

Bulletin of the Mineralogical Society of Southern California

Volume 93 Number 12 - December, 2020

The 984th meeting of the Mineralogical Society of Southern California

With Knowledge Comes Appreciation

A ZOOM Meeting

December 11th, 2020 at 7:30 P.M.

***Program : Natural Radiation – A Tale of Two Minerals;
Presented by Dr. George R. Rossman***

In this Issue:

<i>TITLE</i>	<i>Page</i>
Program: Natural Radiation – A Tale of Two Minerals; Presented by Dr. George R. Rossman	2
From the Editor: Linda Elsnau	2
From the President; Interesting Minerals, A to Z. Round 2, installment 9, the letter “I”: by George Rossman	2
Minutes of the November 13, 2020 Meeting	5
List of Upcoming MSSC Events	8
Mark your Calendar—A Special MSSC Rock Giveaway	9
Dues are Due	9
Ride Share Listing	9
Other Free Things To Do...by Ann Meister	9
Calendar of Events	10
2020 Officers	11
About MSSC	11

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: Natural Radiation – A Tale of Two Minerals; Presented by Dr. George R. Rossman



Amazonite from the Pikes Peak area, Colorado. © GRR

Minerals of the feldspar group are the most common phases volumetrically in the crust of planet Earth. Ideally, when they have the textbook-ideal, composition, they are colorless. But, in fact, there are many colorful varieties of feldspars that are popular with collectors. Amazonite, sunstone, and labradorite evoke images of colorful specimens. Likewise, tourmalines are popular with collectors and have a variety of beautiful colors. Some of the colored varieties of both of these mineral groups are the result of long-term exposure to natural background level radiation. This presentation will examine these colorful minerals and the science behind how we come to understand the origin of their colors.

Dr. George R. Rossman is Professor of Mineralogy in the Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, California, and President of the Mineralogical Society of Southern California. He got his B.S. degree in Chemistry and Mathematics from Wisconsin State University, Eau Claire, and his Ph.D. from Caltech in Chemistry. His principal research interests deal with the use of spectroscopic probes to study minerals. His work addresses problems relating to the origin of color phenomena in minerals; phase identification; and the special role of metal ions in minerals. He and his students develop analytical methods for analysis of hydrous components in minerals and examine their role in modifying physical and chemical properties. He is also interested in the long-term effects in minerals from the exposure to background levels of natural radiation. He was the recipient of the inaugural Dana Medal, of the Mineralogical Society of America in 2001, the Richard P. Feynman Prize for Excellence in Teaching at the Caltech in 2004, and the Friedrich-Becke Medal of the Austrian Mineralogical Society in 2005. He was also honored by having a new mineral of the tourmaline family named after him. He has more than 370 publications in the mineralogical and chemical sciences.



From the Editor: Linda Elsnau

Well, here we are at the end of another year; and what a year it has been! I hope everyone has stayed safe and healthy through the current world “situation” Also, here’s wishing you and everyone you love a safe, healthy and happy holiday season.

Look like we can expect another excellent program from George Rossman this month. We are so lucky to have him as a member and willing contributor. Thanks for all you do George. That goes for all of our other officers who so willingly work to keep MSSC going year after year.

FROM THE PRESIDENT: Interesting Minerals, A to Z. Round 2, installment 9, the letter “I”: by George Rossman

Ilmenite, FeTiO₃

The first written description of the discovery of ilmenite occurred in 1791 by William Gregor. He discovered it in a stream located south of the village of Manaccan in Cornwall, England. He was the person who identified for the first time that titanium was one of the constituents of ilmenite.

William Gregor (1791) Beobachtungen und Versuche über den Menakanit, einen in Cornwall gefundenen magnetischen Sand. Chemische Annalen für die Freunde der Naturlehre, Arzneigelahrtheit, Haushaltungskunst und Manufacturen, 1. 103-119.

