

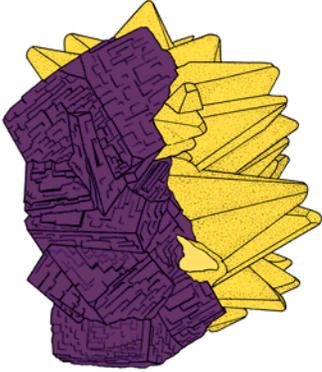
# MINI MINERS MONTHLY

A MONTHLY PUBLICATION FOR YOUNG MINERAL COLLECTORS

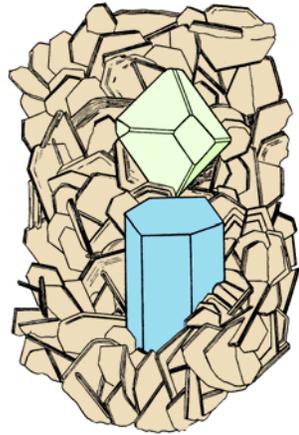
VOL. 13 NO. 4

APRIL 2021

## FLUORITE Issue

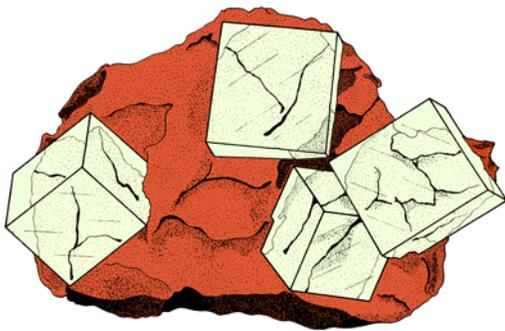


Fluorite is one of the most common minerals in mineral collections. Fluorite specimens come in many sizes, including very large crystals and crystal groups. They are very colorful and can be colorless, purple, blue, yellow, brown, green, pink, and mixtures of colors, often in zones. They are found as cubes, octahedra and sometimes cube and octahedral faces grow together to create more complicated crystals. They can even be 12-sided (dodecahedral). And at mineral shows good fluorite specimens are common and often are not very expensive. But be prepared: the best can be very, very, very expensive.

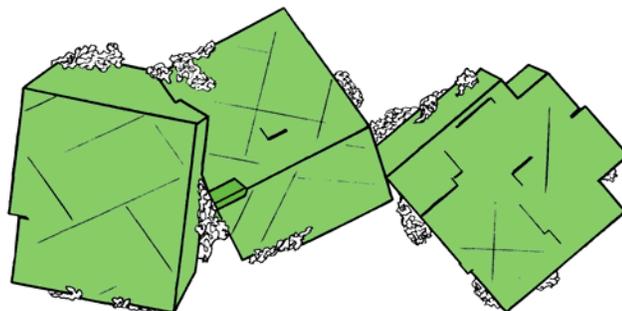


Since fluorite is such a popular mineral to collect, especially for young collectors, this issue is devoted to this special, colorful and wonderful mineral species.

In this issue you will discover the colors, shapes, physical properties and uses of fluorite. Color in all of the fluorite drawings. As always, when you are done enjoying *Mini Miners Monthly* don't hesitate to draw your own fluorite specimens. You can find good pictures of fluorites on the internet (easy enough to GOOGLE), in mineral magazines and books as well. Most importantly, draw the fluorite specimens that you have in your own collection.



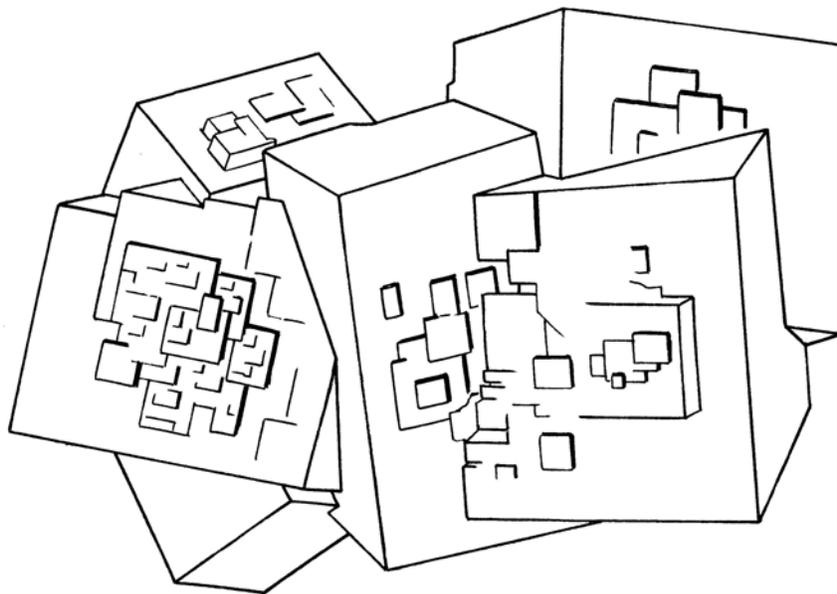
If you like this issue, Diamond Dan Publications has a 32-page book about Fluorite that includes some of these pages and a whole lot more. Copies are \$3.95/copy, postage paid. Clubs and teachers and parents with big families: orders of 50+ copies are \$1.00/copy plus shipping. Email Diamond Dan to place your order! This is one of our most popular books!



