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The Meeting of the Mineralogical Society of Southern California

Friday, May 13, 2011 at 7:30 pm

Larissa Dobrzhinetskaya



Diamonds From Deep Subduction Zones Related to Continental Collisions

**Geology Department, E-Building, Room 220
Pasadena City College
1570 E Colorado Blvd., Pasadena**

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Diamonds From Deep Subduction Zones Related to Continental Collisions

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Geologists have “known” for many years that continental crust is buoyant and cannot be subducted very deep. Microdiamonds of 10-80 μm size discovered in the 1980’s within metamorphic rocks related to continental collisions clearly refute this statement, suggesting that material of continental crust has been subducted to a minimum depth of ~150 km (perhaps much more) and incorporated into mountain chains during tectonic exhumation. Over the past decade, the rapidly moving technological advancement has made it possible to look inside of these diamonds, and learn that they contain nanometric multiphase inclusions of crystalline and fluid matter, and are characterized by a “crustal” signature of carbon stable isotopes. Scanning and transmission electron microscopy, focused ion beam techniques, synchrotron infrared spectroscopy and nano secondary ion mass spectrometry studies of these diamonds provide evidence that they were crystallized from a supercritical carbon-oxygen-hydrogen fluid. These small diamonds preserve evidence of the pathway by which carbon and water can be conveyed down subduction zones to the deep upper mantle and back to the Earth’s surface.

Larissa Dobrzhinetskaya had to cancel the originally scheduled March talk. We are pleased to reschedule her for our May meeting.

June program is about minerals used as pigments in glass making. More details to come.

July Program: Ancient Egyptian Mines for Peridot and Other Gemstones

Lecture synopsis: Ancient Egypt was the source of several gemstones, including amethyst, amazonite, carnelian and other colored chalcedonies, emeralds, peridot, and turquoise. In this presentation, the speaker describes his recent discovery of a peridot mine of the Greco-Roman period on Egypt’s Zabargad Island in the Red Sea, and also provides an overview of the other gemstone mines in Egypt’s Nubian and Eastern Deserts. Examples are given of ancient jewelry made from all of these gemstones.

Speaker bio: James (‘Jim’) Harrell is Professor Emeritus of Geology at the University of Toledo in Toledo, Ohio. He received his BA in Earth Science in 1971 from California State University at Fullerton, his MS in Geology in 1976 from the University of Oklahoma, and his PhD in Geology in 1983 from the University of Cincinnati. Prof. Harrell retired in 2009 after 30 years of teaching at the University of Toledo. For the past 22 years he has been conducting a survey of ancient quarries and mines in Egypt, and has so far made 31 trips to this country in support of this research. In recent years, he has also done fieldwork on ancient quarries in Saudi Arabia, Sudan and Yemen. Prof. Harrell is currently writing a book about the rocks and minerals used by the ancient Egyptians. For a list of his publications and other information on his research, visit his website at <http://www.eeescience.utoledo.edu/egypt/> or write to him at james.harrell@utoledo.edu.

MEANDERINGS FROM THE PRESIDENT by Ann Meister

As you may have noticed, the MSSC membership is dwindling. What do YOU think we should do to build interest and membership in the Society? What are your suggestions?

In our discussions at the board meeting, we decided that a show or similar activity would be difficult to put on until our membership grows, but on the other hand, an activity of that nature puts our name in front of the public and gets interested people to join. That's a dilemma.

Then, many are interested in field trips and an active field trip schedule would promote interest and membership. Several collecting sites were suggested at the board meeting and with the note that many are now fee based and on private property. Our "public" lands are no longer as accessible as they used to be though there are places that we can still go and collect.

To have an active field trip schedule, we need either a field trip chairman who is willing and able to research the collecting sites and make sure the roads are passable, etc. Or we need a field trip coordinator who does not necessarily have to lead the field trip. The job is that of 1) finding people who know a collecting area and are willing to lead a group of people there; 2) set the dates to make sure they do not interfere with other planned trips; 3) make sure announcements get into the bulletin in a timely manner. If a member wants company when they are planning a collecting trip, they would contact the field trip coordinator to set this up. Hopefully that way, two trips are not planned for the same weekend. If anyone is interested, please contact me at president@mineralsocal.org.

HELP WANTED *2nd Notice*****

This is an important job if we want MSSC to survive. MSSC needs someone to do marketing and advertising. The primary focus is to get meeting announcements onto on-line bulletin boards such as the Yahoo group la-rocks and calendars for local communities such as Pasadena, Sierra Madre, Altadena, Monrovia etc. so that we can entice visitors and potential members to our activities. Outreach to local schools may also become part of this job though not necessarily. Please contact Ann Meister at president@mineralsocal.org.

