Bulletin of the Mineralogical Society of Southern California

Volume 94 Number 5 - May, 2020

The 989th meeting of the Mineralogical Society of Southern California

With Knowledge Comes Appreciation

A ZOOM Meeting

May 14th, 2021 at 7:30 P.M.

***Program*: The Tilly Foster Mine Presented by Howard Heitner**

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: **"The Tilly Foster Mine, A Classic Mineral Locality":**
Presented by Howard Heitner

The Hudson valley was the center of American iron mining and production through the 1860's. The ore was massive magnetite. A small iron mine in Putnam County New York worked in the late 1800's produced many high quality crystallized mineral specimens in the relatively short time it was worked. The unique mineralogy was brought to the attention of mineralogists by chance. Among these minerals were magnetite, chondrodite, clinochlore and titanite. Many pseudomorphs were also found there. The talk covers the geology and mineralogy of the mine. Also covered are the history of the mine itself, the relatively modern mining methods used and the sudden end of mining in 1896.

The speaker has collected minerals for sixty years. He started as a field collector, collecting in New York, New Jersey, Maine and other states. Later he started purchasing specimens. He purchased several old collections and became interested in the history of mineral collecting and dealing in the United States. Other interests include fluorescent minerals and pseudomorphs. He was the president of the Stamford Mineralogical Society for many years. In his professional career he was a chemist specializing in water soluble polymers. Most of his career was spent at Cytec Industries in new product development of products used to process minerals. His post retirement mineral time has been spent finally organizing and cataloging his collection and as a volunteer at the AMNH in New York.

How to Participate in MSSC ZOOM meetings:

Program Chair, Rudy Lopez, will send an email invitation each month to our ZOOM Invitation List.

If this is your first time to join our ZOOM meeting:

If you want to participate in our ZOOM meetings, please check out the information in the MSSC website/Bulletin www.mineralsocal.org . **The deadline to contact** Rudy at programs@mineralsocal.org for the upcoming May 14th meeting is Tuesday May 11. You will then be emailed the information you will need to participate in this month's meeting.

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From the Editor: . Linda Elsnau

May finds me hoping everyone is safe and healthy and is taking all steps to remain so. Seems like life is finally returning to something resembling normal. I sure hope so, I'm tired of staying "inside" all of the time. Looks like another excellent program on tap for this month.
As usual, I'm asking again for articles of interest to the membership—from our membership. I know everyone has some interesting tales to tell.

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FROM THE PRESIDENT: Interesting Minerals, A to Z. Round 2, installment 14, the letter "N": by George Rossman

Neptunite
Neptunite was originally recognized as a new mineral in 1893 by Flink based on samples that were collected at the Narssârssuk pegmatite, Igaliku, Kujalleq, Greenland. There, it occurred embedded in feldspar or situated on the pyroxene, aegirine. It occurs there as black crystals ranging from a mm up to about 4 centimeters.

Flink G (1893) Om några mineral från Grönland. Geologiska Föreningen i Stockholms Förhandlingar. 15, 195-208.

It was named for an ancient god. Because neptunite occurs associated with aegirine, a mineral named after the Scandinavian sea god, Aegir, Flink opted to name neptunite for the Roman sea god, Neptune.

We know that the chemical formula is $KNa_2Li(Fe^{2+},Mn)_2Ti_2Si_8O_{24}$. Let's see how well the original analysis of Flink compares to a modern analysis:

Element	Flink %		Modern%
Potassium	K_2O	5.19	5.09
Sodium	Na_2O	6.83	10.03
Lithium	Li_2O	not found	1.65
Titanium	TiO_2	17.60	17.68
Manganese	MnO	3.91	5.10
Iron	FeO	11.87	10.35
Silicon	SiO_2	52.96	51.75

Yes, they missed the lithium, but otherwise, not too bad for an analysis conducted nearly 120 years ago.

After the original discovery paper came out, several other publications appeared in 1909 describing the discovery of neptunite in California in San Benito County.

Hlawatsch C (1909) Bemerkungen zum Aragonit von Rohitsch, Natrolit, und Neptunit von S. Benito. Tschermaks Mitteilungen 28, 293-296.

Bradley WM (1909) On the analysis of the mineral neptunite from San Benito County, California. American Journal of Science, 4th. Series 28, 15-16; and in Zeitschrift für Kristallographie 46, 516-517 (1909).

Ford WE (1909) Neptunite crystals from San Benito, California. American Journal of Science, 4th Series 27, 235-240.

Ford WE (1909) Neptunite crystals from San Benito, California. Zeitschrift für Kristallographie 46, 321-325.

