Lake George Gem & Mineral Club

Club News

January, 2019

Program for the Month: Saturday, January 12, 2019, 10:00 a.m.

Dinosaur Tracks presented by Paul Combs

For a long time, people looked at dinosaur tracks as nothing more than "curiosities". Even paleontologists used them as door stops and paper weights, or gave them away to friends. ***No more.*** About 30 years ago, the study of dinosaur tracks really took off, and the discoveries are nothing short of amazing. In that short time, we have discovered a lot about how fast different dinosaurs walked or ran, how they stood, what they ate, how they hunted, that they swam, how they courted their mates, how they raised their young, that they traveled in herds, and much more. And more track sites are being discovered in the USA and around the world every year. **Paul Combs** will explain the techniques that scientists are using and what all this work is teaching us. For instance, Steven Spielberg used this new information in the making of the "Jurassic Park" series of films. Some of these discoveries are happening right now, at sites here in Colorado!

Silent Auction: We need donations for the silent auction! 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.

From the President-elect -- Richard Kawamoto:

A Happy New Year wish and a hearty welcome to another exciting year of activities with the Lake George Gem & Mineral Club. The club is fortunate to have many members with specific knowledge and interest in the Earth sciences. Utilizing their expertise promises another year of fun and education in the field and at monthly meetings. If you have expertise you would like to share or have ideas for additional presentations or field trips, please use the contact information on the last page of the newsletter for the appropriate members of the leadership team to let us know.

For example, the Fossil Study Group, a new initiative started last year, will be off to a fast start this year with an upcoming field trip on January 26 to the Dinosaur Resource Center in Woodland Park. The January trip will be open to 2018 members and to any new members, with a reduced cost per person (see details below.)

Other activities during the year are now being organized and will include rockhounding field trips, educational presentations, and instructional classes. Attending club meetings and reading the monthly newsletter are excellent ways to keep informed.

Club dues for 2019 are now being accepted, so please visit the club website for registration information. Remember that **2019 membership applications will not be accepted after March 31**.

During the December, 2018 Club meeting, we elected new leaders for 2019, including:

Richard Kawamoto – President
John Rakowski – Vice President
Lorrie Hutchinson - Secretary
Cathy McLaughlin – Treasurer
Bob Carnein, - Newsletter Editor **(Taylor Harper, Jerrolynn Kawamoto,** Asst. Editors)
Danny Alfrey-Research, webmaster, coordination of club claim
Joey Korzekwa-Web updates & design
Dave Alexander and **Laura Canini –** Field Trip Coordinators
Steven Veatch – Pebble Pups Leader
Paul Combs – Fossil Study Group Leader
Jay Penn – Show Vender Coordinator (by mail and email) and Show Host (on site)

While these leaders will help to guide the club, additional volunteers will be needed throughout the year to lead individual field trips, and to help with publicity, setup, and coordination of the annual LGGM Club show, etc. The Club show is still months away, and we are still in need of a Club Show Coordinator. If you are interested in becoming involved, please contact any of the club officers/leaders.

It's cold and white outside, but the club is already stirring. I look forward to seeing all of you for a fun-filled year of all things rocks and hope you are eagerly anticipating it too.

Richard Kawamoto

Field Trips:

Saturday, January 26, Rocky Mountain Dinosaur Resource Center (RMDRC)

The LGGM Club Paleontology Group has arranged an opportunity for all LGGMC members to visit the Rocky Mountain Dinosaur Resource Center in Woodland Park--Colorado's most popular dinosaur attraction. Paul Combs will discuss the field trip and bring RMDRC brochures when he delivers a presentation about *Dinosaur Tracks* at the January 12 club meeting. The RMDRC rotates its exhibits in the main display area, so a lot of what you will see in January will be different from what you experienced 6 months ago.

Background: The RMDRC offers a very good museum for the public, but most of its effort goes into recovering, identifying, preserving, and copying dinosaur remains, not museum activities. The staff creates highly detailed molds of dinosaur bones from all over the world. This allows museums and universities everywhere to contact the RMDRC and request a copy of a skeleton of a particular dinosaur. So the RMDRC functions as a "mail-order" dinosaur center, and it adds more skeletons to its inventory every year. Many dinosaur skeletons on display in museums all over the planet were actually manufactured from precise copies right here in Woodland Park! The RMDRC has warehouse-size shelves full of molds, and its staff is constantly working to keep up with the demand. With any luck, we'll be able to peek behind the scenes and see this work going on. To learn more about the Rocky Mountain Dinosaur Resource Center, check out its web site at: https://www.rmdrc.com/

Field Trip Details. Our private tour is scheduled to begin at **10:00 a.m. on Saturday, January 26**. The RMDRC will provide a guide for the group, and extra guides if more than 30 club members participate. We will need to arrive early in order for everyone to pay and for the RMDRC to count how many guides it will need. Tours usually last about 90 minutes, so we will finish just before lunch. We do not need to leave the RMDRC as a group. If you like, you can stay longer and take a second look at the main exhibit area or shop for dino-goodies in the gift shop. The RMDRC is offering a group-rate ticket price of $8.00 per adult if we can produce 10 visitors or more. That is $3.50 below the normal ticket price. **2018 members and paid-up**

new 2019 members are welcome on this trip. You can sign up for the tour on the club's convenient on-line field trip sign-up page. In case of bad weather on January 26--we will try again on the following Saturday, February 2.

Upcoming Programs for Club Meetings:

- **Summer (date TBD): General Geology of Central Colorado** by **Bob Carnein**
  Two related field trips (for observation, not rock collecting) will occur soon after this presentation
  - Colorado Springs to Manitou Springs area (date TBD).
  - Woodland Park area to Rainbow Falls (the one north of Woodland Park) (date TBD).

