BULLETIN OF FRIENDS OF MINERALOGY

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to promote, support, protect and expand the collection of mineral specimens and to further the recognition of the scientific, economic and aesthetic value of minerals and collecting mineral specimens.

Inside This Issue

President's Message
By Clyde Spencer

Dear Friends;
President Alex Schauss resigned in April. His letter of resignation is provided elsewhere in the Bulletin. His unexpected resignation produced some consternation and considerable email between about a half-dozen of the elected board members. Board member Chris Whitney-Smith resigned also, presumably in support of his good friend, Alex. I really didn't want to become president and had told Alex as much. The time and expense of attending Tucson and Denver every year for the next few years was something I wasn't looking forward to. I was hoping that we could just find a replacement president and I could fulfill my term as VP. Unfortunately, the Bylaws are quite clear that with the resignation of the president, the position is to be filled by the VP. Therefore, after a substantial volume of email exchanges I agreed to accept the position of president of FM. I particularly didn't want to leave the position vacant because there is no mechanism in the Bylaws for replacing a resigning president except by the vice-president. I will endeavor to do my best to get the organization on a level keel and operating smoothly during my remaining tenure in office. However, I want it to be known that I do not intend to run for a second term.

So, by now you may be asking yourself, "Just who is this reluctant, mail-order bride that we seem to be stuck with?"

My degrees are in geology, with an undergraduate emphasis in geophysics; my M.S. thesis was on the occurrence of platinum-group minerals in Northern California. I spent a decade teaching geology and inorganic chemistry at Foothill College in California. I then went into the field of remote sensing. I retired from a major aerospace company as a senior remote sensing scientist in 2009; I specialized in imaging polarimetry. Retiring has allowed me to get back to my first love, mineralogy. I'm currently involved in research on the optical constants of opaque minerals.

As to my experience with leading organizations, I have a life-long history of leadership, starting with being student body president in my high school senior year, at which time I was introduced to Robert's Rules of Order. I was a president of the Bay Area Mineralogists (CA) back in the late-'70s, shortly after it was formed. (I knew and was friends with Gene Foord and Dick Erd, whom some of you may have known.)

From 1990 to 1993, I was the chairman of the Santa Clara Valley chapter of the IEEE Geosciences and Remote Sensing Society. I was a director of the NorCal Chapter of the American Society of Photogrammetry & Remote Sensing in 1994 and 1995.

In 2013, I became the president of the Midwest Chapter of FM, and working with the other new officers, got the chapter incorporated as a 'not-for-profit' in Ohio. We

have also revived symposia that the chapter had in former years. The treasury has increased from about $800 when I took over to almost $4,000 today. We have had a membership of over 100 the last three years.

I was elected to the position of director and vice-president of FM National in 2015. I have served on the Bylaws revision committee and have assisted at the Tucson recruiting table each year since I was elected. I subsequently became president, by default, when the president resigned in April. This is the short version of my experience; I don't want to convince you that I should stay at the helm.

In summary, I have more than a passing acquaintance with managing volunteer organizations. My faith in the necessity of abiding by Robert's Rules of Order comes from decades of personal experience with it.

Moving on, we need to get the revised bylaws approved by the general membership. The bylaws state:

> **Section 3.**
> A copy of the proposed amendment(s), and the sections(s) proposed for amendment, **and a brief statement by the proponents and opponents, if any**, of the reasons for and against the amendment(s), shall be mailed with each ballot.

The only way that we can comply with the bolded part of Section 3 is if the members have a chance to see the board-approved amended bylaws prior to receiving the ballot. Please go to the following URL by clicking on the link:
http://www.friendsofmineralogy.org/FM_BYLAWS_Proposed_Changes_2016_04.pdf

This is the document approved by the Board in February. Please review it promptly and let me know if you have any serious objections to the changes. Keep in mind that this project has been in the works for some time and it is a package deal with no opportunity for amendments. If you see something that you think is serious enough that it should not be approved, then let me know. Otherwise, if there are some minor changes needed, we can address them later.

The resignation of Chris Whitney-Smith left the symposium-funding Selection Committee crippled because he was appointed chairman by Alex Schauss. The other two members of the committee appointed by Alex agreed to continue to serve. I asked past-president Allan Young to serve on the committee, and he graciously agreed. Allan further offered to serve as chairman. The Executive Committee endorsed my appointments. Allan was the author of the motion on funding symposia that was passed at the February business meeting. Therefore, he is quite familiar with the spirit and letter of what was passed. At the moment, the committee is working on finalizing the draft criteria that the Executive Committee provided them, and devising a form for application for support. Hopefully, I'll have more to report with the next edition of the Bulletin.

FM National was three years in arrears in its payments to the American Geological Institute. At my request, they have forgiven the money owed to them for 2014 and 2015. They have also agreed to reduce our annual dues from $400 to $250, based on the fact that we actually have few practicing earth scientists in our membership.

In late breaking news, Mark Jacobson, who is president of the Colorado Chapter, and who has been serving on the Board of Directors of National as the Colorado Chapter representative, has been replaced by Jeff Self as the official chapter representative. That created the opportunity for the Executive Committee to appoint Mark to the Director position vacated by Chris Whitney-Smith; the appointment was unanimous.

We will have a general membership meeting in Denver in September. A major topic of discussion will be the future role of FM in the mineral community. See the opinion piece by Mark Jacobson in this newsletter for some background. Please try to make the meeting, as it will be important for the future of FM. We will send out a mailing to all the members when we know the date, time, and room for the meeting.

I am asking for volunteers for speakers at the FM symposium on Saturday, in February, during the annual Tucson Gem and Mineral Show (TGMS). If you are willing and able to speak for 20 minutes on some aspect of Midwest Minerals, the TGMS theme for 2017, please contact program chairman, Julian Gray. See the formal call for papers elsewhere in the Bulletin.

Lastly, on behalf of the membership, I want to thank Alex Schauss for the things he accomplished while serving as president. By continuing as a director, I'm sure he will be able to make additional contributions. I will try to carry forth with his concerns about opposing closing collecting areas to the public.

Your new president,
Clyde Spencer

NATIONAL OFFICERS

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Deadline for the next FM Newsletter is
September 20, 2016

President's Letter of Resignation

April 15, 2016

To: Board of Directors of Friends of Mineralogy

From: Alexander Schauss

Since assuming the presidency of Friends of Mineralogy, I had hoped to be able to guide this organization progressively into the future - something many members agreed was needed.

However, over the last year it has become clear that the dynamics and board culture isn't compatible with my leadership style . . ..

According to Article VII, Section 4, of the By-laws, "the Vice President shall serve as President in the event that the President resigns." Regretfully, this memo duly serves notice to the board of directors of my resignation as President of Friends of Mineralogy, effective on this given date.

Wulfenite and Cerussite
Old Yuma Mine,
Collected by Gene Schlepp and sold.
Photo by Wendell Wilson

Free Software Tool Developed to Organize Mineral Collections

Innovative software has been developed to help manage your mineral collection. The software is available for free and allows one to self-curate specimens in a wide range of groups or sets using an inbuilt manager you control.

Some people are hesitant to reveal the contents of their collection by placing the information on or through other websites. However, alternatives to date have limited capabilities. This software was designed to include private space to chat with friends and experts about their specimens or mineral topics of interest. It also can print customized lists and labels from your database, the former of which can be particularly useful in documenting the collection for insurance purposes.

The software was developed by Colido GMBH, based in Oberhaching, Germany. It has been demonstrated for several years at the Munich Gem & Mineral show (Mineralientage Munchen), and more recently in Tucson at several satellite shows as well as the Tucson City Centre Hotel (InnSuites). During the Tucson show, anyone wanting a demonstration of the software received a free copy of the recent Munich Show's theme publication on *Precious Stones*.

Depending on the size of one's collection, a 250 MB version that provides ample space for a sizeable collection is available for free. A larger platform is available that comes with many additional features providing 2 GB of space, for either an annual subscription or nominal monthly fee. A 5 GB option is also available. For more information: www. Colido.de

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New Website to Locate Gem, Mineral & Fossil Shows in the USA

Tom Loomis (Matrix Minerals) has developed a new mineral show website called RockandMineralShows.com – RMS for short. 18 months in the making, RMS's purpose is to map out all FM & AFMS shows in the USA using an interactive Google maps interface.

Tom feels that RMS will greatly benefit our hobby by showing people where the shows are on a map in relation to other shows while they travel or plan out a trip. It will also show people where the rock shops, museums, fee-collecting areas, and club meeting places are located. The user will have the ability to plan their trips and vacations around regional shows from coast to coast. By selecting a date range and a geographic area such as a state or region, the mineral hobbyist can plan their trip around certain shows or other related activity.

To use the website, which is free, go to RockandMineralShows.com and sign up. The site also will let subscribers list up to six items for sale so a gem and mineral club can raise funds, or just to provide an article about your club or other mineral-related topic on the RMS website.

To learn more: RockandMineralShows.com or send an email to: dakotamatrix@gmail.com or rms@rmshows.com

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TUCSON MINERAL SYMPOSIUM CALL FOR PAPERS

The thirty-eighth annual symposium held in conjunction with the Tucson Gem and Minerals Show® will take place on Saturday, 11 February 2017. The symposium is cosponsored by the Tucson Gem and Mineral Society, the Friends of Mineralogy, and the Mineralogical Society of America. As a tie-in with the show, the symposium theme is the same as the show theme: *Mineral Treasures of the Midwest.* Presentations on descriptive mineralogy, classic and new localities, and related subjects are welcome. An audience of amateur and professional mineralogists and geologists is expected.

Anyone wanting to present a paper should submit a 200-300-word abstract to Julian C. Gray, juliangrocks@gmail.com or 503-647-2418. Presentations will be twenty minutes in length. Abstracts must be submitted by 31 August 2016.

Mineral Show Dates

September 16 - 18, 2016
The 49th Annual Denver Gem & Mineral Show®
"African Minerals"

Special exhibits, competitive and non-competitive cases, featured presentations over 140 dealers, etc.

Denver Mart Expo Hall (formerly the Denver Merchandise Mart)
451 E. 58th Avenue
(I-25 at Exit 215)
For more information visit the show's website: http://www.denvermineralshow.com/

October 28-30
The Munich Show (Mineralientage München), World of Minerals, Gems & Fossils, Munich, Germany

With over 1,250 exhibitors, the Munich Show is Europe's biggest show for minerals, fossils and precious stones. Between dealer booths and tables and special exhibits on 500,000 square feet of exhibition space, one of the highlights for over 40,000 people that attend the show in the Mineral Pavilion. Many finds from around the world collected during the spring, summer, and early fall first make their first appearance at this show.

This 2016 show's theme is "Hidden Treasures." The show will have a special exhibit of various museum treasures rarely seen by collectors or the public, since museums only display about 5% of their inventory on average.

Considered one of the premier mineral shows in the world, the city is located within a few hours travel time from almost all European countries.

For more information visit the show's website: www.mineralworldmunich.com

***37th Annual* New Mexico Mineral Symposium**
November 12 - 13, 2016

Macey Center
New Mexico Institute of Mining & Technology
Socorro, New Mexico
Featured Speaker:
John Cornish - *Upside Down And In The Future, Mining Tasmania's Adelaide Mine*

The New Mexico Mineral Symposium provides a forum for both professionals and amateurs interested in mineralogy. The meeting will allow all to share their cumulative knowledge of mineral occurrences and provide stimulus for mineralogical studies and new mineral discoveries. In addition, the informal atmosphere allows for intimate discussions among all interested in mineralogy and associated fields.