You Might Be a Rockhound If ...

- You own more pieces of quartz than underwear.
- Your rock collection weighs more than you do.
- Your rock garden is located inside your house.
- You can pronounce the word "molybdenite" correctly on the first try.
- You don't think of "cleavage" the same way everyone else does.
- You have ever uttered the phrase "have you tried licking it" with no sexual connotations involved.
- You think the primary function of road cuts is tourist attractions.
- You find yourself compelled to examine individual rocks in driveway gravel.

New Location AND New Date!

WEST COAST GEM & MINERAL SHOW

MAY 20 - 22, 2011 Show Hours: Fri. & Sat., 10 - 6 ★ Sun. 10 - 5.

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Minutes of the Board of Director's Meeting
March 5, 2011

President Ann Meister called the meeting to order at 1:35 p.m.

In attendance were the following Officers and Board members: President Ann Meister, Vice-President Bruce Carter, Secretary Bob Griffis, Treasurer Jim Kusley, Bulletin Editor and Federation Director Jo Anna Ritchey, and Board members Leslie Ogg, James Imai, Robert Housley and Fred Elsnau. Also in attendance was Linda Elsnau.

The following agenda items were discussed:

Treasurer's Report and financial matters

- The MSSC account currently has \$22,949
- A donation of \$500 was approved for San Bernardino County Museum, reflecting one-half of the profits from the Pacific Micromount Symposium, held in February 2011.
- A discussion was held about the MSSC obligations to Pasadena Community College (PCC) for use of its facilities for monthly meetings. Although there seems to be no formal agreement, in the past MSSC contributed a donation to the Van Amringe scholarship fund. A contribution has not been made since MSSC's last mineral show.

Membership

- Membership has decreased from approximately 139 members three years ago to 39 dues-paying members, including 8 family memberships, and not including an equal amount of life and honorary members. Some of the decrease is due to natural attrition, some to members moving out of the area, and some due to failures by the MSSC to properly manage its membership.
- A motion was passed to send a letter to all former members, going back 3 years, asking them to rejoin the MSSC. The letter will also include an apology for errors made by the MSSC that impacted membership renewals. The motion included a provision for dues paid at ½ the normal rate (\$10 for member, \$15 for family) for those renewals postmarked by June 30, 2011.
- It was agreed to modify the membership form to ask for specific permission to publish in the Membership Roster each or any of the following: (1) e-mail address, (2) phone number, and (3) mailing address. Names of members are required to be published under the bylaws.
- A motion was passed to budget \$100 for the printing of a full-color, two-sided, business-card-sized advertisement to be handed out beginning with Marty Zinn's West Coast show in May 2011. The card will contain the 2011 meeting dates and other MSSC information. Bob Griffis agreed to undertake this project.
- A solicitation will be placed in the Bulletin for an advertising/marketing chairman for the MSSC to coordinate these outreach efforts. President Meister agreed to write a description of the anticipated duties.

Bulletin

MSSC continues to struggle with the move from mailed, paper Bulletins to electronic bulletins. Some of the issues discussed were: (1) that we don't know if emailed Bulletins are actually being received, (2) how to continue subsidizing mailed Bulletins for those without email capabilities (20 Bulletins in March 2011), and (3) standardizing formats to reduce the Bulletin Editor's workload. The Board decided to take up the Bulletin issues at the next Board meeting.

Banquet

The 2011 Banquet had a much lower attendance than in past years. After some discussion, it was decided to explore if the Banquet is too close to the Tucson early start shows, and perhaps adjust the dates to make it easier for some members to attend.

Website

The current MSSC website is in need of maintenance, as there are many broken links, and references to activities that don't currently exist. It was also originally written using Frontpage, but has become corrupted due to access via FTP and other maintenance tools. Bob Griffis agreed to clean up and rewrite portions of the website to make it easier to maintain in the future. A test version of the new website will be prepared for comment over the next few months.

Outreach to Students

A discussion was held about getting more students involved. PCC has an active Dana Club, but few students crossover as MSSC members. Bruce Carter agreed to research options.

Show

A discussion was held about the feasibility of having a show again. A number of possibilities were

discussed, including a (1) small, high-end mineral show and (2) an educational/teacher symposium with mineral dealers. It was decided to explore this topic in more detail at the next Board meeting.

