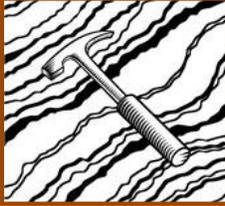
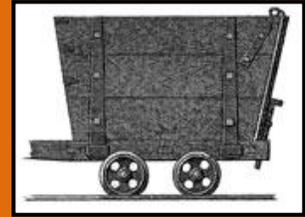
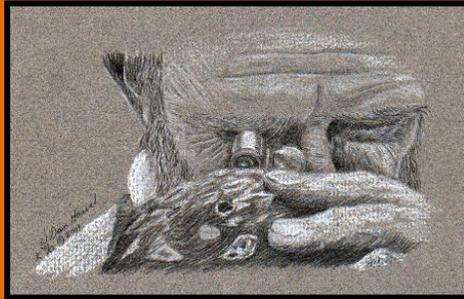


Gem Hunter - The Prospector's Newsletter



Vol 1, No 7, Dec. 2009



Newsletter from the GemHunter

Merry Christmas

Wishing all of you to have a very Merry Christmas and Happy New Year

Prospecting for **RUBY & SAPPHIRE**

I was a young geologist in 1977 when I accepted a position with the Wyoming Geological Survey at the University of Wyoming. My assignment was to research diamonds, precious, base and strategic metals, and colored gemstones, and to map these regions. Little was known about any of these commodities, but by time I left (January 2007), I had discovered dozens of anomalies and deposits, a couple of major gold and colored gemstone deposits, a whole new gold district, one of the largest colored gemstone deposits on earth and a half-dozen ruby and sapphire deposits. I was also able to identify some of the favorable geological characteristics that could be used to find more rubies and sapphires (Hausel and Sutherland, 2006). In other words, I had identified important keys that would lead to other discoveries. In this issue of *GemHunter*, I'll tell you how to find rubies and sapphires. So get your 4 x 4s together and get ready to stake a claim! For me, it has never been about money - it has been about the love of discovery - discovering something that everyone else overlooked.

Characteristics & Habit. Ruby and sapphire are the same mineral - just different colors. They are known as corundum. Corundum is listed as the second hardest naturally occurring mineral on earth with only diamond being harder. It has been assigned a Moh's hardness of 9. Diamond was assigned the highest number of 10. Even so, there are a few other extremely hard naturally occurring minerals that are so rare, they are not listed in most mineralogy books. One of these is lonsdaleite, which is actually harder than diamond. Lonsdaleite, a very high pressure form of hexagonal carbon, was shown to be 30% harder than diamond; but is so rare on the earth's surface that most mineralogists either ignore it or just are not aware of its existence. Plus there is disagreement as to whether any lonsdaleite is of terrestrial origin (Erlich and Hausel, 2002).

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Gemstones made from corundum are durable because of hardness. Raw corundum, when found in the field, forms barrel-shaped hexagonal (6-sided) prisms (or wafers) with rough, rounded surfaces that may exhibit parting. Parting is an atomic (structural) weakness in some minerals (similar to cleavage) that parallels crystal faces and often caused by tectonic pressures. Not all corundum will have parting, but many do.



Left: Pink sapphire crystal projecting from Palmer Canyon schist, Wyoming. Below: Cross-section of corundum showing distinct hexagonal (6-sided) crystal habit (photo courtesy of Art Snoke). Note the distinct white reaction rim surrounding the hexagonal crystal.



Corundum occurs in a variety of colors: gray, grayish green, blue, pink, brown, red & purple. High-quality corundum is used for gemstones of high value that include *ruby* (deep pigeon's-blood red) and *sapphire* (all other colors of corundum). The only difference between these two gemstones is the chromophores, or trace metals that give them color. For example, trace chromium is the coloring agent in ruby, and titanium and iron act as coloring agents in blue sapphire.

Rubies are considered the king of gemstones and are generally more valuable than sapphire but less valuable than diamond. Some of the more valuable rubies and sapphires have included a Burmese ruby of 15.97 carats that sold for US\$3.63 million (\$227,301/carat). In 2005, a near perfect 8.01-carat Burmese ruby with strong fluorescence sold for US\$2.2 million at a record price for a ruby (US\$274,656/carat)! Walton (2004) describes a 62-carat royal blue rectangular cut sapphire that was purchased for \$2.8 million (\$45,000/carat) - a very high price for sapphire.

