The Lake George Gem and Mineral Club -

Club News,
March, 2011

Regular Meeting of the Lake George Gem & Mineral Club
Saturday, March 12, at 10:00AM
Lake George Community Center

Pete Modreski, LGGMC Member and Geologist for the USGS will give a presentation regarding "Pegmatites in the northern part of the Pikes Peak Batholith". Pete has studied this group of pegmatites extensively over the years and will share some of his insight and experience with us. This presentation may turn out to be very useful for those of us planning to make collecting trips to our LGGMC Patience Claim near Wigwam Creek.

We don't normally hold a field trip as early as March, but if the weather happens to be good that day, anyone who'd like to could join Pete on a visit to the White Cloud Pegmatite Mine area after the meeting. It's about a one and a quarter hour drive to the area northeast of Deckers. The hike up to the mine takes about 40 minutes and only about 20 minutes coming straight back down.

Coming Events

USGS Rocky Mountain Seminar Series: "Last Interglacial Sea Level and Global Warming: A Lesson fro the Future?" by Dan Muhs, 10:30AM, Bldg. 25 Lecture Hall, Denver Federal Center	… **March 8**
Columbine Gem & Mineral Society monthly meeting, 6:30PM, Mt. Shavano Manor, 525 W. 16th (at J St.), Salida	… **March 10**
Colorado Springs Mineralogical Society monthly meeting, 7:30PM, Colorado Springs Senior Center, 1514 N. Hancock.	… **March 17**
Pueblo Rockhounds monthly meeting, 7:30PM, Westminster Presbyterian Church, 10 University Circle.	… **March 17**
Fort Collins Rockhounds Gem & Mineral Show. Thomas M. McKee Bldg., Larimer Co. Fairgrounds, 5280 Arena Circle, Loveland.	… **March 25-27**
Colorado Mineral & Fossil Show (spring), Denver, Holiday Inn, 4849 Bannock Street. Free parking and admission.	… **Apr. 22-24**
Rocky Mountain Federation of Mineralogical Societies 2011 Convention and Show, hosted by Colorado Springs Mineralogical Society; call 316-742-3746 or 719-488-5526 or visit the website for information.	… **June 24-26**

Annual Continental Divide Tailgate (CONTINTAIL), Buena Vista Rodeo Grounds; call 720-938-4194 for information. ... **Aug. 12-15**

Lake George Gem & Mineral Club Annual Mineral Show, next to the Lake George Post Office. Free parking and admission. (Jump Start begins Aug. 16) ... **Aug. 19-21**

Club News

We were all shocked to hear of the sudden death of member **Ross Krummel**, of a heart attack, on February 21. Our condolences go out to his family, including his wife Marilyn.

Welcome, New Members:
Scott Ethridge (Florissant)
Linda Laverty (Colorado Springs)
Carol MacCauley (Colorado Springs)
Nick and Melgoza Morales (Colorado Springs)
Ani Petkus (Florissant)

❄❄Vice President and field-trip director **Dan Alfrey** already has a great field-tip line-up for the coming summer. Here's the latest list; please visit our website often for updates, and, remember, you must be a Lake George Gem & Mineral Club member to attend trips. **Please remember to pay your 2011 dues—still a bargain at $15 for individuals or $25 for a family; a membership form can be found at the back of the newsletter.**

May 14: Forever mine (9AM)
May 28: Patience club claim (8AM)
June 11: Spruce Grove interclub trip (with Denver Gem & Mineral Guild) (tentative)
June 18: Pebble Pups interclub trip to Leadville (with Colorado Springs Mineral Society and FMC)
June 18-19: Last Chance mine (Creede) (tentative)
July 9: Petra Placer (9AM)
August 27: Hartsel (not barite!)
September 10: GeoStudy presentations (Alma)
October 1: Patience club claim (8AM)

❄❄.Twenty-eight members and guests attended the February 12 meeting, including guests **Jan and Barney McCavy** of Woodland Park. Several of **Marge Breth's** watercolor paintings were on display. President **John Rakowski** announced that planning for the August mineral show if progressing, and **Dick Lackmond** noted that the Woodland Park show is now filled. **Steve Veatch** will present the Alma Project at the Pikes Peak Historical Society meeting at the Florissant Library on April 17 at 2PM. **Willie Hofmeister** will take over as leader of the lapidary workshop (see below), with **Connie Hofmeister** and **Dick Lackmond** as back-ups. Several people volunteered to help out at the Dinosaur Resource Center's Earth Day activity on April 23. Vice President **Dan Alfrey** asked for field-trip suggestions, including trips that don't require long hikes over difficult terrain. The business meeting was followed by a video titled "The New Crystal Hunters, documenting 3 students collecting at the Smoky Hawk claim with **Joe, Scott, and Tim Dorris**. It gives a great overview of how minerals occur in the Crystal Peak area and how the specimens are recovered and cleaned.