It wasn't until 1827 that the mineral was given its "official" species name. That was done by Adolph Theodor Kupffer who named it after a locality in the Ilmen Mountains, Russia. Specifically, it was a sample found in Pit Number 3, in the Chelyabinsk Oblast, Russia. This sample, which gave rise to the mineral's name is considered the "Type Locality" for ilmenite.

Kupffer, A.T. (1827) Ilmenit, ein neues fossil (Sammt neuen spielarten des zirkon und gadolinit) aus Sibirien; beschrieben. Archiv für die Gesamte Naturlehre: 10: 1-13

Isolated ilmenite crystals are not particularly common, but can be found in macroscopic sizes (**Figures 1,2,3**). More commonly it is found in either aggregates of crystals in rock (**Figure 4**), irregular lumps (**Figure 5**) or laths in host rock (**Figure 6**).



Figure 1. Ilmenite crystal from Kragero, Norway.
Photo credit: Mark Garcia



Figure 2. Ilmenite from Arendal, Norway.
Photo credit: Mark Garcia

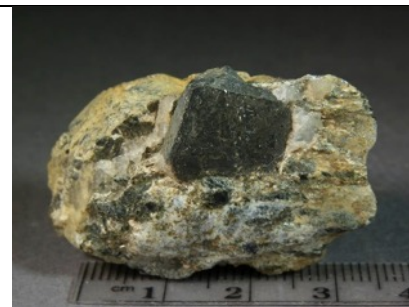


Figure 3. Ilmenite crystal in schist from Litchfield, CT.
Photo credit: Mark Garcia



Figure 4. Ilmenite from Mt Jagged, S Australia
Photo credit: Mark Garcia



Figure 5. Ilmenite from Piney River, Neson, VA.
Photo credit: Mark Garcia

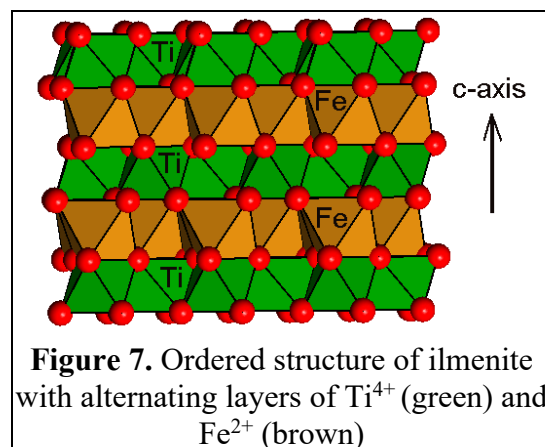


Figure 6. Ilmenite, Little Julia Mine, New Mexico Laths in quartz.
Photo credit: Mark Garcia

The ilmenite crystal structure consists of an ordered derivative of the corundum structure. In corundum all the cations are identical but in ilmenite the Fe^{2+} and Ti^{4+} ions occupy alternating layers perpendicular to the trigonal c-axis (**Figure 7**).

Ilmenite is, by far, the most important ore of titanium. When processed, ilmenite is the main source of titanium dioxide, which is widely used in paints, printing inks, fabrics, plastics, paper, sunscreen, food and cosmetics. If the room you are in has white or near-white walls or ceilings, you have TiO_2 pigment in the paint.

At higher temperatures it has been demonstrated there is a complete solid solution between ilmenite and hematite. There is a miscibility gap at lower temperatures, resulting in a coexistence of these two minerals in rocks but no solid solution. This coexistence may result in exsolution lamellae in cooled ilmenites



with more iron in the system than can be homogeneously accommodated in the crystal lattice. Consider a crystal that initially grows at high temperature with a composition that is a solid-state solution of 80% ilmenite and 20% ilmenite. As the crystal slowly cools (perhaps over geologic times) the atoms of iron and titanium will diffuse through the crystal to form small domains of both ilmenite and hematite (**Figure 8**):

