Lake George Gem & Mineral Club

Club News

July, 2019

NOTE: LGGM Club meetings in April through October will start at 9:00 a.m.

Program for the Month: **Saturday, July 13, 2019, 9:00 a.m.**

Basic Geology of the Colorado Springs/Ute Pass Area

Rick Sauers

Rick Sauers is the Museum Curator at the Western Museum of Mining and Industry. Rick, as the former Executive Director of WMMI, speaks to us about the WMMI and his current role as the Museum Curator.

Rick Sauers Biography

Rick has been involved in history and museum work for over 30 years. He has published 30 books, 20 articles, and over 300 book reviews. He earned his B.A. in History at The Susquehanna University, his M.A. in History at Pennsylvania State University, and his Ph.D. at Pennsylvania State University. Rick was the Executive Director at the Packwood House Museum in Lewisburg, PA from 2006-2012. He became the Executive Director at the WMMI in 2012 and then stepped down to take the position of Museum Curator and devote all his energies into organizing and cataloging an extensive but chaotic collection.

Our club has a history of cooperation and assistance with the WMMI, giving funds annually to the museum and last year supporting their intern Ben Elick, an Earth Science Scholar. In return the WMMI has offered the LGGM Club free admission to their excellent museum. There is a great need for continued assistance in cataloging mineral specimens and organizing this collection, so Rick will speak to this need and request volunteer help from our club members.

* * * * * * * *

Scheduled Programs at Club Meetings:

August - **Steven Veatch**, Pebble Pup Presentation
September - **Steve Gorman**, History of the Gold City Claim
October – **Bob Carnein,** Geology of Ute Pass
November - **Doug White**, Newmont CC&V, geology of Cripple Creek-Victor Gold Mine
December - Towel show, no presentation

Silent Auction: **We need donations for the silent auction at our club meetings! If you have "extras", whether minerals, fossils, books, or other items, and if you have a label saying what the item is and where it came from, we can use it.** If not, bring some cash and be prepared to help support Club activities, including scholarships, Pebble Pups, and other items.

LGGM Club Field Trips:

A note from the Field Trip Coordinators:

The field trip season has gotten off to a great start, although with somewhat inconsistent weather! We're sorry we've had to cancel several trips this spring; we only do so if the roads will be difficult or the weather forecast calls for a miserable day! We are trying to reschedule as many trips as we can, so keep an eye on the website.

Speaking of the website, we had some tricky issues that our website administrator has figured out and make corrective changes. If you have had issues, please try again.

If you cannot go to a field trip, we ask that you unregister for the trip, even if you don't know until the day before or day of the trip. There are several future trips that are full. Please remember that our leaders are volunteers, and the effort required to deal with waitlists and no-shows when you are at the meeting site is significant. If we have been asked by the claim owners to limit attendance, we have to do so. I have been getting several emails per week asking about the waitlist for various events, so there are definitely folks that will gladly take your spot if you can't go.

We have a couple open dates available for field trips in August, so we are looking for trip ideas and volunteer leaders. Don't forget to volunteer for the Gem & Mineral Show in mid-August. Volunteering is a lot of fun -- getting to meet people, hear wonderful and adventurous stories, and supporting your club!

Welcome to summer! Thanks, and happy digging!
--dave and Laura

SCHEDULE OF LGGM CLUB PROGRAMS, FIELD TRIPS & EVENTS			
Date(s)	**What**	**Where**	**Leader/Notes**
W 7/10	Mushroom Gulch Jaspers	Trout Creek Pass	Linda Watson
Sa 7/13	WMMI	LGGM Club Presentation	Rick Sauers
Sa 7/20	Smokey Hawk	Crystal Peak Mining Dist.	Steve Kahler, Richard Kawamoto
Sa 7/27	Magnetite, fluorite	Badger Flats	Linda W
Sa 7/31	Blue Barite	Harvey Claim - Hartsel	Linda Watson
Sa 8/10	Pebble Pup Presentation	LGGM Club Presentation	Steven Veatch
F 8/16 – Su8/18	**LGGM CLUB ANNUAL GEM & MINERAL SHOW**	**Lake George (between Post Office - Starkeys)**	**See lggmclub.org for more details**
Sa 9/14	History of Gold City Claim	LGGM Club Presentation	Steve Gorman
Sa 9/21	Honey Bee/Queen Bee Mines		Dave Alexander
W 10/2	Fossils	Hwy 115 Pierre Shale	
Sa 10/5	Colorado Springs Area Geology Day #1	GOG, Manitou Spr, Cave of the Winds, Crystola	Bob Carnein
Su 10/6	Colorado Springs Area Geology Day #2	Ute Pass (Woodland Park to Rainbow Falls)	Bob Carnein
Sa 10/5	Book Cliffs & Other TBD -Day 1	Grand Junction Area	Dave Alexander, Richard Kawamoto – Joint trip with RAMS
Su 10/6	Book Cliffs & Other TBD -Day 2	Grand Junction Area	Dave Alexander, Richard Kawamoto – Joint trip with RAMS
Sa 10/12	Meteorite near Cotopaxi	LGGM Club Presentation	Richard Walker
Sa 11/9	Newmont CC&V Geology of Cripple Creek-Victor Gold Mine	LGGM Club Presentation	Doug White
Additional Presentations and Field Trips to be added after they are confirmed.			

