BRECCIA

Santa Clara Valley Gem and Mineral Society

Volume 71 Number 10, November-December 2023

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Events

November 28: The General Membership Meeting will feature **a Silent Auction** and **Election**. Bring any extras you may have laying around to sell and $$ for buying! We will be voting for Officers and Board Members for 2024.

November 30: Board Meeting on Zoom.

December 5: Installation Dinner where we have a delicious dinner, and then the 2023 Board Members will be thanked and 2024 Board Members will be introduced.

The December Board Meeting will immediately follow.

January 23, 2024: General Meeting. Topic to be determined.

January 25, 2024: Board Meeting on Zoom.

See page 4 for **Field Trips**.

Editor's Message

November and December will probably be busy months for all. However, because this is traditionally a November-December issue, I get December off from editing.

The **November General Meeting** will be a **Silent Auction** and the **Election for Officers and Board Members**.

The **December General Meeting**, on December 5, will be the **Installation Dinner,** leaving the end of the month free for other activities. See page 3 and fill out the registration for the dinner.

If you have anything you would like to see in the *Breccia*, please send it to editor@scvgms.org. The deadline for submissions is the Sunday after the General Meeting.

Wishing you all a great holiday season and a happy new year,

Deb Runyan, Breccia Editor

editor@scvgms.org, 408-628-7789

Rockhound of the Month

Our rockhound of the month is **Alan Achor** for being the manager of bragging rights for many years.

Sunshine

There is nothing new to report.

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

Installation Dinner 2023

Date: Tuesday, December 5, 2023
Dinner is at 7:00 PM
Place: Cabana Club, 100 Belwood Gateway, Los Gatos

Deadline for reservations: November 30, 2023
Cost: $10.00 per adult, $5.00 per child under 12
Please bring an unwrapped gift for a boy or girl to donate to Toys for Tots.

Return your reservation form to:
Stephen May
1092 Candlewood Ave.
Sunnyvale, CA 94989

Sign up early, there is only room for 50 attendees.

Dinner will be buffet style with the following
Entrees: Rotisserie Chicken; Mushroom Penne Pesto; Fettuccini Chicken Tequila
Salad:Romaine Gorgonzola Salad
Vegetable: Sauteed Almond Broccoli
Side: Homemade honey, wheat bread, and butter
Dessert: Caramel apple bread pudding; Special Rum Sauce

Installation Dinner Registration

Name: _____ Phone # : _____

Number of adults: ____ X $10.00 = $_____

Number of children under 12: ____ X $ 5.00 = $_____

Please make checks payable to: Santa Clara Valley Gem and Mineral Society (SCVGMS)

Mail this form and your payment to:
Stephen May
1092 Candlewood Ave.
Sunnyvale, CA 94989

Field Trips

Note: Driving times are from Campbell and are approximate.

November 11, Saturday: Black Butte Reservoir/Stoney Creek, Orland, CA - 3-hour drive, with tolls
"Stoney Creek" jaspers
Sponsored by Mother Lode Mineral Society
Contact: Kevin Kirschman, kkirschman@prodigy.net or 209-769-1502 cell/text
RSVP to Kevin Kirschman

November 18, Saturday: Calico Area near Yermo, CA - 6-hour drive
Silver Lace Onyx, Petrified Palm Root, nice agate and assorted gems and minerals.
Sponsored by Conejo Gem & Mineral Club
Sign up at: http://whoscoming.com/vgms/Calico2023.html

November 18, Saturday: Fossil Discovery Center, Chowchilla, CA - 2-hour drive
Off highway 99, 19450 Ave. 21 ½, Chowchilla, CA
Pleistocene epoch 700,000 years ago
Adults - $12, Senior - $10, Children - $8

May 29 – June 2 (1 single day in this time-frame, TBD next April): Rainbow Ridge Opal Mine, Denio, NV - 9-hour drive, with tolls
3 spots available, up to 3 adults per spot. $900.00 fee dig.

June 13 – 16: Prineville OR, 10-hour drive.
Pow Wow Field Trips.
A 4-day Rock Show and 3 Field Trips, Fri (6/14), Sat (6/15), Sun (6/16). Locations to be announced.

August 3, Sat – 9, Fri: Delta UT, 11.5-hours drive through Reno; 13-hours through Las Vegas
Dugway Geodes, Topaz Mountain, Drum Mountain agate, Copper varieties, multi-colored druzy and fine crystals, mine tailings
2 travel days, 5 collecting days. Potentially, Garnet Hill, Ely, NV, on the way home.

Proposed for a time in the future: Ocean View Mine, San Diego Area
Tourmaline and Quartz

Bragging Rights

October's Bragging Rights Theme was **"My favorite thing I made"**.

There were two entries:

1. Agate from Drum Mountain Utah, **Stephen May**

2. Big Sur Nephrite Jade inlaid with Virgin Valley Opal from the Bonanza Opal Mine, NV, **Lynn Toschi**

Winner: **Lynn Toschi**

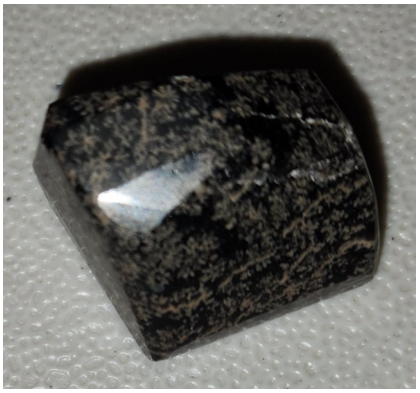
The program for the November General Meeting will be a Silent Auction, so there will be no Bragging Rights.

Cesar Nuñez - Bragging Rights Chairman

Member Displays

Bruce Pohlman showed a mystery mineral (possibly Chalcedony with Obsidian), Snowflake Obsidian, and “fireworks” Obsidian.






