

RAINBOW FLUORITE BERMANISH GLUCK, GERMANY

# Typical Characteristics of Fluorite from Famous Localities

(How to recognize and value your fluorite and its relatives)

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## Introduction

Fluorite is a common mineral. At first, it can seem overwhelming to think about fluorite in an organized way. The abundance of colorful pieces is wonderful in terms of being accessible and fun to collect. It can be tricky to understand what drives value and to separate a \$20 eBay piece from a million-dollar world class piece (and everything in between.) This article hopes to introduce the things that add value to fluorite and to help demonstrate typical characteristics of pieces from famous localities. There are some localities around the world that have fluorite features that are found nowhere else.

## Value (These also generally apply to all minerals)

**Color:** Of gemstones and minerals, one of the highest determinants of value is color. Rich, saturated colors that are neither too dark nor too light are prime and desired. Rare colors for the species are also highly desired and colors that are not found often in minerals are also valuable. Rhodochrosite (manganese carbonate) is soft with generally average luster, but it is wildly expensive because it is bright, true red – a color not usually seen in the mineral world. Schorl (black) tourmaline is much less expensive than other tourmalines because it is not a pretty color. Gemstones are color graded with a 70-80% saturation demanding the highest price in general.

In fluorite, the rarest most valuable color is bright red. (White and jet black are also rare, but do not command the highest prices because they are not as pretty.) The most common color is light to apple green as Chinese mines produce these by the literal ton. Pure  $\text{CaF}_2$  (fluorite) is colorless (or white) so the colors in collectible pieces are due to inclusions and complex interactions between crystal defects and nearby inclusions. Rare earth elements (REE) (those heavy elements often separated off the periodic table) are common coloring agents in fluorite and often have low level radioactivity or are found with elements with radioactivity activating color centers within fluorite. Some fluorites can be too dark in hand, but come to life with back lighting, showing vibrant colors when a bright light is placed behind them, where the light passes through the crystal. “Limpid” is a term used especially by Europeans for

an unsaturated but clear and watery color. It is clear or pastel, almost like aquamarine or morganite colors. Fluorite is also very sensitive to different types of light with most looking their best in incandescent light and looking the worst in LED light. They are almost all fluorescent with white, blue, or purple glow in both LW and SW UV lights. Some pieces change color completely (pink or red in incandescent light and blue in LED.) Others fluoresce in daylight.

**Color Zones and Phantoms:** Color zones are larger areas or blotchy, inky areas of contrasting color. Phantoms are thin lines of contrasting color that follow the current crystal form or a previous one. They are often cubic or octahedral and represent an earlier iteration of the crystal during its growth. Pieces with pretty contrasting colors, many colors, or detailed phantoms are of higher value in general.

**Gemminess:** This is how clear the crystal is. If you can look all the way through the crystal without distracting inclusions, fractures, or cloudiness, this is called “gem.” These will be more valuable than similar pieces that are less perfect. Because fluorite has a natural tendency to cleave on the octahedral planes, many pieces have diagonal cleaves running through them, creating a metallic or mirror type distraction caused by the break in the structure. These can be softened with “vacuum sealing” where the air is suctioned out of the fracture and sealed with opticon or an epoxy with similar refractive index to restore the uninterrupted view of the crystal. As long as it is disclosed, it is a fairly accepted practice within the mineral industry.

**Luster:** Luster refers to the shininess of the surface of the fluorite and often separates the great from the good (or bad.) Standard luster for most fluorite is “candy” luster which has a soft, partially shiny look similar to hard candy. “Matte” luster is worse than average with a weathered or flat, dull look. “Glassy” is somewhat better than candy luster. The best luster is “glossy” luster which is completely shiny as though it has been polished or is wet. Covering the fluorite with oil or wetting the fluorite before photography or video is a common fraud done to increase the apparent value of the fluorite. It is often done in

China and Pakistan and is a common tactic on eBay, with sellers trying to get more money for a lesser piece. Oils can be removed by soaking the piece in acetone (always spot check a small area first.) Many unsophisticated dyes can also be removed with acetone, so if you are unsure if your piece has been manipulated, you can always do the "acetone" test.