The symposium will consist of a day and a half of formal papers presented in 30-minute time blocks. Papers will tend to focus on mineral occurrences from New Mexico and adjacent states, including Mexico. A few selected papers may be presented from other parts of the world. An informal pre-symposium social and tailgating session is held at local motels beginning on Friday, November 11, 2016 and last through the weekend. A field trip to the Copper Flat deposit, near Truth or Consequences is also planned for Friday.

A silent auction, sponsored by the Albuquerque Gem and Mineral Club for the benefit of the New Mexico Bureau of Geology Mineral Museum will be held on Sunday afternoon, November 13. The auction is open to the public and all interested may buy or sell. More information is available at the symposium.

See: https://geoinfo.nmt.edu/museum/minsymp/home.cfml

From the Creation of the Friends of Mineralogy in 1970: Where We are Now and Where Do We Go?

A personal perspective by Mark Jacobson

The creation of FM

On 13 February 1970, twenty prominent specimen mineralogy advocates met at the home of George A. Bideaux in Tucson and proposed a national organization of not more than 100 people to advocate for specimen and locality mineralogy. These twenty were John Anthony (1920-1992), Richard A. Bideaux (1935-2004), George Bideaux (1897-1978), Paul Desautels (1920-1991), Peter G. Embry (1929–2010), Joseph J. Finney (1927-), Joaquin Folch Girona (1892-1984), Richard Gaines (1917-1999), Mike Groben (1928-2015), Jack Hanahan (1924-2001), Russell M. Honea (1929-2002), Mike Kokinis (1927-), Arthur Montgomery (1909-1999), Louis Moyd (1916-2006), Fred Pough (1906-2006), Julian R. Reasenberg (1916-1985), John Sinkankas (1915-2002), John White, Jr. (1933-), Sidney A. Williams (1933-2006), and Leo Neal Yedlin (1908-1977).
Joel Arem (1943-), Richard Bideaux, Raymond W. Grant (1937-), Mike Groben and Arthur Montgomery proposed in a memo that the aims and activities of this Friends of Mineralogy group on March 9, 1970 should include:

"1. Compiling and publicizing information on important mineral collections throughout the world.
2. Encouraging improved educational use and far wiser conservation of mineral specimens, collections, and localities.
3. Supporting a semi-professional journal of high excellence and interest designed to appeal to mineral amateurs and professionals alike, also to undergraduates active in earth science, and through which FM activities may be circulated.
4. Operating informally and altruistically on behalf of minerals, mineral collecting, and descriptive mineralogy, with dependence on voluntary support primarily by members and widest possible circulation of the journal.
5. Functioning by means of fullest membership participation and majority decision, with responsibility for implementation of aims and activities channeled through an annually-selected regional committee willing to do the brunt of the work.
6. Cooperating as fully as possible with IMA and all mineral societies, professional and amateur, and guarding against overlap of functions performed by these groups.
7. Building an active world-wide membership among amateur and professional mineralogists."

As a group, they saw a gap of knowledge, interaction and activities between the professional mineralogists, geologists, geochemists, and museum curators**,** and the amateur mineral clubs composed of families with young curious children and retired people wanting new activities and social networks. The organization as conceived by Arthur Montgomery and Dick Bideaux was supposed to be populated 50-50% by professionals and amateurs**,** where the professionals are curators, university professors, and researchers and the amateurs consisting of mineral dealers and enthusiastic mineral collectors. The idea of keeping the membership to less than a 100 disappeared the first year, when essentially all the leading mineral enthusiasts of all educational backgrounds wanted in. One of the new society's goals was to minimize the perceived professional**/**amateur, degree**/**non-degree divide in the mineral community.

This new group wanted to do more than bridge the education gap but literally fill this gap with knowledgeable, self-educating people who were thrilled with minerals for their beauty, properties, where they came from, how they were formed, and how we got them out of the earth. This was a pre-internet, pre-cell phone age. For amateurs, talking face to face, faceting and polishing rocks, making jewelry, reading magazines and books, listening to 35 mm slide presentations, buying mineral specimens, exhibiting at shows, winning exhibit trophies, and digging in the field for specimens were the activities of choice. The scientific community meanwhile had moved away from specimen mineralogy, their professional activities entailed determining the structures of minerals, predicting the properties of materials based on structure and elements, developing methods to find more economic mineral deposits**,** and how to extract the valuable elements.

The *American Mineralogist* was moving away from descriptive mineralogy and mineral localities to material science. The *Lapidary Journal*, once the literary home for amateur mineral clubs and some serious mineralogical writers, started to change its identity during the 1970s to purely gems and jewelry. The remaining hobby magazines – leaders like *Gems and Minerals*, *Earth Science* and *Rocks & Minerals* had changed little during the 1960s. The 1970's brought changes to the mineral magazines; some were improvements and some were not. As ownership changed, and editors retired, attracting unpaid, high quality mineral articles became more difficult. The rise of the *Mineralogical Record* caused some writers to migrate away from their previous journals. Mineral Club bulletins also started publishing better articles, increasing the competition for the few writers. Mineral locality guidebooks proliferated during the 1960s, increasing people pressure on collecting. Access to collecting localities where there are no public lands, as on the East Coast and Midwest continued to decrease for several reasons, frustrating families and collectors alike. Western USA collecting on government lands became more intensive but did not arouse too much push-back from public land managers until the 1980s.

Friends of Mineralogy chose to colonize this social-ecological gap and fill it with enthusiastic mineral dealers, avocational (unpaid) scientists, curators, researchers and amateur collectors who wanted to do more than collect a few pretty rocks or facet some large exotic stones. **FM's mission thus became to promote, support, protect, and expand the collecting of mineral specimens, while furthering the recognition of the scientific, historical, economic, and aesthetic value of minerals, mineral collecting and mineral collectors.**

What We Have Accomplished and Where We Are Now:

Well the good news – we were overwhelmingly successful, perhaps beyond expectations. Books, magazines, mineral shows, symposia are spread out across the United States. One can now spend almost every weekend traveling to a different mineral show or symposia. The knowledge level of the entire mineral community has increased. FM can only take some credit for this success, since this was the direction of the entire mineral community, but the organization certainly influenced that direction.

There are still with us more than a handful of these early day founders from the 1970s. The Friends of Mineralogy, Colorado Chapter (FMCC) formed in 1978 as a support group for the Denver Museum of Natural History Geology Department where Jack Murphy, the curator, was the charismatic leader. Their first group effort was to update and publish a new *Minerals of Colorado* book. Many of the more involved members also belonged to local mineral clubs where the focus on minerals was not as intense. You know of these people today because they became speakers at mineral shows, authors of numerous mineral articles, books, and collecting guidebooks, mineral dealers, and some of the organizers of the Denver Gem & Mineral show. The range of activities continued to expand with organizing symposia pertaining to mineralogy, geology, and mining history. These symposia involved serious amateurs and professionals from different disciplines. The love of minerals had expanded to mining histories, personal collecting histories and mining artifacts.

This pattern in the Colorado area was of course repeated across the country by the National organization and its affiliated chapters in Pennsylvania, the Pacific Northwest, the Midwest and others. Some of National's first projects were: 1) creating and supporting both financially and intellectually *The Mineralogical Record* (MR), a magazine originally designed to appeal directly to serious specimen collectors and professional mineralogists (the first editor was John White, one of FM's 20 founders); 2) creating a national and worldwide registry of mineral localities; 3) supporting mineral publications such as MR's first article index, and 4) sponsoring mineral symposia.

FM engaged in communications with the Mineralogical Society of America (MSA) that resulted in the first four joint MSA-FM symposia held at the Tucson Gem & Mineral show in February: 1974, *Mineralogy and paragenesis of porphyry copper deposits*; 1976, *Crystal Chemistry and paragenesis of the gem minerals*; 1977, *Crystal Growth and Habit*; and 1981, *The Mineralogy of pegmatites.* These Tucson Gem and Mineral show symposia have continued to the present date with some changes. Currently, the abstracts from these presentations are published in *The Mineralogical Record.* Similarly, the abstracts from the technical session at the Rochester Mineral Symposium, started in April 1974, are published in *Rocks and Minerals*.

Parts of FM also advocated to prevent governmental restrictions to public lands for collecting, keep mineral museums open, aid in mineral education, and organize field trips to localities that were traditionally difficult to obtain access to. FM's locality registry campaign faltered but publishing state localities indexes continued.

So how has the cultural landscape changed, what is the nature today of the social-ecological niche that we had started to colonize in 1970. Well, it has changed quite a lot, and gotten quite crowded. Superb mineral photography has moved from only a few expert amateur practitioners to an army of expert professional and amateur mineral photographers. Mineral related magazines and books, lectures, symposia, and mineral shows have proliferated.

In the meantime, *The Mineralogical Record* had evolved toward a wealthier cadre of collectors with a worldwide focus. It still attracts, to some extent, professional mineralogists and has never abandoned serious collectors who spend less for their specimens or are field collectors. *Rocks & Minerals* under some incredible stewardship has also become a home for serious collectors and professional mineralogists, geologists and paleontologists. This magazine has attracted numerous top-level amateur and professional writers. *Gems and Gemology*, the journal of the Gemological Association of America, which started in 1934, has expanded its scope and quality. Free "advertising" magazines have appeared such as *The Vug* and *Minerals* by the well-known dealer Spirifer, with pictures and articles of breathtaking quality. *Matrix Magazine*, a journal dedicated to the history of minerals – the people who mine, describe, collect and preserve them, with a successful run from 1988 to 2004, was only terminated by the unexpected death of its founder-publisher, Jay Lininger. Local mineral club bulletins have benefited accordingly – there has been no shortage of meaningful, free articles to publish.

Available mineral lectures in the Denver- Colorado Springs corridor has flowered. We have presentations each month hosted by the Colorado Scientific Society, Denver Regional Exploration Geologists Society, Ragged-Ass miners, Friends of the Colorado School of Mines Geology Museum, Friends of Mineralogy – Colorado Chapter, Littleton Gem and Mineral Club, Rams Mineral Club, North Jeffco Gem and Mineral Club, Denver Gem and Mineral Guild, Colorado Mineral Society, and the Colorado Springs Mineral Society, as well as mineralogy-geology-mining lectures at the Colorado School of Mines, the University of Colorado at Boulder, and the United States Geological Survey, and so many others that I can't even remember them all. Nationwide symposia are also prominent throughout the country – Rochester, NY; Bethel, Maine; Cartersville, GA; Socorro, NM; Carlsbad, CA; Kelso, WA; Tucson, AZ; Cincinnati, OH; Butte, MT; and so on. I have not listed the various micromount symposia, mineral club lectures, and symposia sponsored by the American Federation of Mineral Societies. I'm sure I missed a lot of them.

Was FM solely responsible for these events? Of course not. Did we contribute to it? Unquestionably. Should FM take some credit for the achievements and contributions of its members because of the environment FM nurtured? Yes.

Where do we go from here?

Our mission is perfectly clear and correct. But our success suggests that we can and possibly must change our methods and goals. With so many new organizations in some locations, competition and duplication of efforts needs to be avoided. Perhaps, since so many other organizations are effectively implementing some FM goals, we should consider restricting ourselves to only a few of them. I make a big distinction between mission (a high level view), goals (physical proofs of mission success) and tasks (actions taken). Tasks are done to achieve goals and goals are undertaken to support the mission.