Joan Schram showed a beautiful specimen of Black Garnet.


Please email a photo of the items that you wish to display to Michele Smith by the Sunday before the general meeting, so that the people who attend the meeting on Zoom rather than in person can view your items. **Please bring your items with you to the Cabana Club, if you are attending the meeting.**

Don’t know what to display? Any type of rock, mineral, or fossil (identified or not), your latest project, information on a field trip, ideas for a display case, or anything to do with rocks is appreciated. Sharing items helps to educate all who are attending. Show off what you love, so that we can enjoy it with you.

Megalodon Shark vs Great White Shark

This photo shows very clearly the size difference between extinct megalodon sharks and today’s great whites.

https://twitter.com/Atomicfact/status/955447607349870592

Thanks to **Sonia Dyer** for the information!

November Elections

Elections for SCVGMS Officers and Board of Directors members are held at our November General Meeting. Participating as one of the board members is a superb way of getting to know your fellow club members, and an excellent way to serve SCVGMS. If you are interested in any of the offices listed below, contact **Stephen May**, our president. His email address is stephenmay0990@gmail.com.

The current President and Vice-President are leaving office after December, so we need new people to step up!

President—sets the agenda and presides at all meetings of the society using Robert's Rules of Order as a guide. **Jim Herbold** has volunteered.

Vice-President—performs all duties of the president when the president is absent or unable to perform duties customary to the office. The vice-president is also responsible for all club publicity except for the publicity of our annual show. **Bruce Poehlman** has volunteered.

Secretary—keeps an accurate record of the proceedings of all meetings of the society and the board of directors, keeps a roster of the members, publishes a membership directory to members, sends members notices of special meetings, and answers the routine correspondence of the society. The secretary may appoint members to help as needed. **Cynthia Porter** has agreed to continue.

Treasurer—receives all dues and other monies and disburses monies when so authorized by the board of directors, keeping a full and accurate accounting of all transactions. The treasurer also renders reports at the Annual Meeting, is responsible for timely and accurate filing of tax returns, and makes a monthly report to the board of directors and to the president. **Frank Mullaney** has agreed to continue.

Breccia Editor—prepares the Breccia each month except December when no Breccia is published. The editor may appoint an assistant. **Deb Runyan** has agreed to continue.

Federation Director—reports on all Federation activities the month following Federation meetings. **Karen Welder** has agreed to continue.

Alternate Federation Director—reports on all Federation activities the month following Federation meetings taking the place of the federation director when needed. **Paul Kidman** has agreed to continue.

Parliamentarian—shall be present at all Regular and Board meetings, be familiar with the Bylaws and Operating Regulations and refer to the Robert's Rules of Order as needed. The parliamentarian is a nonvoting member of the Board of Directors, elected annually along with the officers and the board. **Dean Welder** has agreed to continue.

There are five **Board Members at Large** positions. These members attend all board meetings and participate in the discussions and voting on any business at hand. **Jim Fox, Missy Fox,** and **Noel Runyan** have agreed to continue. **Stephen May** and **Michele Smith** will join.

Website Links

Your Window to the World of Important Websites

Click on any links below for sites you want to visit!

Link to Our SCVGMS Website: https://www.scvgms.org/

Note: After you click on the above link, if you want to see the Breccia and other news items, scroll down and click on "Download", shown under the Newsletter option.

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

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

To access the news from the **American Lands Access Association**: www.amlands.org

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

Advice From Beings In Nature

Advice From a Penguin

Dive into life. Find warmth among friends. Appreciate snow days. Take long walks. Stand together. Go the extra mile. Keep your cool!

Advice From a Polar Bear

Live large. Sniff out opportunities. Learn some good icebreakers. Be thick-skinned. Be fearless. Appreciate long winter nights. Keep it cool.

Advice From a Sea Turtle

Swim with the current. Be a good navigator. Stay calm under pressure. Be well traveled. Think long term. Age gracefully. Spend time at the beach.

Advice From a Glacier

Carve your own path. Go slow. Channel your strengths. Smooth the way for others. Keep moving forward. Avoid meltdowns. Be cool!

Advice From a Tree

Stand tall and proud. Sink your roots into the earth. Be content with your natural beauty. Go out on a limb. Remember your roots. Enjoy the view.

Advice From a Mountain

Reach for new heights. There is beauty as far as the eyes can see. Climb beyond your limitations. Be uplifting. Savor life's peak experiences. Rise above it all. Avoid dark and cloudy thoughts. Rock on.

Information on Shows

†See the Rock & Gem website here for more information on these shows.