Corundum has striking adamantine to vitreous luster that is notable in faceted gems. Its high specific gravity (4 to 4.1) is favorable for accumulation in black sand concentrates in creeks. Thus when you pan for gold, watch for ruby and sapphire! During one research project, my staff collected a handful of samples in the central Laramie Range north of Cheyenne that had tiny rubies and sapphires (Hausel and others, 1988). Somewhere upstream from those samples are UNDISCOVERED ruby and sapphire deposits. As far as I'm aware, no one ever followed up on those anomalies! All one has to do is get a copy of our report, identify where the positive samples are, and on weekends, start looking upstream and hopefully you will find the source of those gemstones.

THE CORUNDUM GEMSTONES

COLOR	VARIETY
Red	Ruby
Cornflower Blue	Sapphire
Colorless	Leuco-sapphire
Light bluish-green	Oriental Aquamarine
Green	Oriental Emerald
Yellow-Green	Oriental Chrysolite
Yellow	Oriental Topaz
Aurora Red	Oriental Hyacinth
Violet	Oriental Amethyst

Chemically, corundum is simply aluminum oxide compressed under high pressure and temperature (typically 7.2 kilobars and 600°C). To get this kind of pressure typically requires deep burial in a sedimentary basin, or along a subduction zone. In a basin, we will need a 12 to 14 mile column of sedimentary rock to create this kind of pressure and temperature! After being buried so deeply, you will need Mother Nature to provide a tectonic (mountain building) event to bring the aluminum-rich rock back to the surface. Rocks that are buried so deeply tend to convert (recrystallize) to schists and gneisses. When brought back to the surface, these recrystallized sedimentary and igneous rocks (now schists and gneisses) can be found in the cores of mountains or cratons (old continental cores).



Far left: Palmer Canyon ruby (1.1 carats) mounted in necklace (photo courtesy of Chuck Mabarak). Left: Faceted ruby from same region showing parting (distinct parallel lines in the gemstone) (specimen from the Vic Norris collection).

Being an aluminum oxide, corundum will crystallize in silica-poor, aluminum-rich, geological environments under high pressure and temperature. Thus the types of rocks that you as a prospector need to watch for are rocks with high aluminum content that are known as (1) vermiculite (also referred to as glimmerite), (2) alumina-rich mica schists (referred to as metapelite), (3) serpentinite, (4) lamprophyre (a rare aluminum-rich igneous rock) (5) skarn (altered limestones and marbles), and (6) syenite (another igneous rock).

Vermiculite. Vermiculite looks like coarse-grained mica schist and is typically found in belts of metapelite. To produce corundum in these rocks, the rock has to be subjected to high pressure and temperature and must be desilicated - some silica must be removed, otherwise, alumino-silicates will form in lieu of corundum. Common alumino-silicates include andalusite, kyanite cordierite, garnet and/or sillimanite. Thus vermiculite is an alteration product of mica schist and is a result of desilication of metapelite. This may sound a little complicated, but all you need to know is where to

find vermiculite and then how to identify it - so get a good mineralogy book or just get a copy of Hagner's (1944) report.



Sample of vermiculite - a hydrated, micaeous alumino-silicate that looks like biotite.

After I realized rubies and sapphires were associated with some vermiculites, I began to research the origin of vermiculite. I went to the geology library to search for information on vermiculite. Luckily, most work had already been done in Wyoming. In the 1940s, vermiculite was sought for heat insulation in specialized furnaces. The government funded field research to find vermiculite. Hagner (1944) compiled all known information on Wyoming vermiculites. For me, all I had to do was to visit these deposits. Similar reports are likely available for other states and possibly Canada. I would also recommend searching the internet and various geology libraries. By searching Wyoming vermiculite, I found four ruby deposits, but did not get a chance to look at all of the vermiculites.

Metapelite. Just before I packed up to leave Wyoming, I was looking for a ruby deposit in the southern Wind River Mountains where two prospectors had recovered a large salad bowl full of corundum (including one weighing 80 carats) from a stream. In the same area, an out-of-place mica schist cobble was found by a geologist that had gem-quality pink sapphires (Ron Frost, personal communication). So the southern Wind River Mountains appears to be a large, undiscovered, corundum deposit in metapelite. So some ruby and sapphire will also occur in some metapelites as an accessory mineral.