Wise WS, Gill RH (1977) Minerals of the Benitoite Gem mine, Mineralogical Record 8, 442-52.

The San Benito locality is the one from where most collectors' samples come. It is the benitoite mine locality. There, it occurs with benitoite, neptunite, and joaquinite in greenstone and blueschist of the Franciscan Formation. In general, these minerals are surrounded by late-stage natrolite.

Neptunite often forms attractive, black crystals with good crystal forms **(Figures 1,2, 3**). Crystals 3 to 4 cm in length are common. But not all crystals are perfectly formed **(Figure 4.)**

Figures 1, 2. Neptunite from Santa Rita Peak, San Benito County, CA.
Photo Credit: Rob Lavinsky & iRocks.com

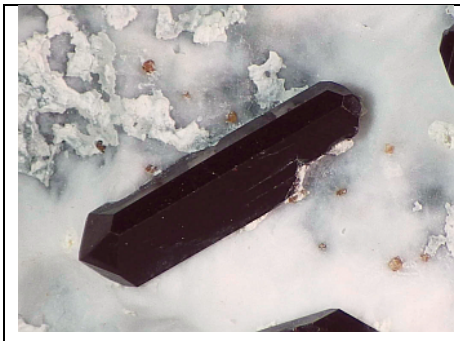

Figure 3. Neptunite and orange joaquinite from San Benito County . Photo Credit: Mark Garcia

Figure 4. Neptunite from San Benito County.
Photo Credit: Mark Garcia

Small, but nice crystals of neptunite also occur at the Point of Rocks Quarry in New Mexico, and in other countries such as Namibia and Germany. Furthermore, neptunite is an associated mineral in rocks from several other localities such as the Crazy Mountains, Montana; Tajikstan; Mongolia; Canada; Yakutia, Russia; New South Wales; and Ireland.

Neptunite's crystal structure was determined in 1966 by Cannillo et al. and improved in 1991 by Kunz et al.

Cannillo E, Mazzi F, Rossi G (1966) *The crystal structure of neptunite* Acta Crystallographica 21 200-208.

Kunz M , Armbruster T , Lager G A , Schultz A J , Goyette R J , Lottermoser W , Amthauer G (1991) Fe, Ti ordering and octahedral distortions in acentric neptunite:, temperature dependent X-ray and neutron structure refinements, and Mössbauer Spectroscopy. Physics and Chemistry of Minerals 18, 199-213.

The atomic structure of neptunite, together with its chemical composition helps us to understand the color of this mineral. Both the iron and titanium ions are surrounded by 6 oxide ions arranged in an octahedron. These octahedra form extended chains where adjacent titanium octahedra share two oxide ions with an adjacent iron octahedron. In **Figure 5**, the oxide ions occupy each vertex of the octahedral, but are not indicated in the figure.

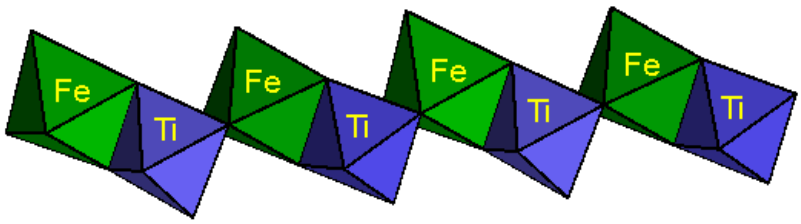

Figure 5. The chain of atoms formed by the alternating iron (Fe) and titanium (Ti) ions in neptunite.

We know from Mössbauer spectroscopy (Bancroft et al, 1967) that the iron is in the 2+ oxidation state and, like nearly all other terrestrial minerals, the titanium is in the 4+ oxidation state.

Bancroft GM, Burns RG, Maddock AG (1967) Oxidation state of iron in neptunite from Mössbauer spectroscopy. Acta Crystallographica 22, 934-5.

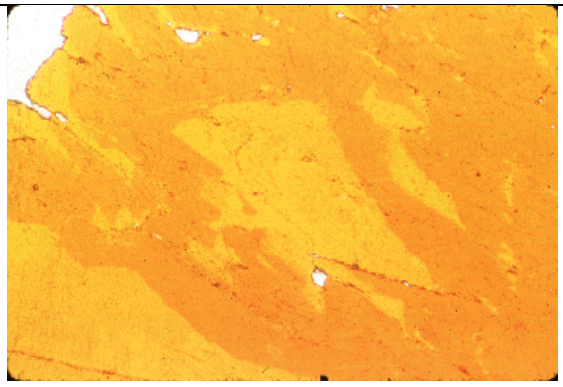

Figure 6. A thin section of neptunite that shows the intrinsic color of the mineral. Photo credit: grr

With this information we are able to discuss the origin of neptunite's color. It is black when thick, but when it is made thin, it is orange **(Figure 6).** This color comes from light interacting with adjacent iron and titanium ions in the structure through a process known as intervalence charge transfer. The incoming light drives an electron from the Fe^{2+} over to the Ti^{4+}. This is a highly efficient process that can cause dark colors in many minerals. It has been described in detail in Mattson & Rossman (1988) for neptunite and other minerals.