**Damage:** Many a wonderful piece's value has been destroyed by damage. Because fluorite is soft (Moh's 4), prone to cleavage, and intrinsically heavy, fluorite is easily damaged. Corners and edges are especially prone, and all corners of a cube or octahedron should be checked as these are most vulnerable. Fluorite is easily damaged when mined, by blast or extraction methods. It is also easily mishandled and simply banging a corner down onto a table can also cause nicks or cleavage.

**Habit and Isolation:** The closer and sharper a crystal is to the textbook shapes we have been discussing, the higher the value and collectability. More complex shapes are also of higher value. A perfect single well-formed cube perched on a matrix is generally more desirable than a jumbled mix of indistinct crystals.

**Size:** I hesitate to include this as this is often confusing at first. Museums often display large pieces as the size is often impressive to novice mineral lovers. There is no denying that they are impressive, but a fine small piece can be worth much more than a coarse large piece. However, if the other factors above are the same, a piece with 10cm crystals instead of 1 cm crystals will be worth more.

**Aesthetics and "Je Ne Sais Quoi":** If a piece is just eye catching or pretty, it is worth more. This is subjective, and I fully encourage you to ignore all the above and collect what you love.

**Case Study:** The next two photos represent two of the thousands of green fluorites from Xianghualing Mine, Linwu Co, Chenzhou, Hunan Province, China being currently produced and offered for sale. They are both about the same size and are being offered for around \$100.



**Figure 1.** This fluorite shows a sizable cube of pale green (the most common color.) It is not gemmy (opaque) with a dull, matte luster. It has significant damage to the top edge, right side, and is missing its bottom right corner (red arrows.) In my opinion, this is a damaged, unattractive piece of widely available material and not worth \$100 currently. Note the pretentious glove used to try to denote care with this low value and highly damaged piece.



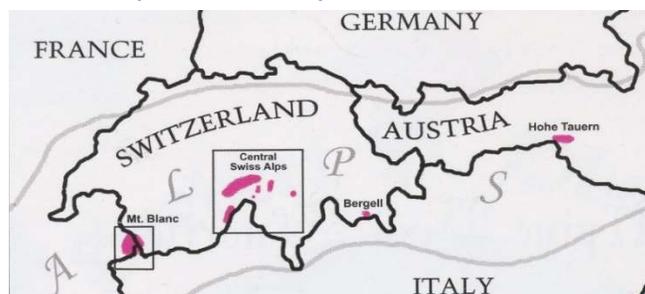
**Figure 2.** This fluorite is from the same mine as Figure 1. In contrast, this is a bright kelly green with hints of blue at the edges. It has octahedrons composed of stepped cube faces. It is partially gemmy as you can view light behind it and has a glassy luster. It is undamaged. This is a nice piece for \$100, and likely to appreciate in value.

## Valuable and Recognizable Fluorite Localities

### Red and Pink Alpine Fluorite:

**Mont Blanc Massif, Chamonix, Haute Savoie, Auvergne-Rhone-Alpes, France**

**Gosheneralp, Goshenen Valley, Uri Switzerland**



**Figure 3.** Geography of alpine fluorite producing areas

Red and pink fluorite is consistently the most valuable fluorite in the world. They are mined in small pockets high up in the Alps where true mountain climbing gear is needed. The pockets must be located and mined with the pieces needing to be brought out undamaged. Due to the altitude and weather, there is a short mining season. There has never been an organized mining venture and it is unlikely there ever will be. The color is desirable, the mining is dangerous, the supply is small, and therefore, the price is high. Red fluorite is found nowhere else. Pink fluorite is found in Huanggang Mine, China and in Pakistan, but this supply is also limited.

Alpine fluorite forms octahedrons with generally a candy luster. They are gemmy and associate with quartz, smoky quartz, and dustings of green chlorite. They can range from pale pink to pure red.



