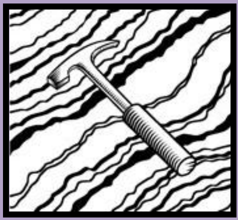
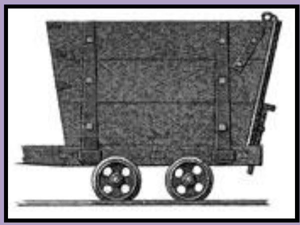
Gem Hunter – The Prospector's Newsletter





Vol 2, No 6 June 2010 *Newsletter from the GemHunter*

BARITE

Barite ($BaSO_4$), a barium sulfate, when found in crystalline form may produce attractive mineral specimens that will enhance most any mineral collector's or rock hound's mineral collection. This industrial mineral has a relatively low Moh's hardness (3 to 3.5), and a relatively high specific gravity (4.5), and when found in large tonnages in massive form, may be mined for a drilling mud additive to aid in blowout prevention in oil and gas exploration due to its high specific gravity. Its high specific gravity produces noticeable heft, which aids in the identification of the mineral.

Left - Barite rose showing cluster of barite crystals that produce a rose-like appearance. Below – cleavage in barite (linear fractures within the crystals).

Barite crystallizes in the orthorhombic crystal system and may form aggregates or divergent groups of tabular crystals known as 'barite roses'. These extraordinary crystal aggregates have a very pleasing appearance and often are sought by mineral collectors.

Barite has perfect basal cleavage with prismatic cleavage at right angles to basal cleavage, and will sometimes form white masses exhibiting distinct right angle prismatic cleavage. Tabular white, yellow, grey, blue, red, or brown, opaque, translucent and transparent crystals have been reported.

The GemHunter Newsletter
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The GemHunter

Some of the more attractive specimens found in Wyoming are light aquamarine blue, transparent to translucent, thin tabular crystals compressed along the c-crystallographic axis. This compression produces distinctly large crystal faces. The individual crystals of the Wyoming aquamarine blue barite occur as plates with distinct beveled edges. Perfect basal cleavage parallel to the c-axis lies perpendicular to imperfect prismatic cleavage parallel to the b-axis. Where found near the Mine Hills the Shirley Basin of southeastern Wyoming, the barite occurs in vugs in limestone enclosed by calcite and prismatic quartz.

The blue barite from Shirley Basin (above) shows crystals with beveled edges along the edge of the a-axis. Note the beveled edge on the crystal in the center of the photo.

Some Wyoming Localities

Shoshone Canyon *(SE section 5, T52N, R102W)*. Small radial clusters of white barite crystals are found in the Shoshone Canyon area of Rattlesnake Mountain about 4 miles west of Cody in northwestern Wyoming. Some of the crystals from in this area are reported to be one inch in length. This barite is associated with paleo-hot spring deposits and solution cavities in the Mississippian Madison Limestone.

New Rambler mine *(SW section 33, T15N, R79W)*. Fine-grained to massive pyrite was reported with barite crystals at the New Rambler copper-gold-palladium-platinum mine in the Medicine Bow Mountains west of the Rob Roy Reservoir.

Hog Park *(NW section 2, T12N, R85W)*. A pod-like mass of barite, 40 feet wide by 300 feet long is reportedly associated with opal in the Hog Park area of the Sierra Madre Mountains several miles southwest of Encampment. The barite is reported to occur along the northern edge of a shear zone in contact with red quartz monzonite. When I investigated this deposit, I could not find any evidence of opal, but white crystalline to massive barite was present.

Shirley Basin. White barite concretions are reported in Shirley Basin northeast of the town of Medicine Bow. These are weakly fluorescent under long-wavelength ultraviolet light.

In addition to white barite, very attractive aquamarine blue barite crystals occur in the vicinity of Sheep Creek near Crystal Hill adjacent to the Mine Hills *(section 10, T26N, R75W)* along the southeastern margin of the basin and adjacent to the western flank of the Laramie Range. Mine Hills are located on the Laramie Peak 1:100,000 topographic map and are accessed from the west from Shirley Basin (see also Shirley Basin 1:100,000).

The barite occurs as attractive light-blue, transparent to translucent, tabular crystals and is found with calcite and quartz in vugs in the Casper Formation near a massive psilomelane, manganite (manganese) and jasper replacements in the Casper Formation (Hausel and Sutherland, 2000).