Next Board Meeting and Agenda

The next Board meeting will be held at 1 p.m. on April 10, 2011 at Bruce Carter's house.

Agenda items will include:

- Treasurer's Report
- Conference/Symposium/Show
- Do we want to talk with dealers at Marty's show about possibility of holding an MSSC show?

The Board meeting was adjourned at 4:45 p.m.

Respectfully submitted, Robert Griffis, Secretary

Minutes of the April 8, 2011 Meeting

The 875th meeting of The Mineralogical Society of Southern California was held on Friday, April 8, 2011, at Pasadena City College, Pasadena, CA. President Ann Meister brought the meeting to order at 7:30 p.m.

The following new business was announced:

- (1) Marty Zinn's West Coast Mineral Show will be held May 20 – 22, 2011 at a new venue, the Holiday Inn on Grand Ave. in Santa Ana, CA.
- (2) MSSC now has a full-color, two-sided, business-card-sized advertisement to be handed out beginning with Marty Zinn's West Coast show in May 2011. The card contains the 2011 meeting dates and other MSSC information.

Bruce Carter then introduced the speaker of the evening, Dr. Michael McKibben, who gave a presentation titled: "Mining Unconventional Mineral Deposits: Geothermal Brines and Seafloor Hot Springs." Dr. McKibben is a professor at the Dept of Earth Sciences, UC Riverside, and Dean of Undergraduate Studies.

Dr. McKibben discussed several projects in the Salton Sea area where geothermal fluids currently being extracted for its heat to drive turbines for power generation are being explored for extraction of their constituents. The Salton Sea area is a region of crustal spreading which results in 300°C hot brines encountered at depths of about 1000 meters. These brines have very high dissolved mineral contents (26 percent total dissolved solids or TDS), and have immense reserves of elements like Lithium (Li), Manganese (Mn), Zinc (Zn), and also economically viable levels of Lead (Pb), Silver (Ag) and even Gold (Au).

In 2003, Cal Energy Corporation performed preliminary work confirming the potential for economic extraction of Zn and Mn from these brines, but unfortunately their business model was flawed. A new company, Simbol Mining, is engaged in pilot-scale testing for extraction of Li, Mn and Zn. A variety of minerals precipitate at various levels in the system. For example, at the flash point, where the brines flash

to steam down in the borehole, the mineral Lollingite (FeAs₂) along with Gold and Magnetite precipitate. In the wellhead, minerals such as Epidote and Silver-rich Galena occur. Dr. McKibben brought samples for inspection.

Environmental impacts from these operations should be minimal, as the extracted fluids are already available, and once used in the power plants, are re-injected.

The focus then shifted to the ocean floor and hot springs observed at mid-ocean ridges. These deep sea vents were first observed in 1976, although the ancient deposits derived from them have long been known on land, such as the Jerome Mine in Arizona and the Flambeau Mine in Wisconsin. These deep sea vents are either the sulfide rich “black smokers” or the sulfate rich “white smokers.” Essentially, sea water circulates through the oceanic crust where it is heated by the upwelling magmas building seafloor. The water dissolves metals from the crust, such as Zn, Copper (Cu) and Iron (Fe) at temperatures exceeding 350°C. Minerals produced include Pyrrhotite, Pyrite, Chalcopyrite, Sphalerite, Galena, and so forth.

The focus of mining is on inactive vents and mounds adjacent to active vent areas to minimize impacts to the unique organisms around these vents. There are 140 known active deposits. A company named Nautilus Minerals is currently extracting Cu and Au from minerals on the seafloor in pilot-scale operations at the Solwara 1 project site in Papua New Guinea.

At the conclusion of the presentation, President Meister asked for other announcements. Bob Griffis reported that MSSC now has a Facebook page at <http://www.facebook.com/pages/MSSC-Mineralogical-Society-of-Southern-California/116556965084164>.

Fourteen people attended the meeting. Dr McKibben gave a fascinating presentation.

The door prize was won by Hal Beesley (Sapphire from Madagascar).

President Meister brought the meeting to a close at 8:50 p.m.

Respectfully submitted, Robert Griffis, Secretary

Minutes of the Board of Director's Meeting April 10, 2011

In attendance were the following Officers and Board members: President Ann Meister, Vice-President Bruce Carter, Secretary Bob Griffis, Treasurer Jim Kusley, Bulletin Editor and Federation Director Jo Anna Ritchey, and Board members Leslie Ogg, James Imai, and Geoffrey Caplette. Also in attendance was former MSSC Secretary Pat Caplette.

As a quorum was present, President Ann Meister called the meeting to order at 1:12 p.m.

