Bulletin of the Mineralogical Society of Southern California

Volume 93 Number 5 - May, 2020

Cancelled meeting of the Mineralogical Society of Southern California

With Knowledge Comes Appreciation

The May, 2020 meeting is CANCELLED!

Pasadena City College
Geology Department, E-Building, Room 220
1570 E Colorado Blvd., Pasadena

Program: **No Program this month**

In this Issue:

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

About the Program: No Program as the May meeting is cancelled

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From the Editor:

As someone once said "Please save us from Interesting Times!" We are definitely in the middle of such times right now aren't we? I hope everyone is staying home as much as possible and staying safe and healthy.

As our President George Rossman tells me, all MSSC meetings are cancelled until further notice. Let's hope we return to something resembling "normal" sooner rather than later. In the meantime, we just keep going on.

No meetins, no field trips, no where to go except the lines outside of grocery stores! Plenty of time to sort your collection! Check out the little sorting tale from Janet Gordon on page 4. Also, thank you too for your article Angie. Linda Elsnau

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

Baddeleyite, ZrO_2

The mineral was named in honor of Joseph Baddeley. He was a British geologist who supervised a railroad project in Rakwana, Sri Lanka. From this project area, he sent samples of unusual minerals he collected to the Museum of Practical Geology in London for analysis. Initially, this led to the discovery of geikielite, $MgTiO_3$. Incidentally, geikielite **(Figure 1)** has subsequently been found at the Jensen Quarry in the Jurupa Mountains, California.

Figure 1. Geikielite from the Maxell Quarry, Wakefield, Quebec, Canada colored due to its iron content replacing some Mg.
Photo credit: Rob Lavinsky & irocks.com

Figure 2. Baddeleyite from Phalaborwa, Limpopo, South Africa
Photo Credit: Rob Lavinsky & Irocks.com

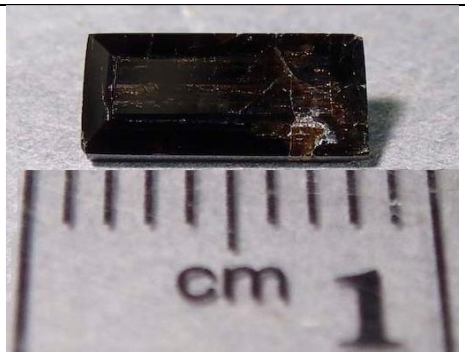

Figure 3. A baddeleyite crystal from the Mogok region, Myanmar.
Photo credit: Marc Garcia

In 1892, Baddeley then sent more samples of heavy minerals he thought might be geikielite to the Museum, but one of them, a 3-gram, 12 mm wide sample, looked different. Lazarus Fletcher, the "Keeper of Minerals in the British Museum", performed a series of tests on the unidentified sample. By today's standards, the tests seem involved and time-consuming. He mapped the morphological characteristics of the crystal denoting the pinakoid and prism faces and determined the relative lengths of the *a*-, *b*- and *c*-axes and the beta angle of the monoclinic phase. He then determined the optical characteristics including color, pleochroism, transparency, optic figures, optic sign, and spectroscopic absorption.

Because the external characteristics determined were not identical to any phase know at that time, what followed was an extensive chemical examination. Ignite a splinter in a blowpipe; heat a portion in a test tube; fuse in borax in an oxidizing and in a reducing flame; fuse in sodium carbonate with potassium nitrate; fuse in sodium carbonate with potassium cyanide on charcoal; treat with five different acids; heat to determine weight

loss at high temperature; dissolve the fusions in acid and perform a series of chemical tests to form precipitates and colors. When all this was done, then determine what chemistry these properties indicate. Wow, today I would just put it in a scanning electron microscope with X-ray fluorescence and in a matter of a few minutes determine what the chemical composition is. Here is what Fletcher wrote more than 100 years ago: "This behavior is so characteristic of zirconia; All the above reactions are thus consistent with the mineral being zirconia coloured by a small proportion of an iron compound."

Thus, he was convinced that he had characterized a new mineral which was named baddeleyite. His words: "For this new mineral I beg to propose the name Baddeleyite, in honour of Mr. Joseph Baddeley, by whom the interesting dense minerals of Rakwana have been brought to the notice of the mineralogical world."

> Fletcher L (1892) On Baddeleyite (native zirconia), a new Mineral, from Rakwana, Ceylon. Mineralogical Magazine 10, 148-160.

