This is the Hope Diamond, all 45.52 carats of it, as it sits in the Smithsonian. The WCGMC was not able to acquire this piece for its Christmas gift program for members, but you might really regret not coming to the party on December 12th for your free gift! (see page 4 for more on the Hope Diamond.)

Website
http://www.wcgmc.org/

ALWAYS LOOKING FOR PLACES TO DIG

One of the NYSGA symposium field trips included a visit to the Gouverneur Talc Company No. 4 Quarry (Valentine deposit) outside Harrisville, NY. We collected the skarn minerals while discussing the geology (see page 3).

Upcoming Events
Christmas Party and Feast
Friday December 12th
6:00 PM, First Presbyterian Church, Newark, NY
• Club will provide meat, potatoes, drinks, and table settings
• Please bring a dish to pass
• GIFTS! Club will provide all who attend with a hobby related gift

IMPORTANT: RSVP to Eva Jane before Dec. 9th to permit a total head count for meat and gifts: gwexteriar@gmail.com or 315-594-8478

Upcoming 2015 Meetings
7:00 PM, First Presbyterian Church, Newark, NY

Friday January 9th
Program by Stephen Mayer
"Stratigraphy and Paleontology of the Jaycox Shale Member, Hamilton Group of the Finger Lakes Region of New York State" … or …
… in other words, a scientific examination of what it means to collect fossils at Green's Landing and Deep Run.

Friday February 13th
Program by Fred Haynes
"WCGMC field trips of 2014, A Review in Pictures"
If you attended any trips in 2014 come see yourself or the minerals/fossils you collected. If you did not attend any 2014 trips come and see what you missed!
Winter is coming to upstate New York so I decided to take us to the desert for this month’s column, specifically to the large, generally flat dry lake beds of Death Valley National Park in California. For decades scientists have observed large rocks strewn about the playa surface and speculated about how they got there. Often they are found with long, sometimes curved tracks suggesting movement across the desert surface.

After more than seventy years of attempts to solve the mystery of the sailing stones, Boise State professor Dr. Brian Jackson and his colleagues finally caught the stones in action this past year. As the stones can be dormant for decades, Dr. Jackson installed weather stations with cameras and fit 15 stones with sensitive motion-activated GPS units.

His work was rewarded last December as a complex set of conditions set the stones into motion. First, rain coated the playa surface with a layer of water. As nighttime temperatures drop, the “pond” froze to form thin sheets of ice, thin enough to move freely but thick enough to maintain strength. The following morning, the ice began to melt and break up into large floating panels, themselves buoyant above the mud surface despite the large rock atop them. Light winds drove across the playa, pushing the rocks in front of them and leaving trails in the soft mud below the ice rafts. The GPS and observation cameras revealed that winds on the order of 3-5m/second (~8-10 mph) caused the movement and the rock laden ice rafts moved about 2-6 meters per minute. Who says geology is not interesting!

In the past, many theories were proposed to explain how rocks, some as heavy as 700 pounds, could slide or sail across the dry lake bed creating a furrow or trail in their wake. Hurricane force winds and muddy playa surfaces were suggested. Slick algal mats present during rare wet periods and thick ice accumulations were also proposed, but experiments and models developed with these ideas could not duplicate the phenomena. Furthermore, it did not seem reasonable that roving herds of pronghorn antelope had entertained themselves by pushing stones around while no one was watching. Besides there were no hoof prints!

Reference:

The Minerals of the Valentine Deposit, Harrisville, Lewis Co., NY

By Fred Haynes

You can call it the Gouverneur Talc Company No. 4 Quarry, you can call it the Valentine Mine, or you can just call it that quarry off route 3 south of Harrisville, NY. Regardless of the name, in the business of wollastonite, the small quarry/mine in extreme northern Lewis County is pretty important. Together with the Lewis Mine of Essex County (see March 2014 WCGMC newsletter), the two quarries provide all of the US production (and 10% of the world’s supply) of the industrial mineral wollastonite.

As an operating quarry, the site is not generally conducive for collecting, however one of the field trips associated with the New York State Geologic Symposium this past October included a two hour stop and a visit to the quarry floor (Robinson and Chamberlain, 2014). Steve Chamberlain and George Robinson led the trip and given their past work on the mineralogy of the locale (Chamberlain et. al., 1999), those of us who participated learned a lot in the brief time we were there.

*The Saturday NYSGA trip also visited the Farr property in Natural Bridge and the Rose Road skarn in Pitcairn, a whirlwind visit to “three and a half skarns” in one busy day.*

The primary minerals at the location are not rare, nor do they occur in particularly well formed and/or terminated crystals. However, they can be both colorful and appealing and, therefore, collectible. Given its purity the mineral of economic importance, wollastonite, is brilliantly white. In its skarn setting the crystals can be large, and occasionally terminated, but in their fibrous and intergrown state, they do not stand out in the mineral case. Much of the recrystalline calcite flanking the wollastonite “ore” is a very deep blue color, but surfaces are all cleavage faces and not crystals. They are pretty in the garden and great examples of calcite’s rhombohedral cleavage, but not highly desirable for a collector of calcite crystals. In places the calcite contains small to moderate sized flakes of steely grey graphite and if the rocks break just right and you collect with care, these flakes show as intricate rosettes that do make the list as keepers.

