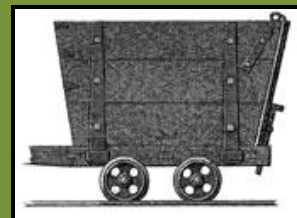
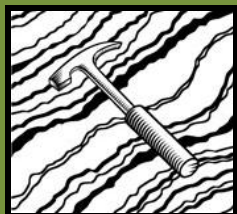


Gem Hunter – The Prospector's Newsletter



Vol. 4 No. 3, May-June, 2012

Newsletter from the [GemHunter](#)

DIARY OF A DIAMOND GEOLOGIST (Part IV) – The Australian Outback

Continued from the Mar-April, 2012 GemHunter newsletter. I arrived in Perth Australia in 1986 after sitting on an airplane for nearly 20 hours. All of the free Foster's Beer distributed by our Qantas flight attendants could not substitute for a good bed and a brisk walk. Curling beer cans is just not the same as curling weights in a gym. But, no matter, I arrived! The land of kangaroo, emu, large beer cans, strange accents and diamonds was waiting!

I had been coached by many seasoned travelers that the best thing to do when arriving in a far off land was to first check into a motel and sleep to recover from a long flight and time zone change. I thought about this for one second: no way! I had waited a lifetime to see Australia and I was going out to see it.

Photo from Kings Park in Perth, Western Australia, 1986.



The GemHunter Newsletter
W. Dan Hausel (GemHunter@live.com)
<http://GemHunter.webs.com>

After touring Perth including Kings Park, the University of Western Australia, the Western Australian Geological Survey and the America's Cup at Freemantle (just south of Perth), I met two geologists I had met in the US – John Carter and Stephen Lipple. Then said goodbye and it was off to the airport to collect my US field assistant (Karl) in my *hired car* (Australian for 'car rental'). I had picked a Holden



saloon (Australian for 'sedan') with four on the floor and a small *boot* (Australian for 'trunk') because I wanted to experience Australia to its fullest. With the steering wheel on the wrong side of the car, I thought it would be entertaining to drive with a stick shift using my left hand. It wasn't too much of a problem, but I could not quite get use to making right turns from the wrong side of the road. Karl and I had to constantly focus on which lane to turn in. But this wasn't too much of a problem after we got out of Perth and were away heading into the outback to the gold fields of Kalgoorlie before the International Kimberlite (diamond) Conference began.

Left – Payne's Find gold-bearing shear zone in Murchison, Australia.

As we headed to the Eastern Goldfields, we drove through [Northam](#), [Merredin](#), [Southern Cross](#), [Coolgardie](#) and finally made it to [Kalgoorlie](#). In Southern Cross, we stopped at what looked like a

petrol station converted into a café, called the *Swaggerman*. The food was just as one would expect – enough grease to extract a parcel of diamonds on a grease table. After a short break in the restroom (which had to be accessed by stepping out the front door and walking around to the back of the café, typical of the many old gas stations from the 1960s), Karl asked me where the restroom was. “Karl, *this is the outback, you just step out to the wall on the side and relieve yourself*”. Karl was shocked, but not as shocked as the local constable who nearly arrested him for urinating in public. From Southern Cross, Karl was a bit moody until we arrived in Kalgoorlie and his experience with the constable started to fade.

Kalgoorlie is a mining town founded in 1893 following a rush to the goldfields. A very important part of the goldfields became known as the Golden Mile. The Golden Mile is on a rich gold-bearing shear zone similar to the Atlantic-South Pass-Miners Delight shear zone that I had just begun mapping in the [South Pass](#) greenstone belt in Wyoming prior to leaving for Australia. The Golden Mile is surrounded by many mines within the Norseman-Wiluna [greenstone belt](#). The main mine in this belt is



known as the [Super Pit](#), a large open pit gold mine. Just like Wyoming, this part of Australia has a group of >2.5 billion year old greenstone belts surrounded by older (3 to 3.8 billion year old) gneisses all intruded by younger (~2 billion year old) granitic stocks.