So what are some of the tasks that FM as an organization or as individuals can do to advance specimen mineralogy? Some ongoing tasks that we should continue:

1) Continue as individual, FM members, writing mineral-oriented articles for magazines that need to be supported: *Rocks & Minerals*, the *Mineralogical Record*, *Mineral News*, *Rock & Gem*, FM newsletters, and club newsletters.
2) Continue organizing symposia and sponsoring presentations by individual members.
3) Continue to support Mindat.org with pictures, localities, mineral information and money.
4) Continue to lead classes in mineralogy, geology, mineral identification, mineral photography, how to make and give a presentation, GPS use, and similar material at local mineral clubs.
5) Continue to lead collecting field trips to localities of significant importance or places where access is legally difficult.
6) Continue preparing and publishing mineral locality indexes and state and country mineralogies.
7) Continue to support mineral museums and their curatorial staff.
8) Continue to advocate for access to public lands for collecting and repress the adverse effects of mined land reclamation and remediation projects that limit access or eradicate collecting sites.

9) Continue to organize mineral shows and silent-voice mineral/mineral book auctions.

What are some possible new tasks:

1. Act as a museum support group for museums where none exist now.
2. Seek out "pioneer – historical museums", small college museums, and other non-mainstream institutions that possess orphaned donated mineral collections that need to be knowledgably indexed and identified, and try to assure the specimens long term safekeeping, even if it must be at another institution.
3. Rescue and redistribute mineral and geology books and minerals at risk of being discarded.
4. Rescue orphaned, unpublished mineralogical manuscripts and have them made available or published in some form.
5. Help find new homes for orphaned mineral and mineral book collections at risk of abuse, discarding or inappropriate sale (meaning sale without preservation of provenance, or dispersal of an historic mineral collection).
6. Help catalog existing collections at museums, document their history and make the catalogs more accessible for reading.
7. Interview historic mining and mineralogical people, transcribe their oral histories, copy their historic photographs and deposit copies in public, cooperative repositories.

Another overall guide might also be to find opportunities to combine activities with other organizations and reduce duplication. There is no conceptual reason that an FM chapter can not be allied with an existing club or society. The chapter would assist in providing lectures, specialized field trips under their own umbrella, and educational classes within the club or if there are several clubs in an area, to all of them.

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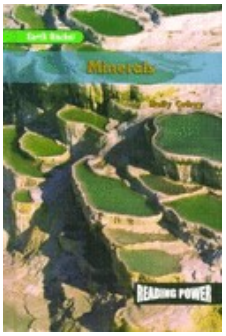
Books on Minerals for Young Readers



So many mineral hobbyists and professionals started showing an interest in collecting minerals when they were very young. Fortunately, several books have appeared in the last few years that are written for younger readers.

Minerals, by Holly Cefrey, was written for four to eight year olds to learn that they are found in the earth, our homes, and even in our food. According to the author, "Young readers will learn about minerals: where they come from, how they grow, what we use them for." The book provides colorful photos, accessible text, and fun facts that make this book an ideal introduction for young readers. This book is part of the Rosen Publishing Group's Earth Rocks! Series, on minerals.ISBN: 978-14042337-82. Available from multiple booksellers.

A Quest for Shinny Purple Crystals: Johnny and Max's Rock Hunting Adventure, by Monica Rakovan (a professional geologist), is written for children between the ages of four to nine. The story, about a boy named Johnny, his dog max, and his friend Sal is about the discovery of an important North American amethyst locality with a bent toward the presentation of fundamental information about minerals, mineral collecting, and geology. Written to be a learning experience as well as a fun story, the book emphasizes the use of proper terms, definitions, and especially safety. Published by The Arkenstone, Dallas, TX; it is available at www.iRocks.com.

Another mineral collecting story written for children between the ages of four to eight is *Julie the Rockhound*, by Gail Kowalski. The story chronicles the discovery of beautiful quartz crystals by a little girl named Julie in the back yard of her new house. Questions to her father about this treasure introduce the reader to many aspects of mineralogy and being a collector. Sylvan Dell Publishing, http://www.sylvandellpublishing.com

Not specifically about minerals but another great Earth Science book for children is *Coprolite: A Really Crappy Story.* This is an educational picture book, written by Lori Gesch and illustrated by her and Michael Dunne. The subject is of course fossilized poo, and she delves into more science and scientific fact about that subject than one would ever dream possible, while at the same time entertaining the reader in this funny and thought-provoking book written in rhyme. Self-published, it is available through lithographie.org and Amazon.com
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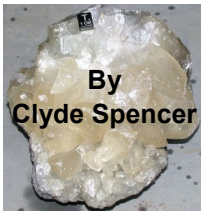
Barriers to Field Collecting – Part 1



I'd like to talk about concerns I have that affect our ability to collect minerals. There are many legal and social changes that have taken place during my lifetime that negatively impact those in the vocation and avocation of mineralogy.

Because the US is a notoriously litigious country, some of the restrictions are related to liability concerns by property owners. When I was a young man living in California, there were numerous abandoned gold mines in the Mother Lode, and even mercury mines in the San Francisco Bay Area (San Jose). Most of them hadn't been worked since at least the Great Depression, or longer. There was no interest in them, and no interest in discouraging anyone from poking around the dumps. In 1979, the price of gold hit an all time high and there was suddenly interest in the old gold mines. However, probably more importantly, during the '70s and '80s, people began buying patented mining claims to build homes. Along with the homes came No Trespassing signs. Similarly, when I lived in Vermont in the late '60s, it was rare to encounter a No Trespassing sign; when I took a short trip to Vermont last Summer, I encountered them frequently.

Also, sometime during the '80s, Vermont banned gold dredging. An area I used to visit frequently to pan and sometimes dredge for gold now has signs banning even using a sluice box. Recently, the California legislature refused to fund the Department of Fish and Game to issue dredging permits, effectively banning an activity that has been ongoing without problems since the 1950s! Had that been the situation when I was doing field work for my thesis, it would have been a serious impediment to acquiring rare platinum group minerals for study. About eight years ago, I ran into some problems in the Whiskeytown National Recreation Area in Northern California, where a friend and I accidentally found ourselves while stopped at a roadside picnic area. The nearby reservoir was created by the Army Corps of Engineers, but is administered by the National Park Service. The NPS is managing the recreation area as though it were a park and had instituted unposted permit regulations for gold panning that effectively make it improbable that anyone can actually find any gold. I was asked by the rangers if I would pan for gold in Yosemite or Yellowstone. I was sorely tempted to say, "No, there isn't any gold there;" however, I bit my lip out of concern that my friend's gear would be confiscated.

Along similar lines, there are many former mining districts throughout the west that have been incorporated into designated Wilderness Areas, and roads leading into them have either been gated or bulldozed shut. A Wilderness Area is supposed to be an area that is unique and has not been altered by the Hand of Man. Instead, it seems that Congress thinks that virginity, once lost, can be claimed if the evidence is hidden. Further, the Bureau of Land Management (BLM) has instituted permit areas where one has to pack out anything and everything you bring in on foot. Yet, refuse left behind by mining operations during the Great Depression and earlier are protected historical artifacts.

There have been continuing skirmishes between the BLM, concerned about 'asbestos,' and those who want to use the Clear Creek Management Area (San Benito Co., CA) for recreation. It is the type locality for the state gemstone, benitoite, and hosts many unusual minerals. I should note that neither I or nor anyone I know who has been visiting Clear Creek for over 45 years have contracted mesothelioma nor even asbestosis. (http://www.mesothel.com/asbestos-cancer/exposure/environmental/clear_creek.htm). Might the terms "toxic," "lethal," and "deadly" be exaggerated? I see the proper role of government as being advisory, not supervisory or patronizing.

Another problem that I'm aware of, particularly for Colorado and South Dakota, are the actions of the U.S. Forest Service closing perfectly serviceable, durable roads to vehicular traffic. These roads have been open to the public for decades and provide access to many abandoned mines and quarries. The locals are sufficiently displeased with this posting that some of them routinely tear the signs down when they find them. In any event, the

closing of roads makes it problematic for many of the elderly to get into collecting sites carrying heavy tools, let alone get back out with their prized specimens. In case you haven't noticed, the age of the average mineral collector is increasing. Since advanced courses in mineralogy and ore microscopy are becoming rare in the university curricula, I suspect that the average age of professional mineralogists is also increasing steadily. After all, 10,000 Baby Boomers are now retiring daily for the next 20 years!

Speaking of roads, road-cuts have been a staple of geology classes for decades both for examining cross-sections of structure and as an opportunity to collect fresh rocks and minerals. I noticed, when I was in Bancroft (ON) three years ago, one of the classic road-cuts was fenced and posted against collecting. Recently, the state of Indiana started making noise about how it was dangerous and illegal to collect in road-cuts. Considering that crushed rock from a quarry in this area goes for about $10 per ton, if someone hauls off 20 pounds of mineral specimens from a road-cut they are depriving the state of a potential sale of about 10 cents worth of aggregate. I suppose it could be considered petty theft, but it is hardly worth tax dollars to prosecute someone. But, the bigger picture would dictate consideration of the educational and recreational value of minerals that would otherwise not be available to collectors; and, it should really belong to the tax payers, not the department of transportation. Fortunately, the state apparently decided that it was making a mountain out of a road-cut and decided to back off on the threats of prosecution – for now.

A few years ago, OSHA tightened up on safety regulations and, among other things, required professional miners to complete safety training, including annual refresher courses. Unfortunately, despite a specific exemption in the regulations for "scientific workers," and "visitors," many quarry operators in Ohio and elsewhere are asking for evidence of the annual miner refresher course before allowing collectors into their operations. I don't know whether the quarry operators simply haven't read the regulations carefully, or if they are motivated by the intent to make it more difficult for collectors to gain access by raising the bar for entrance. Clearly, the curriculum, which among other things instructs one on how to store flammables properly and how to climb scaffolding, is not appropriate for visitors who should not be going near such things. In any event, the requirement probably falls more heavily on geology students and their professors since the annual training requires the commitment of 8 hours of attendance at the annual refresher training. While the state of Ohio currently provides free training, there are some who charge for the training, further elevating the bar for entrance to quarries that require the MSHA refresher training certificate.

Concerns about the White Nose Syndrome (WNS) affecting hibernating bats are a new barrier – literally! Many abandoned mines have been closed to access by humans out of concern for infecting the bats. Interestingly, it seems no one has asked the question "Where did the bats hibernate before the man-made mines were abandoned?" Might it be that with the bats necessarily more widely dispersed in the past they were less susceptible to pandemics? If so, then the actions of excluding humans from mines and allowing bats entrance may be exacerbating the WNS problem. One of my favorite quotations is, "The road to Hell is paved with good intentions – and striped with stupidity."

The problems that I've outlined above are not unique to the United States. If you haven't already had the opportunity to read the excellent missive by Stephen Moreton, (http://www.mindat.org/article.php/1379/Defending+the+freedom+to+collect+minerals) I strongly encourage you to do so. He has given considerable thought to the problems he has encountered and has good answers for those who would restrict things even more.

Fundamentally, liability concerns, bureaucratic restrictions by those with little acquaintance with geology, and environmental concerns have conspired to make it more difficult to engage in field collecting. In the next newsletter, I'll propose some things that the mineral-collecting community – particularly Friends of Mineralogy – might do to remove or at least reduce the barriers I've talked about above. If you have any suggestions along this line, please send them to me. I'll be glad to give you credit if I list them, if you so desire.