Other Upcoming LGGM Club Events:

LGGM CLUB SHOW August 16-18

Vendors: Booth spaces are still available. Contact our Vendor Contact/Show Host: JAY PENN **(505) 883-4195** jaypenn246@gmail.com

VOLUNTEERS ARE NEEDED

Hello Fellow Club Members,

We are the Volunteer Coordinators for the Lake George Gem & Mineral Show, August 16-18. Thank you to the club members who signed up at the June club meeting to help with the show. Many more volunteers are needed. Please Help!
Please contact us at: donk1244@yahoo.com to volunteer for one or more of the following:

FIELD LAYOUT: Immediately after the **Saturday, August 10,** club meeting:
Eight additional able-bodied volunteers are needed to help layout the spaces for the show vendors, such as hammering stakes into the ground.

PARKING HELPERS:

Friday, August 16:
One additional volunteer for the 9am-11am shift
Two volunteers for each two hour shift beginning at 11am-1pm; 1pm-3pm; and 3pm-5pm.

Saturday, August 17:
Two volunteers for each two hour shift beginning at 11am-1pm; 1pm-3pm; and 3pm-5pm.

Sunday, August 18:
One additional volunteer for the 9am-11am shift
One additional volunteer for the 11am-1pm shift
Two volunteers for each two hour shift beginning at 1pm-3pm; and 3pm-5pm

CLUB TENT HOSTS:

Friday, August 16: Two volunteers for each two hour shift beginning at 11am-1pm; 1pm-3pm; and 3pm-5pm.

Saturday, August 17:
One additional volunteer for the 9am-11am shift
Two volunteers for each two hour shift beginning at 1pm-3pm; and 3pm-5pm.

Sunday, August 18:
One additional volunteer for the 1pm-3pm shift
Two volunteers for each two hour shift beginning at 9am-11am; 11am-1pm; and 3pm-5pm.

SHOW TEARDOWN: Sunday, August 18, after 5:00 PM AND **Monday, August 19 at 9:00 AM:** Five additional volunteers are needed for each day.

Looking forward to hearing from you, Don & Beverly Keith

ADDITIONAL COMING EVENTS OUTSIDE THE LGGM CLUB: (Nearby gem, mineral, fossil and geology events that you may enjoy.)

- **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.

Pete Modreski suggests **the following upcoming events:**

Leonardo da Vinci at the Colorado School of Mines, Arthur Lakes Library: In addition to the **Leonardo da Vinci: 500 Years of Genius** exhibit now in progress at the Denver Museum of Nature and Science (see https://secure1.dmns.org/leonardo-da-vinci-500-years-of-genius), there is another excellent exhibit about his work, currently on display at the Lakes Library on the CSM campus. The **Machines of Change: The Da Vinci Machines** exhibit includes "over 60 authentic reproductions of machines and devices designed by Leonardo DaVinci were created using similar materials, building techniques and tools that Leonardo would have had access to in his time", plus full-size reproductions of Leonardo's most famous paintings. The exhibit, free to all visitors, is spaced around the corridors and reading rooms of the main floor of the library. Library hours are 8 a.m. to 8 p.m. most days, 12 to 6 weekends.

July 18-21, "Home Rock Show" (Sale), by John Haney, 9 to 5 daily, 4242 Thompson Ct., Denver 80216. "Rough rock, slabs, cabs, fossils, amber, turquoise, minerals, metaphysical crystals, gemstone bowls & boxes, lapidary equipment & supplies". Contact rocksisme@comcast.net, or 303-296-8268.

* * * * * * * * * * * * *

For more lecture series during the year see:

Colorado Beer Talks (2nd Tuesday, 6-8 p.m.), Windy Saddle Café, 1110 Washington Avenue, Golden, "Golden's grassroots version of TED talks, Expand your mind with a beer in your hand", http://goldenbeertalks.org/
Colorado Café Scientifique in Denver, monthly lectures on science topics held either at Blake Street Station or Brooklyn's, Denver; open to the public, no charge other than refreshments you may choose to purchase; see http://cafescicolorado.org/ .
Colorado Scientific Society (3rd Thursday, 7 p.m.), see http://coloscisoc.org/ . Meets at Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood CO, except when noted.
CU Geological Science Colloquium (Wednesdays, 4 p.m.) see http://www.colorado.edu/geologicalsciences/colloquium
CSU Dept. of Geoscience Seminars (Fridays, 4 p.m.), see https://warnercnr.colostate.edu/geosciences/geosciences-seminar-series/
Van Tuyl Lecture Series, Colorado School of Mines, (Thursdays, 4 p.m.): https://geology.mines.edu/events-calendar/lectures/
Denver Mining Club (Mondays, 11:30), see http://www.denverminingclub.org/ **.**
Denver Museum of Nature and Science, Earth Science Colloquium series, 3:00-4:00 p.m., VIP Room unless noted, day of the week varies. Museum admission is not required; see http://www.dmns.org/science/research/earth-sciences/
Denver Region Exploration Geologists Society (DREGS; 1st Monday, 7 p.m.), http://www.dregs.org/index.html
Florissant Scientific Society (FSS); meets monthly in various Front Range locations for a lecture or field trip; meeting locations vary, normally on Sundays at noon; all interested persons are welcome to attend the meetings and trips; see http://www.fss-co.org/ for details and schedules.
Nerd Night Denver is a theater-style evening featuring usually 3 short (20-minute) TED-style talks on science or related topics; held more-or-less monthly at the Oriental Theater, 4335 W. 44th Ave., Denver; drinks are available; for ages 18+. Admission is $6 online in advance, $10 at the door. See https://www.nerdnitedenver.com/ .

