Bulletin of the Mineralogical Society of Southern California

Volume 94 Number 7 - July, 2021

The 991st meeting of the Mineralogical Society of Southern California

With Knowledge Comes Appreciation

A ZOOM Meeting

July 9th, 2021 at 7:30 P.M.

Program : **"An Evolutionary Account of the Development of Science"**
Presented by Dr. Eric Scerri

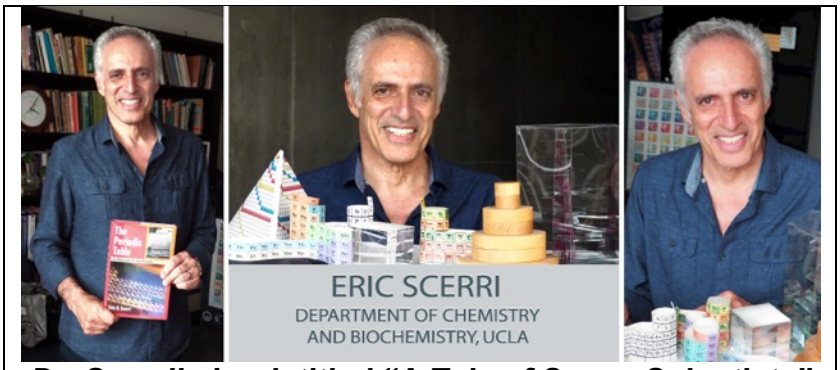
In this Issue:

Remember: If you change your email or street address, you must let the MSSC Editor and Membership Chair know or we cannot guarantee receipt of future Bulletins

About the Program: "An Evolutionary Account of the Development of Science" Presented by Dr. Eric Scerri

The lecture will consider various social aspects of science such as simultaneous discoveries and priority disputes. Dr. Scerri will present a view of science which provides a possible explanation for these features of science.

It consists of an evolutionary view of the development of science in which trial and error rather than logic and rationality bring about progress. This proposal will be illustrated with some examples from 20th century chemistry and physics.



Dr. Scerri's book titled "A Tale of Seven Scientists"

These ideas are based on Dr. Scerri's book titled "A Tale of Seven Scientists", Oxford University Press, 2016.

https://www.amazon.com/Tale-Seven-Scientists-Philosophy-Science/dp/0190232994

In his latest book, Eric Scerri presents a completely original account of the nature of scientific progress. It consists of a holistic and unified approach in which science is seen as a living and evolving single organism. Instead of scientific revolutions featuring exceptionally gifted individuals, Scerri argues that the "little people" contribute as much as the "heroes" of science. To do this he examines seven case studies of virtually unknown chemists and physicists in the early 20th century quest to discover the structure of the atom.
Dr. Scerri was recently named as the 2nd most influential chemist in the world for the decade 2010-2020. He is the author or editor of ten books and a full-time lecturer in the UCLA Department of Chemistry and Biochemistry. He is also the founder and editor-in-chief of the international journal *Foundations of Chemistry* which covers the history and philosophy of chemistry, and chemical education. He was the historical consultant for the 2015 PBS docudrama Mystery of Matter: Search for the Elements in which he is interviewed extensively about the creator of the periodic table, Russian chemist Dmitri Mendeleev.

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How to Join our ZOOM Meetings by Rudy Lopez

MSSC paid members will automatically be added to the invite list each month.

Non-Members must request to attend MSSC zoom meeting each month.
Please go to the MSSC website, http://www.mineralsocal.org to read our Bulletin for upcoming programs, then send Rudy Lopez an email, no later than the Tuesday before the meeting, to programs@mineralsocal.org and he will make sure you're contacted.