- **June (tentative): Fluorescence** by **Conrad North**
  - A field trip will occur soon after this presentation (date TBD) to the Gold City mining claim (possibly a night trip to allow better viewing of fluorescent minerals there.)

Upcoming LGGM Club Events:

- **April ? (TBD): Mineral Physical Properties** by **Bob Carnein**
  This 4 hour class will discuss the physical properties of various minerals and ways that you can easily test these properties to help identify the minerals you have found.
- **May ? (TBD): Basic Wire Wrapping** by **Jerrolynn Kawamoto**
  Darlene Cotton will be assisting in the course. If you have taken this course in the past, your help would also be welcome and would allow us to accommodate more students.

OTHER COMING EVENTS: **(**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

- **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:**

  - **Jan. 3-7**, **Short Course on Geology of Hydrothermal Ore Deposits**, will include several evening events which will be open to the public at no charge. It will be held at Colorado School of Mines, and sponsored by PTTC Rockies and the Society of Economic Geologists. The short course itself will consist of 5 full-day presentations about different types of hydrothermal ore deposits; full information including registration (costs differ depending on whether you are an SEG or DREGS member, student, etc., and you may register by day or full the full course) is at https://www.eventbrite.com/e/geology-of-hydrothermal-ore-deposits-tickets-49856267438. The cost is discounted for DREGS (Denver Region Exploration Geologists Society) members, and one may join DREGS to receive the member attendance rate.

    Two events that are part of the symposium are free and open to anyone who wishes to attend (even if you are not registered for any of the rest of the symposium):

    - **Thurs., Jan. 3**, 6-8 p.m., a reception, with refreshments in the Geology Museum. This will include a silent auction sponsored and for the benefit of the CSM SEG Student Chapter, with whom DREGS maintains a very close relationship;
    - **Sun., Jan. 6**, a combined Panel Discussion / Sample Display Session as follows:

5:00 - 6:00 p.m.: Hydrothermal Deposit Sample Displays and refreshments in BE-243 (Berthoud Hall on the CSM Campus);
6:00 – 7:30 p.m.: Panel Discussion in BE-241 (auditorium across the hall from BE-243);
7:30 – 8:30 p.m.: Informal follow-up discussions, Sample Displays and refreshments in BE-243.

- **Thurs., Jan. 10**, 7:30 p.m., Friends of Mineralogy, Colorado Chapter, bimonthly meeting, **Exploring Mines and Mineral Collecting in the Magdalena Mining District of New Mexico in the 1970's**, by Bob Hembree. At the Lakeview Event Center, 7864 W. Jewell Ave. Lakewood CO. All are welcome! See https://friendsofmineralogycolorado.org/ .

- **Thurs., Jan. 17**, 7:00 p.m., Colorado Scientific Society monthly meeting, two presentations on **Kilauea's 2018 eruption - new methods and perspectives for monitoring volcanic eruptions.** Don Becker, USGS, is a videographer who was sent to Kilauea to film and document the 2018 eruption and earthquakes; and Jeff Sloan works in the USGS UAS (Unmanned Aircraft Systems; i.e., "drones") program and will show how they were used at Kilauea. We may expect to see a lot of great video "footage" of the eruption. Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood; social time with refreshments begins at 6:30 p.m. Anyone is welcome to attend. See http://coloscisoc.org/ .

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.
- **Friends of Mineralogy, Colorado Chapter**, meets bimonthly (Jan.-Mar.-May-Sep.-Nov.), 2nd Thurs. [dates may vary in Sep. and Nov.], 7:30 p.m., Lakeview Event Center, 7864 W. Jewell Ave., Lakeview; see https://friendsofmineralogycolorado.org
- **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; http://westernpaleo.org/ .

Unless as noted, all of these societies' and institutions' lecture series are free and open to the public.

Pebble Pups Events: PEBBLE PUPS STUDY NORTH SEA CORES

The Pikes Peak Pebble Pups announce a special Saturday study session. We will work with a set of cores drilled from the North Sea. **John Rakowski**, a petroleum geologist, will meet with the Pebble Pups to talk about petroleum exploration and the use of cores drilled from sedimentary rock. Mr. Rakowski will discuss the resistivity differences of water-wet sandstone versus sandstone with gas in the pore system. He will explain porosity and permeability and show how the well log's sonic velocity readings can be used to derive porosity. The Pebble Pups will learn many things. Everyone can also ask about careers in geology. This session is designed for the teen Pebble Pups, but all Pebble Pups are welcome that can maintain a focus (4TH GRADE AND UP) on the training. We will also have some treats and other things and we will need you to tell us you are coming. Please send an email to **Steven Veatch** at steven.veatch@gmail.com letting him know you are coming to this remarkable session.

The workshop will meet **Saturday, February 16th at 10:30** am at the Woodland Park Library in the large, downstairs meeting room. Don't miss this deeper dive into geology. For more information contact **Steven Veatch** at steven.veatch@gmail.com.

LGGM Club News:

Frank Rosenberg submitted photos of the December 2018 meeting and towel show.

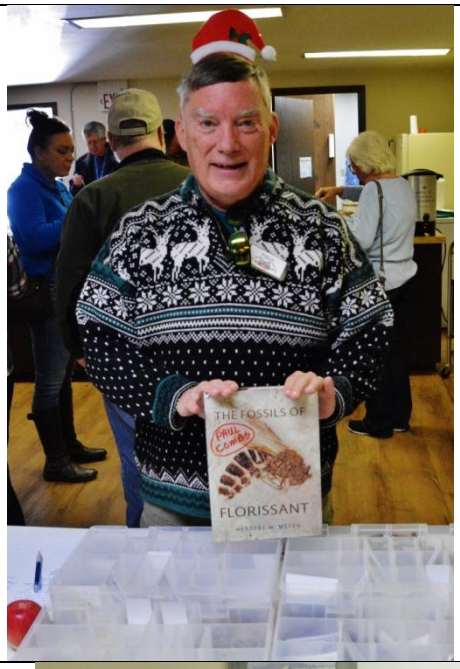
President **Bob Baker** (right) turns over the gavel to President elect **Richard Kawamoto** (center) as Vice President **John Rakowski** (left) looks on.