The reading of the Minutes of the March 5, 2011 Board of Director's Meeting was waived and the minutes were approved unanimously.

The following agenda items, carried over from the previous Board meeting were discussed:

Treasurer's Report and financial matters

- No update was available from the Treasurer as the bank had not yet issued the quarterly statement.
- The Treasurer is working with the bank to resolve an account issue.

Membership

- Full-color, two-sided, business-card-sized advertisement were completed and handed out to officers and Board members for mailing to local shows and to be handed out at Marty Zinn's West Coast show in May 2011. The card contains the 2011 meeting dates and other MSSC information. The original budget of \$100 was exceeded by \$11.95 reflecting sales tax. A motion was passed to approve the overage.
- A letter to all former members, asking them to rejoin the MSSC at a discounted rate was approved at the last meeting. Ann Meister is working on drafting the letter.
- It was agreed to modify the membership form to ask for specific permission to publish in the Membership Roster each or any of the following: (1) e-mail address, (2) phone number, and (3) mailing address. To date, this work has not been started.
- A solicitation will be placed in the Bulletin for an MSSC advertising/marketing chairman to coordinate these outreach efforts. President Meister agreed to write a description of the anticipated duties, and this is in process.

Bulletin

- The Bulletin process is a work in progress and is continuously improving.
- Marty Zinn contacted MSSC with concerns over size and placement of his advertisement for his upcoming May show to be held at a new venue in Orange County. It was agreed to increase the size of the ad and change its placement.

Website

The website is being modified off-line. A test version of the new website will be prepared for comment over the next few months.

A Facebook page for the MSSC is now on line at <http://www.facebook.com/pages/MSSC-Mineralogical-Society-of-Southern-California/116556965084164>.

Outreach to Students

A discussion was held about the schedule conflict for PCC Dana Club students. They are out in the field on Fridays making it difficult to attend Friday night meetings.

Show

The feasibility of having a show was again discussed. Although there is considerable interest amongst Board members, it was decided to table the discussion for now and focus on retention of members, and marketing the MSSC to new members to increase membership.

The following New Business was discussed:

Field Trips

It was discussed and decided that holding Field Trips is an important component of recruiting new member and retaining existing members. There is some level of discomfort about directly leading field trips due to previous litigation issues. It was decided to try to coordinate the following activities for this year:

- Geoffrey Caplette agreed to contact Dana Gochenour about a fall field trip to the Cryo-Genie mine which is a well known tourmaline- and beryl-bearing pegmatite. Geoff will coordinate with Bruce Carter to try and schedule a meeting presentation either the day before or a week before the trip date.
- Bob Griffis agreed to attempt arranging a field trip to the Cascade Canyon corundum locality, potentially to be led by former MSSC Board member Justin Zzyzx of ZzyzxGallery.com.
- Ann Meister agreed to contact Walt Lombardo of Nevada Mineral & Book Company to arrange an open house at his shop in Orange, CA.

Next Board Meeting and Agenda

The next Board meeting will be held at 1 p.m. on June 26, 2011 at the home of Leslie Ogg and James Imai.

The Board meeting was adjourned at 3:25 p.m.

Respectfully submitted, Robert Griffis, Secretary

Minutes April 15, 2011 Meeting

Our MSSC April 8 speaker will be Dr Michael McKibben of the University of California, Riverside. He will speak on the recovery of important elements from hydrothermal solutions (this is the same talk presented to MOROCKS a month or so back-I don't remember the specific title).

For the past few thousand years (since the neolithic period) most economically important elements such as copper, tin, iron, lead and zinc have been recovered by mining mineral deposits. The broken rock is first physically processed to separate out the specific element-bearing mineral from waste rock and then the mineral is smelted or otherwise processed to separate out the particular element.

However, all of these elements can also be found in solution within naturally-occurring waters, particularly hydrothermal solutions. Recovery of these elements from hot groundwater in geothermal areas and from mineral-rich hydrothermal springs in deep oceanic environments present promising new avenues for production of many important elements. Within the next decade or two the production of many elements will likely shift from mines on land to hydrothermal springs in the deep ocean.

Bruce Carter



New Location for the West Coast Gem & Mineral Show

The **West Coast Gem & Mineral Show** has moved back to Orange County! Martin Zinn Expositions is pleased to inform loyal customers and supporters that the 2011 West Coast show will take place at the Holiday Inn-Orange County Airport, in Santa Ana. The hotel is conveniently located just off Exit 8 from the 55 Freeway, 2726 South Grand Ave, at the intersection of South Grand and Dyer Avenues.

