HUI PŌHAKU 'O HAWAI'I
Rock & Mineral Society of Hawai'i, Inc.

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COPPER MINERALS

BY DEAN SAKABE

Bob Moffitt recently visited the Keweenaw Peninsula area in Michigan. At our meeting, he has agreed to share his experience with us.

The Keweenaw Peninsula (1), in Michigan contains one of the largest and most unique copper deposits in the world. It is the only district where native copper was the primary mineral mined throughout the lifespan of the mines. The preserved geologic history consists of rocks from the Precambrian and Pleistocene glacial deposits.

The Keweenaw Peninsula is in Upper Michigan and extends into southern Lake Superior. The peninsula is approximately 150 miles long and 50 miles wide. The Keweenaw fault extends along the length of the peninsula and marks the boundary between the Mid-continent rift and continental rocks. The rift valley was filled with a combination of extrusive volcanic rocks and sediments derived from the igneous rocks. Within this area is the Greenstone flow, which is one of the largest lava flows in the world. It can be mapped for 90 km on the peninsula and is also found on Isle Royale 60 miles northwest on the other side of the rift valley. It has a thickness of up to 1 mile with a volume estimated between 500 to 1,000 sq. miles of lava.

Utilization of copper from both the glacial float and shallow mines occurred for at least 6800 years. Native Americans may have mined between 100 and 500 million pounds of copper from deposits on the peninsula. The fissure veins were the first type of deposit to be exploited by the early prospectors in the 1840's to 1880's. The mines produced large masses of native copper (up to 520 tons), however they were of irregular distribution, and difficult to find. The greatest production of copper was from gas pockets in the lavas on the top portions of the flows. More than 11 billion pounds of copper have been produced in the district over the 150 years of mining activity.

Currently, the only mining that is occurring is in the Caledonia mine, which is being mined for copper and other mineral specimens. Several mines have tours which give a flavor of the conditions under which the miners lived and worked.

(1) The Keweenaw Peninsula, Michigan

MEETING
Wednesday
March 24
7:00—9:00 pm
Makiki District Park Administration Building

NEXT MONTH
"Pretty Poisonous Minerals"
Wednesday
April 28

LAPIDARY

Every Thursday
7pm-9pm
Second-floor Arts and Crafts Bldg
Makiki District Park

MEMBERSHIP COSTS 2008

Single: $10.00
Family: $15.00

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The world's best specimens of native copper have been found in the mines in this district. It also has seen the production of silver crystals, copper included calcite crystals, chalcocite, copper arsenides, and secondary copper minerals.

Copper (2) gets its name from the Greek word *kyprios*, in reference to the Island of Cyprus, where copper deposits were mined by the ancient Greeks. The chemical symbol for copper is Cu which is derived from the Latin name for copper, *cuprium*.

Copper was the first metal used in significant quantity. The Greeks found that it could easily be hammered into sheets, which in turn could be worked into shapes of increasing complexity. The Greeks also found that they could alloy other metals to produce bronze and brass. Although iron became the metal of choice of western civilization, it was still the copper metals which were used when a combination of strength and durability was required. The ability of copper to resist corrosion ensured that copper, bronze and brass remained as functional and decorative materials throughout history and onto the present day.

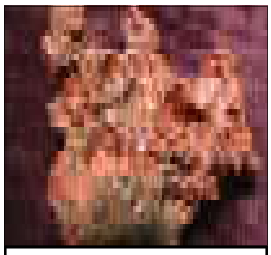
More than 5 million tons of copper are produced annually and copper metals are playing an increasingly vital part in many branches of modern technology. The ductility of copper, which led to its use for water piping in ancient Egypt, is illustrated by the countless thousands of miles of copper tube in contemporary plumbing and heating systems. Copper is corrosion resistant, which induced the Romans to use it for sheathing the roof of the Pantheon. It is still in use today as sheathing on roofs. Additionally, the electrical conductivity of copper, which was utilized by Michael Faraday in his epoch-making experiments, remains the key to modern power generation.

Copper easily combines with a number of other elements and ions to form a wide variety of copper minerals and ores (3). The following is a few of the copper minerals.

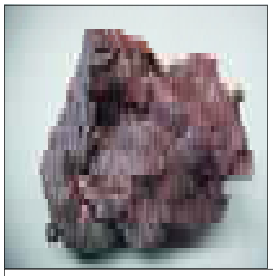
Cuprite (4) (Copper Oxide) is a major ore of copper and is mined in many places around the world. Cuprite gives the greatest yield of copper per molecule since there is only one oxygen atom to every two copper atoms. As a mineral specimen, Cuprite shows fine examples of well-developed cubic crystal forms. Cuprite's dark crystals show internal reflections of the deep red color inside the almost black crystal. Other varieties, such as chalcotrichite, show tufts of needle-like crystals that have a beautiful red color and a special sparkle that make them popular display cabinet specimens. Cuprite has been found in Arizona, Africa, Australia, and Chile.