Greenstone belts are something [prospectors should get to know](#). They represent very old, intensely deformed, volcanic-sedimentary basins and nearly all rocks in greenstone belts have above average gold content which means there is a tremendous amount of gold stored in these large basins that potentially could be mobilized during deformation or thermal events. When such favorable conditions occur, gold is leached from the giant basins and transferred into zones of lower pressure (i.e., fractures, faults, shear zones, breccias) where the gold content can be greatly concentrated and enriched. Many



shear zones in greenstone belts received much of the mobilized gold from ancient deformation events in the past. At South Pass, Wyoming, a metamorphic event (high pressure and high temperature) that recrystallized the rocks in the basin as well as folded and deformed these same rocks was recorded at about 2.8 billion years ago and was responsible for gold mineralization in the *shear zones* that formed about the same time. Any faults or *shear zones* formed after this event typically do not contain gold at South Pass. And if you find a rich shear zone, [look in drainages immediately downstream](#), as you will find placer gold (as well as paleoplacer gold) in streams below a gold-bearing shear zone. The gold content and size will decrease the further you prospect downstream from this source.

Gold specimen from the Kerr-Addison gold mine, [Abitibi greenstone belt, Canada](#).

You can easily find many *shear zones* in greenstone belts just by looking for mine shafts and prospect pits. You will soon recognize that most of these line up in nearly straight lines over good distances. As an example, one *shear zone* I mapped at South Pass was the Lewiston *shear zone* ([Hausel, 1991](#)). Fly to the Burr mine at South Pass on Google Earth (42°25'15"N; 108°32'57"W) to an eye altitude of about 9,000 feet and you will see many pits and trenches cut perpendicular to the shear zone. This shear zone can be traced for 7.5 miles with prospect pits and trenches lining up on an *east-northeast trend* that is folded to the east and changes directions to *north-northeast*.

And as you are looking at these aerial photos, note how much ground in-between all of the many dozens of trenches and prospect pits is undisturbed. This is important to recognize because shear zones are notorious for exhibiting what is known as the nugget effect! They are not consistently mineralized, instead they have periodic rich ore shoots rich with much of the remaining shear containing little to no gold. So, how many ore shoots have been missed in this area alone – easily dozens. Some of the richest gold samples I found in Wyoming came from the Mint (42°26'32"N; 108°32'45"W) and Gold Leaf Prospects (42°36'45"N; 108°32'41"W) on this trend.



Placer gold found immediately downstream from the South Pass-Atlantic-Miners Delight shear zone, Wyoming.

Now if you fly to Kalgoorlie, Western Australia using Google Earth and look for the Super Pit (30°46'37"S; 121°30'21"E), note that the pit is elongated in the direction of the *shear zone* (northwesterly). If you look southeast and northwest of the Super Pit, you will find dozens of gold and nickel mines that line up on this trend. Many of the nickel deposits are in rocks known as komatiites found near the gold-bearing shear

zones. Komatiites are rare ultramafic volcanic rocks that often contain anomalous nickel and gold. In some greenstone belts, such rocks may be mapped or identified as *serpentinites* or *actinolite-tremolite-talc schists*. In Wyoming, we had a problem with one person selling serpentine (serpentinite) as high-quality apple-green jade. The problem with his jade was it was magnetic, soft, and formed entirely of serpentinite.