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From the Editor: Linda Elsnau

Well, here we are, officially half way through 2021 and into Summer! We've had an "interesting" year or so but hopefully things are starting to get back to whatever normal was before March 2020. I see some shows are coming back (Check out the list on page 9) and while "normal" is returning, do check to be sure the event hasn't been cancelled or rescheduled before you head out,

It seems we have an interesting program on tap for this month's meeting. I hope everyone has a safe and healthy July 4th and keep looking forward to "normal

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FROM THE PRESIDENT: Interesting Minerals, A to Z. Round 2, A to Z., Installment 16, the Letter "P": by George Rossman

Piemontite

In 1853, Kenngott reported a manganese-rich mineral related to clinozoisite and epidote from the Praborna mine, St. Marcel, Aosta Valley, in the Italian Western Alps, **(Figure 1, 2)** which he named **piemontit** (which would be spelled "piemontite" as an English language mineral name). But life can be confusing. The English spelling of the Italian word "Piemonte" is "Piedmont" with a "d". Thus Dana (1896) in his System of Mineralogy arbitrarily anglicized the mineral name to "piedmontite" with the "d". This meant that there were two different spellings of the mineral's name floating about.

Kenngott A (1853) Piemontit. in *Das Mohs'sche Mineralsystem*, Verlag und Druck (Wien) 74-75.

Dana, E.S. (1896): The System of Mineralogy of James Dwight Dana 1837-1868: Descriptive Mineralogy, 6th edition, John Wiley & Sons, New York, p. 513-525 and supplement p. 1035.

Figure 1. Piemontite from the type locality at St. Marcel, Italy. Photo Credit: Mark Garcia

Figure 2. A close up of a crystal of piemontite from St. Marcel, Italy. Photo Credit: Mark Garcia

Kenngott originally got the chemical composition a bit wrong. He did not report any hydroxide in his chemical analysis. Today, we know that the correct formula for piemontite is: $Ca_2(Al_2Mn^{3+})[Si_2O_7][SiO_4]O(OH)$. Piemontite is related to the structurally similar mineral, clinozoisite, which has the chemical formula: $Ca_2(Al_2Al^{3+})[Si_2O_7][SiO_4]O(OH)$

In other words, piemontite is a manganese analogue of clinozoisite. To be considered piemontite and not clinozoisite, at least ½ of the site that the manganese occupies must actually be occupied by manganese. If this crystal site contains 49% Mn and 51% Al, it would be considered to be clinozoisite with a strong red color, but not piemontite. Even a modest amount of manganese 3+ can cause a strong reddish color in minerals. Manganese 3+ causes significantly more color than manganese in the 2+ oxidation state. Mn^{3+} is typically at least 50 times more potent as a chromophore as Mn^{2+}. This fact can lead to minerals being misidentified. Of the 22 specimens labeled piemontite that Deer *et al.* (1986) analyzed, only seven meet the minimum criterion of manganese occupying more than 50% of that crystal site. People assumed, incorrectly, that a bright red mineral of the clinozoisite family was piemontite.

Deer, W.A., Howie, R.A., Zussman, J. (1986): Rock-forming Minerals, Vol. 1b, 2. Edition, Disilicates and Ring Silicates, Longman Group U.K.

Here are some local examples of piemontite and "not-piemontite" **Figure 3** is piemontite from a large rock outcrop up Whitewater River, several miles north of the 10 Freeway, on the way to Palm Springs. **Figure 4** is a red, manganese-containing clinozoisite from the Sidewinder Mountains. **Figure 5** shows what clinozoisite looks like when it has essentially no manganese in it, but a small amount of iron replacing the aluminum.

Figure 3. Piemontite from the Whitewater river, San Bernardino Co, CA. Photo Credit: GRR

Figure 4. Red clinozoisite from the Sidewinder Mountains, north of Victorville, CA. Photo Credit: GRR

Let's go back to the nomenclature of the mineral. The Italian region of the type locality, St. Marcel, was called Piemonte when the mineral was first described, and for this reason you would think that the name piemontite (without the "d") would be the correct name for the mineral species. So, what do you do when people cannot agree on a mineral's name? You call a Commission together and meet at Copenhagen in 1960 and in Washington DC in 1962 and discuss what name a mineral should have. Of course, that is what you do. Decisions were made and the Commission unanimously agreed on a few standardizations of mineral names. Examples of common minerals names decided then include those in **Table 1.**

Figure 5. Clinozoisite from Pakistan. Photo Credit: GRR

Analcime, not analcite
Anatase, not octahedrite
Grossular, not grossularite
Hematite, not oligiste
Magnesite, not giobertite
Spessartine, not spessartite
spodumene, not triphane,
piemontite, not piedmontite

Table 1. Mineral names approved in the 1960's.

