MICROMOUNTERS OF NEW ENGLAND NEWSLETTER

The MMNE was organized on November 8, 1966 for the purpose of promoting the study of minerals that require a microscope

No. 303 February, 2010

Current Meeting
Saturday Feb. 20, 2010
Trinity Lutheran Church
Chelmsford, MA
Doors open at 9 am

Next Meeting
Saturday Mar. 20, 2010
Trinity Lutheran Church
Chelmsford, MA

Map and driving directions are on the last page of this newsletter

For information regarding **MEETING CANCELLATION** due to inclement weather,
Joseph Mulvey
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Welcome to the February edition of the Micromounters of New England Newsletter!

Well, January's meeting was a rocking good time! We had a full house again and enjoyed the company and insight of **Jim Nizamoff**, as we all continued to discover what's new and exciting inside of the give away material from the Rocky Mountain Micromounters, **Bob Janules**, **Pat Barker**, and **Ed Clopton**.

This newsletter marks the second that far exceeds a single postage stamp to mail. The opportunities for great writing courtesy of the Internet certainly assist the patient observer to assemble some very nice articles. The copper article by **Jim Daly** of Sauktown Minerals is extremely informative. Jim's article is accented nicely with superb photos by **Carlos Gristani.** Carlos so thoughtfully shared some of his copper collection with us all prior to his departure for sunny, warm, dry Tucson. It was a coincidence that at the same time our monthly subscribed article by **Dr. Andrew Sicree** arrived with a write up about copper mining by POWs in Japan during WWII. Finally, many have received e-mails from a Greek collector who has started his own mineral website. **Michael Samouhos** is a Greek Chemist with an affinity for the minerals of the Lavrion Region of Greece. I added to his great history of the mines with some information courtesy of Mindat and **Jean Marc Johannet.** Thanks to **Steve Rust** who permitted us to use one of his photos from his Mindat posts.

By the way - are you interested in a swap? We have two overseas micro collectors who have helped create this newsletter that would like to speak with you! First we have **Jean Marc Johannet.** He lives in France and loves phosphates. You can contact him by email at JOHANNETJm@CC-PARTHENAY.FR. Next we have **Michael Samouhos** who has many Lavrion minerals for swap and for sale. His website is located at www.lavrionminerals.com.

I had the pleasure and honor of visiting **Bill Henderson** at his home in Connecticut recently. What a super host! What a great man! And Bill's wife Audrey is wonderful as well. The whole day flew by as we looked at specimen after specimen, he taught me the basic theory of screw dislocation by Eshelby and we had some super chili by Audrey. Time certainly flew for me! Bill's mineralogical generosity was stunning and I and my collection are truly indebted to his kindness.

It is time to **renew your membership**. The March newsletter will be the last edition if you don't send in your measly check asap. While the club coffers don't look to run dry in the foreseeable future, it's your support that enables things like the great door prize at the May symposium – a very nice mineral splitter from Excalibur.

The January meeting saw Inga Burggraf walk away with highest honors for her great Epidote specimen submitted for the monthly specimen competition. Rumor has it that Dana will be doing the dishes for a while!

See you at the February meeting on Saturday, February 20th!

DON'T FORGET!

DUE$ ARE DUE

COLLECTING MICROS IN MICHIGAN'S COPPER COUNTRY

Jim Daly Sauktown Sales Mill Creek, IN

Copper Phoenix Mine, Michigan; Carlos Gristani, Photo and Specimen

Today, the chances of finding top-quality cabinet specimens on the dumps in Copper Country are fairly low. Good micro material, however, is still quite plentiful.

If you've never collected in this area before, I'd recommend going for Keweenaw Week. This is a week-long event, with lectures in the evening and field trips during the day. You can sign up for one field trip each morning and one each afternoon, and there are usually about 4 or 5 to choose from in each time slot. For each trip a map is provided and a list of the minerals found at that locality. There are guides present to help identify minerals, and the day before the trip the dump is turned over with a bulldozer. This isn't as much help as you might think. It's great for the people with the metal detectors that are looking primarily for native copper. For the micromounter, it isn't much help. The "fresh" material uncovered is covered with mud. The ideal scenario would be a good rain in between the bulldozing and the field trip.

The lists provided only tell what has been found on the various dumps, not what you are likely to find. That's what I'll try to provide here.

At first glance you might think "you've seen one dump, you've seen them all". Nothing could be further from the truth. While there's copper, prehnite, pumpellyite-(Mg), microcline, epidote and quartz on all the dumps, there are subtle differences.

There are three different kinds of deposits of copper in the area: fissure deposits, primarily in the northern end of the Keweenaw Peninsula (mainly Keweenaw County), amygdaloid deposits in the lower part of the peninsula (mainly northern Houghton County and Ontonagon County), and conglomerates, which are found in all three counties. There are some mines that have exploited more than one type of deposit.

The pumpellyite is almost all pumpellyite–(Mg), although there is also some –(Fe2+) found at the Clark Mine. The pumpellyite–(Fe2+) is in brown flakes, rather than the more typical green blades and nodules.

Just about all the "adularia" is microcline.

Zeolites are more common in the fissure deposits.

The best epidote and quartz is in the amygdaloids.

Copper in the conglomerates isn't usually well crystallized.

There is a lot of information regarding what minerals have been found at each mine in the region, with descriptions and photos. This is very useful information when trying to identify what you've collected, but doesn't tell a lot about what you can reasonably expect to find today at the various mines. I'll attempt here to answer that question, based on my own experience with field collecting and working on "micro bags" of material from mines I haven't visited. These "micro bags"were mainly material collected by Olive Sain, and sold at the annual show of the Ishpeming Club.

The best copper crystals are from the Clark and Central mines, and the Ahmeek has dodecahedral crystals. Copper wire can be found at the Mohawk and Iroquois mines.

The best epidote and clear quartz crystals are from the Laurium and La Salle mines.
The best saponite is found at the Knowlton and Seneca #1 mines. The best adularia (translucent pink to orange) is from the Caledonia, Osceola, Laurium and Iroquois mines.

Prehnite is found in many forms. The most interesting are the thin plates: pink and colorless from the Clark mine, both pink and pale green from the Central mine, and also from the Phoenix, Madison, Seneca, Iroquois and St. Clair mines.

The apophyllite-(KF) from the Clark mine is best. Thomsonite-Ca is found at the Clark and Copper Falls mines, and at Lookout Point (aka Thomsonite Hill). Analcime is found as red and colorless trapezohedrons at the Copper Falls mine.

We can't leave the Copper Country without mentioning two localities that aren't copper mines: The Manganese Mine, located near the Clark Mine, is the type locality for macfallite, and the second known occurrence for orientite.

On the banks of the Houghton Canal there is slag dumped from one of the smelters in the vicinity, probably the Houghton Smelter. There you can find an unusual form of melilite- black acicular crystals.

In closing, I have to add this disclaimer: All localities change. I haven't been to Copper Country in 3 years, so some of the spoils piles I've mentioned may even be gone today. Some have been used in road construction by the county road departments. I've also found that the first visit to any locality is never as productive as subsequent visits. I suspect that it takes time for your eyes to get used to what to look for, much like hunting morel mushrooms in the woods.

Whenever I go to the Copper Country for Keweenaw Week, I like to go a few days early, stopping at the Ispeming, MI club show on the Saturday before Keweenaw Week. The have a field trip to an iron mine on Friday, the show on Saturday, and a trip to the Lindberg Quarry in Negaunee for Kona Dolomite on Sunday. This is the show where I have purchased the "micro bags" of copper country material at silent auction, usually for about 50 cents each.