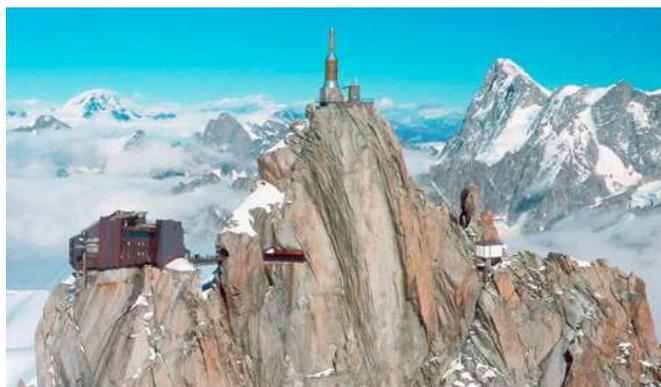
**Figure 4.** Goscheneralp, Goschenen Valley, Uri Switzerland



**Figure 7.** Mont Blanc, Haute-Savoie, Auvergne-Rhone-Alps, France



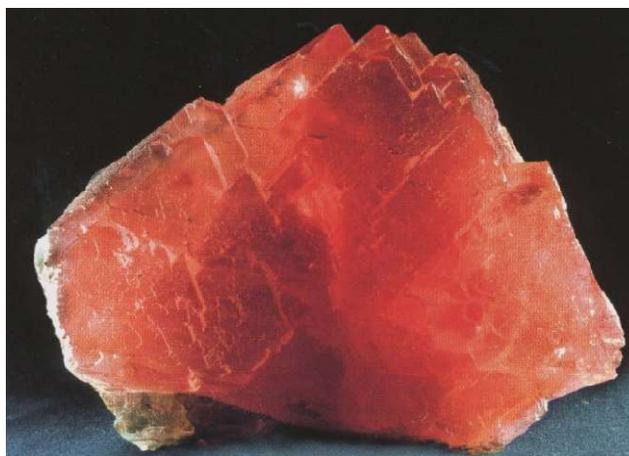
**Figure 5.** Perfect octahedrons of candy luster are gemmy and perched on perfectly glassy and gem cola-colored smoky quartz (Mont Blanc)



**Figure 9.** Near Mont Blanc, a ski resort



**Figure 6.** Smaller and pinker octahedrons of candy luster fluorite are gemmy and perched on clear quartz which is not well formed and more of a druse (Switzerland)



**Figure 10.** The Georges fluorite - 18cm, the largest French red fluorite



**Figure 11.** Corroded octahedrons of red fluorite on a large smoky quartz plate

**Large and Colorful Illinois Fluorite:**

**Minerva No 1 (Ozark-Mahoning No 1), Cave-in-Rock Mining Subdistrict, Hardin Co, IL, USA; Denton Mine, Harris Creek Mining Subdistrict, Hardin Co, IL; Annabel Lee Mine, Harris Creek Mining Subdistrict, Hardin Co, IL Many others: Hill- Ledford, Alcoa, Robinson, Leadhill, Rosiclare, Crystal-Victory, Dominator, Deardorff**

Fluorite from the southern Illinois fluorspar district was plentiful and inexpensive, but with the mines long closed, it has become scarce. It typically has large cubes with distinct saturated colors and contrasting phantoms. Combinations of purple, yellow, and blue are typical, often with tiny chalcopyrite attached to the crystal face surfaces. The cubes often have a subtle reticulated or shallow stepped appearance. They also commonly form with white to yellow dogtooth calcites and rarely with strontianite. They are not green, red, brown, or pink but occasionally are bright magenta. Many are quite saturated, but some can have lighter colors. They are usually gemmy to translucent, but poorer ones can be opaque. They typically have a candy luster with the best ones having glassy or even glossy luster.



