

# HUI PŌHAKU 'Ō HAWAI'I

## Rock & Mineral Society of Hawai'i, Inc.



VOLUME 44, NO. 7

JULY 2009

### PRECIOUS METALS

BY DEAN DASKABE

Wikipedia defines a Precious Metal as a “rare metallic chemical element of high economic value.” These precious metals have historically been gold and Silver, of which they were primarily used in art, jewelry and currency. However, we could expand upon this list by including Platinum, Copper and Aluminum.

**Gold** is one of the most well-known minerals, known for its value and special properties since the earliest of time. Most of the natural gold specimens have been smelted for production, so nice natural specimens are very highly regarded and worth much more than the standard value of gold (1).

Gold in its natural form usually has traces of silver, and sometimes traces of copper and iron. A gold nugget is usually 70 to 95 percent gold, with the remainder mostly silver. The color of pure gold is bright golden yellow, but the greater the silver content, the whiter its color. Much of the gold mined, is actually from gold ore rather than actual gold specimens. The ore is often brown, iron-stained rock or massive white quartz containing minute traces of gold (5). The ore is then crushed and the gold is separated from the ore by various methods.

Gold nuggets, a popular form of gold with collectors, are formed when erosion causes a large piece of gold to separate from its mother rock, and then gets carried into a stream or river. The flowing water tumbles the gold, giving it its distinct rounded shape. The gold eventually settles at the bottom of the water, and due to its heaviness, remains there. Other nuggets also get caught in the same area, forming a placer deposit.

Gold is the most malleable and ductile sub-

stance known. It can be flattened out to less than 0.00001 of an inch and a 1 oz. (28 gram) mass can stretch out to a distance of over 50 miles. Gold is also one of the most resistant metals. It won't tarnish, discolor, crumble, or be affected by most solvents. This malleability and ease of working the metal, has made gold the metal of choice for ornaments. Especially noteworthy are the golden ornaments from the tombs of the Pharaohs in Egypt, where gold masks, statues, coins, and jewelry was archeologically excavated. Along with jewelry, gold has been also been used for coinage throughout the centuries, and is currently accepted internationally as a standard value.



(1) Gold “The Whopper” (Sixteen to One Mine, Alleghany, California)

#### MEETING

Wednesday

July 22

7:00—9:00 pm

Makiki District

Park

Administration

Building

#### NEXT MONTH

Green Minerals

#### 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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## Precious Metals, page 2

As pure gold is easily bent and dented, it is always alloyed with other metals when used in jewelry. This makes it more durable and practical for ornamental use. The purity of the gold based on the alloyed metal is measured in karat weight. The karat measurement determines the percentage of gold to other metals on a scale of 1 to 24, with 24 karats being pure gold.

**Silver** is another precious metal which has also been used for ornamental purposes since the earliest of times. Most silver is extracted from silver ores, but considerable amounts are mined from Native Silver (2). Silver can be found pure, but is usually mixed with small amounts of gold, arsenic, and antimony.

Silver is a very resistant mineral, in that it does not dissolve in most solutions and won't react to oxygen or water. However, it has a detrimental reaction to sulfur and sulfides, which cause it to tarnish on exposed surfaces. For example, hydrogen sulfide (H<sub>2</sub>S) naturally occurs in the atmosphere in small quantities, when silver is exposed to normal air it reacts to the hydrogen sulfide, causing the tarnish. Egg yolks, which contain sulfur compounds, should be kept away from silver. Several chemical coats are available to protect silver from tarnish, as well as various polishes to remove the tarnish.

Silver also has many unique physical properties. Silver is a very good conductor of electricity, is the second most malleable and ductile metal, and is in greater abundance than all other precious metals with similar properties. Silver is largely used as jewelry, ornaments, and coins. It is very easy to work with, and many objects are created from it such as goblets, candelabras, trays, and cutlery. In the industrial sector, silver is widely used for electrical apparatuses and circuits. It is also used for medicinal purposes, particularly in dentistry, for bactericides, and for antiseptics



2) Silver (Keenly-Frontier Mine, Lorrain Township, Ontario, Canada)

**Platinum** is the rarest and most expensive of the precious metals. It is much rarer than gold. Due to its rarity and lack of good crystals, it is seldom represented in mineral collections and is not readily available to mineral collectors (3).

Natural Platinum is fairly impure. It is always associated with small amounts of other elements, such as gold, copper, nickel, and iron, and many times contains the rare heavy metals iridium, osmium, rhodium, and palladium. Platinum is a precious metal used in jewelry as ring settings, bracelets, and necklaces. Platinum also has a number of industrial uses due to its other special properties. The most famous is its use as a *catalyst* (anti-pollution device), found in car mufflers. It is also used for numerous laboratory apparatuses and as dental fillings.



(3)Platinum (Kunder Massif, Russia)

**Aluminum** could be considered a precious metal, since before the 1900s, it was one of the most difficult metals to extract from ores. Aluminum is a very reactive metal, which does not occur in a natural metallic state. Therefore, it was unknown as a separate element until the 1820s, although its existence was predicted by several scientists who had studied aluminum compounds. It was produced in metallic form independently by the Danish chemist and physicist, Hans Christian Oersted, and the German chemist, Frederick Wohler, in the mid-1820s.