Copper, Phoenix Mine, Michigan
Carlos Gristani, Photo and Specimen

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A Hell of a Mine: The Kinkaseki Copper Mine

by Andrew A. Sicree

MINING ON FORMOSA AND WWII

At the onset of World War II in the Pacific, Japan had controlled the Chinese island of Formosa (now Taiwan) for nearly fifty years. The Kinkaseki Copper Mine, the largest copper mine in the Japanese Empire, was located on the northeast coast of Formosa near Jiufen in what is now Taipei County, Taiwan Province, Taiwan. The mine is also variously called the Kinkwaseki or Chinkuashi or Jinguashih ("Pumpkin Rock" after an unusually-shaped nearby mountain-top). As a source of copper ore, Kinkaseki was vital to the Japanese economy and to the Japanese war effort. Kinkaseki was also one of the Japanese Empire's most notorious "hell mines."

The Jiufen area became the site of a late-1800s gold rush when alluvial gold was found nearby by Chinese miners returning from the American gold fields. The discovery of vein gold followed the alluvial gold finds and Jiufen boomed. The boom turned bust when the gold mines dried up, but copper mineralization was discovered nearby and copper mining began in earnest in the 1930s.

Soon after Japan's surprise attack on Pearl Harbor, the Japanese overran the Philippines, the Dutch East Indies, and most of the South Pacific. Manila, Hong Kong, and Singapore fell and tens of thousands of British and American soldiers and civilians were imprisoned by the Japanese.

Labor shortages in Japan led to the Japanese forcing many POWs to work as slave labor for the military and for private companies such as Mitsubishi and Kawasaki (companies that, incidentally, were never forced after the war to pay those they had exploited and killed). POWs taken in Singapore or the Philippines were shipped (at great hazard – many unmarked POW transports were torpedoed *en route*) to Formosa and the Japanese home islands. The healthier POWs were forced to work as slaves in factories and in many cases, mines.

Japanese POW camps were horrible places and the treatment of POWs by the Japanese is one of the great crimes of the World War II era. It is not our purpose here to document the atrocities committed, but one must note that unlike in Nazi Germany, few Japanese leaders were prosecuted for the atrocities they ordered. One of the worst of the Japanese slave labor POW camps was at the Kinkaseki Copper Mine on Formosa.

MINING BY POWs

One of the British prisoners of war at the Kinkaseki Mine, Sgt. Jack Edwards, preserved his recollections of life as a POW miner in his book, *Banzai, You Bastards!* Edwards recalled that at Kinkaseki "we were issued black cardboard helmets, canvas shoes, a threadbare short-sleeve green shirt and shorts - these were to be our 'mining clothes'." Between the prison camp and the mine lay a mountain that had to be climbed each morning on the way to the mine, and then again in the evening by the exhausted returning miners. Some prisoners were so weak that they had to be assisted in the morning on the trail to the mine by their fellow POWs.

As they approached the mine, Edwards recalled that the POWs "were marched to the mine entrance and forced to stop at a small Japanese shrine to pray for our safety in the mine." He described the descent in to the mine, saying that "for forty-five minutes we trudged on and then turning off to the left, climbed down very rough steps under a low ceiling for several levels…warm air hit us…water dripped down, quite warm…down we went, getting hotter and hotter…there were cries of pain all around as we caught our backs…on the jagged walls and low ceiling…I thought we were descending into hell."

The POW miners were only given rudimentary tools to work the ore. Edwards described using "a chunkel and a two-handled bamboo basket…our task was to scrape the ore into the basket, and then carry it to the trolley (ore cart) which we called 'bogies'." POW miners faced extraordinary dangers down below because timbering was used only in entranceways to the mine. Rockfalls killed a number of prisoners. Temperatures underground could reach as high as 130°F in the deepest portions of the mine. Chinese laborers who also worked (for pay) at the mine refused to venture into the hottest depths, so the British POWs were forced to work at these extreme temperature in spite of their weakened states. Many collapsed from overwork and heat prostration. Carbide lamps provided the only lighting and at times the lamps went out due to lack of oxygen underground. POW miners who escaped serious injury were plagued by bronchitis and stained blue from constant exposure to copper sulfate (formed by acidic water reacting with the copper ore). Their sore, cracked feet never healed.

Edwards recounts that even the return trip was a tremendous struggle: "at the end of the day we had to climb those terrible stairs to get out of the mine, and then still face that long climb back up over the mountain to the camp…no-one spoke during those climbs - you needed all your breath." Supposedly, a POW miner who worked 50 straight days without getting sick, was given a day off, but very few achieved this "reward."

DEATHS AND INJURIES IN THE MINE

Another former Kinkaseki POW, Jack Butterworth, recalled that the mining "was extremely dangerous because we dug up rather than in, and as the roof went up we had to raise the floor with rubble. Debris often came crashing down, and many men were injured. You had to bring out 24 bogeys of good cooper ore per day for a four-man team. If you didn't get that you were lined up and beaten." For failing to meet their quotas the POW miners were beaten "six or eight strokes with a stick, a hammer shaft, and it was called 'getting the hammer.' You'd look at the rock at the beginning of the day, decide whether to go for the 24 or not. Sometimes it was better to get the beating." He reports that he saw the guards "murder a man, hit on the head with a sword scabbard…he died that night…"

Exact numbers of POWs forced to work at Kinkaseki are unclear because the Japanese moved sick prisoners out to other camps and brought in additional prisoners from time to time. Between 500 and 1,100 prisoners may have worked at the mine, and hundreds died there of beatings, rockfalls, disease, and starvation. Only about 100 Kinkaseki POWs are believed to have survived the war.

THE SPIRIT OF POW MINERS

In spite of the incredible conditions and the constant beatings, degradations, and killings, many of the British POWs kept their dignity and spirit. Kinkaseki POW miner Maurice Rooney reported that a fellow miner named Arthur Smith became known as the "Robbie Burns of Kinkaseki" because of the poetry and songs he wrote while a prisoner. The song most popular among the POWs and most hated by the Japanese guards was a ditty Smith wrote titled "Down the Mine" which became the signature tune of the camp. The lyrics are:

There's a song in old Formosa,
that the nips they loudly sing,
in the billets every evening,
you should hear the music ring.
Now they sing to British soldiers,
who've traveled from afar,
to fight for King and country,
now they're prisoners of war.
But they know they'll see
their homeland in the future once again,
listen while I sing to you,
the Nipponese refrain.

Refrain: Down the mine bonny laddies,
down the mine you go,
though your feet are lacerated,
you dare not answer no,
though the rice is insufficient
and we treat you all like swines,
down the mine bonny laddies,
down the mine.

Now the boys were fairly happy,
till one cold and cloudy day,
when the buggers said oh no,
he came out and he to them did say,
Now I expect you all are wondering,
why you're out on this parade,
the reason is you must be taught,
the Taiwan serenade.

Refrain: Down the mine bonny laddies,
down the mine you go,
though your feet are lacerated,
you dare not answer no,
though the rice is insufficient
and we treat you all like swines,
down the mine bonny laddies,
down the mine.

You should see us work with chunkels,
and we work with baskets too,
though the method is old fashioned,
to the boys it's something new,
and we'll work away with patience
till the dawn of freedom's day
but until then the Nippon men
will all be heard to say,

Refrain: Down the mine bonny laddies,
down the mine you go,
though your feet are lacerated,
you dare not answer no,
though the rice is insufficient
and we treat you all like swines,
down the mine bonny laddies,
down the mine.