Mattson SM, Rossman GR (1988) Iron (2+)-titanium (4+) charge transfer in stoichiometric iron (2+), titanium (4+)-minerals. Physics and Chemistry of Minerals 16, 78-82.

Other minerals are associated with neptunite. It occurs on a matrix of natrolite, $Na_2Al_2Si_3O_{10}\cdot 2H_2O$, along with benitoite, $BaTiSi_3O_9$ **(Figure 7),** California's state gemstone. Other minerals found with neptunite are joaquinite-(Ce), $NaBa_2Ce_2FeTi_2[Si_4O_{12}]_2O_2(OH,F)\cdot H_2O$ **(Figure 8),** and jonesite, $Ba_4(K,Na)_2Ti_4Al_2(Si_3O_9)_2(SiO_4)_4O_2\cdot 6H_2O$ **(Figure 9).**

There are a couple of other minerals related to neptunite, but with a different cation occupancy: Manganoneptunite, $Na_2KLiMn^{2+}{}_2Ti_2Si_8O_{24}$, where manganese replaces the iron. It was reported in 1923 from the Kola Peninsula, Russia. It is also found in Malawi, and at the Mont Saint-Halaire quarry, Quebec, where it occurs as nice crystals up to about 4 mm in size. The other mineral is magnesioneptunite, $KNa_2LiMg_2\ Ti_2Si_8O_{24}$, where magnesium is the dominant cation, rather than iron. It was reported in 2011 from the Northern Caucasus, Russia, where it occurs in rocks as grains a few 10s of micrometers in size.

Figure 7. Benitoite crystals in natrolite from San Benito County. Photo credit: Mark Garcia

Figure 8 Orange-brown joaquinite-(Ce) from San Benito County
Photo credit: Mark Garcia

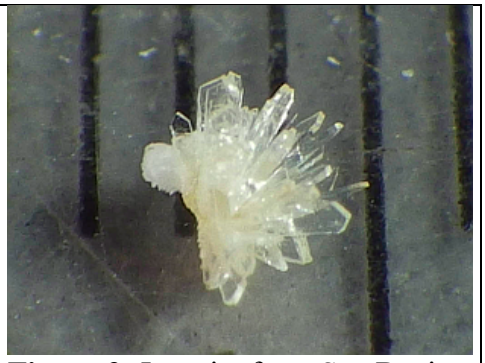

Figure 9. Jonesite from San Benito County. Photo credit: Mark Garcia

Hopefully, you have some neptunite from San Benito County in your collection.

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MINUTES of the April 9, 2021 ZOOM General Meeting

At 7:33 pm, the 988th meeting of the members of the MSSC was called to order by President, Dr. Rossman. It was MSSC's 11th ZOOM conference. Again, we thank Caltech for their generous allowance in sharing their licensing with us.

Message from the Chair (Dr. Rossman):

Dr. Rossman welcomed one and all to the meeting. He reports that the International Mineralogical Association's (IMA) has not announced any new minerals, so the number of approved minerals stands at 5,688.

Regular Business (Dr. Rossman)

Dr Rossman called for corrections or additions to the minutes. Tony Kamph noted that in the April bulletin, it was implied that he was responsible for 5 of the known minerals. The minutes should have said that *Tony Kamph was responsible for 5 of the minerals on the IMA's list of newly described minerals.* The minutes were than approved by a vote of the membership.

Announcements and Reports

1) Program Chair Rudy Lopez: again asked members and guests who wanted to be on the e-mail invitations for the zoom meetings, to notify him of this.

2) Marek Chorazewicz provided details about the March 20th field trip where specimens of manganese minerals were found in the Randsberg area.

3) Rudy gave a brief overview of coming presentations at future MSSC meetings and pointed out that we will get updates on geological and mineralogical studies on Mars…..

Program

Dr. Rossman then asked Program Chair Rudy Lopez to introduce our speaker, Curator of Minerals, Aaron Celestian from the Natural History Museum of Los Angeles County.

