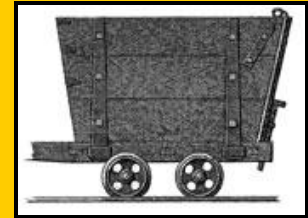
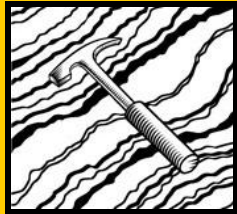


Gem Hunter - The Prospector's Newsletter



Vol 2, No 9, September 2010

Newsletter from the GemHunter

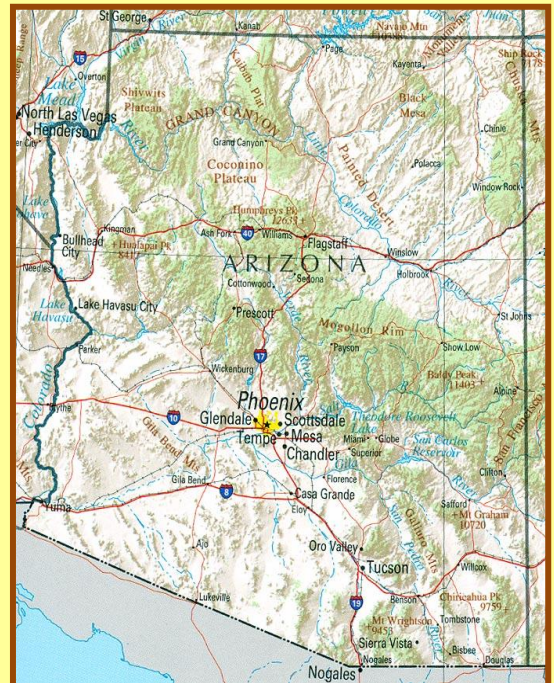
God Bless America!

ARIZONA – GOLD GEOLOGY & PROSPECTING (Part 1)

Arizona is known as the *copper state* with many giant copper deposits found though out much of the basin and range province in Arizona south of the Grand Canyon. In 2007-2008, copper, molybdenum gold and silver were recovered from a number of mines that include Morenci, Bagdad, Sierrita, Safford, Miami, Ray, Mission, Silver Bell, Pinto Valley, Mineral Park, Johnson Camp and Carlota and exploration and development continued at Resolution, Rosemont and other properties (Niemuth, 2008). In addition to these, some by-product lead and zinc was recovered.

Total copper production from Arizona is enormous: along with copper, Arizona has been an important source for gold: total production has been about 16 million ounces since the 19th century. Of course, the gold was mined at different times over the past hundred plus years when gold prices were much lower, but if mined today, this would be valued at about \$20 billion for the gold alone. Each year, Arizona produces about \$6 to \$8 billion in metals.

Much of the precious metal was recovered as a by-product of mining copper from low-grade porphyry and high grade massive sulfide and replacement (skarn) deposits. A few primary gold lodes of economic importance have been found, and geological evidence suggests there are still many hidden primary gold deposits to be found - which we will discuss in upcoming newsletters.

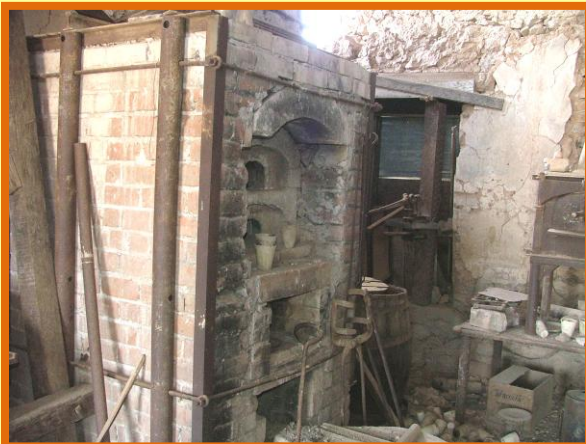


Notable primary gold deposits include the Vulture mine near the potato patch to the northwest of Phoenix - so named because of the nuggets found in the district. The inactive

The GemHunter Newsletter
W. Dan Hausel (GemHunter@live.com)
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Vulture gold mine in the Wickenburg district north of Phoenix produced 370,000 ounces of gold before terminating operations decades ago. Today, the mine is open for self-guided surface tours.

The Oatman and Katherine camps in the San Francisco district near Toprock in northwestern Arizona produced >2 million ounces of gold in the past (Koschman and Bergendahl, 1968). Significant amounts of silver with by-product gold and some lead and copper were also recovered from mines in the Tombstone district in extreme southeastern part of the state. Several other gold deposits of interest include Lost Basin and Chloride in the extreme northwestern corner of the state.