THE END OF THE WAR

Late in the war, a "short-cut" tunnel was excavated through the mountain between the POW camp and the Kinkaseki Mine. The Japanese camp commander said that the tunnel had been dug out of concern for the well-being of the miners, but closer inspection of the short-cut tunnel revealed heavy steel doors at both ends. Jack Edwards was told by guards that they had been ordered to kill all of the POWs should the Americans invade Formosa (after the war, documents were found at Kinkaseki that confirmed these orders), and he suspected that the "short-cut" tunnel was meant to be their death trap. Butterworth reported that plans were being made to kill the POWs on August 18th, 1945, but the atomic bombings of Japan and the August 16th surrender by the Emperor forestalled the killings.

After the war the Kinkaseki Mine was operated by the Taiwan Metal Mining Company. In the 1970s, metal deposits began to run out and the copper processing plant was shut down in 1987 after an accidental spill of sulfuric acid. Today, the Museum of Gold at Chinguashi (which the Japanese called Kinkaseki) has an exhibit commemorating the sacrifices of the British POW miners. The site of the former POW camp is now a park and a memorial has been erected in honor of those held prisoner there.

Mineral specimens from Kinkaseki are very rare, but the University Museum at the University of Tokyo reports two specimens (I-56 & I-57) from the "Kinkaseki Mine, Formosa" in which gold occurs as small grains in chalcedonic quartz of epithermal origin – one wonders if these specimens were mined during the war. Few of the miners at Kinkaseki would have had the strength or will to carry mineral specimens out of the mine.

Ref.: Edwards, Jack, and Jimmy Walter, *Banzai, You Bastards!*. Souvenir Press Ltd. U.K., 1991, 336 pp.

OLD NEW_GATE PRISON

Kinkaseki wasn't the first copper mine to be connected with POWs. Copper was mined at New-Gate in Connecticut from 1705 to approximately 1750, then the abandoned mine was used as a prison from 1773 to 1827. During the American War for Independence, the British used New-Gate Prison to hold political prisoners – the prisoners were actually held underground in the old mine workings, in miserable and highly unhealthy surroundings.

DAMNED TO THE MINES

In the days of the Roman Empire, mines and quarries were worked by condemned criminals and, in the first centuries after Christ, by Romans convicted of being Christians. Under the Empire, the sentencing of a prisoner to be *damnatio ad metalla* (condemned to the mines) was considered the most severe punishment, second only to execution. Like execution, it was preceded by scourging, and entailed the loss of liberty, property, and other rights. It was a life sentence, although it might be a brief sentence: conditions in the mines were terrible and life expectancy was short. The sentence of *damnatio ad opus metalli* (condemnation to mine labor) was a distinct and somewhat less severe form of punishment.

MMNE SECRETARIAL REPORT November 21, 2009

The November MMNE meeting came to order at the Chelmsford Trinity Lutheran meeting place, President Joe Mulvey presiding.

Joe started the meeting with the drawing of door prizes donated by Anna Wilken. Joe then gave thanks to a long list of people for various reasons: 1. to Ed Clopten for his donation to club members of numerous "sandwich bag minerals"; 2. to Nate Martin for bringing for viewing the various mineral trimmers discussed as a May Meeting grand door prize; 3. to Gene Bearss for supplying the meeting coffee; 4. to Pat Barker, Inge Jewell, Gene Bearss and Bob Janules for the donation of minerals for kids collections; 5. to Pat Barker & others not specified for supplying meeting snacks; 6. to Mike Swanson for his generous donations of specimens for the May Meeting.

Joe announced that Tom Mortimer would be the principal presenter for the May 2010 Meeting and said that he had already updated the club online brochure to indicate it. He also said that he was waiting for a response from Jim Ross of "Absolute Clarity" regarding an additional half hour presentation. With some good natured urging from Joe Mulvey, Gene Bearss volunteered to give a presentation on Maine minerals.

Joe suggested that the January MMNE meeting date be moved to January 23rd due to a conflict with the Boston Mineral Club's annual mineral Auction in Needham, Ma. on the 16th. Several members are in both clubs. The suggestion was moved, seconded and approved unanimously.

The president then suggested that Ed Clopten , for his generous contributions to the club, be granted an honorary member status for one year. It was moved, Pat Barker seconded the motion and it passed unanimously.

The members present voted and approved the disbursement of $100 each to the "Rocks and Minerals" Color fund on behalf of former member Brian Porter and club friend and contributor, Art Smith.

Regarding May Meeting business, Hal Herard requested that members have donations for the sales table ready for him by April when he returns from Florida. Gordon Jackson volunteered to set up and supervise the May silent auction table. Joe Mulvey said the hall had been paid for already and that the caterer was included in that same payment.

Tom Mortimer noted that the monthly meeting room was getting somewhat cramped and suggested that the club investigate the possibility of renting a larger room in the Trinity Lutheran facility. There was brief discussion but in the end it was decided to put the refreshments in the hallway to free up space in the meeting room. No further action was determined.

Respectfully submitted
Bob Wilken, Secretary

MMNE Secretarial Report January 23, 2010

President Joe Mulvey brought the January 23rd meeting to order at the Chelmsford, MA Trinity Lutheran Church. He began with a series of brief random announcements regarding the May Meeting.

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- Tom Mortimer and Gene Bearss will be the speakers.
- Jim Ross of Absolute Clarity had not indicated yet if he would be able to be present to show his microscopy and digital equipment.
- Micromineral donations for the event should be readied with the appropriate colored dot (indicating price) for the sales table.
- The club will buy the grand door prize, the mineral trimmer previously approved by the membership, from Excalibur Minerals.
- Joe has listed the event in the free-event listings of "Rocks and Minerals", and in the AFMLS and EFMLS Newsletters.

In reference to the MMNE newsletter, Joe said he was in the process of compiling a couple of new articles, one being on the mines of Laurion, Greece. He also said he was pleased with the quality of the subscription service that is providing interesting mineralogical articles for the newsletter. He indicated that the newsletter would not be entered into the AFMLS newsletter contest this year because he had been asked to participate as a judge in the 2010 contest. This would disqualify the MMNE.

Joe said that he had been contacted by a member of the new Rocky Mountain Micromounters for the purpose of requesting a copy of the MMNE's bylaws. He said that he offered to do a mineral swap if that club had any interest in doing so.

Field trip opportunities were also discussed. Joe said that the annual "ice walk" into Palermo Mine in North Groton, NH would occur on the first Sunday in March. Nate Martin said he has organized a collecting trip to the Red Cloud Mine on the day after the Tucson Show. Any MMNE members are welcome. Nate also said that Graves Mountain Open House (in Lincolnton, GA) would be held on the last weekend in April (23rd-25th).

Tom Mortimer gave an accounting of the treasury and announced that **DUES ARE DUE FOR 2010**. Tom said that approximately one half of last year's members had paid.

Nate Martin announced that he wished to get permission from "Rocks and Minerals" to post a series of articles ("50 Years of Mineral Collecting") by the late Gunnar Bjareby on the Boston Mineral Club's website. He requested help in obtaining the May-June 1959 and the Sept-Oct 1960 articles.