Barriers to Field Collecting – Part 2

The professional archaeology and vertebrate paleontology communities have been quite successful in getting legislation passed that effectively prohibits amateur collecting on 'public' lands. Also, commercial activities can be suspended temporarily if excavations expose significant fossils or artifacts. The mineralogy community could learn from these successful actions. Unfortunately, the existing legislation is heavy-handed and short-sighted. Fossils (as do many minerals) have a limited life-span once exposed to the elements by erosion. What isn't collected will become weathered and won't be preserved. With a small number of adequately-funded paleontologists, it is problematic as to the number of fossils that will be found and collected before they become so degraded as to be useless, or re-buried at lower elevations with the subsequent loss of stratigraphic information.

Another issue is that with commercial operations, there is an economic incentive to ignore or 'over look' any regulated discoveries. Probably a better approach would be to provide commercial operations with a tax incentive to cooperate with academic institutions and museums.

Vertebrate fossils and minerals have enhanced research and commercial value if they have accurate and detailed provenance and stratigraphic information. Thus, commercial collectors have a financial incentive to document their activities. To address the concerns of researchers about the loss of scientific knowledge, professional institutions could be given grants to purchase specimens on the open market. Other solutions might include the right of first refusal before being put up for auction to collectors without research interests. Alternatively, qualified researchers could be granted an opportunity to study the specimens before title was passed to a collector.

If a mineral (or fossil) specimen is never collected, then there will never be any scientific knowledge obtained from it, nor will anyone be able to appreciate whatever aesthetic qualities it may have. Today, most of the new, fresh mineral specimens available for research are coming from countries where mining is active, such as China, South America, and South Africa. Some specimens are coming from abandoned mines in the US, but the policies of the Forest Service and Bureau of Land Management are hindering that, and the problem is getting worse.

In my judgment, hiring paleontologists, or training employees already on staff to properly collect, catalog, and prepare fossils would be a better use of tax dollars than hiring law enforcement personnel to keep the public from collecting. It seems that the vision (if there truly is one!) of preservationists is to turn the great outdoors into something like a zoo or an arboretum where the public can wander on approved trails and admire something different from the cities they live in, but not touch or collect anything. The former public land policy of multiple uses is being supplanted by the Sierra Club mantra of "Take nothing but pictures and leave nothing but footprints." That admonition is more appropriate for heavily-used parks than for National Forests or former mining areas administered by the BLM. I suspect that at the heart of the different views of the appropriate use of public lands is the dichotomy between urbanites who have grown up in cities, vicariously living by watching TV and movies, versus those who earn their livings through the bounty of the land they live on. The urbanites typically have little appreciation for where the resources come from that provide them with TVs, computers, smart phones, computerized automobiles, and the energy to sustain their consumptive lifestyle. They don't appreciate how importing those raw materials negatively impacts our international balance of payments and our economy.

The larger the number of field collectors, the greater the probability that something unique and scientifically valuable will be discovered. The current policies of federal and state agencies focus on preservation, particularly scenery and biological diversity, and impede the expansion of knowledge about things below the surface of the

ground. Particularly, the requirements of mine reclamation favor environmental demands over vocational and avocational mineral interests.

The question should be asked, "Are fossils and artifacts any more valuable than minerals in expanding our scientific knowledge?" I would submit that they are equal. Therefore, any policies that would expand the number of collectors, provide access to favorable localities, and make specimens available to researchers should be encouraged. To that end, most mining reclamation projects are short-sighted. If there are problems with acid mine -drainage, there are potential alternatives to burying the site. Burial precludes opportunities for collecting. Also, there are numerous examples of mine dumps being reworked as changing technology has transformed worthless gangue into a valuable resource. Burying and unburying a mine may cause reworking dumps to be uneconomical because of the energy expended in the process.

While those who have mineral collections are commonly most interested in the aesthetic qualities of their specimens, they provide valuable financial incentives for the production and preservation of new minerals. These collections can serve as databases of localities and typical properties of minerals from different localities. Eventually these collections get recycled during estate sales. Thus, collectors potentially provide valuable research material for professional mineralogists both now and in the future. Indeed, even waste trimmings from new material may be valuable for research. Not only professional mineralogists, but advanced-amateur micromounters are responsible for discovering new species of minerals and documenting unusual habits. Field collecting should be encouraged and facilitated to expand the knowledge about minerals and rocks.

There are numerous examples of fossils that have been in museums for decades and, when finally studied in detail, have provided valuable scientific information. Similarly, a quasicrystal specimen (icosahedrite) collected in Russia in 1979, was in a museum in a collection, acquired from a private collector, and not studied in detail and reported on until 2011 (Bindi, *et al.,* 2012). Khatyrkite was reported in an initial analysis in 1985. (http://www.pnas.org/content/early/2012/01/03/1111115109.full.pdf+html) The important thing is that it was collected and curated; had it never been collected, the scientific community would not have the information provided by the specimen. Left in the field, it will eventually weather away, taking with it any new knowledge it might hold.

Additionally, documented collections have archival value for historians.

Can the Bureau of Land Management (BLM) and US Forest Service (USFS) enforce their restriction on bartering or selling mineral specimens, collected on public lands, to commercial dealers? It would seem to violate the principal of private property, where one is free to use or dispose of their property as they see fit. Absent that, then the item isn't really their property. If a collector sells or trades specimen to another private collector, is the recipient under the same legal restraint? How can federal agencies enforce the restriction? Who would be liable for prosecution – the original, untraceable collector, the person who ultimately sells it to a commercial dealer even though they may not be aware of the origin or date of collection, or the commercial dealer who receives the material? If the latter, it provides an incentive for the dealer to improperly identify the locality, which seriously reduces the scientific value. Lastly, how could the federal agency establish when the material was collected if it is from a classic locality? *Ex Post Facto* laws are unenforceable.

I can understand and appreciate the concern for conserving a particular material that might be limited in quantity. As an example, the classic locality for lawsonite in Tiburon (CA) seems to be restricted to a few boulders. However, long before collectors exhausted the deposit, homes built there made the site inaccessible. There is a finite amount of everything and one might reasonably ask whether it really matters whether a deposit is exhausted quickly or slowly. We might well be conserving minerals for future generations that have no interest in such things!

A related issue is whether the federal agencies restrictions on the quantity that can be collected daily are reasonable? One might drive several hours to a collecting site, and then be restricted to "25 pounds plus one specimen." That means you could easily hold in two hands what you can legally keep after a long drive. The policy encourages people to lie about how many days they have been in the field. I don't condone lying, but I am sympathetic to their response to an ill-conceived policy, albeit with good intentions.

Further, it is often necessary to collect something larger than 25 pounds to be able trim it carefully, with appropriate tools, to a cabinet-size piece for display, or to section it to expose additional material. Being forced to remove matrix in the field to reduce its weight may also reduce its scientific value if reaction rims or cross-cutting relationships are lost. Thus the weight limit is counterproductive in that it encourages small pieces. Lapidarists,

who might want to make book ends or large polished spheres, are just out of luck. I suppose one might apply for a special collecting permit, but there is no guarantee that it would be issued to all who could put it to good use.

Additionally, one might serendipitously come across something for which they did not request a permit for. There is no guarantee that even if they were to go to the expense and trouble to come back with a permit, that they could again find the same specimen or that someone else might not have taken it.

It would seem to me that the federal collecting policies are virtually unenforceable unless guards are posted at all collecting sites and personally monitor collecting activities. Anything less and the policies will be applied unevenly and possibly unconstitutionally.

It seems to me that a fundamental structural problem is that bureaucrats have to justify their jobs and continued employment by demonstrating that they are doing something. I'm reminded of the adage, "Don't confuse activity with results." In many cases, it seems that the bureaucrats are inventing restrictions, policies, permitting processes, *etc*. that are surrogates for actually accomplishing something important or necessary. Once those job-justifying policies and procedures are in place, it is difficult to get them removed. The situation is compounded by the consequences of Jerry Pournelle's Iron Law of Bureaucracy, which states "*In any bureaucracy, the people devoted to the benefit of the bureaucracy itself always get in control and those dedicated to the goals the bureaucracy is supposed to accomplish have less and less influence, and sometimes are eliminated entirely.*"

If we don't pay attention to the political changes impacting our ability to field collect, and attempt to reverse them, we may find that our only opportunity will be to use a 'Silver Pick' to obtain Chinese specimens! It is evident that the bureaucrats who have made the collecting policies have little to no appreciation for collecting procedures or scientific documentation requirements.

[Previously published in FM Midwest Chapter newsletters]
[Parts 3 and 4 will be in the next issue]

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Wulfenite.
Red Cloud Mine,
Formerly in the collection of Gene Schlepp from Harvard University.
Photo by Gene Schlepp
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Report on the 2016 NCMA Micromount Symposium
By Henry Barwood

I set out for the NCMA symposium early on Friday June 3. The counter at the Delta desk at Montgomery Airport only had one agent working so I had to stand in line for 45 minutes to get my bags checked in. After that I had another 35 minute wait at TSA. I got to the departure gate 15 minutes after the plane was scheduled to leave, but since half the plane was behind me, they decided to wait a bit!

My flight to Sacramento was supposed to leave at 8:31 AM Atlanta time and the Montgomery flight got in at 8:11 AM. As always with Atlanta Airport, I arrived at gate D23 and departed at Gate A3. I did my best imitation of a three legged race half a mile to the shuttle and then another half mile out to gate A3. I arrived at 8:32 to find the gate deserted. I did another race back to the flight board and found that it had been moved to gate A5. I arrived sweaty and winded at Gate A5 to find people still boarding (they only had one gate agent show up that morning). I was #13 on the standby list with 3 seats remaining. Then a miracle occurred! The lady kept calling for people to board and they kept not showing up. Over the next 10 minutes, I worked my way up from #13 to #2. I was the next-to-the-last person to board the plane! Unfortunately, that also meant I got to sedge into the center seat! Luckily the fellow in the window seat turned out to be an 80 year old retired photographer from Lawrence Livermore Labs, who also like minerals. He and I talked imaging and minerals all the way to Sacramento.

At the airport I decided to let them get me a wheelchair. They rolled me out to the rental car shuttle area and parked me in the shade (about 150 people in line). A wonderful lady spotted me and told the shuttle driver to get me on the next bus. I thanked her profusely and managed to get on board. I got a rental SUV and headed out to the back of the rental lot (it is always a half mile to where the vehicle I rent is parked) to space K-20. I arrive at K-20 and find it…empty!. Back I go dragging all my bags. An attendant heads out to locate the SUV. Finally I escape the airport and headed up to the Mother Lode Motel at Placerville. Couldn't check in so went on to the meeting. Arrived at the Community Hall around 2:30 and set up my old beat-up scope and got out my bucket seat. Spent the afternoon checking out micros for sale and talking with everyone.

After dinner, we had Don Howard's annual presentation "What's Old in Minerals" about goodies from the previous year's give-away table. Bob Housley gave a talk on the mineral wayneburnhamite from the Crestmore quarry that was fascinating. Brent Thorne followed with a presentation on new mineral species from the last year and showed images of a lot of them. Bruce Kelly showed a lot of images he had prepared, all excellent! Don Howard recapped his induction into the Micromounter's Hall of fame and followed it up with his presentation at Baltimore on filiform minerals

Saturday, I visited the meeting briefly and then had to go back to Sacramento to pick up Adam. He had planned on coming up late Friday evening, but couldn't make the last flight out of LAX. Unfortunately, I had to miss Paul Adam' great presentation on the Silver Coin Mine. I had heard an early version back in January at the SCFM meeting, but would have loved to hear the update.