Rocky Mountain Map Society (RMMS; Denver Public Library, Gates Room, 3rd Tuesday, 5:30 p.m.), http://rmmaps.org/
Western Interior Paleontological Society (WIPS); beginning January 2019, WIPS will meet on the 1st Monday of the month, 7 p.m., at Lowry Conference Center, 1061 Akron Way, Denver. See http://westernpaleo.org/ .
RMFMS Annual Convention --The Lake George Gem & Mineral Club is a member of The Rocky Mountain Federation of Mineralogical Societies (RMFMS). This year, the 2019 RMFMS annual convention will occur in Prescott, Arizona on August 2-4. Full details are available at http://www.prescottgemmineral.org/wp-content/uploads/2019/03/2019-rmfms-convention-packet-final-v2.pdf

LGGM Club News:

On Saturday, June 8th, **Conrad North**, Past President of the Fluorescent Mineral Society, presented information at the club meeting about mineral fluorescence, the role of activators in producing fluorescence, and information about UV lighting equipment available to rockhounds interested in collecting fluorescent mineral specimens. Thank you, Conrad.

* * * * * * * * *

Summer and the LGGM Club field trip season are on! Here's one example:

Sun 6/23 **Dave Alexander** and **Richard Kawamoto** led a joint field trip with the Mile High RAMS to the Sedalia copper mine. It's a long, steep hike to the area above the wooden structure shown in the left photo where huge almondine garnets (right photo) can be found. Pink thulite, black schorl and various copper minerals were also collected.

*** * * * * * * * ***

From Wayne Orlowski we have the following links:

50 million-year-old fossil captures a swimming school of fish

https://www.sciencenews.org/article/50-million-year-old-fossil-captures-swimming-school-fish?utm_source=email&utm_medium=email&utm_campaign=latest-newsletter-v2&utm_source=Latest_Headlines&utm_medium=email&utm_campaign=Latest_Headlines

* * * * * * * * *

A graphic representation of the "feldspar" solid solution series which depicts the common minerals we see on hikes. A good talking point/conversation starter diagram for a conversation on mineralogy. Also, check out the gallery tab in the upper right for another graphic representation of the garnet family mineralogy. https://strike-dip.com/feldspars/

* * * * * * * * *

James Hutton's birthday and biography. James Hutton was a Scottish geologist, chemist, naturalist, and originator of one of the fundamental principles of geology—uniformitarianism, which explains the features of the Earth's crust by means of natural processes over geologic time. https://www.britannica.com/biography/James-Hutton

* * * * * * * * *

Meet The Covert Geologists That Helped The Allies Win The Second World War

https://www.forbes.com/sites/robinandrews/2018/07/31/meet-the-covert-geologists-that-helped-the-allies-win-the-second-world-war/?fbclid=IwAR2grLzz1IHeDAK2VrGlNrdOkT0QQb8rYU8uDHoUVID9pD_09OEaz7RdOeA#7a69a9391abc

* * * * * * * * *

Pebble Pup News:

PEBBLE PUP AND EARTH-SCIENCE SCHOLARS FIELD TRIPS 2019

Sat. 7/20/19. **South Park Field Expedition** Leader: Steven Veatch You must register for this field trip with Steven Veatch by July 10 at steven.veatch@gmail.com

Sat. 8/10/19. **Pipe Springs Tourmaline** Trip Leaders: Laura Canini and Steven Veatch
You must register for this field trip at steven.veatch@gmail.com by August 1.

If you are a member of the Colorado Springs Mineralogical Society http://www.csms1936.com/ or the Lake George Gem and Mineral Club https://www.lggmclub.org/ you may go on their field trips.

* * * * * * * * * *

Here is the latest installment of **"Bench Tips" by Brad Smith:** (www.BradSmithJewelry.com)

NEW MELTING DISH

A new melting dish or crucible must be given a protective coating of borax before its first use. Borax extends the life of the ceramic material. Once done, it generally does not have to be repeated. The procedure is straightforward.

Heat the new melting dish to red with a large torch. You'll need plenty of heat. I use an acetylene/air Prest-O-Lite torch with a large #5 nozzle.




When the dish is hot, sprinkle in a half teaspoon of borax, let it melt, and spread it with a carbon rod over all of the interior surface of the dish. Add more borax if needed. Sometimes you will have to hold the dish at an angle to coat the sides up to the rim. And don't forget to coat the pouring spout itself.

* * * * * * * * *

RING SIZE VARIATIONS

The numerical sizes marked on ring gauges and ring mandrels are often not the same across different manufacturers. If you're using a ring gauge to measure a customer, be sure to compare the markings on the gauge with the markings on the mandrel you use to make the ring. They may not be the same.

Also, you may have to adjust a little for the width of the ring shank. If you're making a wide shank ring, the ring generally has to be a little bit larger in diameter than the ring gauge size in order to get a comfortable fit.

Work Smarter With Brad's "How To" Jewelry Books
www.Amazon.com/author/bradfordsmith

Happy hammering,
- Brad

Notes from the Editors

Jerrolynn Kawamoto
Editor
jerrolynn@wildblue.net
719-748-8152

Bob Carnein
Associate Editor
ccarnein@gmail.com
719-687-2739

Bob Carnein's article last month called What the Heck is a Pegmatite discussed the basic characteristics of pegmatites. You may want to reread that article or have it handy as you read his second article, which continues the topic of pegmatites.