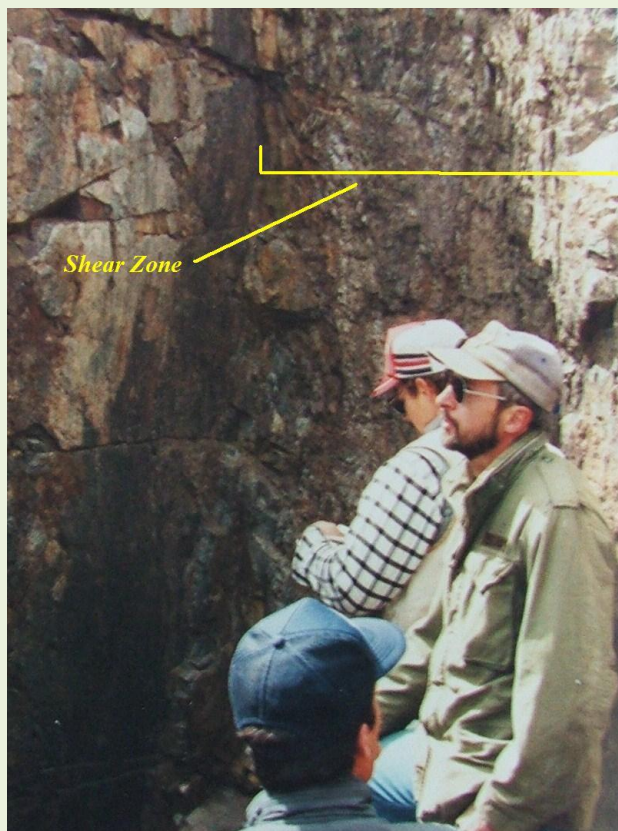


As mentioned gold is not evenly distributed in shear zones which really drives prospectors and geologists crazy. For example, ore deposits in shear zones typically have very limited strike lengths, but by their nature, they tend to plunge down into the earth to great depth, sometimes for as much as mile or more. But few prospectors recognize this characteristic of what geologists call 'saddle reef' deposits (even most geologists miss this).

The photo to the left is part of a shear zone in the South Pass greenstone belt at the Carissa mine. This has many concentric folds and parallel fractures: many have been rehealed by quartz. The rock in-between the quartz veinlets look normal in hand specimen, but under a microscope, it is a mylonite: crushed and deformed rock with hundreds of tiny parallel fractures and foliation making individual minerals almost unidentifiable. Where quartz has rehealed the shear, it should contain trace to rich pockets of gold.

Prospectors often report saddle reef deposits to have a '*nugget effect*' because when they prospect such *shear zones*, they will encounter small surface areas rich in gold, but within a short distance, the gold content dramatically declines (sometimes as much as 10 times less gold). Because only a small ore shoot occurs at the

surface, they often give up as it is expensive and labor intensive to sink a mine shaft to follow the shoot at depth (besides, at this point they would be permitted to death by the county, state and federal governments). But such shoots often continue down plunge to great depths. Rarely ore shoots with considerable strike length are found. But two good examples of ore shoots on *shear zones* with good strike lengths are found at Australia's Super Pit and Wyoming's Carissa Mine.



So you are probably thinking, what exactly is a greenstone belt? There are [entire books](#) written on this subject, and instead of me trying to give you a few years of geology lessons, keep in mind they are found in very old rocks (Precambrian). And if there is a [greenstone belt](#) near you, it will likely have some known gold, nickel and iron ore deposits. When you examine greenstone belts, you will probably notice they all have [similar kinds of rocks](#) including what are known as pillow [basalts](#), [komatiites](#), [amphibolites](#), [greywacke](#) and others. Some of the rocks may even been called greenstones, or greenschists.

Photo – Standing adjacent to a shear zone. The shear zone behind the geologists is highly fractured with much quartz, and tends to weather faster than the surrounding, more competent rock outcrops to produce slight depressions.