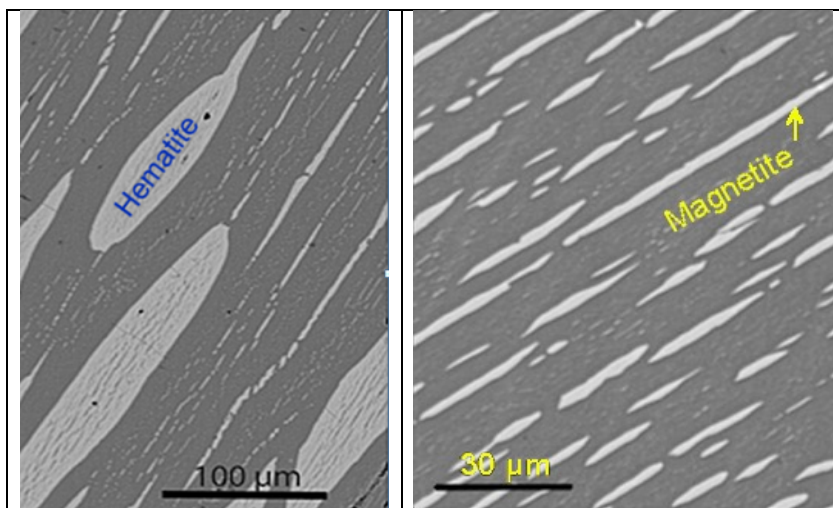
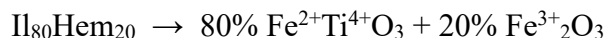


Figure 8. Exsolved domains of hematite (light color) within ilmenite (darker color)

Figure 9. Scanning electron microscope image of exsolved magnetite in ilmenite.

Magnetite can also exsolve from ilmenite solid solutions (**Figure 9**). The exsolved magnetite will allow ilmenite to be attracted to a magnet. That may confuse your identification if you expect ilmenite not to stick to a magnet.

Ilmenite has been found in rocks returned from the Moon. These ilmenite samples have typically been significantly enriched in magnesium (magnesium replacing iron). This enrichment is similar to what we find on Earth in ilmenite from kimberlites. NASA even has gone so far as to use the Hubble Space Telescope to scan light reflected off the lunar surface in an attempt to locate areas of the moon that are enriched in ilmenite. Why? Ilmenite would be an ore of iron and titanium that could be used for construction on the moon.

High pressure polymorphs

As is the case for many other minerals, when ilmenite is compressed under high pressures, the atoms move and change into a new structural arrangement. Namely, a new, high-pressure polymorph will form. And this is a new mineral species that is given its own species name. In this case, the new mineral species is wangdaodeite, International Mineralogical Association's mineral number 2016-007. It's actual formula in the meteorite is $(\text{Fe}_{0.85}\text{Mg}_{0.10}\text{Mn}_{0.05})\text{TiO}_3$, corresponding to the ideal formula FeTiO_3 . It was found in a meteorite found in China. This meteorite experienced a violent shock event, perhaps when two bodies collided when they orbited the sun. The shock wave going through the body gave rise to an estimated pressure of at least 200,000 times atmospheric pressure to form wangdaodeite. It has about the same density as ilmenite, 4.72 g/cm^3 , and occurs inside shock melt veins along with ringwoodite (a high pressure polymorph of olivine) and xieite, a high-pressure polymorph of chromite with the spinel structure. It was named in honor of Daode Wang, Department of Meteoritics and Cosmochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (CAS), for his systematic study of Chinese meteorites in general and Antarctic meteorites. The type locality is the Suizhou meteorite (Suizhou L6 chondrite), Xihe, Zengdu District (Cengdou District), Suizhou, Hubei, China. But, it has only been found in microscopic quantities that are best imaged in a scanning electron microscope. Grains range from 2 to 20 micrometers in size.

Xie, X., Gu, X., Yang, H., Chen, M., Li, K. (2020) Wangdaodeite, the LiNbO_3 -structured high-pressure polymorph of ilmenite, a new mineral from the Suizhou L6 chondrite. *Meteoritics & Planetary Science* 55

With Knowledge Comes Appreciation!