However, these commissions were unable to reach a decision on a few problems such as: allanite or orthite; kyanite or disthene; sphene or titanite; blödite or astrakhanite (but they rejected bloedite). [Note: later, those names were finally decided; no, it is not sphene … it is titanite.] The IMA finally declared in writing that the name of the mineral is piemontite, not piedmontite in 1980.

International Mineralogical Association (1980) International Mineralogical Association: Commission on new minerals and mineral names. Mineralogical Magazine 43, 1053-1055.

Piemontite and clinozoisite are members of the epidote-group. These minerals are monoclinic in symmetry and have the general formula $A_2M_3[T_2O_7][TO_4](O,F)(OH,O)$, where there are 2 'A' sites that have metal ions in the 2+ oxidation state, and 3 'M' sites that have metal ions in the 3+ oxidation state. The Commission on New Minerals and Mineral Names (CNMMN) of the International Mineralogical Association (IMA) established at the beginning of 2003 a committee called the Subcommittee on Epidote-Group Mineral Nomenclature to evaluate the name of all minerals in the epidote family of minerals. **Table 2** presents all the names of mineral species in the clinozoiste subgroup from Armbruster et al. (2006) as accepted at that time.

Table 2. Clinozoisite subgroup: accepted mineral species

Name	Old name	A1	A2	M1	M2	M3	O4	O10
Clinozoisite		Ca	Ca	Al	Al	Al	O	OH
Clinozoisite-(Sr)*	*Niigataite*	Ca	Sr	Al	Al	Al	O	OH
Epidote		Ca	Ca	Al	Al	Fe^{3+}	O	OH
Epidote-(Pb)*	*Hancockite*	Ca	Pb	Al	Al	Fe^{3+}	O	OH
Mukhinite		Ca	Ca	Al	Al	V^{3+}	O	OH
Piemontite		Ca	Ca	Al	Al	Mn^{3+}	O	OH
Piemontite-(Sr)*	*Strontiopiemontite*	Ca	Sr	Al	Al	Mn^{3+}	O	OH
Manganipiemontite-(Sr)*	*Tweddillite*	Ca	Sr	Mn^{3+}	Al	Mn^{3+}	O	OH

Armbruster T, Bonazzi P, Akasaka M, Bermanec V, Chopin C, Giere R, Huess-Assbichler S, Liebscher A, Menchetti S, Pan Y, Pasero M (2006) Recommended nomenclature of epidote-group minerals. European Journal of Mineralogy 18, 551-567.

To make life more complicated, Table 2 includes manganipiemontite-(Sr), as a member of clinozoisite subgroup of minerals. This mineral species contains more manganese than piemontite. This mineral from the Wessels Mine in South Africa was originally called tweddillite by Thomas Armbruster et al. who first characterized it in 2002. It was named after the first curator of the Pretoria Geological Museum. Then later, it was renamed manganipiemontite-(Sr) by the Epidote Subcommittee of the CNMMN in 2006 as presented in Table 2 above.

Armbruster T, Gnos E, Dixon R, Gutzmer J, Hejny C, Dobelin N, Medenbach O (2002) Manganvesuvianite and tweddillite, two new Mn^{3+}-silicate minerals from the Kalahari manganese fields, South Africa.Mineralogical Magazine 66, 137-150.

But wait. It gets more complicated. The name reverted back to tweddillite in 2015 and was published as such in 2018. Yikes. Make up your mind, commission members.

Revheim O and King VT (2018) Epidote supergroup nomenclature: The names hancockite, niigataite and tweddillite reinstated. Mineralogical Magazine 80, 877-880.

Piemontite is found at several localities in the USA including other localities locally, as well. Examples are from New Mexico and Los Angeles County in **Figures 6 and 7.** It is usually distinctively colored and hard to miss.

Figure 6. Piemontite from the Ortega Mountains, New Mexico. Photo Credit: Mark Garcia

Figure 7. Piemontite from the Prairie Fork of the San Gabriel River, Los Angeles County, CA. Photo Credit: Mark Garcia

What is piemontite used for industrially? Short answer: nothing. Sorry.