And what is a [shear zone](#)? A [shear zone](#) is a tabular zone that typically expresses evidence of ductile and brittle deformation over a broad area. It is one form of a fault zone. If you review the [South Pass greenstone belt blog](#) on the internet, I've placed some photos of *shear zones* to help you understand what a

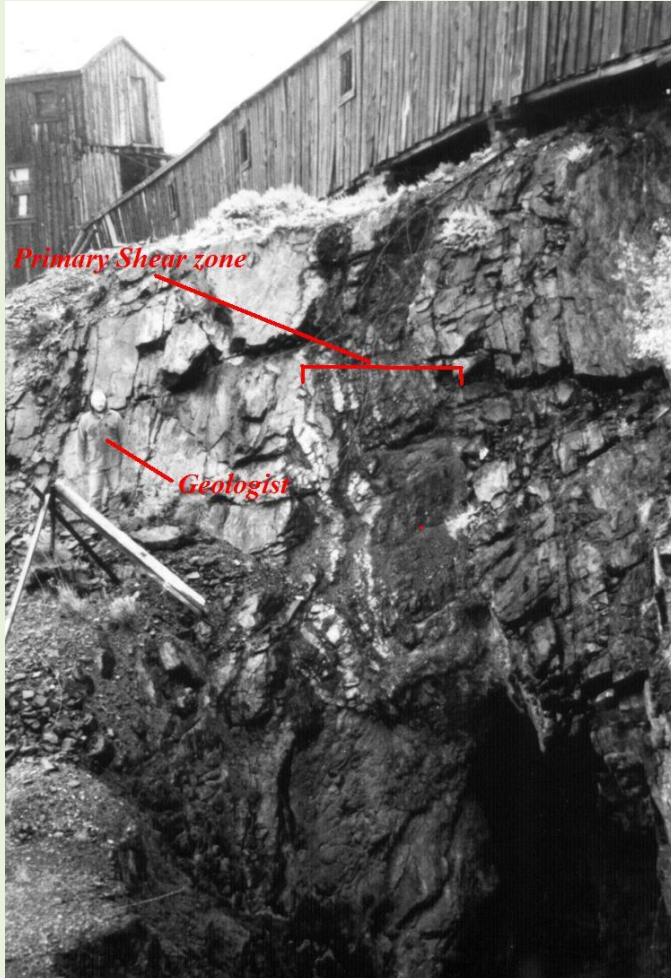
shear zone is. Some dictionaries use the following definition:

“A tabular zone of rock that has been crushed and brecciated by many parallel fractures due to shear strain. Such an area is often mineralized by ore-forming solutions”.

Some significant Archean lode gold deposits occur in the Norseman-Wiluna greenstone belt of Western Australia (this encloses the famous Kalgoorlie Golden Mile). The Super Pit is a major gold mine. It has been developed as an open-cut gold mine with a pit having dimensions of 2.2 x 1 mile in surface area. Such shear zones are characterized as very large tonnage, low-grade (~0.05 – 0.1 opt [opt = ounces per tonne]) gold lodes that are confined to narrow, steeply-plunging, near-vertical sulfide-deficient structures (i.e, there are very little sulfide minerals associated with the gold, such as pyrite or arsenopyrite). The gold-bearing structures are confined to the volcanic-intrusive-sedimentary sequences of the greenstone belts and not associated with the granites.

If I were to describe the principal gold deposits at the South Pass greenstone belt in Wyoming, I would use pretty much the same description used for the Golden Mile! This is a very important concept, as it

is just as likely that Wyoming has its own golden mile along the South Pass-Atlantic-Miner Delight trend. The major difference is that Wyoming never had an major company which attempted to consolidate properties, and Australia never had a legislature that took away the principal gold deposit along the gold-bearing *shear zones*.



Gold in *shear zones* will be enriched in folds within the shears. Most of the ore in these deposits is disseminated with much of the gold being invisible to the naked eye. Gold is distinctly associated with the Boulder-Lefroy *shear zone* in the Kalgoorlie area. The Fimiston Open Pit (Super Pit), is Australia's largest open cut gold mine. It is located on the southeastern edge of [Kalgoorlie](#) and produces 850,000 ounces of gold per year. The mine originally included a number of very small underground mines that were consolidated into a single open pit in 1989 by Kalgoorlie Consolidated Gold Mines Pty Ltd.