# Fluorite

## The Rainbow Mineral

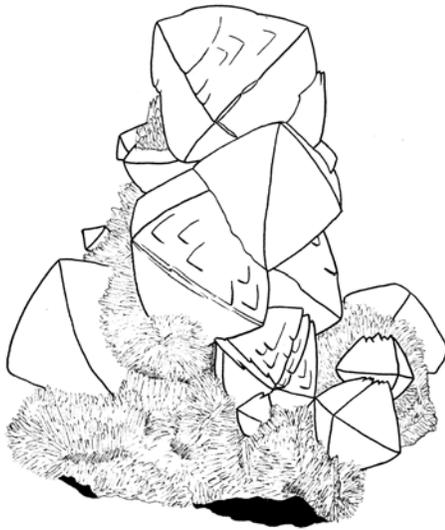
Fluorite is a very common mineral. It is found all over the world. It is found as cubes, octahedra, and combinations of these two forms. It is also found as smooth, rounded balls. Fluorite also occurs with many other minerals, resulting in specimens that are beautiful to see. One of the reasons that fluorite is one of the most popular minerals to collect is *COLOR!* Fluorite is found in a rainbow of colors. That's why we call fluorite "The Rainbow Mineral." Legend says there's a pot of gold at the end of a rainbow. For mineral collectors, a pot of fluorite would be even better! Here you will learn more about fluorite than you ever thought you could know.



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## FLUORITE'S PHYSICAL PROPERTIES

**Chemical Formula:**  $\text{CaF}_2$  ~ Calcium Fluoride

**Crystal System:** Isometric (also called "Cubic")

**Luster:** Vitreous (also called "glassy")

**Hardness:** 4

**Specific Gravity:** 3.0 - 3.3

**Fracture:** Conchoidal (also called "shell-like")

**Cleavage:** Perfect Octahedral. This means that with care, you can break a piece of fluorite into a perfect, 8-sided diamond shape which is called an *octahedron*.

Transparent. Often fluorescent.

## THE NAME "FLUORITE"

The name "Fluorite" was created from the Latin word *fluere* which means *to flow*. You see, fluorite is what metallurgists call *a flux*. Smelting is the process of removing valuable metal from its ore. For example, when an ore, like the iron ore *hematite* is smelted, it is heated to very high temperatures to make the metal (iron) come out of the ore. But this takes a **LOT** of heat! When the flux mineral (fluorite) is added to the hematite, the iron comes out of the ore *at a lower temperature!* So, the flux mineral called fluorite makes iron *flow* out of iron ore at a lower temperature! This makes it easier to remove the iron and saves a lot of money because it takes less fuel to heat the ore.



There are a number of other words that come from the mineral name *Fluorite*. One of the elements removed from fluorite is *fluorine* which is used to make the chemical *fluoride* that is used in toothpaste. The special property of *fluorescence* where ultraviolet light creates different colors in minerals was probably first seen in the mineral fluorite and so was named after this special mineral species.

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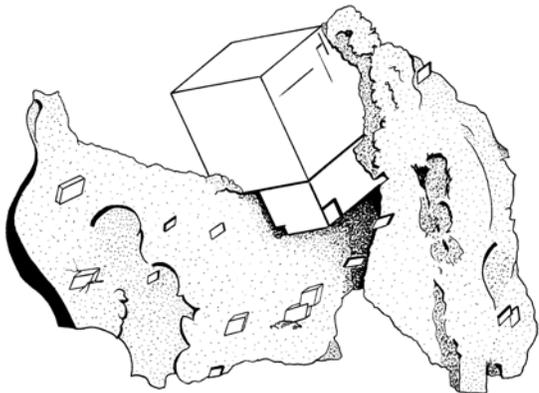
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## COLORFUL FLUORITE

Some have called fluorite "The most colorful mineral in the world!" Others have described it "like a bouquet of flowers." Without a doubt, fluorite can be found in all the colors of the rainbow - and more!

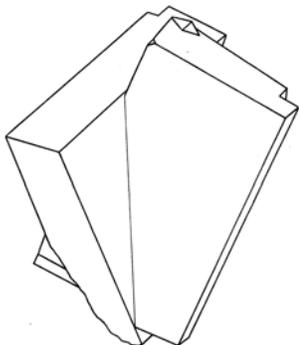
Pure fluorite contains only two elements, **calcium and fluorine**. Its chemical formula is  $\text{CaF}_2$ . When you find pure fluorite in nature, it is colorless and clear as glass. But pure minerals are not often found in nature. They usually contain small amounts of other elements or have defects in the crystals and these "impurities" create color in fluorite.

**Green** in fluorite can be created when some of the calcium (Ca) is replaced by the element samarium (Sm). *Green fluorite cubes from China.* ▶

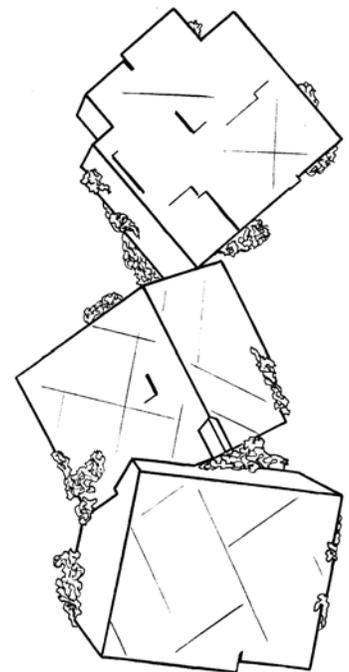


◀ **Purple** in fluorite can be created when radiation causes special changes in the crystal structure. The presence of something mineralogists call **calcium colloids** can create colors that range from **blue to darkest purple**. This can get

very complicated, but you can think of a "calcium colloid" as bunches of special calcium atoms. *Above left: Deep purple fluorite cubes from Penfield Quarry, Penfield, New York, USA*



◀ **Yellow** in fluorite is also created by special chemical changes inside the crystal. Yellow fluorite forms when two fluorine ions (F) are replaced by one oxygen (O) ion. *Intergrown yellow fluorite cubes from the Hilton mine, Scordale, Westmoreland, England.*