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MINUTES of the June 11, 2021 ZOOM Meeting

At 7:39 p.m., the **990th Membership Meeting** of the Mineralogical Society of Southern California (MSSC) was called to order by President Dr. Rossman, Ph.D. It was MSSC's 13th ZOOM conference meeting. We thank Caltech for their generous allowance in sharing their licensing with us. The Coronavirus (COVID-19) pandemic has not been declared over.

Message from the Chair (Dr. Rossman):
Dr. Rossman welcomed everyone to the meeting. He reports that the International Mineralogical Association's (IMA) has approved 5,721 as of today. He names one of the new minerals; it comes from fumaroles in the Kamchatka volcanic region of Russia. *Ryabchikovite* (IMA2021-011) is a mineral similar to diopside's calcium-magnesium-silicate. But, in this case, the calcium is replaced by copper so it is a copper-magnesium-silicate pyroxene.

Regular Business (Dr. Rossman)
Minutes: Dr. Rossman called for a motion to approve the May 14, 2021 Membership Meeting Minutes as published in the JUNE 2021 *Bulletin.* Dr. George asked if there were any corrections or additions and hearing none, called for a motion to approve. A motion to approve the stated minutes was made by Carolyn Seitz with a second by Ahni Dodge. The vote was called and **the motion to approve the minutes passed unanimously**. Dr. Rossman declared the Minutes approved.

Announcements and Reports
1. Program/Education Chair Rudy Lopez announced the June 27, 2021 Fallbrook Gem & Mineral Society's "Rough N' Cut" Blow Out sale from Noon to 4pm. They will be selling: "…lapidary materials, equipment, minerals, gemstones and more earth science treasures!" There is free entry and free parking (across the street). Be sure to visit their wonderful museum. Their society is located at 123 W Alvarado St, Fallbrook, CA. Our Pacific Micromineral Conference is held at the Fallbrook hall and we support them.

2. Rudy reports that Dr. Rossman will be speaking at Fallbrook on June 17th, Thursday. George confirms, says he will speak about his trip to the Bolivian ametrine mine and if it is a natural mineral or is a product of laboratory treatment.

3. Dr. Rossman reports that Marek is investigating sites for future field trips. The next field trip is scheduled for early September 2021 to Topaz Mountain, in Utah. Please check the *Bulletin* and/or MSSC's website for further details. Topaz Mountain is a wonderful place to collect topaz crystals, sometimes red beryl and other exotic crystals.

4. Angie Guzman reports that the Bylaws review is almost finished and will be voted on by the Board at their upcoming July 11th meeting and, by the Membership at the August 13th ZOOM meeting. *[Secy Note: The full document will be published in the Bulletin early enough for all members to review it before the vote at the meeting August 13th.]*

Program
Dr. Rossman turned the meeting over to Program Chair Rudy Lopez. Rudy introduced speaker, Peter Goetz. Pete is a graduate of San Diego State University. His degree is in Structural Geomorphology (a subfield of physical geography) with a minor in Geology. Mr. Goetz has a vast knowledge of opals, is an opal expert and shares his experiences about his passion with us. After a career in retail, he returned to his passion and taught in the Anaheim School District for 22 years. Goetz is the former president of the American Opal Society. He will address "Opal of Canada and the Americas" that he calls a down and dirty presentation on non-Australian opal, geologic settings, mining and characteristics.

Pete picks up where he left off from his last MSSC presentation (August 2019). He reminds us that opal is an amorphous form of hydrated silicon dioxide, SiO_2+nH_2O. Opal does not have a crystalline structure but layers of spherical particles and their colors come from diffraction. He says most (90%) of the world opal is Australian and, of that 95% comes from the Great Artesian Basin (GAB) area in eastern Australia.

There are differences between Australian and American opal. Most American opal is associated with volcanic rock whereas Australian opal is associated with sedimentary rock formations.