There is a lot of ilmenite locally in the San Gabriel Mountains. There is a Soledad Canyon ilmenite mine. And hundreds of placer and lode claims have been placed in the anorthosite complex (a type of rock dominated by plagioclase feldspar commonly with small amounts of pyroxenes, ilmenite, and magnetite) in the western San

Gabriel Mountains. Mindat.org lists several ilmenite deposits in Kagel Canyon, Soledad Canyon, and elsewhere in the local mountains. Mostly what you will see locally are ‘lumps’ of ilmenite rather than crystals (**Figure 10**). If you go gold panning in the local rivers, you will find many fine, sand-sized, grains of ilmenite. In fact, much of the ilmenite of commerce is mined from delta deposits where heavy mineral sands concentrate (**Figure 11**).



Figure 10. Ilmenite from Monte Cristo Creek in the San Gabriel Mountains.

Photo Credit: Mark Garcia



Figure 11. Alluvial ilmenite sand from New South Wales, Australia.

Photo Credit: Mark Garcia

If You Have Not Yet Signed Up To Join Our Future ZOOM Meetings, Here's How:

Contact our Programs chair, Rudy Lopez at programs@mineralsocal.org no later than Tuesday December 11th, 2020. Please include “December, ZOOM Meeting” in the subject line of your email. This response date will allow time for us to send you the information needed to participate in the ZOOM meeting

MINUTES of the November 13, 2020 Meeting

At 7:33 p.m., the **983rd Membership Meeting** of the Mineralogical Society of Southern California (MSSC) was called to order by President Dr. Rossman, Ph.D. It is MSSC's 6th ZOOM due to the ongoing Coronavirus (COVID-19) pandemic. We thank Caltech for their generous allowance in sharing their licensing with us.

Message from the Chair:

Dr. Rossman welcomed one and all to the meeting. His report of no new approved IMA minerals this month leaves the overall approved at 5,617 minerals, same as last month.

Regular Business

Minutes: Dr. Rossman directed our attention to the Minutes of the last membership meeting, October 9, 2020, as published in the November 2020 *Bulletin* and asked for a motion to approve them. Rossman called for any corrections, additions or objections to the Minutes, hearing none called for a **motion to approve** the Minutes. Motion was made by L. Ogg and seconded by A. Dodge; the Minutes were approved per the motion.

Nominations and Election of Officers and Directors (A. Guzman): MSSC Secretary Angela Guzman officially opened nominations for Officers (2021) and two Director (2021-2022) seats in accordance with MSSC By-Laws: “*Nominations for Officers and Directors shall be made at the October and November meetings. Officers shall be elected by majority vote of a quorum of the membership at the regular November meeting.*” Members may nominate a member in good standing for officer or director seats. Nominations made and accepted at the October 2020 meeting were:

Officer

President	Dr. George Rossman
Vice President	Ahni Dodge
Treasurer	Carolyn Seitz
Secretary	Angela Guzman
CFMS Director	Angela Guzman

Director (2021-2022)

Director #1	Leslie Ogg
Director #2	n/a

Guzman called for any other nominations for all Officer and Director seats. There were two nominations for Director seat #2: Pat Stevens and Janet Gordon. Hearing none other, Guzman formally closed the nominations.

The election was opened by Guzman. Angie asked for approval of those nominated for Officer and Director seat #1 by acclamation. The Membership was in agreement. The vote for Director seat #2, between Stevens and Gordon was taken with the majority in favor of Stevens. The final vote was for the entire ticket (see below). Guzman made the motion, seconded by R Lopez, to vote the slate by acclamation. The vote was unanimous in favor. The elected, next term Officers and Directors are:

Officers (2021)

President	Dr. George Rossman
Vice President	Ahni Dodge
Treasurer	Carolyn Seitz
Secretary	Angela Guzman
CFMS Director	Angela Guzman

Directors (2021-2022)

Director #1	Leslie Ogg
Director #2	Pat Stevens

The elections were closed and completed. Angie congratulated and thanked the newly elected Officers and Directors, as well as, the alternate year Directors and all Chairs for their service.