New show dates are May 20-22, 2011. The show is open from 10 am – 6 pm Friday and Saturday, and from 10 am – 5 pm Sunday. Admission and parking are free. Be sure to register for a chance to win a door prize.

More than 80 dealers will occupy all first floor hotel rooms, ballrooms and meeting space, and will overflow to second floor. The show features the same great mix of dealers selling fine minerals, fossils, gem and lapidary rough, findings, display stands and packaging, decorator items, beads, and finished jewelry.

Returning wholesale dealers include Jewel Tunnel Imports, Top Gem Minerals, Norcross-Madagascar, Midwest Minerals, Barlows, PaleoFacts, Rincon Minerals, and Bolva. Retail dealers are too numerous to list here, but include a wide range of products at all price levels. International dealers represent China, India, Russia, Brazil, Argentina, Madagascar, Ethiopia, Germany, and Morocco. Of course California mineral localities will be well represented by local dealers, and there are plenty of minerals from all across the US.

This show is California's best opportunity for collectors and families to see and buy mineral specimens, meteorites, petrified wood, fossils, beads, jewelry, gemstones, geodes, decorator pieces, and other nature-related items. Whether you are just starting a collection, or looking to add a special new find to your cabinets, this is the show to attend.

Visit www.mzexpos.com for a complete list of participating dealers.

Regina Aumente
Assistant Show Manager
Martin Zinn Expositions



Caption: This fly knew a good specimen when it saw one, laying claim to this copper grouping and refusing to stay away during the photo shoot. Sam Norwood specimen, 1.5 × 0.75 inches; David Schuder photo.

Permission to use picture must be acquired from schuder@comcast.net or schuder@pasty.net. Photo and caption from Rock and Minerals Magazine, March- April 2011.

In the News

[Ancient Marsupial Had Lizard-Like Teeth](#): Fossil remains of a new type of extinct snail-munching marsupial identified by Australian palaeontologists, more closely resemble a modern-day lizard than a mammal.

[Beams of Electrons Link Saturn With Its Moon Enceladus](#): Researchers have discovered that jets of gas and icy grains emanate from the south pole of Enceladus, which become electrically charged and form an ionosphere. The motion of Enceladus and its ionosphere through the magnetic bubble that surrounds Saturn acts like a dynamo, setting up the newly-discovered current system.

[Huge Dry Ice Deposit Discovered On Mars](#): Researchers using NASA's Mars Reconnaissance Orbiter ground-penetrating radar identified a large, buried deposit of frozen carbon dioxide, or dry ice, at the Red Planet's south pole. The newly found deposit has a volume similar to Lake Superior's nearly 3,000 cubic miles.

[Jurassic Spider from China Is Largest Fossil Specimen Discovered](#): With a leg span of more than five inches, a recently named Jurassic period spider from China is the largest fossil specimen discovered, and one that has modern relatives in tropical climates today.

From Bob's Rockshop.com (www.bobsrockshop.com)

Minerals of the Reward Mine Or What's in a Name?

by Walt Margerum

The Name and History

Reward, Brown Monster, Ruth, Graham-Jones, Eclipse, and F. D. Roosevelt are some of the names given to the mine shown on maps as the Reward mine. The most important names from an historical perspective are Eclipse, Brown Monster, and Reward. I will try to explain how they all refer to the same mine, and why the literature still refers to both the Reward and the Brown Monster.

The Reward mine is located in Owens Valley California on the west slope of the Inyo Mountains just to the east of Manzanar. This is a very historic part of the valley, being the location of some of the earliest mineral discoveries, as well as the site of the Manzanar Detention Camp during WWII.

According to Chalfant (1933), the Eclipse was discovered in 1860 along with the Union and the Ida, and work was started in the summer of 1862 by R. S. Wigham. The most probable reason for the delay was the numerous conflicts between the white settlers and the local Native American population of Owens Valley. These conflicts continued until 1866. Chalfant gives a somewhat disjointed but none-the-less interesting description of them. Goodyear (1888) describes the Eclipse mine in the log of his travels in the early 1870's published in the Eighth Annual Report of the California State Mineralogist in 1888. He states that the owners at that time purchased the mine from the Union Company, but does not say who they were. From this it can be deduced that sometime before 1870 the Eclipse became part of the Union Company, and it was then sold to new owners. Knopf (1912) provides a description of the mine from about the time of Goodyear until 1912, and states that it was then under the ownership of the Reward Consolidated Gold Mining Company. Hence its present name.

