BRECCIA

Santa Clara Valley Gem and Mineral Society

Volume 73 Number 8, August 2025

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Events

August 26, 6:30 PM: Member Sale

If you have something to sell, please contact Jim Herbold.

August 26, 7:30 PM: The General Membership Meeting will feature **Neil Delfino** with "Why is there blue in my brown jasper?". The Bragging Rights theme is **"Green"**.

September 23: The General Membership Meeting will feature TBD.

September 30, 7:30 PM: Board Meeting on Zoom. All Members are welcome to attend. If you do want to attend, please contact Jim Herbold.

Labradorite by PlasticBeachComic Zazzle

The dog days of summer

Membership Dues for 2025 Are Due!

SCVGMS membership dues are due for the year 2025. Your dues are essential to the operation of SCVGMS.

Dues are $5.00 for Junior, $20.00 for an individual, and $30.00 for the household.

Paying Online is Easy

You can now easily pay online, at https://www.scvgms.org/product/membership-dues/

Or

Pay Frank at a meeting

Or

Send your check to Treasurer, Santa Clara Valley Gem and Mineral Society, Box 54, San Jose, CA 95103-0054; or to: Frank Mullaney, 5705 Begonia Drive, San Jose, CA 95124

Thank you.

Editor's Message

A big thank you to **Michele Smith** for all her work on the Santa Clara County Fair! She was there all day, every day. Two partial days were all I could handle.

Phil Kesten kindly sent me an article on Green Stones. It may help if you need ideas for the August Bragging Rights.

Want more information on Field Trips? Contact **Stephen May**, by email Stephenmay0990@gmail.com, or by phone 669-248-3993 or 408-306-6782.

Do you have anything that other members might enjoy? The deadline for submissions is the Sunday after each General Meeting.

Deb Runyan, Breccia Editor

editor@scvgms.org, 408-628-7789

New Members

We welcome new members to SCVG&MS!

John Hawk
Charles Jenkins
Randy Merten
Jon Roth
Connie Thayer

Sunshine

We have missed **Kyle Van Woerkom** at several meetings.

If you know of anyone needing some sunshine in their lives, please email **Margo Mosher at** margomosher@yahoo.com.

Rockhound of the Month

Our rockhound of the month is **Bruce Poehlman** for covering several General and Board Meetings in **Jim Herbold's** absence.

From the County Fair

Michele Smith promised a family from Missouri that we would include a photo of them. So, here is the "Nose Rope Family".

The girls enjoyed creating their own "nose ropes", then roped their parents into them, too!

Field Trips

Note: Driving times are from Campbell and are approximate.

2025 Co-Op Field Trips

August 8–9, Friday and Saturday: Black Butte and Stony Creek, CA, 4-hours

Jasper, Agate, Petrified wood

August 8–10, Friday to Sunday: Blue Forest & American Fossil Quarry, Kemmerer, WY, 13-hours

Petrified Wood, Fossils. Petrified Wood no fee, American Fossil Quarry Fee Dig

Sacramento Mineral Society

Contact: Mike Jones, 916-477-0890 (Cell), scienceskoolbus@gmail.com

August 27–September 1: Texas Springs, NV, 8-hours, and Tony Funks Rock Shop Gooding, ID, 6-hours

Limb Casts, additional materials

Calaveras G & M

September 25–28: Topaz Mt & Dugway Geo Beds, North West of Delta, UT, 11-hours

Topaz Crystals, Bixbite (Red Beryl), Pseudobrookite Crystals, Hematite Crystals, and Geodes.

Roseville Rock Rollers, CFMS, CO-OP

Contacts: Gene Doyle, Field Trip Leader, text or leave message, 408-605-9457 (Cell), eugene.doyle@sbcglobal.net. Gene Doyle will email you a more detailed write up upon request.

For questions about the above listed field trips

Contact: Stephen May, Stephenmay0990@gmail.com

Phone: 669-248-3993 or 408-306-6782

President's Message

Hello, club members and friends! I hope that you are enjoying this year's mild summer in Northern California, if that's where you live. I just heard on the radio that it is the mildest summer in the Bay Area since 1982. I don't want to jinx it, but I'll certainly take it!

For well over a decade I've been very fond of the area in and around Sonora Pass in California. For many years in a row we camped with the kids nearby in the Pinecrest area and we discovered the agates that can be found on the trail to Sardine Falls right near Sonora Pass. Some take a beautiful polish, and it was great to see the kids get excited about finding them. I wish that lasted longer!

Agates from Sardine Creek, near Sonora Pass, some of which exhibit beautiful banding and quartz crystal centers. All polished by me.

Last summer I spent many days camping at Sonora Pass in an effort to acclimatize in advance of my hike up Mt. Whitney. I finally did a bit more research on the geology of the area, and I will quote from an AI-generated response from the internet about that: "The Sonora Pass area in the Sierra Nevada is geologically complex, featuring both ancient granitic rocks and younger volcanic formations. The area is known for the Intrusive Suite of Sonora Pass, a Late Cretaceous batholith composed of the Kinney Lakes granodiorite and the Topaz Lake granodiorite. Additionally, Tertiary volcanic activity, including the Relief Peak Formation and the Stanislaus Group, has significantly shaped the landscape".

