Wayne County Gem and Mineral Club News

December, 2022 **Always Looking for Places to Dig!**

For members who have signed up, the Holiday Party is Friday, December 9th. The doors will open at 6:00 PM, we plan to eat ~6:30 PM, and the program to follow at ~ 7:30 PM. The event will be at the Marbletown Fire Hall 6416 Silver Hill Rd., Newark, NY. *NOTE: not at the normal meeting location.*

http://www.wcgmc.org

FACEBOOK link

new crinoid species? (see page 3)

The December 2022 WCGMC Newsletter is dedicated to Ed Smith

Edward William Smith
January 20, 1954 – November 2, 2022

Multi-faceted is a word that describes
Edward William Smith.
Like the gems that he discovered
and cut, there were many sides to Ed.
He was an outdoorsman who
cherished our earth. He was an engineer
and an inventor. An avid reader,
Ed loved to acquire and share knowledge
with everyone he encountered
as he enjoyed life.

Edward William Smith was a loving
husband, a loyal brother and uncle,
and a faithful friend.
Our lives were greatly enriched
by his presence.
Ed will be missed by all who knew him.

a good man and an even better friend

To view a pictorial tribute to Ed, click on his picture above, or on this link.

First and foremost - happy holidays to all! Our annual holiday party will be next Friday (12/9) at the Marbletown Fire Department (same place as last year). See page 1 for times and details. The club will be providing the meat and drinks, with members asked to bring a dish-to-pass to round out the holiday feast! There will be a small prize awarded to the best rock, gem, mineral, lapidary, or fossil-themed dish - in previous years I've seen geode cakes, Stonehenge rice crispy treats, fossil cookies, and so many neat creative things.

Secondly, this month's workshop will be held on Saturday, December 10th at the Weilers so come on by and keep working on your lapidary creations to finish them in time for holiday gift giving! I don't know about everyone else, but I'm always trying to finish up a cab or a polish this time of the year so I can mount and wrap something up to sneak under the tree at the end of the month.

I also want to take a moment for a more somber item. Last month we lost a long-time member, friend, educator, board member, mentor, craftsman, and so very much more. Ed Smith was always there helping teach new members, doing demonstrations or activities for kids at the gem show, sharing his knowledge or creative ideas with the club, helping repair or invent new machines, breaking rocks along side us on darned near every field trip I've ever been on with the club, and bringing smiles to the faces of those around him. His kind nature, clever mind, jovial spirit, and all-around pleasant companionship will be deeply missed.

One of my favorite quotes from Ed is one I'd encourage everyone to keep in mind since it embodies the spirit of why we got into this hobby and how we should always view it - "I like to go on digs just I can beat up rocks!" He certainly did much more than just make larger rocks into smaller ones on trips, but the essence of his quote was "have fun doing what makes you happy." In that spirit, I'd ask that everyone take a moment and next time you're faceting a gem, polishing a cabochon, out in the field digging in the dirt, or breaking open a rock that you take a moment and appreciate the marvel of what you're doing, remember the joy and delight of learning it for the first time, and fan the flame of passionate creation and discovery that make this hobby great.

Yes, Ed liked to break rocks, but I also remember the quiet moments, like sharing dinner with Ed and other WCGMC rockhounds outside our rental home in Bethel, Maine in July of 2021. Photo by Fred Haynes

May your spirits be bright and your love and appreciation of crafting, collecting, or learning be joyful this holiday season and over the years to come!

James

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How about that! There is new rock being created at the world's largest volcano, Mauna Loa on the Island of Hawai'i. Basaltic magma is erupting from multiple fissures on the northeast side of the volcano. The fountains of lava in this picture were up to 25m high. You can follow the first surface eruption of Mauna Loa since 1984 on a new Wikipedia site dedicated to the ongoing eruption or on the United States Geological Survey webpage, which is the source of the photo to the left.