Blue barite crystals from Shirley Basin.

References

Dana, E.S., and Ford, W.E., 1949, A textbook of Mineralogy: John Wiley & Sons, 851 p.

Hausel, W.D., and Sutherland, W.M., 2000, Gemstones and other unique minerals and rocks of Wyoming: Wyoming Geological Survey Bulletin, 267 p.

Sinkankas, J., 1964, Mineralogy: Van Nostrand Company, 585 p.

ANDAUSLITE, KYANITE, SILLIMANITE, STAUROLITE

Andalusite, cordierite, kyanite, and sillimanite are all alumino-silicates associated with alumina-rich, mica schists known to geologists as metapelites. Usually, one or more of these alumino-silicates are found in the same metamorphic terrain and can provide a general barometer of the intense pressure and temperature that the mica schist was subjected to. For example, kyanite forms at relatively high pressure and low temperature compared to sillimanite and andalusite. Andalusite as well as cordierite, will form at relatively higher temperatures and lower pressures than sillimanite and kyanite. Sillimanite forms at high pressures and temperatures between the other alumino-silicates.

Andalusite, kyanite, and sillimanite are polymorphs with the general chemical composition of $Al_2(SiO_5)$. Andalusite is orthorhombic and forms dull, rough, prismatic crystals with square cross sections in mica schists, and is often partially replaced by sericite (a fine-grained white mica). Most andalusite found in Wyoming is opaque, grey to brown. However, andalusite crystals of brownish-pink, white, rose-red, red-brown, green, yellow and violet have been reported elsewhere. It has a hardness of 6.5 to 7.5 and specific gravity of 3.1 to 3.2. But because of the common partial replacement of andalusite by sericite, the specific gravity may be relatively low. Its hardness is often difficult to determine because of partial replacement by softer mica.

Kyanite is the triclinic polymorph of andalusite and sillimanite. Typically, kyanite forms distinct light-blue, bladed, opaque crystals with a specific gravity of 3.53 to 3.65. Gem varieties of kyanite are uncommon. Good crystals of kyanite have a unique hardness which is useful in identifying this mineral. Parallel to the greatest length of the crystal [(c-axis) or m(001)], it has a hardness of 5 and can be scratched with a pocket knife. However, in the direction of the short axis, it has a hardness of 7 and cannot be scratched with a pocket knife unless the mineral is altered or weathered. In other words, there should be a noticeable difference in the mineral's hardness depending on the direction it is scratched. This along with its distinctive blue color, are useful in identifying this mineral.

Sillimanite, another orthorhombic polymorph, forms slender, prismatic, or fibrous white, colorless, to very light green crystals with vitreous to silky luster. Sillimanite has a hardness of 6.5 to 7.5 and specific gravity of 3.23 to 3.27. The mineral rarely forms transparent crystals suitable for cutting. No gem varieties of sillimanite have yet been reported in Wyoming.

Kyanite in outcrop (left) and single crystal of gem-quality kyanite (below).

Staurolite, a complex alumino-silicate $(Fe,Mg)_2(Al,Fe)_9O_6(SiO_4)_4(O,OH)_2$, is a monoclinic (pseudo-orthorhombic) mineral with a hardness of 7 to 7.5. It commonly forms distinct brown, to yellow-brown, cruciform (cross-like) twins, although it may occur as flat, elongated crystals. It is typically associated with kyanite, muscovite, and almandine garnet. No gem varieties of staurolite are known in Wyoming.

These metamorphic minerals are restricted to the Precambrian cores of several of Wyoming's mountain ranges where large regions of moderate to relatively high-grade metamorphic rock was deeply buried during the geological past. The lithostatic pressure from a thick pile of sedimentary rocks that buried these terrains, resulted in metasomatic alteration of the rocks. In other words, the minerals in these rocks slowly changed to other minerals more suited to withstand the higher pressure and temperature.