†November 10-12, 2023 - Santa Ana, CA

West Coast Gem & Mineral Show

Holiday Inn-Orange County Airport

2726 S. Grand Ave.

Hours: Fri 10-6, Sat 10-6, Sun 10-5

Contact: Laura L. Delano, President, MineralShows, LLD@gmail.com

Website: https://www.mineralshowslld.com/

†November 11-12, 2023 - Lake Havasu City, AZ

53nd Annual Lake Havasu Gem & Mineral Show

Aquatic Center

100 Park Ave.

Hours: Sat 9-5, Sun 9-4

Contact: Sandi Willis, (928) 733-6270, willissandie318@gmail.com

Website: https://lakehavasugms.com/

†November 17-19, 2023 - Hillsboro, OR

Gem Faire

Westside Commons

801 NE 34th Ave.

Hours: Fri 12-6, Sat 10-6, Sun 10-5

Contact: Yooy Nelson, (503) 252-8300, info@gemfaire.com

Website: https://gemfaire.com/

†November 18-19, 2023 – Lakeside, CA

El Cajon Valley Gem & Mineral Society

Lakeside Rodeo Grounds

12584 Mapleview St.

Hours: Sat 9-5, Sun 9-4

Contact: Cheryl Boney, (619) 277-4981, ecvgms@gmail.com

Website: https://www.ecvgms.org/

†November 25-26, 2023 - San Francisco, CA

Pacific Crystal Guild

San Francisco County Fair Building

1188 9th Ave., Golden Gate Park

Hours: Sat 10-6, Sun 10-4

Contact: Jerry Tomlinson, (415) 383-7837, jerry@crystalfair.com

Website: https://www.crystalfair.com/

†December 1-3, 2023 - Costa Mesa, CA

Gem Faire

OC Fair & Event Center

88 Fair Dr.

Hours: Fri 12-6, Sat 10-6, Sun 10-5

Contact: Yooy Nelson, (503) 252-8300, info@gemfaire.com

Website: https://gemfaire.com/

†December 2-3, 2023 - Barstow, CA

Mojave Desert Gem & Mineral Society

Cora Harper Community/Fitness Center

841 Barstow Rd.

Hours: 10-5

Contact: John Printz, (760) 979-6138, MDGMSsecretary@gmail.com

Website: https://mdgms.net/

†December 8-10, 2023 - West Jordan, UT

R.O.C.K. (Rockhounders Outreach for Community Knowledge)

Viridian Library and Event Center

8030 South 1825 West

Hours: Fri 10-6, Sat 10-6, Sun 10-4

Contact: Angela Dieter (801-634-5167) / Janica Wright (801-641-8588)

†December 8-10, 2023 - Santa Barbara, CA
Gem Faire Inc
Earl Warren Showgrounds
3400 Calle Real
Hours: Fri 12-6, Sat 10-6, Sun 10-5
Contact: Yooy Nelson, (503) 252-8300,
info@gemfaire.com
Website: https://gemfaire.com/

†January 5-7, 2024 - Mesa, AZ
Flagg Mineral Foundation
Mesa Community College
1833 W. Southern Avenue, NE Corner of Dobson Road and US 60
Hours: Daily 9-5
Contact: Dana Slaughter, dsminerals@aol.com
Website: https://flaggmineralfoundation.org/home/flagg-gem-and-mineral-show/

†January 17-21, 2024 - Quartzsite , AZ
Quartzsite Improvement Association
225 E Ironwood
Hours: Daily 9-5
Contact: Nancy Nichols, (928) 927-6325,
Powwow@qiaarizona.org

January 20-21, 2024 – Exeter, CA
Tule Gem and Mineral Society
Exeter Veterans Memorial Building
324 N. Kaweah Ave.
Hours: Sat 10-5, Sun 10-4
Contact: (559) 802-6029,
bandgbing@aol.com
Website: http://www.tulegem.com/

†January 24-February 4, 2024 - Tucson, AZ
JOGS Tucson Gem & Jewelry Show
Tucson Expo Center
750 E Irvington Rd
Hours: Daily 10-5, Sun. 10-4
Contact: Yelena Masenko, (213) 629-3030,
advertising@jogsshow.com
Website: https://jogsshow.com/

†February 17-18, 2024 - Antioch, CA
Antioch Lapidary Club
Contra Costa County Fairgrounds
1201 West 10th St.
Hours: Sat 10-5, Sun 10-5
Contact: (925) 457-1859, (510) 693-9075,
roccosgee1@yahoo.com,
kellyplumb900@yahoo.com
Website: https://antiochlapidaryclub.com/

February 24-25, 2024 – Vallejo, CA
Vallejo Gem and Mineral Society
Solano County Fairgrounds
McCormack Hall,
900 Fairgrounds Dr.
Hours: Sat and Sun 10– 5
Contact: (415) 254-1506,
dduhonvgms@gmail.com
Website: https://vjgems.co

March 2-3, 2024 – Ventura, CA
Ventura Gem & Mineral Society
Ventura Co. Fairgrounds
10 W. Harbor Blvd.
Hours: Sat 10-5, Sun 10-4
Contact: (805) 312-8467, info@vgms.org
Website: https://www.vgms.org/

March 16-17, 2024—San Jose, CA
Santa Clara Valley Gem and Mineral Society
Santa Clara County Fairgrounds
344 Tully Rd.
Hours: Sat and Sun 10–5

Semi-precious Gems—Beryl and Topaz

Prof. Philip R. Kesten, Ph.D.

Got rocks in your pocket? Yes, you do—and if not in your pocket, perhaps hanging from a chain around your neck or from a bracelet on your wrist… or set into a ring. The gemstones in your jewelry, both precious and semi-precious gemstones, are rocks. When you see them for sale in a store or on website they are usually faceted and polished, but they are rocks nevertheless—and you can certainly find them as rough stones. Many rocks are considered semi-precious, among them amethyst, beryl, onyx, and topaz. In this essay we will take a look at beryl and topaz.

Before we get started in earnest, it's worth noting that although it's tempting to think of "precious" gems as costly and "semi-precious" gems as less so, that's not always the case. It's true that the "big four" precious stones—diamonds, blue sapphires, rubies, and emeralds—are indeed pricey. But many so-called semi-precious stones, especially ones of high quality, can also carry a stiff price tag. For this reason, many people have stopped separating the gem world into these two categories. And by the by, although rubies are always red and emeralds always green, there are varieties of sapphire that are not blue—there are, for example, purple, green, and even orange sapphires. These stones tend to cost less than blue sapphires.

Let's start with beryl. Individual molecules in beryl have the chemical composition $Be_3Al_2(SiO_3)_6$, that is, atoms of beryllium, (Be), aluminum (Al), silicon (Si) and oxygen (O) bonded together. In these "beryllium aluminum silicate" molecules, six groups of one silicon atom bound to three oxygen atoms (SiO_3 is a silicate molecule) are bonded to two beryllium atoms and two aluminum atoms. Each beryllium and each aluminum atom has lost electrons; the net non-zero electrical charge that results from this deficit of electrons enables them to connect to (that is, to chemically bond to) the six silicates.