I've been familiar with the granites of the Yosemite and Sonora Pass areas, but I now have learned about granodiorite, a cousin of granite. Again from AI: "Granodiorite and granite are both intrusive igneous rocks, but they differ primarily in their mineral composition and resulting color. Granite typically contains more potassium feldspar and fewer dark minerals, leading to a lighter color, often pink or red. Granodiorite, on the other hand, has more plagioclase feldspar and a higher

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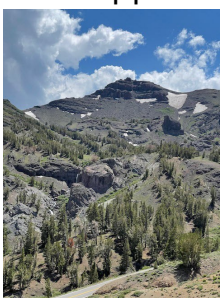
percentage of dark minerals like biotite and hornblende, making it generally darker, often appearing grayish-white."



Margaret Lewis Peak, the tallest point in the Sonora Pass area, is over 11,000 feet high. The dark basalts of volcanism are clearly evident, and this explains the presence of agates in the area.

A few weeks ago I drove over Sonora Pass on my way to another hiking and rockhounding adventure. After coming back over the pass to head back to the Bay Area, I decided to take a break to have a cup of coffee and take a short walk to explore. The specific place I stopped was the Stanislaus Creek Trailhead, probably less than a mile from the pass itself. There was a stream and a large number of what seemed to be river-tumbled stones, often large and very unlike what I've seen anywhere else in the area. After doing a bit more sleuthing on this, I believe I found an exposure of ancient material tumbled in the headwaters of the Stanislaus River. I picked up a few interesting specimens and will share some pictures of them here. I believe they are from older granitic rocks and not from the newer Topaz Lake granodiorite batholith which is the dominant feature of the exact area I was walking.

Massive quartz, with translucence and a reflective fracture plane when the piece is angled just right against light

Quartz vein in unknown matrix

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Is the green material hornblende? That's my best educated guess after scouring the internet for answers…

Feldspar phonocrysts in granite with quartz vein.

Jasper, the only one I found in the area - this would be a remnant from a volcanic exposure, not a granite or granodiorite exposure.

You tell me what this odd piece is, I have no idea, and I found nothing else like it. The little blobs almost remind me of the radiating circular pattern seen in Arkansas wavellites. My niece likes this piece best of all the ones I brought home.

To close, I'll mention that I have no significant administrative news to share related to the club. The board now meets bi-monthly and things are non-eventful on that front. By the time you read this, the club will have been present at the Santa Clara County Fair. The Member Sales that we have been holding in advance of our general meetings at the Cabana Club continue to be a hit. I hope to see you at one of our meetings in the near future.

Enjoy!

Jim Herbold

SCVGMS President

Smile

Why can't you use "beef" as a password?

Because it's not stroganoff.

Bragging Rights

Last month's Bragging Rights Theme was **"Obsidian"**.

1 Stones and Cross, **Dan Gehret**
2 Mahogany gold sheen, **Stephen May**
3 Mexican Rainbow Sheen, **Neil Delfino**
4 Zuni Bear, **Deb Runyan**
5 Large slab of Rainbow, **Larry Moore**
6 Large banded, **Dustin Bastianelli**
7 Unknown
8 Fire Obsidian (4 of 6 Pieces), **Jim Fox**
Electric blue obsidian, **John Hawk** {Ed.: I apologize for not getting a photo}

Winner: **Larry Moore** for his Large Rainbow Obsidian

This month's Bragging Rights theme is "Green".

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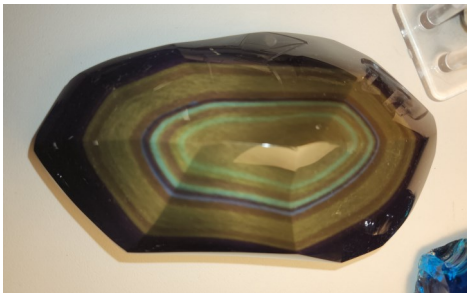

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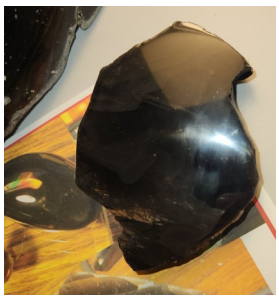

8 (See Jim Fox's Fire Obsidian for better photos)

Member Displays

{Ed.: I apologize for not getting photos of most of the pieces}

Bruce Poehlman brought a mystery rock (heavy, with purple druzy crystals), possibly gallium or bismuth.

Bob Kout brought jasper agate, and stone canyon jasper.

Neil Delfino brought a faked spider in amber.

We encourage all to bring anything to do with rocks to a meeting. Show off what you love, so that we can enjoy it with you!

