Bulletin of the Mineralogical Society of Southern California

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The 910th meeting of the Mineralogical Society of Southern California

www.mineralsocal.org

With Knowledge Comes Appreciation

June 13th, 2014 at 7:30 pm

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

Program : **The Science Education Center of California's Science Museum on Wheels Program.** Presented by Dan Krawitz

In this Issue:

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About the Program: The Science Education Center of California's Science Museum on Wheels Program. Presented by Dan Krawitz

California has some of the world's top public and private universities. These institutions of higher learning have provided the human capital to fuel our regional economy and their academic publications have led to numerous Nobel Prizes. At the K-12 level, California's education has been less successful. California ranks near the bottom of the United States in elementary, middle and high school test scores and our K- 8 science programs are at the bottom of the industrialized world.

A number of public and private sector organizations have stepped in to help and there is a small cottage industry providing science enrichment to elementary and middle schools in California. The June 13th program explores the challenges of bringing fossils, minerals and science labs to school sites in California and the additional challenge of building a natural history museum to support science enrichment in California. The program will include two slide shows and several specimens from the museum collection of the Science Education Center of California.

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From the Editor: Linda Elsnau

Where has the time gone? Here we are in mid 2014 already! As usual….HELP! I really need contributions from you, our wonderfully intellegent, knowledgable, smart, helpful, friendly, literate, members. Your contributions help make our bulletin more personal and interesting for everyone. Don't know what to contribute? Here are some suggestions: **a)** a review of your favorite or most useful mineral related book or resource. **b)** your latest mineral collecting trip, whether that was to your favorite site or to the latest show. **c)** What got you interested in this hobby. what first attracted you to collect, study or simply enjoy minerals? If you specialized, what is your speciality and why? **d)** Have you seen anything mineral related that you think would be of interest to the group? Visited a museum, seen a new mineral cleaning method, tried a new trimming method. **e)** Do you have a favorite collecting story or location? What's your fondest memory of your collecting trips? **f)** Are you a micro-mineral collector? Why? What attracted you to that aspect of the hobby? What's your favorite mico specimen? Do you "mount" your micro specimens? What mounting method do you prefer. If you don't mount them, why not? **g)** anything else mineral related that you would like to share with the rest of the members.

To submit an article, simple email it to me, preferrable as a word document. If you include photos, be sure that we have permission to use them from the original photographer, Thanks

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MEANDERINGS FROM THE PRESIDENT by Ann Meister

After our fantastic fossil talk at the last meeting, I found the recent news about fossils and fossil collectors particularly fascinating. Fossils can be extremely fragile. If someone is not there to find them when they weather out of their sedimentary beds, they may disappear forever, disintegrating into the sands of time.

On May 17, news headlines proclaimed the "biggest dinosaur ever" was unearthed in Argentinean Patagonia. The report says that a local farm worker stumbled on the remains in the desert near La Flecha in 2011. Scientists believe it is a new species of titanosaur, a herbivore dating from the Late Cretaceous period about 95 million years ago. It may be the largest creature to ever walk the earth. Based on its huge thigh bones, it was 130 feet long, 65 feet tall and weighed around 170,000 pounds significantly more than the previous record holder, *Argentinosaurus*. One picture shows one of the scientists next to a femur that was half again as long as he was tall. So far, the partial skeletons of seven individuals – about 150 bones – have been found. The excavation is being done by researchers of the Museum of Paleontology Egidio Feruglio.

The Google doodle for May 21 was a celebration of the 215the anniversary of the birth of British paleontologist and fossil dealer Mary Anning (1799-1847). I had never heard of her. She made important findings in the Jurassic marine fossil beds at Lyme Regis in Dorset. In her seaside town, she walked along the unstable cliffs at

low tide looking for fallen rocks that contained the fossils. It was dangerous work. She is credited with finding the first specimen of *Ichthyosaurus* acknowledged by the Geological Society in London. She also discovered the first nearly complete plesiosaur around 1820. Being a woman and of lower class and from a provincial area, her work did not receive the same recognition as the findings of the gentleman scholars of London. However, her obituary was published in the Quarterly Journal of the Geological Society – an organization that would not admit women until 1904.

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MINUTES of the May 9, 2014 Meeting

The 909th meeting of the Mineralogical Society of Southern California (MSSC) was held on

Friday, May 9, 2014 at Pasadena City College's Geology Department. The meeting was brought to order by President Ann Meister.