Respectfully submitted,
Bob Wilken

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The **9th Winter Gathering of Micromounters** will be held on Friday, February 26th and Saturday the 27th 2010. More details at http://www.earlrock.us/wintermicro/index.html Right now I have no idea of what might be on the program, but, whatever it is, it will be interesting, and friendly. There will be a $15 registration fee to cover expenses for refreshments and lunch on Saturday. For more information please contact Ed or Martha Cunningham Ph. 386 658-2589 or email wintergathering@windstream.net

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Greetings! The **Connecticut Valley Mineral Club** is a 70-year young educational club that supports eastern NY, western Massachusetts, and northern Connecticut by enthusiastically sharing our knowledge and expertise about rocks, fossils, and minerals. Western Mass Mineral Jewelry Fossil Show. Saturday, March 27 and Sunday, March 28, 2010. Holiday Inn at Ingleside (Exit 15 off I-91) Holyoke, Massachusetts

$4 Adult - Children 12 and under free with adult admission - Active Military ID and Scouts in Uniform FREE! -

Our 2010 Show features two event banquet rooms, Minerals, Gemstones, Jewelry, Crystals, Beads, Fossils, Lapidary, and Mineral Arts from Around the World. Live Demonstrations - Free Exhibits - Ample Secure Free Parking - On-Site Food.

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A recommendation from the COPPER COUNTRY ROCK AND MINERAL CLUB
HOUGHTON, MICHIGAN: **High Pressure Water Gun** for cleaning mineral specimens.suggested source: Valley Litho Supply Co. 1047 Haugen Ave, Rice Lake WI 54868, phone: 800-826-6781, fax: 800-962-5924, www.valleylitho.com.

Great price ($59.95 plus shipping as of 7/07/08: still the same price 04/30/09). Excellent service and return policy. AND they stock the parts to virtually rebuild, should you get careless and crack the ceramic nozzle, blow the springs, etc. You can buy direct on-line from their e-bay store
http://stores.ebay.com/Valley-Litho-Supply

Valley Litho takes all major credit cards, but especially nice is that they prefer PayPal. Also, a liberal 7-day return policy (so don't dawdle waiting to check out the gun when it arrives).: The first time we ordered from them, the gun wouldn't build pressure- just sat there and buzzed. We phoned immediately and they sent a replacement (didn't even wait for us to ship back the first gun) and the replacement arrived NEXT day (another nice feature since they are close-by in Rice Lake.) Second gun: the same thing. Apparently the entire case had the same problem, so, they rejected the first case, opened a new case and shipped the third gun which worked, and is still working beautifully, with a few extra parts thrown in for good measure. They paid all postage. Total time 'til we were up and running: four days, which is less time than waiting for a return call to place an order with two other sellers we have tried in the past and who don't seem to understand the words "replacement parts", a MUST if you're serious.

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From Tom Mortimer: My son collects baseball memorabilia. He found this outfit that makes many different styles of wall mount display cases. Some of these look like they would work well for minerals. Perhaps this would be of interest to some of our members? http://www.displaygifts.com/sport_displaycases.html

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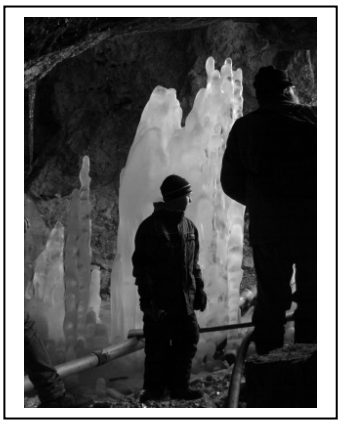
PALERMO OPEN HOUSE

Each year, the first Sunday in March means spring is almost here as friends of Bob Whitemore and fans of the Palermo Mine gather to hike up the mountain for some light exercise, to view how winter has treated the mines and to see the ice stalactites and stalagmites.

This is not a mineral collecting trip! Well, unless you collect ice. Pack a lunch, bring plenty of warm clothes, and take some great pictures. All interested should meet at the mine gates on Sunday, March 7 at 9am. For directions or more information please email Joe Mulvey at bassmeister_2000@yahoo.com



The ***Newsletter*** is the official publication of the Micromounters of New England (MMNE). The last by-laws revision was May 16, 2009. The MMNE is a member of the Eastern Federation of Mineralogical and Lapidary Societies (EFMLS) (http://www.amfed.org/efmls) and the American Federation of Mineralogical Societies (AFMS) (http://www.amfed.org). Material from the *Newsletter* may be copied in other rock and mineral publications if credit is given to the author and the *Newsletter* and permission has been obtained from the author. If there are questions regarding copying contact the editor. The club address is c/o the Secretary. Meetings are held monthly, September through May, except for December, and usually on an informal basis in July. Meeting sites may change and will be posted in the *Newsletter* as far in advance as possible. Visitors are welcome to attend all meetings. Bring a microscope and light source if you have one.

DUES are $12/year for a single person and $15/year for a family membership, levied on a calendar basis. The family membership includes two adults and all children under 18 living at the same address. One copy of the *Newsletter* will be sent on a family membership.

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MMNE Website: http://www.micromountersofnewengland.org

Schedule of Upcoming Meetings

Saturday, February 20, 2010……..Bring in your Copper Specimens for the friendly competition
Saturday, March 20, 2010……..To be determined at February meeting
Saturday, April 17, 2010……To be determined at March meeting
Saturday, May 15, 2010…….The 2010 Micromounters of New England Annual Symposium

History of the Lavrion Mines by Michael Samouhos

The history of Lavrion mines, lost to the depths of the time, is directly connected with the history of Greece. Lavrion took its name after the Greek word “lavra” which means narrow passage or tunnel describing the characteristics of mining galleries. The first underground excavations began around 3000 BC establishing Lavrion mines as the oldest in Europe. However, the production of silver was limited until 483 BC (the period of Greco-Persian wars), when the rich deposits of Maronia (present day Agios Konstantinos) were discovered and the greatest mining period began.

Laurium, Laurion, or Laureion, Thoricum before early 1000s BC, Ergastiri 'workshop' from medieval times to 19th century) is a town in southeastern part of Attica, Greece and is one of the southernmost and the seat of the municipality of Lavreotiki, famous in Classical antiquity for the silver mines which were one of the chief sources of revenue of the Athenian state, and were employed for coinage; and notorious for the treatment of the slaves who mined it. In modern times, the town is also known as Lavrio or Lavrion. It is a sea port of much less importance than nearby Piraeus.

A mine in Lavrion area (personal photo)

It is located about 60 km SE of Athens, SE of Keratea and N of Cape Sounio.

Laurium is situated on a bay overlooking the island of Makronisos (ancient times: Helena) in the east. The port is in the middle and gridded streets cover the residential area of Lavrio. GR-91 runs through Lavrio and ends south in Sounio.

Tetradrachmon coin (5th century B.C), Goddess Athena and the owl (the symbol of wisdom for ancient Greeks) are designed in the two sides (image from the book “The Ancient Lavrion”

The silver production was so high that the historians of the Classical Period wrote: “the silver is flowing like spring water”. The Lavrion silver mines soon became the principal source of wealth for the Athenian State. Hundreds of tons of silver that had been initially stored in the Parthenon treasury were liquefied in order to erect several of the city’s architectural monuments. The construction of an enormous war and trade fleet with a hegemonic presence in the Eastern Mediterranean region was financed. Fine Arts and Sciences (philosophy, mathematics, astronomy, drama, history etc.) flourished. The tetradrachmon, the currency of the Athenian State, which was constructed from the silver, became the dominant currency of the ancient world.