Photos from the County Fair

The Flint Knapper, **Donna Kelley**

Margaret Kolaczyk, making chain mail

New member **John Hawk,** polishing stones

The Field Trip table, with **Donna Kelley**

Jim Fox at the Touch Table

Jose Sul at the polishing wheel

Rockhound Holidays–Three Cheers for August!

By Jim Brace-Thompson

From the Ventura Gem & Mineral Society's Rockhound Rambling, August 2024

Few obvious rock, mineral, or fossil related holidays showed up in my internet search for the month of August, but I did find a few, although the last one may be stretching it a bit. To wit...

August 8th is Wear Your Mom's Jewelry Day. Barbara J. Feldman started this holiday on her mom's birthday as a way to cope with her passing and to stay connected. She urges everyone to start a multi-generational tradition of not only wearing mom's jewels on this day, but keeping pieces alive– dusting them off, repairing and polishing them, perhaps taking them to a jeweler for an update and an upgrade, then wearing them proudly before passing them on to your own daughter in a "chain of love". Says Feldman, "I had a complicated relationship with my mom, but her jewelry symbolizes the good parts of our relationship; the jewelry pieces I remember from my childhood keep my mom with me in a positive way". Feldman encourages you to share your own jewelry stories and pictures via social media using the hashtag #MomJewelryDay or #WearYourMothersJewelryDay.

Search your mom's old jewelry box for a vintage piece to wear on August 8th.

International Geocaching Day is the third Saturday of August. That puts it on the 17th this year. It's said to be a sport that "uses multi-million dollar satellites to find Tupperware in the woods", and it reportedly began on May 3, 2000. That's when Oregon resident Dave Ulmer posted GPS coordinates of hidden "treasure": a bucket containing DVDs, books, a bit of money, a can of beans, and a slingshot. (What? No rocks?) Actually, though, it began back in 1854 with "letterboxing". Folk scattered weatherproofed boxes with clues to other locations. Each letterbox contained a notebook to record your name and any

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observation you might wish to make and a custom-carved rubber stamp to mark your own notebook with a record of your various finds. It became a holiday with a Geocaching Block Party in 2011. According to an informal set of ethics, geocachers follow a "take-one/leave-one" philosophy. If you take the hidden treasure, you replace it with something of comparable value. As in the days of letterboxing, there's also a logbook to record your name. Since Ulmer's original posting, it's said geocaches have been posted to sites like https://www.geocaching.com/play 600 million times! Best of all, it gets people outdoors and encourages a sense of adventure. Should we make this an official part of our annual spring or fall picnic and hide a treasure of rocks (not a can of beans) up at Camp Comfort?

August 27th is World Rock Paper Scissors Day. Forget the Olympics! Take part in a real sport where rock smashes scissors, scissors cut paper, and paper wraps rock. Played without any expense or fancy equipment, this game even transcends language barriers. Almost as old as the Olympics, the game is said to date back to the Chinese Han Dynasty between 206 BC and 220 AD when it was "Slug, Snake, Frog". Nowadays, there's even the World Rock Paper Scissors Association headquartered in Ottawa, Canada. It created this holiday in 2014 and provides the following advice for the strategically minded. Women more often throw scissors while men throw rocks. If playing against an aggressive opponent, throw paper. (Angry and aggressive players more often throw rocks.) Rocks are thrown 35.4% of the time, paper 35%, and scissors 29.6%. Use those statistics for whatever they're worth. Meanwhile, use this game to settle disputes, add fun to a party, or just to pass the time come August 27th.

On August 27th, find a partner to play Rock Paper Scissors!

Website Links

Your Window to the World of Important Websites

SCVGMS Website: https://www.scvgms.org/

SCVGMS Facebook Page: https://www.facebook.com/santaclaravalleygemandmineralsociety

American Federation of Mineralogical Societies (AFMS): https://www.amfed.org

American Lands Access Association (ALAA): www.amlands.org

BLM Rockhounding: https://www.blm.gov/programs/recreation/rockhounding

California Federation of Mineralogical Societies (CFMS): https://www.cfmsinc.org/

Mindat.org (world's largest open database of minerals, rocks, meteorites): https://www.mindat.org/

GemKids: https://gemkids.gia.edu/

Smithsonian Science How Webcast Archives: https://naturalhistory.si.edu/education/school-programs/grades-3-5/smithsonian-science-how/smithsonian-science-how-webcast-archives

Smithsonian National Museum of Natural History: https://www.youtube.com/@nationalmuseumofnaturalhistory

More Smiles

As I walk through the valley of the Shadow of Death, I remind myself that you can't always trust Google Maps.

What did Sherlock Holmes do when he dropped his mobile phone?

He cracked the case wide open!

Six cows were smoking joints and playing poker.

That's right. The steaks were pretty high.

Information on Shows

August 2-3, 2025 – Roseville, CA

Roseville Rock Rollers Gem and Mineral Society

Roebbelen Event Center @the Grounds, 700 Event Center Drive

Hours: Sat 10-5m, Sunday 10-4

Contact: (916) 216-1114,

gloriarosevillerockrollers@gmail.com

Website: https://rockrollers.com/pages/gem-mineral-show

August 16-17, 2025 – Tehachapi, CA

Tehachapi Valley Gem & Mineral Society

Tehachapi Senior Center, 500 East "F" St.