❄❄.An agreement has been signed with **Mountain Aspen Granite Company**, to set up our new Lapidary Workshop at their facility just east of the Safeway in Woodland Park. The space

will be available until they move their business in about a year and a half. Our insurance is in place, and we will set up the equipment later in March. **Willy Hofmeister** notes that we could use wet grinders and polishers, a band saw, or any other spare equipment that you may have. If you want to donate equipment or have a lead on something, call Willy at 719-687-2620.

❄❄ Dick Lackmond sent along a link for a site on how to cut and polish sunstone from Oregon. It's: http://customgemstonestudio.com/photos-a....ng-in-sunstone/

❄❄ The program for the May 14 meeting will be Amanda Adkins of *Colorado Rocks!*, talking about "Examples of Colorado Prospecting, Gems, and Locales. After the meeting, we'll once again visit **Frankie and Townsend Wolfe's** Forever Mine claim.

❄❄Here are the latest "Bench Tips" from Brad Smith.

MODIFY TOOLS FOR PRONG SETTING

When setting stones in a prong mount, avoid slipping by grinding a groove in the face of your prong pusher or one jaw of your flat-nose pliers. Easiest way to cut the slot on the pusher is with a file., and the easiest way to cut the slot on your pliers is with a cutoff wheel in the Foredom or Dremel.

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SANDING DISKS

One of the flexshaft tools that saves a lot of time is the snap-on sanding disk. I mainly use the medium and fine grits but sometimes need the very fine ones sold for working with platinum.

Ordinarily, you'd think of placing the disk on the mandrel with the grit side facing away from your hand, but notice that you end up with your elbow up in the air. Instead, try flipping the disk so that the grit side is towards your hand. It's a much more comfortable pose because the elbow is down near your side, and it gives me a better view of what I'm sanding.

I use these snap-on disks so frequently that I keep multiple mandrels with different grits already mounted in the bur stand. Some mandrels have the grit facing out and some facing in.
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More **BenchTips by Brad Smith** are at: groups.yahoo.com/group/BenchTips/
or: facebook.com/BenchTips

Pebble Pups Corner

Pebble Pups will meet at the usual time: 6PM, March 8, at the Lake George Community Center. After canceling because of foul weather in February, we'll try again with a presentation by **Bob Carnein**, a repeat of his June presentation on **"Fluorescent Minerals"**, which most of the kids missed the first time. If you know interested children or home schoolers, please urge them to attend! Adults are welcome to sit in. Call **Steve Veatch** at 719-748-5010 for more information.

Steve Veatch reports that Pat Hill, of the Ute Pass *Courier* wants to do an article on the Pebble Pups. Steve also is working with Pebble Pups Junior **Patrick Glover** on an article about

Chinese spessartine and smoky quartz, which will appear here later. They hope to publish the article in an English scientific magazine.

Dan Alfrey has arranged for Chris Peterson to talk about meteors and fireballs at the May 10 meeting.

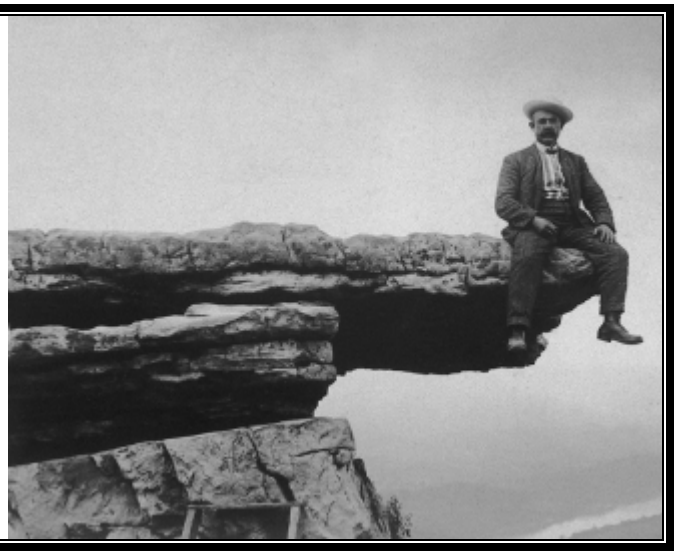
Many thanks to **Dick Lackmond** and **Dave Harvey**, who donated samples of Columbine blue agate from South Park, for use by the Pebble Pups.