Corundum-bearing mica schist (metapelite) is likely to have some kyanite. Kyanite is an alumino-silicate that occurs as distinct sky-blue rectangular-shaped prisms. It is likely that silica in these rocks was combined with alumina to produce kyanite during metamorphism. Left over alumina crystallized as corundum. The reason why kyanite is such an important indicator is that some kyanite will crystallize under similar pressures and temperatures as corundum. So how does one find kyanite? The easiest way is to search geological maps and look at the rock descriptions of mica schists and see if the map legends mention kyanite (or even corundum).



Kyanite schist in central Laramie Range.

Personally, I recommend Copper Mountain in the Owl Creek Mountains, the central Laramie Mountains, West Cooney Hills in the Laramie Mountains, the Sierra Madre

Mountains, or the Granite Mountains. Kyanite is found in all of these regions and if you don't find any corundum, no problem, much of the kyanite will produce attractive cabochons. Also examine any other aluminosilicates that may occur in the rocks. Any of these (if transparent or translucent) could also produce gems.



Left - two cabochons cut from kyanite collected from kyanite schist at Palmer Canyon.

Some corundum is also found in the Granite Mountains at a number of different locations. One of the more interesting deposits is northwest of Jeffrey City and is now known as the Red Dwarf deposit (sections 13 & 24, T30N, R93W). I mapped corundum schist (metapelite) over a 5,000-foot

strike length with a 20- to 50-foot width at this location (Hausel, 1996, 1997). The host rock has 1 to 10% corundum porphyroblasts (large crystals) encased in zoisite-fuchsite reaction rims. These reaction rims, or crusts, are light to dark green and replace much

of the original corundum. Some of the corundum has excellent color, but is cloudy and the color shows pockets of deep purple red to light red. Most rubies on the market today have been heat-treated prior to being sold as gems. This sometimes clarifies the material and in some cases enhances the color of the gem. The Red Dwarf rubies have yet to be tested as far as I am aware.



Above: Ruby from the Red Dwarf encased in a reaction rim.

The Red Dwarf corundum may be light purplish-pink, lavender, to reddish-purple, and range from millimeter size to >2 inches across. Some gem-quality corundum was found here. Most are partially to entirely replaced rubies. One partially replaced ruby was originally 5 to 6 inches in length. This means that the Red Dwarf deposit at one time in the geological past contained some of the largest rubies on earth until they were replaced by zoisite. I suspect there are still some large preserved rubies in nearby soils and in the outcrop at depth! Some star rubies have also been found in this area in the past. The property was claimed after I mapped it, so you will need to get permission from the claimant to collect on the property.



Right: Large ruby-zoisite porphyroblast collected at the Red Dwarf deposit. Much of this giant ruby was replaced by zoisite (green), but some excellent pigeon's blood reddish-purple ruby remains. Prior to replacement, this specimen would have been one of the largest rubies in the world.

Serpentinite. In addition to metapelite, another rock type that contains corundum is serpentinite. Some serpentinites are enriched in alumina. There is one outcrop a short distance west of the Red Dwarf that has tiny (millimeter size), light-blue, translucent to opaque corundum (sapphire). Locally, the serpentinite has 20 to 40% corundum, but most of the rock has only trace sapphire.

In the Sierra Nevada in California, I found both sapphire and benitoite in streams downslope from massive serpentinites while searching for diamonds. There is a lot of serpentinite in California, Oregon, Washington, Montana and Wyoming and most are unexplored for sapphire.

The Palmer Canyon Deposit. Corundum is associated with vermiculite west of Wheatland at Palmer Canyon (N/2 Section 18, T24N, R70W). Some metapelite at this location also has kyanite, cordierite (iolite gems), ruby and sapphire. The corundum forms small, hexagonal, pink, red and white grains 0.1 to 0.3 inch across. Many grains have well-developed parting which limits the size of facetable material. Even so, significant percentages have excellent color and are transparent to translucent (personal field notes, 1997). Small amounts of corundum have also been identified at the Grizzly Creek iolite-kyanite deposit to the south and other localities to the north. As with all of these, before you prospect, check to see if there are any active mining claims. These deposits have been under active claims since I discovered them, so they still may be claimed: check the BLM <http://www.geocommunicator.gov/blmMap/Map.jsp>.