The old assay lab at the Vulture mine.

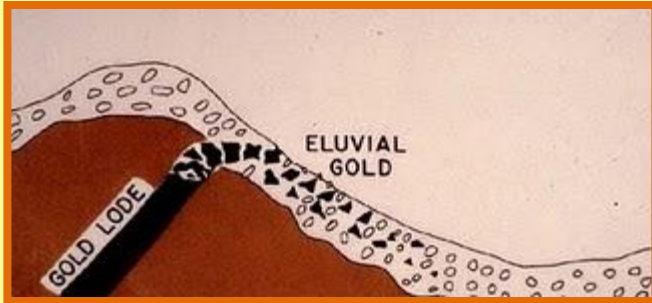
Historically, gold and silver were found by Spanish and Mexican prospectors looking for silver. The first known gold discovery was made by a Spanish priest in 1774 in the Quijotoa Mountains 60 miles west of present day Tucson. In addition to being found in gravel, gold was found in nearby veins associated with hematitic (rusty iron oxide) breccias that locally produced spectacular gold specimens. In Arizona, gold has been identified in several districts. Only a few of

the more prominent will be discussed and for more information, refer to Wilson and others (1969), Wilson (1981).

The Vulture mine headframe

Gold placers are found in nearly every county in Arizona. Most occur as [fanglomerates](#) in and on pediments, or in adjacent gulches. This is due to the intense arid environment in Arizona which results in slow erosion and weathering of nearby lodes to produce pebbles, cobbles and boulders that are slowly carried down slope by gravity and the periodic flash floods. Most fanglomerates are not economic to mine because of the lack of heavy mineral concentration, but some of these in Arizona are great sources for gold nuggets and flakes. Since the gold in the fanglomerates originated from lodes upslope, the discovery of gold in fanglomerates should lead prospectors upslope to the original source of the gold and in some cases, may lead prospectors to rich, undiscovered, hidden gold deposits lying under a few inches to a few feet of soil.





Sketch showing the typical dry gold placer in Arizona. A lode gold deposit will 'leak' gold that is carried down slope in an alluvial fan (fanglomerate). Gold in quartz will decrease in size and volume the further it is carried down slope from the lode deposit. The original gold will be very angular and become more rounded through time and distance from the source rock. It is likely that the state has dozens (if not hundreds) of undiscovered lode deposits based

on the number of dry placers found in Arizona.

Similar to Australia, active stream placers are uncommon in Arizona because of the lack of perennial streams: as a result the majority of placers in Arizona are dry placers. One of the few active stream placers was discovered at Lynx at the southern edge of Prescott. More than 108,000 ounces of gold was recovered from this placer discovered in 1863. The placers are found along much of the length of the creek suggesting that several lodes contributed to this placer. Gold occurs as fine flakes to nuggets up to 4 ounces. Portions of the placer were set aside for recreational gold panning by the city of Prescott and the US Forest Service. Nuggets up to 11 ounces were found in the Copper Basin placers 15 miles to the west of the Lynx area. Another active placer was found near the confluence of the Gila with the Colorado River in southwestern Arizona in 1853. This discovery attracted more than 1000 prospectors in 1861.

Arizona is well known to nugget hunters for its dry placers. The more productive dry placers were found at LaPaz, Dome, Gila City, LaCholla, Weaver, Rich Hill, Greaterville, Quijotoa, King Tut and the White Hills (Wilson, 1981). Notable of these was the Greaterville placers in southern Arizona south of Tucson. This placer was rich in gold and water had to be transported upslope over a distance of more than 4 miles in order to mine the placers.

At the LaPaz placer west of Quartzite in western Arizona, gold was discovered in 1862 along the Dome Rock Mountains of western Arizona. Gold was recovered at Goodman Arroyo, LaPaz Arroyo, Ferrar Gulch, Garcia Gulch and Ravenna Gulch. The gold-bearing gravels ranged from a few feet deep to unknown depths and is distributed throughout the gravel and enriched on bedrock. The district became known for large nuggets: some of the larger weighed 26, 27, 47 and 65 ounces. Such large nuggets suggest that this area would be an excellent location to search for hidden and buried lodes.

Rich silver deposits are also found in Arizona. Some were found in the Bradshaw Mountains as well as at the Silver King, Signal, Globe and Tombstone districts.

The majority of lode deposits in Arizona occur as gold-bearing quartz veins with limited strike length and width, silver-bearing veins and replacement deposits in limestone, and giant copper porphyry deposits and massive sulfides marked by multiple intrusive stocks with distinct zones of hydrothermal alteration. There are so many discoveries of giant copper porphyry deposits in Arizona that the state essentially became the type section for

these incredible deposits. Porphyry deposits are polymetallic deposits that typically produce mineable quantities of copper, molybdenum, gold, silver, lead, zinc and other metals and some gemstones.