Joel Briggs, in his Desert Drifter web site, provides the following history of the Reward mine. *"In 1871, the Eclipse was sold, and the new owners changed its name to the Brown Monster Mine. Shortly after that, the six-stamp mill was replaced with a 30-stamp mill, which was driven by waterpower generated by water diverted from Owens River. Because of economic reasons, in 1905 a 20-stamp was erected to replace the 30-stamp mill and was moved closer to the mine openings. A tram system was installed to bring ore down to this mill eliminating the need to transport ore away from the mines. In 1911 the mine and plant were overhauled and an electric transmission line 4 1/2 miles long was constructed across the Owens Valley to furnish power. After a short run, the mine was closed in the spring of 1912, pending change of ownership. From 1913 to 1936, the mine was worked on and off with some of its ore being shipped to the Tropic mill at Rosamond for refining and smelting. Considerable exploration was done from November 1940 to April 1942 with several hundred feet of drifts and crosscuts driven, and core drilling done through out the mines. The end results were not favorable and the mine stayed idle until 1948 when a vein carrying lead, silver and gold was discovered in the upper part of the Reward. The vein played out in 1950. In the same year, a small mill was erected to concentrate on some of the lower grade ores, and within nine months, this too was also abandoned for economic reasons, and the Reward Mine once again became dormant. In 1979, the Missouri Mine, Inc. did intense diggings, cyanide testing and core sampling on the Reward Mine. Their findings showed some promise and investigations are still under way to determine feasibility on a full-scale operation."* I wish to thank Joel for his permission to reprint this history.

According to BLM records Missouri Mines, Inc. of Sherman Oaks California still holds active claims in the area.

The Geology and Mineralogy

Although the Reward was primarily a gold mine, it also produced lead, silver, and copper. Knopf (1912) refers to two separate veins in the mine, the Brown Monster and the Reward, and states that the Brown Monster vein is to the north of Reward Gulch, and the Reward vein is to the south. It should be noted that current USGS topographic maps refer to Reward Gulch as Eclipse Canyon. Subsequent writers have kept to this vein distinction when referring to the Reward mine. Knopf provides the following description of the geology of the mines.

"The country rock in the vicinity of the Reward mine consists of a stratified series of limestones of Carboniferous age, but to the southwest there are Triassic rocks, which form the low hills that project through the

alluvium of Owens Valley. The strata strike generally northwest, but as they have been intensely folded the dips are extremely variable. The folding is displayed in diagrammatic perfection on the north side of Reward Gulch; in the bottom of the gulch the strata stand vertical, and near the level of the Brown Monster outcrop they are sharply bent and dip west at a low, angle.

A few hundred yards east of the mine, at an altitude of 5,000 feet, is exposed intrusive diorite which is part of the great granitic mass making up the western flank of the Inyo Range for a considerable distance to the north. In consequence of the intrusion the limestones in the vicinity of the mine have been considerably metamorphosed and are either tremolite bearing marbles or dense-textured lime-silicate hornstones. Dikes and sills have been injected, one of which, 10 feet thick and approximately 50 feet above the vein, is particularly noteworthy because, being easily traceable on the surface, it furnishes an index of the character and amount of the faulting that the Reward vein has undergone. A limestone bed a foot thick, lying above the diorite sill, has as a result of metamorphism been recrystallized to a coarse-grained aggregate of diopside, tremolite, and calcite.

The Reward vein conforms approximately to the bedding of the inclosing rocks. The hanging wall, as seen above the outcrop, is a stratum of dark-blue siliceous limestone 5 feet thick, which locally is considerably brecciated. The vein can be traced south of the gulch for 400 feet, beyond which it forks and the branches pinch out abruptly. Near the surface the vein lies nearly flat, but at the face of the lowermost drift it dips 40° NE. and strikes N. 40° W. The vein swells and pinches abruptly, ranging from a few inches to 10 feet in thickness with an average thickness of 4 feet.

The ore is a coarse white quartz generally devoid of sulphides. On some of the levels the Reward vein shows large solid bunches of coarsely crystalline galena and some pyrite, chalcopyrite, and sphalerite. These last, however, are extremely rare, and the total quantity of sulphides is only a small fraction of 1 per cent of the ore. Oxidation products occur to some extent, limonite, ferruginous jasper, chrysocolla, cerusite, anglesite, the deep azure-blue linarite, and the bluish-green caledonite, the last two of which are rare basic sulphates of lead and copper.