Pete takes us to British Columbia, Canada, in the Okanagan Valley where the Klinker Claim is located. Common opal occurrences are widespread in the Tertiary volcanic rock but precious or gem-quality opals are rare. The opal is found in vugs and seams of volcanic tuff. It is an open dig area and the public is welcome to dig, for a fee, from June through September.

In the United States, several western states (WA, ID, OR, CA, AZ and NV) and Louisiana have opal and, in some case, it is opal Vs agate. Be careful what you pick up, it may not be opal. In Louisiana near Leesville in the western part of the state at the Catahoula formation, Louisiana Sand Opal was mined, but today opal is hard to find. Sand Opal was only mined from late 1980's to early 1990's.

The BLM land in Wyoming at Cedar Rim (100 miles west of Casper) has a large opal field that is open. Good colors are found there: orange, yellow-orange to orange fire opal; white to very light-blue translucent to opaque common opal and clear, transparent hyalite opal (glassy and clear). The photos Pete displayed showed the brilliant colors. Only trace precious opal (both white and black) have been identified. You can collect all you want. There is no fee and there is no limit.

Arizona, south of Tucson, has the Southern Sky Opal Mine. Pete tells us that opal is found in rhyolite (host rock) and hydrothermal activity provides the water source (geysers). With each eruption, different minerals create different color bands in some of the opal. The photos Pete exhibited showed great examples of beautiful banding.

Washington, across the state line from Lewiston, Idaho, in the Moscow mining area, is lots of obsidian with rhyolite. Underlying layers of rhyolite-obsidian are present in rock cavities left by gasses. And, at Wind River, an industrial mineral site, 25 miles north of Cascade Locks in the Columbia River Gorge, opals occur as amygdules in lava buttes. Sunnyside and Green Water River each have gravel bars that line the banks. These are open areas and good digging.

In Idaho, aside from the Moscow Mine area in Lewiston, the Spencer Opal Mine is an open area where amazing opal colors are found but the opal is not thick enough to cut. And, in California there's opal at Opal Canyon in Bishop. Another example of an open pit.

Pete talks about doublets and triplets and is asked to describe the terms. Doublets are thin slices glued together on a "matrix" of obsidian or basalt then you cab it. Triplets are basalt and opal that are capped with quartz, then you cab it. The value of these items may be low to high, depending on quality of materials and workmanship.

In Oregon, Opal Butte has geodes called thunder eggs. There is Tertiary rhyolite and Columbia River basalt that show as dark green. But are they agate or opal? 90% are agate! Hyalites are transparent and very rare. Man, oh man, the pictures are spectacular. WOW!! At Juniper Ridge, there is an open pit mine with fire agates that are yellow, orange and even some reds. Goetz says they facet-up real nice. He showed photos of some very nice pieces. Pete says you can collect from June through October but must call for an appointment.

In Nevada, the opal has a lot of gas in it. At Virgin Valley, the open pit charges at least $100 (up to $700) to go through tailings. Nevada has the brightest opal and is very beautiful. The valley was forested with some shallow lakes but volcano action spewed ash (1,500' thick) and with the artesian water that comes up from the ground, dissolved the silica to give rich colors in the opal.

In the state of Jalisco (Mexico) there is opal. But, like some of the Nevada opal, it has a lot of gas in it. The rhyolite host rocks have cavities where the opal grows yellow and orange. Unusually, some of the host rock is andesite. Pete says the pre-Aztec peoples called opal "vilztliltepatl", hummingbird. Meanwhile, Honduras has the oldest opal mines in the world. Tablon Opal Mine is 4,000-5,000 years old. The matrix for the opal is black with grey/black basalt and the opal is congealed within the rock itself. Goetz's photos are incredible, stunning!

During his presentation and after it, Pete was asked a few questions such as: What is the water content of opal? It is 6-13%. How much is good, black opal worth? High quality is about $30,000. Where else is there good opal? Ethiopia has beautiful opal. Pete says that skin oil, over time, will ruin the opal and, in some cases,

colors may change. He was asked about America's most stable opal. Pete said Oregon is good, but he never saw any from British Columbia with a crack; overall, the West Coast of the US is stable. Opal Butte was mentioned regarding the beautiful colors of opal, someone else talked about florescence, hyalite's brilliant green, yellowish green. All good stuff.