Call To Order: The meeting was called to order at 7:40pm. A warm welcome to the 909th Membership Meeting to all in attendance was given by President Ann Meister. Ann asked the guests to identify themselves. Guests in attendance were Jane Reed, Sharon Yu and Gina Hensel.

Minutes: There was a motion from the floor by Laura and seconded for the Minutes of the April 2014 Membership meeting, as published in the May 2014 Bulletin to be approved. The members voted and the Minutes were approved unanimously.

Announcements: The following announcements were made:

- Membership rosters were mailed out. If you did not receive yours, please see Linda Elsnau.
- Bulletins are now e-mailed to everyone. If you didn't receive yours, the snail mail copy fee had not been collected.
- Deadline for submissions to the June 2014 Bulletin is May 25, 2014. All articles, stories or other contributions are welcomed.
- **The next Board Meeting will be June 8, 2014 at Bruce Carter's home.** Agenda items are to be submitted to Ann Meister before the meeting.
- August 10, 2014 is our annual Picnic/Swap to be held at Bruce Carter's home. Check the upcoming Bulletin for details.
- January 10, 2015 is our Installation Banquet. Details to be announced.
- The Lancaster show is this weekend.
- West Coast Gem and Mineral Show (in Santa Ana) is next weekend.
- CFMS show is May 30, 31 and June 1 at Fairplex in Pomona. See www.cfms2014show.com for more details.

Show and Tell: Jane Reed brought some items from her late father's collection. They will be available for anyone to take after the meeting in the refreshment room. Thanks, Jane!

Discussions:

BJ mentioned the rock slides that happened 2-3 years ago in the San Gabriels…there's an interest in gold. Some of the rock may have gold in them.

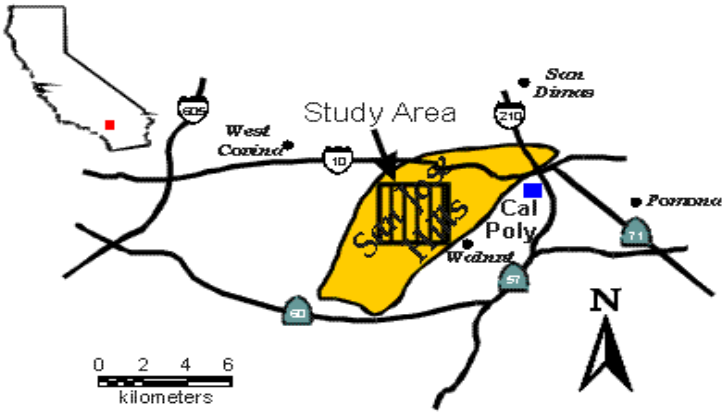
San Gabriels becoming a National Recreation Area: Check the Sierra Club website and search: *"Broad Support for National Recreation Area in San Gabriels ..."* for full details. www.sierraclub.org

U S Forest Service Adventure Pass has been declared illegal by a Federal Court. A senior Adventure Pass is $5, the ticket is $5! Get one and use it or you will be cited.

Ann mentioned that recently a stranded hiker out of Altadena's Cobb Estate Trailhead (Sam Merrill Trail) had to be rescued by helicopter at 6:00 in the morning! She said that traffic, parking and rescues in that popular area are an issue for residents.

Program: Ann Meister turned the meeting over to Programs Chair, Rudy Lopez. Rudy announced that speakers are lined up through March 2015. In fact, February 2015 will be a presentation on Mars! He thanked George and others who gave him referrals.

Rudy introduced our speaker, Keith Krzywiec. Keith is founder of West Covina Fossil Paleontology (WCFP), which has dealings with the Natural History Museum of Los Angeles County and he still volunteers and gives tours there. Keith has been digging for and collecting fossils in the San Gabriel Valley for a very long time. His recent efforts are focused in the San Jose Hills in the Puente Formation (Fm), rich in Miocene sediment, shale, petrified wood and other goodies. His current field crew consists of Ray, a Cal-Poly grad, Mark, a physicist professor, Gail, an X-Ray technician and himself, a former aerospace worker.



Krzywiec began his presentation with an overview of the collection site and geographic surroundings. Nearby Puddingstone, for instance, also has a lot of Miocene rock.

First off, he showed a photo of a 63-foot fin whale skeleton that periodically leaked oil from its bone until 10-15years ago! The skeleton has been at the Natural History Museum of Los Angeles County since the 1920's. Keith "introduced" us to some of his colleagues: Dr Larry Barnes, a marine paleo-vertebrate expert, Dr J B Stewart, fossil fish expert, Dr Hal Thomas the lab supervisor, Dr Lindsey Grove, malacology (mollusks) collections manager and others. These people have given great support to Keith over his collecting career. In fact, over time, Keith has donated several fossils to the museum.