Notes from the Editor

Bob Carnein, Editor

ccarnein@gmail.com

719-687-2739



This month, I'm continuing an occasional series of articles on minerals of the Mohs Hardness Scale. We looked at fluorite (number 4) a couple of months ago; this time, we'll look at talc, which is number 1.

Tabular Talc

by Bob Carnein

Introduction.

Talc is best known to collectors as mineral number 1 on the Mohs hardness scale and as the main ingredient in talcum powder. Central Colorado collectors rarely see it and aren't likely to recognize it, because talc occurs mainly as an alteration product or as pseudomorphs replacing other minerals (Figure 1). Alteration products are usually fine grained mixtures that require sophisticated analytical techniques, such as examination with a petrographic microscope, for identification. The closest occurrences of talc to Lake George, as listed in Eckel (1997), are in the Montezuma district of Park and Summit counties.

To those familiar with minerals, the name *talc* is one of those oddities that don't seem to obey the general rules of naming. This is because the name has ancient origins, probably deriving from an Arabic or Persian word, *talq*, *talg*, or *talk*, meaning "mica". When talc occurs in large grains, it resembles mica, with its flaky crystals and single direction of cleavage (Figure 2).


Figure 1. Talc pseudomorphs after quartz (left) and anthophyllite (right) (webminerals.com; Wikipedia.org)

In ancient times, impure, fine grained talc, now called *steatite* or *soapstone*, was often used for carving sacred or ornamental objects. It's still used by many artisans because of its softness and lack of brittleness. Chinese, Inuit, and African soapstone carvings, both ancient and modern, are readily available for purchase. Technically, much Chinese soapstone (agalmatolite) is, in large part, the closely related, slightly harder mineral *pyrophyllite* (per-ahf'-fill-ite) (Figure 3) (Mineral Information Institute; www.mii.org). Although most soapstone is a mixture of talc and other minerals, the term is sometimes used for dense aggregates of any soft silicates, including serpentine, chlorite, etc.

Talc and pyrophyllite have many properties in common. Both are assigned to the triclinic crystal system but rarely or never form distinct crystals. Both have one direction of perfect cleavage, and both occur as flexible (but not elastic) sheets or folia and in radiating groups or compact masses. Both are very soft (H=1 to 2), feel slippery, and will mark cloth. Both have a pearly to greasy luster, and both occur in a variety of colors—mainly white, tan, or some shade of green. As you might guess, the two minerals are hard to distinguish without the aid of X-ray diffraction or microscopic techniques.


Figure 2. Typical talc specimens (gccaz.edu; Amethyst Galleries)

Structure of Talc and Pyrophyllite.

Phyllosilicates.

Why are talc and pyrophyllite similar? Warning: ***This isn't a simple question***. Both species, along with serpentine, the micas, and the clay minerals, belong to a group of silicate minerals called *phyllosilicates* (fill-oh-sill'-ick-ates) (from the Greek *phyllon*, leaf). The "leaf" part

Figure 3. Pyrophyllite from Georgia (left); Chinese "qing tian stone" carving (right) (aarockshop.com; ChineseArts.com)

of the name reflects the fact that these minerals are made up of sheets of ions and have a flaky or platy habit, with a single cleavage parallel to the flat surfaces of the sheets.

Siloxane Layers. All phyllosilicates consist of compound (usually 2- or 3-part) sheets. One sheet is built up of SiO_4 units called *silicate tetrahedra*. A SiO_4 tetrahedron consists of one Si^{+4} cation surrounded by 4 oxygen anions (O^{-2}) (Figure 4). The resulting $(SiO_4)^{-4}$ units join (by sharing adjacent O^{-2} ions) to form continuous sheets (called *siloxane sheets*) (Figure 5). **Notice that each tetrahedron in the sheet has an unshared O^{-2} ion at its apex**. This becomes important later.