But, life got complicated. In 1892, a description of a new mineral "brazilite" appeared in the Neues Jahrbuch fur Mineralogie in a communication by Dr. Hussak from Brazil. Hussak thought that it was a tantalum-niobium mineral. But when analyzed in Sweden, it proved to be almost pure zirconia. The morphological parameters and optics agreed with the newly proposed baddeleyite. So, at that time, two names were suggested for the same mineral. Ultimately baddeleyite was given preference, in part because the name 'brazilite' had previously been used as a specification of an oil-bearing rock found in Bahia, Brazil. Also, Hussak withdrew the name brazilite from consideration.

A model for the crystal structure of baddeleyite was proposed in 1959 by McCullough and Trueblood and the complete 3-dimensional structure determination was completed in 1965 by Smith and Newkirk.

> Smith DK, Newkirk H (1965) The crystal structure of baddeleyite (monoclinic ZrO_2) and its relation to the polymorphism of ZrO2. Acta Cryst 18, 893-991.

The structure is a distorted fluorite structure. An interesting feature about the structure is that the zirconium ions are in coordination with seven oxygen ions. Seven-coordination is unusual in both minerals and in chemistry.

Typically, badelleyite is a dark, opaque mineral when of modest size **(Figures 2, 3).** Ideally, ZrO_2 would be colorless. Both Zr^{4+} and O^{2-} are colorless. Mindat.org has several examples of near-colorless baddeleyite from Italian localities such as the one in **Figure 4.** But, it can also occur in a variety of different colors, particularly when in micromount size **(Figures 5 and 6)**. Unfortunately, at least to my knowledge, no baddeleyite crystals with these colors have ever been chemically analyzed to determine the origin of their color. But don't think that baddeleyite is always a nicely crystallized or colorful mineral. Often, it can be a rather ….. OK, call it ugly … mineral **(Figures 7, 8).**

Figure 4. Baddeleyite from the Água de Pau Volcano, Azores.
Photo credit: Luigi Chiappino

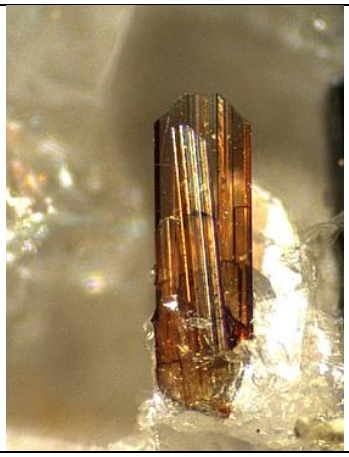

Figure 5. Baddeleyite from the San Vito quarry, Naples area, Italy.
Photo credit: Luigi Chiappino

Figure 6. Baddeleyite from the San Vito quarry, Naples area, Italy.
Photo credit: Luigi Chiappino

Figure 7. Baddeleyite from Pocos de Caldas, Minas Gerais, Brazil.
Photo credit: Marc Garcia

Figure 8. Baddeleyte from Minas Gerais, Brazil.
Photo credit: Marc Garcia

Locally, it has been reported at two localities in the San Benito Mountains but probably is more widespread as microscopic crystals in rock.

Baddeleyite is commonly enriched in uranium (U) (up to 3000 ppm) and very low in originally incorporated lead (Pb). That makes is an ideal mineral for U-Pb dating. Baddeleyite has proven to be a promising phase for age-dating of rocks using the decay of uranium to lead. Uranium is naturally radioactive and slowly decays into the element lead. The age of the crystal and its host rock can be determined by measuring the ratio of lead to uranium currently in the crystal. Baddeleyite is typically magmatic in origin and can be used to constrain the timing of igneous crystallization. Age dates obtained from baddeleyite can be very precise (±1 one million years for a date greater that one billion years). Because of this, baddeleyite has long been a prime target for U-Pb geochronology of mafic rocks. Zircon also is used for U-Pb dating. It is common in silica-saturated rocks, whereas baddeleyite (ZrO_2) occurs primarily as a U-bearing accessory phase in igneous rocks with low silica content.

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MINUTES of the April, 2020 General Meeting

Since the April meeting was cancelled, there are no minutes to be reported.

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List of Upcoming MSSC Events : Mark your Calender!