**Figure 12. Large glossy cube of yellow fluorite with outer phantoms in blue and purple. The top and back are covered with pointed "dogtooth" calcite. (Minerva No 1)**



**Figure 13. Lovely blue cubes have subtle darker blue to purple phantoms at the edges with contrasting white dogtooth calcites. A tiny dark spot of chalcopyrite can be seen on the candy luster face, just right of center. (Denton Mine) Kevin Ward Specimen and photo**



**Figure 14. Lovely candy luster on magenta and purple cubes. (Attr. Robinson Mine)**



**Figure 15 above and 16 below. Classic cube form with a yellow core, a purple phantom, and a blue outer color zone. (Annabel Lee)**



## Brown and Honey Clay Center, Ohio Fluorite:

**Stonco White Rock Quarry, Clay Center, Allen Township, Ottawa Co, Ohio, USA**

The honey to cola-colored cubes of fluorite are found nowhere else in the world and should be easily recognized as a USA classic. Stoneco quarry was a lime quarry in dolomite which has been open for nearly a century. The cubes of fluorite range from transparent to opaque in all shades of rich brown color. Most notably, they form on or with "jackstraw" white to yellowish to bluish elongated celestine.



**Figure 27. Stoneco Quarry in 1966. Photo by Larry Maltby**



**Figure 28. Cubes of cola brown fluorite have a glassy surface and combine with white peaked termination celestine at the left side**



**Figure 29. The cubes are glossy with more distinct color zones from cola to nearly white. Note the small celestine crystals on the left side and the dolomite matrix (which is anticipated as this is a lime quarry.)**



**Figure 30. A huge formation of bladed and terminated celestine host glossy and gemmy cubes of color zoned cola fluorites. Smaller crystals are honey colored. Mike Royal Specimen and photo**

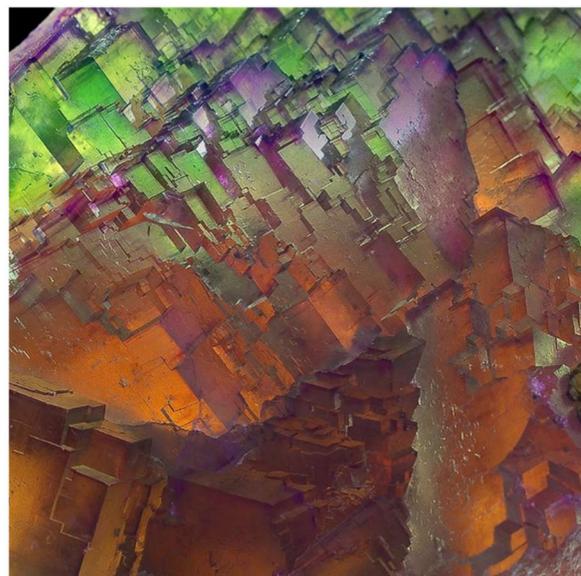


**Figure 31. Dolomite matrix hosts many small gem cubes of root beer colored fluorite with long blade sof white celestine on a matrix of dolomite. Jamison Brizendine Specimen and photo**