Although a siloxane sheet consists of nearly infinite numbers of joined $(SiO_4)^{-4}$ tetrahedra, its composition reduces to Si_2O_5 or Si_4O_{10}. Notice that, because Si has a +4 charge and O has a -2 charge, the siloxane sheet itself has a charge. If you combine 2 Si^{+4} and 5 O^{-2} ions, the overall charge of the Si_2O_5 sheet will add up to -2 (+8, -10). Minerals must be electronically neutral (the positive and negative charges must balance), so $(Si_2O_5)^{-2}$ can't, by itself, be a mineral—it has to combine with something with a positive charge to neutralize its negative charge.

Brucite and Gibbsite Layers. The negative charge of the siloxane layer is balanced by another, different kind of sheet. In talc, it starts with a magnesium ion (Mg^{+2}) surrounded by 6 hydroxyl ions $(OH)^-$. The combination produces a tiny, 8-sided unit called an *octahedron*. The Mg-OH octahedra can join together to form sheets (called *octahedral layers*), as shown in Figure 6. Notice that some $(OH)^-$ ions are shared between adjacent octahedra. As a result of this sharing, the ratio of Mg^{+2} to $(OH)^-$ reduces to 1:2, making a layer with the formula $Mg(OH)_2$. By themselves, these layers are called *brucite sheets*, for the mineral brucite (Figure 7).

Similar layers can be made with Al^{+3} and $(OH)^-$ ions. In this case, the sheet's composition is $Al(OH)_3$—the mineral *gibbsite* (Figure 8). Notice that both brucite and gibbsite are minerals—each is electronically neutral (try adding the charges up for yourself!). As you might expect, both minerals occur as platy crystals with a single cleavage parallel to the flat surfaces of the sheets (Figures 7 and 8).

Figure 4. Model SiO4 tetrahedron. The Large balls represent oxygen; the small Ball represents silicon. (Carnein photo)

Figure 5. Model siloxane sheet. (Carnein photo)

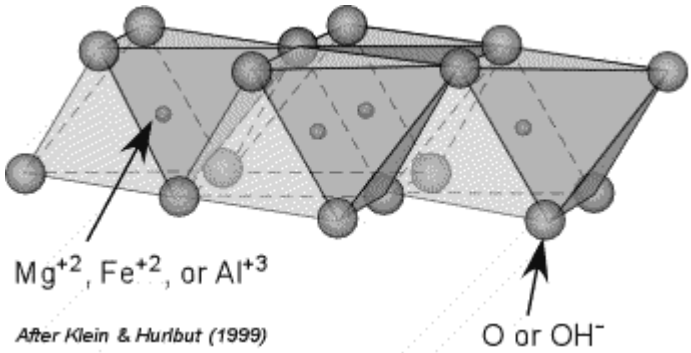


Figure 6. Arrangement of octahedra in octahedral layer. (Tulane.edu)

Figure 7. Brucite. (thunderhealing.org)

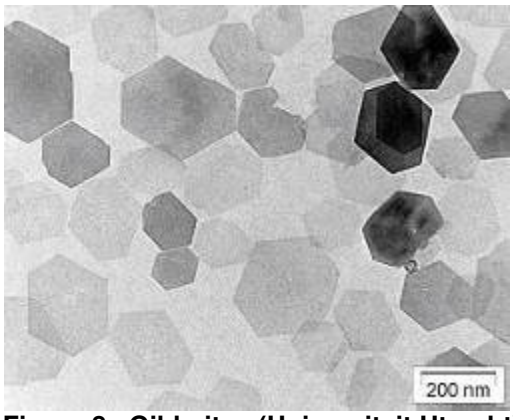


Figure 8. Gibbsite. (Universiteit Utrecht)

Composite Sheets. Since brucite [$Mg(OH)_2$] and gibbsite [$Al(OH)_3$] are both already minerals, the next logical question is "Why do they combine with siloxane [$(Si_2O_5)^{-2}$] to make composite sheets?" It turns out that the spacing of the $(OH)^-$ anions on the top (or bottom) of

the brucite and gibbsite sheets is nearly identical to that of the unshared oxygens at the apices of each SiO_4 tetrahedron in the siloxane sheet. This makes it possible for a siloxane sheet to "plug into" a brucite or gibbsite sheet by substituting each unshared oxygen (O^{-2}) for a hydroxyl $(OH)^-$ (Figure 9). It turns out that, when this happens, the result is a neutral compound: $Mg_3Si_4O_{10}(OH)_2$ if the octahedral sheet is brucite, or $Al_2Si_4O_{10}(OH)_2$ if it's gibbsite. The minerals with these formulas are talc and pyrophyllite, respectively.