Dr Celestian began his talk discussing the current status of visitors to the County Museum, and forthcoming events including an exhibit of large, colored diamonds. After that, he began his presentation of The Lithium "Gold Rush". He pointed out that the element lithium has become a critical material for the production of batteries for electric vehicles, and that world demand for lithium has soared.

He mentioned that there is a relatively small number of minerals with lithium as an essential component including beryl, spodumene, tourmaline and lepidolite which occur in pegmatites. Historically, spodumene has been mined for lithium, including from some pegmatites where giant crystals of spodumene occur. The supply of lithium minerals in pegmatites is now far from sufficient to supply the world's demand for this element. Furthermore, extraction of lithium from spodumene requires significant chemical processing. Clay minerals such as hectorite are another source of lithium where the lithium ion can occur in the interlayer position of these silicate phases. Very large deposits of such clays exist including in the western USA. Active exploitation of clay deposits is now underway.

Another potential source of lithium is underground hydrothermal solutions such as those that occur near the south end of the Salton Sea where hot water is currently extracted for hydrothermal energy and re-injected back into the ground. Such fluids can contain significant amounts of lithium. The question is how to recover it. The approach that Dr. Celestian is exploring is to use tunnel structure manganese oxides as 'zeolites' that can effectively and selectively bind the small diameter lithium ion. Manganese oxides such as todorokite, romanechite, and pyrolusite all have structures with different-sized tunnels. In particular, an easily synthesized spinel structure manganese phase appears to be particularly attractive for such an application.

Other large reservoirs of lithium exist but are not currently practical for exploitation. Ocean water is one such example where, in principle, desalination plants might be able to also extract the lithium from the water. Space may be the largest reservoir where the lithium is produced by supernova explosions, but, of course, it is not practical to recover lithium from space.

A series of questions from the audience followed what was an interesting talk.

The meeting by adjourned at 8:38 pm followed by a period of additional questions to Dr Celestian from members of the audience.

Submitted by George Rossman

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List of Upcoming MSSC Events : Mark your Calender!

Event	Date	Comments / Scheduled Program (if known)
Meeting Dates:	**ZOOM** June 11, 2021	Peter Goetz: - Beautiful Opal, Identification and Internet Opal
	ZOOM July 9, 2021	Eric Scerri: the Periodic Table: It's Story & It's Significance
	ZOOM August 13, 2021	Krista Sawchuk: Discovering the Deep Earth
	ZOOM September 10, 2021	Alan Rubin: The Origin of Chondrules
Board Meeting	TBA	
Field Trip	TBA	No Field Trips Planned at this Time

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

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Notice of a change to our Membership Form

At the MSSC Board meeting on April 25, 2021, it was approved the Membership form is being changed. The form and dues will start being sent to our Treasurer, Carolyn Seitz.

The revised form is attached to the email covering this Bulletin. (and enclosed with the USPS mailed bulletins.

Starting May 1st-change to Membership form.

All new or renewing membership dues will be sent to:

MSSC
13781 Alderwood Lane #22J
Seal Beach, CA 90740-3993

Questions: Contact Carolyn Seitz (MSSC Treasurer) at: treasurer@mineralsocal.org

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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 meetings cancelled*

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OTHER FREE THINGS TO DO...by Ann Meister

The Watson is on Wednesday, **May 12**, at 5 PM Zoom online with a live audience Q&A at the end. At 8 PM the recorded lecture (without Q&A) will be posted on Caltech's YouTube channel https://www.youtube.com/user/caltech. You must register in advance for Zoom at Webinar Registration - Zoom. The speaker is Dianne K. Newman, Professor of Biology and Geobiology at Caltech. The title of the presentation is, **"From the Soil to the Clinic: How Infection-Causing Microbes Thrive Without Oxygen."** Chronic infections cause major harm in humans: they can destroy the lungs of individuals living with cystic fibrosis or lead to limb amputations in diabetics whose wounds fail to heal. The common connection among these chronic infections is the types of microbes that cause them. Such microbes often hail from the soil, where they typically grow slowly and cope with large fluctuations in oxygen concentrations. In the body, their ability to survive in the absence of oxygen renders them difficult to treat with conventional antibiotics. In this lecture, Newman will explain how her lab is characterizing the microenvironments and metabolic states of these pathogens, mindful of their soil origins, in order to understand not only how they survive in their oxygen-limited environments, but also how to develop new and more effective therapeutic approaches. For online stuff at Caltech go to http://events.caltech.edu/