Malachite (5) (Copper Carbonate Hydroxide) is a famous and very popular semi-precious stone, named for the Greek word for "mallow", a green herb. Malachite has banded light and dark green designs, which give it a unique ornamental quality unlike that of any other stone. The light and dark green bands are so distinctive that Malachite could be the most easily recognized mineral. Malachite forms the banding from subtle changes in the oxidation states of the surrounding pore waters. Malachite forms in massive nodules, however, it also forms crystalline structures, along with other unique features. It has fine acicular crusts and tufts (6) (appearing as a mat of thin hairs), and another unusual form is found in stalactitic habits. Malachite has been found in many localities such as the Ural Mountains (Russia), Tsumeb (Namibia), Shaba (Congo), Australia, England, and Arizona.

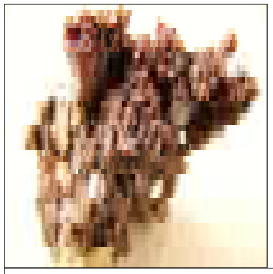
(5) Malachite
Kalukaluku Mine, Katanga Proirng, Congo



(2) Native Copper
Keweenaw, Michigan



(3) Copper and Cuprite
Red Dome Mine, Queensland, Australia



(4) Cuprite
Ray Mine, Pinal County, Arizona

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Azurite (7) (Copper Carbonate Hydroxide) has a deep blue color called "azure", hence its name. Azure is derived from the Arabic word for blue. The blue color is due to the presence of copper, and the way copper chemically combines with the carbonate groups (CO3) and hydroxyls (OH). Azurite has been used as a dye for paints and fabrics for eons. Azurite is frequently associated with Malachite (8), often occurring together, being that they have very similar formula. Malachite can replace azurite, making a pseudomorph, or an exact copy of an azurite crystal (only now instead of being blue, it would be green). Azurite paints made centuries ago have undergone the oxidation transformation so that paintings of formerly beautiful blue skies now have a most unusual green hue. Fine crystal clusters, nodular specimens, and interesting and beautiful combinations with malachite are important pieces in anyone's mineral collection. Azurite his found in Bisbee (Arizona), Lasal (Utah), New Mexico, China, Toussit (Morocco), Tsumeb (Namibia), Mexico, Shaba (Congo), and Australia.

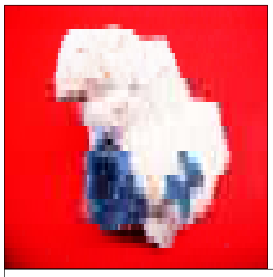
Dioptase (9) (Hydrated copper silicate) is a very beautiful mineral, which can challenge even emerald's deep green color. Unfortunately, it is rather soft (for gemstones) and has good cleavage, therefore is not usually cut as a gemstone. Dioptase is one of the few silicates to crystallize in the same symmetry class as dolomite and forms crystals that can have a typical carbonate's rhombohedral shape. Specimens of dioptase are often deeply colored and show well developed crystals. The faces of the rhombohedrons, and even the prism faces, are very reflective due to a high luster. Crystals can be quite clear with very deep color. Dioptase has been found in California, Arizona, Tsumeb, Nambia, Zaire, Russia and Chile.

Chalcopyrite (10) (Copper Iron Sulfide) sometimes called copper pyrite, is easily confused with Pyrite. Chalcopyrite is one of the minerals referred to as "Fool's Gold" because of its bright golden color. As an ore of copper, the yield of chalcopyrite is rather low, only 25%, compared to other copper minerals, however the large quantities and widespread distribution of chalcopyrite make it the leading source of copper. Chalcopyrite is a common mineral and is found in almost all sulfide deposits. Fine crystals of chalcopyrite have a unique character and make fine additions to anyone's collection. Chalcopyrite has been found in Chile, Peru, Mexico, Europe, South Africa, and several states in the US.