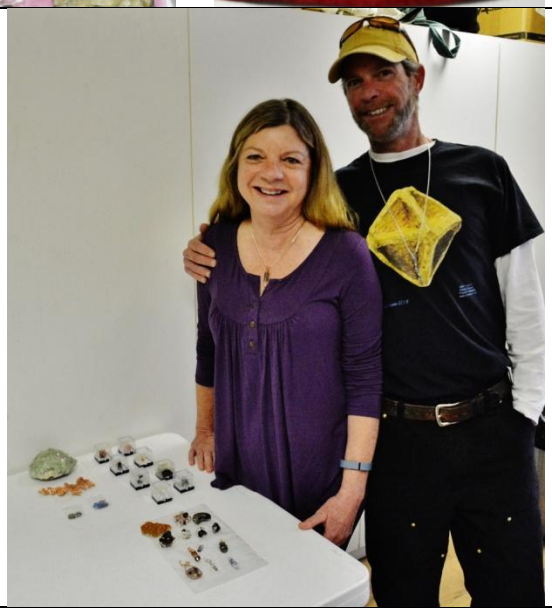
Many club members brought their favorite finds to the towel show.

A little expert advice is always helpful.

A variety of snacks was welcome as well.

Additional Members with Their Finds and a Favorite Fossil Book!





A Note on a Rare Mineral Occurrence

Bob Carnein

As some of you know, this spring, a Club member brought in an unknown mineral he found northwest of Florissant for identification (Figure 1). The specimen came from an area where there are scattered amazonite occurrences, but the member made the important observation that this mineral wasn't like anything he had seen before. (Many collectors probably would have tossed it.) He showed it to **John Rakowski** and **Bob Carnein**, who tentatively identified it as perhaps fluorite or anhydrite.

Figure 1. Sample of an unknown mineral found about 2 miles northwest of Florissant, Teller Co., CO. (Carnein photo)

Bob and John visited the locality and collected some additional samples of other minerals. The find was a very small one, consisting of only a few pounds of material in a small trench in a "swale" between two ridges. Bob took a piece home and determined the specific gravity to be about 3.0. He also crushed a small sample and examined the powder under a polarizing microscope, using immersion oils

to determine its properties. Long story short, the sample was neither fluorite nor anhydrite, and its properties (namely index of refraction) didn't allow a positive identification by the methods available.

At this point, based on its physical properties, Bob suspected that the sample was the rare aluminum mineral cryolite (Na_3AlF_6), which is well known from several localities near St. Peters Dome but has not been previously identified in the Crystal Peak area. Knowing that **Philip Persson**, a recent CSM grad who works for Collector's Edge Minerals, is an expert on the rare minerals associated with cryolite, Bob sent Philip two samples for identification. Philip, in turn, sent the samples to **Markus Raschke**, Professor of Physics and Chemistry at the University of Colorado, who used a scanning electron microscope (SEM) combined with energy-dispersive X-ray spectroscopy (EDX), to tentatively identify them as cryolite and the rare associated minerals prosopite and gearksutite.

Because Dr. Raschke doesn't have ready access to X-ray diffraction (XRD) analysis, which gives more certain results, Bob sent two additional samples to New Mexico Tech, where the rare minerals gearksutite, pachnolite, and hydrokenoralstonite (quite a mouthful!) were identified. As a result, we have now tentatively identified **5 "new" minerals from the Crystal Peak area**. Dr. Raschke has several additional samples, including the one pictured below (Figures 2 and 3), which he will check out after the holidays. This sample has an odd mineral that fluoresces yellow in short-wave UV and blue in long-wave UV.

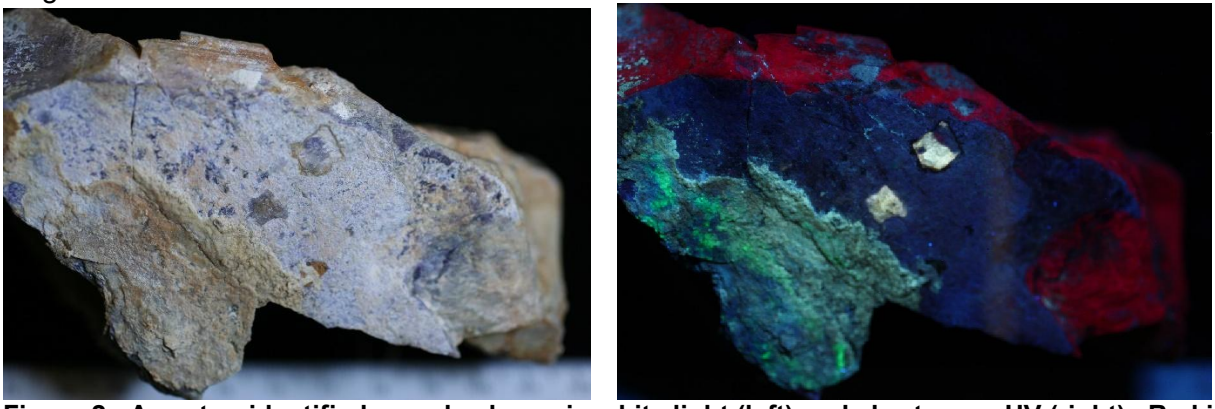


Figure 2. As yet unidentified sample shown in white light (left) and short-wave UV (right). Red is microcline feldspar; green is caliche; yellow is unknown mineral. (Carnein photos)