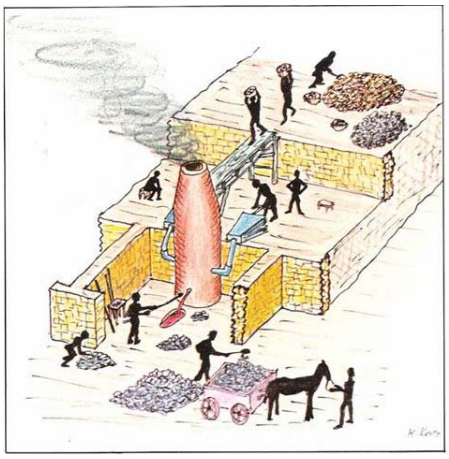
An ancient washing ore unit in the metallurgical facilities complex of Soureza

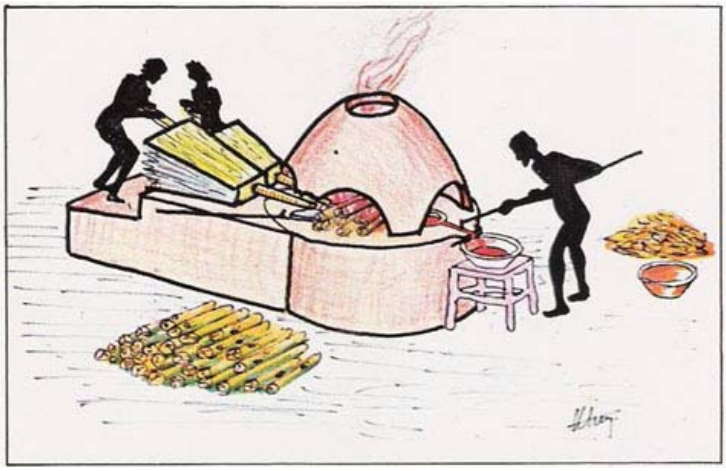
The decline of the mines came during the Peloponnesian War, a 30 year civil war between Athens and Sparta. In 413 BC, the Spartans captured Lavrion and the excavations in the mines ceased. Some decades later, Athenian economy recovered and silver production recommenced. However, Macedonia under Philip II (Alexander’s father) was now the dominant power in the Hellenic region and the silver Athenian tetradrachmon was surpassed by the golden Macedonian drachma. The works in Lavrion mines will continue, but with

decreased rates, until the first Byzantine Period (6th century AC).

At this point, we must mention that the silver and lead extraction from galena ore in the ancient times was a technological miracle. The process had four stages:

- The galena ore (which contained the silver) was enriched in washing units by using water under pressure in order to remove the light and poor in metal parts of the ore.
- The enriched galena which is a lead sulphide (PbS) + silver (Ag) was converted to the oxide form (PbO + Ag) by roasting (in metallurgy this process is called reduction roasting).
- PbO + Ag chemical compound (which is called litharge) was directed into a furnace, where it melted with carbon and produced a PbAg alloy (reduction melting process).
- The Pb-Ag alloy was next placed into a fireproof ceramic cup. The cup was heated in a specially constructed furnace were air was blowing under pressure. At 900 the alloy melted and Lead (Pb) was oxidizing while silver (Ag) was not oxidizing. Then the alloy formed two separate layers, a heavy one containing silver in the bottom of the cup and a lighter containing litharge in the top. Litharge was removing and the process was continuing until the silver in the bottom was pure (over 99%). The precious metal was then ready for coins construction.

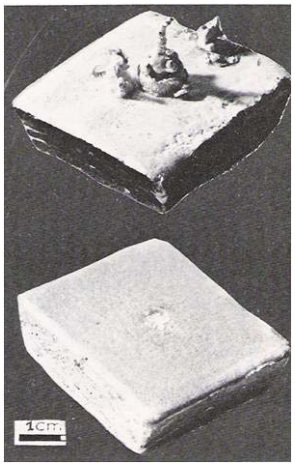




Representation of a reduction melting furnace for the production of the Pb-Ag alloy (image from the book “The Ancient Lavrion”) The most important stage of silver production process: The separation of silver from lead (image from the book “The ancient Lavrion”)

The above mentioned metallurgical process of ancient Greek metallurgists is followed, with no essential changes, until nowadays for silver production. Its efficiency was slightly improved in the late decades of 19th century by the discovery of flotation method for the ore enrichment and the Water-Jacket furnace for reduction melting. Professor Constantine Konofagos, in his significant book “The ancient Lavrion”, describes in detail the metallurgical process of silver production in the ancient period.

Lavrion area between the 6th and 19th century was abandoned, loosing all of its old glory. It was 1859 when the Greek metallurgist Andreas Cordellas was sent by the Greek government in Lavrion to examine the possibility of reopening the mines after a lapse of centuries. Cordellas detected the presence of extensive ancient mining residues which could produce large quantities of lead and zinc (zinc was an unknown metal in ancient world while lead had limited applications and was produced in small quantities). Immediately, two mining companies were founded: The Greek Company which was



The phenomenon of silver “blooming”, silver’s surface becoming rough (is “blooming”) during solidification only when its purity is over 99%. Lavrion silver was ready for coins construction only if this phenomenon was observed (image from the book “The Ancient Lavrion”)

exploiting the ancient ore residues and the French Company (led by the French-Italian J. Serpieri) which was exploiting newly discovered underground ore deposits. The Greek Company stopped its activities in 1917 while the French Company continued working until 1982. Both companies rejuvenated the abandoned city of Lavrion converting it to a great industrial city with thousands of workers. Silver, lead, zinc and arsenic were produced in vast amounts. This industrial activity became an important source of income for the newborn Greek State, which was founded in 1830 after 4 centuries of Ottoman occupation and after 9 years of national - liberating war against the Ottoman yoke.

Andreas Cordellas, the founder of new Lavrion city in 19th century (image from the book “The ancient Lavrion”)

The ore floatation factory of the Greek Company in the beginning of 20th century. With a 3350 surface was one of the biggest in the world. Unfortunately, a small part of it is saved in nowadays (image from the book “Historical and technological equipment in Greece”)

The cessation of French Company activities, after the definite exhaustion of the ore deposits, brought economic decline in Lavrion leaving thousand of workers unemployed in the late 80s. But the situation quickly changed. The construction of a passenger’s port and the development of tourism, thanks to natural beauty of the locality and the existence of archaeological monuments, led to new economic development in late 90s.

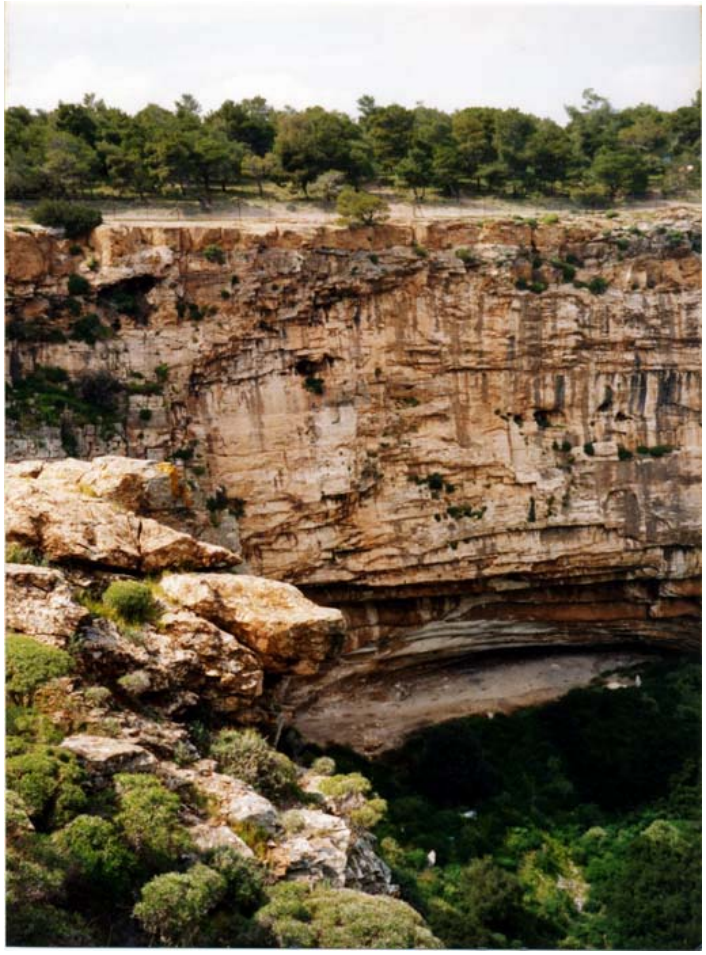
A view of the French Company facilities in 2000 (personal photo)