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## Precious Metals, page 3

Aluminum was refined at great expense and at this time was more valuable than gold. Bars of aluminum were exhibited alongside the French Crown jewels at the Exposition Universelle of 1855, and Napoleon III's most important guests were given aluminum cutlery (those less worthy dined with silver cutlery). Additionally, the pyramidal top of the Washington Monument is made of pure aluminum, which at the time of its construction was as expensive as silver.

The name aluminum was derived from *alumen*, the Latin name for alum (an aluminum sulfate mineral). The metal was called aluminium with the *-ium* ending being the accepted ending for most elements at this time. This usage persists in most of the English-speaking world except the United States, where the last *i* has been dropped from the name.

Because aluminum metal reacts with water and air to form powdery oxides and hydroxides, aluminum metal is never found in nature. Many common minerals, including feldspars, contain aluminum, but extracting the metal from most minerals is very energy-intensive, and therefore expensive.

The main ore of aluminum is bauxite(4), the source of over 99% of metallic aluminum. Bauxite is the name for a mixture of similar minerals that contain hydrated aluminum oxides. These minerals are gibbsite, diaspore, and boehmite. Because it is a mixture of minerals, bauxite itself is a rock, not a mineral. Bauxite is reddish-brown, white, tan, and tan-yellow. It is dull to earthy in luster and can look like clay or soil. Bauxite forms when silica in aluminum-bearing rocks (that is, rocks with a high content of the mineral feldspar) is washed away (leached). This weathering process occurs in tropical and subtropical weathering climates.

Australia produces over 40% of the world's aluminum ore. Brazil, Guinea, and Jamaica are also important producers, with lesser production from about 20 other countries. The United States' production, which was important 100 years ago, is now negligible.

Most bauxite is first processed to make alumina, or aluminum oxide, a white granular material. Alumina is lighter than bauxite because the water has been removed, and it flows readily in processing plants. This is unlike bauxite, which has a sticky, muddy consistency. Australia, the United States, and China are the largest producers of alumina. All the U.S. alumina being made is from imported bauxite.

Aluminum metal is refined from alumina, usually in industrialized countries having abundant supplies of cheap hydroelectric power. The refining process is called the *Hall-Heroult Process*, named after Charles Hall of the U.S. and Paul L.T. Heroult of France, who each independently invented the process in 1866. In this process, alumina is dissolved in molten cryolite (aluminum fluoride mineral). The alumina is then separated into its elements by electrolysis. This process made the price of aluminum drop to a mere fraction of its previous price structure and dropped it from the "precious Metal" category.

The largest producers of aluminum metal are Russia, China, the United States, and Canada, which are countries that have abundant hydroelectric power. Recycling of aluminum by melting cans and other products is an important source of metal in many developed countries.



(4)Bauxite (Saline Co, Arkansas)

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## News and Notes, page 4

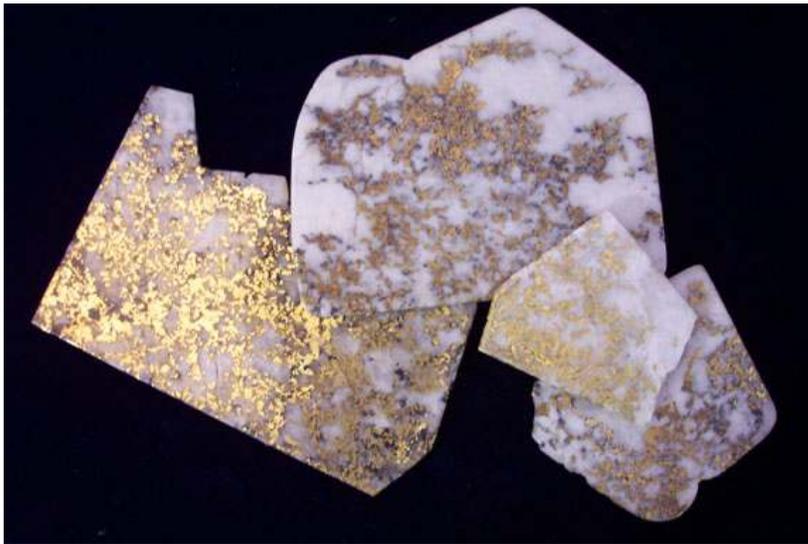
### DOOR PRIZES

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](http://pohakugalore.net/Hui_pohaku/Hiu_pohaku_1.html)

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



(5) Gold in Quartz (Sixteen to One Mine, Alleghany, California)

### TENTATIVE ROCK SHOW WAIKIKI OUTRIGGER

October 17 & 18, 2009

### Rock & Mineral Society of Hawai'i, Inc.

#### 2008 Officers

##### *President*

Faye Chambers  
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##### *Vice President/ Admin.*

Ed Sawada

##### *Vice President/ Lapidary*

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##### *Treasurer*

Debbie Iijima  
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##### *Newsletter Editor*

Elise Thomasson  
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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](mailto:elise.thomasson@gmail.com)

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