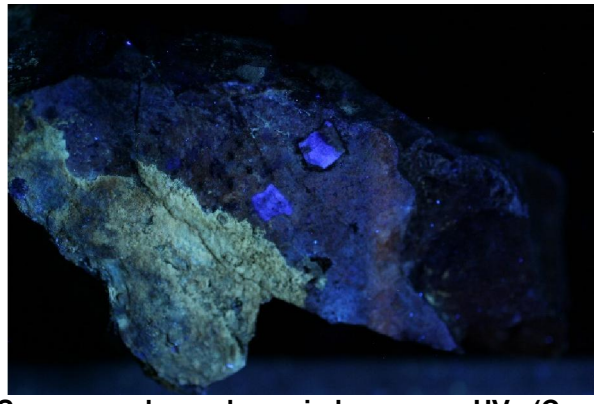


Figure 3. Same sample as above, in long-wave UV. (Carnein photo)

The writer appreciates the support of the Lake George Gem & Mineral Club, which agreed last year to budget $150 to fund identification of unknown minerals found by Club members. This paid for the XRD analyses at New Mexico Tech. Collectors are encouraged to bring in any odd minerals they find in our area. Despite 150 years of collecting, there are still new things to be found!!

Wayne Orlowski submitted the following article:

Methane Bubbles Frozen in Lake Baikal

Explanation: What are these bubbles frozen into Lake Baikal? Methane. Lake Baikal, a UNESCO World Heritage Site in Russia, is the world's largest (by volume), oldest, and deepest lake, containing over 20% of the world's fresh water. The lake is also a vast storehouse of methane, a greenhouse gas that, if released, could potentially increase the amount of infrared light absorbed by Earth's atmosphere, and so increase the average temperature of the entire planet. Fortunately, the amount of methane currently bubbling out is not climatologically important. It is not clear what would happen, though, were temperatures to significantly increase in the region, or if the water level in Lake Baikal were to drop. Pictured, bubbles of rising methane froze during winter into the exceptionally clear ice covering the lake

Image credit and copyright: Kristina Makeeva

"Bench Tips" by Brad Smith

www.BradSmithJewelry.com

SOLVENT DISPENSER

Frequently, I need to fill a small bottle with alcohol, like the bottle
of an alcohol lamp or a nail polish bottle that I use for the yellow ochre anti-flux. Often I can't find a small funnel and end up spilling almost as much as I get into the bottle. It's wasteful, and the fumes aren't too good for you either.

A neat and inexpensive solution is to use a lab dispensing bottle to store small quantities of the solvents most frequently used. The bottles have a wide mouth for filling and a fine tip for dispensing. You can get a small stream or just a drop or two. With the bottle's fine tip, I don't spill a drop.

A Google search will turn up many suppliers. One I've used is Carolina Biological Supply Company at www.carolina.com The bottle is Catalog #716580 Unitary Wash Bottle, Low-Density Polyethylene, 125 mL US$ 5. They have several sizes and other bottles labeled for specific solvents.

STIFFENING EARRING POSTS

Soldering an earring post will always soften the wire a bit. The easiest way I've found to harden it is to grip it with pliers and twist it a couple of half turns. This work hardens the wire and also tests your soldered joint.

Discover New Jewelry Skills With Brad's "How To Do It" Books
http://amazon.com/author/bradfordsmith

Notes from the Editor

Bob Carnein, Editor

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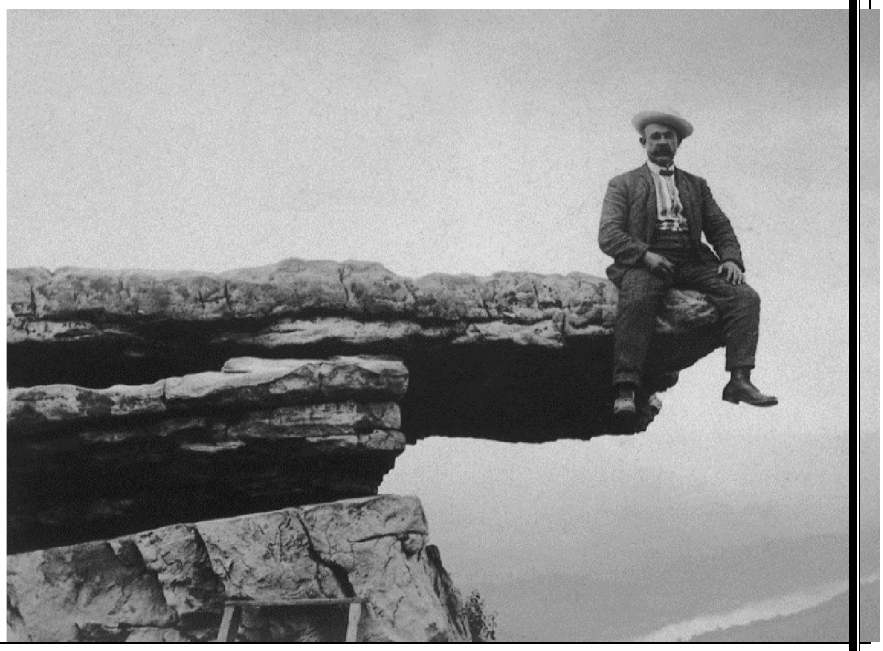

After more than 10 years as Editor, I'm happy to announce that Jerrolynn Kawamoto and Taylor Harper are taking over some of my duties, as of this issue of the Lake George newsletter. They will alternate responsibilities until either one of them quits in frustration or they have a shoot-out at the Iron Tree. I'll continue to edit some of the more technical articles for the foreseeable future. If you would like to submit an article or news item, please copy everything to me and to Jerrolynn (jerrolynn@wildblue.net) and Taylor (tays2930@yahoo.com).