Shear zone at the Carissa mine, South Pass greenstone belt, Wyoming. Note the location of the primary shear. This actually is enclosed by a much larger shear zone that is about 1,000 feet wide, thus all of the rock in this photo is part of the larger shear zone.

Most of the good gold mined from the Super Pit is in lodes formed in shears in a rock unit called the Golden Mile Dolerite. The mine will eventually reach 2.4 miles in length, 1 mile wide and reach a depth exceeding 1,700 feet. Since 1893, more than 50 million ounces of gold have been mined from the Golden Mile (10 million ounces more than the famous Homestake mine in

the US).

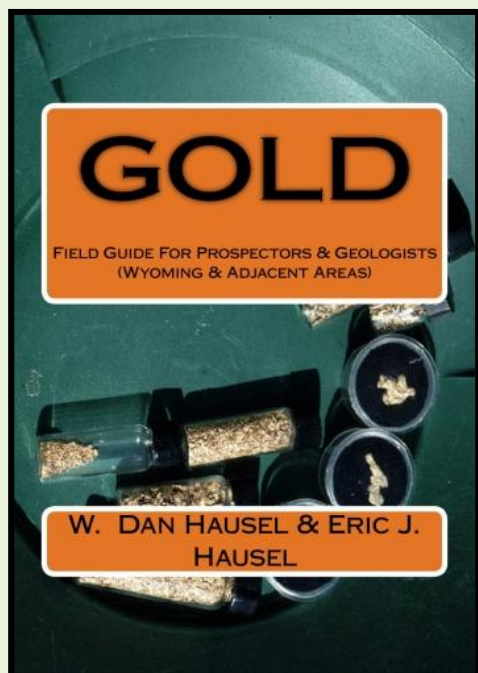
From Kalgoorlie, Karl and I drove back to Perth for the beginning of the International Kimberlite Conference at the University of Western Australia (more in the next issue).

GOLD

See what some of you are saying about our books. [Visit the Gemhunter](#). Want to strike it rich? Our [new 366-page book](#) (*rated 5 out of 5 stars on Amazon*) is based on more than 30 years geological and prospecting experience by my son Eric and myself and designed to lead you to a gold prospect. If you want to find all of those *gold deposits on shear zones* in Wyoming's South Pass, Rattlesnake Hills, Seminoe Mountains and Elmers Rock greenstone belts, this book is for you.

The GemHunter Newsletter
W. Dan Hausel (GemHunter@live.com)
<http://GemHunter.webs.com>

Since 1980, a few hundred previously unrecognized and ignored gold anomalies were identified in Wyoming and nearby areas, some of which could lead to a gold mine.



In 1981, I found a dozen specimens of quartz with visible gold on mine dumps near [Bradley Peak](#). One sample with no visible gold but some pyrite and limonite assayed **2.87 ounces per ton** in gold (*considered to be a very high gold assay*). A nearby iron formation sample assayed **1.15 ounces per ton in gold**. Then the news was released and Wyoming's first gold rush in nearly a hundred years followed with dozens of exploration teams and claim staking groups rushing to the area. Believe it or not, this area and nearby drainages were held by a promoter who did practically nothing with the property and years later, the district again has been forgotten and remains mostly unprospected. In our book, we tell you where these samples were taken and describe nearby unexplored deposits that must contain some gold and probably some nuggets.

In that same year, I discovered a previously unknown gold district west of Casper. Gold anomalies were detected in a variety of rock types in the [Rattlesnake Hills](#). I was positive this would lead to another gold rush – it didn't. This surprised me as

I figured the Rattlesnake Hills had the best potential for economic gold deposits in Wyoming other than the Absaroka Mountains, which had all been quietly withdrawn and incorporated into wilderness, primitive, roadless areas, etc.