Today, Lavrion region (called Lavreotiki) which covers a surface of 200 is an industrial over ground museum of ancient and 19th century metallurgy industry and a huge underground mineralogical and geochemical laboratory of nature. National Technical University of Athens has undertaken the responsibility of marking, protecting and promoting the region. The total length of galleries is approaching 2000 km! The presence of about 500 mineral species has been ascertained by geologists! A small sample of them you can admire in this web site.

Geology of the Lavrion Mines

The name Lavrion is also often spelled "Laurium" (the ancient Latin spelling) and "Laurion" (which is the Anglicized version); "Lavrion" is the closest transliteration from the Greek alphabet and should be preferred. (Attiki is also often spelled either "Attika" or "Attica"; but - again - "Attiki" is the closest transliteration from the Greek alphabet.)

The various mines - and there are quite a few of them - are located within or near the town of Lavrion; the villages of Plaka and Agios Konstantinos (St. Constantine - previously named Kamareza, which is also often spelled "Kamariza," "Kameresa" and even "Camariza"); and in the "Areas" known as Elafos, Thorikos, Sounion, Soureza, Vromopoussi, etc... (There are very few actual towns or villages in the District - just the three named above - so the geography is described in many cases by "Areas" - such as the Sounion Area, which is an area south of Lavrion which is famous for its ancient Greek temple.) Some of the mines are: Adami #02, Christiana, Jean Baptiste, Hilarion, Km-3 ("Km-3" referes to the Lavrion-Agios Konstantinos road kilometer marker the mine is near), Plaka mine #80, Serperi, Sounion mine #06 ("Exi" mine), and Sounion mine #19. There are others. The numbers are part of a district-wide (not town- or area-specific) numbering system devised by geologists and collectors to distinguish the many mines who's names have been lost in the mists of time.



Openwork (quarry)

Locality: Chaos Mines, Chaos area, Lavrion District Mines, Lavrion (Laurion; Laurium) District, Attikí (Attica; Attika) Prefecture, Greece
Part of the large openwork (quarry) at the Chaos mine.

NOTES:
- Several mines in the District are the type locality for species on this list. These are noted in the specific mine list for each species. The District is NOT the type locality for any of them, though - specific mines are.
- There are NO "Km-2" and "Km-4" mines, which some materials have been labeled as coming from. The correct locality for specimens labeled thusly is usually the "Km-3" mine. The name "Adayir" seems to be a fictitious name for the Adami mine #02.

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Acanthite
Adamite
var: Alumino Adamite
var: Cobaltoan Adamite
var: Cuprian Adamite
var: Manganoan Adamite
var: Nickeloan Adamite
'Agardite'
Agardite-(Ce)
Agardite-(La)
Agardite-(Y)
Aikinite
Akaganeite
Allophane
Aluminocopiapite
Alunogen
Amesite
Anatase
Andorite
Anglesite
Ankerite
Annabergite
var: Magnesian Annabergite
Anthonyite
Antimony
Antlerite
Aplowite
Aragonite
var: Flos Ferri
Arfvedsonite
Argentojarosite
Argentopyrite
Arsendescloizite
Arsenic
Arseniosiderite
Arsenobismite
Arsenocrandallite
Arsenogorceixite
Arsenogoyazite
Arsenolamprite
Arsenolite
Arsenopyrite
Arsentsumebite
Arthurite
Artinite
Arzrunite
Asbolane
Atacamite
Atelestite
Attikaite (TL)
Aubertite
Aurichalcite
Aurorite
Austinite
var: Cuprian Austinite
Azurite
Bariopharmacosiderite
Barstowite
Baryte
Bastnäsite-(La)

Beaverite
Berthierite
Betekhtinite
Beudantite
Beyerite
Bianchite
Bindheimite
Bismite
Bismoclite
Bismuth
Bismuthinite
Bismutite
Blixite
Boleite
Bornite
Botallackite
Boulangerite
Bournonite
Boyleite
Brianyoungite
Briartite
Brochantite
Brookite
Brucite
Bukovskýite ?
Calcite
Caledonite
Calumetite
Carbonatecyanotrichi
Carminite
Cerussite
Chalcanthite
'Chalcedony'
Chalcoalumite
Chalcocite
Chalcophanite
Chalcophyllite
Chalcopyrite
Chalcostibite
Chenevixite
Chenite
Chlorargyrite
var: Bromian Chlorargyrite
Chlorophoenicite
Chloroxiphite
Chrysocolla
Cinnabar
Claringbullite
Clinoatacamite ?
Clinomimetite
'Clinopyroxene Subgr
Cobaltaustinite
Conichalcite
Connellite
Copiapite
Copper
Coquimbite
Corkite
Cornubite
Cornwallite
CoronaditeCosalite

Cotunnite
Covellite
Creedite
Cryptomelane
Cubanite
Cumengeite
Cuprite
var: Chalcotrichite
Cuprocopiapite
Cyanochroite
Cyanotrichite
Dadsonite
Damaraite
Delafossite
Descloizite
Devilline
Diaboleite
Diaphorite
Digenite
Dimorphite
Djurleite
Dolomite
Dufrénite
Duftite
Dundasite
Dypingite
Dyscrasite
Dzhalindite
Ecdemite
Elyite
Enargite
Endellite
Epsomite
Erythrite
Ettringite
Euchroite
Famatinite
Feinglosite ?
Feroxyhyte
Ferrihydrite
Fibroferrite
Fiedlerite (TL)
Fluorite
Fornacite
Fraipontite
Freedite
Freibergite
Fülöppite
Gaitite
Galena
Gartrellite
Gaspéite
Gearksutite
Georgiadèsite (TL)
Germanite
Gersdorffite
Gibbsite
Gilalite
Glaucocerinite (TL)
Glaukosphaerite ?
Goethite

Gold
Gorceixite
Gordaite
Goslarite
Goudeyite
Grandreefite
Greenockite
Groutite
Guérinite
Gunningite
Gypsum
var: Selenite
Halite
Halloysite
Halotrichite
Hawleyite
Heinrichite
Heliophyllite
Helmutwinklerite
Hematite
Hemimorphite
Herbertsmithite
Hetaerolite
Hexahydrite
Hidalgoite
Hinsdalite
Hisingerite
Hohmannite
Hollandite
Honessite
Hörnesite
Huntite
Hydrocerussite
Hydrohetaerolite
Hydromagnesite
Hydroniumjarosite
Hydrotalcite
Hydrowoodwardite
Hydrozincite
Ilmenite
IMA2002-034 (TL)
Iodargyrite
Jamesite
Jamesonite
Jarosite
Johannite
'Kamarezite'
Kamarizaite (TL)
Kaňkite
Kapellasite (TL)
Kermesite
Kettnerite
Keyite
Kieserite
Kolwezite
Koritnigite
Kornelite
Köttigite
Kröhnkite
Krupkaite
Ktenasite (TL)

