Lake George Gem & Mineral Club

Club News,

December, 2023

Our next meeting will be at 10AM December 9 at the Lake George Charter School.

December is our Annual Election and Towel Show/Social

Every December, we ask members to bring some jewelry, fossils, or minerals that they would like to "share" with other members. Items to show off must fit on a bath-sized towel (hence the name "towel show"). You are also invited to bring any specimens that you have not been able to identify. During the business meeting, we will elect officers for 2024. Nominations from the floor are invited, but nominees must be present.
The Club will furnish light refreshments.

At our January meeting, **Bob Carnein** will talk about *"Cripple Creek Eye Candy"*, a short version of a talk he gave last year for the Cripple Creek District Museum on the minerals of the Cripple Creek district. If you came to the October meeting for **Dale Hernandez's** excellent update about the geology and gold production at Cripple Creek, this talk will introduce you to the actual minerals that occur there. Over 120 minerals are currently known from the deposit, and Bob will show specimens and photos of some of the more exotic ones that you might not be aware of. Specimens from Bob's extensive collection and photos from other collections will make this a valuable supplement to the October talk.

Markus Raschke will give a talk (not yet scheduled, but probably this spring) on his adventures tracking down a world-class scheelite-beryl-cassiterite deposit in the Tibetan Plateau of China.

Rocks & Rails Mineral, Gem, & Model Train Show/Expo - 12/08/2023

Start Date: 12/08/2023
End Date: 12/10/2023
Venue: Boulder County Fairgrounds
Address:
9595 Nelson Rd
Longmont , CO 80501
Website: https://flatironsmineralclub.org/

Our Club owes a real debt of gratitude to **Betty Merchant** and **John Rakowski**, who have kept our *Pebble Pups/Earth-Science Scholars* group going since **Steve Veatch** decamped for the wilds of Michigan. The group continues to work on the next generation of rockhounds, holding field trips during the summer and regular meetings during the school year. The following are upcoming topics; **PLEASE CONSIDER VOLUNTEERING TO LEAD A CLASS OR TRIP** for this excellent extension of the Club's education mission.

- December: Types of Crystals
- January: Fossils and Dinosaurs
- February: Quartz and Feldspars
- March: Rock Types and the Rock Cycle
- April: Landforms of the U.S.
- May: Erosion and Sedimentation

Frank Rosenburg supplied this brief report about the November meeting:

At our November meeting, we had the good fortune to have Dale Hernandez and Doug White, geologists with the Newmont Mining Corp., who gave a detailed presentation on the Cripple Creek/Victor Gold Mine operation. The talk covered its Geologic Evolution, Historic Production, and Present Operations. We thank both gentlemen for their very interesting talk.

ADDITIONAL COMING EVENTS OUTSIDE THE LGGM CLUB: (Nearby gem, mineral, fossil, and geology events that you may enjoy.) Go to each club's website for more information.

- **Cañon City Geology Club** meets on the 2nd Monday of the month at 6PM in the United Methodist Church, Cañon City
- **Columbine Gem & Mineral Society**, meets on the 2nd Thursday of each month, 6:30PM in the meeting room, Mt. Shavano Manor, 525 W. 16th (at J St.), Salida
- **Colorado Springs Mineralogical Society**, meets on the 3rd Thursday of each month at 7PM in the Mt. Carmel Veteran's Service Center, 530 Communication Circle, Colorado Springs;

- **Pueblo Rockhounds**, meets on the 3rd Thursday of each month at 6:30PM in the Westminster Presbyterian Church, 10 University Circle, Pueblo.

Here's something different from the Mines Museum:

Thanks to **Pete Modreski** for the following list of upcoming events:
Coming Earth Science Events,

Mon., Nov. 6, 11:30 a.m., some of you may be interested in this week's Denver Mining Club presentation: Stacey Holzer, Gemologist, Authentic Solutions. "**Appraisal of Gems and Minerals: How to Get the Best Value for Family Jewelry**."
If you're not familiar with the Denver Mining Club, it has luncheon meetings every Monday, 11:30 a.m. – 1:00 p.m., at Golden Corral Buffet & Grill, 3677 South Santa Fe Drive, Sheridan, CO 80110 (southwest side at Santa Fe Dr. & Hampden Ave.; purchase of buffet lunch required). All are always welcome; see their website for the full schedule of each month's meetings & speaker topics: www.denverminingclub.org .