Paul Combs provides information on the rules for collecting fossils on BLM land and the reasons that these rules are necessary. Please note, however, that rules for collecting on US National Forest lands often differ from those for BLM, and may also vary from one National Forest to another, or even from one ranger district to another. You should contact the local forest ranger district office if you plan to collect in National Forest, and get information from the BLM, if necessary, about the locations of mining claims on National Forest land.

Steve Veatch shares with us his feelings upon experiencing the amazing glory and history of the Florissant Fossil Beds National Monument.

Types of Granite Pegmatite

by Bob Carnein

When I began my study of geology at Ohio State, nearly 60 years ago, I already had some familiarity with pegmatites, having collected minerals in the mid-1950s in the famous pegmatite deposits of Connecticut and New York. Those localities were the spawning grounds for several generations of geologists. In those days, pegmatites were usually assigned to one of two groups: *simple* and *complex*.

Simple pegmatites typically mimic the mineral compositions of the enclosing granitic plutons or high grade metamorphic rocks. Besides quartz and feldspars, they may contain the micas biotite and/or muscovite; a garnet (typically almandine); magnetite; and schorl (the black, iron rich variety of tourmaline). Simple pegmatites range in size from bodies only a few inches thick to masses that may cover dozens of acres (Figure 1). They may be simple tabular bodies (dikes or sills) or lens shaped or irregular. Contacts with the enclosing rocks are often gradational but may be sharp, and aplite (fine grained "sugary" textured granite) and graphic granite may occur near the margins (Figures 2 and 3).

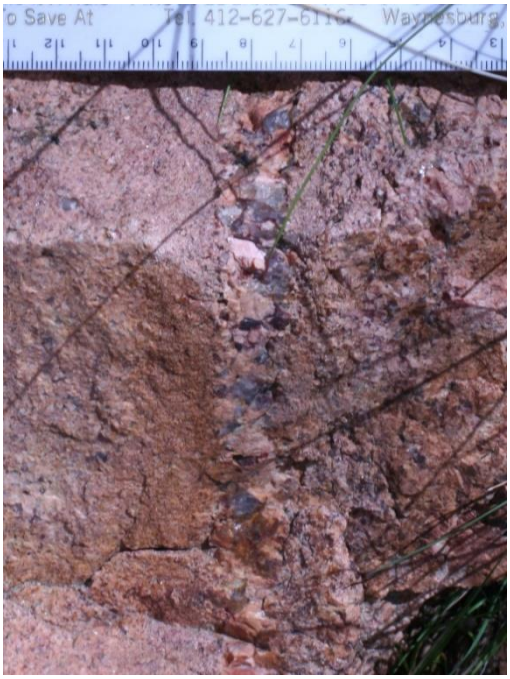

Figure 1. Narrow pegmatite dike surrounded by aplitic granite (Pikes Peak Granite). (Carnein garden rock and

Complex pegmatites are especially interesting to mineral collectors because of the variety of odd minerals that occur in them. They generally occur in granitic igneous host rocks, and it's thought that the odd minerals represent chemical elements that were originally widely dispersed in tiny amounts in the magma. The idea is that, as crystallization proceeded, these substances, along with water, fluorine, and other volatile elements, were expelled into a smaller and smaller volume of remnant fluid. As the bulk of the magma cools and crystallizes, they concentrate in the final residue, where they form the minerals that we love to collect.

Pegmatite Classes and Families. Like most things, the classification of pegmatites has become much more complicated since I was in college. Although it's still useful to talk about simple and complex pegmatites, recent workers, including Černý and Ecrit (2005), London (2008), and Simmons, *et al.* (2003) use other criteria to subdivide granitic pegmatites into *classes* and *families*. So, for example, Černý and Ecrit (2005) recognize abyssal (high pressure and temperature), muscovite, muscovite-rare element, rare-element, and miarolitic (pocket forming) **classes** of granitic pegmatites, in order of decreasing pressure and temperature. Rare-element pegmatites have minerals containing such elements as beryllium, cesium, lithium, niobium, rubidium, tin, tantalum, zirconium, uranium, and rare-Earth elements. Examples include some common minerals (e.g. beryl and spodumene) as well as exotic minerals that even geologists can't identify without the aid of X-ray diffraction, X-ray fluorescence, or other analytical techniques.

Figure 2. Aplite dike (fine grained, left of center) surrounded by "common" pegmatite. Pikes Peak Granite. Carnein specimen and photo.

Figure 3 (right). "Graphic Granite" pegmatite consisting of oriented intergrowths of quartz (gray) in microcline (white). Carnein specimens and photos.

Based on their chemistry, pegmatite classes are further subdivided into **families**. Although there are only two families of granitic pegmatites, I have a hard time keeping them straight. This is because petrologists use a shorthand notation to name them, and I'm frankly not good at remembering acronyms. The two groups are the **NYF** and **LCT** families. NYF refers to pegmatites containing significant *niobium*, *yttrium*, **or** *fluorine* minerals; LCT refers to pegmatites containing significant *lithium*, *cesium*, **or** *tantalum*.

Examples. Let's look at a "close to home" example of how all this works. Most central Colorado collectors have spent time looking for "pockets" in the Pikes Peak Granite. The technical term for such pockets is *miarolitic cavities* (Figure 4). Thus the Pikes Peak pegmatites belong to the miarolitic class, which means that they formed at relatively shallow depths and low temperature-pressure. Well formed crystals are typical of miarolitic pegmatites.