Field Trip Report (M Chorazewicz):

Marek reports that the October 24, 2020 field trip to Red Cloud Mine was great and well attended. Marek and other attendees collected many mineral specimens. He showed a few wulfenite specimens that are remarkable. MSSC's website has Marek's full report including lots of photos. As for future field trips, it is uncertain when the next will be due to COVID-19 pandemic. Keep an eye out for updates in the *Bulletin* and on the website. Kudos and thanks to Marek for his commitment and dedication in planning, leading and reporting on MSSC field trips.

Other announcements:

Rudy Lopez announced that next month's scheduled speaker, Renee Newman, will be unable to present. However, Dr. Rossman, Professor at CalTech and expert in mineral color, will provide a ZOOM presentation on Friday, December 11th. The topic includes how minerals get their color. George promises lots of beautiful slides, a little science and a wonderful presentation. You won't want to miss it!

Also, Lopez announced there has been an increase in membership by 10 new members since our last membership meeting in October 2020. Increase in membership is due, in part, to interest in our well-planned, fun field trips. We've also attracted members through our current meeting venue, ZOOM. (Thanks, Caltech.). We are grateful for each one of you. Welcome!

Rudy also advises that MSSC's Annual Installation Banquet will actually be a ZOOM membership meeting with a presentation by Denise Nelson. Denise has over 30-years' experience in the gem and jewelry business including international travel and trade. The Banquet meeting will be on January 8, 2021. "Save the Date"!

Program: Rudy Lopez introduced speaker, Abby Kavner. Dr. Kavner is a professor of Earth, planetary and space sciences at University of California Los Angeles, UCLA. She earned her Ph.D. at UC Berkeley in 1997. Dr. Kavner is an expert in the behavior of Earth's interior and interiors of planets. Her research focus is on studying rocks and minerals at high pressures and high temperatures to understand the chemical and thermal evolution of the Earth's interior. Abby studied as a materials engineer and earned her BS and MS (Corrosion Engineering) before receiving her Ph.D. in 1997. In 2020, Dr. Kavner was awarded a Fulbright sabbatical, which she took in Spain.

Dr. Kavner's presentation, "Minerals under Pressure", begins with a brief glimpse of what it is like teach mineralogy during a pandemic. She is building a community of learners rather than individual competitive scientists. This is done through the use of ZOOM, chat, blackboard and other forms of communication. Her mineralogy class at UCLA includes the use of optical microscopy and use of Excel spreadsheets for mathematical models of ionic bonding for such minerals as calcite, rhodochrosite, siderite, dolomite, magnesite, malachite, azurite and so on. She views the Earth as a geophysicist. She became interested in the Earth by becoming interested in that "...giant-corrosion-iron-mantle boundary at the center of the Earth..." She'll show an anatomy of evolution through maps, talk about her lab and student researchers and add a bit about her high-pressure mineral physics sabbatical work in Spain.

The first map is the Earth with a cutaway showing the inner core, outer core, mantle to the crust. It asks these questions: How does it work? What do we know? How do we know it? What are we still learning? [*Secy Note: ponderings, for sure*] The next map is of the continents (high, granite) and ocean floor (low, basalt). Still another shows the magnified deviation of Earth from oblate to spheroid. Gravity gives the Earth its shape, the interior is not uniform; there is some activity! On yet another map, heat flow and thermal state of Earth are shown as coming from the mid ocean mountain ranges. Dr. Kavner tells us heat is escaping in two-dimensional form.

In the map titled "Seismology: Global Distribution of Earthquakes", Kavner tells us depths of earthquakes range from 0-70km, 70-300km to 300-700km (that's deep). This is important to know because it is a way to measure energy waves. For instance, in 1994 Shearer was able to "draw" a radial 3-D picture (using time and degrees) of energy waves expended by earthquakes that originated from Earth's interior. More importantly, it is a picture of what the Earth looks like when a huge amount of energy is released. On the map, the fundamental wave is the oscillating of the Earth moving back and forth.