This month, we have two fine articles, one from **Steve Veatch** about a famous painting by a historical figure in geology, and one by **Paul Combs** on types of fossil preservation. As usual, there is also a mineral quiz at the end, along with the answer for last month's quiz. Enjoy, and Happy New Year!!

WHY ARE THERE FOSSILS?
by Paul Combs

First, a definition: “Fossil” comes from a Latin word, ***fossilis***, meaning “something dug up”. It can be any sort of remains or traces of a once-living plant or animal, including a bone, a fossil starfish, an impression of a leaf, objects preserved in amber (or the amber itself), “petrified” wood, coal, or natural gas (yes). That covers a lot. The fossil itself does not need to be preserved as stone, or in stone. Insects preserved in amber are one example of non-stone fossils.

Generally speaking, fossils need to be at least 10,000 years old, although there is disagreement about that arbitrary date. It is also important to remember that the overwhelming majority of life forms never have a chance to be preserved as fossils; only a lucky minority might happen to be in the right place and time. There is also some bias involved: a jellyfish, which is more than 90% water, is much less likely to be preserved than a large, durable item, like a mammoth tooth. Rapid burial is extremely important because it helps to hide the dead organism from scavengers, and it often slows decay by preventing bacteria from attacking the organism. The need for rapid burial is another form of bias, because only a few ecosystems, like river deltas, bays, and swamps, have good conditions for fossilization. Lastly, fossils can be destroyed by erosion, metamorphism, volcanic activity, glaciers, and other processes. The oldest identifiable fossils are simple one-celled creatures around 4.1 billion years old!

There are many ways a living creature can become a fossil, so let’s look at those:

PERMINERALIZATION

This is probably the preservation process that most of us think of first. After a once-living object has been buried, its empty spaces (spaces filled with liquid or gas during life) can become filled with groundwater. Chemicals in the groundwater can precipitate into those empty spaces, eventually hardening into chert, opal, or other common "fills". This can happen in extremely small spaces, including *within cell walls*. Permineralization can leave amazingly detailed fossils for us to find.

(Left) Permineralized wood, Pliocene Goliad Fm.; (right) replacement of brachiopod shells by silica, Pennsylvanian Naco Fm. (Combs photos)

Sometimes, paleontologists use special chemicals to remove the original tissue (usually wood) that might be millions of years old! The ancient wood is always in very bad shape, about the consistency of wet toilet paper. NOTE: When the shell, bone or other tissue has been completely replaced with another chemical, such as pyrite, chert or opal, we use the term **REPLACEMENT**. So you might think of the first part of this section as "partial replacement," which is a term paleontologists sometimes use. There are many cases where mineral replacement was so gradual and detailed that original microscopic features have been preserved!

About 15 years ago, Dr. Mary Schweitzer of North Carolina State University in Raleigh used chemicals to remove the non-organic material from the bone of a 68-million-year-old *Tyrannosaurus rex* named Bob. She was flabbergasted to discover that some of the leftover material was Bob's red blood cells! Not only that, tests showed that Bob was actually a pregnant female Tyrannosaur. No one expected it, but bits of DNA were also preserved, and tests confirmed the theory that birds are the closest living relatives of *T. rex*. Pretty cool. There is a good article about Bob in Smithsonian Magazine online at: **https://www.smithsonianmag.com/science-nature/dinosaur-shocker-115306469/**

CASTS AND MOLDS

In some cases, a once-living object—maybe a whale vertebra—is buried and the sand or mud surrounding it lithifies. But bones are soluble and they can be dissolved by chemicals in the groundwater, leaving a hollow space. This leaves an *external mold* of the bone. If the mold should become filled with another material, it produces a *cast*, which closely resembles the shape of the original vertebra. (Casts do not preserve the fine, internal detail that we find in permineralization.) In another case, sediments can fill the inside of a clam, then harden, producing an *internal mold* as well as an *external mold*. It is very common to find external and internal molds together. Some of you who went on the October 17 fossil trip found external molds or internal molds of brachiopods.

Internal mold of a gastropod (snail) from the Ordovician Manitou Fm. (Combs photo)

I want to tell you about one of my favorite—and possibly the weirdest—external molds. It is the Blue Lake Rhino Cave, discovered near Coulee City, Washington, in July, 1935. About 12 million years ago, a lava flow surrounded the carcass of a male rhinoceros (Genus: *Diceratherium*). Over time, the rhino's soft tissues rotted away and a few bones remained inside the hollow mold. Erosion eventually exposed one end of the mold and you can visit it today, although you would need to climb 300 feet up a steep lava cliff. If you are skinny and fit, you can crawl inside and see features like the rhino's horn and belly button! If you don't want to get your clothes dirty, there is a man-made cast of the rhino on display at the University of Washington's Burke Museum in Seattle. Or you can save your money and see a good article with photos at: **http://historylink.org/File/9409**

ADPRESSION (COMPRESSION-IMPRESSION)

Virtually all fossils undergo compression, so this term can be misleading. What we are really talking about is the removal of the complex organic molecules that were originally in the organism's tissues. Usually, all that remains is the carbon that is contained in all known life forms. These fossils almost look like black-and-white photographs and they can be extremely detailed. The leaves, flowers and insect fossils in Florissant Fossil Beds are preserved this way. Very often, the lower half of the fossil contains the carbonaceous film (the ***compression***) and the upper half is only an ***impression***.