Sat., Dec. 2, WIPS (Western Interior Paleontological Society) Holiday Party and Silent Auction Fundraiser, at the Clements Community Center, Lakewood. All are welcome. See the WIPS website for details!

Fri.-Sat.-Sun. Dec. 8-10, "Rocks and Rails" Gem and Mineral Show sponsored by the Flatirons Gem and Mineral Club, Boulder County Fairgrounds, 9595 Nelson Road, Longmont; combined with the Boulder County Model Railroad Club model train show; one admission for both, adults $8, seniors $5, children under 12 free with adult. Fri & Sat. 10 a.m. – 5 p.m., Sun. 10 a.m. – 4 p.m.

Thurs., Dec. 14, 6:00 p.m., **Colorado Scientific Society, December Annual Meeting, Potluck Dinner and Presidential Address, Cal Ruleman, US Geological Survey (presentation title TBA);** in-person meeting at Calvary Church Golden; see https://coloscisoc.org/ for details. All are welcome.

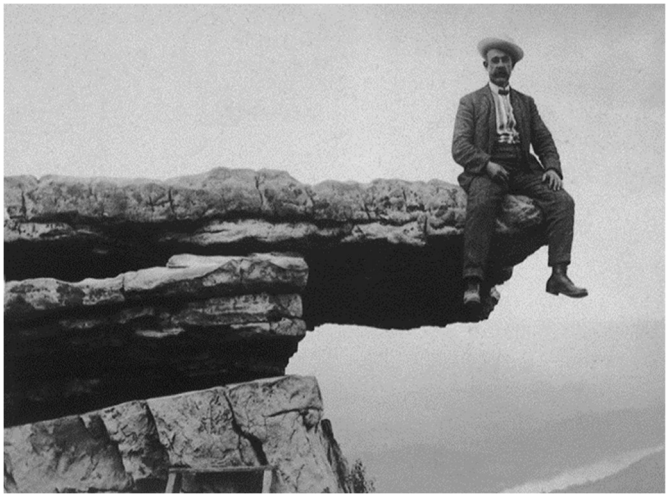
Carol Kinate reports that postcards advertising our show next August will be available at the December meeting.

From Rock&Gem: "**Hot" (radioactive) rocks!:**
https://www.rockngem.com/what-are-radioactive-minerals/?fref=51b7c6f9-c5ae-4ed4-b14c-850ebbc5dbae&em=Y2Nhcm5laW5AZ21haWwuY29t&utm_campaign=RnG+Weekly+Nov+09_2023

Rock&Gem also has a useful article about "**Useful rocks**":
https://www.rockngem.com/minerals-used-in-everyday-life/?fref=148aff3f-f23c-43cf-8716-4532a4cd55ab&em=Y2Nhcm5laW5AZ21haWwuY29t&utm_campaign=RnG+Weekly+Nov+02_2023

Rock Seeker had this recent article about a misunderstood gem material: **Bloodstone**:
https://rockseeker.com/bloodstone/?ck_subscriber_id=1874913717&utm_source=convertkit&utm_medium=email&utm_campaign=%E2%80%8BBloodstone%3A+The+Gemstone+of+Legends+and+Lapidaries%20-%2012403031

…or how about an article about rocks (actually minerals) that **stink**?:
https://rockseeker.com/minerals-that-smell/?ck_subscriber_id=1874913717&utm_source=convertkit&utm_medium=email&utm_campaign=These+Rocks+Stink%21+8+of+the+Smelliest+Minerals+%28good+and+bad%21%29%20-%2012051717



Notes from the Editor

Bob Carnein

Newsletter Editor

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Here's an article I wrote about recent mineral finds in a country most of us don't know much about. I hope you enjoy reading it!

A MINERAL FIEND LOOKS AT IRAN

by Bob Carnein

Introducation. When many Americans' thoughts turn to Iran, they tend to think about ayatollahs, centrifuges, and terrorism. Although Iran is hard to comprehend by Western standards, few of us realize that it is also a land of abundant energy and mineral resources. Not only does Iran rank third in global oil reserves and second in natural gas (U.S. Energy Information Administration, accessed November, 2023), but it has huge resources of a variety of metals and industrial minerals.

Iran's Mineral Riches. Most readers will be surprised (as I was) that Iran has 7000 mines employing 620,000 people. Its zinc reserves are the world's largest, and reserves of copper (9th largest), uranium (10th), and iron (12th), as well as baryte, bauxite, and many others, add up to a total of 7% of global mineral reserves (financialtribune.com, accessed November, 2023). The value of its mineral reserves

was estimated at $3/4 trillion in 2014 (Wikipedia.org, accessed November, 2023; more up-to-date data are hard to locate). A recently discovered lithium deposit may be the second largest in the world (cnbc.com, accessed November, 2023). All of this in a country about the same size as Alaska, with a population of about 90 million people.