Figure 4. Typical well formed (euhedral) crystals of smoky quartz, microcline, fluorite, and goethite from a miarolitic cavity. Pikes Peak Granite. (Carnein specimen and photo)

Most collectors know that, besides such common minerals as microcline feldspar (or "amazonite"), smoky quartz, albite, goethite, and biotite, the Pikes Peak pegmatites may also contain fluorite [CaF_2] and/or topaz [$Al_2SiO_4(F,OH)_2$]. Note that both these minerals contain essential fluorine (F). As a result, our local pegmatites are assigned to the NYF family of the miarolitic class.

Recently, some of you were fortunate enough to collect in the Eight Mile Park pegmatite district, near Royal Gorge in Fremont County. You probably noticed that, unlike the pegmatites of the Lake George or Wigwam Creek areas, those of Eight Mile Park contain abundant muscovite. Another difference is that they don't contain pockets with well-formed quartz and microcline crystals, though both of these minerals are abundant. Other common minerals in the district include beryl (beryllium aluminum silicate), garnet, and schorl. Although you may not have found any, the Eight Mile Park deposits also contain lepidolite (a lithium mica), Elbaite (a lithium tourmaline), and montabrasite (a lithium phosphate) (Anonymous, 2016). Put all of this together and the Eight Mile pegmatites can be placed into the LCT family of the muscovite-rare element class.

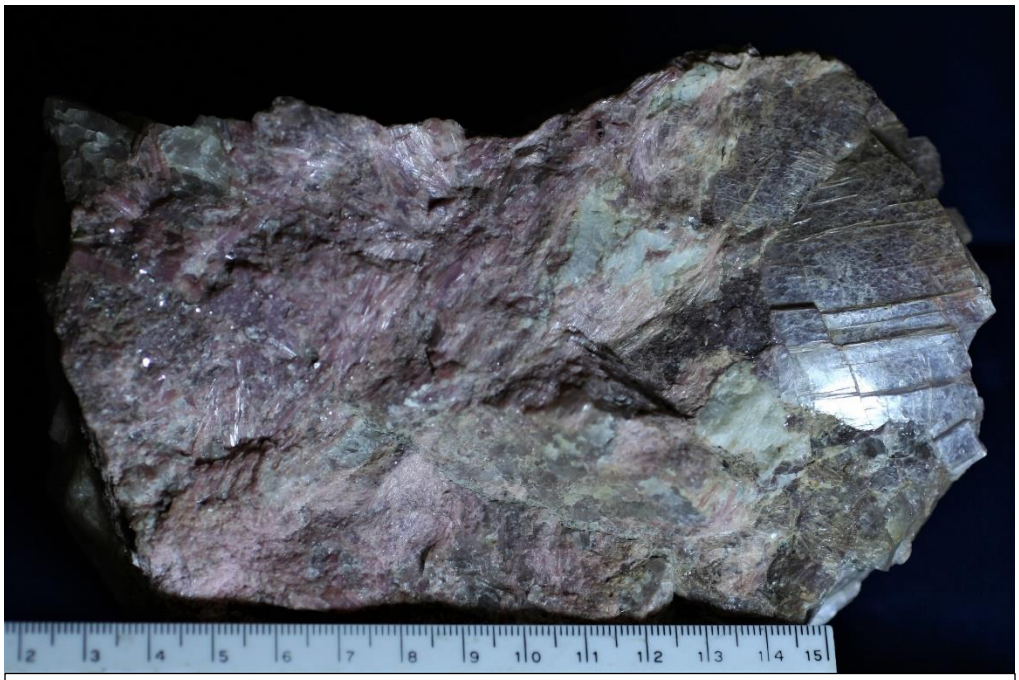

Figure 5. LCT pegmatite from the Brown Derby mine, Gunnison County, Colorado. Pink crystals are Elbaite; whitish gray is albite; curved lavender plates are lepidolite. (Carnein collection and photo)

The Bigger Picture. Interestingly, geologists are now recognizing connections between kinds of pegmatites and plate-tectonic cycles. For example, Bradley and McCauley (2016) found that, world-wide, of 66 LCT pegmatites that have been accurately age dated, many were formed late in the cycle of igneous rock formation that peaks as supercontinents, such as Pangaea, come together. Four such cycles are recognized, starting over 2.5 billion years ago. In detail, the LCT pegmatites, which are often the most economically valuable types, form in several specific geologic settings related to the "supercontinent cycle". This may be important for people looking for economic mineral deposits.

Why Study Pegmatites? Considering the thousands of books and articles about pegmatites available in university and government libraries, it's obvious that these rocks are clearly significant to many people besides mineral collectors. They are or have been important sources of several industrial minerals, including feldspar, clay, muscovite mica, and crushed stone. In addition, they have produced significant amounts of beryllium, lithium, and rare-Earth elements (e.g. yttrium, scandium, neodymium, cerium, europium, etc.). Finally, pegmatites are major sources of several important semiprecious gemstones, among them aquamarine and other colored beryls, topaz, kunzite, garnet, and tourmaline.

The Pegmatite State. Colorado is a wonderland of pegmatites. In fact, E.W. Heinrich, who published many articles about our pegmatite heritage in the mid-20th Century, noted that Colorado should have been named The Pegmatite State (Jacobson, 2018). For more information about Colorado's pegmatite districts, I encourage you to read recent articles by Lake George Gem and Mineral Club member Marc Jacobson (1986; 2018). I hope to see you on a pegmatite near home!

References Cited

Anonymous, 2016, Field trip guide to the Eight Mile Park pegmatite field, Fremont County, *in* M.I. Jacobson, compiler, Field Trip Guidebook for the Second Eugene E. Foord Pegmatite Symposium: Colorado School of Mines Geology Museum and others, p. 10-22.