Carbon film of a flower from the Green River Fm. (Eocene). (Combs photo)

Many of you might be interested to know that the colors in birds' feathers are created by microscopic bead-like structures called melanocytes. Melanocytes are mostly carbon and they are very durable. A few years ago, Jakob Vinther, a Danish PhD student at Yale University, noticed melanocytes in the ink sac of a fossil squid (many animals have melanocytes). So he decided to check other fossils. Sure enough, he found them in fossil bird feathers. Since the shape of the melanocytes determines the color of the feather, it has been possible to recreate the colors of many fossil birds. Many feathered dinosaurs have been found and some of their colors have been determined, too. This information has already been used in books, museum models and the "Jurassic Park" series of movies! There are many articles and papers on this subject, and here is one:
https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=111902

BIOIMMURATION

(*Immuration* has been in use in the English language since at least the 16th century and it means "to wall in or enclose".) *Bioimmuration* means that an organism has been overgrown by another organism that has preserved an imprint of it, although in negative form. An oyster that grows on a clam might preserve an impression of the clam shell on that side. This happens in the ocean today. More rarely, one object might preserve another object within itself by growing completely around it. In another

example, sponges and other life forms tunnel into clam shells, rocks, wood, and other protective surfaces. Those tunnels are examples of bioimmuration, but they are also considered by some to be trace fossils, not true fossils. (See next paragraph)

TRACE FOSSILS

Trace fossils (properly called *ichnofossils*) mostly consist of tracks, tunnels, burrows, coprolites (fossil feces) and various kinds of marks left by living organisms. Trace fossils were recognized in the early 1800's as significant clues to behavior, diet, locomotion, and more. They can even tell us about animals that left no body fossils at all, but dug tunnels and burrows.

Trace fossils: (left) dinosaur trackway in Cretaceous Dakota Fm. near Morrison, Colorado; (right) tunneling in a Cretaceous oyster (on left). (Combs photos)

Ichnofossils can tell us many things that body fossils cannot, but they can tell us even more when they are combined with information from body fossils. For instance, we are now able to calculate how fast many dinosaurs walked or ran, and we know whether they walked on two legs or four (a few did both). Their coprolites tell us what they ate, and—sometimes—whom. A few times, paleontologists have discovered which animal killed another animal by matching the killer's tooth marks to a body fossil. **Dinosaur CSI!**

A few years ago, paleontologists working in Inner Mongolia discovered the remains of food that adult dinosaurs had chewed up and spat out for their youngsters to eat at the nest! Florissant Fossil Beds has leaf fossils with notches that show were caterpillars had eaten 34 million years ago. In North America, nearly one new dinosaur track site (one or more tracks) is discovered each week. Colorado is famous for its many dino track sites. Maybe you'll get lucky! As the weather warms, I hope to take interested club members to look at the tracks (and bones) at the famous Dinosaur Ridge site, near Morrison. There are other good track sites near Cañon City, La Junta (about 1,400 tracks), the famous Johnson Farm site near St. George, Utah, and all over the Colorado Plateau. Here is the Johnson Farm web site: **https://www.utahdinosaurs.com/**

RESIN (AMBER)

Fossil resin (amber) is preserved plant sap, and it has earned its own category in the discussion of fossil preservation. Botanists think that plants, and especially some trees, exude resin to protect themselves from insect pests, or as a "scab" during healing. Our local evergreens exude a lot of resin when they are under attack by the fungus carried by pine beetles. This happens in summer, and many objects can become trapped in our local sap, including insects, pollen, leaves, and more.

Fossil resin can also contain those items, along with bacteria, fungi, spiders, and even small vertebrates (tree frogs, lizards, etc.). Small fragments of DNA can be preserved in the critters that are trapped in resin, which gave Michael Crichton the idea to write his 1990 science-fiction book, "Jurassic Park". Here in Colorado, tiny amounts of fossil resin sometimes occur in coal (a chemical fossil), including bituminous coal outcrops near Walsenburg. Amber is not a chemical fossil because it nearly always retains its original chemistry, but some workers would say it is also not a "true fossil" because it

is not a once-living organism. Here is a website about ground-breaking resin fossils: **http://www.eartharchives.org/articles/trapped-in-time-the-top-10-amber-fossils/**

SUBFOSSILS

Some workers use the term "subfossil" for any organic remains, including such objects as bones, bird's nests, Neanderthal spears and animal defecations, whose fossilization process is not complete, either because they are less than 10,000 years old, or because they are in a location that is not good for fossilization. Subfossils are often discovered in dry caves and rock shelters where they might be preserved for thousands of years. (One famous example is the hide, bones, and some muscle fibers of a giant ground sloth called *Northrotheriops shastensis* that died in a lava tube at Aden Crate, New Mexico and was mummified. It is on display at Yale's Peabody Museum of Natural History in Hartford, Connecticut.) Scientists often disagree about the exact definition of a subfossil, but that argument is usually found in the footnotes and fine print. The really important part is the information the object can give us. Desert USA has a good article about the discovery of the *Northrotheriops* ground sloth at: **https://www.desertusa.com/animals/shasta-ground-sloth.html**

CHEMICAL FOSSILS

People don't often think of some chemical fossils as fossils at all, but this category is where we find crude oil, coal, natural gas, oil shale, and a few rare examples. All of them are strong evidence for ancient life, even though only the coal contains visible fossils. Basically, these fossils are composed of chemicals that can only be produced by once-living creatures. The oldest traces of life on Earth are chemical fossils. The carbon adpressions mentioned above are also chemical fossils, so they belong in two categories. In 2014, NASA announced that the *Curiosity* and *Opportunity* rovers on Mars would begin searching for chemical fossils on the Red Planet! In northwest Colorado and nearby states, our famous oil shale, which formed in a very large lake around 52 million years ago, contains a potentially valuable chemical fossil called *kerogen*.