The "Mystery Map" is of the magnetic field (Tesla measure of magnetic strength), not of the core, but measured only by tiny magnetic particles in the rocks. When the rocks cool down and the magnetic field is frozen in, the magnetic field in the tiny particle is in the direction at the time of freezing. These magnetite particles capture a history of Earth. On the map, Abby points to the location parallel to the Atlantic Ridge. The magnetic field shifts polarity and the Earth's generation of new ocean crust and the spreading of the ocean crust records those shifts.

Understanding the “Mystery Map” and adding in plate tectonics provides so much of Earth’s history in the map.

All of the maps together are geophysical observations, geochemistry analysis and Earth and planet materials science that paint a picture of Earth structure and dynamic processes. Abby tells us that her research and studies tie into the function of high pressure and high temperature. They have equilibrium properties (density, elastic multi-component), transport properties, conductivity, chemical diffusion and viscosity, pea soup of Earth.

Abby shows us Kavner Lab with her research group, Krista, Chris, et al. She takes us through the research that the team is working on and talks about heat flux, thermal conductivity of oxides at high temperature and pressure, measurements of temperature, experimental data using iron, the Goldilocks story (fixed inner core timing) and other wonderful studies and research.

Dr. Kavner had the awesome opportunity to study at the University of Valencia in Spain under the Fulbright she was awarded. While on sabbatical, she studied high pressure mineral physics and participated in their famous Science Fair as a competition judge. While in Spain, Abby was able to go to the Mineral Museum in Madrid.

There was so much more of the lecture about the upper, mid and lower mantle boundaries in Dr. Kavner’s presentation. I hope you saw it, too. Thank you for your presentation, Dr. Kavner.

Q&A followed with several interesting questions: *How well do we really know what minerals are at the Earth core?* How do we know? We use measurements and experiments on minerals from lower mantle origins, such as diamonds (how much carbon is present, for example). *What are the major phases of minerals?* Magnesium in the lower mantle and in the higher is olivine (60%) and garnet (40%). *Is the core on Mars solid or soft?* We don’t know a lot about the core of Mars (yet), we don’t know the radius of the core or if it’s iron rich; the lowest pressures of the Mars mantle are about 23GPa (gigapascal), exactly the pressure of Earth’s upper lower mantle boundaries, where SiO_4 turns into SiO_6 , big density difference and a change in physical properties.

Dr. Rossman thanked everyone and Caltech for allowing MSSC to use their ZOOM license. See you next month!

The meeting adjourned at 8:54 p.m.

Respectfully submitted, Angie Guzman, MSSC Secretary

List of Upcoming MSSC Events : Mark your Calender!

Event	Date	Comments / Scheduled Program (if known)
Meeting Dates:	ZOOM January 8, 2021	Denise Nelson: TBA
	ZOOM February 12, 2021	Tony Kampf: The Journey from an Unknown to a New Mineral.
	ZOOM March 12, 2021	John Rakovan: New insights into the structure and formation of wire silver and gold.
	ZOOM April 9, 2021	Krista Sawchuk: Discovering the Deep Earth
Board Meeting	January 17, 2021	Via ZOOM
Field Trip	TBA	TBA

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

Mark Your Calendar For A Special MSSC Rock Giveaway

MSSC is having a 1 Day Free Rock Give Away on Jan. 16, 2021 for members only. These rocks and some cut slabs are from a collection that was donated to MSSC.

You may take the entire milk crate the rocks are in or bring your own empty containers.

Everything will be placed in the driveway with 6 feet between each crate.

You must wear a mask to protect everyone.

There are 30 milk crates with a wide assortment of specimens (various sizes).

Date: Saturday, Jan 16, 2021

Time: 9:00 am- 12:00 noon

Location: Rudy & Cheryl Lopez

1301 Leonard Ave

Pasadena, CA 91107

Do not miss out on this one time give away!!!!!!