Far-left: Gem-quality 8-carat pink sapphire (from the Vic Norris collection). Left: Sapphire-kyanite schist from Palmer Canyon.

As a final note, Wyoming does not have any known ruby or sapphire deposits associated with skarn, lamprophyre or syenite. But a large number of the excellent cornflower blue sapphires were recovered



from an alumina-rich lamprophyre in Montana. For information on the Montana occurrences, contact the Montana Bureau of Mines and Geology.



Left: Ruby cabochon showing excellent parting (Platt Ranch) & reddish-pink sapphires (Palmer Canyon). Right: Pink sapphire (Platt Ranch) & ruby & sapphire surrounded by iolite (Palmer Canyon).



DIAMONDS in the NEWS

Rockwell Diamonds recently recovered three large colored stones from the Saxendrift alluvial diamond mine in South Africa. The three stones included a salmon-pink 30.54 ct diamond and two intense fancy yellow diamonds of 35.54 ct and 36.32 ct from its Saxendrift mine on the Middle Orange River.

BAFFIN BAY DISCOVERY

The Baffin Bay diamond discovery in Nunavut, Canada continues to provide extraordinary results. Peregrine Diamond's (<http://www.pdiam.com/s/Home.asp>) stock jumped 108% following news of their discovery of rich diamond pipes. In one drill hole (CH6-B) the company recovered drill core that contained an indicated diamond ore grade of 210 carats/100 tonnes. In another (CH6-A), the company recovered core with an indicated grade of 1,050 carats/100 tonnes! As an example of how rich this is, the Kelsey Lake mine in Colorado reported average ore grades of 1 to 15 carats/100 tonnes, and the richest diamond mine in the world (Argyle mine, Australia) mined ore at an average grade of 680 carats/100 tonnes during peak production (Hausel, 1998). The Baffin Bay discovery could likely lead to a major new diamond mine. To date, the company identified over 200 anomalies on their property. They drilled 14 of these and found kimberlite in 7.

STAR DIAMONDS

Shore Gold Company (<http://www.shoregold.com>) began exploring Saskatchewan for diamonds several years ago and found a group of very large kimberlites. Mining feasibility studies on their Star Kimberlite suggests a borderline economic diamond deposit. It would take capitalization of \$1.67 billion to place the diamond property in production by 2014. The company reported drilled reserves of 171 million tonnes at an average grade of 12 carats/100 tonnes (20 million carats). At a nearby property, it is reported that the Orion South kimberlite has 84 million tonnes averaging 13.83 carats/100 tonnes with an inferred resources of 98 million tons averaging 12.85 carats. These kimberlites are relatively low grade, but are some of the largest that have been found. The company recently displayed an excellent 22-carat gem-quality diamond from their Star property.

OPALS ANYONE?

Opal is described as accessory mineralization with schroekingerite in the Lost Creek - Cyclone Rim area within the Eocene Battle Spring Formation and the Cathedral Bluffs Tongue of the Wasatch Formation, as well as within Quaternary surficial material. This deposit is reported to lie east of Lost Creek in sections 29-33, T26N, R94W, and in part of section 25, T26N, R95W, along the Cyclone Rim fault zone. Opal was also reported as

interstitial material in the South Pass Formation to the west. Essentially, nothing else is known about this opal; however, the Cedar Rim deposit south of Riverton, Wyoming, was described to be very similar to Lost Creek-Cyclone Rim. But when I began prospecting Cedar Rim, I was amazed that boulders of opal weighing up to 100,000 carats were exposed along road cuts and in some cases, there were hundreds of opal cobbles and boulders (<http://gemhunter.webs.com/opal.htm>). The opal field was scattered over parts of 14 to 16 sections (sections are areas of land that are about 1 square mile. Could the same be true for Lost Creek - Cyclone Rim? I never got the change to prospect this area. So it's your turn!

TRIVIA

Here's some trivia. What is a trillion? A number of unimaginable proportions but quoted in conversations about the national debt. Recently I met a family from Rhodesia (Zimbabwe) who told me their home and land was taken from them by the government. The homes, farmland and wealth of the Rhodesian people was redistributed (sounds familiar) in the name of CHANGE. In Mid-November (2008) Zimbabwe's inflation was 79,600,000,000% and was taking just 24 hours for prices to double (<http://www.cato.org/zimbabwe>)! Zimbabwe at one time produced considerable gold, platinum-group metals, chromian and other metals, but borrowing, wealth redistribution and corruption destroyed their country, industry and economics.