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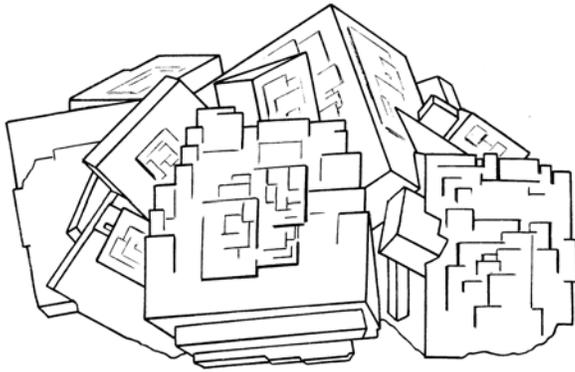
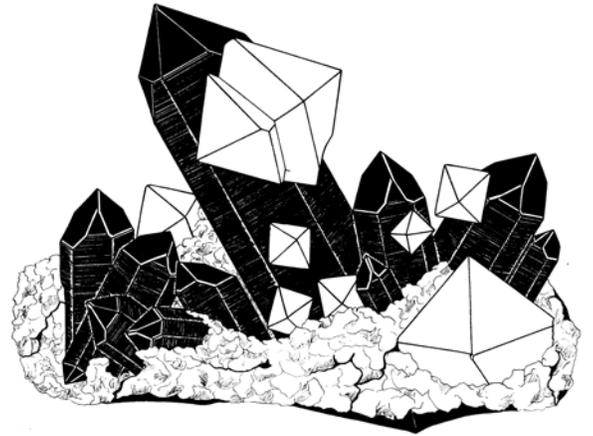
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**Pink and red** in fluorite is created by a very complicated chemical change in the fluorite that involves the elements yttrium (Y) and oxygen (O).

We'll leave the details to the experts, but it is fun for you to learn that small changes inside a fluorite crystal can create very different colors. *Pink octahedral fluorite crystals on smoky quartz from The Goscheneralp, Uri, Switzerland* ►

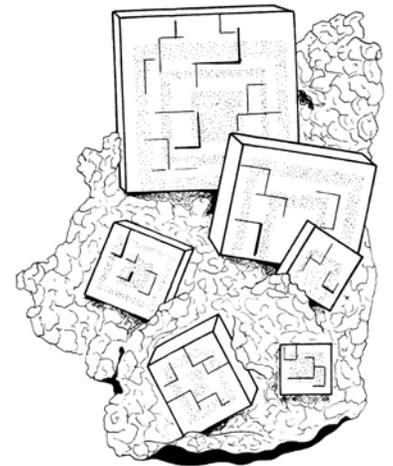


◀ **Light blue** in

fluorite can be created when the rare element yttrium (Y) takes the place of some of the calcium (Ca) atoms. *Lilac purple fluorite with blue edges from the Bingham mine, Socorro County, New Mexico, USA.*

**Brown** in fluorite is created by impurities of hydrocarbon material like oil or tar that are trapped in the fluorite crystal structure. "Hydrocarbons" are materials that were created by decaying plants that were trapped in sediments. Later, when the sediments became rock, the plant material broke down (decayed) into large molecules made up of

hydrogen and carbon. *Brown fluorite cubes from Clay Center, Ohio, USA.* ►



◀ **Color Zones** in fluorite are created when there are differences in the chemical environment as the fluorite formed over thousands and millions of years. Sometimes the changes go back and forth, back and forth and create zones that look like layers, like this slice of "Blue John" fluorite from England.

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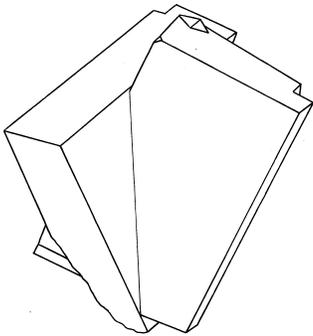
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## Hidden Colors in Fluorite "FireFly Stone" - 螢石

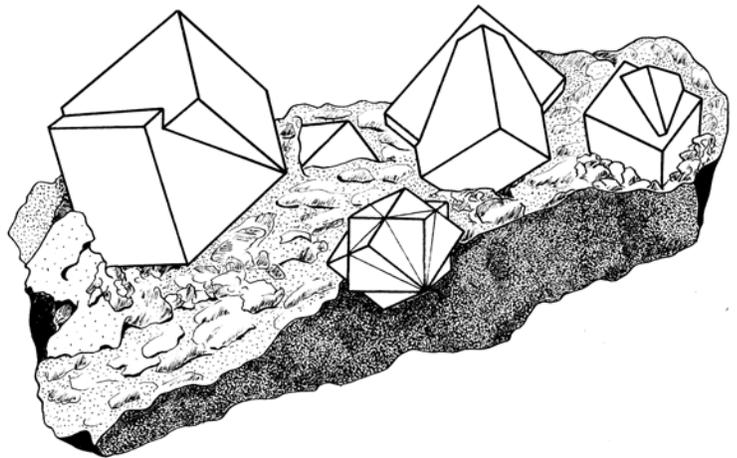
On a warm summer night, you might see special insects flying around the woods and fields. If you watch closely, you will see them light up, like little yellow light bulbs. On and off, on and off . . . they sparkle in the air. These wonderful beetles are called fireflies or lightning bugs. If you catch one in a jar, you will see that the end of their bodies really do light up! The light is created by a chemical reaction. This is called **bioluminescence**.



Fluorite can light up like a light bulb, too. Hundreds, maybe even thousands of years ago, people noticed that some fluorite specimens would glow a bluish-white color after being removed from sunlight and put in the dark. English miners and mineral collectors noticed that fluorite specimens from the Rogerley Mine in Weardale, England would glow in the dark after they sat in sunlight. This natural phenomenon is called **phosphorescence**. This may be the reason that the Japanese call fluorite **Firefly Stone**. The characters in the Japanese language look like this, 螢石 and are

pronounced **Hotaruishi**. To the Japanese, some fluorite specimens can glow in the dark - just like a firefly!