The six-fold nature of the beryllium aluminum silicate molecules results in a hexagonal crystal habit—long crystals with six smooth sides, and most often with the same angle between every pair of adjacent sides. Crystals of beryl are most often "flat" terminated, that is, the end of the crystal is flat rather than pointed. (Crystals of quartz or tourmaline, for example, terminate in a point.) Figure 1a. shows a sketch of a flat-terminated, hexagonal crystal, and a crystal of green beryl is shown in Figure 1b.

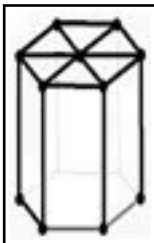


Fig. 1a. A sketch of a flat-terminated, hexagonal crystal. (Made by prk)

Fig. 1b. The hexagonal crystal habit is evident in this crystal of beryl. https://i.pinimg.com/564x/d2/cd/7f/d2cd7f47c1fe4a3be6cd1c80d6988ca9.jpg

Yes, the beryl crystal shown in Fig. 1b. is green. But the variations of color in specimens of beryl span a wide range, from colorless (pure beryl), to red ("red beryl"), to yellow ("heliodor"), to green

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("emerald"). (Yes, emerald is a variety of beryl!) Many of the colors of beryl arise due to impurities in the chemical composition of the crystal. A small amount of manganese, for example, imparts a deep red color to beryl. Heliodor gets its yellow color from small amounts of iron, and emerald is green due to small amounts of chromium mixed in with the beryllium aluminum silicate molecules. A few atoms of the element lithium impart a light red color to beryl, which takes the name "pezzottaite," and other varieties of beryl include colorless goshenite, pink morganite, and light blue aquamarine.

Would you like to wear earrings or a pendant into which a cut and faceted piece of beryl has been set? A relatively small specimen of brilliant yellow heliodor will only set you back around $150 per carat, that is, about $150 for a stone that weighs 200 milligrams. (Larger stones, and stones with few imperfections cost more, perhaps $500 per carat. And really large stones, stones of more than 20 carats or so, can run over $1,000 per carat.) Red beryl, a rather rare variety of beryl, on the other hand, can cost as much as $20,000 per carat. And a cut and faceted, high quality emerald can run as high as $100,000 per carat. So when it comes to gemstones, all beryls are not created equal.

What about topaz? We humans have had a fascination with the gemstone topaz for centuries. Ancient Romans often carried specimens of topaz, believing that the stone provided protection when travelling. During the Middle Ages some people believed that attaching a specimen of topaz to their left arm would ward off curses. Ancient Hindus believed that a topaz in, say, a pendant, would bring wisdom and long life to the wearer. And an English superstition that dates back to the early 1800s claimed that topaz could cure mental disorders.

Today, topaz is a popular stone both among rock and crystal collectors and among those who enjoy fine jewelry. It can be found in nature in a number of colors, although most common are colorless, brown and yellow. Blue topaz—a pale, light blue topaz—exists, and is both pricey and rare. (But beware! Most blue topaz was not that color when it was dug out of the ground; a blue color is often added to a colorless topaz by pounding it with radiation.)

The name "topaz" has a somewhat confused history. It comes from the Greek "Topázios" or "Τοπάζιος», the name of a tiny island in the Red Sea. (This island is now known as Geziret El Zabargad (Zabargad Island) in Greek, or St. John's Island in English.) But no, this island was not a source of topaz in ancient times. Rather, Topázios was the first place in the ancient world where peridot was first found—peridot, a yellow-green variety of olivine. The Greek name for peridot was "topázios," which gave the island its name. But a yellowish olivine was also found on the island, and back then both peridot and this yellowish olivine were confused with topaz. Indeed, back in the Middle Ages many people referred to any yellowish stone as "topaz." So the stone topaz gets it name due to confusion!

Topaz was once hard to find, and was therefore rather pricey. A pinkish orange variety of topaz, which was first found in the Ural Mountains in Russia and which became known as "imperial topaz" to honor the Russian czar, is particularly rare. As a result, imperial topaz was—and is still today—rather expensive. Back when it was discovered in the 1700s, an imperial topaz specimen of even modest

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size might have commanded over a million in today's dollars. And today, even with so many sources of topaz having been discovered since the eighteenth century, a specimen of imperial topaz can still fetch a hefty price of about $1,000 per carat. A rough crystal of imperial topaz is shown in Figure 2a, and a faceted imperial topaz gemstone in Figure 2b.

Fig. 2a. A rough crystal of imperial topaz, https://itacrystals.com/wp-content/uploads/2021/07/Tpzio1.jpg

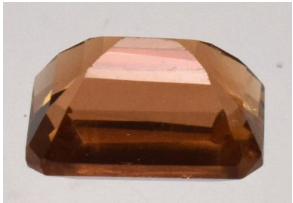

Fig. 2b. A faceted imperial topaz gemstone, https://i.etsystatic.com/27172493/r/il/0c084a/3389118465/il_794xN.3389118465_apz3.jpg

In addition to its rarity, topaz—and particularly a larger specimen of topaz—is expensive due to its tendency to break along fixed planes within a crystal. Why does that increase the price of topaz? As a result of this "perfect cleavage," crystals of topaz are relatively fragile, so more often than not, topaz is only found in smaller bits and pieces rather than larger, whole crystals.

Don't be deceived, however, by the fragile nature of topaz… it is still rather hard. Yes, there it is up at 8 on the Mohs' hardness scale. (The Girls Can Flirt And Other Queer Things Can Do: from 1 to 10 in hardness, talc, gypsum, calcite, fluorite, apatite, orthoclase feldspar, quartz, topaz, corundum, and diamond.) At a hardness of 8, a piece of topaz will leave a scratch on a piece of glass (Moh's hardness of 5.5), on a steel file (Moh's hardness of 6.5), and even on a piece of unglazed porcelain tile (Moh's hardness of 7).

Pure topaz is comprised of aluminum fluorosilicate molecules, in which aluminum (Al) atoms are bonded to silicates (SiO_4) and fluorine (F), oxygen (O), and hydrogen (H) atoms to form $Al_2SiO_4(F,OH)_2$). Figure 3 shows a silicate molecule. Its four oxygen atoms form a tetrahedron with the silicon atom at its center; each oxygen atom holds an extra (negatively charged) electron, which allows these silicate molecules to bond to other atoms to form aluminum fluorosilicate molecules.

Pure topaz is colorless, but specimens of topaz can be found in a variety of colors—pink and red, yellow, blue, violet, and brown, for example. Some of these colors result from impurities, for example, topaz becomes pink, red, or violet when chromium atoms—only a few chromium atoms per millions of aluminum fluorosilicate molecules—find their way into the mix as crystal formation occurs.

Topaz can form as relative short, stubby, four-sided crystals with flat terminations, as shown in Figure 3a. Topaz crystals can also exhibit a variety of more complex habits, including crystals with sides of different sizes and at different angles one with respect to the other, as shown in Figure 3b. As a general rule, topaz crystals exhibit three mutually perpendicular axes of different lengths.

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Fig. 3a. A rough crystal of topaz, exhibiting four sides of equal size and a flat termination, https://www.mineralminers.com/html/imperial-topaz-crystals.stm#imperial-topaz-crystals

Fig. 3b. A complex crystal of topaz., https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcS69KwcEBIkZx7MuXVzerBhZ8BaHGFj6RvbiQ&usqp=CAU

Finally, here, perhaps, is a surprise about topaz as a gemstone. We tend to think of gemstones as stones that sparkle, especially when they have been faceted and polished. This is generally true because when light entered through a top face of a faceted stone—a gemstone such as diamond - most of that light ends up being reflected back up to, and out of, one of the top surfaces. This makes it seem like the light is coming from inside the stone, which makes a gemstone like a diamond sparkle. See Figure 4.

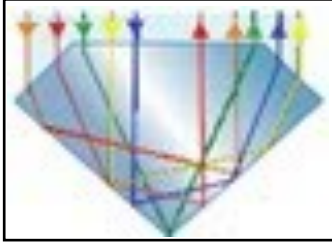

Fig. 4. Light that enters through top surfaces of a diamond (on the left side of this sketch) is reflected by back and out through the top surface (on the right side). This makes it seem like the light is coming from inside the diamond, and makes the diamond sparkle. (Made by prk)

But what does the sparkle of a diamond have to do with topaz? A bit of physics will help answer this question.

When light strikes the boundary between the surfaces of two materials, it can exit the boundary at a different angle than the angle at which it entered. Light travels at a fixed, given speed in any particular material, but when comparing different materials, the speed at which light travels is always slower when the density is lower. In addition, another key to the phenomenon of light crossing a boundary between two materials is that light is a wave. Certain aspects of light "wiggle" up and down as the light wave propagates.

The distance a wave travels in one wiggle—this is the wave's "wavelength" or λ—is equal to the speed of the wave (v) times the time for one wiggle (T), or $\lambda = v\,T$. (Think about taking a drive in your car. The distance you travel can be determined by multiplying your speed times the length of time you have driven.) Because the rate at which a light wave wiggles up and down, and therefore the time T

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that it takes for one wiggle, is always the same regardless of the medium through which light is passing, the wavelength shrinks when the speed is lower. Diamond is far denser than air, so light slows down after it enters a diamond from the surrounding air. And because the speed of light in a diamond is lower than the speed of light in air, the wavelength of light in diamond is smaller than the wavelength of that same light wave in air.

A picture will help make sense out of that last statement. Figure 5a. shows a wave of light moving through air from the upper left to the lower right. Two successive wave crests are shown as yellow lines, and the wavelength λ—the distance between successive wave crests—is shown in red. In Figure 5b. the light enters through the top surface of a diamond. Because the wavelength in diamond (again, shown in red) must be smaller than the wavelength in air, and because the wave crests must remain connected on either side of the air-diamond interface, the wave must change direction as it enters the diamond. This phenomenon is known as "refraction."

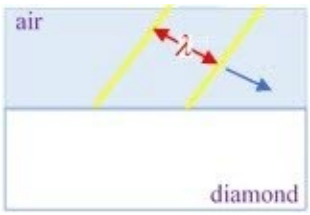


Fig. 5a. Light waves, represented by two wave crests (two yellow lines), travel through air toward a diamond surface, in the direction denoted by the blue arrow. The wavelength λ of the light wave is shown in red. (Made by prk)

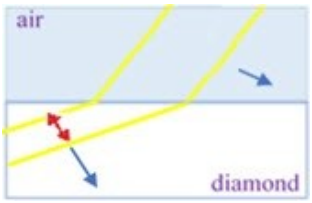


Fig 5b. The light wave travels more slowly in the diamond, which results in a shorter wavelength. As a result, the light wave exits the boundary at a different angle than the angle at which it entered the air-diamond interface. (Made by prk)

Okay, but wait, you say—where's the sparkle? We can sketch the directions of a light wave as it, say, leaves a diamond and enters air, as in Figure 6a. We have been careful to make sure that the angle between the (perpendicular to the) surface and the direction of the light in air is larger than the angle in the diamond. In Figure 6b., the angle at which the light approaches the diamond-air interface is larger, so large that the outgoing light wave has been refracted right down to the surface. And in Figure 6c., in which the light hits the diamond-air boundary at an even larger angle than in Figure 6b., the light has no choice but to be reflected back into the diamond.

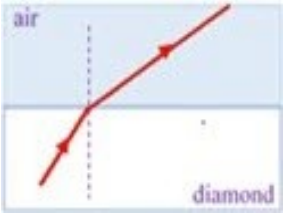


Fig. 6a. Light waves traveling from inside a diamond to the surrounding air leave the diamond-air interface at a larger angle than the angle at which they entered. (Made by prk)

Fig 6b. When the light strikes the diamond-air interface at a large enough angle, the outgoing light wave come out parallel to the surface. (Made by prk)

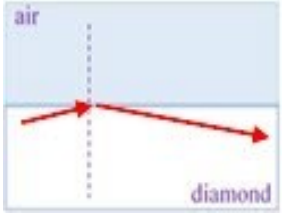


Fig 6c. Light striking the boundary at an angle larger than the one shown in Figure 6b. is reflected back inside the diamond. (Made by prk)

(Continued on page 16)

(Continued from page 15)

Could this happen? Most certainly, yes! Take a look back at the sketch in Figure 4. Every ray of light drawn entering the diamond is reflected back into the diamond as it strikes diamond-air interface at the lower left, and again at the lower right of the diamond. As a result, all of those rays exit the diamond through the top surface. Light appears to come from within the diamond!

Okay, but wait, you say—where's the sparkle? This phenomenon of internal treflection arises because the speed of light in a diamond is not the same as the speed of light in air. But another aspect of the speed difference is that the speed of blueish light in a diamond is not quite the same as the speed of reddish light! Because white light is mixture of light of all the colors of the rainbow, the color-dependence of the speed of light in diamond causes light of different colors to refract at slightly different angles. In this process, then, the different colors in white light become slightly separated. So when you move a diamond just a bit, you see moving, changing, different colors of light. The light shimmers, and oh my, yes, the diamond sparkles!

Okay, but wait, you say—what does this have to do with topaz? The speed of light in topaz is relatively high compared to the speed of light through diamond, and, indeed, through most other gemstones. How high? In space, light travels at around 670,000,000 miles per hour. In a diamond, the speed of light is about 40 percent of that, or 280,000,000 miles per hour. In, say, cubic zirconium, light speed is about 310,000,000 miles per hour. But in topaz, light can whiz along at nearly 420,000,000 miles per hour. Much higher than in, say, a diamond! And that much higher velocity means that far less of the light that enters the top surface of a faceted topaz will be reflected inside the stone, so far less of the light entering the top surface of the stone will come back out through the top surface. Much less sparkle! So cut and faceted specimens of topaz simply do not sparkle as much a diamond or a cubic zirconium. (Don't get me wrong, however. Cut, faceted specimens of topaz are, nevertheless, beautiful!)

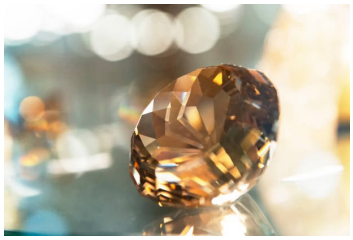


Fig. 7. Light waves traveling from inside a diamond to the surrounding air leave the diamond-air interface at a larger angle than the angle at which they entered.

https://media.istockphoto.com/id/1327044002/photo/beautiful-faceted-topas-of-olive-color.jpg?s=612x612&w=0&k=20&c=lru0rqlpwPg6YBBLzg7wPAlpgCb4FGcRjNgbE7lPZXs=

If you don't have a specimen of beryl or topaz in your collection, consideri adding them. And because both beryl and topaz are found in a variety of crystal habits and a rainbow of colors, you might want to add more than one specimen of each… or even to start a sub collection!

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

Improbable Rock Stories

Diamonds from tequila and peanut butter…

November 10, 2014

Marc Abrahams

First came diamonds from peanut butter, in Scotland, in 2007. Then came diamonds from tequila, in Mexico, in 2008. Now, in 2014, come diamonds from peanut butter, in Germany.

(Thanks to Roger Highfield for alerting us to the German peanut butter.)

BONUS (not necessarily related): The effect of peanut butter on the rotation of the earth.

UPDATE (possibly unrelated, and involving a small-sample, perhaps unreliable test): "'Peanut Butter Test' Is A Quick And Easy Screen For Alzheimer's".

With permission from Marc Abrams - https://improbable.com/2014/11/10/diamonds-from-tequila-and-peanut-butter/

Why tequila is a girl's best friend

September 28, 2010

Marc Abrahams

A year after winning the Ig Nobel Prize in chemistry, Miguel Apatiga tells how it changed his life, in an essay in The Guardian. He begins:

"Ever since our research was first published, people who hear about it for the first time just can't help laughing. Well, the fact is that most sane people would not dream of trying to turn cheap tequila into diamonds. In fact, at most of the scientific conferences I have attended, the first response to the reading of any paper on the topic is laughter, and a lot of it. But then the audience quietens down. There is no doubt that this research makes people laugh … and then think.

I had never heard of the Ig Nobel prizes until I was called and informed that I, together with the two other authors of the research, had been nominated. At the beginning of the conversation, I thought it was just an ingenious prank, but after hanging up, I checked the internet…."

With permission from Marc Abrams - https://improbable.com/2010/09/28/why-tequila-is-a-girls-best-friend/

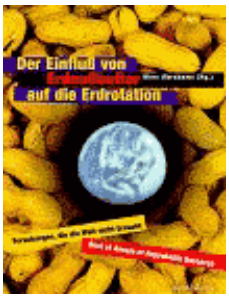
(Continued on page 18)

(Continued from page 17)

Peanut butter, diamonds, and the earth

June 29, 2007

Marc Abrahams



Peanut butter is being turned into diamonds by scientists with a technique that harnesses pressures higher than those found at the centre of the earth. Edinburgh University experts say the feat is made possible by squeezing the paste between the tips of two diamonds creating a "stiletto heel effect". The scientists also revealed they can turn oxygen into red crystals using the same method. Demonstrations take place at Royal Society Exhibition shows from 2 July.

So says a June 27, 2007 BBC report, which features a picture of peanuts in their pre-compressed state.

Implications are not fully known — but the effects of peanut butter on the rotation of the earth were documented long ago.

With permission from Marc Abrams - https://improbable.com/2007/06/29/peanut-butter-diamonds-and-the-earth/

(Editor's Note: I have updated some out-of-date links in the articles above.)

Punishment

What do you call a gemstone that's always on the move?
"Tourmaline."

How does a gemstone know if it's popular?
It has lots of "carat-er" references.

Why is it hard to be a diamond?
Too much pressure.

There are a few gems amongst these terrible rock puns.

Rock Garden

Reports from Members (Palos Verdes Gem & Mineral Society)

I also grow succulents, but I converted these ceramic pots to a rock garden.

In my mind, I could see a picture frame with succulents and rocks.

- Audrey Goode

From the TUMBLER Newsletter, October 2023 - Page 7 - Palos Verdes Gem & Mineral Society

Sad News from Minnesota

The Pillsbury Doughboy died yesterday of a yeast infection and trauma complications from repeated pokes in the belly. He was 75.

Doughboy was buried in a lightly greased coffin.

Dozens of celebrities turned out to pay their respects, including Mrs. Butterworth, Hungry Jack, the California Raisins, Betty Crocker, the Hostess Twinkies, and Captain Crunch. The grave site was piled high with many flours.

Aunt Jemima delivered the eulogy and lovingly described Doughboy as a man who never knew how much he was kneaded.

Born and bread in Minnesota, Doughboy rose quickly in show business, but his later life was filled with turnovers. He was not considered a very smart cookie, wasting much of his dough on half-baked schemes.

Despite being a little flaky at times, he still was a crusty old man and was considered a positive roll model for millions.

Doughboy is survived by his wife Play Dough, three children: John Dough, Jane Dough and Dosey Dough, plus they had one in the oven. He is also survived by his elderly father. Pop Tart.

The funeral was held at 3:50 for about 20 minutes.

If you smiled while reading this, please rise to the occasion and pass it on to someone having a crumby day and kneading a lift.

October 2023 Membership Meeting Minutes

Call to Order - 7:35

Pledge of Allegiance

Program for the evening will be a video from our extensive collection. "Where and How to Look for Fossils"

New Members (**Cynthia Porter**): no new members

Member Displays:

1. **Bruce Pohlman** Mystery mineral: Chalcedony w/? and Snowflake or "fireworks" obsidian

2. **Joan Schram** Black Garnet specimen

November Meeting

Silent Auction

Vote on new officers

Installation Dinner December 5th $10 per person (RSVP and Pay)

Toys for Tots fundraiser. Bring unwrapped toy(s) to donate

Next Year's Show

First meeting next Thursday Nov 2 location will be sent out

Fairground Parking $20 per car so we are looking at a buy out so that parking will be free for attendees

Financial (**Frank Mullaney**):

Dodge and Cox

Taxes

AFMS Newsletter

Field Trips (**Stephen May**): Updates

November 4th, 9:00 AM to 4:00 PM. The Calaveras Gem and Mineral Society has announced its next tailgate to be In Angels Camp. Directions available.

November 11 (Saturday) – 12 (Sunday, on your own): Black Butte Reservoir, to collect Stoney Creek Jaspers. Camping at Buckhorn Campground. 3 hr. drive.

November 18 (Saturday): Fossil Discovery Center, Chowchilla, CA off highway 99.

19450 Ave. 21 ½, Chowchilla, CA USA, 2 hrs. 5 min.

Pleistocene epoch 700,000 years ago

Adults - $12 Senior - $10 Children - $8

May 29 – June 2 (1 single day in this time-frame, TBD next April) Rainbow Ridge Opal Mine, 3 spots available, up to 3 adults per spot. $900.00 fee dig.

June 13 – 16, Prineville OR. Pow Wow Field Trips. A 4-day rock show and 3 Field Trips, Fri. (6/14), Sat. (6/15), Sun. (6/16). Locations to be announced. Drive time 8 hrs. 42 min.

August 3 (Sat) – 9 (Fri), Delta UT: -Dugway Geodes-, -Topaz Mountain-, -Drum Mountain

agate-, -Copper varieties, multi-colored druzy and fine crystals, mine tailings-. 2 travel days, 5 collecting days. Potentially, Garnet Hill, Ely NV, on the way home.

Proposed for a time in the future Ocean View Mine- San Diego Area Tourmaline and Quartz

Rockhound of the Month – **Alan Achor** for being manager of bragging rights for many years

Bragging Rights for the month of October, General Meeting, the theme is "**My favorite thing I made**" – Cesar Nunez

1. Agate from Drum Mountain Utah (2) **Stephen May**
2. Big Sur Nephrite Jade inlaid with Virgin Valley Opal from the Bonanza Opal Mine NV (20) **Lynn Toschi**

Winner: **Lynn Toschi**

Hospitality: Introduce Guests; 27 Members and 1 Guest in attendance.

Guest: **Marc Gordon**

Sunshine: Margo Mosher. None to report

Federation Report (**Karen Welder**): ALAA Meeting Nov 10 in Visalia

Program: Mineralogical Video Program from our extensive collection.

"Where and How to Look for Fossils"

Adjournment: Meeting adjourned at 9:18 PM.

Respectfully submitted, **Cynthia Porter**, Secretary

Minutes for SCVGMS Board Meeting – October 26, 2023

The meeting was called to order by Stephen May at 7:35 PM.

Roll Call: All board members were present except for Noel Runyan, Deb Runyan, Rick Kennedy, Paul Kidman and Cynthia Porter.

Reading of the minutes from the September 28th Board Meeting: M/S/P (F. Mullaney, M. Fox).

Revisions: Corrected Proposal: Michele Smith, not Frank Mullaney, proposed awarding Donna Kelley with Honorary Membership status. Proposal was tabled to check with accountant on 501c3 restrictions.

Correspondence: Frank Mullaney, Nothing new

New Members: Second Meeting for Marc Gordon (Zoom this week). Frank Mullaney sent Marc an application and upon receipt of application and payment of dues, $15.00 + $5.00, Marc will be approved for membership. M/S/P (F. Mullaney, M. Fox).

Treasurer's Report: Frank Mullaney: Motion to pay Go-Daddy $419.70 M/S/P (J. Fox, M. Powers).

Our accountant suggested we move money out of our Dodge and Cox account or we might be in danger of loosing our 501c3 status. Pending Frank Mullaney's discussion with tax accountant. Frank is authorized to move $125,000.00 out of Dodge and Cox. M/S/P (M. Smith, M. Fox).

Our tax year is now officially ending at the end of 12/31/23 instead of 11/30/23.

Committee Reports:

Federation: Karen Welder at Visalia meeting

Installation Dinner - Check with Rick Kennedy

Field Trips: Stephen May - See Breccia for details.

Old Business: Cynthia sent out dues notices.

Nominating Committee - Roster is complete.

Donna Kelly an Honorary, Lifetime Member; Rules status- Put it down as Travel and motel expenses.

New section of our site, Members only Trading Post cannot be financially connected to the SCVGMS.

Noel: Club to come up with a mechanism for rock identification and open to a nationwide resource. Table until January 24, 2024.

Show Meeting - Michele Smith will have a Show meeting on Thursday November 2nd 7:00 PM at San Carlos Pizza, 484 E. San Carlos St. San Jose, CA 95112.

New Business:

Board agreed with Dean Welder's vendor fees changes

Programs:

November- Silent Auction.

December- Installation Dinner: Stephen to contact Michael Paone to confirm. Checklist needed for Tamara Bell, volunteers. Tamara will actually be flying out the day of the dinner.

Next Board Meeting is November 30th at 7:30 PM via ZOOM.

Meeting adjourned: 8:25 pm

Respectfully submitted,

Jim Fox (Filling in for Cynthia Porter, SCVGMS Secretary)

More Advice From Beings In Nature

Advice From a River

Go with the flow. Slow down and meander. Be thoughtful of those downstream. Go around obstacles. Immerse yourself in nature. Stay current. The beauty is in the journey.

Advice From the Earth

Be well-rounded. Keep a positive atmosphere. Have a magnetic personality. Celebrate diversity. Think globally. Be good to your mother. There's no place like home.

Advice From a Honeybee

Create a buzz. Sip life's sweet moments. Work together. Always find your way home. Bee yourself.

Advice From a Butterfly

Let your true colors show. Get out of your cocoon. Take yourself lightly. Look for the sweetness in life. Take time to smell the flowers. Catch a breeze. We can't all be monarchs.

SCVGMS ELECTED OFFICERS

President: Stephen May, 408-306-6782

Vice President: Michele Smith, 408-374-1897

Secretary: Cynthia Porter, 408-978-5848

Treasurer: Frank Mullaney, 408-691-2656

Editor: Deb Runyan, 408-628-7789

Federation Director: Karen Welder, 408-353-2675

Alternate Fed. Director: Paul Kidman, 408-356-4995

Board Members at Large

Jim Fox, 408-356-7711

Missy Fox, 408-356-7711

Michelle Powers, 408-694-8686

Noel Runyan, 408-866-7564

Rick Kennedy, 408-529-9690

Parliamentarian: Dean Welder, 408-353-2675

SCVGMS COMMITTEE HEADS

Bragging Rights Chair: Cesar Nuñez

Donation Receiving Committee Chair: Michele Smith

Show Chairpersons 2024: TBD

Fairgrounds Booth Chair: Michele Smith

Fairgrounds Liaison: Frank Mullaney

Fairgrounds Volunteer Coordinator: Margo Mosher

Field Trip Coordinator: Stephen May

Founder's Day Picnic Chairman: Jim Herbold

Founder's Day Raffle: TBD

Founder's Day Bingo: TBD

Hospitality: TBD

Installation Dinner: Tamara Bell, and Michael Paone

Member Displays: Rick Kennedy

Refreshments: TBD

Silent Auction: TBD

Sunshine: Margo Mosher

Trophies: Frank Mullaney

Librarian: Deb Runyan

Santa Clara Valley Gem and Mineral Society

P.O. Box 54, San Jose, CA 95103-0054

Website: www.scvgms.org

Email: info@scvgms.org

Phone Number 408-265-1422

Like us on Facebook:

https://www.facebook.com/santaclaravalleygemandmineralsociety

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. **The Next General Meeting is on November 28 at 7:30 at the Cabana Club and also available on Zoom.** The Next Board Meeting is at 7:30 on **November 30** on Zoom.

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 the general meeting. The Breccia editor is Deb Runyan who may be contacted by email at Deb4Rocks@gmail.com and by phone at 408-628-7789. The Breccia is proofread by Pat Speece and by Sonia Dyer.

Exchange bulletins may be emailed to Deb4Rocks@gmail.com. Permission to copy is freely granted to American Federation of Mineralogical Societies (AFMS) affiliated clubs when proper credit is given.