Bradley, D.C., and A. McCauley, 2016, Tectonic settings of LCT pegmatites in the context of the supercontinent cycle: *in* M.I. Jacobson, M. Raschke, F. Barnard, and P.J. Modreski, editors, *Second Eugene E. Foord Pegmatite Symposium, Abstracts, Short Papers, Posters, and Program*: Denver, Colorado School of Mines Geology Museum and others, p. 14-17.

Černý, P. and T.S. Ecrit, 2005, The classification of granitic pegmatites revisited: The Canadian Mineralogist, vol. 43, p. 2005-2026.

Jacobson, M.I., 1986, Granitic pegmatite districts of Colorado: an overview, *in* P.J. Modreski, editor, *Colorado Pegmatites—Abstracts, Short Papers, and Field Guides from the Colorado Pegmatite Symposium, May 30-June 2, 1986*: Denver, Colorado Chapter Friends of Mineralogy and others, p. 7-15.

_____, 2018, The pegmatites of Colorado: a survey of localities: Colorado Mineral Society Mineral Minutes, January, 2018, p. 4-7.

London, D., 2008, *Pegmatites*: Couronne, Quebec, Mineralogical Association of Canada, The Canadian Mineralogist, Special Publication 10.

_____, 2016, Rare-element granitic pegmatites: GeoScience World, https://pubs.geoscienceworld.org, accessed June 24, 2019.

Simmons, W.B., K.L. Webber, A.U. Falster, and J.W. Nizamoff, 2003, *Pegmatology, Pegmatite Mineralogy, Petrology and Petrogenesis*: New Orleans, Rubellite Press.

* * * * * * * * *

FOSSILS ON BLM LAND: HOW TO AVOID JAIL TIME AND STILL HAVE FUN

by **Paul Combs**
Paleontology Study Group, Lake George Gem & Mineral Club

As rockhounds, we not only want to learn about rocks, minerals and fossils, we are also eager to look at, find, photograph, shape, polish, display, identify, buy, sell, trade and – most of all – collect them. That last part can get us into trouble with private landowners, not to mention city, county, state and federal authorities. We know that we can't dig up city parks, national monuments and similar places, but where can we dig, and what are the rules? Our club has created a short list of clear guidelines that instruct us about proper behavior on private and public lands, but there are a lot of fine points and legal traps that can't be listed on a simple guideline. That would require a shelf of books. Maybe more.

As leader of the Paleontology Study Group, I was thrilled to get my hands on a pair of very helpful Bureau of Land management (BLM) pamphlets. After all, a lot of our collecting is done on Colorado's abundant BLM lands. The first pamphlet is general in nature and is titled: **ROCKHOUNDING & FOSSIL COLLECTING** (1) and the second one is **FOSSILS ON AMERICA'S**

PUBLIC LANDS (2), which gives specific guidance about fossils. These and additional brochures are also available on line. Basically, these are attempts to keep the public informed about the "do's and don'ts" of rockhounding and fossil collecting on BLM land. Luckily for us, the BLM is not the Nazi Gestapo. Far from it. They are hard-working people and America's own sons and daughters, just like us. They would not like to have a confrontation with you any more than you would want one with them. But they are law enforcement officials, so we would be smart to familiarize ourselves with the laws they are trying to enforce. It would also be a good idea to understand why those laws exist in the first place. BLM laws and regulations were created after a lot of careful consideration, often in coordination with scientists and other experts.

WHY PROTECT FOSSILS? Fossils are indispensable to scientists who want to research the history of life on this planet, the climate at different times in our past, the movements of the Earth's crust and a thousand other topics. Fossils tell us about monsters that lived in a world filled with wonder. They amaze us with stories of catastrophes and ice ages when there were glaciers on the Front Range. 150 years ago, who would have thought that the ocean had covered Colorado, not once but several times? Paleontologists collect information that is used by schools, universities, movie makers, TV channels, book publishers and, let's not forget, fossil fuel companies. Some fossils are very common and, despite their attractiveness, they are a-dime-a-dozen and no one cares if we collect them. Other fossils are rare or one-of-a-kind, which makes them nearly priceless to scientists. A dinosaur, or even a dinosaur bone, would be a good example of a rare scientific treasure. When I lived in Texas, I was a volunteer Ice Age fossil collector for Texas A & M University. We all knew that a single mammoth tooth could fetch $400 or more on Ebay, but we weren't doing it for money. Sadly, that is not true for everyone.

There is a constant race between the unscrupulous people who just want to make easy money and the scientists who are trying to preserve and study fossils. Until recently, important fossils were being lost at an alarming rate. They were showing up on the open market and there was little that could be done to prevent it. Concerned scientists testified before Congress and requested that it enact laws to forbid the private collection of certain fossils on federal lands. The scientists knew that the public likes to collect fossils, too, so they tried to accommodate people like us. As a matter of fact, amateur collectors have made some major fossil discoveries in the past. So, with that in mind, the paleontologists carefully considered which types of fossils really, truly need protection and which ones could continue to be collected by you and me. The law that was eventually created is known as the **Paleontological Resources Preservation Act (PRPA) of 2009** and, in my opinion as a former paleontology major, it is a pretty good compromise between the desires of rockhounds and the needs of the scientific community.

(This is also why the commercial fossil quarry in Florissant permits you to keep a leaf fossil but takes a bird fossil for use by science. They are trying to help scientists, even though the bird fossil was found on private land.)