Echinoderms of the Deep Run Shale Member

by Stephen Mayer

Paleontologists and amateurs alike are privileged to collect fossils within the Finger Lakes of New York in one of the best Devonian localities worldwide. Common fossils include corals, trilobites, brachiopods, bivalves, bryozoans and echinoderms. The latter include the ubiquitous crinoids and blastoids as well as rare echinoids and starfish. Here we focus on the Deep Run Shale Member, Moscow Formation, Middle Devonian, a key fossiliferous stratigraphic interval where many of these phyla are encountered, including some very unique echinoderms.

The Deep Run Shale Member is an eastwardly thickening calcareous siltstone that is exposed in outcrops between Erie County and Cayuga County, New York. In western sections, the Deep Run Shale is a condensed unit only a few feet thick, which balloons in the Canandaigua Valley, and thins again in the Cayuga Valley. The resistant Tichenor Limestone forms the base of the Moscow Formation throughout the region and grades upward into the lowermost Deep Run Kipp Road Bed. The Kipp Road unit is a series of thin fossiliferous layers which are, in turn, overlain by the barren to sparsely fossiliferous Willard Siltstone of the Uppermost Deep Run.

The shales comprising the Deep Run Member were deposited in a shallow inland sea within the northern arm of the Appalachian Basin west of the Acadian Mountains. In the Middle Devonian, the North American continent was lying 15-30 degrees south of the equator and was affected by a subtropical climate. The shallow sea was warm and supported a diverse fauna. It is difficult to ascertain the real extent of the diversity of species which existed in this ancient sea but a diverse underwater ecosystem must have existed. Vast gardens of crinoids were interwoven with thickets of bryozoans while trilobites crawled amongst solitary and colonial corals. Brachiopods filter fed on plankton drifting with the currents and gastropods attached to crinoids consumed energy derived from their waste products.

Paleozoic echinoderms of the class Crinoidea are subdivided into three different subclasses, multiple orders, families, genera and species. I have found at least four different species of crinoids in the Kipp Road Bed in the Canandaigua and Seneca Lake Valleys. The robust crinoid subclass Camerata is represented by large rhizome-like stems of *Dolatocrinus liratus* Hall, 1861 (Fig. 1) and *Megistocrinus depressus* Hall, 1861 (Fig. 2). The stems range up to 1.5 feet (45 cm) in length and 0.5 inch (1.27 cm) in diameter and tightly overlie one another throughout the region.

Figure 1. *Dolatocrinus liratus*: calyx is 4 cm across. Note the *Naticonema lineata* gastropod to the left.

Figure 2. Megistrocrinus depressus: Calyx is 4 cm across; stem is 10 cm long.

The presence of countless preserved crinoid stems in the Devonian of western New York State would suggest one might find an equal number of crinoid calyxes. The calyx is the cup-shaped body that sits atop the stem and from which arms wave in the seas capturing nutrients. However, calyxes are actually quite rare. One possible explanation for this is that during storm-related underwater disturbances, which caused rapid sedimentation and smothering of organisms, the soft tissue binding the calcitic plates of the calyx together may have immediately decomposed and, in turn, caused the calyx to disarticulate prior to fossilization. Another possibility could have been that predatory animals fed upon the calyx and thus only a few remained to be fossilized. Still there may be other explanations for the apparent lack of calyxes.

Fragile crinoids belonging to the subclass Flexibilia are also encountered in the Kipp Road Bed. Most notable is *Taxocrinus lobatus* Hall, 1861 (Fig. 3 left), which are often found with a gastropod attached and feeding from the crinoid tegmen (a weakly calcified surface where the crinoid mouth and anus are situated side by side). Another crinoid species, *Synaptocrinus nuntius* Hall, 1861 (Fig. 3 right) also occurs in this unit, but less frequently.

