. Hand Digging Only—No Explosives or Machinery.
3. Available to Club members only.
4. Anyone who digs must also be available for reclamation.
5. Club members are to call John Casto, Member at Larger, at 719-329-0212 before digging for assessment and access reasons.
6. Stay on claim indicated by posts with bright orange tops—there are several other claims in the area.
7. Pick up all trash.
8. No overnight camping.
9. Do not dig up any live trees.
10. Absolutely NO COMMERCIAL DIGGING!!!
11. There are 2 large disturbances made by prior claimant; do not dig in those areas. *The Forest Service is going to do reclamation work..*
12. Follow all US Forest Service and American Federation of Mineralogical Societies (AFMS) rules and regulations. A copy of the AFMS rules and regulations may be found at www.amfed.org or the July 2006 Pick&Pack, see our web site, www.csms.us.

DIRECTIONS TO THE CLAIM

Trail Creek Road to Forest Road 201, follow to Forest Road 752.

At top of the hill, look for a green gate; follow the road to the claim. If Joe Dorris is digging, you can walk to the claim.

Please notice the 2 large disturbances. Even though these are on the claim, do not work in those areas because the Forest Service needs to reclaim these areas.

Next edition of the Pick&Pack will be in Sept 2007—no publication in August!

The Mini Miners Monthly is a publication for young mineral collectors. Subscriptions may be obtain at www.diamondanpublications.com or by snail mail to Diamond Dan Publications, PO Box 143, Manchester, NY 14504.

TIPS & TIDBITS: 🗁Ticks—Next time you are on a field trip during tick season, take along a roll of scotch tape. If you find a tick on your clothing or body, trap it with a piece of tape. It is also useful for removing fastened ticks. Save the imprisoned fastened tick so it can be identified when you reach hom. *From The T-Town Rockhound, 6/07* 🗁Mineral Oil—is an excellent cleaner for selenite crystals. It seems to loosen all those tiny particles left after washing the crystal in water, plus it also brightens them. It is fine for preserving borax crystals from hydration changes. It makes varasie a deeper green and improves the appearance of fluorites and calcite. *From The T-Town Rockhound, 6/07* 🗁Gold—An ounce of pure gold can be stretched into a single wire 5 miles long. *From Mini Miners Monthly, 6/07* 🗁Mineral Pictures—If you want to see fabulous photographs of minerals, fossils, gemstones, lapidary and other related topics, check out the website of photographer Jeff Scovill. You may have seen his photographs in many rock related publications. www.scovilphoto.com. *From The T-Town Rockhound, 6/07*

JULY 2007 — CSMS CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4 Happy Independence Day	5 7p Board Meeting	6	7 No Lapidary Group Meeting
8	9	10 7p Micromount Group Meeting	11	12	13 7:30p Crystal Study Group Meeting	14 Mt. Antero Field Trip
15	16	17	18	19 **7:30p General Assembly**	20	21 3p Jewelry Group Meeting
22	23 7p Faceting Group Meeting	24 7:30p Camera Club Meeting	25 7:30p Fossil Group Meeting	26	27	28
29	30	31				

"Only our individual faith in freedom can keep us free." - Dwight D. Eisenhower

Locations

Board Meeting: 1st Thursday @ 7:00p. SilverWood Hotel
Linda Laverty, 520-5939

Camera Club: 4th Tuesday @ 7:30p 1514 Hancock, CO
Roger Pittman: 683-2603

Crystal Study Group: 2nd Friday @ 7:30p, 1514 North Hancock, COS;
Kerry Burroughs: 634-4576

Jewelry Group: 3rd Saturday @ 3p; 6608 Gambol Quail Dr E; contact *Rick Copeland: 594-6293 or Bill Arnson: 749-2328*

Faceting Group: 4th Monday @ 7:00p, Various Locations *David Wilson: 635-7891*
dlwilson@pcisys.net

Fossil Study Group: 4th Wednesday @ 7:30p.
John Harrington: 599-0989

Lapidary Group: 1st Saturday @ Noon 3085 Rhapsody Drive, COS.
Drew Malin: 531-7594

Micromounts Group: 2nd Tuesday @ 7:00p, 1514 North Hancock, COS
Phil McCollum: acc@frii.com
Moyra Lyne: 442-2673

REFRESHMENTS FOR GENERAL ASSEMBLY MEETINGS

July=Lapidary	September=Micromounts	November=Camera
August=Picnic!!	October=Fossil	December=**Everyone**

PRESIDENT	Drew Malin	531-7594	advanceone@comcast.net
VICE PRESIDENT	Linda Laverty	520-5939	chilipepper24@juno.com
SECRETARY	Roger Pittman	683-2603	prpittman@netzero.com
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MANAGING EDITOR	Betty Cain	634-8205	bcain2@earthlink.net
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MEMBER-AT-LARGE	Brent Williams	632-3552	zaphod1863@yahoo.com
PAST PRESIDENT	Robert Landgraf	685-1364	RMLWP74@aol.com
SHOW CHAIRPERSON	Kaye Thompson	636-2978	
FIELD TRIP DIRECTOR	Brent Williams	632-3552	zaphod1863@yahoo.com
LIBRARIAN	Sarah Udell	237-7985	sarahudell@hotmail.com
CAMERA CLUB	Roger Pittman	683-2603	prpittman@netzero.com
CRYSTAL STUDY	Kerry Burroughs	634-4576	kburrou@comcastnet
FACETING GROUP	Dave Wilson	635-7891	dlwinlson@pcisys.net
FOSSIL GROUP	John Harrington	599-0989	harington1@mindspring.com
JEWELRY GROUP	Rick Copeland	332-7915	rick.copeland@covad.net
LAPIDARY GROUP	Drew Malin	531-7594	advanceone@adelphia.net
MICROMOUNT GROUP	Phil McCollum		acc@frii.com
PEBBLE PUBS	*Vacant*		

COLORADO SPRINGS MINERALOGICAL SOCIETY

Minutes, General Assembly
June 21, 2007

Vice President, Linda Laverty, called the meeting to order at 7:31 pm.

The May minutes were approved as printed in the Pick&Pack.

Treasurer's Report
No report was given.

Guests:
Paul Hatfield and Thelma Whitehead, new members, attended their first meeting.

Satellite Groups:
- No Group Reports were presented during this special pre-Show Meeting.
- Field Trips: 7/23 trip to Ray & Richard's claim; there are still openings. Contact Ray Berry, (719) 598-7877, rayber@peoplepc.com.
- Other Reports: Jack Thompson reported on the AFMS/RMFMS convention and show at Roswell, NM. There were many more competitive cases this year than in the past, but the show was not well attended. Betty Cain won RMFMS 1st place as New Editor, Steven Veatch won RMFMS 1st place and AFMS 7th place in Advanced Articles for "Fossil Spiders from Florissant", and Terry Beh won RMFMS 3rd place and AFMS 9th place in Adult Articles for "Magic Bus Ride with Steven Veatch". Jack and Kaye Thompson were honored by AFMS for Adult Educational for Advanced Audiences.

Old Business:
- Show - Need help for set-up and tear down, tickets, and security. We need volunteers for all positions, 8a-8p and with dealer set-up at 2p.

New Business:
- Linda asked each subgroup to bring in specimens they've found and to provide a 10-minute presentation about their groups' activities for the summer during the September General Assembly.

Program
- There was no program presented at this meeting because the time was used for Show business.

Meeting adjourned at 8:15p.

AND THE WINNER IS . . .

The CSMS Pick&Pack, editors **Bill and Betty Cain**, was honored with 1st Place in the RMFMS New Editors for 2007 Contest (published in 2006). The plaque, ribbon, and certificate were awarded at the Editors Breakfast at the 2007 AFMS Annual Show in Roswell, NM and presented to us at the June General Assembly. Boy, was I shocked and thrilled!

Thanks to **Jack and Kaye Thompson**, who were also winners in the AFMS Educational Display for Advanced Audiences, accepted the awards on our behalf. Thanks, Jack and Kaye, and congratulations on your award!

EDITOR'S NOTE—It has been an honor to prepare and publish the Pick&Pack for the last two years; it's a hard job that I love! Bill has taken on the duties of Membership Director, and I'm carrying more of the weight for finding articles, rounding up reports, and making sure we meet the deadline. Articles and input from you has become even more important..

Unfortunately, we cannot compete in the 2008 New Editors Contest, but we can submit the Pick&Pack for the Large Bulletins contest, with your help.

Comments from the judges: "You have a great bulletin. It certainly describes the various activities of your club and should be interesting reading for all your members." " You had a variety of interesting articles from a variety of sources." " You really have an active, healthy club—it is very evident from your bulletin." " Overall, just an excellent job." "Your bulletin is beautiful! I like your format, with an eye-catching article on page 1 and President's report and coming program immediately following."

Judges' suggestions: Review of previous month's program (other than minutes); articles from subgroups; book reviews; and I will pay more attention to typos (1/4 point deducted)!

JULY BIRTHSTONE—RUBY

FROM WWW.MINERALGALLERIES.COM

The gemstone ruby is the red variety of the mineral Corundum, the second hardest natural mineral known to mankind. All colors of corundum other than red or white are called Sapphire. The red color in ruby is caused by trace amounts of the element chromium. The best shade of red for ruby is often given the name "pigeon blood red", but ruby can be any shade of red up to almost pink.

Oriented rutile crystal inclusions cause a six-rayed-star light effect (called *asterism*) to form the popular Star Ruby.

Rubies come from all over the world but good gemstones are found at Thailand, India, Madagascar, Zimbabwe, North Carolina in the U.S., Afghanistan, Pakistan, Sri Lanka, Kenya, Tanzania, Kampuchea, and perhaps most notably, Burma.