We wish to thank Peter Goetz for his fascinating presentation on opal. Come again, Pete!

If you missed his presentation, well, you missed a honey. Pete had some fabulous photos and great information. Next meeting will feature Eric Scerri who will present ~~"The Periodic Table: It's Story and It's Significance".~~ See you July 9th. ***Editor's Change**, The July program will be "An Evolutionary Account Of The Development Of Science" presented by Dr. Eric Scerri.*

There was no other society business. Dr. Rossman thanked Caltech for sharing their ZOOM license with us. Thanks to all who attended. Be well and stay safe.

Adjournment was at 8:46 p.m.

Respectfully submitted, Angie Guzman, MSSC Secretary

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List of Upcoming MSSC Events : Mark your Calender!

Event	Date	Comments / Scheduled Program (if known)
Meeting Dates:	**ZOOM** August 13, 2021	Krista Sawchuk: Discovering the Deep Earth
	ZOOM September 10, 2021	Alan Rubin: The Origin of Chondrules
	ZOOM October 8, 2021	DR. Sarah Milkovich - MARS
	ZOOM November 12, 2021	Paolo Sanchez, UC Berkeley, Geology & Geophysics ' 22 -Important Minerals You Probably Never Heard Of
Board Meeting	July 11, 2021	ZOOM
Field Trip	September 4-6, 2021	Topaz Mountain, Thomas Range, Utah

Note: Dates and programs shown above are subject to change. Check your bulletins to confirm final information each month.

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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		*In person eetings cancelled until further notice*

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OTHER FREE THINGS TO DO...by Ann Meister

The **Watson Lecture Series at Caltech is on hiatus until the Fall semester.** Stay tuned until October!

The **Von Kármán Lecture** on Thursday, **July 22** at 7:00 PM. Available live on at July 2021 - Science + Art: Picturing Discovery (nasa.gov) or NASA JPL Live NASA JPL Live (ustream.tv). The speakers are Morgan Cable, Ocean World Astrochemist, NASA/JPL and Joby Harris, Visual Strategist, NASA/JPL. The title of the

presentation is **"Science + Art: Picturing Discovery."** A scientist and an artist walk into a room… In this STEAM inspired chat, we'll discuss how science influences art and art, in turn, influences science. We'll discuss how JPL artists collaborate with scientists to create artistic renderings of scientific discoveries and how artists take information and enhance it through data visualization.

The **UCLA Meteorite Gallery** is temporarily closed until further notice; however the monthly lecture will be presented on Zoom on Sunday, **July 18** at 2:30 PM. The speaker and title to be announced. **Zoom Registration:** https://ucla.zoom.us/meeting/register/tJEqduyupj0vGd3S0_52FsbHTbPjYr0sZQUj
If you need detailed instructions on how to join a meeting via Zoom please contact our Curatorial Assistant, Juliet Hook, at jahook@ucla.edu. Note: Registration is only needed once as this is a recurring meeting in Zoom. Visit the website and check on events and videos and other neat things about meteorites, go to https://meteorites.ucla.edu**. See the 2021 Poetry Contest Winners at** The UCLA Meteorite Collection - Gallery Events

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MSSC Advertisement Policy:
Mineral-related ads are allowable in the MSSC bulletin. Below is the price per month

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 13781 Alderwood Lane, #22-J, Seal Beach, CA 90740

Calendar of Events:

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

Due to COVID-19 many clubs have cancelled or changed their show dates. CFMS updates this list if clubs notify them. If you have any questions, please reach out to the contact listed to make sure the show is still taking place.