The Rattlesnake Hills was also highly recommended by me for drilling and research by the University of Wyoming Mining and Mineral Resource Research Institute, but the university didn't think much of the discovery and dropped funding for the project! But a mini gold rush occurred in the following year and led to exploration by a few companies. After 30 years, another company drilled deep in the one of the highly recommended prospects and hit rich gold at depth that is comparable to Cripple Creek! The deposit will likely become Wyoming's [first hard rock gold mine](#) in decades.

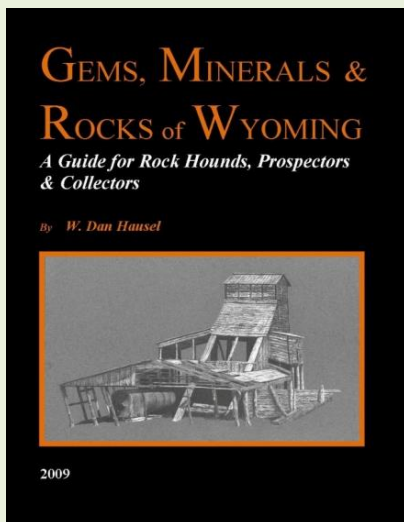
In our book, we also tell you [how to recognize gold](#), where [to look](#) for it and what kind of rock it occurs in. We even tell you [how to use a gold pan](#). Not only do we tell you exactly where most of these anomalies, mines [and prospects are located](#), we also tell you what additional publications will assist you in finding more anomalies.

GEMS, MINERALS & ROCKS OF WYOMING

Gems, Minerals and Rocks of Wyoming – A Guide for Rock Hounds, Prospectors and Collectors is available from [Amazon](#): or order it from your local bookseller.

Book reviews (rated 4.6 out of 5 by Amazon customers).

The GemHunter Newsletter
W. Dan Hausel (GemHunter@live.com)
<http://GemHunter.webs.com>



When I wrote this book, I wrote it for the amateur prospector, [rock hound](#) and mineral collector. I included photos of minerals, rocks and gemstones and made sure they were not world-class specimens simply because authors of most other gem and mineral books spent too much time looking in museums for perfect specimens which are seldom found in the field. Most photos are of common samples that I collected over the years. While working in Wyoming, I [discovered dozens](#) of previously unrecognized gemstone deposits, some that [may be world class](#) and some that [were world-class](#). I found evidence for many other gemstone deposits in the Cowboy state that remain unexplored. I also discovered more than a [hundred gold anomalies](#), found at least [two major gold](#) deposits, and identified more than 300 anomalies that [appear to be kimberlite pipes](#) most within known diamond districts or are located near known kimberlite deposits.

Unfortunately, any scientific book, even those written for the layman, can be challenging to anyone without scientific knowledge. In this book, I've tried to keep the information basic while including a little information for mineralogists. In other words, I've tried to satisfy people with many backgrounds. Hope you find this book useful.

Buy it, you will like it

By

Kurt Kephart (Billings, Montana)

If you are into rocks & minerals of Wyoming, this book gives you a 30 year short cut. The author has combined his expertise, experience and passion for geology into a no-nonsense, x marks the spot, book. I recently took several trips to Wyoming from my home state of Montana and found the Sweetwater agates and white opals in the location given in the book. I am looking forward to my next adventure to Wyoming.

Paulette Dilks - Gems, Minerals & Rocks of Wyoming: A Guide for Rock Hounds, Prospectors & Collectors

Dan puts in more information than the casual reader might be able to assimilate. However I believe the book is useful and interesting to all readers. He literally tells you where to go (you may have to climb a mountain) to find gemstones and his history (and I have followed him on his free blog and on CanadianRockhouser) bears out his personal success at this.

Cecil C. Chittenden Gems, Minerals & Rocks of Wyoming: A Guide for Rock Hounds, Prospectors & Collectors

This is the best book I have ever read on Rouckhounding, For detailed info on specific areas of Wyoming this book can't be beat. Dan Hausel is an expert in this area.