Fossil collecting: The timeline is late Miocene Epoch (23mya-5.3mya). The Puente Fm's four members are *La Vida* near top of the San Jose Hills (11 mya), *Soquel*, *Yorba* and *Sycamore Canyon* (6 mya). Keith showed a map of California in Miocene time. It is quite different from today!

There are many different types of fossils found in the Puente Fm. The fossils Keith found include petrified wood (possibly Juniper), 10-12 mya pine needles, oak leaf, manzanita, salix (willow leaf) and others. A 10 million year old walnut fossil was found in the city of Walnut on a street named Walnut Vista!

He also found fresh water gastropods that look similar to today's snail shell. There were 3-4 other malacological specimens, as well as, a clam shell fossil that looks much like the one here:

The one Keith showed us is from the nearby Topanga Fm and is 16 million years old! Think about the fresh water fossils found in deep ocean sediments, some found in shale, some between layers of sediment and shale with most found in the Puente Fm.

Split-tail fish are ocean fish. This type of fish fossils were found in shale at Puente Fm and San Pedro Fm, nearby. There are viper fish, pipe fish (sea horse), lantern fish and coprocites, ever popular with kids…fish poop! There is an abundance (16 species) of shark teeth, serrated teeth, and hooked teeth, fragments of now extinct shark, the megaladon, 50' Baleen whale tooth and even the lumbar of a 25' whale. Fossils stuck in mudstone are dolphin ribs and teeth, tough to extract! There are bird fossils, sea lion fossils, turtle scutes that are found in turbidity areas and some that are just there for the taking, provided you have appropriate permission, of course.

Keith brought a fantastic, extensive exhibit display of fossils for all to see. He answered many questions and we thank him for a great presentation.

Drawing: The drawing was won by new member, Scott Jacobson. Congratulations!

Adjournment: The meeting was adjourned at 8:55 p.m. Refreshments were served in the office following the meeting. Thanks, Laura. Jane Reed's specimens were put out for anyone to take.

Respectfully submitted, Angie Guzman, Secretary

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Part III: Golden State Quicksilver: The Origin of Silica-Carbonate Hg in California

by Kyle Beucke

Part 1 can be found in your February, 2014 MSSC Bulletin; Part II was in the April, 2014 MSSC Bulletin

Possible present-day analogues of silica-carbonate mercury deposits

Part of my reason for being interested in hydrothermal deposits is a long-standing fascination with hot springs. There are some currently active hydrothermal systems in the northern Coast Ranges that have been cited as possible present-day analogues to silica-carbonate mercury deposits. Several are described below:

Sulphur Bank

The Sulphur Bank mine was first mined for sulfur and later for mercury, becoming one of the most important mercury mines in California. The cinnabar mineralization is very recent and is apparently still occurring. The andesite lava flow that hosts much of the ore has been dated at 44,500 years (the carbon dated age of a log covered by the lava), and sediments in adjacent Clear Lake show peaks of mercury deposition during the Pleistocene (Sims and White 1981).

Although the water discharged from springs at Sulphur Bank is the hottest recorded outside of the Geysers steam field (up to 80.5° Celsius, with temperatures of up to 218° at a depth of 503 meters), there are no volcanic intrusions exposed at the mine, and the source of the lava flow is 2 kilometers away (Goff et al. 1995; Donnelly-Nolan et al. 1993). The water chemistry and gases suggest a strong influence of organic sediments; these fluids have been variously interpreted as connate, metamorphic, and "evolved meteoric" (resulting from the boiling of meteoric water in Franciscan rock, imparting a non-meteoric isotopic signature and organic components to the fluids) (Goff et al. 1995; Rytuba et al. 1993; Sims and White 1981). Pickthorn (1993) considered Sulphur Bank to be an example of a silica-carbonate type mercury deposit based on the chemistry of the gases and fluids that are currently issuing from the area. In opposition to this idea, Rytuba (1995) proposed that Sulphur Bank was a hot springs mercury deposit associated with recent Clear Lake volcanism, distinct from silica-carbonate mineralization, which he considers to be largely pre-volcanic.