Event	Date	Comments / Scheduled Program (if known)
Meeting Dates:	June 19, 2020	Eric Scerri: The Periodic Table: It's Story & In Significance
	July 10, 2020	Peter Goetz: - Beautiful Opal, Identification and Internet Opal
	September 11, 2020	*TBA*
	October 9, 2020	
Annual Picnic	August, 2020	*Date & Location to be Announced*
Board Meeting	June 14, 2020	*PCC Meeting Room*

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

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A Self-Isolation Tale by Janet Gordon

In keeping with the date and times, I will share my recent experience cleaning out a storage shed. There was an unlabeled flat of minerals collected long ago, and I opened it to see if there was anything we really wanted to keep. And yes! It was filled with specimens carefully wrapped in large quantities of pristine toilet paper! What a find. I carefully put the flat back. We now have a secret TP reserve that may be needed before all this is over. Maybe I should get the flat out again to see if the minerals are any good.

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The Field(s) of Mineralogy, A Layperson's Observations By Angie Guzman,

I suppose you could say there are many "facets" to mineralogy. First is the "Eureka!" moment of discovery followed by study of the raw material - to see what it's made of. Generally, next comes large scale processing of ore along with experimentation to find logical uses. Eventually, design of synthetics comes into play; then studies of minerals found deep within the earth's richness. Ultimately, the search leads to the heavens for asteroids, meteorites and other celestial bodies (moon rocks, for example).

Recall that first time you spotted something that caught your eye to awaken your interest in minerals? It could have been a plain or odd-looking rock that may have contained hidden "gems"; or was it something that glistened, something you couldn't possibly avoid giving your attention to? Using our natural curiosity, just leaning over the object gives rise to an unearthing of a world you hadn't previously known existed, mineralogy. Close inspection of the treasure using just your naked eye, reveals colors, shapes and the naturally occurring beauty that attracted you to it in the first place. That is the "aha moment"!

Studying your find, looking at it under a microscope or other detail device, you spot definitive forms, they're crystals! You realize it's not just a rock but a mineral that appears unique. But wait, it has other things under and around it, a different looking crystal, other colors and a "matrix". Before you know, you've opened the door for more research and knowledge. And so it goes.

Others dig deep into the surface of our planet and bring up ore to be processed. "Ore dressing" is a process that extracts minerals from commercial ore. Usually, ore dressing is done on a huge scale. In reality the process goes back centuries to around 970BC. There are phases and procedures for sizing, sorting, classification, etc., of the ore. Once the minerals are extracted, they are further studied for appropriate uses. At some point, someone said something like, "…I think we can make this in the lab!" Thereafter, synthetic gems popped out of labs by the hundreds. Many synthetics are virtually equal in chemical formulation, optical structure and physical appearance to their original, natural counterpart. These synthetics have a thriving marketplace in technology, for industrial uses and in jewelry. They are, however, less valuable than natural gems and, for that very reason are "grown" under extremely strict guidelines. An old adage comes to mind, "Let the buyer beware."

Discoveries are not limited to Earth. Outer space is abundant with minerals. Near-Earth asteroids are silicate rock made up of oxygen and silicates. Nickel, platinum, gold, magnesium and other precious metals make up metallic asteroids. There are few asteroids that are a combination of silicate and metallic. But, not to be outdone, the near-Earth asteroid *Itokawa* consists of olivine and pyroxene and is similar to the meteorites that had pelted Earth in the past. In fact, Hayabusa, a Japanese robot spacecraft, landed on *Itokawa* in 2005 and returned collected materials to Earth in 2010.

There are many fields of mineralogy. In learning about mineralogy, we increase our understanding of minerals. And so it is, many people study minerals to see why one is red or blue, some collect them, others employ spiritual meanings, some trade or sell theirs, many display theirs, some craft theirs into jewelry and some just dig 'em up for profit and/or fun. No matter the reason, minerals are a part (medicinal, too) of our daily lives. When we find that special mineral, whether here on this planet or out there in outer space, we're thrilled. I know I am!

Our quest for knowledge is insatiable. The more we know the more is our understanding and appreciation.

Be safe. Be well.

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May Featured Mineral: Gypsum

Formula: $CaSO_4 \cdot 2H_2O$

Crystal System: Monoclinic

Name: : First known mention is by Theophrastus about 300-325 BCE from the Greek γυψοζ (gypsos) meaning plaster.