The price of gold is an indicator of inflation (<http://www.kitco.com>). Do you know how small an ounce of gold is? An ounce of gold is just about the size of a quarter. Take an ounce of gold, hammer it into a circular coin only 2 millimeters thick; it will be just 1.3 inches in diameter. This little thing is now worth >\$1,200! It seems just last year, gold was selling for under \$900/ounce (that's because it was). And in 2000, it was selling for under \$300/ounce. When I started college - the price of gold was \$35/ounce: gold prices are now 32 times higher and will continue to rise with staggering debt.

Our country is now \$12 trillion in debt (http://www.brillig.com/debt_clock). Most people can't comprehend this number. So, let's make it more visual. Convert the National Debt into one dollar bills and stack these on top of one another. Congress could build a tower nearly 7.5 million miles high. So how high is 7.5 million miles? The moon is only 221,200 miles from earth. Congress has already constructed monuments to themselves consisting of 34 towers of one dollar bills that all reach to the moon - thanks to them, we no longer need a space shuttle to get to the moon. Take this same pile of bills, lay them on their side at the equator - it will circle the earth 300 times!!!

GREAT DIAMOND HOAX

Global warming is a hoax of unprecedented proportion: <http://www.petitionproject.org> and <http://www.dailyexpress.co.uk/posts/view/143573>. In 1871 and 1872 there was another hoax (nowhere nearly as great as the Global Warming or Climate Change scam)

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that snowed many greedy politicians and investors. This one was later called the Great Diamond Hoax. It is a fascinating story I will tell you about in an upcoming newsletter.

LINKS

<http://gemhunter.webs.com/>

<http://diamondprospector.webs.com/>

<http://gemstonehunter.blogspot.com/>

<http://WyRuby.blogspot.com>

<http://iolite-wyoming.blogspot.com>

<http://southpassgreenstone.blogspot.com/>

<http://geologicalconsultant.webs.com/>

<http://www.goldhunter.webs.com/>

<http://wygemstones.blogspot.com/>

<http://discussionsondiamonds.blogspot.com/>

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BOOKS

GEMS, MINERALS & ROCKS of WYOMING

*A Guide for Rock Hounds, Prospectors
& Collectors*

By W. Dan Hausel



2009

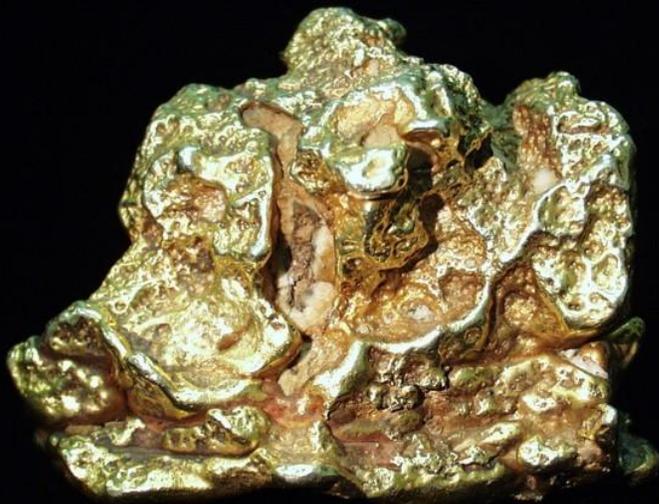
GEMS

In 2009, I completed a book for prospectors and laymen describing some gemstones, rocks and minerals and where these can be found in Wyoming. This book, [Gems, Minerals and Rocks of Wyoming - A Guide for Rock Hounds, Prospectors and Collectors](#) is available from Amazon and other outlets. You can order it from Amazon:

http://www.amazon.com/Gems-Minerals-Rocks-Wyoming-Prospectors/dp/1439218560/ref=sr_1_1?ie=UTF8&s=books&qid=1257276514&sr=1-1 or order it from your local bookseller.

GOLD

In 2010, watch for: ['GOLD: Geology, Prospecting Methods & Exploration'](#). A book on how to find gold and other precious metals and where to find them. Over the years, I found two (possibly 3) major gold deposits and hundreds of anomalies. I enjoyed finding them - now it's up to you to explore and mine them.



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