Figure 3: Two Flexibilia crinoids from the Deep Run Shale: on the left - *Taxocrinus lobatus* (5 cm long arms) that is accompanied by a bryozoan-encrusted Natioconema gastropod, on the right - a particularly well-preserved *Synaptocrinus nuntius.*

The most remarkable crinoid discovered thus far (Fig. 4) belongs to the subclass Inadunata. It was found by WCGMC member Gary Thomas. George McIntosh, Rochester Museum and Science Center, Curator Emeritus, has identified it as *Poteriocrinites multicosta* (Goldring, 1954), but also observed that the ornamentation is slightly different than others he has seen. Therefore he believes that it could be a new species. All three of the major subclasses of Paleozoic crinoids are represented by these 5 species with possibly many more yet to be discovered.

Complete blastoid fossils (another class of echinoderms) are uncommon in our area although intact theca, which formed the main body, are occasionally encountered. Like crinoids, they had a stem or column made up of stacked disc-shaped plates attached to the ocean floor by a holdfast. It is likely that blastoid stems are mixed together with crinoid stems in the Deep Run shales but due to their similarities are very difficult to distinguish. At least two blastoids, *Devonoblastus leda* (Fig. 5 left) and *Nucleocrinus powelli* (Fig. 5 right) occur in the Kipp Road Bed. Like crinoids, blastoids used their arms, called brachioles, to feed upon plankton drifting in the oceanic currents. However, unlike crinoid arms, the brachioles are rarely preserved in the fossil record. And just like crinoids, possibly many more species remain to be discovered.

Figure 4: A new crinoid species (?), perhaps related to *Poteriocrinites multicosta.*

Figure 5: Blastoids from the Deep Run Shale Member: on the left - *Devonoblastus leda*, on the right – *Nucleocrinus powelli.*

References:

Goldring, W., 1954, Devonian crinoids, new and old, II. New York State Museum Circular, 37:3-51.

Hall, J.,1861, Natural History of New York, Part VI. Paleontology, Geologic Survey of the State of New York

Beneficiation of Metal Ores

by Howard Heitner

What comes out of a mine? Let's say a lead mine or a copper mine. A collector would say, obviously, nice crystals of galena, chalcopyrite, calcite, and a host of other goodies, that the collector would be happy to own. I would qualify that answer by adding the phrase "on your lucky day". Even if those specimens existed before mining, their chances of surviving the blasting, tunneling, crushing etc. are remote. The truth is that very few specimens survive.

What mainly comes out of a mine is ore. Ore, however, is not a geologic term. It is an economic term referring to any rock that can be mined and processed to make a profit. Ore has a rather strange property for a rock. At any given location, the amount or ore can grow or shrink without any geologic or natural change. Why does this happen?

The price of the valuable material in the ore (usually a metal) fluctuates due to supply and demand. The cost of mining and processing remains fairly constant, so the profitability is mainly determined by the price of the metal. When the price goes up the amount of ore will increase, and vice-versa. Furthermore, because the cost of mining can vary among locations (logistics, taxes, wages, etc.), the same rock can be ore at one location and just mineralized rock at another. Of course, a clever geologist or engineer who can figure out a mining method that is less expensive can "create" ore also.

During the last century or so, tons and tons of ore came out of mines on conveyer belts, ore cars, large trucks etc. Most ore will look like ordinary rock, perhaps with a few shiny specks in it. In previous centuries, miners could just follow rich veins of metallic minerals and workers at the surface could pick out the valuable minerals with just a little hammering to remove waste rock. Except for mineral collectors, those days are gone for the most part.

So how can one make a profit from a rock that contains a very low percentage of metal? That percentage is called the grade. An industrial scale process is needed to do this. This process is called **beneficiation**, or a process that is literally beneficial to making a profit. The goal is to do the same thing that the surface workers with hammers used to do, get out the good stuff, but on a much larger scale in order to profit under today's economics.