The Geysers

The Geysers geothermal field appears to have a close association with silica-carbonate mercury deposits (Hulen and Walters 1993). Silica-carbonate mercury deposits are situated along high-angle faults that form the limits of the geothermal field. For example, the Mercuryville fault, which forms the southwestern boundary to the Geysers steam reservoir, hosts the Culver-Baer silica-carbonate mercury deposit (McLaughlin 1981). Mercury vapor and hydrocarbons are present in the Geysers steam, suggesting that mercury mineralization may still be occurring (Fruchter et al. 1977; Moore et al. 2001). The Geysers hydrothermal system was probably initiated 1.1-1.2 Ma as a result of the emplacement of a pluton (Moore et al. 2001). This intrusive activity is considered to have been the source of heat for the system from its inception to the present. One of the quartz veins sampled by Moore et al. (2001) was from the Socrates mine area, a silica-carbonate mercury deposit; they noted the similarity of this vein to those observed in other nearby mercury deposits. Based on their research, they interpreted this vein to be representative of an earlier, fluid-dominated hydrothermal system at the Geysers that preceded the modern vapor-dominated system. This is in agreement with McLaughlin´s (1981) opinion that the Mercuryville fault, which forms the southwestern boundary of the Geysers, may have been a "major thermal vent area" for an earlier Geysers hydrothermal system. Based on study of Geysers veins by Moore et al. (2001), the Socrates mine vein could have been formed in the temperature range of 154-325° Celsius, and the fluids may have been connate. In contrast, Donnelly-Nolan et al. (1993) proposed that the fluid responsible for the mercury mineralization at the Geysers was a boiled-down meteoric water that had interacted with Franciscan rock.

Skaggs Springs mine

Another possible silica-carbonate mercury deposit analogue (although silica-carbonate rock is not present) with recent mercury mineralization is the Skaggs Springs mine. This deposit is entirely in sedimentary rock and is surrounded by rock of the Franciscan Formation. It has a similar mineralogy to other silica-carbonate mercury deposits, including mercury sulfides (primarily metacinnabar), a silica gangue (opal, quartz, and chalcedony), and curtisite (idrialite). The carbon in the curtisite/idrialite is evidently from "organic matter of plant origin." (Echigo et al. 2009) Everhart (1950) reported that

metacinnabar was being deposited in nearby hot springs. The fluids from the springs are chemically similar to those at Sulphur Bank and springs associated with silica-carbonate rock; for example, they are high in bicarbonate and have a high boron-chlorine ratio (White 1967).

Baker Soda Spring

Baker Soda Spring is located adjacent to a silica-carbonate mercury deposit (the Baker mine). The cool (25° Celsius) fluids have deposited grayish precipitates with elevated levels of mercury, (2.2 parts per million). The high salinity of the fluids suggests that they could be connate (Smith 2010).

Conclusions

The available age constraints of California Coast Range silica-carbonate mercury deposits and their association with high-angle faults suggests that their formation is in some way connected to the passage of the Mendocino Triple Junction and the initiation of transform faulting. The fluids responsible for the mercury mineralization were evidently thermal; their source is unknown, but there is evidence suggesting that connate and/or metamorphic water expelled from sedimentary rocks (which evidently supplied the carbon and possibly also the mercury) was involved. The influence, if any, of magmatism/volcanism remains a mystery. The model proposed by Pickthorn (1993), involving the tectonic release of mineralizing fluids, is compatible with the abundance of silica-carbonate mercury deposits in areas with no apparent volcanic activity, but it is at odds with the observed pattern of both volcanic activity and mercury deposits dying out north of Clear Lake (as pointed out by Moiseyev 1971). It is possible that these hydrothermal systems were driven by deep intrusive magmatism that failed to reach the surface.

The widespread occurrence of silica-carbonate mercury deposits along the Coast Ranges and the apparent relationship with the passage of the Mendocino Triple Junction suggests that there could be deposits actively forming to the north, between the northern-most known deposits and the current position of the Mendocino Triple Junction. The Sulphur Bank and Skaggs Springs deposits, both of which are among the northern-most mercury deposits in the California Coast Ranges, have characteristics that suggest they may be currently or recently active silica-carbonate mercury systems. These characteristics include fluid and gas composition, mercury-dominated mineralization, lack of associated metallic mineralization, and association with Franciscan formation rock.

Remaining questions

Some of the remaining questions regarding the genesis of silica-carbonate mercury deposits include:

-How tightly is the mineralization linked to the migration of the Mendocino Triple Junction, and what is the temporal relationship with magmatism/volcanism? Regarding the passage of the Mendocino Triple Junction (MTJ), there are heat sources and hydrothermal systems in the California Coast Ranges that are related to, but much later than the passage of the MTJ. Examples include "anomolously young" basalt along the Calaveras fault that is only 3-4 million years old (most volcanism in this area is significantly older) (McLaughlin et al. 1996) and currently active thermal springs with apparently connate water at Alum Rock Park (Manga and Rowland 2009) and the Paso Robles area (Rytuba 2010).