DIAMOND MINE FOR QUEBEC?

Vancouver-based Stornoway Diamond Corp filed a notice of intent to take its Renard diamond project in north-central Quebec to the next level of the permitting process for mine construction. The process could take 2 years. Stornoway owns 50% of the Renard project and the balance is held by the Quebec government's Soquem.

The notice of intent describes a combined open pit and underground mining operation at Renard, with a production rate of between 5 000 and 7 000 tonnes per day and a potential mine life of 25 years based on the diamond resources identified to date. Stornoway announced in December that the total indicated diamond resource at Renard was 23-million carats, while inferred resources were 13.3-million carats.

BERYL (EMERALD)

According to miningweekly.com, Gemfields recovered a large, 6,225-carat emerald from its Kagem mine, in Zambia. The emerald was named 'Insofu', *meaning elephant*. The Insofu has excellent color and good translucency. Its size, color and protective biotite reaction rim make it difficult to see deep into the gem. However, the emerald should yield a number of excellent faceted gems of significant size according to Gemfields.



Hexagonal industrial quality beryl from Casper Mountain, Wyoming.

Emerald is part of the beryl family of gemstones, which form distinct hexagonal (6-sided) crystals. In a future newsletter, we will examine the beryl gems which include aquamarine, emerald and precious beryl. Because of the geological environments that these crystallize in (simple and complex pegmatites or basically very coarse-grained granite lenses) some pegmatites have yielded very large beryl crystals. For example, the beryl-pegmatite at Casper, Mountain, Wyoming, was known for tree-stump size green to yellow-green beryl crystals, some which included pockets of gem-quality helidor (yellow-green beryl).

Some of the larger beryl found around the world include long prismatic crystals of 2.5 tonnes (12.5 million carats). Another beryl crystal reported from Albany Maine was 27 feet long and weighed more than 25 tonnes (125 million carats!) (Bauer, 1968; Hurlbut and Switzer, 1979; Hausel and Sutherland, 2005; and Hausel, in preparation).

Some of the more important deposits of emerald occur in South America, particularly in Columbia and Brazil. During Biblical times, emerald was also mined in the Cleopatra mines

of Egypt and some emerald was mined in Afghanistan. In the US, some emerald is found in North Carolina and likely will be found someday in Wyoming based on some of the geological environments in the Cowboy state.

Varieties of gem beryl (after Hausel, 2009)

Variety	Color	Chromophores (coloring agents)
Emerald	Chrome-green	Cr, V, Fe ²⁺ , Fe ³⁺
Aquamarine	Light-blue, sea green	Fe ²⁺ , Fe ³⁺
Maxixe beryl	Blue (fades in sunlight)	Fe ²⁺ , Fe ³⁺
Aquamarine	Light green	Fe ²⁺ , Fe ³⁺
Chrysolite	Yellow-green	Fe ²⁺ , Fe ³⁺
Golden beryl	Golden-yellow	Fe ²⁺ , Fe ³⁺
Heliodor	Greenish-yellow	Fe ²⁺ , Fe ³⁺
Morganite	Pink-orange, pale pink	Mn ²⁺ , Mn ³⁺
Bixbite	Dark red	Mn ²⁺ , Mn ³⁺
Goshenite (rosterite)	Colorless	None

A large emerald found in North Carolina recently attracted some interest by the press (*see the following Associated Press news release*).

North Carolina Farm Produces Emerald Shaped into Massive Gem

By EMERY P. DALESIO, Associated Press Writer Mon Aug 30, 9:28 pm ET

RALEIGH, N.C. – An emerald so large it's being compared with the crown jewels of Russian empress Catherine the Great was pulled from a pit near corn rows at a North Carolina farm. The nearly 65-carat emerald, its finders are marketing by the name Carolina Emperor, was pulled from a farm once so well known among treasure hunters that the owners charged \$3 a day to shovel for small samples of the green stones. After the gem was cut and re-cut, the finished product was about one-fifth the weight of the original find, making it slightly larger than a U.S. quarter and about as heavy as a AA battery.



The emerald compares in size and quality to one surrounded by diamonds in a brooch once owned by Catherine the Great, who was empress in the 18th century, that Christie's auction house in New York sold in April for \$1.65 million, said C.R. "Cap" Beesley, a New York gemologist who examined the stone.

AP photo Courtesy of Terry Ledford. The hexagonal emerald is shown with a quarter for scale.