HIGHLIGHTS OF BLM REGULATIONS

Rocks and fossils collected without a permit from public lands such as the BLM must be for your personal use only. They may not be sold or bartered to commercial dealers or any other person. The BLM asks us, please, to remember that future generations will want to experience the thrill of finding fossils, so they request that we take only a small amount.

INVERTEBRATE and PLANT FOSSILS: We are permitted to collect "reasonable amounts" of common **invertebrate fossils** (animals without backbones), such as trilobites, ammonites, brachiopods, snails, oysters, clams, other shellfish, corals, insects, crabs, and similar life forms (1,2,3,4). This also includes evidence of invertebrate animals preserved in rock such as tracks, traces, burrows, and impressions (3). You may also collect a "reasonable amount" of **plant fossils**, such as leaves, stems cones, seeds, and leaf or stem impressions and root traces (1,2,3).

Scientifically important invertebrate and plant fossils may **NOT** be collected without a permit (2,3) but—lucky for us—there probably aren't many fossils in that category on BLM lands in this part of Colorado.

For collection of fossils, a "reasonable amount" is defined by the BLM as "what a collector may keep for a personal hobby collection or display in their home"(3). If you don't intend to sell the rocks and fossils you collect on public lands, you should probably ask yourself "how many fossils do I really need for my own personal use?" After all, how many curio cabinets or display shelves do you have? And how many rocks or fossils do you give to your friends and relatives each year? Once your collection and display areas are filled, perhaps you should focus your efforts on collecting only a few specimens of better quality, rather than adding a lot more quantity to your collections. With this focus, the BLM limits sound reasonable for personal use.

"PETRIFIED" WOOD: Petrified wood is in a separate category from fossils. Each private collector may remove up to 25 pounds of petrified wood per day and a total of up to 250 pounds per calendar year from BLM lands, for personal, non-commercial use (1,3,4)

VERTEBRATE FOSSILS: (fossils of animals with backbones, like a fish, mammoth or dinosaur), may only be collected by qualified researchers with a proper permit. That includes fossils as small as a single tooth, bone or tusk. This law also protects "trace fossils", such as dinosaur tracks (1,2,3,4).

ROCKS: In Colorado, most BLM lands allow collection of up to one five-gallon bucket of rocks per day, with a maximum of 250 pounds of rocks per year for personal, non-commercial use (1).

SPECIAL CHANGES OR RESTRICTIONS IN PARTICULAR AREAS: In some areas of the BLM lands, these daily and annual amounts of fossils, petrified wood and rocks that may be collected may increase or decrease. These changes are generally posted with clear signs. Some BLM lands are closed entirely to collecting due to the existence of national monuments, patented or unpatented mining claims, trailheads, wildlife preserves, nature trails, etc. It is a good idea to check with the local BLM office first, and keep your eyes open for posted signs and claim stakes

.

CULTURAL ARTIFACTS: A BLM article called Collecting on Public Lands (4) states the following: Cultural materials on public lands may not be removed, damaged, disturbed, excavated or transferred without BLM permit. Cultural resources include prehistoric and historic artifacts and sites, broken objects and debris more than 100 years old that were used or produced by humans. Protected materials include arrowheads and other stone tools, grinding stones, beads, baskets, pottery, old bottles, horse shoes, metal tools, graves and trash scatters. Historic sites such as cabins, sawmills, graves, trail traces, mining areas,

townsites, ranches and railroads are not open to collecting. Metal detector use is allowed on public lands. Modern money may be collected, but coins and artifacts more than 100 years old may not be collected. These items are protected under the **Federal Antiquities Act** of 1906 and other laws.

FOSSIL AND ROCK COLLECTION ON BLM LAND WITH A PERMIT: Collecting vertebrate or rare fossil specimens, collecting larger amounts of rocks, or collecting rocks for commercial purposes requires specific permits. Check with the BLM office for regulations and procedures for obtaining the appropriate permits.

The Rocky Mountain Dinosaur Research Center in Woodland Park is an example of a responsible scientific institute with a permit to collect vertebrate fossils. These are the sorts of fossils that everyone would like to collect, but we are required to leave them where we find them. Fossil vertebrates are just too important for average citizens to dig them up for their own purposes. Once they have been collected and sold, or placed in your garage, vertebrate fossils are lost to science forever. Just imagine: If all dinosaur fossils had been dug up and sold privately over the past hundred and fifty or more years, there would never have been a Jurassic Park movie and dozens of museums across the country would have no monsters to amaze us, and our grandchildren. Whenever we deal with a limited resource, we need to be mindful of the fact that we can't afford to squander it. I have a friend in Texas who is a professor of Ice Age paleontology and he has a sign in his office that reads, "They don't make them anymore".

REFERENCES

(1) Rockhounding & Fossil Collecting BLM Colorado, BLM/CO/GI-09/007: Retrieved from https://permanent.access.gpo.gov/gpo29771/Rockhounding%2520Brochure.pdf. on 06/24/2019. (Copies available at BLM offices).

(2) "Fossils on America's Public Lands", BLM/WO/GI-97/006+3032+REV11: Retrieved from http://npshistory.com/publications/blm/fossils-americas-public-lands.pdf on 6/24/2019. (Copies available at BLM offices).

(3) Rules for Casual Collection: Retrieved from https://www.blm.gov/programs/cultural-heritage-and-paleontology/paleontology/rules-for-casual-collection on 06/26/2019

(4) Collecting on Public Lands: Retrieved from https://www.blm.gov/sites/blm.gov/files/documents/files/collecting_on_publiclands.pdf on 06/26/2019.