Techniques are available that could potentially be used to date silica-carbonate mercury deposits. Estimates on the age of the cinnabar itself could be obtained using lead isotopes (as done at Almaden, Spain by Higueras et al. 2005). Carbonate veins associated with silica carbonate mercury mineralization could be dated with uranium-lead dating (see Richards et al. 1998). Techniques such as these would offer a more direct means of dating mineralization than simply cross-cutting relationships.

-Is mercury mineralization part of the same process as the silica-carbonate alteration? One way this could be investigated is by dating certain minerals, for example, by comparing the age of carbonate-altered serpentinite to that of veins containing cinnabar.

-What type of fluids deposited the mercury in silica-carbonate mercury deposits, and how do they compare to the fluids currently issuing from springs in the vicinity of these deposits? It might be possible to study fluid inclusions from veins to obtain data on fluid chemistry and deposition temperature. The sources of fluids and gasses involved in the mineralization could be determined, addressing the question of the role of magmatism, etc. Extensive work of this type was done at the Geysers geothermal area by Moore et al. (2001).

References

- American Society of Civil Engineers. 1996. Hydrology Handbook. American Society of Civil Engineers. 824 pp.
- Bailey, E.H., Clark, A.L., and R.M. Smith. 1973. Mercury [p. 401-414]. In: United States Geological Survey Professional Paper 820 (Probst, D.A. and Pratt, W.P., editors).
- Bailey, E.H. 1964. Geology and quicksilver deposits of the New Almaden District, Santa Clara County, California. United States Geological Survey Professional Paper 360: 1-206.
- Bailey, E.H. 1946. Quicksilver deposits of the western Mayacmas district, Sonoma County, California. California Journal of Mines and Geology. 42: 199-230.

- Barnes, I.B., Hinkle, M.E., Rapp, J.B., Heropoulos, C., and W.W. Vaughn. 1973a. Chemical composition of naturally occurring fluids in relation to mercury deposits in part of north-central California. United States Geological Survey Bulletin 1382-A: A1-A19.
- Barnes, I., O´Neil, J.R., Rapp, J.B., and D.E. White. 1973b. Silica-carbonate alteration of serpentine: wall rock alteration in mercury deposits of the California Coast Ranges. Economic Geology. 68: 388-398.
- Ciancanelli, E.V. 1981. Faulting and ore controls at the Culver-Baer mine, Sonoma County, California. United States Geological Survey Professional Paper 1141: 243-250.
- Donnelly-Nolan, J.M., Burns, M.G., Goff, F.E., Peters, E.K., and J.M. Thompson. 1993. The Geysers-Clear Lake area, California: Thermal waters, mineralization, volcanism, and geothermal potential. Economic Geology. 88: 301-316.
- Donnelly-Nolan, J.M., Hearn, B.C., Curtis, G.H., and R.E. Drake. 1981. Geochronology and evolution of the Clear Lake volcanics. United States Geological Survey Professional Paper 1141: 47-60.

  Drinkwater, J.L., Sorg, D.H., and P.C. Russell. 1992. Geologic map showing ages and mineralization of the Quien Sabe volcanics, Mariposa Peak Quadrangle, west-central California. United States Geological Survey Miscellaneous Field Studies Map 2200.
- Dunning, G.E., Hadley, T.A., Christy, A.G., Magnasco, J., and J.F. Cooper, Jr. 2005. The Clear Creek mine, San Benito County, California: a unique mercury locality. Mineralogical Record. 36: 337-363.