Chemical fossils: (left) kerogen shale from the Piceance basin of northwestern Colorado; (right) close-up of bituminous coal. (Combs photos)

PSEUDOFOSSILS

New fossil collectors always hate pseudofossils because they look like fossils, but aren't fossils at all. On the other hand, some people like to collect them, even though they aren't fossils. These are visual patterns in rocks that are produced by *geological processes* rather than *biological processes*. Manganese dendrites are probably the classic pseudofossil, and they resemble carbonized plant material. I saw another pseudofossil, a septarian concretion, at the December club meeting. These tricks of Mother Nature can occur in almost any type of rock, including rocks that contain real fossils. Moss agate, cone-in-cone structures, concretions, stylolites, and many other structures might be mistaken for real fossils, and it takes a bit of practice to recognize all of them.

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Duria Antiquior: A Nineteenth-Century Forerunner of Paleoart

by **Steven Wade Veatch**

In a breath of inspiration in 1830, English geologist Henry De la Beche (1796–1855), while exploring new intellectual territories in the emerging fields of paleontology, painted *Duria Antiquior* (meaning “a more ancient Dorset”), a representation of a prehistoric Dorset coast. De la Beche’s work was groundbreaking—his artwork combined science and art in the first artistic rendering of a paleontological scene, while laying bare the secrets of the past. Before 1830, art depicting the prehistoric world did not exist, and these realms were unknown to the public (Porter, n.d.). While it is true that scientists made drawings of fossil animals and exchanged them with each other in private letters, the public had no concept of how prehistoric animals looked. This painting opened people’s imagination to new visions, thoughts, and beliefs.

Fig. 1. *Duria Antiquior*. A watercolor painted in 1830 by Henry De la Beche, who conjured up a vivid picture of an ancient world. *Duria Antiquior* is now in the National Museum of Wales. Image is public domain).

De la Beche's painting also laid the foundation for a new genre that would later be known as *paleoart*, an artistic genre that reconstructs prehistoric life according to the fossil record, scientific understanding, and artistic imagination. De la Bache's brushstrokes of prehistoric time included (literally) all the information known at that time about ancient life and soon became the first teaching graphic used in the classrooms of the Golden Age of Geology, a period from 1788 to 1840 (Clary R. M., 2003). Today, this graphic would be equivalent to a PowerPoint slide in a classroom.

De la Beche's *Duria Antiquior* brings the viewer face-to-face with creatures that once lived in a coastal sea where these animals fought a deadly battle for survival, a typical theme of nature in the Regency era (McGowan, 2001). The scene is remarkable: a toothy ichthyosaur bites into the long neck of a plesiosaur, while another plesiosaur tries to grab a crocodile on the shore (De la Beche's ichthyosaur is minus the triangular dorsal fin and vertical tail fin that, from later fossils found in Germany, we now know it had). A turtle quietly dives into the water. What would become coprolites (fossil excrement) drop from a terrified plesiosaur (Davis, 2012). Other creatures patrol the deep waters for food, while two pterosaurs dive toward each other in the sky. Belemnites appear like squids. Hollow ammonite shells rest on the bottom of the sea, and crinoids (sea lilies) are portrayed in the lower right corner. Groves of palm trees grow on the shore. All of this is rendered through the painter's use of a restrained palette of browns, greens, and blues.

Another striking feature of the painting is how it is divided. The water line reveals the action above and below the water's surface (Rudwick, 1992). The *Duria Antiquior* is the first example of what is known as an *aquarium view* that would become a Victorian trend several years later (Clary & Wandersee, 2005). The area above the water line is further divided into two areas of activity—action on the land and in the sky. De La Beche wanted the viewer to be convinced of his portrayal of a prehistoric scene.

De La Beche based the *Duria Antiquior* on fossils found by Victorian fossil collector, Mary Anning (1799-1847), along the Dorset coast near the resort town of Lyme Regis (Brewster, 2016). Anning was from a poor family who frequently found themselves on the far side of desperate. To ease these brutal financial circumstances, the family earned money by collecting and selling fossils. When they were children, her father would take Mary Anning and her brother, Joseph, fossil hunting by the fossil-rich cliffs near Lyme Regis. They returned home with fossils and, with superior skill, cleaned and prepared them, and then sold them to tourists as curios. Anning, aged 11, continued the family business after her father died of tuberculosis and heavily in debt.

By 1830, Anning was a celebrity among the leading constellation of British geologists for her knowledge and skill in collecting and preparing fossils (Cadbury, 2000). Anning is credited with finding the first ichthyosaur skeleton to be recognized and the first two plesiosaur skeletons ever found. Her discovery of these marine reptiles had created a sensation in the scientific community (McGowan, 2001).

Anning frequently found herself in financial straits due to harsh economic times in Britain, and the unpredictability of finding and selling fossils. Being strapped for money restricted her ability to find fossils. De la Beche wanted to keep her in the field hunting fossils. To that end, he arranged to have prints of *Duria Antiquior* made and then sold the copies for £2 10s (approximately £213 or $279 today) each (Rudwick, 1992). De la Beche gave the profits—with great enthusiasm—to Anning, so she had more time to hunt for fossils and seashells along the seashore. The painting was a smashing success, and, to meet the enormous demand for the prints, the *Duria Antiquior* was reprinted and redrawn several times.

The *Duria Antiquior* pushed the boundaries of science and art at the end of the Regency period in Britain. This avant-garde watercolor became the first scene of prehistoric animals interacting with each other in their ancient environment, all based on known science at the time. This was the earliest such art to be widely distributed and helped shape the understanding of prehistoric life on Earth.