Production of these resources is stymied by a combination of political instability and technical issues, resulting, in part, from sanctions imposed by the U.S. and its allies. Were these issues to be resolved, many global mining companies would no doubt take another look at Iran's potential. Total mineral reserves are probably grossly underestimated.

Although systematic studies and preservation of ancient Iranian mining sites are lacking (jra-tabriziau.ir, accessed November, 2023), the highlands of Iran are considered to be one of the world centers of early metallurgy as early as 4000BCE. Small scale open-cast mining of copper around 5000BCE was followed by underground mining of copper and silver, as well as experiments with various alloys, through the Bronze Age (Hellwing, 2021). Combined with the development of updraft furnaces and other metallurgical technologies, these innovations formed the basis for some of the earliest urban centers in the world. These sites currently are not well protected, and future geotourism may provide opportunities for rural development (Ghazi, *et al.*, 2021). This could include mineral collecting.

Geology. As one might expect from its location in the zone separating the African and Arabian tectonic plates from Eurasia and the Indian plate from Asia, Iran occupies a region of extreme geologic unrest and complexity. To the southwest is a zone of compression and obduction (shown by the "toothed" lines on Figure 1). Here, deformed Precambrian crystalline rocks and Paleozoic sediments form the Zagros Mountains.

Central Iran is an assemblage of microplates that originally were attached to the old supercontinent of Gondwana. When Gondwana broke up in the Carboniferous, these microplates fused together, forming the "Iranian plate", which moved northward toward the southern edge of the northern supercontinent of Laurasia. This was eventually shoved against present-day Eurasia by the northeastward motion of the Arabian plate in the Miocene.

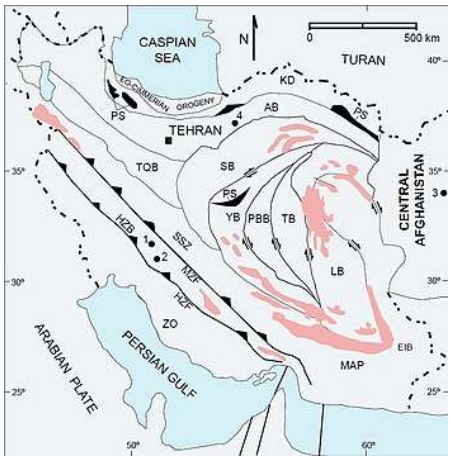


Figure 1. Major structural features of Iran. (www.wikipedia.org)

The northern part of Iran is separated from central Iran by a major suture zone and includes deformed Paleozoic oceanic crust that was originally part of the seaway (called Tethys) that once separated Africa, Arabia, and India from the Eurasian continent. It is essentially a part of the Alpine-Himalayan orogen.

To the east, Iran is separated from Afghanistan and the Indian plate by a zone of strike-slip faults. Suffice it to say that all of this structural complexity, developed in events spread over hundreds of million years, produced the conditions required for the formation of a variety of different types of economically important mineral deposits. Included are hydrothermal base-metal deposits, some of which are deeply oxidized and contain precious metals; salt deposits containing an interesting assortment of minerals; and world famous turquoise deposits that have been exploited for thousands of years.

Minerals for the Collector. From past articles in this newsletter, you may remember that, when hydrothermal polymetallic (containing several metals) ore deposits are exposed at Earth's surface in an arid climate, a variety of attractive secondary minerals may form. This results from several things:

- The presence of pyrite, whose breakdown by weathering releases sulfuric acid that attacks other metallic sulfides, freeing metal ions. This may occur slowly in an arid climate;

- Presence of O_2, CO_2 and oxygen-containing ions (e.g., SO_4, PO_4, WO_4, etc.) in pore spaces above the water table (in the so-called oxidized zone). These gases and ions combine with metal ions in the weathering rocks to form new metallic minerals, many of which may be colorful and/or well crystallized;
- A very deep water table in an arid country like Iran results in an unusually thick zone of oxidation and an increased opportunity for finding attractive minerals.