  Echigo, T., Kimata, M., Maruoka, T., Shimizu, M., and N. Nishida. 2009. The crystal structure, origin, and formation of idrialite (C22H14): inferences from the microbeam and bulk analyses. American Mineralogist. 94: 1325-1332.
- Everhart, D.L. 1950. Skaggs Springs quicksilver mine, Sonoma County, California. California Journal of Mines and Geology. 46: 385-394.
- Fruchter, J.S. and J.D. Ludwick. 1977. Mercury emissions from geothermal power plants. Science. 196(4294): 1094-1097.
- Goff, F., and C.J. Janik. 1993. Gas geochemistry and guide for geothermal features in the Clear Lake region, California [p. 207-261]. In: Active Geothermal Systems and Gold-Mercury Deposits in the Sonoma-Clear Lake Volcanic Fields, California (J.J. Rytuba, editor), Society of Economic Geologists Guidebook Series 16.
- Goff, F., Janik, C.J., and J.A. Stimac. 1995. Sulphur bank mine, California: an example of a magmatic rather than metamorphic hydrothermal system? Proceedings, World Geothermal Congress. Florence, Italy, 18-31 May 1995, v.2, p. 1105-1110.
- Groves, D.I., Goldfarb, R.J., Gebre-Mariam, M., Hagemann, S.G., and F. Robert. 1998. Orogenic gold deposits: A proposed classification in the context of their crustal distribution and relationship to other gold deposit types. Ore Geology Reviews. 13: 7-27-
- Higueras, P., Munha, J., Oyarzun, R., Tassinari, C.C.G., and I.R. Ruiz. 2005. First lead isotopic data for cinnabar in the Almaden district (Spain): implications for the genesis of the mercury deposits. Mineralium Deposita. 40: 115–122.
- Holmes, Jr., G.W. 1965. Mercury in California. United States Bureau of Mines Information Circular 8252: 87-206.
- Hulen, J.B., and M.A. Walters. 1993. The Geysers felsite and associated geothermal systems, alteration, mineralization, and hydrocarbon occurrences [p. 141-152]. In: Active Geothermal Systems and Gold-Mercury Deposits in the Sonoma-Clear Lake Volcanic Fields, California (J.J. Rytuba, editor), Society of Economic Geologists Guidebook Series 16.
- Lindgren, W. 1913. Mineral Deposits. McGraw-Hill Book Company, Inc., New York, New York. 883 pp.
- Liu, K., Levander, A., Zhai, Y., Porritt, R.W., and R.M. Allen. 2012. Asthenospheric flow and lithospheric evolution near the Mendocino Triple Junction. Earth and Planetary Science Letters. 323-324: 60-71.
- Manga, M., and J.C. Rowland. 2009. Response of Alum Rock springs to the October 30, 2007 Alum Rock earthquake and implications for the origin of increased discharge after earthquakes. Geofluids. 9: 237–250.
- McLaughlin, R.J. 1981. Tectonic setting of pre-Tertiary rocks and its relation to geothermal resources in the Geysers-Clear Lake area. United States Geological Survey Professional Paper 1141: 3-23.
- McLaughlin, R.J., Sliter, W.V., Sorg, D.H., Russell, P.C., and A.M. Sarna-Wojcicki. 1996. Large-scale right-slip displacement on the East San Francisco Bay Region fault system, California: Implications for location of late Miocene to Pliocene Pacific plate boundary. Tectonics. 15(1): 1-18.
- Moiseyev, A.N. 1971. A non-magmatic source for mercury ore deposits? Economic Geology. 66: 591-601.
- Moore, J.N., Norman, D.I., and B.M. Kennedy. 2001. Fluid inclusion gas compositions from an active magmatic-hydrothermal system: a case study of the Geysers geothermal field, USA. Chemical Geology. 173: 3-30.
- Peabody, C. E., and M.T. Einaudi. 1992. Origin of petroleum and mercury in the Culver-Baer cinnabar deposit, Mayacmas district, California. Economic Geology. 87: 1078-1103.
- Pickthorn, W.J. 1993. Relation of hot-spring gold mineralization to silica-carbonate mercury mineralization in the Coast Ranges, California [p. 77-89]. In: Active Geothermal Systems and Gold-Mercury Deposits in the Sonoma-Clear Lake Volcanic Fields, California (J.J. Rytuba, editor), Society of Economic Geologists Guidebook Series 16.
- Richards, D.A., Bottrell, S.H., Cliff, R.A., Strohle, K., and P.J. Rowe. 1998. U-Pb dating of a speleothem of Quaternary age. Geochimica et Cosmochimica Acta. 63 (23/24): 3683-3688.
- Robb, L. 2005. Introduction to Ore-Forming Processes. Blackwell Science Ltd., Malden, MA. 384 pp.
- Rytuba, J.J. 2010. Geothermal Systems in the Paso Robles Groundwater Basin, Central Coast Ranges, California. Geological Society of America Abstracts with Programs. 42(4): 79.
- Rytuba, J.J. 1995. Cenozoic metallogeny of California: Geological Society of Nevada Symposium on Geology and Ore Deposits of the American Cordillera, Program and Abstracts: A68.