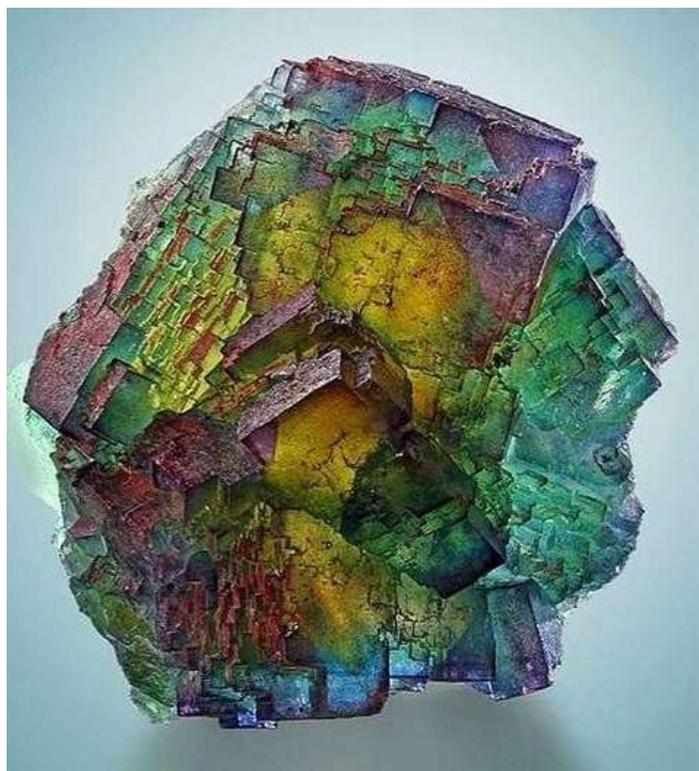
## Rainbow Fluorite from Germany

**Bergmannish Gluck, Frohnau, Annaberg-Buchholz, Saxony, Germany**

This mine was a silver and cobalt mine that was converted to a uranium mine after WWI by the Soviets in East Germany. Information is very difficult to obtain (probably kept secret for the nuclear efforts,) as are these amazing fluorites. Hematite staining in red on the edges of the multicolored fluorites is not a true "red" fluorite color, but adds to the rainbow effect. Most of these pieces are quite dull in natural light and require backlighting to see the effects. They are cubes with an intricate stepped pattered, usually jumbled together. I have not seen pieces on matrix but are usually floater pieces with recrystallized bottoms.



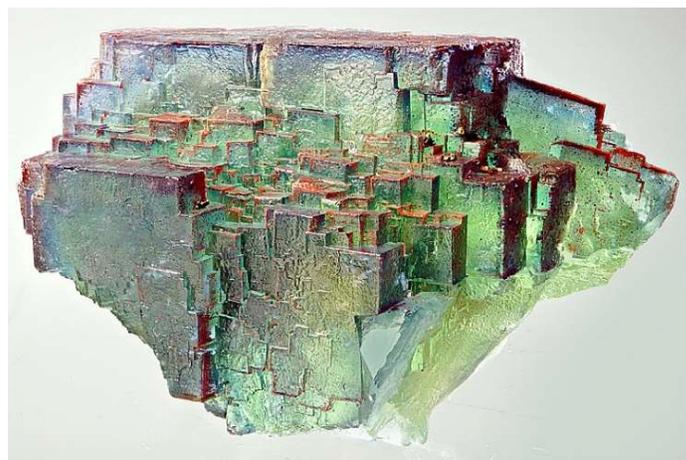
**Figure 34. Rainbow Fluorite close up of intricate color zoning and stepped growth features. Joreg Wittig photo**



**Figure 30. Rainbow fluorite, Bermannish Gluck, Germany. Will Hough photo and specimen**



**Figure 35. Rainbow fluorite, Bermannish Gluck, Germany.**



## Purple Fluorite with Carthage Corners from Elmwood Mine, Tennessee, USA

Elmwood Mine, Carthage, Smith Co, Tennessee, USA

Once a prolific mine with thousands and thousands of great specimens, Elmwood Mine is now submerged in water. Elmwood fluorite made huge cube crystals (up to 20cm on edge) as well as huge golden calcite scalenohedrons. Pieces were (very) inexpensive many years ago but have come up dramatically in price due to the mine being closed. On first look, the purple and yellow cubes of fluorite can look similar to Cave-in-Rock, Illinois fluorite, but there are differences in most pieces. (Note: Although southern Illinois may seem close to Tennessee, they are very different deposits and Elmwood is not simply an extension of southern Illinois fluorospar fields.) Most fluorite from here is yellow or purple or a combination of both. Often the yellow is lighter than the yellows of Illinois and usually on the inside of the crystal with darkish purple on the outer portions. One way to know positively that the piece is from Elmwood, is the presence of "Carthage corners" where only the corners are yellow with the rest of the outside of the crystal being purple (It might still have a yellow core.) They are named because Elmwood Mine is near the town of Carthage, and these corners are found nowhere else in the world (red circle). Cream colored snowballs of granular (sugary) barite (red arrows) also indicate that this is from Elmwood, as they are not found in Illinois. Sphalerite in tetrahedrons of dark brown to orangish or reddish (pink arrow, sphalerite from the matrix is peeking out between the crystals) is much more common here than in Illinois so if you see brownish crystals on the matrix that can help identify. Calcite here is often larger, more golden or orange, and in scalenohedrons (green arrows). Illinois calcites are more "dogtooth" in form (like a canine tooth) and have whiter or lighter yellow color.



Figure 36. A 37cm museum sized classic Elmwood Mine example

Figure 36. A better example of Carthage corners. Ward minerals specimen and photo