The location is also well known for its interesting and, in some cases, rare mineral assemblage, much of which is
found as micromount material within massive yellowish green prehnite that runs through both the calcite and the wollastonite. In addition to acicular prehnite crystals, these vugs can hold small prismatic hedenbergite crystals, brewsterite-Ba (a rare zeolite), babingtonite and apophyllite. When I peer into some vugs in my specimens, I am sure I have some of these species, but I will need some help to identify them for certain. There was very fine drusy quartz along some fractures, but I did not see any of the nice hematite stained large quartz crystals for which the location is known (Robinson and Chamberlain, 2014).

References:


Although the quarry itself is not open to collecting, the operators do restock a pile of mixed material from the quarry just outside the main gate on Hermitage Road. It is worth a quick stop if you are passing through Harrisville on Route 3. In addition to the skarn mineral suite at the location, there is usually some unakite available.

**Balmat-Edwards Mining District
NYSGA Keynote Address by William deLorraine**

The opening address at the 2014 New York State Geological Association Symposium this October in Alexandria Bay was delivered by William deLorraine, Chief Geologist for St Lawrence Zinc Co. in Gouverneur, NY. Bill is also the President of the St. Lawrence County Gem and Mineral Club.

His focus at NYSGA was on the geologic evolution of the world-class zinc deposits known as the Balmat-Edwards Zinc District. Although sphalerite (ZnS) was discovered at Balmat in the 1830s and has been exploited since 1915, the complex geologic history of the ores remains problematic. Originally deposited in a carbonate-rich sedimentary exhalative environment, the entire region was subjected to Upper Amphibolite grade metamorphism (~650° C and ~6 Kbars pressure) during Grenville time (ca.1.15-1.2 Billion years). At that time significant deformation affected all rock units, and sphalerite ore bodies were remobilized. The sphalerite is not thought to have melted, but rather to have taken on a plastic character, migrating along weaknesses at great depth. Bill refers to the remobilized bodies as daughter ores and has spent his career tracking their convoluted movement during mobilization and looking for the elusive, and perhaps larger, parent ores. Due to the multiple stages of deformation this is not an easy task. His talk, including animated graphics demonstrating how the sphalerite is thought to have migrated, was informative and entertaining. And, yes, he did show some slides of the pretty minerals the district is known for (hexagonite, magnetite, chrome tremolite, and more).

**A Bit on the Economics of Zinc**

From 1930 to 2001, the Balmat Mine mined 33 million tons of ore with an average grade of 8.7% zinc. Depressed zinc prices forced closure in 2001, but the mine came back to life in 2006 when zinc prices spiked and remained open until August of 2008. Although not operating, the mine is maintained in a “ready to operate mode,” pumping it out regularly and maintaining all essential equipment. Zinc currently sells for about $1.02/pound, up from 80 cents earlier in the year. Unlike gold, silver, copper, and oil zinc price has not dropped during the 2014 downturn in other commodity prices. Furthermore, the Balmat-Edwards District is not out of ore. A quick look at the chart below is illustrate what the mine needs to reopen, stable zinc prices above $1 or perhaps at $1.20/pound.

**Historical Zinc Price Data and Balmat Production**
The Hope Diamond

The Hope diamond is one of the most recognized and well known jewels in the world. At 45.52 carats (9.104 grams), the 1" by ¾" pear-shaped blue jewel is currently valued at more than 200 million dollars. From its undocumented discovery in India in the 17th century (or before), the diamond has seen owners in India, France, and Britain before coming to the United States early in the 20th century. It has been re-faceted on several occasions to improve quality and luster. The gem has resided in the Smithsonian Museum of Natural History since 1958, when Harry Winston, a jeweler from New York City, donated the famous gem with the hopes it would stimulate further donations. It did and the National Gem Gallery at the Smithsonian is a must visit for anyone trekking to Washington D.C.

The Hope Diamond was removed from its setting for a short time in 2009. The blue color is due to a very small amount (3-5 ppm) of boron in the crystal lattice. Nitrogen, when present in sufficient quantity can impart a yellow color to diamonds.

It is believed that the Hope Diamond was recovered from alluvial gravel sands along the Krishna River in Andhra Pradesh Province of southeast India, perhaps in the early 17th century, perhaps earlier. Exploited from the 14th to the 19th century the placer deposits along the Krishna River once employed as many as 60,000 people. The source for the diamonds is believed to be one of the hundred or so kimberlite pipes that intruded the Dharwar region of south central India about 1.1 Billion Years ago. Although diamonds have been recovered from the source kimberlites themselves, by far the largest jewels and the most economic mining ventures have been in the alluvial deposits along the several rivers that drain the region.