The Brown Monster vein can be traced more or less continuously for 1,000 feet northwestward from Reward Gulch. In the underground workings it displays the same general features that it shows along the outcrop, being in places a solid and well defined quartz vein and in others mixed with country rock. In the upper levels the vein dips 25° E., but in depth it steepens and near the bottom of the incline the dip increases abruptly to 50°. The vertical depth attained on the vein is 200 feet.”

One good source for mineral information is the mindat.org database created by Ralph Jolyon. This database lists 23 minerals from the Reward. My research has added 15 more minerals giving a total of 38. It should be noted that Paul Adams has written several excellent articles published in Mineral News that are the basis for many of the minerals listed in the mindat.org web site for the Reward mine.

Table I summarizes the minerals. Those underlined are listed on the mindat.org web site as having been verified as occurring at the mine. Those in **bold** have been verified by the author, and those in *italics* by Bob Housley and his magic machine. The remainder are from the literature, primarily Goodyear, and Knopf. As you can see there is some overlap of verification, and a few unverified minerals.

Although many excellent cabinet specimens have been obtained from the mine in the past, most recently reported minerals are micro's. Many of these are well crystallized, and make excellent specimens.

As stated earlier Missouri Mines inc. holds active claims in the area, and their rights should be respected.

References

- Briggs, Joel (2004), "Reward Mine and Brown Monster Group"; The Desert Drifter web site (www.desertdrifter.com/ddwebsite/articles/reward.htm).
- Chalfant, W.A. (1933), "The Story of Inyo"; Chalfant Press, 430 pp.
- Goodyear, W. A. (1888), "Inyo County"; California State Mining Bureau Eighth Annual Report of the State Mineralogist for the year ending October 1, 1888, pp. 262-264.

Table I. Minerals of the Reward Mine

<u>Anglesite</u> PbSO ₄	<u>Arsentsumbite</u> Pb ₂ Cu (AsO ₄)(SO ₄)(OH)	<u>Azurite</u> Cu ₃ (CO ₃) ₂ (OH) ₂
<u>Beudantite</u> PbFe ₃ (AsO ₄)(SO ₄)(OH) ₆	<u>Brochantite</u> Cu ₄ (SO ₄)(OH) ₆	Calcite CaCO ₃
<u>Caledonite</u> Pb ₅ Cu ₂ (CO ₃)(SO ₄) ₃ (OH) ₆	<u>Cerussite</u> PbCO ₃	Chalcopyrite CuFeS ₂
<u>Chlorargyrite</u> AgCl	<u>Chrysocolla</u> (Cu,Al) ₂ H ₂ Si ₂ O ₅ (OH) ₄ ·nH ₂ O	Copper Cu
<u>Conichalcite</u> CaCu(AsO ₄)(OH)	<u>Corkite</u> PbFe ₃ (PO ₄)(SO ₄)(OH) ₆	Cuprite Cu ₂ O
Diopside Ca Mg Si ₂ O ₆	<u>Duftite</u> Pb Cu(AsO ₄)(OH)	Goethite FeO(OH)
Galena PbS	Geochronite Pb ₁₄ (Sb, As) ₆ S ₂₃	<u>Gold</u> Au
<u>Hemimorphite</u> Zn ₄ Si ₂ O ₇ (OH) ₂ · H ₂ O	<u>Leadhillite</u> Pb ₄ (SO ₄) (CO ₃) ₂ (OH) ₂	<u>Linarite</u> Pb Cu (SO ₄) (OH) ₂
<u>Malachite</u> Cu ₂ (CO ₃) (OH)	<u>Mimetite</u> Pb ₅ (AsO ₄) ₃ Cl	<u>Perite</u> Pb BiO ₂ Cl
<u>Pyrargyrite</u> Ag ₃ SbS ₃	Pyrite Fe S ₂	<u>Pyromorphite</u> Pb ₅ (PO ₄) ₃ Cl
Quartz SiO ₂	<u>Schmiederite</u> Pb ₂ Cu ₂ (Se ⁴⁺ O ₃)(Se ⁶⁺ O ₄)(OH) ₄	Silver Ag
Sphalerite (Zn, Fe) S	Tremolite Ca ₂ (Mg, Fe) ₅ Si ₈ O ₂₂ (OH) ₂	<u>Tsumebite</u> Pb ₂ Cu (PO ₄) (SO ₄) (OH)
<u>Vanadinite</u> Pb ₅ (VO ₄) Cl	<u>Wulfenite</u> Pb MoO ₄	

Joylon, Ralph (2005), "Reward Mine, Inyo Co., California, USA"; Mindat.org database (www.mindat.org)

Knopf, Adolph (1912), "Mineral Resources of the Inyo and White Mountains, California"; United States Geological Survey Bulletin 540, "Contributions to Economic Geology (Short Papers and Preliminary Reports) 1912, Part I. Metals and Nonmetals Except Fuels", pp. 116-119.