Regular meetings of various groups

Café Scientigique features a talk and discussion on some current science topic; 6-30-8:00 p.m. Tuesday evening once a month (approximately the 3rd Tuesday) at the Wynkoop Brewery (Mercantile Room) , corner of 18th & Wynkoop Streets, Denver. No charge; all are welcome.
http://cafescicolorado.org

Colorado Scientific Society, monthly meetings with one or two speakers on an earth science topic, 3rd Thursday, 7:00 p.m. American Mountaineering Center, 710 10th St. (NE corner with Washington), Golden, CO.
http://www.coloscisoc.org

Denver Mining Club, Informal weekly luncheon meetings with a speaker, every Monday, 11:30-1:00, Country Buffet, 8100 W. Crestline Ave, #A3, Littleton, CO (about 1/2 mile north and east of the intersection of Wadsworth Blvd. & Bowles), tel: 303-933-9923. No charge, but all who attend must purchase a lunch at the restaurant. See web site http://china-resources.net/den_min.html

Denver Region Exploration Geologists' Society (DREGS) meets monthly on the 2nd Monday, 7:00 p.m. Consolidated Mutual Water Company (lower level), 12700 W. 27th Ave., Lakewood, CO; no charge, all are welcome to the meetings.
See http://www.dregs.org/

Rocky Mountain Assoc. of Geologists (RMAG) has monthly luncheon meetings with a speaker at the Marriott City Center, California St. between 17th & 18th Streets, 11:30 a.m. Luncheon cost is $24; no reservations are needed for the talk only.
See http://www.rmag.org/

USGS Colloquium Series, lectures on Thursday, 1:30-2:30 p.m. Foord Lecture Room, Bldg. 20, Denver Federal Center, Lakewood, CO. USGS staff, visitors, and guests are welcome. See http://geology.cr.usgs.gov/crg/colloquia.htm

Western Interior Paleontology Society (WIPS), meets 7:00 p.m. first Monday of the month, Sep-May, Ricketson Auditorium, Denver Museum of Nature and Science, http://www.wipsppc.com

CLASSIFIEDS . . .

NOTICE—Items listed for sale in the Pick&Pack are displayed only as an informational service to our members and advertisers. CSMS and/or the Pick&Pack do not promote nor warranty any item displayed. The sellers and buyers are responsible for the condition and ownership of any item shown.

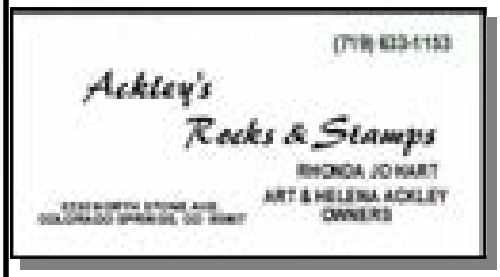
Mettler H33AR Electronic Scale
160 gal max; accurate to .0001 grams. $170 Dick's Rock Shop

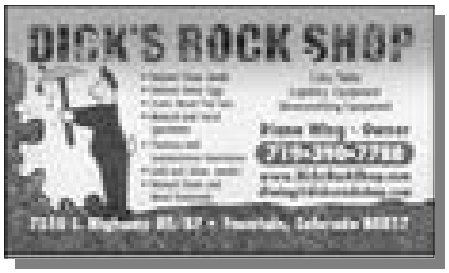
4-1/2" Trim Saw $195
Dick's Rock Shop

FOR SALE
14" diamond Lapidary Saw
Highland Park—$800
Dick's Rock Shop

WMMI Farmers Market

The Museum's Farmers Market in running until the end of summer. Stop by the Reynolds Farmhouse to purchase fresh produce. *(Another great reason to visit the museum!)*





BETTY CAIN, EDITOR

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Joining the Colorado Springs Mineralogical Society (CSMS)

General Assembly meetings are the third (3rd) Thursday of each month, except August, beginning at 7:30 p.m. at the Colorado Springs Senior Center, 1514 North Hancock Blvd., Colorado Springs, CO. **Visitor are always welcome**.

CSMS also offers Satellite Group meetings that allow more focused attention in specific areas of our members' interests. Our current Satellite Groups consist of the following: Camera Club, Crystal Study Group, Faceting Group, Fossil Study Group, Jewelry Group, Lapidary Group, Micromounts Group, and Pebble Pups. For details of Satellite Group meetings, see page 11.

Yearly dues include 10 issues of the **PICK&PACK**, all field trips (additional fees may be required on some field trips, and members are responsible for all transportation to and from), participation in all Satellite Groups (some groups may request additional fees to help cover resource costs), free admission to the *Western Museum of Mining & Industry*, a year of learning and enjoyment, plus a lifetime of memories.
Individuals—$20 Family—$30 Juniors—$2

If you are interested in joining CSMS or would like more information, we encourage you to attend our next General Assembly meeting (see page 2 for details of the next meeting) or visit our web site: www.csms.us.