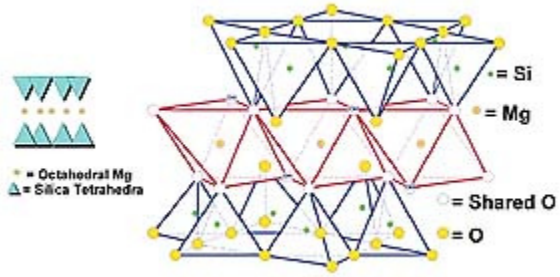


Figure 9. Composite sheet structure in talc. (rtvanderbilt.com)

The same kinds of substitution result in building all phyllosilicate structures—not just talc and pyrophyllite but also the micas (biotite, muscovite, phlogopite, lepidolite, and margarite), the chlorites, the clays, and the serpentine group. Except for serpentine, all of these have obvious properties related to their layered structures. They occur as flat, platy crystals with a plane of weakness (cleavage) parallel to the sheet structure. **An understanding of their structures goes a long way toward explaining their properties**.

Uses.

Talc and pyrophyllite have similar properties and similar uses. Because it's softer, talc is preferred for many uses (especially cosmetics) and commands a higher price. Besides talcum powder, finely ground talc (and pyrophyllite) is used in paints, ceramics, insecticide dusts (where the active ingredient sticks to the dust particles), paper, and foundry facings (they prevent molten metal from sticking to the mold). Surprisingly, there is currently a market for soapstone for countertops and floor tiles—it's a great material for the manufacturer but not so great for the consumer looking for durability! Most of this material is imported from Brazil, India, or Canada, though there are a few US producers. Soapstone also makes great wood stoves, because the stone holds and radiates heat evenly.

The next time you think about the minerals of the hardness scale, remember that mineral number 1 provides an excellent example of how a mineral's physical properties reflect the internal structure of ions and molecules in its make-up. Also, remember that talc and its buddy pyrophyllite are both used for all kinds of industrial applications besides artistic carvings and baby powder!

References

Eckel, E.B., 1997, *Minerals of Colorado*, updated and revised by R.R. Cobban, *et al.*: Golden, CO, Fulcrum Publishing.

Ford, W.E., 1932, *A Textbook of Mineralogy…by E.S. Dana*: New York, John Wiley & Sons.

Klein, C., and C.S. Hurlbut, Jr., 1999, *Manual of Mineralogy (after J.D. Dana), 21st Edition, Revised*: New York, John Wiley & Sons, Inc.

DUES ARE DUE! DUES ARE DUE! DUES ARE DUE! DUES ARE DUE!

Lake George Gem and Mineral Club
Box 171
Lake George, Colorado 80827
LGGMClub.org

2011 MEMBERSHIP APPLICATION

Name(s) _____

Address _____City _____State __ Zip _____

Telephone ( ) _____ - _____ E-mail _____

Names and ages of dependent members: _____
_____

Annual membership - dues Jan. 1 through Dec. 31 are as follows:

- Individual (18 and over) …….. $15.00
- Family (Parents plus dependents under age 18) ……. $25.00

Annual dues are due on or before March 31. Members with unpaid dues will be dropped from the roster after this date. **Any new member joining on/after August 30 shall pay one half the annual dues.**

I hereby agree to abide by the constitution and by-laws of this club.

Signed _____ Date: ____/____/____

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

My interest areas include:
Minerals __ Fossils__ Lapidary __ Micromounts __
Other _____

I would be willing to demonstrate any of the above for a club program or educational activity? If yes, which: _____

Please indicate which of the following activities you might be willing to help with:

Writing _____ Editor _____ Mailing _____ Local shows _____

Club Officer _____ Programs _____ Field trips _____ Refreshments _____

Questions about the club or club activities? Contact John Rakowski (719) 748-3861

Rev. Jan. 2011

Lake George Gem and Mineral Club
P.O. Box 171
Lake George, CO 80827

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 an opportunity to learn about earth sciences, 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 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 10:00 AM. From April through September, we meet at 9:00 AM, 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).

Our Officers for 2011 are:

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

Dan Alfrey, Vice President
PO Box 4164
Woodland Park, CO 80866
719-440-6234
alfreydan@aol.com

Wayne Johnston, Treasurer
207 Cooper Lake Drive
Divide, CO 80814
719-687-6067
wjohnston719@msn.com

Charlene DeVries, Secretary
280 Homestead Rd.
Divide, CO 80814
719-686-1822
dave.devries@verizonbusiness.com

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