But the good stuff is held prisoner by useless rock, often lots and lots of it. The first step in beneficiation is called liberation. The ore is broken apart to free the tiny specks of metallic minerals. This is usually done in a machine called a mill where the ore is tumbled in large cylinders with steel balls or rods which smash it into smaller pieces. The resistance to breaking of individual particles of ore varies, so the ground ore is passed through a screen in a process called classification. The particles small enough for the next step go on while the bigger ones go back to the mill. The amount of milling depends on the fine structure of the ore. If the grains of metallic mineral are larger, less milling is required to liberate them. Milling uses a lot of energy and is a major cost in beneficiation.

Examples of ore that require beneficiation: On the left, the black mineral is galena (PbS) which must be liberated from the rock to produce a concentrate rich in the lead-bearing sulfide mineral.. In the center, the brass-colored mineral is chalcopyrite, a copper-iron sulfide ($CuFeS_2$) This is a high grade specimen, but rock with as little as 1-2% chalcopyrite can be ore if found in sufficient quantities such as in the those mined in open pits in Arizona. The ore specimen on the right is from Upper Michigan and the shiny metallic mineral is native copper. Unlike the other two, liberation of the copper through the milling process leads to direct recovery of the pure metal and further smelting is not required.

Once the metallic minerals are liberated, they must be separated from the useless assortment of minerals (called the gangue). In many cases a process called flotation is used to make the particles of the valuable mineral float and the gangue particles sink. At first thought, that sounds ridiculous. Galena has a density of 7.6 gm/cm^3. The density of water is 1.0 g,/cm^3. Surely it will not float.

The solution to this problem involves surface chemistry. If you put a drop of water on wax paper, it does not spread out, but forms little beads. The wax surface is called hydrophobic; it does not like water! If a hydrophobic particle is in contact with water and air, the air is favored. *The opposite of hydrophobic is hydrophilic. Hydrophilic surfaces prefer to be in contact with water.*

Therefore, if one could make the surface of a sulfide mineral hydrophobic, it would prefer to be in contact with air. If the ground ore is slurried in water and air bubbled through it, any hydrophobic particles would cling to the bubbles and rise to the surface. This process is called mineral flotation. To use flotation for beneficiation, the sulfide minerals have to be made as hydrophobic as possible and the gangue made as hydrophilic as possible.

Several types of chemicals are added to the ore slurry to do this. Chemicals called collectors make the sulfides hydrophobic. Often these chemicals contain sulfur. Other chemicals called activators are also added with the collector. For example, copper sulfate is added to activate sphalerite for flotation. Chemicals called depressants make the gangue hydrophilic as possible. Often these are water soluble polymers. A further chemical is added called a frother. Once the bubbles reach the surface, they are stabilized in a thick foam. The foam is scraped off, filtered, washed and dried.

The final product of beneficiation is called concentrate. The milled ore is called the feed. The sulfide minerals go into the concentrate. It contains some gangue, because liberation is not complete and particles that are mostly sulfide carry gangue with them. The gangue minerals leave in the tailings stream. For the same reason, recovery of the valuable sulfides is not complete, because some particles do not contain enough hydrophobic sulfide to float. Furthermore, not all sulfides are valuable, in particular pyrite, which is a component of many ores. More complex flotation processes are used to separate pyrite from valuable minerals like chalcopyrite and sphalerite. Every ore is different and a lot of laboratory experiments have to be done to optimize the process for a particular one.