Adam set up a few spaces from me. The group had swelled until there were very few slots available. We spent the afternoon looking at give-aways and generally talking with other collectors. Both California micromount symposia are fascinating because of the number of unusual minerals that show up and the number of participants who have a mineral named for them! The afternoon silent auction featured some really nice items. Neither Adam nor I were successful in our bids. A large group of us went to dinner at a Mexican Restaurant that featured HUGE servings.

Saturday evening was the live auction. Tim Rose was the auctioneer and his always entertaining style was a hit with the attendees! Bids were brisk and a significant amount was raised for the NCMA. The most sought after specimen was a pauladamsite! By the end of the auction, everyone was pretty much exhausted and headed to the various motels.

Sunday morning the die-hards all reconvened and poured over the remaining give-away material and the remaining $1 micromounts. At 10 AM Herwig Pelckman gave a talk on “Alfred Schoep, from Fred Flintstone to Bob the Builder”. Those of you who have never heard Herwig give a talk, you have missed something. His presentations are excellent and it was enjoyed by everyone. After his talk everyone pitched in to help break down the meeting and clean up. The extra give-aways were loaded up by anyone who could travel with them, good bye’s were said, and the meeting was over for a year.

I got some excellent mounts from the $1 table and also some really nice stuff from the give-away tables. I hope to have some images posted soon.

Sunday afternoon, Adam and I drove over to Nevada via Lake Tahoe. Neither one of us had been through that area before, so we enjoyed the drive. We arrived at Winnemucca around 6 PM and found a mid-price motel to stay in. We drove on over to the Silver Coin mine to check it out. It was raining in the desert and the normal brown was replaced by a vibrant green. Adam and I were both amazed. There has been a lot of prospecting of the Silver Coin area and several old adits have been opened. We would like to have explored, but it was getting dark. Adam got out of the truck to take a look at the phosphate stope and got eaten alive by mosquitoes! The entire adit was a cloud of the little biters! First thing on our shopping list was bug spray!

Adam devised a way to haul stuff up out of the phosphate stope so that I could collect. Monday morning we went shopping for parts to build a “Barwood Gizmo” (and bug spray!). We got everything done around noon and went back over to Silver Coin where we assembled our machine. It took a few test runs to get it working, but after that things went smoothly.

Here is a shot of the rain in the desert when we arrived (note the dust storm in the foreground):

Followed by a nice rainbow:

Here is our Gizmo hauling potential specimen material:

Here we are sorting stuff:

The canned air was a necessity for blowing off the dust! We managed to recover about 3 buckets of decent specimens.

Late Tuesday we pulled out and headed back towards Sacramento. We had wrapped and packed specimens as we collected and hoped to ship them from Winnemucca, but the UPS place was only open from 8AM to 9AM each day, so on to Sacramento! We drove over on I-80 and even went through Donner Pass!

Wednesday morning we found a UPS store and shipped the boxes back to Troy, then headed to the Airport. We got checked in curbside thanks to Adam being an employee and then he wheeled me through TSA so we both got though with a minimum of hassle! My flight was supposed to leave at 12:38. At 12 noon they announced that the plane had a flat tire! I've been flying for 30 years and have NEVER had a plane get a flat! They called maintenance and changed the tire, which took 2 ½ hours! There was a question if I would get on the plane, but by the time it pulled back from the gate around 3PM, half the passengers had bailed out. Instead of being jammed in a middle seat, I got to sit with a space between me and the other passenger back to Atlanta. Only real problem was we didn't arrive at Atlanta until nearly 11PM and the last flight to Montgomery left at 10:15. Jane and Shelby drove up to Atlanta to get me and we made it back to Troy around 2AM.

It was a great trip and with luck I'll have some mineral image up soon.

Attendees of the 2016 NCMA Micromount Symposium That Have Minerals Named After Them

Top Row: Bob Housley - Al Wilkins - Joe Marty - Mike Kokinos
Bottom Row: Tim Rose - Ted Hadley - Eckhard Stuart

Paul Adams

Pictures of attendees , freebee tables and set-up by Beth Heesacker

COLORADO CHAPTER UPDATE

Second Eugene E. Foord Pegmatite Symposium July 15-19, 2016

The Second Eugene E. Foord Pegmatite Symposium opens Friday night, July 15, 2016 at the Colorado School of Mines Geology Museum, on the Colorado School of Mines campus in Golden, Colorado. This symposium features oral presentations by nationally and internationally renowned experts on pegmatites, which are coarse-grained igneous rocks known as producers of the gemstones aquamarine (blue beryl), heliodor (yellow beryl), morganite (pink beryl), kunzite (pink spodumene), topaz (clear and blue) and garnet (red). Pegmatite mines are also known as producers of feldspar for ceramics and glass, white quartz for decorative materials, mica for insulation and lubricants, and tantalum for cell phones, and cesium for oil and gas completion fluids.

This technical meeting brings to Golden more than 80 participants who have traveled great distances from Brazil, Czech Republic, Ireland, Sweden, Canada, and many different states in the United States. Oral presentations that last for two days on Saturday and Sunday, July 16-17 on the CSM campus will be followed by two days of geologic and mineralogic field trips to some of the well known pegmatite deposits in Colorado. Eight field trips, four each day, will cover Larimer, Jefferson, Teller, Fremont and Gunnison counties. The field trip participants will visit some of the pegmatites in Colorado that are famous for their gemstones and rare minerals.

The symposium has been organized and sponsored by the Geology Museum of the Colorado School of Mines, the Friends of Mineralogy-Colorado Chapter, the Denver Region Exploration Geologist' Society, and the Friends of the Colorado School of Mines Geology Museum.

Participation to the symposium is open to the public by registering prior to Saturday, July 16, by mail. Registration information and forms can be found either on the Facebook page https://www.facebook.com/LikeCSMGeoMuseum/ or the Friends of Mineralogy-Colorado Chapter website, http://friendsofmineralogycolorado.org/2nd-foord-pegmatite-symposium/.

For further information you may contact Mark Jacobson (markivanjacobson@gmail.com, 337-255-0627), Dr. Bruce Geller, director of the CSM Geology Museum (bgeller@mines.edu, (303) 273-3815) or Dr. Peter Modreski, Resource Geologist, U. S. Geological Survey (pmodreski@usgs.gov, 303-202-4766).

Midwest Chapter Update

Penfield is a haul, but worth the drive! (Reggie Rose)

A trip to Penfield, NY is not one you leave for on the morning of the trip, especially if you are an FM Midwesterner. From Ohio, it's about a 7 hour trip. Three Midwest "Fmers" besides this author made the long trek.

If you find one really nice piece from any field trip worth taking home you have had a good day. Our FMMW representatives on the May 7th trip were Dieter Burrell (Ann Arbor, MI), Mike Royal (Defiance, OH) and FM Secretary Frank Konieczki (Belleville, MI). Frank found a dolomite-calcite combo specimen with a nice pocketed calcite crystal. The calcite manifested itself in multiple scalenohedral peaks. Frank also found a nice nearly 3" x 3" x ¼" selenite plate, pearly and pretty clear, but the photo Gods did not cooperate on this specimen.

If you had to pick an FM collector who would not get shut out on any given trip, Mike Royal would be a good one to select. Mike also came up with a dolomite-calcite combo with multiple scalenohedrons piled one on another.

If there was one amazing find from Penfield on this early May morning, Dieter Burrell made it. Perhaps the quarry guide on this trip is incomplete; what Dieter found is not even in the mineral list. He brought back home a dazzling dolomite-celestine pocket guarded in sentinel-like fashion by several elongated celestine crystals over 3" in length.

For sure, dolomite is in the quarry guide, and it is all over the place at Penfield. However, celestine is not common here. It's the first celestine specimen I have seen from Penfield, and it is a real beauty. What is encouraging about these finds is that the collecting at Penfield's sister quarry Walworth in the fall is usually better and is a two day collection, not one. Again, hats off to our FMMW collectors.

Dieter, Mike and Frank

Dolomite – Celestine pocket, Dieter Burrell

New Jersey Chapter Update

A New Find of Albite from the C.K. Williams & Co. Quarry, Easton, PA Discovered by Gary Moldovany

A few words about the locality: the C.K. Williams & Co. Quarry, located near the City of Easton, Northampton County, Pennsyvania is part of a small complex of quarries located along Chestnut Hill which is just west of the Delaware River on Route 611. A part of it was formerly known as the Sherrer or Verdolite Quarry. The main purpose of the quarry was mining for serpentine or "verdolite" for ornamental building purposes. The quarry was also exploited for the mineral tremolite, which was used as mineral pulp additives in paint and paper products.

Slabs of the ornamental material were used in the Alberta, BC Parliament House. The Easton Post Office building has floor tiles made from the serpentine and dolomite from the Royal Green Marble Quarry, across the river in Philipsburg, NJ. That quarry is part of the same geological formation as the Easton Quarry.

The quarry became fully operational in the 1930's under the management of Abraham Sherrer. There were several smaller quarries that were taken over and consolidated by the C.K. Williams Company. The land was purchased by the famed mineralogist Arthur Montgomery in 1953 who was a professor at Lafayette College in Easton. He later conveyed the property to Lafayette College. The quarry is presently owned by the City of Easton and is a popular collecting spot for local rockhounds. Many interesting specimens of eastonite, tremolite and serpentine can still be collected there.

Across the road, on the riverbank, are the remains of the dump area which also contains considerable mineralization. The geological setting of the quarry is a highly altered limestone, recrystallized into marble and containing solutions of serpentine minerals. The solutions crystallized into a pegmatite containing quartz and feldspar. Further alteration, weathering and ground water intrusion resulted in a rather complex mineralogy with serpentine, tremolite, eastonite, brucite and dolomite. Other minerals present include a suite of REE minerals such as thorian uraninite, boltwoodite, carnotite, thorite and some other uranium secondaries. Wolsendorfite and thorogummite have also been found. "Contact metamorphosed Precambrian Franklin Marble in the Reading Prong Section of the New England Province" ("Geology of Pennsylvania" pg. 645) The quarry is bordered on the north and south by large masses of granitic pegmatite. A link to the article: www.mindat.org/article.php/2375/

Update from NJ President KC Dalby

We have just concluded our fiscal year with our last meeting in June, before the summer recess. It has been a busy year- highlights as follows:

- Co-sponsoring field collecting with the North Jersey Mineralogical Society has proved to be advantageous, opening up several new and different areas to collect and offering the ability to field collect to a greater amount of enthusiasts. One such trip involved an overnight collecting fossils in the Potomac River Basin in areas not open to the general public. This was aided by a contact with the Delaware Mineralogical Society.
- We are in communication with Jolyon Ralph to iron out all the details of Mindat hosting Friend's websites. We have some work to do on our site before submission to Jolyon. We hope to have the kinks worked out of the system and a written procedure/process to be reported in time for the Denver meeting. We took the spot of "guinea pig" on this project with the blessing from our president, Clyde Spencer.
- We have also submitted a new mineral find at an old collecting site in Eastern Pennsylvania for this bulletin and it has also been sent to Jolyon Ralph for use in updating the site database on Mindat.
- We have increased membership in the society to 32 adult members and hope to continue with membership growth by potentially sponsoring a mineral/fossil show in 2017. At the point that the membership agrees to sponsor the show, we will communicate that information.
- We look forward to the beginning of our next fiscal year beginning in September with our annual "all business meeting" with a yearly review of our Bylaws and Operating Procedures.

Pennsylvania Chapter Update

Planerite from Lime Ridge, Mount Pleasant Mills, Snyder County, Pennsylvania

By
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Introduction

The Lime Ridge locality is famous for its spectacular specimens of green wavellite, and other phosphate minerals have been reported to occur there. The locality is along an unimproved road south of the National Limestone quarry about 0.45 mile northwest of Mount Pleasant Mills at about 40° 43′ 30″ N latitude and 77° 01′ 26″ W longitude. The locality is on the eastern end of a long, narrow hill labeled Lime Ridge on the U.S. Geological Survey Richfield 7.5-minute topographic map (not to be confused with the village of Lime Ridge in Columbia County). The locality is accessible from the quarry, which is owned by Eric Stahl. Mr. Stahl allows mineral clubs to collect in both the quarry and the wavellite locality, by prior arrangement. The wavellite locality is in the Keyser and Tonoloway formations, undivided. Wavellite and other phosphate minerals are found in veins in a brown siliceous sandstone.

Analysis

A specimen approximately 6 cm by 3 cm from Lime Ridge labeled "turquoise" was furnished by Steve Carter. The mineral is a pale blue-green crust on a brown, coarse-grained sandstone matrix with small, rounded, white quartz pebbles (fig. 1). An analysis of the mineral was done at West Chester University. Images were captured with an FEI Quanta 400 environmental scanning electron microscope (SEM)with a tungsten filament using a 20 kV accelerating voltage under low vacuum. The analysis was done with an Oxford INCA X-Ray Energy Dispersive Spectrometer (EDS) integrated with the SEM.

Under magnification, the planerite formed spherulites (figs. 2 and 3) approximately 90 micrometers (microns) across. Analysis of six points provided the average values in table 1. Silica is the most common impurity in planerite (Foord and Taggart, 1998).

Results

The analysis provided results that are very close to the ideal formula of $Al_6(PO_4)_2(PO_3OH)_2(OH)_8{\cdot}4H_2O$ for planerite given by Foord and Taggart (1998). The lack of copper indicates that the mineral is planerite. Although a trace (<0.02 weight percent) of copper is present, values less than 0.1 weight percent are suspect. Planerite, a mineral in the turquoise group, is an end member in a solid solution series with turquoise ($CuAl_6(PO_4)4(OH)_8{\cdot}4(H_2O)$).

Figure 1. Planerite from Lime Ridge, Mount Pleasant Mills, Snyder County, Pennsylvania, 6 cm. Steve Carter specimen.

Acknowledgements

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References

Foord, E.E., and Taggart, J.E., Jr., 1998, A reexamination of the turquoise group: the mineral aheylite, planerite (redefined), turquoise and coeruleolactite: Mineralogical Magazine, vol. 62, no. 1, p. 93-111. (available at http://rruff.info/uploads/MM62_93.pdf)

PACIFIC NORTH WEST CHAPTER UPDATE

Greetings, mineral lovers from the PNWFM Chapter President!

In any club-type organization like PNWFM, attracting new members is always a concern. We do a reasonable job of retaining the more seasoned mineral collectors, but we could definitely do more to attract young people into mineral collecting and more specifically, into FM. One way to do this has been suggested by Linda Smith. If we appoint a liaison to the geology departments in Northwest colleges, we can raise awareness of FM amongst the teachers and students. It is a natural and complimentary match, and would be beneficial to all.

A first try at this could be as simple as sending packets of symposium flyers (both in email and post) to a dozen or so college department heads, hoping that they get into the right hands. Ideally, this will eventually progress beyond just advertising into a two-way dialog where PNWFM is viewed as a valuable resource to education and vice versa.

This naturally leads to some questions: Do we have any members who have appropriate connections to geology professors in the region? Can we get a couple of volunteers to get this started by collecting the contact information and sending out some brochures in May? Please contact me if you have thoughts on this, or would like to help.

Symposium – October 14-16, 2016
We have settled on a symposium title: *"Great US Copper Localities: Butte, Bisbee and the Upper Peninsula."* Allan Young has been working on getting the speakers and talks lined up and it is almost complete, so look for an announcement on our Facebook page and web site soon.
As I mentioned in January, please consider bringing a display. One of the best aspects of our symposium is that PNWFM members share parts of their fantastic collections. I will be bringing a display of copper minerals this year, but there is no requirement that the displays be "on theme."

Washington Pass Cleanup
Our annual service project, campout and collecting trip at Washington Pass will be held August 12-14, 2016. This trip is a lot of fun and a great opportunity to collect with some of the most knowledgeable collectors of this locality. There will be more details in the July newsletter, but feel free to contact me if you have questions.

Member Participation: So many ways to get involved!
Write an article or send in a few photos for the newsletter. Went to Tucson? Send us a trip report! Find a weird fuzzy green mineral you'd like to share? Send us a photo whether you can positively identify it or not; I think mysteries are as fun as scholarly certainty. Thanks to Wes Gannaway, Beth Heesacker, Karen Hinderman, Al Liebetrau, Bob Meyer, Don Newsome, Lanny Ream, Alexander Schauss, and myself for providing newsletter content so far this year.

Buy and sell, meet and socialize with other collectors at the Seattle Mineral Market: **May 21-22**, 2016 at Lake City Community Center, 12531 - 28th Ave NE, Seattle, WA 98125. See seattlemineralmarket.com for details. Camp out and collect rare minerals at Washington Pass, **August 12-14**, 2016.

Plan to attend our 2016-2017 symposia:
October 14-16, 2016 *Great US Copper Localities: Butte, Bisbee and the Upper Peninsula*
October 13-15, 2017 *Minerals of Morocco*

"Like" our official Facebook page: facebook.com/PNWFM Visit the Rice NW Museum of Rocks and Minerals in Hillsboro, OR. PNWFM members get free admission and store discounts. ricenorthwestmuseum.org Send me ideas for how PNWFM can better serve you and the mineral collecting community.

Until next time, -- Bruce Kelley, President, PNWFM

SOUTHERN CALIFORNIA CHAPTER UPDATE

This past year has been a learning experience for our club leadership with lots of growing pains. We are still working to reestablish an operational website and are being challenged with loss of field trip locations as corporations sell off prime mineralogical sites or President Obama and Senator Feinstein establish more National Monuments in California barring mineral collecting by our chapter and others. Working with new ownership of world class historical mineralogical sites like Crestmore Mine or BLM and their bureaucracy for access into newly established National Monuments in the Mojave Desert are time consuming.

We have had two successful symposiums and associated field trips this last year since our June 2015 submission. We were not able to communicate this in the February FM Board meeting due to an overwhelming agenda and lack of time. Hopefully leadership might be able to allow chapter reports once again this next year. Our October 17th Symposium and field trip were extremely successful with a quality collection of minerals in the field despite the loss of Crestmore Mine field trip location in the last month with sale of property before our fall symposium. Our spring symposium to Darwin Mine region of Inyo Mountains was even more successful with 57 attendees and a variety of fluorescent minerals found in three different field trips over the March 19-20th weekend.
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Fall Symposium, October 17, 2015

The SCFM Fall Symposium was hosted by San Bernardino Valley College Geology Department. The field trip Saturday afternoon was to CalPortland's active Slover Mountain Quarry, followed by the historical Henshaw Quarry. Thirty nine attendees interacted with Dr. Doug Morton, USGS Emeritus and U.C. Professor Emeritus after his formal presentation entitled "Regional Geological Setting of Crestmore Quarry & Other Historic Quarries in Northern Peninsular Ranges Batholith."

Jurupa Mountain Discovery Center provided a 40 ft. long display of Crestmore Quarry minerals, photos, and materials from their regional collection for participants to view during the educational symposium. One 7 ft. portion of this display is shown above.

Fall Symposium 2016

SCFM's Fall Symposium will be conducted in the central Mojave Desert region October 15-16, 2016 with field trips to selected sites in the new National Monuments established by President Obama in February, 2016. Symposium theme and field trip locations pending. Detailed flyers will be provided this summer.

Mineral Toxicity

Clyde Spencer

I was looking on the internet recently for some information on the toxicity of minerals. To my dismay, I found very little specific information. Some of what I did find was by people who probably should have known better, but was very wrong!

This project started because of concern about federal agencies remediating old mine dumps. Once a dump is buried, or hauled off to a containment site, there is no opportunity for mineral collecting. Bureaucrats, whose primary concerns are job security and 'make work' projects, use concern for public health and safety as the rationalization for spending tax dollars and justifying their jobs. Unfortunately, misinformation about the toxicity of minerals makes their shell game easier to run. Just because a hand-held X-ray fluorescence spectrometer shows certain problematic elements to be present on a mine dump, it doesn't mean that they represent a danger to hikers or even mineral collectors.

AREA CLOSED FOR PUBLIC SAFETY

- Recent soil sampling in and around the Santiago Mill site revealed very high levels of lead, arsenic and mercury, well above what is safe for humans and animals
- Walking around the area or in the mill kicks up dust that contains dangerous levels of these toxins, releasing them into the air. They also get on your shoes, shoelaces and clothing.
- The open mine shafts and the mill are unstable and unsafe. Do not go near the opening of the mine. The shaft could collapse and the unventilated air inside could expose you to undetectable fatal gases.

"This is an important part of Colorado's history and its mining heritage. Our goal is to make the site safe for visitors so that this history can be shared with future generations.

Sue Struthers, U.S. Forest Service Archeologist

HISTORY OF THE SANTIAGO MILL

The Santiago Mill is an increasingly rare example of an early- to mid-twentieth century American floatation mill located on National Forest System lands. It is one of the last complete depression-era mills standing.

Built in 1935, the mill was used for concentrating locally mined gold, silver and lead ore, utilizing the floatation process. Designed to save on power costs, the mill utilized gravity to process ore extracted from the Santiago Mine and surrounding dumps.

Floatation was a cost effective way to process heavy mineral particles out from lighter waste particles by "floating" the waste from the mineral using water.

Prominent features of the mill site include the 1935 mill and sampling shed, 1948 water tank, and 1911 ore bin. The mill is a shed-roofed, wood-framed building with four steeped bays. On the northeast side of the mill is a single story gable-roofed with a shed-roofed addition called the sampling shed.

The mill itself contains remnants of milling equipment from the 1930s through the 1950s. The 3,700 gallon water tower, critical to the floatation process is found northeast from the mill. This tower was filled by a piping system from snowmelt collection higher up the slope and another welded pipe, a half-mile long that pumped water from the town of Waldorf below.

Cu Hg Zn As Pb

WHY BE WORRIED?

- Arsenic contamination in soil is of public health concern due to its toxic effects as a cancer causing carcinogen When arsenic is present in soil, small amounts can be ingested by swallowing soil through hand-to-mouth actions and breathing in dust.
- Even the small amounts of lead can cause harm to the body. Symptoms of lead poisoning include headache, abdominal pain, memory loss, kidney failure, and weakness, pain, or tingling in the extremities.
- Less than a gram of mercury can produce toxicity or death. Effects include damage to the brain, kidneys and lungs. Common symptoms of mercury poisoning include itching, burning, skin discoloration, swelling and peeling.

Now, presumably, Superman would not be affected by a piece of kryptonite if it were contained in a lead box. Minerals represent an analogous situation in that to be harmful they must have what is called bioavailability. That is, they must be ingested, inhaled, or otherwise pass through the skin barrier and be taken up by the blood or organs of the body. Generally, to do that, they must be soluble in water or stomach acid.

Therefore, even if a mineral is composed of elements that by themselves would be toxic, if they are so tightly bound chemically to other elements that they are insoluble, then they will simply pass through the gastrointestinal track with no effect. Even the much-maligned metallic **mercury** will pass through one's system with little measurable effect. (Although, mercury vapors are quite toxic; see "Poisons" link below.) However, even soluble minerals that are composed of toxic, or normally reactive elements, can be harmless in small quantities. Probably the best example of that is table salt, formally known as the mineral **halite**, or the industrial chemical sodium chloride. If you were to eat enough salt, it could make you very sick or even kill you. However, while chlorine gas is quite poisonous, and refined sodium will react with water (such as in one's body tissues) to produce heat and hydrogen gas, when the elements are dissolved in water as ions, they are not only relatively benign, but also essential to humans. There are many other elements called trace elements that are essential in small quantities – although, they would be toxic in large quantities.

Thus, there is the question of just how much is required to either kill or sicken someone. Chemicals are usually rated in their toxicity as a dose that will kill 50% of the individuals (LD_{50}), measured in the weight of chemical

per unit weight of body tissue (*e.g.* milligrams per kilogram). Obviously, individuals vary in their susceptibility to poisoning. (For a readable introduction to poisons, and a perspective on relative toxicity of truly dangerous substances, go to this link: Poisons)

Chemicals vary widely in their LD_{50} toxicity and there seems to be little information on toxicity for minerals that aren't used in industrial processes or consumer products. Perhaps part of the reason is that so many minerals are oxides or silicates that are insoluble and unreactive, and therefore have virtually no chemical toxicity. Some common sense will have to be applied here. For starters, determining the solubility of minerals in water especially, and secondarily in hydrochloric acid, will alert one to potential danger. (see the article by Spencer, 2014) For a more complete list of water soluble minerals than I provided, see the website at the following link: Betts. If the mineral is soluble, then one should consider the constituent elements. If the elements are relatively rare and are not incorporated commonly into the cellular building blocks of living tissue, then they should probably be suspect.

To reinforce the importance of dosage, the Merck Manual states,

> Nine **trace *minerals*** … are required by people in minute amounts:
> Chromium
> Copper
> Iodine
> Iron
> Fluorine
> Manganese
> Molybdenum
> Selenium
> Zinc
> … All trace *minerals* are toxic at high levels; some *minerals* (arsenic, nickel, and chromium) **may** be carcinogens.

Note that the term "trace *minerals*" is used here in a dietary sense and relates to the elemental availability in soluble form and does not have the same meaning as does the term 'minerals' used by mineralogists.

I'm not going to address radioactive minerals because they have their own special set of conditions and there is still debate about whether all levels of exposure to ionizing radiation are dangerous, or if there are threshold effects. However, if you are a collector of radioactive minerals, it might be prudent to wear a dust mask while handling alpha and beta emitters. If you spend considerable time in close proximity to gamma emitters, you might want to consider storing them in a lead container, although metallic lead presents its own unique risks.

As a general rule of thumb, chemicals that have found utility as insecticides or rodenticides should be regarded with caution. These typically exhibit acute toxicity. Examples would be soluble arsenic or thallium compounds. Personally, I'm not concerned about handling relatively insoluble arsenic compounds such as **arsenopyrite** (sulfoarsenide) or **sperrylite** (arsenide). Indeed, I've handled them for years with no known ill effects. I've even played with metallic mercury globules when young and I'm still around to talk about it at an advanced age! One of the reasons for that is that metallic mercury and lead typically exhibit chronic toxicity, meaning that they can accumulate in the body with long-term exposure, and may eventually reach a threshold where symptoms are exhibited. The body can excrete most toxins naturally. Thus, if there are only infrequent, low-dose exposures, the critical threshold may never be reached.

Almost anything that is inhaled in copious quantities, ranging from road dust, to sawdust, to milled flour, or coal dust can cause congestion and blockage in the lungs. These are usually problems in industrial environments where workers are exposed to high levels of dust over a period of years. There are a few minerals that seem to be particularly irritating, such as quartz, leading to silicosis, and fibrous minerals (such as amphibole-group minerals), leading to asbestosis. Chronic industrial exposures are different from occasional, short-term, low-level exposures. I'm not going to dwell on the hazards of mineral dust. If you are in a dusty environment, put on a good dust mask or leave the area!

Refined beryllium has a general reputation for being toxic, and I have heard concerns expressed about lapidarists being exposed to beryllium while cutting and polishing **beryl**. However, I've never actually heard of any harm coming from the activity. That may be because beryllium silicate is insoluble and, also, that water is used invariably in the cutting process to both cool and lubricate the stone, which eliminates any potential dust problem. Related to the general problem of dust inhalation is the physical form of the mineral. As a general rule of thumb, soluble minerals are easier to dissolve if finely ground.

Many minerals can be decomposed thermally. That is, if subjected to sufficiently high heat they will break down into their constituent elements. Sulfides, arsenides, selenides, and tellurides are some of the more common anion groups susceptible to decomposition that release one or more elements as a gas. Thus, roasting some minerals such as **cinnabar** or gold tellurides may release toxic vapors. Also, the act of grinding (probably because of localized heating) may liberate stable metallic elements from the neutralizing anion, as in the case of **cinnabar**. However, the thrust of this article is the danger of handling or just being around minerals commonly found in mine dumps or collections. We are not concerned here with industrial processing, just with collecting, handling, and displaying minerals.

I'm going to define a *toxic mineral* as a naturally occurring, inorganic substance that has high bioavailability and also has the potential for disrupting the normal functioning of the body in such small quantities that merely handling it, or accidentally ingesting or inhaling a very small quantity, would result in the need for medical attention. This is in contrast to having the lungs or gastro-intestinal system overwhelmed by a volume of material that one would not normally encounter. To emphasize further the distinction between organic and inorganic, and the importance of dose-toxicity, there is the well-known case of the Dartmouth College researcher who died shortly after a drop or two of dimethylmercury made it past her double-latex gloves and was absorbed by the skin of her finger. That contrasts with inorganic mercuric sulfide (**cinnabar**), which is virtually insoluble.
This now brings us to some of the absurd statements and claims I have encountered on the internet.
Probably the worst internet article, because of the hyperbole and exaggeration, is the following:
10 Most Deadly Rocks and Minerals

The next web page is very similar to the one above, with some minor differences in the minerals selected: Killer Minerals: The World's 10 Most Deadly Minerals

Suggesting that **fluorite** is dangerous to handle says just about all you have to know about the veracity of the claims on this website: The 9 Deadliest Minerals We've Ever Mined

Even Wikipedia gets in on this with a link of supposed "Poisonous Minerals": Poisonous minerals

A former webpage with similarly ridiculous claims on the Stanford University (CA) server has, to the credit of the university, been removed.

The authors of these online materials commit the logical fallacy of assigning the danger of the constituent elements, or the chemicals that can be made from minerals, with the intrinsic danger of the naturally occurring mineral. That is a bit like warning that iron oxide is dangerous because knives can be made from it. What these web pages share in common are pretty pictures, drama, and unscientific hyperbole about the unfounded risks from mineral specimens.

I think that remarks are in order about some of the minerals claimed on the websites to be so dangerous that one is cautioned about even handling them. The remarks that follow are not intended to be inclusive.
The claim on one of the websites that **coloradoite** was "recently discovered" supports my claim that the cautions are 'to be taken with a grain of salt'; **Coloradoite** has been known since at least 1877. The term "magma veins" is not something you will find in a geology text, again bringing into question the veracity of the claims.

Copper sulfate (**calcanthite**) has found use as an algaecide and fungicide. That is because copper is toxic to algae. However, it is used because, while there are many chemicals that will kill algae, copper sulfate has relatively low toxicity to humans and therefore has been used in reservoirs that provide drinking water, and even in swimming pools. According to Extoxnet ,"Copper sulfate is only moderately toxic upon acute oral exposure," with an LD_{50} in mice of 30mg/Kg [that would be equivalent to 3 grams in a 220 lb human]. However, they further note, "Ingestion of copper sulfate is often not toxic because vomiting is automatically triggered by its irritating effect on the gastrointestinal tract." Indeed, it has been used to induce vomiting when a patient has ingested a truly

dangerous poison. (For a discussion of this and an extensive treatment of the risks of copper and its compounds, click on the following link: Copper) Probably of more concern is that some people are uncommonly sensitive and experience an allergic reaction when handling materials containing copper; I have not experienced that personally. Various sulfates can act as a laxative if ingested, but common Epsom Salts (magnesium sulfate) are used to make hot-water baths for sore or aching muscles. Therefore, the point is again that the dose and avenue of access to the body are important. I'm not going to recommend anyone lick a specimen of **calcanthite**, but I sincerely doubt any harm would be suffered beyond experiencing a bad taste. In summary, the claim that this is one of the ten most toxic minerals known, seriously exaggerates its toxicity.

Hutchinsonite is a lead/thallium-bearing sulfoarsenide that is claimed to be "highly toxic" principally because of the inclusion of thallium. They call thallium the "dark twin of lead." The problem with the claim is that, because **hutchinsonite** is only slightly soluble, the thallium has very low bioavailability. Most thallium minerals are sulfoarsenides or sulfoantimonides, which are relatively insoluble.

One alarmist website claims "…the sulfur content of **galena** makes it extraordinarily brittle and reactive to chemical treatment." It sounds scary, but I have no idea what they mean by saying that it is "reactive to chemical treatment" just because it is a sulfur compound. Lead sulfide is only slightly more soluble in acid than refined lead. Again, we are concerned about simply handling the material, and the only chemical treatment a mineral collector might be engaged in would be the chemical cleaning of specimens. Lead sulfide is virtually insoluble in water (*i.e.* saliva and perspiration) and only slowly soluble in stomach acid (HCl). A piece inadvertently swallowed would probably be passed from the gastrointestinal tract before significant quantities of lead would be released into the blood stream. The body will naturally excrete small quantities of lead in the blood stream through urine and feces. The half-life in the blood stream is estimated at about one month. However, lead is a cumulative toxin that will concentrate in bones and teeth if one is exposed to high doses or chronic low doses over time.

Antimony resides in the Periodic Table in proximity to lead. Therefore, antimony sulfide (**stibnite**) shares some properties in common with **galena** such as high density, softness, and opacity. Most notably, **stibnite** also is insoluble in saliva or perspiration, and only slightly soluble in stomach acid. The claimed poisoning resulting from the use of stibnite eating-utensils on one of the questionable websites is probably from the long-term use with acidic foods, which is similar to the historic problems with lead. The sulfide may slowly oxidize to **senarmontite**, which is slightly soluble in water. While some antimony compounds are known to be toxic, and thus used as medicine (NIH), elemental antimony has an oral LD_{50} of somewhere between 1,100 and 20,000mg/kg in rats (CDC). That translates to at least 100 to 2,000 grams of antimony in a 220lb human. Considering the low solubility in acid of both **native antimony** and the sulfide, the question is whether one could ingest enough **stibnite**, and whether it would stay in the system long enough, to be deadly. This is yet another example of unstated assumptions about acute poisoning based on improbable circumstances.

Arsenopyrite is chemically similar to **pyrite**, which may also have some small amounts of arsenic present. It is not advisable to roast either material in a closed area; one would be overwhelmed by the irritating sulfur dioxide. **Arsenopyrite** and **pyrite** are only soluble in nitric acid. Therefore, neither are in the bioavailable class of minerals!

The alarmist websites claim that **orpiment** (and commonly associated realgar) are more dangerous than arsenic because of the associated sulfur. That is unlikely because native arsenic is more soluble than the sulfide forms. Indeed, both sulfides have low bioavailability. **Orpiment** is probably the most toxic mineral considered here so far; however, it is that toxicity that has given it utility in both traditional and modern medicine. Interestingly, **orpiment** appears to be less soluble in stomach acid than in saliva or perspiration (Mineral Arsenicals). However, only occasional handling of the mineral, even without gloves, probably is nothing to be concerned about. I, and many others, have handled it with no apparent harm.

Cinnabar is often claimed to be the most toxic among the minerals listed in the above sensational websites. However, it is virtually insoluble! The only acid that will dissolve it is *Aqua Regia*, commonly used for dissolving gold and platinum. Its reputation for being dangerous is because in the mining of it, miners are exposed to the vapors of associated metallic mercury. Similarly, in the preparation of pigments, when the cinnabar is finely ground, some metallic mercury likely is produced. Single crystals and crystal clusters are virtually inert and of no danger.

Claims at some of the alarmist websites that **fluorite** and **hydroxylapatite** are dangerous to handle are equally without merit, and generally for the same logical fallacies that apply to the minerals that I have commented on in more detail.

The US Geological Survey (USGS) even gets in the act with a webpage about the "Potential Toxicity of Multiple Metals Associated with PGE Deposits." Basically, they state a concern about natural stream drainage from mineralized areas (in this case, containing Platinum Group Elements) and the possible impact on the stream biota that have probably acclimated to elevated copper and nickel concentrations. Interestingly, they also mention cobalt and zinc, but don't mention chromium. Platinum Group Minerals (PGM) are, as a whole, non-toxic. (Although, vapors from heated osmium are toxic.) They are sometimes associated with other elements (*e.g.* copper) that are toxic to algae and fish; however, those elements can be present even when PGMs are absent. Therefore, I'm not sure why the USGS is focusing on terranes with PGE potential.

One of the more comprehensive literature treatments of the toxicity of minerals that I have seen is by Puffer (1980). However, he lists something like 200 different minerals that are supposedly toxic. His approach to evaluation is similar to someone warning that, because all mammals have teeth and claws, they are potentially dangerous, and then not making the point that tigers are much more dangerous than a house cat. These 200 'toxic' minerals include such things as **gold**, renowned for its unreactive nature and commonly worn as jewelry and wedding bands for decades! It lists **chromite**, again so insoluble and unreactive that it persists in alluvial environments for tens if not hundreds of millions of years. Similarly, it lists **magnetite**, which has been recommended to treat water to remove dissolved arsenic. It lists numerous insoluble silicates and oxides that obviously have very low bioavailability. Indeed, it even lists **zircon**, a silicate that even *Aqua Regia* doesn't dissolve, and is so unreactive that it survives multiple geologic erosional cycles and provides a basis for estimating the age of source rocks for ancient sediments in which the **zircon** is found.

Puffer (1980) states that "I have seen fellow 'rockhounds' eat lunch in quarries without washing after successfully sampling beautiful orpiment specimens." However, he doesn't relate any problems encountered by those individuals collecting the arsenic sulfides! It is telling that what is often regarded as one of the more dangerous minerals, apparently doesn't cause problems even when handled casually. Perhaps that is because nitric acid is required to dissolve **realgar** and **orpiment** rapidly!

Puffer (1980) cites a study that states a tablespoon of table salt can kill an infant [of unspecified age]. This is likely true, but it is the result of an electrolyte imbalance, not inherent toxicity of the **halite** or its constituents. It is the inverse of what a fraternity initiate would experience from drinking too much water quickly. Puffer also claims that **borax** and related soluble borates are toxic and that children have died from skin absorption. However, borax has been recommended as an oral treatment for arthritis. I have personally taste-tested it over a period of days with no ill effects. I do have concerns about possible liver damage with higher doses over longer periods. However, it is obvious that this 'toxic' mineral isn't going to kill you if handled casually, or even if ingested in small doses.

Puffer (1980) further makes the claim, "In fact, virtually any mineral will most likely be poisonous if taken in sufficient quantity." That doesn't provide useful guidance as to the relative risk individual minerals pose. In addition, it overlooks the fact that anything ingested will probably be excreted within one or two days, and unless stomach acid can dissolve it in a fraction of that time, it will be passed through unaffected. In short, one has to seriously question the veracity of the cautions given in the article! He has taken an overly cautious approach to the problem. What is needed are recommendations about minerals that are truly dangerous, not an unwieldy list of relatively innocuous minerals that are problematic only under exceptional circumstances. This treatment of the topic is only slightly better than the internet websites about which I initially complained.

I have to wonder what motivates someone to go to the trouble to create a webpage about supposedly dangerous minerals. Perhaps they were intended to be what has come to be known as "Click Bait." If it is out of genuine concern that someone more knowledgeable than themselves might be injured, their concern is misplaced. Is it coincidence that the choice of minerals and the description of dangers are so similar amongst the websites? There seems to be a lack of any expertise in mineralogy or toxicology, as well as a deficiency in critical thinking amongst those who produced the websites. Are these 'over-the-top' environmental zealots who dislike mining, or are they just people who crave attention and find the internet an avenue for their "ten minutes of fame"? Either way, they are doing harm. My motivation to write this is to address the unwarranted alarm and to try to correct the harm done by uninformed activists. In what is, at best, a misguided attempt to protect people, those advocating closing areas such as the Santiago Mill in Colorado, are obviously overreacting and missing the big picture.

I think that there are some important assumptions about risk that need to be stated. While field collectors are known to lick some specimens, they are not in the habit of actually eating their specimens! Observant mineral collectors will usually be able to tell if the mineral they are collecting is water soluble (*e.g.* **halite**) because of the way that the mineral feels when handled. Therefore, they aren't going to risk dulling the luster on nice crystals by licking them. The worst-case scenario that comes to mind is, while a collector is hammering on a rock, breathing hard with their mouth open, that a spalling chip may be ingested inadvertently. However, in over 60 years of collecting, I've never experienced that problem, nor have I heard of anyone else experiencing it.

My recommendations for a list of ten minerals that may actually be dangerous, based on solubility and presence of elements known to be toxic, are:
Arsenolite (dimorphous with **claudetite**) [As_2O_3] is moderately soluble in water {2.05g/100g H_2O} and its toxicity complicates its use as a medicine. Exposure to oral administration in rabbits of 0.2mg/kg (per day over a period of 30 days) produced reversible cardiac damage (Mineral Arsenicals). Besides the chronic nature of the experimental exposure, it equates to a dose of 20mg per day for a 100kg (220 lb) human. The article by Puffer (1980) claims that a 3mm cube of **claudetite** would be a lethal dose for a human. He separately states that the equivalent lethal dose for a 100kg human could be as low as 140mg; however, he doesn't state if that is the LD_{50} or LD_{100} dose. In any event, there is a question about the accuracy of the claims. Therefore, while this is one of the more toxic minerals that one is likely to encounter, it is inconceivable that casual handling would result in anything close to a dose that would even result in symptoms of poisoning. To be conservative, these two minerals should be handled with some care.

Eriochalcite [$CuCl_2 \cdot 2H_20$] {sol. 75.7g/100g H_2O} The high solubility of this copper chloride dihydrate, and the known toxicity of copper, raises a copper-red flag, as it were. However, it is regarded as more of a potential irritant than an actual toxic material.

Heinrichite [$Ba(UO_2)_2(AsO4)_2 \cdot 10\text{-}12H_2O$] This being a hydrated arsenate, it is obviously water soluble, and the toxicity of arsenates has already been addressed above. The presence of barium (see **witherite** below) and uranium add to the concerns.

Hieratite [K_2SiF_6] Potassium hexafluorosilicate is a strong irritant that has the potential for fluorosis similar to **Villiaumite.**

Lanmuchangite (thallium alum) [$TlAl(SO_4)_2 \cdot 12H_2O$]is a recently discovered sulfate that is very water-soluble. I was unable to find any information on its toxicity. However, because of the presence of thallium, until more is learned about it, it should be handled with more caution than common minerals.

Lafossaite [TlCl] {sol. 0.33g/100g H_2O} Again, no toxicity data were readily available, but because of the thallium cation, and the moderate solubility, it should be treated with caution.

Munirite [$NaVO_3 \cdot 2H_2O$] {sol. 19.3g/100g H_2O} This is a very rare vanadate . It is listed as being toxic with the oral LD_{50} dose for rats being 98mg/kg, which equates to 9.8g/100kg.

Scacchite [$MnCl_2$] {sol. 77.3g/100g H_2O} Because this is a chloride, it is highly soluble. Manganese is a cumulative neurotoxin that in advanced stages mimics Parkinson's disease. Most commonly, manganese poisoning is associated with industrial exposure such as through welding. However, because of **Scacchite**'s high solubility, and the fact that is excreted slowly, if at all, you probably don't want to specialize in collecting this species.

Villiaumite [NaF] {sol. 4.13g/100g H_2O} There have probably been more people sickened or killed by malfunctioning water fluoridation equipment than by ingestion of this mineral. However, it is toxic and should be treated as such.

Witherite [$BaCO_3$] {sol. 0.0014g/100g H_2O} A CDC report lists this as toxic, despite the carbonate having very low solubility in water; this report provides little information on the acute toxicity. Presumably, stomach acid increases the bioavailability of the barium. It is used commonly as a rat poison. However, the LD_{50} for rats is stated as 418 mg/kg, which equates to 41.8 g for a 100 kg human, assuming that the sensitivity for humans is the same as for rats, which probably isn't the case. In reading several different reports, there are unresolved contradictions; one report indicated a dose as low as 0.8 g was lethal, while in other instances people survived acute

doses over 15 grams. It seems that all the instances of poisoning involved barium carbonate powder that was either used accidentally in place of barium sulfate in medical treatments, or mistaken for flour and cooked into food; I found no examples of accidental ingestion of solid **witherite** being responsible for hospitalization.

The list is not comprehensive, and there may be minerals that are more toxic. The short list above is offered only as a guide to some minerals that actually should be handled with more caution than most, and are more dangerous than the minerals given as "deadly" in the various alarmist websites. Note that except for **witherite**, all of the minerals in my list are relatively uncommon and do not occur in especially large sizes. Therefore, the average collector is unlikely to encounter them in any quantity to cause a problem. Solubilities were obtained from the CRC Handbook of Chemistry and Physics.

In summary, the risk from handling various minerals varies with the solubility, particle size, the particular element (s) comprising the mineral, the frequency or duration of handling, and somewhat with the individual. The risk of poisoning from accidental ingestion varies with the aforementioned properties as well as the quantity ingested. Small children are problematic; just as many items that are used routinely in the home for cleaning and maintenance need to be secured from toddlers, some minerals should be put in childproof containers, and placed where puppies can't chew on them either.

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Santiago Mill, Colorado (Credit: Dan Kile)

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