Dues are Due **January 1, 2021**

Don't delay or forget...do it now!

Your 2021 Membership form was included as page 13 of your November, 2020 Bulletin.

Detach/Print your form, fill it out and mail it with your check today!

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	<i>In person meetings cancelled until further notice</i>

OTHER FREE THINGS TO DO...by Ann Meister

The UCLA Meteorite Gallery will be closed until further notice. The website does not show a lecture for December at this time. Visit their website for updates, videos and other neat things about meteorites:

<https://meteorites.ucla.edu>

The Watson Lectures are back via Zoom! The lecture is on Wednesday, **December 9**, from 5 to 6 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 the Zoom

event link at [Watson Lecture - The Inner Life of the Brain: Fear, Sex, and Violence | www.caltech.edu](http://www.caltech.edu/WatsonLecture-TheInnerLifeoftheBrain-FearSexandViolence)

The speaker is David J Anderson, Professor of Biology, Institute for Neuroscience at Caltech. The title of the presentation is, “**The Inner Life of the Brain: Fear, Sex, and Violence.**” Behaviors that are fundamental to animal survival, such as mating and the fight-or-flight response, are driven by internal emotional states. In humans, these brain states are subjectively experienced as “feelings,” such as desire, rage, or terror. Understanding the brain mechanisms that govern these states, using powerful new tools such as optogenetics and calcium imaging, will lead to better treatments for psychiatric disorders. However, such studies can only be performed in animal models. How can we study an animal’s internal state when we do not know if it has subjective feelings? In this lecture, Anderson will describe a new approach to this problem, which allows the neurobiology of emotional states to be studied in diverse animal species without reference to subjective feelings. For online stuff at Caltech go to <http://events.caltech.edu/>

The **Von Kármán Lecture** is off for December.

Season’s Greetings, Merry Christmas, Happy Hanukkah and a Happy New Year!

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 1855 Idlewood Road, Glendale, CA 91202			

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

No Southern California Shows are listed until:

March 13-14, 2021, Arcadia CA

Pasadena Lapidary Society

“Inspiration Unearth”, 62nd Annual Tournament of Gems

Arcadia Masonic Center, 50 W. Duarte Rd., Arcadia

Hours: 10-5 Daily

Website: pasadenalapidary.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

30-35 dealers.

Website: <http://www.palomargem.org/annual-gem-mineral-and-jewelry-show/>

2020 MSSC Officers:

OFFICERS		
President	George Rossman	president@mineralsocal.org
Vice President	Ahni Dodge	vicepresident@mineralsocal.org
Secretary	Angie Guzman	secretary@mineralsocal.org
Treasurer	Jim Kusely	treasurer@mineralsocal.org
CFMS Director	Angie Guzman	
Past President	Ann Meister	
DIRECTORS		
2019--2020	Rudy Lopez	
2019--2020	Bob Housley	
2019--2020	Leslie Ogg	
2020-2021	Pat Caplette	
2020-2021	Cheryl Lopez	
COMMITTEE CHAIRS		
Bulletin Editor	Linda Elsnaue	bulletin@mineralsocal.org
Hospitality	Laura Davis	
Membership	Cheryl Lopez	membership@mineralsocal.org
Micro Mount Conf. Chairman	Al Wilkins	
Program and Education	Rudy Lopez	programs@mineralsocal.org
Publicity	Linda Elsnaue	bulletin@mineralsocal.org
Webmaster	Leslie Ogg	webmaster@mineralsocal.org

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

1855 Idlewood Rd.,

Glendale, CA 91202-1053

E-mail: treasurer@mineralsocal.org

Website: www.mineralsocal.org **The Mineralogical Society of California, Inc.**

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MSSC Bulletin Editor
3630 Encinal Ave.
Glendale, CA 91214-2415

To:



Happy Holidays

**With Knowledge Comes
Appreciation**

***Your MSSC
Bulletin Is
Here!***