If you are already familiar with the spectacular specimens of azurite, malachite, wulfenite, mimetite, linarite, cerussite, and other colorful oxidized minerals of Arizona, New Mexico, and Mexico, you get the picture. The same chemical processes that produced these minerals also occur in Iran. Add to that the underground mines that exploit unweathered hydrothermal deposits and widespread salt deposits that have their own special mineral-forming processes and you have the ideal conditions for a mineral collector's paradise.

Mindat.org (accessed November, 2023) currently lists 448 valid mineral species for Iran. Of these, Iran is the type locality for 12. Because of the relatively limited research in Iranian mineralogy, these numbers are likely to increase in the future. Here's a list of some of the more attractive minerals and the provinces in which they are found (see Figure 2):

Figure 2. Provinces of Iran (Wikipedia.org)

- Amethyst (Isfahan)
- Aphthitalite (Qom, Manjan)
- Atacamite (Isfahan)
- Aurichalcite (Isfahan)
- Baryte (Semnan)
- Calcite (West Khorasan)
- Cerussite (Isfahan)
- Chromite (Kerman)
- Demantoid (andradite; Azerbaijan)
- Gypsum (Tehran)
- Halite (Semnan)
- Hemimorphite (Khorasan)
- Hydrozincite (Yazd)
- Iranite (Isfahan)
- Mimetite (Isfahan)
- Sphalerite (Yazd, Manjan)
- Turquoise (Khorasan)
- Willemite (Isfahan)
- Wulfenite (Yazd, Isfahan)
- Zunyite (Hormozgan)

Specimens of some of these minerals rank as among the world's best. For example, zunyite $[Al_{13}Si_5O_{20}(OH,F)_{18}Cl]$crystals from salt domes in Hormozgan, found in large quantities in the late teens and twenties, are relatively large and perfect by most standards (up to about 4 cm) and are occasionally twinned (Figure 3). They are colored reddish brown because of included hematite, which is sometimes visible on the surfaces as thin plates (Figure 4). Matrix specimens may contain dozens of perfectly formed tetrahedral zunyites.

Figure 3. Zunyite, twinned crystal on matrix (Carnein specimen and photo)

Figure 4. Zunyite crystal with hematite on matrix (specimen and photo Quebul Fine Minerals (www.QuebulFine Minerals.com)

Another noteworthy occurrence is of beautiful "snowflake" twinned cerussite [$PbCO_3$] crystals from Isfahan Province (Figures 5 and 6). These rival similar specimens from Tsumeb, Namibia (probably the world's best), and from Arizona. They consist of delicate reticulated intergrowths of twinned cerussite crystals, sometimes with orange wulfenite and/or mimetite. Although these came out in fairly large numbers a few years ago, prices have risen quickly as the supply was depleted. A recent article in the Mineralogical Record (Wilson, 2023) summarizes what has become a world-class deposit (that has been mined for 2000 years) in Isfahan.

Figure 5. Twinned cerussite crystals (specimen and photo Quebul Fine Minerals, www.QuebulFineMinerals.com)

Figure 6. Twinned cerussite with mimetite. (specimen and photo Fabre Minerals, www.fabreminerals.com)

Superb botryoidal mimetite [$Pb_5(AsO_4)_3Cl$] specimens rivalling those from San Pedro Corralitos, Chihuahua, are much rarer but occasionally occur in Isfahan, where they are associated with cerussite and wulfenite. Combination specimens like that shown in Figure 6 are collector treasures, as are specimens with mimetite alone (Figure 7).

Figure 7. Spectacular mimetite specimen from the Nakhlak mine, Isfahan Province. (Specimen and photo Quebul Fine Minerals, www.QuebulFineMinerals.com)

Another collector favorite that occurs in world-class specimens in Isfahan is wulfenite [$Pb(MoO_4)$]. Like mimetite and cerussite, wulfenite occurs in oxidized lead deposits, where breakdown of galena results in a wide variety of secondary lead minerals. Other secondary lead minerals that you may be familiar with include anglesite, linarite, and pyromorphite. Wulfenite crystals from Iran range in color from pale orange to pumpkin orange, and, rarely, bright red. The specimen in Figure 8 displays a bright orange-red wulfenite from the Chah Kharboze mine; to see more spectacular wulfenites, see Wilson, 2023.

Figure 8. Wulfenite with pyromorphite (?; green microcrystals) from Chah Kharboze mine, Esfahan, Iran. (Carnein specimen and photo)

Other fine collector minerals from Iran include gemmy demantoid garnet (a variety of andradite) (Figure 9), unique and distinctive hematite crystals (Figure 10), and willemite pseudomorphs after descloizite (Figure 11).