In this issue we are featuring the many different colors of fluorite. There are also *other* colors that are created by different kinds of light. When fluorite is placed under **ultraviolet light** it can be fluorescent blue, red, yellow, white and green. Ultraviolet light is light that cannot be seen by the human eye. However, when it is absorbed by a mineral, ultraviolet light can create wonderful colors in the mineral.



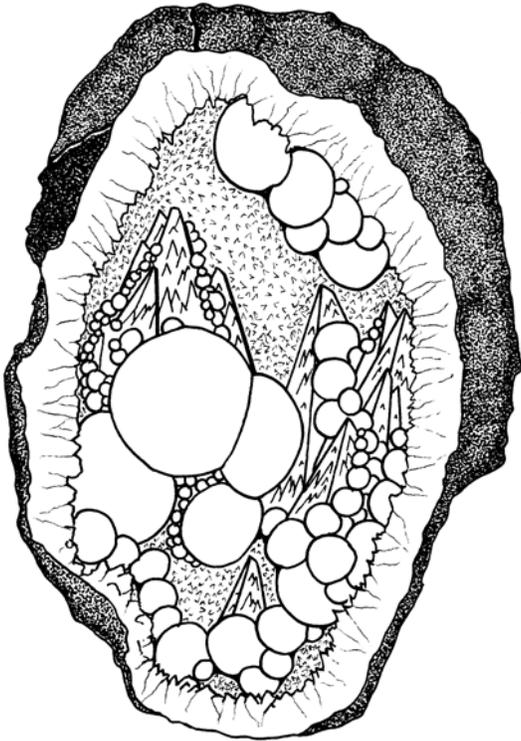
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## FLUORITE FROM AROUND THE WORLD A RAINBOW OF COLORS ~ A VARIETY OF SHAPES

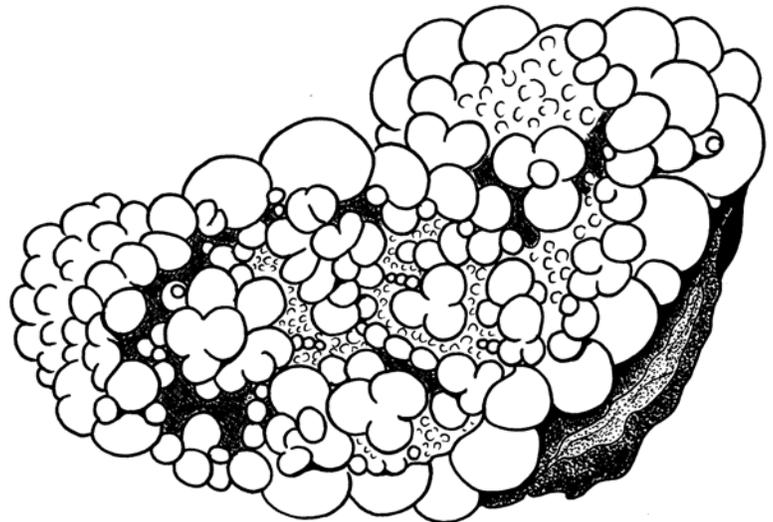


Fluorite can be found all over the world. We are going to go on a trip around the world with you to show off some of the wonderful colors and shapes of fluorite.

### ROUNDED FLUORITE

Fluorite can be found in rounded masses like this specimen (left) from Mahodari, Nasik, India. It is a vug in the black igneous rock called basalt. The vug (or hole) is filled with small, white quartz crystals. On top of the quartz has grown yellow-brown calcite crystals. On top of the calcite crystals has grown red fluorite spheres. The deep red color of the fluorite is from hematite that has been trapped in the fluorite.

To the right is another rounded fluorite specimen. This is a grayish-purple fluorite from Fourmile Creek, Fremont County, Colorado, USA. When a mineral forms this rounded, lumpy formation, it is described as *botryoidal* which means *grape-like* because, as you can see, it looks like a bunch of grapes.



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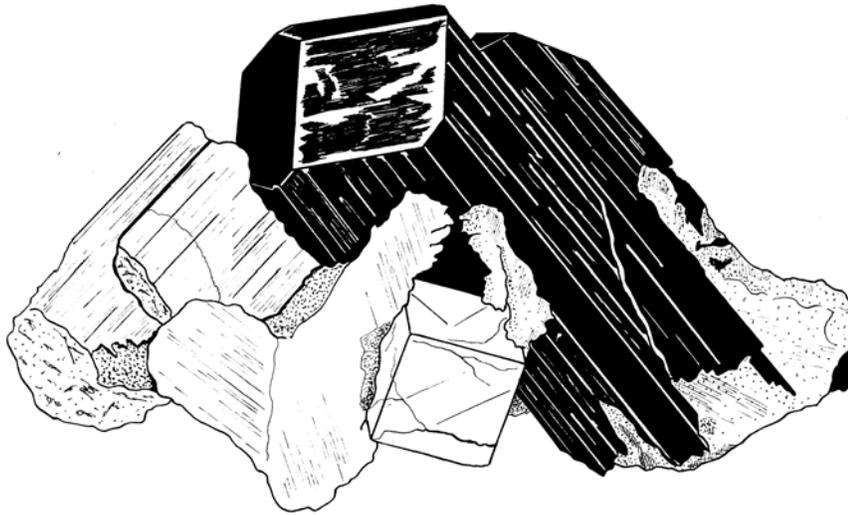
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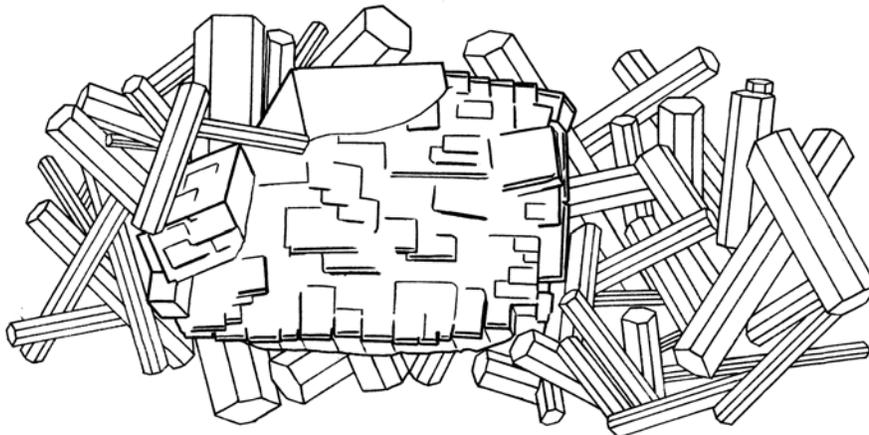
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## MINERALS ASSOCIATED WITH FLUORITE

As you look through this book and specimens in museums and other collections, you will see the many different minerals that are associated with fluorite. A number of examples are scattered throughout this book.



Above is a simple green fluorite cube (notice it has some cracks in it). It has grown with large, black tourmaline crystals (black tourmaline is called *schorl*) and rough, creamy feldspar crystals. This specimen is from Erongo, Namibia, Africa. Below is another incredible fluorite specimen from Erongo. It is dark green with dark purple edges! It has grown with gemmy, glassy, light blue beryl crystals. Light blue beryl is called *aquamarine*. Fluorite is also associated with calcite, barite, quartz, and galena.



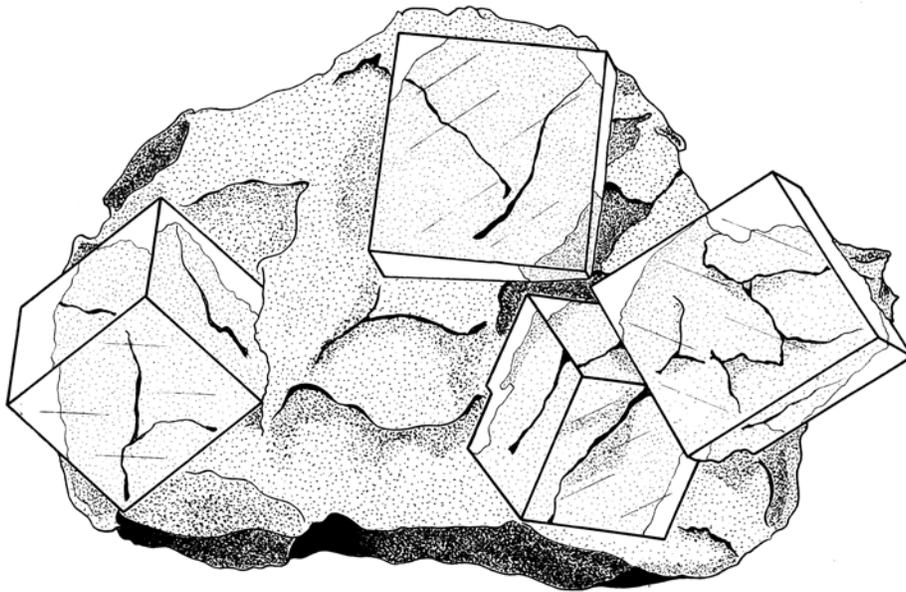
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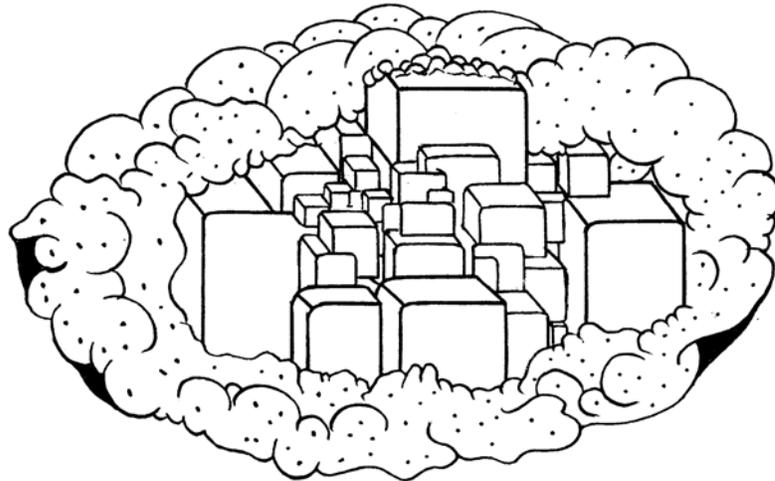
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## Simple Cubes

This outstanding specimen has four perfectly clear, undamaged fluorite crystals. They are so clear that not only can you see right through them, you can also see that they magnify the matrix on which they sit! The fluorite is a very light, pastel green. The crystals sit on a rust-red matrix. This eye-catching specimen is another treasure from Dal'negorsk, Primorskiy Kray, Russia.



This interesting specimen below is from Naica, Chihuahua, Mexico. It is a collection of parallel purple cubes sitting in a nest of white calcite. One feature that makes this specimen extra-interesting is that each crystal is light purple and they are all dark purple around the edges!



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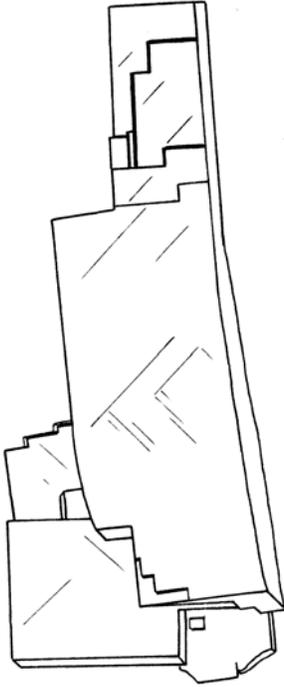
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## A Very L~O~N~G FLUORITE Cube

Pictured here is a very unusual crystallized fluorite specimen from the Slitt vein, Blackdene mine, Weardale, County Durham, England.

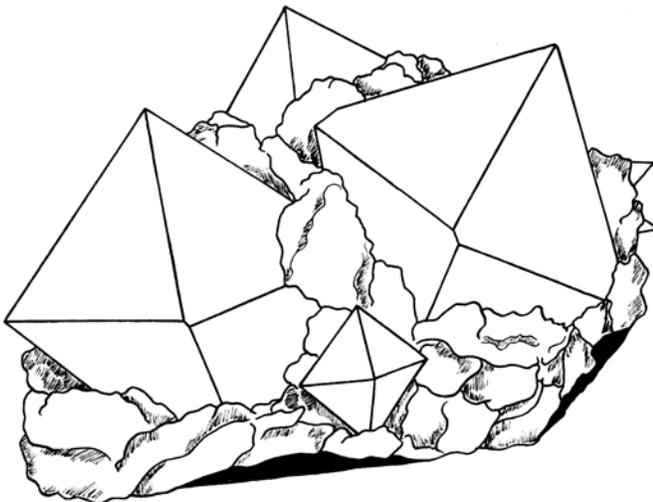
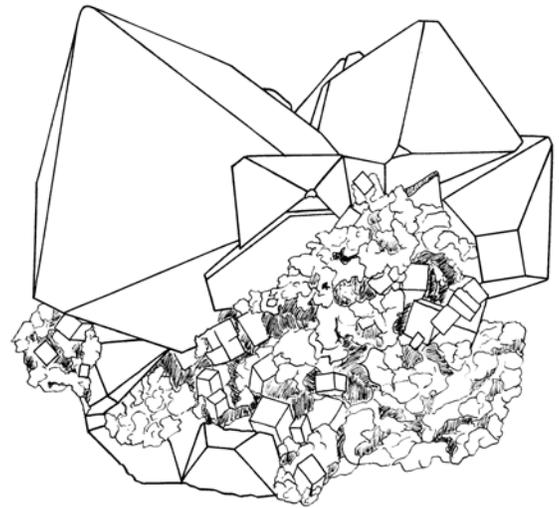
It is a curved, elongated **cube**. As this crystal developed, the environment allowed for the crystal to grow not as a usual cube, but as a **rectangle**. The mineral kingdom always has many surprises to offer those who are looking for them.



## OCTAHEDRAL FLUORITE Crystals

Another typical crystal form for fluorite is the simple octahedra. An octahedra is a diamond-shaped crystal that is made of 8 triangular faces.

On the following pages are some octahedral fluorite specimens from all over the world. Here is a grouping of light pink fluorite octahedra from Peru. They are on a matrix that has brassy yellow pyrite cubes. ►



◄Bright, apple green octahedra from Riemvasmaak, Northern Cape Province, South Africa.

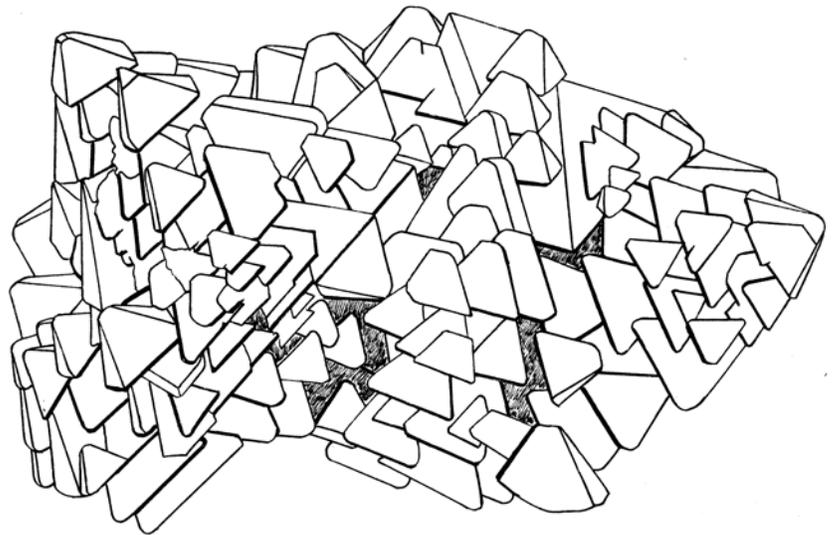
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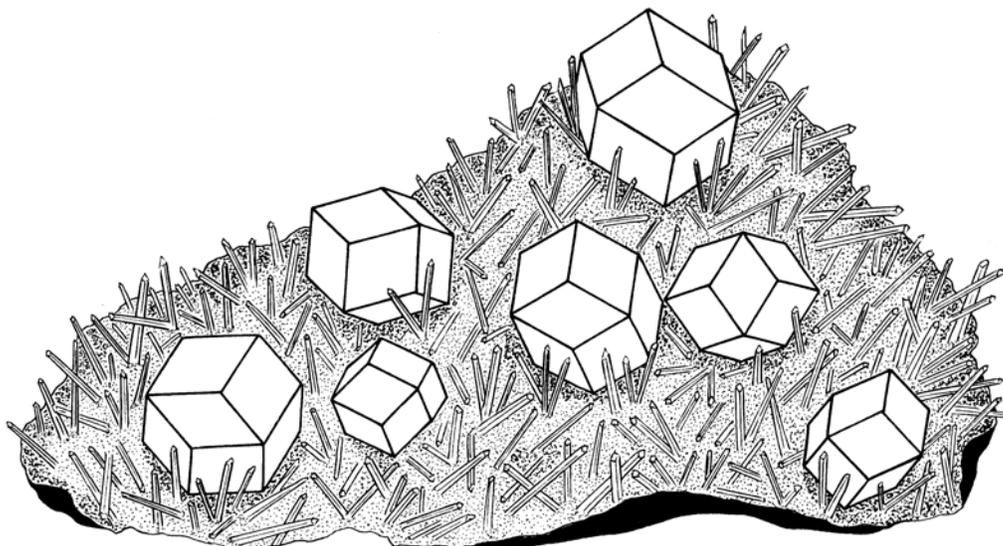
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Pictured here is an amazing and complex group of fluorite crystals. This is at least two larger octahedral crystals made up of dozens of smaller octahedral crystals! A second feature that makes this specimen unique is that it is very, very dark purple. It is so dark that it looks black. This wonderful specimen is from the Akchatau tungsten-molybdenum mine in Kazakhstan.



## Dodecahedral Fluorite Crystals

A rare crystal form for fluorite is the rhombic dodecahedral crystal. These crystals have 12 faces and each face has 4 sides. Fluorite specimens from the famous Sweet Home Mine near Alma, Colorado, USA occurred in this form. Pictured below is a specimen with a number of dodecahedral fluorite crystals on matrix with needle-like quartz crystals. These fluorite crystals are dark purple in the middle and get lighter toward the edges.



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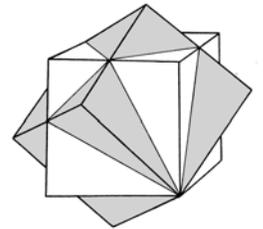
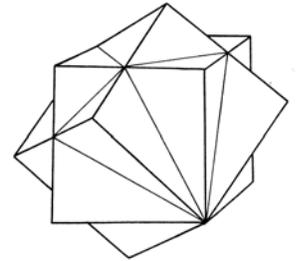
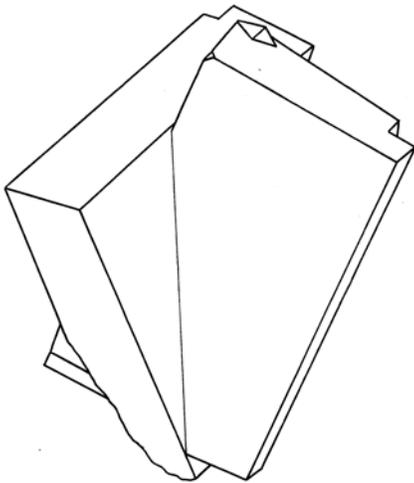
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## ENGLISH FLUORITES

Some of the most famous fluorite specimens in the world have come from England. The glassy, deep green, purple and yellow cubes from places like Weardale, County Durham, England, display a special feature of fluorite cubes. The specimens from Weardale are often *twinned*

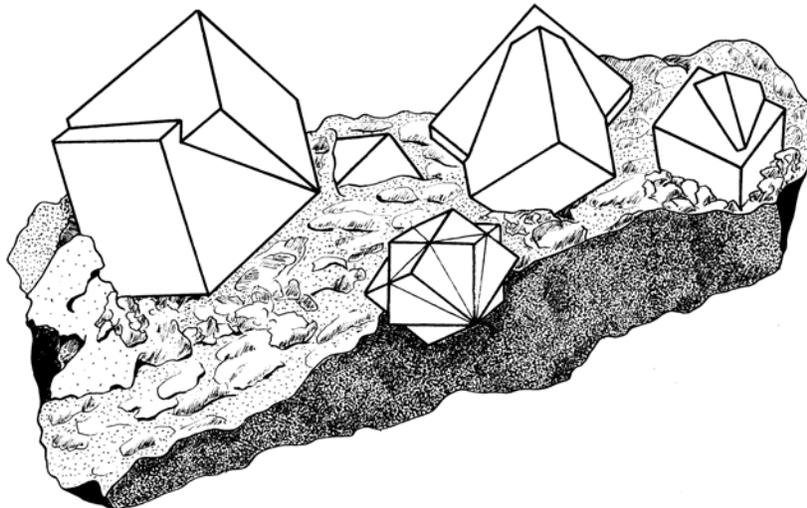
crystals. This means that two crystals have grown together in a way that is determined by their crystal form. When two of these fluorite cubes grow together, a **penetration**

**twin** is formed. To the right is a picture of a perfect penetration twin. One of the crystals has been shaded so you can more easily see the two individual crystals.



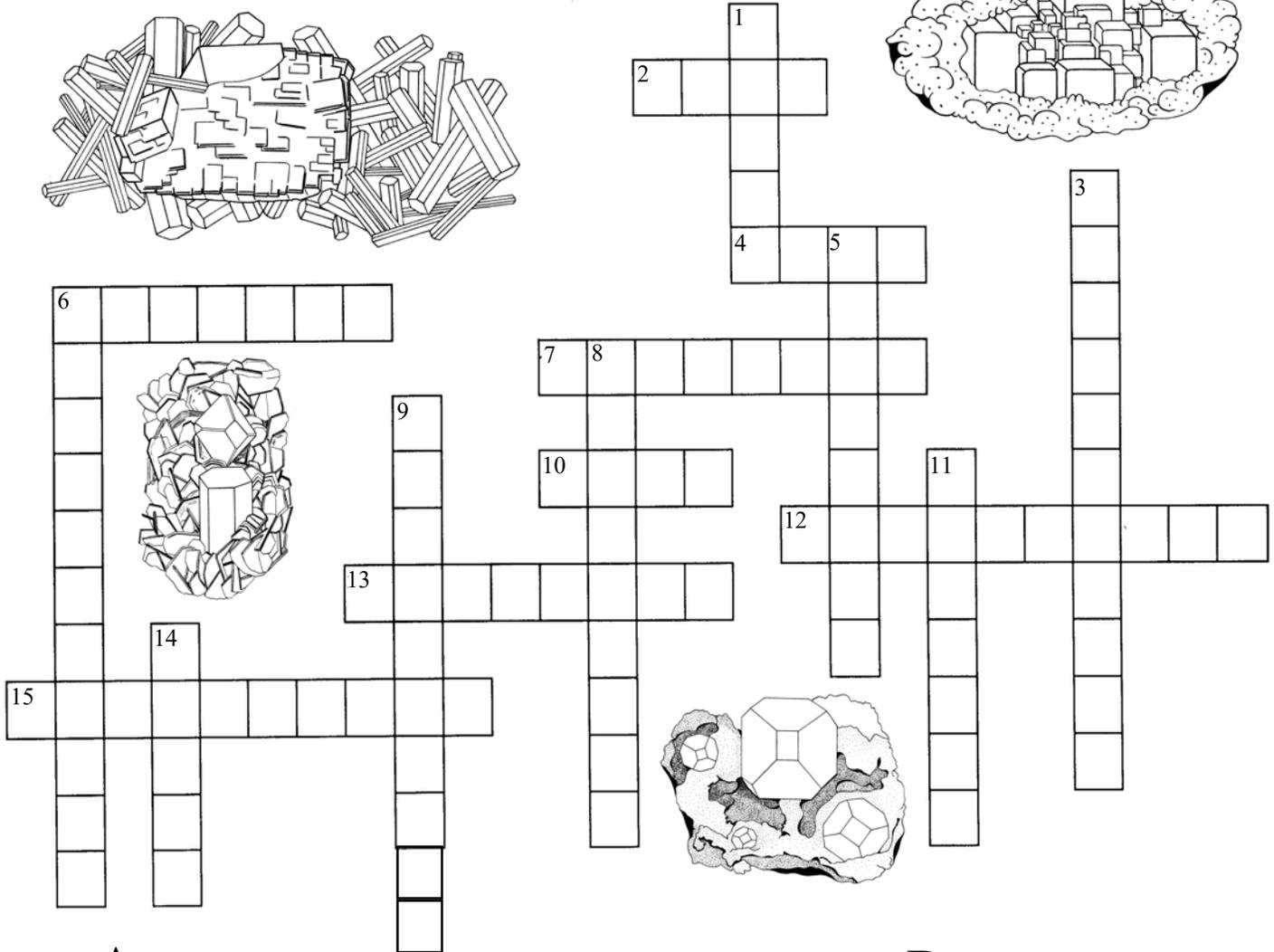
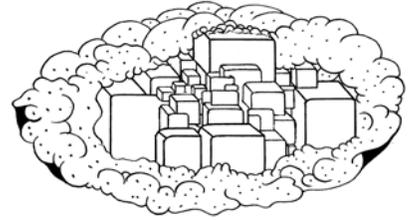
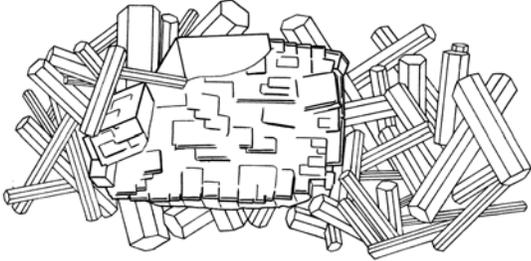
◀Here is an amber-yellow twin of fluorite from the Hilton mine, Scordale, Westmoreland, England.

Below is a specimen of a number of penetration twins of fluorite on matrix. This specimen is from the Heights mine, Weardale, England. You can color the crystals deep green, purple or yellow.



# A FLUORITE CROSSWORD PUZZLE

Here's a test of your "fluorillogical" knowledge!  
Good luck!



## Across

2. Something added to ore to make the metal come out at a lower temperature.
4. A crystal that looks like a box is called a \_\_\_\_\_.
6. In the Japanese language, fluorite is called \_\_\_\_\_ Stone.
7. Fluorite's luster is described as \_\_\_\_\_.
10. The man who created the mineral hardness scale was named Friedrich \_\_\_\_\_.
12. The fluorine atom in fluorite is used to make an ingredient found in \_\_\_\_\_. You use this every day.
13. Fluorite is number 4 on the mineral \_\_\_\_\_ scale.
15. A crystal that has 8 faces, each of which is a triangle, is described as \_\_\_\_\_.

## Down

1. Another name for the isometric crystal system.
3. Fluorite forms special twin crystals that are called \_\_\_\_\_ twins.
5. The name given to banded masses of fluorite found in England.
6. When ultraviolet light shines on fluorite \_\_\_\_\_ colors are created.
8. The crystal system to which fluorite belongs.
9. Fluorite has \_\_\_\_\_ cleavage.
11. The color pink is created in fluorite by the elements \_\_\_\_\_ and oxygen.
14. The mineral name "fluorite" comes from the \_\_\_\_\_ word "fluere."

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## CROSSWORD PUZZLE SOLUTION

### Across

2. Something added to ore to make the metal come out at a lower temperature. FLUX
4. A crystal that looks like a box is called a CUBE.
6. In the Japanese language, fluorite is called FIREFLY Stone.
7. Fluorite's luster is described as VITREOUS.
10. The man who created the mineral hardness scale was named Friedrich MOHS.
12. The fluorine atom in fluorite is used to make an ingredient found in TOOTHPASTE. You use this every day.
13. Fluorite is number 4 on the mineral HARDNESS scale.
15. A crystal that has 8 faces, each of which is a triangle, is described as OCTAHEDRAL.

### Down

1. Another name for the isometric crystal system. CUBIC
3. Fluorite forms special twin crystals that are called PENETRATION twins.
5. The name given to banded masses of fluorite found in England. BLUEJOHN
6. When ultraviolet light shines on fluorite FLUORESCENT colors are created.
8. The crystal system to which fluorite belongs. ISOMETRIC
9. Fluorite has OCTAHEDRAL cleavage.
11. The color pink is created in fluorite by the elements YTTRIUM and oxygen.
14. The mineral name "fluorite" comes from the LATIN word "fluere."