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Red River Floodway, Winnipeg, Manitoba, Canada
7.2 cm x 6.9 cm x 5.1 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Salar de Uyuni, Nor Lípez Province, Potosí, Bolivia
6.3 cm x 5.2 cm x 2.7 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Red River Floodway, Winnipeg, Manitoba, Canada
4.5 cm x 3.7 cm x 3.5 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Lake Gilles Gypsum Deposit, Corunna Station, Iron Knob, Middleback Range, Eyre Peninsula, South Australia, Australia 9.8 cm x 6 cm x 4.1 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Willow Creek, Nanton, Alberta, Canada
9.5 cm x 5.9 cm x 5.7 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Betekom, Begijnendijk, Flemish Brabant, Flanders, Belgium
6.2 cm x 3.7 cm x 1.2 cm

© *Irocks*

Gypsum (Var: Selenite)
$CaSO_4 \cdot 2H_2O$, Calcite $CaCO_3$
Locality: Naica Mine, Naica, Saucillo Municipality, Chihuahua, Mexico
6.2 cm x 5.8 cm x 4.4 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality:
La Mesa, San Diego County, California, USA
10.4 cm x 9.4 cm x 6.7 cm

© *Irocks*

Gypsum $CaSO_4 \cdot 2H_2O$
Locality: Lignite mine, Neuenhain, Neuental, Schwalm-Eder, Kassel Region, Hesse, Germany 7.3 cm x 6.5 cm x 5.2 cm

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Ride Share Listing

Can You Provide A Ride?
Would You Like Company On The Drive To Meetings?

We have heard from several of our members that they would like to ride-share with someone to the meetings. We will list the names, general location and either a phone number or an email address of anyone who would like to connect for a ride-share. If you would like to catch a ride or would like company for the trip, let me know at msscbulletin@earthlink.net and I'll put the information in this section of the bulletin. After that, any final arrangements made are up to you. Also, If you make a connection that works for you, let me know so that I can remove your information from the bulletin. The Editor

Looking for	Who	Where	Contact at
A Ride home after meetings	Ed Kiessling	1299 Linda Vista Ave. Pasadena, CA	626-796-3421
A Ride home after meetings	Isabel King	900 N. Broadway, Los Angeles, CA	217-457-7726
A ride	Richard Stamberg	North Orange County, near Cal State Fullerton	714-818-6601 Please leave a voice message

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OTHER FREE THINGS TO DO...by Ann Meister

The **Von Kármán Lecture** on Thursday **May 7**. *** On-line time to be announced. *** The speaker is Tracy Drain, Systems Engineer, JPL. The title of the presentation is **"Becoming a NASA Engineer."** What does it take to become a NASA Engineer? In a sit-down with Tracy Drain, JPL Systems Engineer, we'll follow her road to her dream job. Using past and future missions as examples, we'll find out that the path is more cyclical than you think and discover why you should always take your own notes. ****Check with the website for information on viewing this lecture.** They also have a link for the YouTube playlist of past shows: https://www.jpl.nasa.gov/events/lectures_archive.php?year=2020&month=5

The **Watson Lectures** at Caltech's Beckman Auditorium have been **cancelled**.

The Archive of Watson and Von Kármán Lectures

You're in the best seats in the house for these deep dives into the cutting-edge research being done at Caltech and JPL. Our Watson lectures (on YouTube) run the gamut of all the Institute's endeavors—from atomic-scale materials to the ecology of ocean microbes—while the von Kármán public talks (on YouTube) focus on JPL's space missions, instruments, and technologies.

The **UCLA Meteorite Gallery** will be **closed** until further notice. Visit their website for videos and other neat things about meteorites: https://meteorites.ucla.edu

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MSSC Advertisement Policy:

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

Business Card	$5.00
1/3 page	$10.00
1/2 page	$20.00
Full Page	$35.00

In addition, any advertiser who purchases 12 months of space in advance will receive a discount of 12 months for the price of 10 months. The copy for the ads should be mailed to the editor at bulletin@mineralsocal.org and the payment should be sent to the **MSSC Treasurer 1855 Idlewood Road, Glendale, CA 91202**

WITH KNOWLEDGE COMES APPRECIATION !

Calendar of Events:

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

All CFMS Club Shows Scheduled for May, 2020 have been cancelled.

If you do plan attending ANY event during April, I would advise checking for a cancellation before traveling

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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	
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2019--2020	Currently open	
2019--2020	Bob Housley	
2019--2020	Leslie Ogg	
2020-2021	Pat Caplette	
2020-2021	Currently open	
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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 Elsnau	*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:

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MSSC Bulletin Editor
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To:

With Knowledge Comes Appreciation

Your MSSC Bulletin Is Here!