July 10, 2021 – Bellflower, CA
Delver's Gem and Mineral Society
Holy Redeemer Lutheran Church, 14515 Blaine Ave., Bellflower, CA 90706
Parking lot sale! 10AM – 4PM
Website: delversgemclub.wordpress.com

~~**August 14-15, 2021 – Arcadia, CA**~~
CANCELLED rescheduled to 3/13-14/2022
Pasadena Lapidary Society
Arcadia Masonic Center, 50 W. Duarte Rd., Arcadia
Hours: 10-5 Daily
Website: http://pasadenalapidary.org

August 21-22, 2021 – Tehachapi, CA
Tehachapi Valley Gem and Mineral Society
TVGMS Annual Gem, Mineral and Jewelry Show
500 East "F" Street, Tehachapi, CA 93561
Saturday and Sunday 9 AM to 5 PM
Website: http://tvgms.org

September 4-5, 2021 – Reno, NV
The Reno Gem & Mineral Society, Inc.
Jackpot of Gems
Reno Convention Center, 4390 S. Virginia St., Reno
Saturday 10 AM-5 PM, Sunday 10 AM – 4 PM
www.renogms.org

September 18-19, 2021 – Chico, CA
Feather River Lapidary and Mineral Society
Silver Dollar Fairgrounds, 2357 Fair St., Chico, CA 95928
Saturday 9 AM – 5 PM, Sunday 9 AM – 4 PM
Website: http://featherriverrocks.org

September 24, 25, 26, 2021 – Stoddard Wells, CA
Victor Valley Gem and Mineral Club
45th Annual Stoddard Wells Rockhound Tailgate.
Location: Dale Evans Parkway and Stoddard Wells Road, Apple Valley, CA. Go straight on Stoddard Wells Road, will turn to dirt. Follow 7 miles to "Tailgate". Signs will mark the road. Cars & RV's can make it with ease, go slow. See our website for additional details and directions.
Hours: 9 AM – 5 PM daily
Website: http://www.vvgmc.org

October 1-3, 2021 – Vista, CA
Vista Gem and Mineral Society
Vista Gem and Mineral Open Air Market
Antique Gas and Steam Engine Museum, 2040 N. Santa Fe Ave., Vista CA 92083
Friday and Saturday 10 AM – 5 PM, Sunday 10 AM – 4 PM
Website: http://www.vistarocks.org

October 10, 2021 – Fallbrook, CA
Fallbrook Gem and Mineral Society
Fall Festival of Gems
Location: Across the street from the Fallbrook Gem and Mineral Museum, 123 W. Alvarado St., Fallbrook, CA in the parking lot.
October 10th, 9 AM – 4 PM
Email: info@fgms.org

With Knowledge Comes Appreciation

Random Quote From: **Elements of Crystallography and Mineralogy** Page 122
by E. Alton Wade and Richard B. Mattox
Harper & Brothers, Publishers, New York © 1960

Polymorphism

Chemically identical compounds with different structures are called *polymorphs* and the phenomenon is termed *polymorphism*. When the radius ratios sf the constituent units are near the critical values, transition from one structure to another are possible, usually as a result of changes in external conditions. Conditions that prevail at the time of formation can control the manner of atomic packing. In the case of carbon, if extremely high pressure-temperature conditions are present at the time of crystallization, a closely packed tetrahedral arrangement of the carbon atoms results and the mineral formed is diamond. Under other conditions, such as dynamic metamorphic, the result is a planar arrangement of well-bonded carbon atoms with the planes widely separated and loosely bonded, the mineral is graphite with properties very different from those of diamond.

The table that follows on page 123 lists four additional examples of polymorphous substances. An incomplete table lists:

ZnS	Sphalerite, Wurtzite	TiO_2	Rutile, Anatase, Brookite
$AuTe_2$	Calaverite, Krennerite	Al_2SiO_5	Andalusite, Sillimanite, Kyanite

Changes in packing usually result in the polymorphs of a mineral crystallizing in classes of different systems. When they are in the same crystal class, the lattice cell divisions are different. It is evident that manner of packing is an important factor in controlling physical characteristics.
Minerals of identical compositions which have two structural forms are said to be dimorphous. Those with three structural forms are trimorphous.

2021 MSSC Officers:

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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 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 website for details.

The Society also sponsors the annual Pacific Micro mount Symposium held at the Fallbrook Mineral 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. Bulletins are delivered by email, there is an additional annual $20.00 fee if you prefer paper bulletins mailed to your address. The Society's contact information:

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MSSC Bulletin Editor

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To:

With Knowledge Comes Appreciation

Your MSSC Bulletin Is Here!

Happy 4th of July!