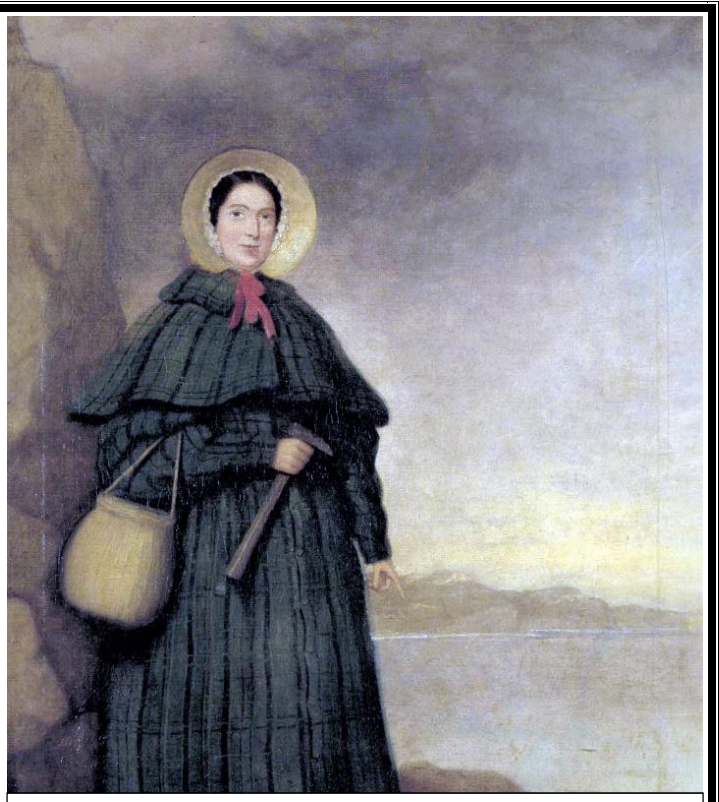

Fig. 2. Portrait of Mary Anning. This painting was owned by her brother, Joseph, and given to the Natural History Museum, London, in 1935 by Mary's great-great niece, Miss Annette Anning. (Image is public domain).

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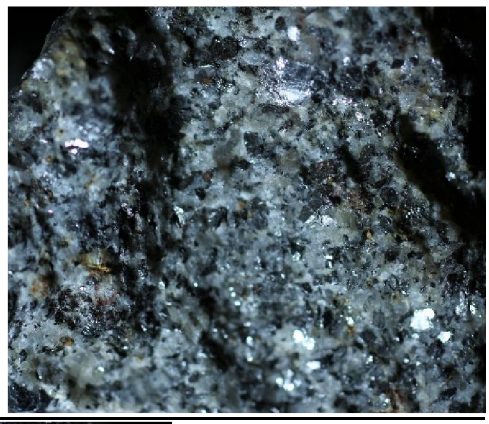
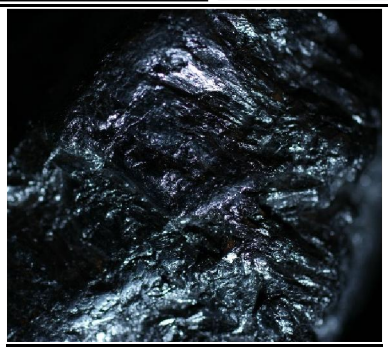
Monthly Mineral Quiz

Last Month's Mineral: Phenakite.

Composed of beryllium silicate (Be2SiO4), phenakite is a relatively rare mineral that occurs in small amounts in many pegmatites, including those of Mt. Antero. Although it has a fair to good cleavage, its high hardness (71/2 to 8) and transparency make it a good gemstone. Most gem phenakite comes from the Mandalay region and Shan state, Myanmar and the Jos plateau of Nigeria, but there are many other localities. It can usually be distinguished from quartz, which it resembles, by its rhombohedral crystal habit (the terminations on the crystal shown), lack of horizontal striations, and "drill-bit" twinning (where shown; see last month's newsletter).

This Month's Mineral





This month's mineral occurs as small, metallic gray flakes embedded in rock (as in the left and center photos above, a specimen from New York) or as foliated masses (as in the right photo, a specimen from Sri Lanka). It's an important industrial mineral, though a significant amount of the annual production is synthetic. It is easily scratched with a fingernail, has a black streak, and has a very low density, compared with most minerals. It's a common accessory mineral in metamorphic rocks, especially marbles and schists. What is it?

Lake George Gem & Mineral Club

Box 171, Lake George, Colorado 80827

www.LGGMClub.org

MEMBERSHIP APPLICATION

Date: _____/_____/20____

Name/s _____

Address _____ City _____ State _____ Zip _____

Telephone ( ) _____ - _____ E-mail _____

(Email is required to receive Newsletter and field trip info.)

Names/ages of minor members (if family membership): _____

_____

Dues for Jan. 1 through Dec. 31 each year are as follows:

____ Individual (18 and over) $15.00

____ Family (includes dependents under age 18) $25.00

Current year membership renewal and application occurs Jan. 1-March 31, after which membership is closed for the current year. Membership/email list will be purged April 1st for the current year.

MEMBERSHIP MUST BE CURRENT TO PARTICIPATE IN ANY FIELD TRIP OR CLUB CLAIM!

I agree to abide by Club constitution, by-laws, and rules regarding field trips and club claim visits.

Signed _____ *Date:* _____/_____/_____

*I am or have previously been a member of Lake George Gem & Mineral Club. Yes ___ No ___

***My interest areas** include (check all that apply): Minerals ____ Fossils_____ Lapidary _____

Micromounts ____ Colorado geology _____ Pebble Pups (ages 7-17) ____ Mining history _____

Crystallography _____ Other _____

***I am willing** to give a talk/presentation to [the Club] or [Pebble Pups] on _____

and/or lead a field trip to (list) _____

***I am willing** to participate/help in the following ways (can choose more than one): Club Officer _____

Newsletter Editor/Writer _____ Local Show/Show Committee _____ Nominating Committee _____

Winter Programs Committee _____ Field Trips ____ Art (Badges) ____ Membership Coordinator _____

Website assistance _____ Pebble Pups _____ Other (be specific): _____

Questions about the Club or Activities? Visit the website *or* contact a Club Officer. Updated 1/2018

Lake George Gem & Mineral Club
PO Bo 171
Lake George, CO 80827

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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).

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