  Rytuba, J.J. 1992. Descriptive model of hot-spring Hg [p. 178-179]. In: Mineral Deposit Models (D.P. Cox and D.A. Singer, editors). United States Geological Survey Bulletin 1693.
- Rytuba, J.J., Donnelly-Nolan, J.M., and R.J. McLaughlin. 1993. The Geysers geothermal area and mercury deposits in the Clear Lake volcanic field [p. 153-170]. In: Active Geothermal Systems and Gold-Mercury Deposits in the Sonoma-Clear Lake Volcanic Fields, California (J.J. Rytuba, editor), Society of Economic Geologists Guidebook Series 16.
- Rytuba, J.J. and M.D. Kleinkopf. 1995. Silica carbonate Hg deposits [p. 199-203]. In: Preliminary compilation of descriptive geoenvironmental mineral deposit models (E.A. du Bray, editor). 272 pp.
- Sherlock, R.L., Logan, M.A.V., and E.C. Jowett. 1993. Silica carbonate alteration of serpentinite, implications for the association of precious metal and mercury mineralization in the Coast Ranges [p. 90-116]. In: Active Geothermal Systems and Gold-Mercury Deposits in the Sonoma-Clear Lake Volcanic Fields, California (J.J. Rytuba, editor), Society of Economic Geologists Guidebook Series 16.
- Sims, J.D., and D.E. White. 1981. Mercury in the sediments of Clear Lake [p. 237-242]. In: Research in The Geysers – Clear Lake Geothermal Area, Northern California (R.J. McLaughlin and J.M. Donnelly-Nolan, editors). Geological Survey Professional Paper 1141.
- Smith, C.N. 2010. Isotopic geochemistry of mercury in active and fossil hydrothermal systems. Doctoral dissertation. University of Michigan. Retrieved 28-April-2013. http://deepblue.lib.umich.edu/handle/2027.42/75899
- Studemeister, P.A. 1984. Mercury deposits of western California: an overview. Mineralium Deposita. 19: 202-207.

- Tosdal, R.M., Enderlin, D.A., Nelson, G.C., and N.J. Lehrman. 1993. Overview of the McLaughlin precious metal deposit, Napa and Yolo Counties, northern California [p. 312-329]. In: Active Geothermal Systems and Gold-Mercury Deposits in the Sonoma-Clear Lake Volcanic Fields, California (J.J. Rytuba, editor), Society of Economic Geologists Guidebook Series 16.
- United States Geological Survey. 1978. Relation of mercury mineralization to The Geysers hydrothermal system. Geological Survey Professional Paper 1100: 198-199.
- White, D.E. 1967. Mercury and base-metal deposits with associated thermal and mineral waters [p. 575-631]. In: Geochemistry of hydrothermal ore deposits (H.L. Barnes, editor). Holt Reinhart and Winston, New York, New York. 590 pp.

Editor's Note: My thanks to Kyle Beucke for his generous permission to use his article and pictures in our bulletin. If you would like to see the article in its' original format, please visit:
http://www.mindat.org/article.php/1683/Golden+State+Quicksilver%3A+The+Origin+of+Silica-Carbonate+Hg+in+California

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Featured Mineral: **Brazilianite**

Formula: $NaAl_3(PO_4)_2(OH)_4$,

Crystal System: Monoclinic

Name: Named by Frederick Harvey Pough and Edward Porter Henderson in 1945 for the type locality country, Brazil, where it was first found.

irocks.com photo

Locality: Linópolis, Divino das Laranjeiras, Doce valley, Minas Gerais, Brazil
3 cm x 2.5 cm x 1.6 cm

Rock Currier photo

Locality: Linópolis, Divino das Laranjeiras, Doce valley, Minas Gerais, Brazil
Pfifer Collection. Scale at bottom of image is an inch with a rule at one cm

irocks.com photo

Locality: Linópolis, Divino das Laranjeiras, Doce valley, Minas Gerais, Brazil
6.4 cm x 3.9 cm x 3.4 cm

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THE HEARTBEAT OF CFMS By Jennifer Haley, CFMS 2014 President

Often I am asked what CFMS is and what we are here for. When Terry asked me to write an article about it, I said "yes" in a heartbeat. There is so much I could write about the California Federation of Mineralogical Societies. Perhaps the best place to start is to give you some historical background.

Mineral clubs were formed in America as early as 1885, when the interest in the earth sciences really began blossoming. The first California club was formed in 1931 by the Mineralogical Society of Southern California in Pasadena. That club is still active today. In June 1935 a "Mineral Day," was held at the San Diego Exposition. Several representatives of various clubs met there (in those days that meant a good handful) to organize a state organization of mineral societies, and in January 1936 CFMS held their first convention. Their

sole purpose was to bring together a closer association of clubs devoted to the earth sciences, and the practice of lapidary arts and crafts with a vision for the future. Soon rock and gem clubs were spouting up all over.