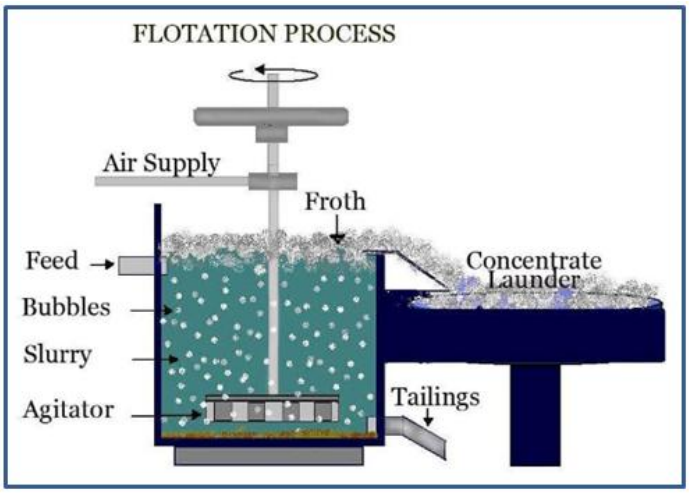

Diagram of the flotation process.
from www.911metallurgist.com with permission.

For a metal sulfide concentrate the final step requires liberating the metal (copper, lead, zinc, etc.) from the sulfide minerals. This step is referred to as smelting. Sometimes this occurs at the same location as beneficiation, but often the ore concentrate is shipped to a more central site for smelting, much as crude oil is sent to a refinery.

A lot more chemistry and processing is involved at the smelter, with a whole new set of issues, both economic and environmental, but that can be saved for another time. After all of this, if the stars are aligned and the market price of the metal is high enough, the mining company makes a profit from the combined efforts of exploration, mining, beneficiation, and smelting.

Of course, most of us would probably still prefer to have our sulfide minerals look like this galena from the Sweetwater District of Missouri. The gangue is calcite! from Wikipedia Commons

Splendid Sands Calendar

December, 2022
Austvågøya Island,
Lofoten Archipelage
Norldand, NORWAY

Photo by Leo Kenney

by Leo Kenney, Kate Clover & Carol Hopper Brill

The Lofoten archipelago is the northernmost heavily populated region within the Arctic Circle, perhaps because it experiences elevated temperatures relative to its high latitude. It is even known for surfing and attracts international surfers each September for the Lofoten Masters. Austvågøya is one of the larger islands in the group, largely a mountain massif of Precambrian gneiss.

Austvågøya's lowlands are largely limited to coastal beaches whose biotic grains are dominated by the worn white remains of red coralline algae. These algal species contain red pigment which allows them to live at depths ranging from the tidal zone to over 800' below sea level. Chalky reds come in crusts, nodular and branching forms. Alive, these species are purple-red, but dead fragments, crushed by the waves and bleached by the sun, are chalky white.

Mollusc shell grains in this biogenic sand include a blue bivalve (upper center) and a tannish internal spiral (columella) from a snail (lower left). Sea urchin remains provide additional color – green and lavender spines, plus an angular green and white skeletal plate (upper left).

Our brand new six-wheel polisher (in the foreground) was in action at our November workshop.

These two ladies were busy selecting minerals from the club inventory to be used at the Holiday Party. Yes, Teresa those amethyst!

Wayne County Gem & Mineral Contacts

ELECTED OFFICERS

President – James Keeler
jamesrocks(at)jkeeler.com
Vice-President – Holly Woodworth
autum14513(at)yahoo.com
Secretary – Beth Webster
Treasurer - Bill Lesniak

Board of Directors
Bob Linderbery
Heidi Morgenstern
Karen Wilkins

Past President – Linda Schmidtgall

Visit us on Facebook:
https://www.facebook.com/groups/1675855046010058/

APPOINTED POSITIONS

Field Trip coordinator – Teresa Ferris, ***help wanted***
Fossil Field Trip Leader - Stephen Mayer

Fred Haynes – Newsletter Editor
fredmhaynes55(at)gmail.com

Bill Lesniak – Website Coordinator
Glenn Weiler – Workshop Coordinator

Linda Schmidtgall – Collection Curator

Fred Haynes – Facebook Administrator
Jim Rienhardt – Sand Chapter

Club meets 2nd Friday of each month starting in Sept.
Social meeting at 6:30 PM Regular meeting at 7:00 PM
Park Presbyterian Church, Maple Court, Newark, NY
Website – http://www.wcgmc.org/

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