Hours 9-5 both days

Contact: (661) 972-1117,

tehachapiVGMS@outlook.com

Website: https://www.tvgms.net/

September 13–14, 2025 – Reno, NV

Reno Gem and Mineral Society

Silver State Pavilion at the Grand Sierra Resort

2500 E. Second St.

Hours: Sat 10–5, Sun 10–4

Contact (925) 785-4551, sabl@comcast.net

Website: http://renogms.org

September 20–21, 2025 – Arcadia, CA

Pasadena Lapidary Society

Arcadia Masonic Center

50 W Duarte Rd.

Hours: Sat 10–5, Sun 10–4

Contact: (626) 260-7239

Website: https://pasadenalapidary.org/pls-2025-show/

September 20-21, 2025 – Monterey, CA

Carmel Valley Gem and Mineral Society

Monterey Fairgrounds, 2004 Monterey Road

Hours: Sat and Sun 10-5

Contact: johnandjamiesmama@yahoo.com,

(831) 679-2896

Website: http://cvgms.rocks

September 20-21, 2025 – Chico, CA

Feather River Lapidary & Mineral Society

Silver Dollar Fairgrounds, 2357 Fair St.

Hours: Sat 9-5, Sun 9-4

Contact: shows@featherriverrocks.org

Website: https://www.featherriverrocks.org

September 27-28, 2025 – San Luis Obispo, CA

San Luis Obispo Gem and Mineral Club

San Luis Obispo Veteran's Memorial Building, 802 Grand Ave.

Hours: Sat-Sun 10-5

Website: https://slogem.org/gems-by-the-sea/

October 4-5, 2025 – Anderson, CA

Shasta Gem and Mineral Society

Shasta District Fair and Event Center

1890 Biggs St.

Hours: Sat 9-5, Sun 9-4

Contact: (530) 356-2378, miller3987@gmail.com

Website: https://shastagemandmineral.org/

October11-12, 2025 – Redwood City, CA

Peninsula Gem and Geology Society

Redwood City Community Activities Building

1400 Roosevelt Ave.

Hours: 10-5 both days

Contact: (650) 575-3144, cci@pacbell.net

Website: https://pggs.org/

Ducks in a Row

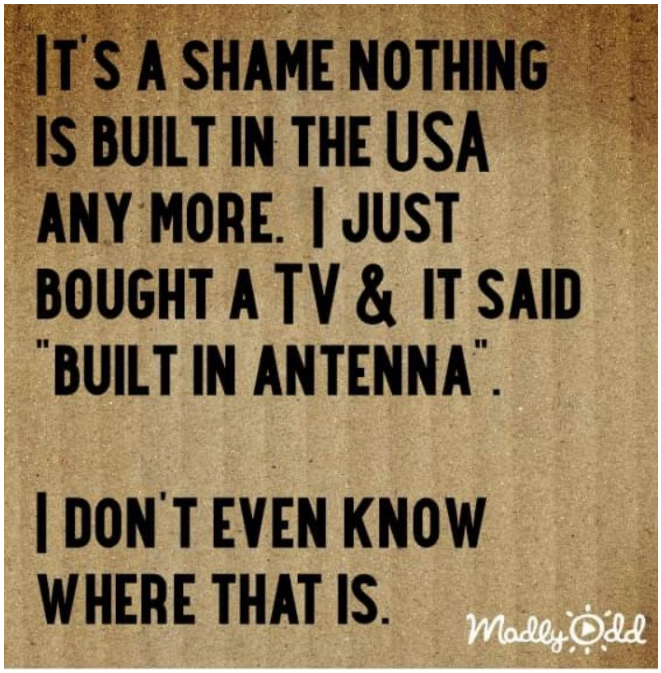
If I waited until I had all my ducks in a row, I'd never get across the street.

Sometimes you just have to gather up what you've got and make a run for it.

Judge Lynn Toler

© Tiny Buddha

https://tinybuddha.com/wisdom-quotes/if-i-waited-until-i-had-all-my-ducks-in-a-row/



Green Stones

Got a rock in your pocket? You might. And if you do, it might be green. There are certainly, after all, a good number of stones and crystals that are either green, or for which a green variety can be found.

Malachite, for example, is green. Green varieties of fluorite and calcite are also common. And crystals of certain varieties of apatite and garnet can also be green, or greenish yellow. But because I have addressed malachite, fluorite, calcite, apatite, and garnet in other essays in this compilation, in this essay I will briefly discuss some other, less common, stones that are green: greenstone, chrysocolla, prehnite, torbernite, titanite, and serpentine.

Just to get us started, I present images of these six stones in Fig. 1a., Fig. 1b., Fig. 1c., Fig. 1d., Fig. 1e, and Fig. 1f., respectively. Yes, they are all either green, or have some green embedded in them. With this, then... onward I go!

Fig. 1a. A specimen of greenstone.

From https://images.nzgeo.com/2022/02/174_GeoNews_03-1300x1294.jpg

Fig. 1b. A specimen of chrysocolla.

From https://spiritrockshop.com/wp-content/uploads/2021/04/lapidaryslabs17-1-1.jpg

Fig. 1c. A cluster of prehnite crystals.

https://assets1.fossilera.com/sp/515849/prehnite/708x500%3E/prehnite.jpg

Fig. 1d. A cluster of torbernite crystals.

https://www.weinrichmineralsinc.com/userfiles/products/3/5/3501005.jpg

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Fig. 1e. A specimen of titanite.

https://i.ebayimg.com/images/g/Mc8AAOSw1I5lIO0P/s-l1200.webp

Fig. 1f. A specimen of serpentine.

https://i0.wp.com/geologyscience.com/wp-content/uploads/2019/05/Canada-Serpentinite.jpg

Greenstone. A fine place to start an essay on green rocks is… well, greenstone! A glance at the specimen of greenstone shown in Fig. 1a. should convince you that this rock is aptly named. Greenstone also goes by "chalconatronite", and also by its traditional Māori name "pounamu". (Greenstone is only found in New Zealand, so it is not surprising that the Māori, the Indigenous Polynesian people who live on the New Zealand mainland, have a word in their native language for this stone. And by the by, the correct way to pronounce "Māori" is "mah' ree", with a bit of a trill on the "r".) In any case, although it has fallen out of favor with some in the rock and mineral world, I prefer the name "greenstone". It is, if nothing else, evocative.

Greenstone is a complex amalgam of a number of minerals, notably epidote, actinolite, albite, and chlorite. And because all of these can be found as green rocks, all of them can contribute to the green color of greenstone.

Greenstone is of moderate hardness, coming in at around six on the ten-point Mohs hardness scale. (A brief explanation of the Mohs hardness scale is included at the end of this essay.) The moderate hardness of greenstone makes it an excellent choice for fashioning statues and other pieces of art… statues and pieces of art fashioned from greenstone are likely to survive years of even rough treatment.

One of the most well-known statues formed from a chunk of greenstone, and also the largest greenstone sculpture in the world, is the statue "Señor de las

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Limas", shown in Fig. 2. This statue depicts a young man holding a limp "were-jaguar" baby; were-jaguars were mythical creatures held up as supernatural entities by the ancient peoples in Mesoamerica. By the by, this statue was created about three thousand years ago, and is on display in the Xalapa Museum of Anthropology in Veracruz, Mexico. I hope to see it, live and in person, one day!

Fig. 2. The Señor de las Limas statue, the largest greenstone sculpture in the world.

https://i.pinimg.com/736x/ea/d2/aa/ead2aa495dbd4e4213b9242138f4b6d3.jpg

Chrysocolla. Chrysocolla can be found as a green, a blue, or a blue-green stone. Fig. 1b. shows a representative specimen of the green variety of this stone. Fig. 3a. and Fig. 3b. show a blue and a blue-green specimen of chrysocolla, respectively.

The molecules that comprise chrysocolla are rather complex, with atoms of five different elements bonded together. But in each variety of chrysocolla, among those five elements is always either copper atoms, or minerals that contain copper atoms, or both. And as we know from minerals such as malachite and copper-infused gypsum—minerals that contain copper take on a green color. By the by, although there is more aluminum and more silicon than copper in a specimen of chrysocolla, it is still considered a copper ore, albeit a minor ore. Copper is valuable, after all.

Fig. 3a. A blue specimen of chrysocolla.

https://upload.wikimedia.org/wikipedia/commons/e/ee/Chrysocolla-230109.jpg

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Fig. 3b. A blue-green specimen of chrysocolla.

https://i.ebayimg.com/images/g/o2wAAOSwMSNkxSmZ/s-l1600.png

Worth noting: the word "chrysocolla" has an interesting etymology. It is formed from the ancient Greek words "χρυσός» («khrusós"), meaning "gold", and "κολλα» («kolla"), meaning "glue". Gold? Glue? Oh, my(!), yes: Chrysocolla is related to the material used by the ancients to solder together—to glue together! —pieces of gold. Yes, back some twenty-six hundred years ago, those ancients were using this copper ore to bond bits of gold together. And chrysocolla is still used for this same purpose today.

Prehnite. Although prehnite rocks are found in many shades of green, including a darker, olive green, it is most often found as a green that is light in color. (See the specimens shown in Fig. 1c. and Fig. 4a.) Prehnite is also sometimes found as a yellow, a pink, a blue, a white, and even an orange crystal; see Fig. 4b., Fig. 4c., Fig. 4d., Fig, 4e., and Fig. 4f. In addition, I note that in these images, the yellow prehnite crystals (Fig. 4b.) are embedded in a calcite matrix, the pink specimen shown is a cabochon (Fig. 4c.), and some green prehnite has snuck into the specimen that has blue spherules of prehnite in it (Fig. 4d.). And also, just to say, orange prehnite is relatively rare.

Fig. 4a. A cluster of botryoidal and globular crystals of green prehnite.

https://assets0.fossilera.com/sp/471961/prehnite/708x500%3E/prehnite.jpg

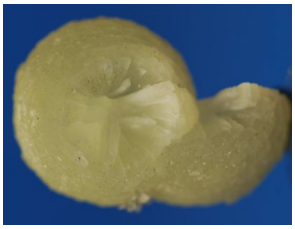

Fig. 4b. Yellow crystals of prehnite on a calcite matrix.

https://www.mineral-forum.com/message-board/files/2013_01_30_006_149.jpg

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Fig. 4c. A pink prehnite cabochon.
https://www.flickr.com/photos/finn-2367/6899999476

Fig. 4d. Blue (and green) spherules of prehnite, on a matrix.
https://www.mineral-forum.com/message-board/files/ppprehnite2_681.jpg

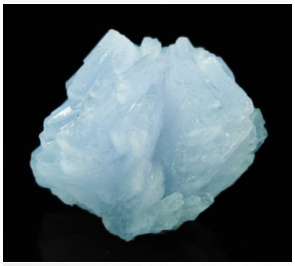

Fig. 4e. Crystals of white prehnite.
http://khyberminerals.com/tuc19/img_2364.jpg

Fig. 4f. A cluster of orange prehnite crystals.
https://cdn.irocks.com/storage/media/6251/kcpr-32a.jpg

Prehnite was discovered in a South African mine in the late seventeen hundreds, and was named to honor Hendrik Von Prehn, a commander of the military forces that stood guard over the (Dutch) colony installed at the Cape of Good Hope. (Von Prehn was also, hooray(!), a collector of rocks and minerals.) South Africa is known today as a principal source of diamonds and turquoise, as well as a number of other precious and semiprecious gems... but the discovery of prehnite in that country predates the discovery of all of those other stones. Diamonds, for example, were only found in South Africa in the eighteen sixties, nearly eighty years after the discovery of prehnite.

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Prehnite can be found as well-formed crystals, for example as box-like, rectangular prisms. More often however, specimens of prehnite present as clusters of botryoidal and globular crystals, such as those shown in Fig. 4a., Fig. 4b., and Fig. 4d. And oh, yes, prehnite is considered a semi-precious gemstone.

Torbernite. Atoms of copper are embedded in the molecules that comprise torbernite, and, yes, these copper atoms account for its green color. (Glance back: a cluster of deep green torbernite crystals was shown in Fig. 1d.)

I will bet, however, that you do not have a specimen of torbernite in your rock and crystal collection. And, I suppose you might not have even come across this rock—especially if you are relatively new to the world of minerals and crystals. Why and why? Specimens of torbernite are radioactive, so they are not commonly found for sale in stores or on the Web. And even if they were, you probably would not want a radioactive specimen in your display case.

And, oh my(!) torbernite is really radioactive: embedded in the molecules that comprise torbernite are uranium atoms, and uranium atoms are most certainly radioactive. Although it is worth noting that while uranium has some modest value, it is not economically advantageous to use torbernite as a uranium ore: it is relatively hard to extract uranium from torbernite.

As an aside, a uranium atom is radioactive because the configuration of the electrons, protons, and neutrons that comprise it is unstable. So a U235 atom, for example—a U235 atom is composed of one hundred and forty-three neutrons, ninety-two protons, and ninety-two electrons—can transform into a rather stable lead atom by emitting various bits of itself. And yes, the various bits, as well as the lead atom, are far more stable than the "parent" uranium atom.

Just by the by, torbernite was so named to honor the sixteenth century Swedish mineralogist and chemist Torbern Olof Bergman. I am a physicist, so this is

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particularly cool to me: although neither physics nor mathematics were his principal fields of endeavor, Bergman taught both of physics and mathematics at a Swedish university. He also wrote and published papers on, for example, the science that underlies rainbows, and also science that underlies the aurora borealis. So huzzah to the mineralogist, chemist, mathematician, and physicist Torbern Olof Bergman!

And although this next bit is not about rocks… I must note that the aurora borealis, about which Torbern Olof Bergman wrote, is a spectacular bit of physics. The aurora—a display of shimmering and colorful lights that sometimes appears in the sky above high-latitude regions of the Earth—is the result of charged particles being blown out from the Sun and then being drawn down—accelerated down—toward the magnetic north pole of the Earth. (Drawn down by the force that the magnetic field of our planet exerts on those charged particles.) As these particles accelerate down, they smack into particles in the atmosphere… and those interactions cause the particles in the atmosphere to glow. And to glow in a wide rainbow of colors! Yes: that is the source of the aurora borealis.

And if you are wondering, by the by, if this same phenomenon occurs at the south magnetic pole of the Earth… it does!

Titanite. Titanite is a "calcium titanium nesosilicate" mineral; the molecules of which titanite is comprised are formed from a calcium (Ca) atom and a titanium (Ti) atom bonded to a silicate. In the case of titanite, the silicate is a silicon (Si) atom bonded to five oxygen (O) atoms, or SiO_5… so the molecules in titanite are $CaTiSiO_5$. In addition, trace amounts of iron and aluminum are also often found mixed in with the calcium titanium nesosilicate molecules. Glance back up to Fig. 1e. for an image of a specimen of titanite.

Some mineralogists will tell you that titanite was named to honor the Titans of Greek mythology. But this does not ring true to me, so I prefer to think of the

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name of this mineral as linked to the chemical composition of the stone, that is, to acknowledge its titanium content.

And on the subject of the name of this mineral, titanite was once known as "sphene". But in 1982, The Commission on New Minerals, Nomenclature and Classification of the International Mineralogical Association, which is now known as The Commission on New Minerals and Mineral Names, declared that "sphene" was obsolete. And in so doing, they also approved "titanite" as the official name of this mineral. Although curiously, sphene was actually given the name "titanite" sometime around the end of the eighteenth century. It just took a while for the new name to become official.

Titanite is found in a wide range of colors, from red, black, brown, and yellow, to… yes, green. Because the presence of chromium atoms in the molecules in titanite imparts a green color—often a bright, vivid green color—to this rock, some mineralogists refer to the green variety of titanite as "chrome titanite". In addition to the image of a specimen of titanite shown in Fig. 1e., I also present the image of a cluster of titanite crystals in Fig. 5. I note that while these crystals are considerably darker than the amorphous specimen of titanite shown in Fig. 1e., both of these are common colors for specimens of titanite.

Fig. 5. A cluster of titanite crystals on a matrix. It is not uncommon to find titanite as flattened, wedge-shaped, twinned crystals, such as those exhibited by this specimen.

https://upload.wikimedia.org/wikipedia/commons/8/87/Titanite_-_Tormiq_valley%2C_Haramosh_Mts%2C_Pakistan.jpg

Serpentine. Up front, I have to note that, had I been drafting this essay only a few weeks before now, I might not have included serpentine. Yes, I was vaguely aware that serpentine is green, and, yes, I was also vaguely aware that serpentine is the official rock of California, the state in which I live. But it was just a few weeks ago that I actually acquired a specimen of serpentine. To be

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more precise, it was just a few weeks ago that I found a specimen of serpentine on the ground! Oh, my(!) I was walking in a parking lot near the Sonoma, California, coast, and there, on the ground, I spotted a green rock. And that rock was, yes, a specimen of green serpentine! Perhaps it is true for you, too: any rock that I find myself, out there in the wild, has great meaning for me. So with my newly found piece of serpentine close at hand, I will add a few words about this stone to this essay.

Before I write about serpentine, however, it is important for me to note that, at least in California, it is illegal to collect rocks and minerals from state parks or state beaches without a permit. It is important to note, also, that certain rocks and minerals are protected by federal laws. But I hope that I was not pushing the limit of any of these laws by picking up a rock in a parking lot! In any case, please do not break any laws in your excitement to find cool rocks.

So, serpentine… Serpentine is a magnesium silicate; the molecules that comprise this rock include atoms of magnesium (Mg), hydrogen (H), and oxygen (O), together with silicates. In this case, the silicates are, typically, two silicon atoms bonded to three oxygen atoms, or Si_2O_5. So the molecules in a specimen of serpentine are, typically, $Mg_3Si_2O_5(2H_2O)O_2$.

Specimens of serpentine are most often composed of a number of separate magnesium silicates. And one of these carries an interesting and curious name: lizardite! No, the name of this stone is not connected to the name of the reptile: lizardite was discovered, in the nineteen fifties, on the Lizard Peninsula in Cornwall, England.

And no, again, the Lizard Peninsula was not so named because lizards can be found there. Oh, I am sure that there are some lizards that live on the Lizard Peninsula, but linguists have suggested that the name of the peninsula is derived from its name in the Cornish language. From, perhaps, the Cornish term "lys ardh", which means "high court", or from, perhaps, the Cornish word "lezou", meaning "headland". I am not a linguist, but I have to side with the second

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option, given that the Lizard Peninsula is the southernmost tip of England and therefore a "headland". A section of the rugged and rocky Lizard Peninsula coast is shown in Fig. 6. And, oh my(!), after gazing at this and other pictures of the Lizard Peninsula, I have added it to the list of places I would like to visit!

Fig. 6. Part of the coast of the Lizard Peninsula in Cornwall, England.

https://www.cornishcottages.co.uk/Media/4241_W753H377_Kynance_Cove_034f56.jpg

As promised, before I wrap up this essay on green stones… a word about the Mohs hardness scale. This scale, which characterizes the relative hardness of one mineral compared to another, or, really, one material compared to another material, was devised by the German chemist and mineralogist Carl Friedrich Christian Mohs in the early part of the nineteenth century. Mohs created this scale as a way to help him identify rocks, minerals, and crystals.

The Mohs hardness scale runs from a hardness of one (quite soft and easily scratched) to a hardness of ten (very hard and hard to scratch). The marker posts on the scale that Mohs created, from soft to hard, are **t**alc, **g**ypsum, **c**alcite, **f**luorite, **a**patite, **o**rthoclase feldspar, **q**uartz, **t**opaz, **c**orundum, and **d**iamond. I have put the first letter in each of these names in bold, to tie them to the handy-dandy mnemonic "The girls can flirt and other queer things can do". "T" stands for "talc", "g" for "gypsum" … up through "d" for diamond. Remember this mnemonic and you will never forget the hardness scale!

By the by, there is nothing special about the specific minerals on the Mohs hardness scale. Before Mohs, minerals were primarily characterized by their chemical properties, but Mohs wanted a more direct way to characterize them. So he devised this scale by observing that some minerals are harder than others, and that when one mineral was drawn against another, the harder mineral was able to scratch the softer one. After studying many minerals, he selected the ten minerals named above to define a ten-point hardness scale.

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Let us consider the Mohs hardness scale in action. Draw, for example, a piece of fluorite against a piece of calcite. With a Mohs hardness of four, fluorite is harder than calcite, which sits at three on the Mohs hardness scale. (Yes, calcite is the "Can" term, that is, the third term, in the mnemonic.) So fluorite will leave a scratch on calcite. But apatite is harder than fluorite: apatite is the "and", or fifth, term in the mnemonic, so it has a Mohs hardness of five. So when a piece of fluorite is drawn against a piece of apatite, it is the fluorite that will be scratched.

If you will be using the Mohs hardness scale out in the field, it is also helpful to know the hardness of some common, easily available objects in addition to the ten stones Mohs selected. Your fingernails, for example, have a Mohs hardness of two and a half, the hardness of a copper penny is three and a half, the hardness of a knife blade is five and a half, and both a piece of glass and a steel file have a Mohs hardness of six and a half. So if you can, for example, scratch an unknown mineral specimen by running the edge of your fingernail against it, it has a hardness of less than two and a half. At a hardness of less than two and a half, that unknown mineral could be a specimen of talc or gypsum. And a penny, with a hardness of three and a half, will leave a scratch on a piece of calcite. (Calcite, again, has a Mohs hardness of three.) But a penny will not scratch a specimen of fluorite; with a hardness of four, fluorite is harder than a penny.

I hope you are ready to find some "green" to add to your rock and mineral collection. Although I would recommend against putting a specimen of torbernite on your wish list—it is, after all, radioactive!

Prof. Philip R. Kesten, Ph.D., Department of Physics, Santa Clara University

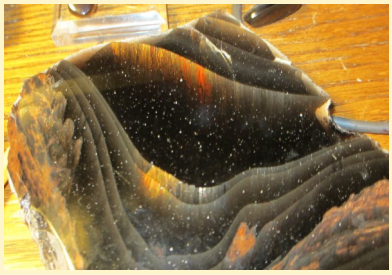
Jim Fox's Touch Table: Fire Obsidian

Fire Obsidian has a bright fiery flash, found in the obsidian, which can contain many bright colors. It tends to run along a strand, and takes a lot of practice, patience, and skill in order to create beautiful gems with it. Fire Obsidian gets it's color and flash from the magnetite that is embedded within the volcanic glass. These tiny microscopic metal flecks refract the sun's rays through the obsidian, like a prism, creating one of the rarest forms of obsidian known to exist.

Since Fire Obsidian gets its color from magnetite, it does require bright lighting, with the stone turned in the right direction, to get the color to light up. Under normal conditions, it will appear black. Because of all these factors, Fire Obsidian can be comparable, in price, to your finest quality Black Opals.

Fire Obsidian Cab, Polished

Fire Obsidian Flat, Polished



Fire Obsidian Slab, Polished

Fire Obsidian Cut, Unpolished

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An Invitation

This society is pleased to invite guests to attend general meetings, study groups, and field trips. **General meetings are held the fourth Tuesday of every month with meet and greet time beginning at 7:00 followed by the meeting at 7:30 PM at 100 Belwood Gateway (the Cabana Club), Los Gatos, CA 95032.** Belwood Gateway is just south of Blossom Hill Road between Leigh Avenue and Harwood Road.

Our Society's Purpose: The inculcation of a love of rocks and minerals by the furtherance of members' interests in the earth sciences and by education in all facets of related educational activities with the promotion of good fellowship, proper ethics, and conduct.

Our Membership Requirements: Attendance at two general meetings within twelve months.

This society is a member of the California Federation of Mineralogical Societies (CFMS) and is affiliated with the American Federation of Mineralogical Societies (AFMS).

Our Newsletter, the Breccia, is published 11 times annually. The deadline for all articles is the Sunday after each general meeting. The Breccia editor is **Deb Runyan** who may be contacted by email at editor@scvgms.org and by phone at 408-628-7789. The Breccia is proofread by **Pat Speece** and **Sonia Dyer**.

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