Those in **bold** have been verified by the author, and those in *italics* by Bob Housley and his magic machine. The remainder are from the literature, primarily Goodyear, and Knopf.

Calendar of Events

May 6-8 - BISHOP, CA

Lone Pine Gem & Mineral Society
Tri-County Fairgrounds (Robinson Bldg.)
Corner of Sierra Street & Fair Drive
Hours: Fri. 6pm-10; Sat. 9:30-4; Sun. 10-3

Francee Graham (760) 876-4319

Email: franceem@quet.com

May 7-8 - RENO, NV

Reno Gem and Mineral Society
Reno Livestock Events Center Exhibit Hall
1350 N. Wells Ave.

Hours: Sat. 10-5 Sun. 10-4

Ann Johnson (775)544-4937

Website: www.renorockhounds.com

May 13-15 - ANDERSON, CA

CFMS SHOW & CONVENTION

Northern California Treasures
Hosted by: Superior California Gem & Mineral Society, Shasta Gem & Mineral Society, & Paradise Gem & Mineral Club
Shasta District Fairgrounds - Anderson, CA

Briggs Street (8 miles south of Redding)

Exit 677 off Interstate 5 to Highway 273

Hours: Fri. & Sat. 9-5; Sun. 10-4

May 20-22—SANTA ANA, CA:

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

May 21-22 - YUCAIPA, CA

Yucaipa Valley Gem & Mineral Society

Yucaipa Community Center

34900 Oak Glen Road

Hours: Sat. 9-5, Sun. 10-4

Sheri Maisel (909) 797-0017

Website: www.yvgms.org

May 22—SAN BERNARDINO, CA:

Show; Rings & Things; Hilton San Bernardino, 285 E. Hospitality Ln.; Sun. 10-2; free admission; gemstones not available in our catalog or online store, bead strands, 15% off many gemstone and bead strands, findings and stringing supplies; Web site: www.rings-things.com/Show/index.html

June 3-5 - WOODLAND HILLS, CA

Rockatomics Gem and Mineral Society

Pierce College

20800 Victory Blvd

Hours: 9-5 daily

Gary Levitt (818) 993-3802, (cell) (818)

321-6290

Website: www.Rockatomics.org

June 4-5 - GLENDORA, CA

Glendora Gems

Goddard Middle School

859 East Sierra Madre

Hours: Sat. 10-5; Sun. 10-4

Bonnie Bidwell (626) 963-4638

June 4-5 - LA HABRA, CA

North Orange County Gem and Mineral Society

La Habra Community Center

101 W. La Habra Blvd.

Hours: 10-5 daily

Dave Swarton (626) 912-1531

Website: www.nocgms.com

Society Contacts for 2010

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president@mineralsocal.org.
 Vice President: Bruce Carter
 Secretary: Bob Griffis
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 CFMS Director: Jo Anna Ritchey
 Past President Geoffrey Caplette

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About the Mineralogical Society of Southern California

Organized in 1931, the Mineralogical Society of Southern California, Inc. is the oldest mineralogical society in the western United States. The MSSC is a member of the California Federation of Mineralogical Societies, and is dedicated to the dissemination of general knowledge of the mineralogical and related earth sciences through the study and collecting of mineral specimens. The MSSC is a scientific non-profit organization that actively supports the geology department at Pasadena City College, Pasadena, California. Support is also given to the Los Angeles and San Bernardino County Museums of Natural History. The Bulletin of the Mineralogical Society of Southern California is the official publication of the Mineralogical Society of Southern California, Inc.

The MSSC meetings are usually held the second Friday of each month, January, February and August excepted, at 7:30 p.m. in Building E, Room 220, Pasadena City College, 1570 E Colorado Boulevard, Pasadena, California. The annual Installation Banquet is held in January, and the annual Picnic and Swap Meeting is held in August. Due to PCC holidays meetings may vary. Check the Society web page for details. The Society also sponsors the annual Pacific Micro mount Symposium held at the San Bernardino County Natural History Museum during the last weekend of January.

Annual Membership dues for the MSSC are \$20.00 for an individual membership, \$30.00 for a family membership.

The Society's contact information::

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The Mineralogical Society of California, Inc.

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