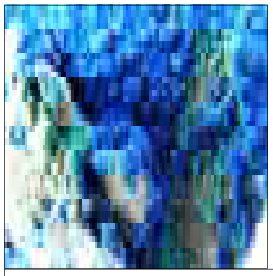
Chrysocolla (Hydrated copper silicate) is an attractive blue-green mineral that provides a unique color to the mineral world. Chyrsocolla is more appropriately a mineraloid (amorphous, inorganic substance lacking a crystal structure), they are mineral in nature but lack the crystal structure that a true mineral has. Chrysocolla forms in the oxidation zones of copper rich ore bodies. Pure Chrysocolla is soft and fragile and therefore not appropriate for use in jewelry. However, chrysocolla often is "agatized" in chalcedony quartz and it is the quartz that provides the stone with its polish and durability. Druzy Chrysocolla is a rock composed of agatized chysocolla with a crust of small sparkling quartz crystals in small cavities. Occasionally, Chrysocolla can have a turquoise color and be used as a fraudulent substitute for turquoise. Chrysocolla has been found in Arizona, Utah, New Mexico, Pennsylvania, Israel, Zaire, and England

(9)Dioptase
Altyn Tube Mine, Quebec, Canada

(6) Malachite
Tsumeb, Namibia



(7) Azurite
Harts Ranges, Northern Territory, Australia



(8) Malachite on Azurite
Metcalf, Arizona

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(10) Chalcopyrite and Quartz
Boldut mine, Cavnic, Maramures, Romania

(11) Royston Turqouise
Tonapah, Nevada

Turquoise (11) (Hydrated Copper Aluminum Phosphate), could possibly be the most valuable, non-transparent mineral in the jewelry trade. It has been mined since at least 6000 BC, by early Egyptians and also used in ornamental creations by Persians and Native Americans. Turquoise continues to be very popular with today's jewelry market. Although crystals of any size are rare, some small crystals have been found in Virginia and elsewhere. Most specimens are cryptocrystalline, meaning that the crystals could only be seen by a microscope. The finest turquoise comes from Iran but is challenged by some southwestern American specimens. Turquoise is often imitated by "fakes", such as the mineral chrysocolla, and poorer turquoise specimens are often dyed or color stabilized with coatings of various resins. The name comes from a French word which means "stone of Turkey", from where Persian material passed on its way to Europe. Turquoise is found in Arizona, New Mexico, Nevada, Mexico, Australia, Iran, Afghanistan, and China.

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News and Notes, page 5

DOOR PRIZES

Please note that we have instituted door prize drawings at our monthly meetings. Because of Hawaii's gambling laws, these drawings cannot be conducted in the common "raffle" format where tickets are sold. Rather, each *paid* member attending the meeting will receive a drawing ticket upon request. A voluntary donation of $1.00 is requested and encouraged. Drawings will be conducted at the end of the meeting with available prizes awarded in random order. You must be present to win. Please remember: if you win a prize, please bring one to the next meeting. This helps to keep our drawings going. Thank you.

WE HAVE A WEBSITE!
http://pohakugalore.net/Hui_pohaku/Hiu_pohaku_1.html

MAHALO TO MARKUS FOR HELPING US GET OUT OF THE ELECTRONIC *STONE AGE*!

THE METAPHYSICAL PROPERTIES OF RED GEMSTONES
BY JADE EMORY

Red is the color associated with the 1st chakra at the base of the spine, where the "coiled serpent" of the kundalini resides. Once awakened by a spiritual Master, the kundalini rises up the spine and awakens the 6 other chakras and their corresponding levels of increasingly subtle consciousness. Therefore, red gems support the worldly function of animal-level survival as a baseline for spiritual growth. Paradoxically, many disciples of meditation Masters need to work on this mundane experience because in past lives their focus was on more lofty metaphysical pursuits. Red gems help a person to ground, as do black gems. But red gems add the creative fire to that grounding, so that worldly manifestation is an exciting process.

If a person has the astrological sign Leo as their Sun Sign, or otherwise prominent as their Rising Sign, they may be attracted to rubies. However, if they have too much fire in their birth chart, rubies can actually cause fevers or "burnout".

Many red gems have manganese in their chemical makeup. Manganese is very soothing to emotional pain. In fact, although the heart chakra usually responds to green stones, it is red African Rhodochrosite that heals a traumatized heart. Even rose quartz, which is pink rather than red, helps people suffering from depression.

Rock & Mineral Society of Hawai`i, Inc.

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The Rock & Mineral Society meets on the 4th Wednesday of each month (except for adjusted dates in November and December) at the Makiki District Park, 7:00 - 9:00 pm. Enter from Keeaumoku Street. Parking is free but limited.

The Newsletter is published monthly, some days prior to the meetings and is distributed in electronic format by email (Adobe Acrobat PDF file attachment). Printed copies are "snail" mailed to those who do not have email. The electronic format usually contains full-color images; the print version may be limited to B&W due to reproduction costs.

Any newsletter comments are appreciated, and can be sent to elise.thomasson@gmail.com

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