The stone is named for a London banking family that owned the jewel in the 19th century. The history of the Hope diamond is full of famous and interesting characters, and sufficient disease, criminal activity, and death that some believe the stone carries a curse. Much of that belief may be a result of the diamond’s appearance under ultraviolet light.

In fact it is also phosphorescent as the red color remains for many seconds after removed from UV light exposure. Note the more typical blue fluorescence of one of the 16 pear and cushion cut diamonds that surround the Hope diamond in its current setting. A blue fluorescence is typical of about 40% of all diamonds and is due to just 3-5 parts per million boron in the carbon-dominated lattice. The red color and phosphorescent nature of the Hope diamond is due to a unique interaction of two impurities, boron and nitrogen, in the lattice, although it is not completely understood why this diamond fluoresces so differently from any other.

In the pendant surrounding the Hope diamond are 16 white diamonds, both pear-shapes and cushion cuts. It is interesting that one of these appears deeply blue fluorescent itself. I can find no mention of this specific diamond in the literature. Anyone who can tell me more about it gets a prize!
Definitions of four terms introduced in red text in the articles of this issue.

A **kimberlite** is an igneous rock sourced deep within the mantle, some 100-250 miles below the surface (see figure below). At those depths pressures are sufficient for diamond to be the stable form of carbon. It is believed that kimberlite magmas surface rapidly incorporating bits of upper mantle and lower crust during ascent while not allowing the diamond xenocrysts to alter. Because of the cylindrical shape of many kimberlite bodies they are typically referred to as pipes, although carrots might be a more appropriate description! There are actually several kimberlite bodies in New York State, running in a N-S belt from near Ithaca to Ogdensburg. However, their chemistry suggests an upper mantle source too shallow for diamonds. Herkimers remain the only “diamonds” in the state.

In geology jargon, an **exhalative** deposit is a term applied to ore deposits interpreted to have been formed by the release of metal-bearing hydrothermal fluids into a water reservoir (usually the ocean), resulting in the precipitation of metal-bearing minerals (pyrite, sphalerite, galena, chalcopyrite, etc.). These ore bodies typically conform (interlayer) with other sediments being introduced to the seafloor or with subsea volcanics. When the encasing rocks are sedimentary, the ores are referred to as Sedimentary Exhalative ores (or SedEx deposits).

A **playa** is a transitory or ephemeral dried up lake bed consisting of very fine grained sediment, often infused with salts. They can cover large areas, but are never deep. They are common in intermountain basin areas in desert terrain.

**Zeolites** are hydrated aluminum-silicate minerals built upon a specific framework of silicon tetrahedral linked only at the corners. Given this geometry, the lattice is very capable of incorporating smaller cations like calcium and sodium leading to a large number of different stable zeolite minerals. There are more than 45 recognized natural species of zeolites and many more have been synthesized. Analcite, chabazite, heulandite, laumontite, natrolite, and stilbite are some of the common natural zeolites. Zeolites are low temperature minerals and one common occurrence is in vugs in volcanic rocks. The high microporosity and well defined pore geometry of various zeolites allow them to be used to absorb/trap specific chemicals, separate molecules, and purify water. Others are used as desiccants, effecting trapping water in their very small pores.
Sometime this winter each of us will likely need to navigate the New York State Thruway in adverse winter conditions. Most are aware that the main treatment deployed by the NY Thruway Authority to improve road conditions is rock salt. But did you know that conventional rock salt (NaCl) is only effective at temperatures above 15ºF. Halite, when distributed in adequate amounts, will lower the melting temperature of snow and ice to ~15ºF. Below that level, the Thruway Authority does mix in calcium chloride and magnesium chloride, but that only helps to about 10ºF. When temperatures plunge into the single digits and below, it is best to stay home and enjoy the weather vicariously (on TV or the internet).

Some neat facts from the Thruway Authority website:

- The average annual usage of rock salt in the past 10 years is 180,000 tons.
- The Authority has 38 salt storage bins strategically located along its 496 miles of roadway.
- These storage bins hold 128,100 tons of salt when filled prior to the start of the season. Salt is reordered during the season as needed.
- When applicable a salt and beet brine mixture is applied as a pre-treatment for rock salt.

So, do you think Chad stamp designers knew that when you turned this 1999 stamp on it’s side the dolomite + quartz specimen resembles the country’s borders?
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Club meets 2nd Friday of each month starting in Sept.
Mini-miner meeting at 6:30 PM.
Regular meeting at 7:00 PM
Park Presbyterian Church, Maple Court, Newark, NY

Website – http://www.wcgmoc.org/

Dues are only $15 individual or $20 family for a full season of fun. Send to WCGMC, P. O. Box 4, Newark, NY 14513