Timeless Trees at Florissant, Colorado

by Steven Wade Veatch

The huge petrified *Sequoia* stumps near Florissant stretch the limits of my understanding. I'm left with only wonder, like a poem I can't explain. Under the dominion of a clear blue sky, the afternoon light ricochets off the stone, displaying the myriad beige and brown hues of the fossil stumps. Their stony surfaces contrast with tufts of grass that surround them. The nearby orange-red bark of ponderosa pine and the scent of the forest adds another layer of magic, while silent mats of pine green moss cluster in the shadows. Pale lichens cover some of the stone tree rings. The warm summer air buzzes with insects.

Figure 1. View of the Florissant Fossil Beds National Monument's iconic "Big Stump." Photo by S.W. Veatch.

For me, the stone trees are a portal where the past joins with the present, and time seems to have stopped. I imagine how it all began 34 million years ago when a cluster of nearby volcanoes, once dormant, erupted. It started with a blast of ash and fiery molten rock shooting out from awakened vents. The air became heavy and dark, as plumes of grey ash hazed eastward towards what would become Florissant. Rainfall mixed with loose sediments on volcanic slopes, forming mud—the color of morning coffee—that rushed down the slopes of the volcanoes at speeds of up to 90 miles an hour. Ash rained out of the sky and mixed with the spreading mud. The mud popped and hissed, while it spilled over ledges, covered rocks, and stretched heedlessly into the Florissant valley.

A wreckage of plants and animals tumbled in the mud's advance as it invaded the forest of tall *Sequoias*. It turned the area into a surreal, harsh, hellish place, wiping out local populations of oreodonts, rhino-like brontotheres, and small horses. Birds, struggling to dodge the devastation, flew skyward from the branches of trees that stood above the mud. Tendrils of steam rose out of the jumbled mess of mud that surrounded the bases of the trees. The weight of the mud pressurized and squeezed the wood. Over time, silica in the mud penetrated the wood, leaving behind the remnants of the ancient forest we encounter today.

I first saw the petrified trees when I was in grade school. I came back often with my family to look at them again. This relic stone forest changed me. I studied fossils and rocks because of them. And I learned from them. I now realize how mankind is a force of nature and how we can alter landscapes, just as the ancient mud and ash did so long ago at Florissant. Our addiction to fossil fuel has altered our planet's atmosphere and contributes to changing global climate. Florissant's *Sequoias* are extinct because of climate change, and these trees encourage us to contemplate our annihilation as the planet experiences rates of extinction not experienced since a meteor wiped out the dinosaurs.

At the stone stumps, I take a few minutes to listen, where the sounds of the chirping birds, chattering squirrels, and the soft whispers of breezes exist with the noises of development—homes being built, cars moving and dogs yapping. I can also hear the petrified forest—it speaks of an Earth that is always in a state of change, but this protected ancient forest (a national monument now) also provides a place where change slows down, at least for me. As I look at the fossilized trees, I sense a calm as they release me from my ego and create an awareness of the wonderful things I can discover outside of myself.

Figure 2. Dynamite was used the early twentieth century to expose this stump. The use of explosives resulted in the shattered texture of the stump and required the use metal bands to hold it together. Photo by S.W. Veatch.

Monthly Mineral Quiz

Last Month's Mineral. Pyrrhotite "peer'-oh-tite" ("magnetic pyrites") is an iron sulfide of somewhat varied composition. Although it resembles pyrite, it can be distinguished from it by its lower hardness (3 ½ to 4 ½ vs. 6 to 6 ½) and its variable magnetism (pyrite is non-magnetic). Distinct crystals are rare, but they are pseudohexagonal, while pyrite is cubic. Pyrrhotite, like pyrite, is common at many localities, though it's far less abundant than pyrite. This specimen, with chalcopyrite, came from the Sudbury astrobleme (a giant deformed asteroid impact), in southern Ontario, which was mined for copper, nickel, and platinum. Pyrrhotite, itself, has no economic value unless it contains nickel as an impurity.

This Month's Mineral. This extremely common mineral occurs in a variety of habits, including crystalline masses, fibrous aggregates, and well formed crystals, which are often twinned (middle and right photos). An unusual property is flexibility—you can bend it. Another is its very low hardness (softer than a fingernail). It has several directions of cleavage, is translucent to transparent, and doesn't react to dilute HCl (hydrochloric acid). It is a valuable industrial mineral that is most common in sedimentary rocks. What is it?

The Lake George Gem and Mineral Club is a group of people interested in rocks and minerals, fossils, geography 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 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 October, 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.

Our Officers for 2019 are:

Richard Kawamoto, President
7584 Cedar Mountain Rd.
Divide, CO 80814
719-748-8152
kawahome@wildblue.net

John Rakowski, Vice President
PO Box 608
Florissant, CO 80816
719-748-3861
rakgeologist@yahoo.com

Lorrie Hutchinson, Secretary
10915 Grassland Rd.
Colorado Springs, CO 80925
719-382-3503
4lohutch@gmail.com

Cathy McLaughlin, Treasurer
11595 Owls Nest Rd.
Guffey, CO 80820
702-232-3352
cathy_mclaughlin@hotmail.com

C.R. (Bob) Carnein
Newsletter Associate Editor
507 Donzi Trail
Florissant, CO 80816
719-687-2739
ccarnein@gmail.com

Jerrolynn Kawamoto
Newsletter Editor
7584 Cedar Mountain Rd.
Divide, CO 80814
719-748-8152
jerrolynn@wildblue.net