It is likely that, as Iran minerals develop a reputation among collectors and Iranians realize there's a market for fine

specimens, more minerals will reach the world-wide market. The minerals that have come out in the last decade or so certainly deserve our attention.

Figure 9 (left) and 10 (right). Andradite var. demantoid and hematite. Specimens and photos from Quebul Fine Minerals (www.QuebulFineMinerals.com)

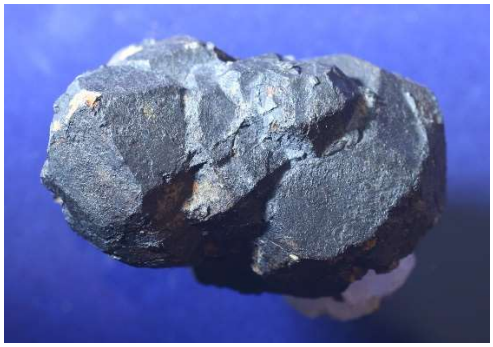
Figure 11. Willemite pseudomorph after descloizite "Christmas tree", Anarak District, Iran. Specimen and photo Quebul Fine Minerals (www.QuebulFineMinerals.com)

References.

Ghazi, J.M., M. Hamdollahi, and M. Moazzen, 2021, Geotourism of mining sites in Iran: an opportunity for sustainable rural development: International Journal of Geoheritage and Parks, vol. 9, issue 1, p. 129-142.
Hellwing, B., Patterns of early metallurgy on the Iranian Plateau, from the beginnings to the end of the Bronze Age, *in* C. Marro and T. Stöllner, eds., *On Salt, Copper, and Gold*: Lyon, MOM Éditions, p. 201-230.
Wilson, W.E., 2023, The Nakhlak mine, Anarak District, Esfahan Province, Iran: The Mineralogical Record, vol. 54, no. 3, p. 383-408.

Monthly Mineral Quiz

The Monthly Mineral for December (Carnein photos and collection)



Here's a common mineral that most of you have collected. It occurs at several localities regularly visited by the LGGMC; the one on the left, above, came from a pegmatite at one of them. This mineral belongs to a large group that has 6 major members but dozens of varieties (some of which are gemmy). It occurs in all three major rock types, but metamorphic rocks are its "typical" home. Just for the record, it has no cleavage, has a hardness of 7-7.5, and a S.G. of about 4.3 (this varies because the composition varies). Crystals are common, and most are rhombic dodecahedrons (right, above), though trapezohedrons are common at one of our favorite localities. Name this common mineral.

Last Month's Mineral: Aragonite

Aragonite, $CaCO_3$ is a common mineral whose composition is identical to that of calcite. Mineralogists call such pairs *dimorphs*. When crystallized, the two are easy to distinguish, but the identification of massive specimens may be more difficult. S.G. helps (aragonite is denser than calcite), and cleavage can be useful (aragonite has one distinct cleavage, while calcite has 3 that form rhombohedrons). Although it's the high pressure dimorph of $CaCO_3$, aragonite doesn't always form under high-pressure conditions. For example, it's common in mollusk shells and speleothems (cave deposits). It may break down and be replaced by calcite. It there is any doubt about its identity, one should do appropriate tests.

The Lake George Gem and Mineral Club is a group of people interested in rocks and minerals, fossils, geology and history of the Pikes Peak/South Park area, Indian artifacts, and the great outdoors. The Club's informational programs and field trips provide opportunities to learn about Earth science, rocks and minerals, lapidary work and jewelry making, and to share information and experiences with other members. Guests are welcome to attend, to see what we are about!

The Club is geared primarily to amateur collectors and artisans, with programs of interest both to beginners and serious amateurs. The Club normally meets on the second Saturday of each month at the Lake George Community Center, located on the north side of US Highway 24 on the east edge of town, sharing a building with the county highway shops. **In the winter, we meet at 10:00AM. From April through September, we meet at 9:00AM, to allow more time for our field trips.**

Our organization is incorporated under Colorado law as a nonprofit educational organization, and is a member of the Colorado, Rocky Mountain, and American Federations of Mineralogical Societies. We also sponsor an annual Gem and Mineral Show at Lake George, where collectors and others may purchase or sell rocks, minerals, fossils, gems, or jewelry. Annual membership dues (Jan. 1 through Dec. 31) are $15.00 for an individual (18 and over), and $25.00 for a family (parents plus dependents under age 18). New memberships and renewals are only accepted Jan 1 through March 31 each year.

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