In particular, many alumina-rich sedimentary rocks (such as shales) were greatly affected. Under the pile of sedimentary rock, these slowing changed to mica-schists with a distinct schistose fabric. In addition to mica, many of these schists also grew porphyroblasts of large crystals with aluminum-rich silicate minerals known simply as alumino-silicates. Much later in geological history, dramatic forces in the earth resulted in large blocks of the earth being uplifted many miles along faults, and produced many of today's mountain ranges. Erosion removed much of the overburden such that today we see exposed in the mountain ranges, the old, metamorphic crystalline cores. If you examine a Geological Map of Wyoming, you will note that the only place that you see these ancient Precambrian rocks is in the cores of many mountain ranges. You should also note that where ever you see metasedimentary rocks on the map, these are some of the better places to search for the alumino-silicates as well as rubies and sapphires.

Right – the first gem-quality kyanite produced from Wyoming rough. Literally billions of carats of this material were found by the author that had been overlooked as a gemstone until the mid 1990s. Below is another gem-quality kyanite with an interesting color contrast between the blue, black, white and yellow-brown. These were cut from material recovered in the central Wyoming Laramie Range west of Wheatland.

In some of these areas, you might find some attractive specimens of mica schist with abundant sky-blue kyanite crystals. Rocks that have been called peanut schists contain porphyroblasts of andalusite and cordierite found in the South Pass area of the Wind River Mountains, staurolite crosses in mica schists, and some gem-quality, sapphire-blue crystals of cordierite have also been found west of Wheatland.

Alumino-silicate minerals that often are found in porphyroblasts (large metamorphic crystals) include andalusite, cordierite, kyanite, sillimanite, and staurolite. Usually, one or more of these alumino-silicates are found in the same metamorphic terrain and can provide a general barometer of the intense pressure and temperature that the mica schist was subjected to during the geological past.

Areas where these alumino-silicates have been reported in Wyoming include Copper Mountain in the Owl Creek Mountains, South Pass in the Wind River Mountains, the Seminoe Mountains, the Elmer’s Rock greenstone belt, and the Sierra Madre Mountains.

Figure D. Outcrop of kyanite schist at Grizzly Creek. The distinct prismatic crystals in the rock are kyanite, many are gem-quality.

FIELD TRIPS

We look forward to spending time with you in July. July 9-11, field trip to the diamond and gold fields of southeastern Wyoming. July 16-18th – field trip to the South Pass gold district (**http://www.wdanhausel.com**).

Register at: http://www.learngoldprospecting.com/index.cfm?var_file=fieldtrips/gem-gold-fieldtrip.cfm

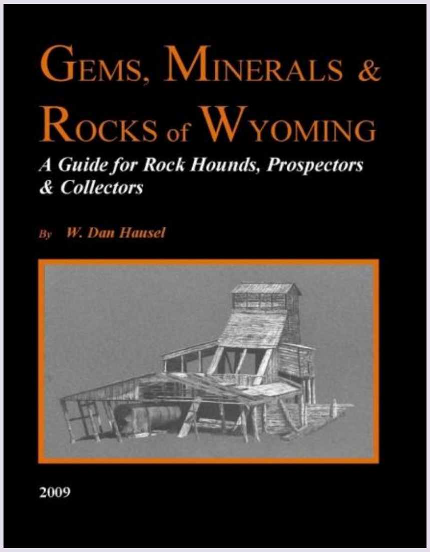
LINKS

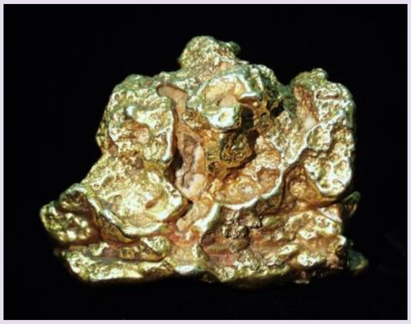
GemHunter
Diamond Prospector
Gemstone Hunter
Rubies and Sapphries
World Class Colored Gem Deposit discovered
Gold at South Pass
Gold Prospecting
Gold in Montana
Donlin Creek Gold
Gold in California
Gold in Alaska
Leucite Hills Lamproites and Peridot
FIELD TRIPS

Geological Consultant
Gold Prospector
Gems Minerals & Rocks of Wyoming
Discovery of Major Diamond Province
Jade Deposits
Rattlesnake Hills Gold Deposit
Seminoe Gold Deposit
Chrome Diopside
Mountain of Gold
Gold in Arizona
Giant Opal Deposit found in Wyoming
Gem Garnets
Copper King Gold Mine

BOOKS

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.





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 3 decades, 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.