Jill Randolph Gems, Minerals & Rocks of Wyoming: A Guide for Rock Hounds, Prospectors & Collectors

I was surprised that diamonds aren't always found in coal! This was very informative on different minerals.

New FORMAT for GEMHUNTER Newsletter

It's become apparent: I need to change the amount of GemHunter newsletters I send out. I also write a monthly [newsletter for another](#) one of my passions - [martial arts](#) and in particular, Shorin-Ryu [karate](#)

The GemHunter Newsletter

W. Dan Hausel (GemHunter@live.com)

<http://GemHunter.webs.com>

and kobudo. I am also in the mist of writing 3 books (one on gemstones, another on Arizona gold deposits and a third on martial arts) and periodically submit articles to the [ICMJ Prospecting and Mining Journal](#), and have been offered a contract for a series of books for a major book company (although we are still trying to work through the legal jargon of the contract which could result in my not signing). I also still dabble [a little bit into art](#) and other things, and I prospect in Arizona with my wife when I'm not teaching martial arts, so I will need to cut back on the GemHunter newsletter. What I plan to do in the future is to produce quarterly issues – so your next issue will be the *Fall, 2012 issue*. If anything earth shaking shows up before then, I will send out a special issue. Keep prospecting!

LINKS

[The Gem Hunter](#)
[Geological Consultant](#)
[Prospecting for Diamonds](#)
[Ruby & Sapphire](#)
[World-Class Iolite-Ruby-Sapphire-Kyanite deposits](#)
[South Pass Gold](#)
[ICMJ Prospecting and Mining Journal](#)
[Books](#)
[Art by Dan](#)

[Gold Hunter](#)
[Gemstone Prospecting](#)
[Wyoming Gemstones](#)
[Diamonds](#)
[Jade](#)
[National Rock Hound Hall of Fame](#)
[University of Wyoming Awards](#)
[Wyoming Authors](#)
[WikiBin](#)

GEMSTONE LINKS

[Chromian Diopside](#)
[Commerical Gold Deposits at Rattlesnake Hills](#)
[Giant Opal Deposit](#)
[Peridot](#)
[World Class Iolite](#)
[Gemstones Minerals and Rocks](#)
[Guide to Quartz and Agate](#)
[Rock Hounding](#)
[Geology & Gemstones](#)
[PhotoBucket Diamonds](#)

[Garnet](#)
[Leucite Hills Peridot](#)
[Barite](#)
[Sloan Ranch Kimberlite & Diamonds](#)
[Diamond Mineralogy](#)
[Rockhounding for Garnet](#)
[Gemstone Capitol of the US](#)
[Tin Cup Jasper](#)
[Panoramio Photos](#)
[Gemstones Book](#)

GOLD LINKS

[Alaska Gold](#)
[Arizona Gold](#)
[Mountain of Gold](#)
[Colorado Gold](#)
[Rattlesnake Hills Gold](#)
[Douglas Creek gold & diamonds](#)
[Carisa Gold Mine](#)
[Prospectors' Guide to Gold](#)
[Montana Gold](#)
[HOW to Operate a Gold Pan](#)
[Cheyenne GPAA](#)
[GemHunter on Twitter](#)
[Wyoming State Gem & Mineral Society](#)
[Gold Prospecting Clubs](#)

[Gold Prospecting](#)
[California Gold](#)
[Donlin Creek, Alaska](#)
[Seminole Gold District](#)
[Copper King Gold deposit](#)
[Copper & Gold in Arizona](#)
[Ferris-Haggarty Copper Mine](#)
[Discovery of Nickel & Palladium](#)
[How to Find a Gold Prospect](#)
[Field Trip to Snowy Range](#)
[Past GemHunter & Keystone News](#)
[Mining Books](#)
[Prospecting Clubs](#)
[Prospecting Groups](#)