Lanarkite
Langite
Laurelite
Laurionite (TL)
Lautenthalite
Lavendulan
Lead
Leadhillite
Legrandite
Lemanskiite
Lepidocrocite
Limonite
Linarite
Litharge
Lizardite
Löllingite
Lorettoite
Ludjibaite
Ludlockite
Luzonite
Macphersonite
Magnesiocopiapite
Magnesite
Magnetite
Mahnertite
Malachite
Maldonite
Mammothite
Manganite
Mapimite
Marcasite
Massicot
Matlockite
Mawbyite
Meixnerite
Melanterite
Mendipite
Mereiterite (TL)
Metavoltine
Miargyrite
Microcline
Millerite
Millosevichite
Mimetite
Minium
Mixite
Monteponite
Mooihoekite
Morenosite
Murdochite
Namuwite
Natroalunite
Natroglaucocerinit e (TL)
Natrojarosite
Nealite (TL)
Népouite
Nesquehonite
Nickelaustinite
Nickelhexahydrite
Nickeline
Niedermayrite

Niedermayrite (TL)
Nontronite
Nordstrandite
Ojuelaite
Olivenite
Opal
var: Opal-AN
Orpiment
Orthoserpierite
Osakaite
Osarizawaite
Otavite
Ourayite
Owyheeite
Pääkkönenite
Paracoquimbite
Paradamite ?
Paralaurionite (TL)
Paramelaconite
Parasymplesite
Paratacamite
Parnauite
Paulmooreite
Penfieldite (TL)
Percylite
Perite
Pharmacolite
Pharmacosiderite
Philipsbornite
Philipsburgite
Phosgenite
Pickeringite
Picropharmacolite
Pitticite
Plattnerite
Plumbogummite
Plumbojarosite
Polybasite
Polyhalite
Posnjakite
Preisingerite ?
Proustite
Pseudoboleite
Pseudocotunnite
'Psilomelane'
Pyrargyrite
Pyrite
Pyrolusite
Pyromorphite
Pyrostilpnite
Pyrrhotite
Quartz
var: Milky Quartz
Quenstedtite
Ralstonite
Rammelsbergite
Ramsdellite
Ransomite
Realgar
Rhodochrosite
Richelsdorfite
Robinsonite
Romanèchite
Römerite
Rooseveltite
Rosasite
var: Nickeloan
Rosasite
Rosickýite
Rösslerite
Rozenite
Rutile
Safflorite
Sainfeldite
Saponite
Sauconite
Scheelite ?
Schulenbergite
Schultenite
Scorodite
Scrutinyite
Segnitite
Senaite
Sénarmontite
Serpierite (TL)
Shakhovite
Shannonite
Shubnikovite ?
Siderite
Siderotil
Silver
Slavíkite
Smithsonite
var: Cuprian
Smithsonite
Spangolite
Sphalerite
Spherocobaltite
Starkeyite
Stephanite
Stibarsen
Stibiconite
'Stibioenargite'
Stibnite
Strashimirite ?
Strontianite
Sulphur
Susannite
Symplesite
Talmessite
Talnakhite
Tamarugite
Tenorite ?
Tetrahedrite
Thometzekite
Thomsenolite
Thorikosite (TL)
Tooeleite
Trippkeite
Tripuhyite
Troilite
Tsumcorite
Tyrolite
UM1992-30-SO:CCuHZn
'Unnamed (Orthorhombic dimorph of Barstowite)'
Valentinite
Vanadinite
Vauquelinite
Vernadite
Veszelyite
Volborthite
Voltaite
'Wad'
Wallkilldellite-(Mn)
Warikahnite
Willemite
Wittichenite
Woodruffite
Woodwardite
Wroewolfeite
Wulfenite
Wurtzite
Xanthiosite
Xanthoconite
Zaccagnaite
Zálesíite
Zdeněkite
'Zeiringite'
Zincaluminite (TL)
Zincite
Zincmelanterite
Zincocopiapite
Zincolivenite (TL)
Zincowoodwardite (TL)
Zincrosasite
Zinkenite

DON'T FORGET TO RENEW YOUR MEMBER SHIP!!!

Original Article
Geology and Origin of Supergene Ore at the Lavrion Pb-Ag-Zn Deposit, Attica, Greece
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ABSTRACT

The Lavrion carbonate-hosted Pb-Ag-Zn deposit in southeast Attica, Greece, consisted of significant non-sulfide ore bodies. The polymetallic sulfide mineralization was subjected to supergene oxidation, giving rise to gossan. The principal non-sulfide minerals of past economic importance were smithsonite, goethite and hematite. The supergene mineral assemblages occupy secondary open spaces and occur as replacement pods within marble. Calamine and iron ore mainly filled open fractures. X-ray diffraction and scanning electron microscopy of samples of oxidized ore indicate complex gossan mineralogy depending on the hypogene mineralogy, the degree of oxidation and leaching of elements, and the local hydrologic conditions. Bulk chemical analysis of the samples indicated high ore-grade variability of the supergene mineralization. On multivariate cluster analysis of geochemical data the elements were classified into groups providing evidence for their differential mobilization during dissolution, transport and re-precipitation. The mode of occurrence, textures, mineralogy and geochemistry of the non-sulfide mineralization confirm that it is undoubtedly of supergene origin: the product of influx into open fractures in the country rock of highly acidic, metal-rich water resulting from the oxidation of pyrite-rich sulfide protore. Dissolution of carbonates led to opening of the fractures. Mineral deposition in the supergene ore took place under near-neutral to mildly acidic conditions. The supergene dissolution and re-precipitation of Fe and Zn in the host marble increased metal grades and separated iron and zinc from lead, thereby producing economically attractive deposits; it further contributed to minimization of pollution impact on both soil and ground water.

Abstract courtesy of
Wiley Interscience website

http://www3.interscience.wiley.com/journal/122217404/abstract?CRETRY=1&SRETRY=0

Adamite
Hilarion Mine, Aghios Konstantinos Bildbreite: 3-4mm

Kamariza
A small village situated around 4.5 km W of the town of Lavrion. The village was called Kamareza until the 1980s (similar names have been used in English to translate the Greek name).
Several mines are located in or around the village, all together often called "Kamareza mines". The most important (but not the only ones) are the Serpieri, Jean Baptiste, Hilarion and Christiana mines. All these mines consist of many interconnected ancient tunnels, often connected with tunnels from different mines, which can make accurate locality designation difficult. Most specimens from "Lavrion" are actually from one of these mines.

Agardite (REE)
Hilarion Mine, Aghios Konstantinos Bildbreite: 4mm

Agardite' minerals are rare-earth rich members of the Mixite Group. They form a complete series with Mixite.

Agardite was named for Jules Agard, geologist with the Bureau de Recherches Géologiques et Minières, Orléans, France.

This mine and the Christiana mine are co-type localities for zincowoodwardite; and this mine and the Serpieri mine are co-type localites for natroglaucocerinite.

The adit is known for very nice cuprite crystals.

Note: labels stating "Kamareza Mine No. 48" or "Hilarion No. 48" are incorrect.

Annabergite : Ni3(AsO4)2·8H2O
Photo Copyright © Jean-Marc Johannet
Locality: Km-3 Mine, Lavrion Mines, Lavrion (Laurion; Laurium), Lavrion District Mines, Lavrion (Laurion; Laurium) District, Attikí (Attica; Attika) Prefecture, Greece
Field of view: 2.5 mm, Photo & Collection: JM.Johannet.
Acquired from Bernard Mary.