While big, uncut crystals and even notable gem-quality emeralds have come from the community 50 miles northwest of Charlotte called Hiddenite, there has never been one so big it's worthy of an imperial treasury, Beesley said.

"It is the largest cut emerald ever to be found in North America," Beesley said in a telephone interview from Myanmar, an Asian country rich in precious gems.

The discovery is a rarity for emeralds found not in the rich veins of South America and Asia but in North America, said Robert Simon, owner of Windsor Jewelers in Winston-Salem.

"Most of the stones that have come out have not been gem-quality that I would mount in jewelry," said Simon, who was part owner of a 7.85-carat, dime-sized emerald found in the same community in 1998 that has since been set in jewelry and sold to a private owner.

Terry Ledford, 53, found the roughly 2-inch-square chunk rimmed with spots of iron a year ago on a 200-acre farm owned by business partner Renn Adams, 90, and his siblings. The rural community of Hiddenite is named for a paler stone that resembles emerald.

"It was so dark in color that holding it up to the sun you couldn't even get the light to come through it," a quality that ensured an intense green hue once the stone was cut with facets that allowed light into the gem's core, Ledford said.

The North Carolina stone was cut to imitate the royal emerald, Ledford said. A museum and some private collectors interested in buying the emerald have been in contact, Ledford said.

Modeling an empress's emerald is likely to have less influence on the North Carolina stone's sale price than its clarity, color and cut, said Douglas Hucker, CEO of the [American Gem Trade Association](#), a Dallas, Texas-based trade association for dealers in colored gems.

"A 65-carat cut emerald from North Carolina is a big, big stone," he said. But "once an emerald is cut, it's subject to the same type of market conditions that any emerald would be."

Emeralds are part of North Carolina's mineral claim to fame, though other places in the U.S. also are rich in gems. Maine mines have yielded aquamarine and amethyst, Montana bears sapphires, Idaho is known for star garnets, and Arkansas has diamonds.

It's not fully known why small, subterranean cavities containing emeralds formed in central North Carolina, said geologist Michael Wise of the Smithsonian's National Museum of Natural History, who has studied the underground world around Hiddenite for years. Emeralds are produced where a superheated fluid carrying the element beryllium migrated through rocks that contain chromium, Wise said.

"This doesn't happen frequently," Wise said. "The conditions have to be just right to make an emerald. ... It happens to be the case at this particular place."

Adams said decades ago when his parents owned the farm, they allowed anyone with a shovel to dig for emeralds on the property for \$3 a day. Virtually all of it was too full of flaws to be cut into precious stones and was mostly sold to mineral collectors, Adams said.

Ledford said they don't plan to quit after pocketing the profits from their big find, Ledford said.

"We'll definitely keep on mining," he said. "It would be good to know you don't have to go and could do it for pleasure. You feel like you've got to find something to survive but since we found this emerald, once we get it sold, there will be less stress."

LINKS

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[Arizona Copper & Gold](#)
[Seminoe Mtns, WY](#)
[Copper King, WY\](#)
[Ferris-Haggarty, WY](#)

Field Trips

[Sloan Ranch](#)

[Leucite Hills](#)

[South Pass](#)

METAL PRICES (9/10/2010)

Gold - \$1,247/oz Silver - \$19.88/oz Platinum - \$1,540/oz Palladium - \$518/oz
Copper - \$3.40/lb Nickel - \$10.20/lb Zinc - \$0.95/lb Rhodium - \$2,080/oz
Lead - \$0.98/lb

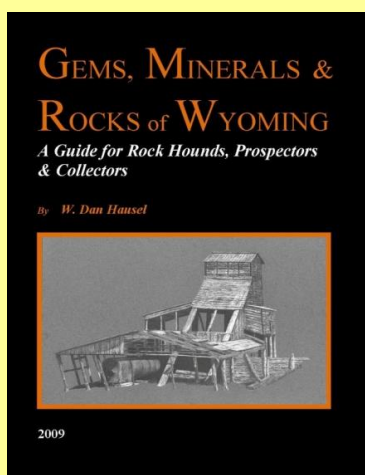
BOOKS

GEMS, MINERALS & ROCKS of WYOMING - *A Guide for Rock Hounds, Prospectors and Collectors* Now available from [Amazon](#): or order it from your local bookseller.

Coming Soon

- GOLD in WYOMING – *A Prospector's Guide to Precious Metal Deposits*
- GOLD – *A Guide to Gold Deposits in the West*
- MOUNTAIN OF GOLD – *One Geologist's Experiences in discovery of Gold, Diamonds, Colored Gemstones & Unusual & Strange Prospectors*
- GEMSTONES OF THE WORLD – *Geology & Occurrence*
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