The **UCLA Meteorite Gallery** is temporarily closed until further notice; however, the monthly lecture will be presented on Zoom on Sunday, **May 16** at 2:30 PM. Speaker and topic are not yet available. **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. The speaker and topic will be announced on the website. Visit the website and check on events and videos and other neat things about meteorites, go to **https://meteorites.ucla.edu**

The **Von Kármán Lecture** on Thursday, **May 20** at 7:00 PM. Available live on YouTube at Live & Upcoming - YouTube or NASA JPL Live . NASA JPL Live (ustream.tv) . The speakers are Dr. Justin Maki, Imaging

Scientist/Mastcam-Z Deputy PI, NASA/JPL, and Hallie Abarca, Mars 2020 Image and Data Processing Operations Lead, NASA/JPL. The title of the presentation is **"Space Cameras: A Sharper Image."** Are you ready for your close-up? Our newest space exploring cameras are bringing the universe into even sharper focus. We'll discuss how we get these extraordinary images of the solar system and beyond back to the phone in your pocket.

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TOURMALINE with ALBITE
and QUARTZ
Himalaya Mine,
San Diego County, CA
by Frederick C. Wilda

WEST COAST GEM & MINERAL SHOW!

Hilton Orange County/Costa Mesa!
3050 Bristol Street, Costa Mesa CA

May 7-8-9, 2021
Hours: 10-6 Fri & Sat, 10-5 Sun

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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**

WITH KNOWLEDGE COMES APPRECIATION !

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.

May 7-8, 2021 Yucaipa, CA
Yucaipa Valley Gem and Mineral Society
Yucaipa Blvd and Adams St, Yucaipa, CA 92399
Friday, May 7: 6 pm to 10 pm, Saturday, May 8: noon to 10 pm Website: http://yvgms.org

June 12-13, 2021 – Escondido CA
Palomar Gem and Mineral Club
340 N. Escondido Blvd., Escondido CA 92025
Saturday – 10 AM – 5 PM, Sunday 10 AM-4PM
Website: pgmcshow@palomargem.org

June 25-27, 2021 Lodi, CA – Cancelled
CFMS Annual Show and Conference

August 14-15, 2021 – Arcadia CA
Pasadena Lapidary Society
"Inspiration Unearthed", 62nd Annual Tournament of

Gems
Arcadia Masonic Center, 50 W. Duarte Rd., Arcadia
Hours: 10-5 Daily
Website: pasadenalapidary.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

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May Featured Mineral: Ferberite

Formula: $FeWO_4$

Crystal System: Monoclinic

Name: For Dr. Moritz Rudolph Ferber (1805-1875), amateur mineralogist, Gera, Germany.

© *Irocks*

Ferberite $FeWO_4$
Locality: Yaogangxian Mine, Yaogangxian W-Sn ore field, Yizhang Co., Chenzhou, Hunan, China 6.0 cm

© *Irocks*

Ferberite $FeWO_4$ Quartz SO_2
Locality: Panasqueira Mines, Covilhã, Castelo Branco, Portugal
5.2 cm x 3.1 cm x 1.7 cm

© *Irocks*

Ferberite $FeWO_4$ Quartz SO_2
Locality: Kara-Oba W deposit, Betpakdala Desert, Karazhal, Karaganda Region, Kazakhstan
7.4 cm x 4.7 cm x 2.2 cm

Irocks

Ferberite $FeWO_4$
Locality: Tazna Mine, Cerro Tazna, Nor Chichas Province, Potosí, Bolivia
5.5 cm x 4.8 cm x 4.0 cm

Irocks

Ferberite $FeWO_4$ Siderite $FeCO_3$
Locality: Panasqueira Mines, Covilhã, Castelo Branco, Portugal
4.9 cm x 2.3 cm x 1.0 cm

Irocks

Ferberite $FeWO_4$
Locality: Tae Hwa Mine, Neungam-ri, Angseong-myeon, Chungju City, North Chungcheong Province, South Korea 3.1 cm x 1.3 cm x 1.3 cm

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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:

Mineralogical Society of Southern California
13781 Alderwood Lane, #22-J, Seal Beach, CA 90740
E-mail: *treasurer@mineralsocal.org*
Website: ***www.mineralsocal.org*** **The Mineralogical Society of California, Inc.**

MSSC Bulletin Editor

3630 Encinal Ave.

Glendale, CA 91214-2415

To:

With Knowledge Comes Appreciation

Your MSSC Bulletin Is Here!

2021 MSSC Membership Dues

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Total enclosed: $_____

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Questions: Contact Carolyn Seitz (MSSC Treasurer) at: treasurer@mineralsocal.org