Annabergite
Vivianite Group, Annabergite-Erythrite Series.
Annabergite is the nickel analogue of Erythrite. It is often found as a green alteration coating on other nickel minerals.

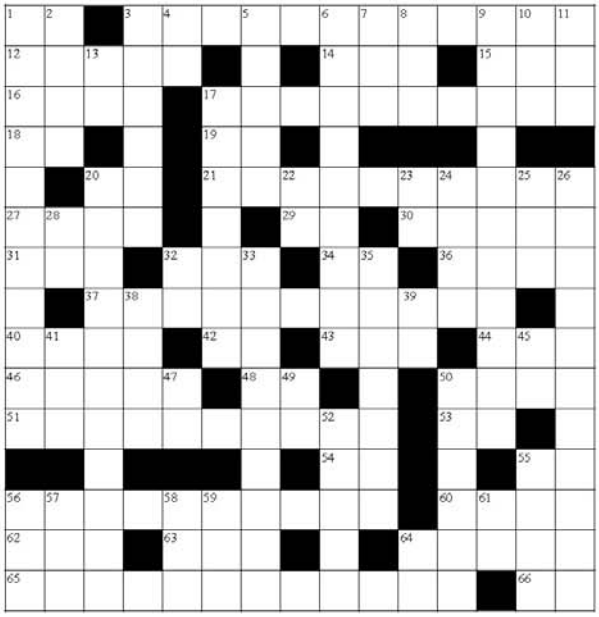
Formula: $Ni_3(AsO_4)_2 \cdot 8H_2O$

System:	Monoclinic	**Colour:**	Green, pale rose, light ...
Lustre:	Earthy	**Hardness:**	1½ - 2½
Name:	Named after one of the Co-type localities, Annaberg, Saxony, Germany.		

A small ancient mine working a Ni deposit west of the town of Lavrion, situated close to the "Km 3" milepost on the road from the town of Lavrion to the village of Agios Konstantinos (formerly Kamareza), around 2.5 km from each. One of the most famous localities within the Lavrion district, known for the world's best annabergite specimens, with bright green crystals reaching 1 cm. Most well-crystallized specimens are the Mg-rich variety termed "cabrerite" (obsolete name), showing bright apple-green color.
Specimens can still be found in the dumps.

Crystal Matrix Crossword

Geoscience Miscellany



ACROSS

1 mineral collector (ab)
3 aluminosilicate from Monte Somma, Italy
12 of the wind
14 ___-fold axis in hexagonal or cubic system
15 meaning new
16 formed in a cirque by a glacier
17 goethite belongs to this group
18 very abundant element in rocks
19 ante meridiem
20 element named for the country of Fries
21 cuprite sometimes has this ten-sided form
27 work (Latin)
29 12 inches (ab)
30 a shinbone of a mammoth
31 river in Germany running into the Meuse
32 Cantonese swear word
34 info tech
36 long times
37 big, mean and dead
40 laugh
42 element in carrolite
43 crazy about crystals
44 irreducible (ab)
46 He, Ne, Ar, are ____
48 element found in the Merensky Reef, S.A.
50 of the air we breathe
51 extensive chain of mtns.
53 element named 4 Germany
54 amplitude modulation
55 measure of acidity
56 site of big mineral show
60 resident of Bangkok
62 Salt Lake City (ab)
63 to regret
64 what acid does with calcite
65 color-change chrysoberyl
66 element that can combine with gold to form minerals

DOWN

1 changed in form
2 plant fossil fuel
3 keep the lights on
4 integrated circuit
5 has the same ending
6 line on quartz crystal
7 Peruvian soft drink
8 blended together
9 Ca, Mg borate
10 don't drink it, golf it
11 Earth Observing System
13 left to right
17 built wall in Britain
20 pushing something forward
22 element named 4 Cailfornia
23 space alien
24 Mon ____!
25 Norse dwarf
26 Sr, Ba, Na phosphate
28 bomb element
32 drive
33 done with a uniplaner
35 "harbor wave" in Japanese
38 little more than a yard
39 where its __
41 ___ Domini
45 room (ab)
47 element found in rutile
49 tellurium
50 banded silicate gems
52 more than one ratio
55 the Warsaw ____
56 Confederate States of America
57 not well
58 Irish Republican Army
59 wears a whimple
61 half a laugh
64 element number 75

LAST MONTH'S SOLUTION: Places

F	R	■	N	A	T	R	O	N	I	O	B	I	T	E
R	I	S	E	R	■	A	■	I	I	W	■	R	A	P
A	C	E	Y	■	C	I	N	C	I	N	N	A	T	I
N	H	■	I	■	U	N	■	A	■	■	■	N	■	■
K	■	I	T	■	P	Y	R	R	H	O	T	I	T	E
L	O	D	E	■	R	■	T	A	■	S	I	T	E	S
I	R	E	■	R	I	B	■	G	D	■	D	E	S	K
N	M	■	A	N	T	I	Q	U	I	T	Y	■	L	E
I	O	B	E	■	E	K	■	A	G	E	■	L	A	B
T	L	A	P	A	■	I	N	■	G	■	M	E	S	O
E	U	C	R	P	Y	T	I	T	E	■	A	D	■	R
■	■	A	■	■	■	A	■	I	R	■	N	■	O	N
C	A	R	N	E	L	I	A	N	S	■	I	N	R	I
O	S	D	■	R	A	T	■	U	■	F	L	I	N	T
P	H	I	L	A	D	E	L	P	H	I	A	■	E	E

DIRECTIONS TO TRINITY LUTHERAN CHURCH, CHELMSFORD MA

170 Old Westford Rd., Chelmsford, MA.
From Rt. 3, take Exit 32, (The "Drum Hill Rotary").
From Rotary, Take Old Westford Rd. towards Westford for about .85 miles to Grandview Rd.
Entrance for Trinity Lutheran Church on left.
Proceed up rather long driveway to parking area.

If things go according to plan, we should be able to use the entrance on the far left side of the church.
Our meeting room is just inside this entrance.

Those coming from the south may want to try an alternate route, exiting from Rt. 495 at Exit 33, then taking Rt. 4 north to a left onto Davis Rd. See map below.

Table of Contents

MEMBERSHIP FORM, NEW AND RENEWAL IT IS THAT TIME!!!!

Membership in the MMNE runs from January 1st to December 31st. Dues are payable on or before January 1st for the upcoming year. Failure to renew on time will result in cancellation of membership including the subscription to the Newsletter. Please fill out this form and return it with your payment.

Name: _____

Street/PO Box Address: _____

City/State/Zip : _____

Telephone: _____

E-mail address: _____

___ Hard copy via USPS or ____ via email to above address

Membership type: Individual $ 12.00 Family $ 16.00
Family membership includes two adults residing at the same address and all children at that address under the age of 18. Only one copy of the Newsletter per family membership.
Newsletter: The Newsletter is available as hard copy sent through the mail, or via email, which may have color photographs included. Please indicate choice of format. The Newsletter is published in January, February, March, April, May, Summer Issue (June), September, October and November (no December issue), and is send out approximately two weeks prior to the next scheduled meeting.
Please remit payment to Treasurer Tom Mortimer, 3 Roberts Rd., Amherst, NH 03031

Joe Mulvey, Newsletter Editor
Micromounters of New England
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Nashua, NH 03062

TO: