

Mini Miners Monthly

A Monthly Publication for Young Mineral Collectors.

July 2015 Vol. 9 No. 7

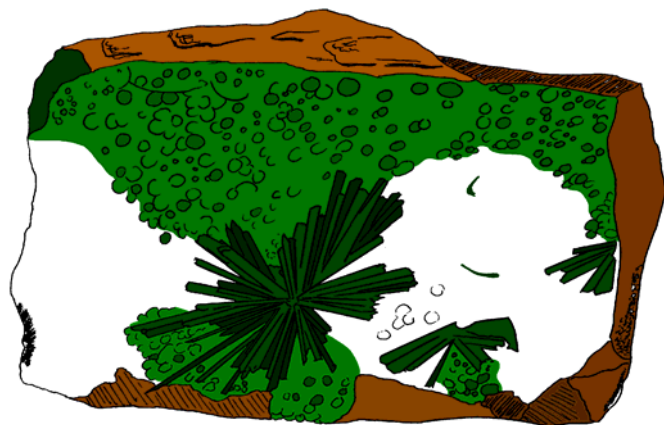
Many Mini Miners are out in the field digging for minerals and crystals at this time of year. We have a tradition to print the American Federation of Mineralogical Society's "Code of Ethics." The truth is that careless and selfish collectors have created problems. They have left trash, trespassed on private property to find minerals, and damaged property of other people. The result is that many mineral digging sites that used to be available to the public have been closed down and now no one is able to enjoy them. More and more sites are being closed every year. Please be the mineral collector that follows the Code of Ethics. Your actions when you are out digging for specimens might make the difference between a site being available next year or being closed down forever.

Mini Miners Monthly has always been a combination of fun and educational. A smart, educated mineral collector is a more successful collector. So, this issue has a few brain challenges. Do them alone or do them with friends. Either way . . . you're going to have to think! And if you don't know the answers, there is no problem if you grab a good book or two or use the internet and find the answers.

We also have a couple games (actually, two variations on the same type of game) that you can play with your club friends, classmates, or family.

And what good is an issue of Mini Miners Monthly if we don't give you a chance to draw pictures?! One thing Diamond Dan has learned is that when you take your time, draw the main features of a specimen and then add the little details, the final pictures are better. So we present some mineral drawings here for you to copy.

Learn to study the small details of specimens and represent them on paper. After you have copied these specimens, look for some awesome mineral pictures on the internet and draw them. Focus on the details. The more you practice, the better you will become.



MEGA MINERALS

By Emma Fajez

Most of the samples in our mineral collections are not very large. It's usually quite exciting to get a specimen as big as one's hand, isn't it? However, this month, we'll explore the biggest and often most interesting mineral samples in the world. Can you guess what some of them are?

Imagine that one of your quartz crystal specimens was magnified several times. What do you think it would look like? Well, take a look at the world's largest crystal cluster on display in the Kristall Galerie Swakopmund, Namibia. This nearly ten-foot tall and ten-foot wide specimen is a mass of stunning quartz crystals. Another reason why this specimen is so spectacular is because many of the crystals that make up the cluster are double-terminated, also called floaters. This cluster may contain



Figure 1: Kristall Galerie's fantastic quartz specimen.



Figure 2: Mexico's Cueva de los Cristales. Be sure to compare the person's size with that of the crystals.

the world's biggest floater crystals.

Some of the biggest crystals in the world are the selenite, or gypsum, crystals in Mexico's Cueva de los Cristales. Amazingly enough, the largest crystal in this special cave is 36 feet long and weighs 55 tons. Discovered by miners, these crystals are located far underground in a hot, humid

cave that was originally filled with water heated by a nearby magma chamber. What an interesting place!

The world's largest gem-quality aquamarine crystal, usually called the Papamel Aquamarine, was unearthed in 1910 at Brazil's Papamel mine. Amazingly enough, this 244-pound crystal had almost no flaws.

Another notable aquamarine crystal is the crystal from which the Dom Pedro Aquamarine was faceted. The original crystal was about a meter long, but the three Brazilian miners carrying the crystal inadvertently let go of the crystal, shattering it into three pieces. The famous lapidary Bernd Munsteiner cut and faceted the largest piece of this crystal into the stunning Dom Pedro Aquamarine, now on display at the Smithsonian's National Museum of Natural History. The finished sculpture, titled *Waves of the Sea*, is the world's biggest sample of cut aquamarine at $13 \frac{13}{16}$ inches tall.

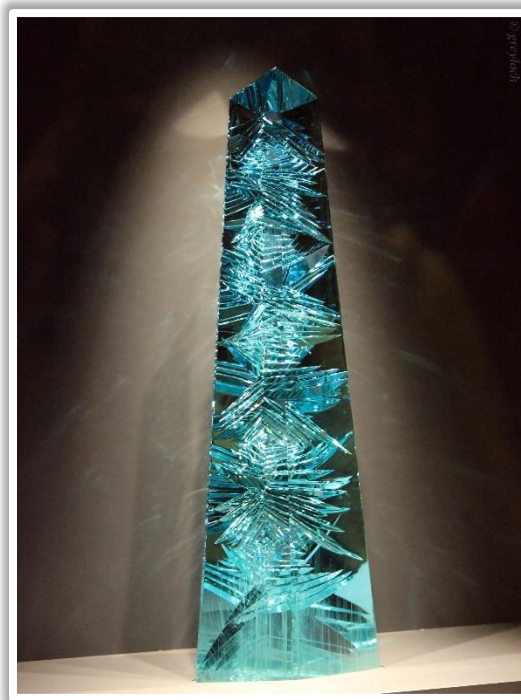


Figure 3: Mr. Munsteiner's beautiful sculpture *Waves of the Sea*.

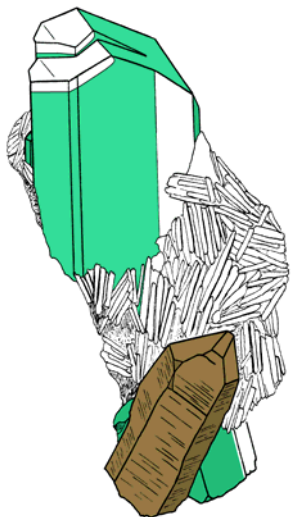
That was just a taste of all the mega minerals that have been discovered. Take some time this month to look online with your parents' help to see if you can find any more examples of the world's biggest minerals. Have fun finding some giants in the mineral world!

Photo Credits

Figure 1 (Credits in German): „Laika ac Crystal Gallery (8412169034)“ von Laika ac from USA - Crystal Gallery. Lizenziert unter CC BY-SA 2.0 über Wikimedia Commons - [https://commons.wikimedia.org/wiki/File:Laika_ac_Crystal_Gallery_\(8412169034\).jpg#/media/File:Laika_ac_Crystal_Gallery_\(8412169034\).jpg](https://commons.wikimedia.org/wiki/File:Laika_ac_Crystal_Gallery_(8412169034).jpg#/media/File:Laika_ac_Crystal_Gallery_(8412169034).jpg)

Figure 2: "Cristales cueva de Naica" by Alexander Van Driessche - Gaianauta received this from Alexander Van Driessche via Email. Licensed under CC BY 3.0 via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:Cristales_cueva_de_Naica.JPG#/media/File:Cristales_cueva_de_Naica.JPG

Figure 3: "Dom Pedro Aquamarine 1" by greyloch. Minor editing done to photo. Licensed under CC BY-SA 2.0 via Flickr. - <https://www.flickr.com/photos/greyloch/9119208377/in/photolist-p2gyoF-eTQjWD-f6BqGp-oWm7cA-oYo2Wp-oWm7ds-hP3Qhd-ho4Amc-qU43qN-55k7zP-eCGCoG-dNM4kw-4QQErN-4QQEKw-4QLsMa-i5ybRk-hv1jpp-ekFQ4N-sBAK1q-56b2eA-fCVGLE-edamP5-D8Wxp-k4oNgN-4JfHW8-sa7sjq-fkXksi-f4rzgG-f52w32-e3W7Yf-4FcFyz>



“IS TO” CHALLENGE

Let's see what you know about minerals. This "Is To" challenge is a comparison challenge. You are challenged to figure out what the first two compared minerals have in common and then you complete the second comparison based on the comparison made in the first. Maybe an example is easier to understand:

Amethyst is to Quartz as Aquamarine is to _____.
(The answer is Beryl. Amethyst is a variety of the mineral quartz.
Aquamarine is a variety of the mineral beryl.)

Galena is to Pyrite as Siderite is to _____.

Why? _____

Hematite is to iron as Malachite is to _____.

Why? _____

Calcite is to Aragonite as Kyanite is to _____.

Why? _____

Muscovite is to Mica as Emerald is to _____.

Why? _____

Gold is to Silver as Copper is to _____.

Why? _____

Fluorite is to Calcite as Topaz is to _____.

Why? _____

Quartz is to Tourmaline as Native Copper is to _____.

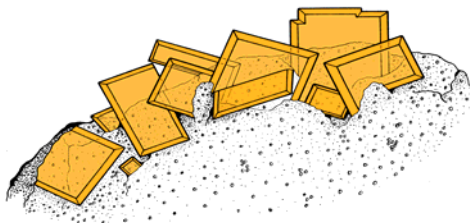
Why? _____

Smoky Quartz is to Milky Quartz as Amethyst is to _____.

Why? _____

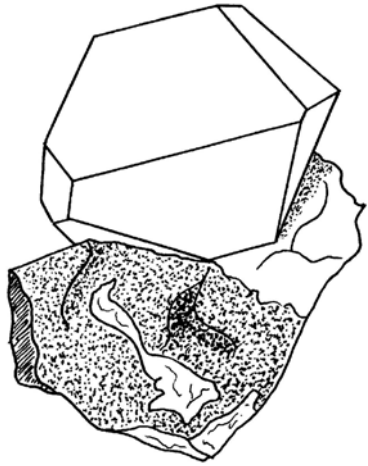
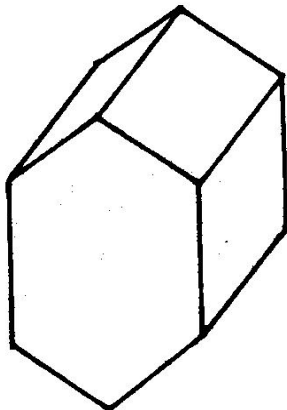
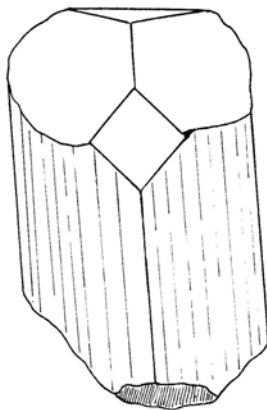
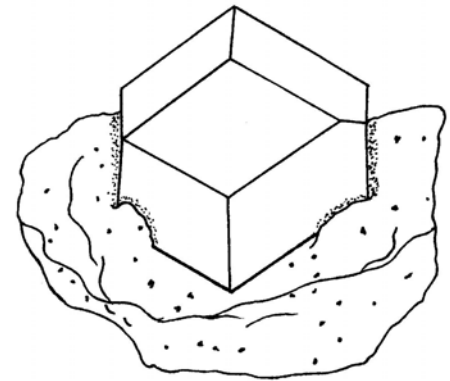
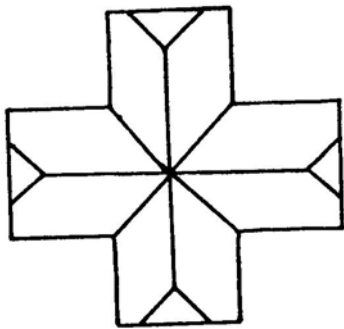
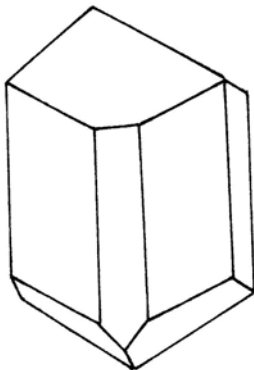
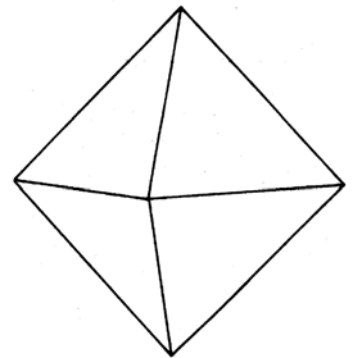
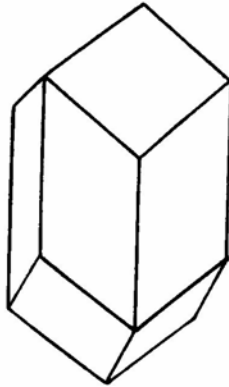
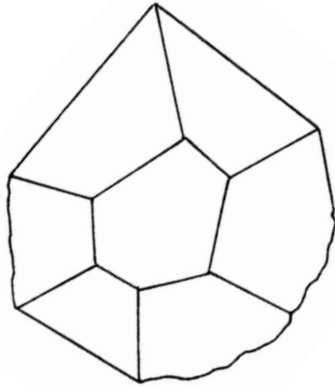
Almandine is to Garnet as Elbaite is to _____.

Why? _____



CRYSTAL FACES

Here are some simple mineral and crystal drawings. Can you draw eyes and ears, a nose and mouth and turn the crystals into faces?



Top row: Chrysoberyl, Diopside, Fluorite.

Middle row: Dravite, Staurolite, Garnet

Bottom row: Tourmaline, Vanadinite, Zircon

MINERAL NAME SCRAMBLE

Here are some familiar mineral names. The problem is that the letters are all mixed up. Can you put them in the correct order?

ETSIOURQU _____

MPSUYG _____

PRCEOP _____

TTBINISE _____

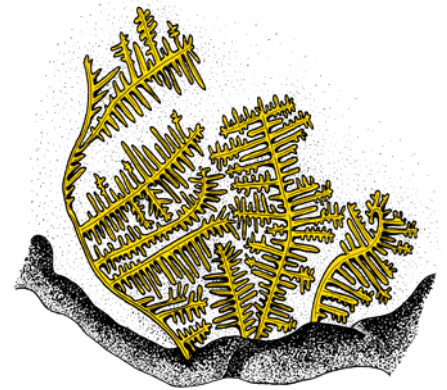
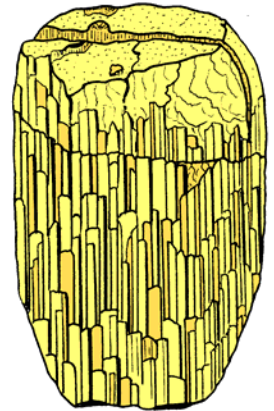
PHGRITAE _____

MONDIAD _____

AGUTIE _____

ASEOPTDI _____

NOCRIZ _____

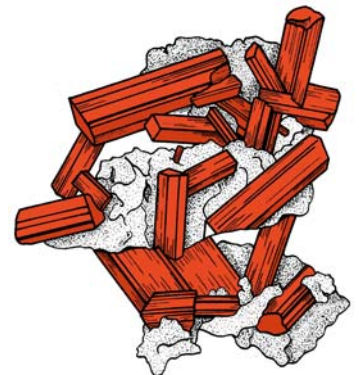
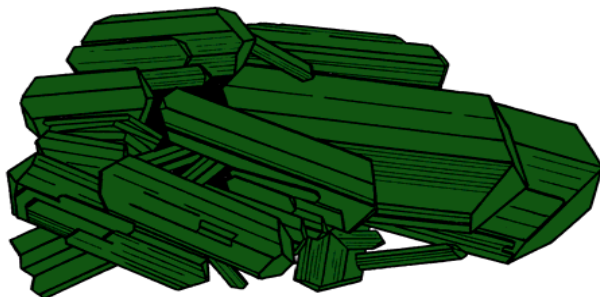


And now for some really tough ones. These are for the "Expert" Mini Miners.

RTOCSELAOH _____

BALTOTIESRIC _____

SCUMOTEIV _____



WHAT'S IN A MINERAL?

Minerals are made of elements that have combined together to form molecules. If you look in a mineral field book or hand book, you will see the chemical formula of the mineral.

Here's a little challenge for you. Get your mineral book and figure out which element is NOT found in the minerals listed below. Circle the answer or answers. The easiest are the first ones and they get harder as you go along. Try to do this from memory. Don't be afraid to use a good book or the internet for help!

Pyrite Fe (iron) Cu (copper) S (sulfur) C (carbon)

Fluorite F (fluorine) Pb (lead) Ca (calcium) Ba (barium)

Halite Na (sodium) F (fluorine) Cl (chlorine) K (potassium)

Goethite H (hydrogen) Fe (iron) Ba (barium) O (oxygen)

Malachite O (oxygen) H (hydrogen) Ni (nickel) Cu (copper) C (carbon)

Gypsum H (hydrogen) S (sulfur) Si (silicon) Ca (calcium) O (oxygen)

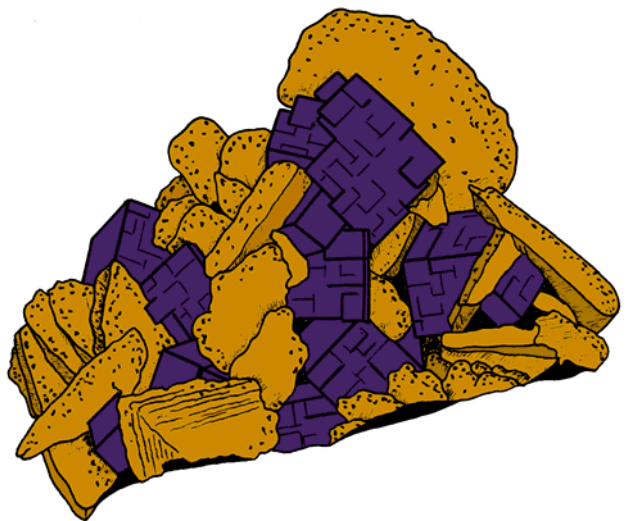
Vanadinite Pb (lead) V (vanadium) Cl (chlorine) O (oxygen) Fe (iron)

Muscovite Mg (magnesium) K (potassium) Al (aluminum) Si (silicon)

Dolomite Ca (calcium) Cu (copper)
Mg (magnesium) C (carbon)

Beryl Be (beryllium) Si (silicon)
Pb (lead) Al (aluminum)

Hemimorphite Zn (zinc) S (sulfur)
O (oxygen) Si (silicon)



IT'S NOT WHAT IT LOOKS LIKE

This is a story about a wonderful, special mineral specimen that comes with a lesson every mineral collector needs to learn.

The dolostone of upstate New York can contain wonderful mineral surprises. In the Herkimer region of central New York, you can find doubly-terminated, water-clear crystals of quartz that are also known as "Herkimer Diamonds." In the Rochester area, specifically in the town of Walworth, you can find glassy, light blue fluorite cubes, brown to orange Sphalerite crystals, yellow dog-tooth calcite crystals and white to light pink dolomite crystals.

Imagine finding all of these crystals on the same piece of matrix?! Pictured here, below, is one such spectacular specimen. The specimen measures 4" x 2.5" x 1.75". The matrix is literally covered with crystals. And the crystals are nicely spread out around the matrix. Also, you can see that the fluorite cubes sit right on top, in the center of the specimen. You couldn't find a better specimen if you made it yourself!

Unless, of course, someone with a lot of time, patience and talent could make one for you.

This very special specimen was created by Louis Posman, an experienced mineral collector in Rochester, New York. Lou spent many evenings and many, many hours carefully selecting



individual crystals and crystal groups. And then he carefully glued them on the dolomite matrix. This specimen is so well constructed that the only way you can see it is a fake is if you look very, very, very closely where, in only a few places, you can actually see the glue. The other evidence that it is created and not natural is that on the bottom side, Lou signed it!

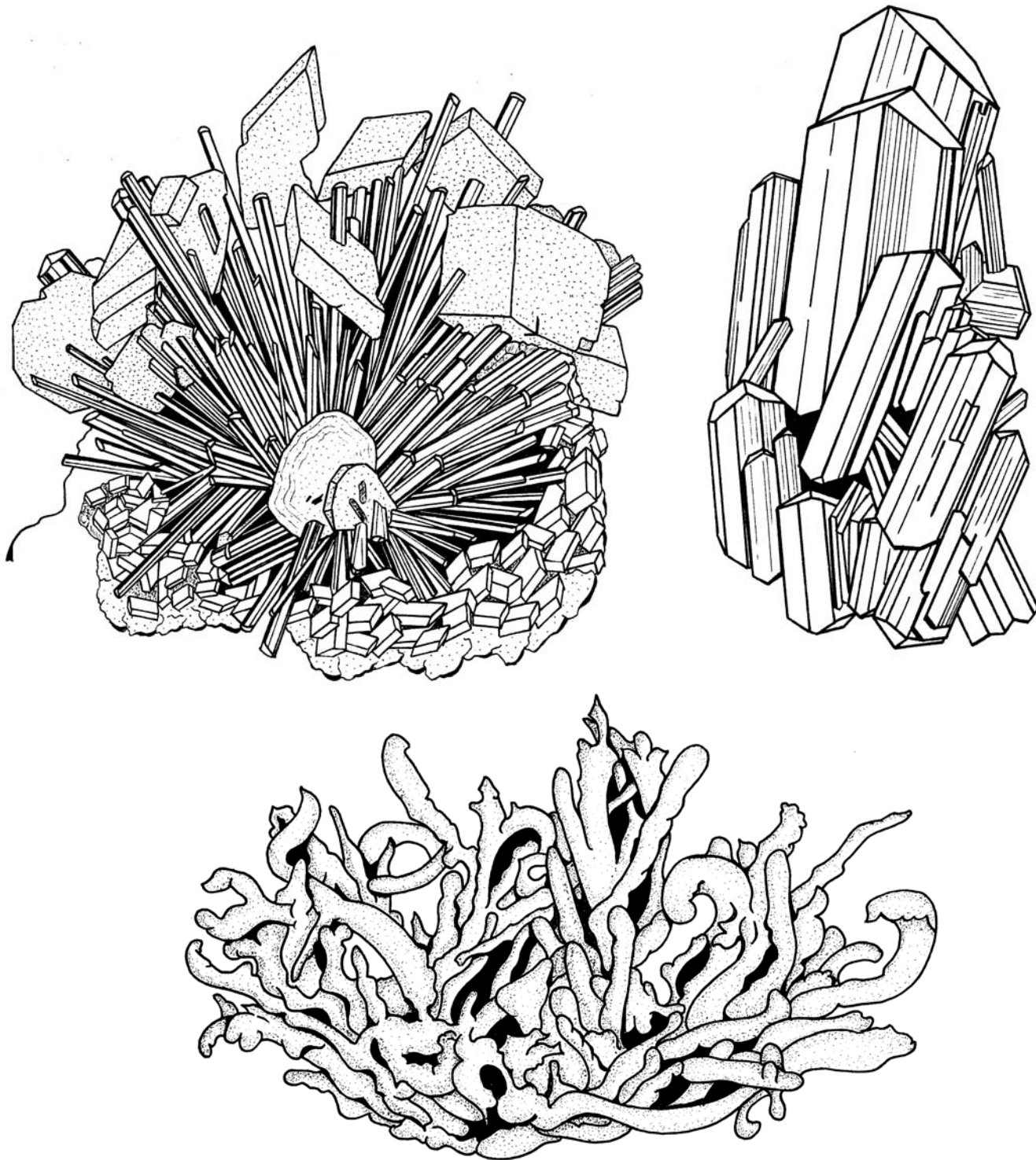
So what? Did you know that there are some (very few) mineral dealers who enhance, modify and create mineral specimens and then sell them for very high prices. Years ago there were some small, metallic, multi-faceted "hematite" crystals on the market. Made in a shop with a polishing machine. Clear quartz crystals are exposed to radiation and they turn jet black. Fresh chalcopyrite is heated to high temperatures and it turns a mixture of bright red, green, and blue and is sold as "Peacock Ore." (By the way, there is natural Peacock Ore as well.) Agates are dyed and sold in bright, fluorescent colors like purple, red and blue. And through the years, some very good dealers have learned to glue crystals on matrix to both create and enhance specimens.

So what can a collector do? Study, read and learn. Visit mineral shows and closely examine specimens. Look for glue. If something doesn't look natural, ask questions like, "Is that natural or has it been treated in some way?" An honest mineral dealer (and most mineral dealers are very honest) will tell you if the specimen is natural or not. Experience and education is your best defense against being tricked.

By the way, there are some mineral collectors who specialize in mineral fakes! Do you want to know more about mineral fakes? Please visit www.fakeminerals.com which is run by Justin Zzyzx. Justin is one of the world's experts on mineral fakes.

COPY THE DRAWINGS

One very good way of learning about crystals and mineral forms is to draw them yourself. In order to create an accurate drawing of a specimen, you have to learn and know about the forms the mineral's crystals can have. Learning these things also takes practice. So, we have given you here two pages of special mineral drawings. These drawings have a lot of detail in them. If you learn to pay attention to the details of a mineral specimen, you will naturally learn about the specimen itself. Try to carefully copy the mineral specimen drawings that are presented here. Use a new, clean piece of paper for each. Draw them out in pencil first, then use an ink pen to finish them (if you wish). Don't be afraid to use a ruler to make straight lines. Notice how little dots are used to create shading and shadows.



NAME THE CRYSTAL SYSTEM

Minerals crystallize in what are called "Crystal Systems." Below you will see a mineral name and to the right of it, four crystal systems. Circle the correct crystal system for the mineral named. Can you do it from memory? Don't hesitate to grab a good mineral book or go to the internet and look for the answer. On your mark, get set, GO!

Aquamarine (Beryl) Isometric Hexagonal Monoclinic Tetragonal

Fluorite Monoclinic Orthorhombic Triclinic Isometric

Quartz Tetragonal Isometric Hexagonal Monoclinic

Muscovite Monoclinic Hexagonal Triclinic Tetragonal

Celestite Isometric Hexagonal Monoclinic Orthorhombic

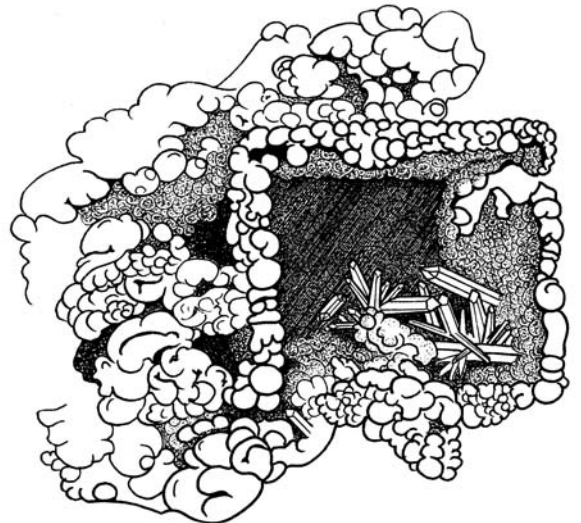
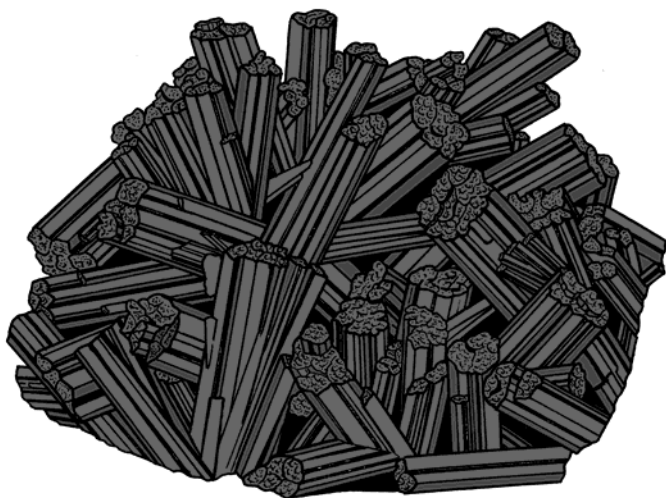
Azurite Triclinic Monoclinic Hexagonal Isometric

Garnet Isometric Tetragonal Hexagonal Orthorhombic

Gypsum Hexagonal Monoclinic Triclinic Tetragonal

Zircon Isometric Triclinic Tetragonal Hexagonal

Tourmaline Monoclinic Triclinic Orthorhombic Hexagonal



SOME MINERAL GAME IDEAS FOR A RAINY DAY

It's raining here again today. What is a mineral enthusiast to do with a bunch of mineral collecting friends when we don't want to go outside? We can play mineral games inside. (These are also good for mineral club meetings, too.)

20 Questions, Mineral Collector Style

One person is "It." That person thinks of a mineral. The rest of the group tries to figure out the mineral by asking questions, one question at a time. Sit in a circle. The person to the right of the "It" person asks a question and gets a chance to guess the mineral's name. If he or she can't, then the next person asks another question. That person then gets a chance to guess the mineral's name. The "winner" of the round is the first person to get the mineral name right. It can be fun to have prizes (a mineral specimen, a snack, an old mineral magazine, etc.) This goes on until 20 questions have been asked. If the group can't figure out the mineral name after 20 questions, the "It" person is declared the "winner" and he or she gets the prize.

Who Am I?

This game is actually a fun variation on the 20 questions game. Let's say you have 10 people playing the game. Have another person (a parent or leader or volunteer) write mineral names on 10 pieces of 8 1/2 x 11 paper, one name on each paper, in large capital letters. Then, the leader or volunteer tapes one page on the BACK of each player. The player never sees the mineral name on his or her back. Then, the leader starts the timer and everyone has 5 minutes to ask each other questions about the mineral name on their back. The questions can only be YES or NO questions. At the end of 5 minutes, the group gathers together and each player tries to identify the mineral name on his or her back. You can just do this for fun, or, you can have some prizes ready for those who can successfully identify their mineral name.

Repeat the game over and over using different mineral names each time. You may want to prepare 4 or 5 sets of names ahead of time. Make each set more difficult than the one before. The last set can have names of minerals that the players may not have heard of before. Though they likely won't guess the name, they may learn something along the way.

NOTE: Have some mineral books or tablets available so players can look up information if they have to so they can answer questions accurately.



CODE OF ETHICS FOR COLLECTING IN THE FIELD

If you want to have a successful time digging in the field this summer, please follow the "Code of Ethics" that are set up by the American Federation of Mineralogical Societies. When all collectors follow these agreements, we will be able to be sure collecting sites will be open to us and future generations.

- *I will respect both private and public property and will do no collecting on privately owned land without permission from the owner.
- *I will keep informed on all laws, regulations or rules governing collecting on public lands and will observe them.
- *I will, to the best of my ability, ascertain the boundary lines of property on which I plan to collect.
- *I will use no firearms or blasting material in collecting areas.
- *I will cause no willful damage to property of any kind such as fences, signs, buildings, etc.
- *I will leave all gates as found.
- *I will build fires only in designated or safe places and will be certain they are completely extinguished before leaving the area.
- *I will discard no burning material - matches, cigarettes, etc.
- *I will fill all excavation holes which may be dangerous to livestock.
- *I will not contaminate wells, creeks, or other water supplies.
- *I will cause no willful damage to collecting material and will take home only what I can reasonably use.
- *I will practice conservation and undertake to utilize fully and well the materials I have collected and will recycle my surplus for the pleasure and benefit of others.
- *I will support the rockhound project H.E.L.P. (Help Eliminate Litter Please) and will leave all collecting areas devoid of litter, regardless of how found.
- *I will cooperate with field-trip leaders and those in designated authority in all collecting areas.
- *I will report to my club or federation officers, Bureau of Land Management or other authorities, any deposit of petrified wood or other materials on public lands which should be protected for the enjoyment of future generations for public educational and scientific purposes.
- *I will appreciate and protect our heritage of natural resources.
- *I will observe the "Golden Rule", will use Good Outdoor Manners and will at all times conduct myself in a manner which will add to the stature and Public Image of Rockhounds everywhere.

ANSWERS

ONLY LOOK HERE IF YOU ABSOLUTELY HAVE TO!

“IS TO” CHALLENGE

Galena is to Pyrite as Siderite is to Calcite (or rhodochrosite).

Why? Galena and Pyrite form cubic crystals. Siderite, calcite and rhodochrosite form rhombohedra.

Hematite is to iron as Malachite is to Copper.

Why? Hematite is an ore of iron. Malachite is an ore of copper.

Calcite is to Aragonite as Kyanite is to Andalusite or Sillimanite.

Why? Calcite and Aragonite have the same chemical formula. Kyanite, andalusite and sillimanite also have the same chemical formula.

Muscovite is to Mica as Emerald is to Beryl.

Why? Muscovite is a variety of mica. Emerald is a variety of Beryl.

Gold is to Silver as Copper is to Platinum.

Why? All of these minerals are native elements. All crystallize in the cubic system. All have metallic luster.

Fluorite is to Calcite as Topaz is to Quartz.

Why? Fluorite is harder by 1 on the hardness scale. Topaz is harder by 1 than quartz on the hardness scale.

Quartz is to Tourmaline as Native Copper is to gold, silver, platinum, galena, etc.

Why? Quartz and tourmaline have glassy luster. Copper, gold, silver, platinum, galena and more have metallic luster. There are other possibilities. Tourmaline and quartz crystallize in the hexagonal system. Copper, gold, silver, etc. crystallize in the cubic system.

Smoky Quartz is to Milky Quartz as Amethyst is to Quartz crystal, rose quartz, etc..

Why? These are all different varieties of quartz.

Almandine is to Garnet as Elbaite is to Tourmaline.

Why? Almandine is a variety of garnet and Elbaite is a variety of tourmaline.

MINERAL NAME SCRAMBLE

ETSIOURQU TURQUOISE, MPSUYG GYPSUM, PRCEOP COPPER

TTBINISE STIBNITE, PHGRITAE GRAPHITE, MONDIAD DIAMOND

AGUTIE AUGITE, ASEOPTDI DIOPTASE, NOCRIZ ZIRCON

And now for some really tough ones. These are for the “Expert” Mini Miners.

RTOCSELAOH Orthoclase; BALTOTIESRIC Cristobalite;

SCUMOTEIV MUSCOVITE

MORE ANSWERS

WHAT'S IN A MINERAL?

(More accurately, these are the elements that are NOT in these minerals.)

Pyrite Cu (copper), **Fluorite** Pb (lead), **Halite** F (fluorine) and K (potassium), **Goethite** Ba (barium), **Malachite** Ni (nickel), **Gypsum** Si (silicon), **Vanadinite** Fe (iron), **Muscovite** Mg (magnesium), **Dolomite** Cu (copper), **Beryl** Pb (lead), **Hemimorphite** S (sulfur)

NAME THE CRYSTAL SYSTEM

Aquamarine (Beryl) - Hexagonal; **Fluorite** - Isometric; **Quartz** - Hexagonal; **Muscovite** - Monoclinic; **Celestite** - Orthorhombic; **Azurite** - Monoclinic; **Garnet** - Isometric; **Gypsum** - Monoclinic; **Zircon** - Tetragonal; **Tourmaline** - Hexagonal