Grammar schools and middle schools were inviting their local rock and gem club to come in to teach their students programs in the earth sciences. This was one of the gifts the clubs gave to their communities very early on. Naturally this tradition became a charm magnet to inspire children of all ages to learn about the fascinating science hands on.

For generations, adult club members with their gracious personalities invited members to their personal work spaces to teach whoever wanted to learn about lapidary and the basics of jewelry making. Club field trips to collect rock material opened up a world of adventure and art, while at the same time everyone learned to hone their skills the more they learned.

The social relationships of belonging in a club were outstanding, and are what has always set a rock club apart from many other types of clubs. What people found when they discovered a rock club was a feeling of "home," and a good place to have fun while learning. What most people do not know is that CFMS suspended its activities during WWII, but resumed again in June 1946.

I think what people forget is that all the rock and gem clubs are the heartbeat of CFMS and visa versa. Every year the Federation with its family of clubs adds a new growth ring to their historical family tree based on the foundation of those who came before them. To all of them we owe a great sense of gratitude that will always be a part of who we are. What I like to tell people is when we lose those "golden ones" who touched our hearts and inspired us in the hobby, one of the best things you can do is to become in your own way a person who passes on the skills with the gifts of inspiration you were given.

Stay tuned next month for **The Heartbeat of CFMS Part II,** which will describe what the Federation does for the clubs.

To all of us who enjoy the earth sciences, and the practice of lapidary arts and crafts, "*go out and play, put your hearts and your souls into the hobby and make some wonderful memories. It's what we do best and it is our gift to give."* Let's make it great year!

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Ride Share Listing

Can You Provide A Ride?
Would You Like Company On The Drive To Meetings?

We have heard from several of our members that they would like to ride-share with someone to the meetings. We will list the names, general location and either a phone number or an email address of anyone who would like to connect for a ride-share. If you would like to catch a ride or would like company for the trip, let me know at msscbulletin@earthlink.net and I'll put the information in this section of the bulletin. After that, any final arrangements made are up to you. Also, If you make a connection that works for you, let me know so that I can remove your information from the bulletin. The Editor

Looking for	Who	Where	Contact at
A ride	Richard Stamberg	North Orange County, near Cal State Fullerton	
A ride	Catherine Govaller	San Bernardino, CA	

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Business Card	$5.00
1/3 page	$10.00
1/2 page	$20.00
Full Page	$35.00

In addition, any advertiser who purchases 12 months of space in advance will receive a discount of 12 months for the price of 10 months. The copy for the ads should be mailed to the editor at bulletin@mineralsocal.org and the payment should be sent to the
MSSC Treasurer 1855 Idlewood Road, Glendale, CA 91202

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Calendar of Events:

Only local area shows are listed here. Other CFMS Club shows can be found at: http://www.cfmsinc.org/

May 30 - June 1: POMONA, CA
2014 CFMS Show and Conference
May 30 - June 1
Fairplex, 1101 W. McKinley Ave
POMONA, CA
Show Website: www.cfms2014show.com

May 31 - June 1: ESCONDIDO, CA
Palomar Gem & Mineral Club
California Center for the Arts
1340 N. Escondido Blvd.
Hours: Sat 10 - 5; Sun 10 - 4
Website: www.palomargem.org

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June 6 - 8: LA HABRA, CA
North Orange County Gem & Mineral Society
Sonora High School
401 S. Palm Street
Hours: Fri 4 - 8:30; Sat 8 - 8; Sun 9 - 6
Website: www.nocgms.com

June 7 - 8: GLENDORA, CA
Glendora Gems & Mineral Society
Goddard Middle School
859 East Sierra Madre
Hours: Sat. 10 - 5; Sun 10 - 4
Website: Facebook Page

June 27 - 29: RIALTO, CA
Orange Belt Gem & Mineral Society
"Tailgate" across street from Rialto City Hall
105 S. Palm Ave. (corner 1st & Palm Ave.)
Hours: Fri & Sat 9 - 6; Sun. 9 - 3
Website: obmsrocks.yolasite.com

June 28 - 29: CULVER CITY, CA
Culver City Rock & Mineral Club
Veterans Memorial Auditorium
4117 Overland Ave
Hours: Sat 10 - 6; Sun 10 - 5
Website: www.culvercityrocks.org/fiesta.htm

JULY 2014
No Shows Listed for July

Dates to hold open: August 10, 2014 for our annual pot-luck picnic and January 15, 2015 for our annual Banquet!