

## DVESScapades

*escapades: interesting, stimulating, exciting activities and adventures*



## Delaware Valley Earth Science Society Newsletter



**May 13, 2009  
Program:**

### **President's Message - by AnnLynne Benson, DVESS President and EFMLS Director**

**STUNNING SUCCESS AT STERLING -**  
DVESS is like the little mouse that roared. Although our volunteer base remains small, dedicated members threw one heck of a party for 196 enthusiastic Rockhounds who came from North, South, East and West to the annual **Digg** at Sterling Mine in Ogdensburg, NJ on Saturday, April 25.

They came from the East Coast (**NJ, PA, MD and NY**), most of the New England states (**CT, MA, NH and ME**), as far north as **Toronto**, as far south as **WV, TN and FL**, and as far west as **MN**.

They came to toil in brilliant sunshine and blistering 92' F heat looking for some of the 340 minerals native to the Franklin/Ogdensburg region, 70 of which fluoresce, **and**, 13 of which are found **nowhere else on earth**.

Greeting them upon arrival were Amazing **Alice and Rick Harty** who once again traveled from **North Carolina** to handle registration, in tents which were set up on Friday - and taken down on Sunday - by Marvelous **Mel LeCompte**. When these committed volunteers put in "a day's work" it's a 24 hour day!!! They get our most sincere **"THANKS!!!"** for making this event possible.

There was much more to do than just dig. There were lower mine tours, upper mine tours, and a blackout tour with UV lamps only! Heartfelt gratitude to Tour Guides **Jeff**

**Winkler** and **Eric Weis** who walked miles on our behalf.

Many thanks to webmasters **Jim Cooper** and **Terry Wilson** who got the word out and made the registration process smooth and easy.

Our gratitude to the esteemed **Hauck** family and **Sterling Volunteers** for making all who attended deliriously happy and deeply grateful for the opportunity. Particular thanks to the lovely lady who spent so much time on her feet at the snack bar, helping us keep our strength up, and to **Chris Gillis** and **John Dymond** for much rock-moving while preparing for our big day. Special, special thanks **Bill Kroth** who, on Friday evening, gave a unique tour to volunteers who had arrived early.

Thanks also to **Gary Weinstein** and others for providing door prizes. Among the winners were young **Matt Benedict** of East Hampton who won a small UV lamp, **Bob LaCorte** of Long Island who won a Stuart Schneider book *"The World of Fluorescent Minerals"*, and **Robert Stitham** who won another book on Fluorescents by Stuart Schneider and **Joan Davis** of Corning, NY was the grand prize winner who walked away with a UV lamp and charger.

Sincere thanks to all who donated their time, talent, and "treasure" such as **Dennis Ausma** **Buffenmyer** who donated his change when his rocks were being weighed out.

Thanks and welcome to our **new members** who joined for insurance purposes - I hope you feel (and I'm sure you do) that you got your money's worth. Enjoy your newsletters and if you have any questions or comments, please don't hesitate to contact one of our Board members.

Special thanks and apologies to anyone whose name I neglected to mention - your contributions were equally important and greatly appreciated. I invite you to submit a brief article describing your involvement in, and impression of, the Sterling Digg.

I believe this is the most successful digg we've ever had - not only did our Rockhounds take home 4,688 lbs. of rocks and minerals, we brought joy and excitement to a huge

number of people from all over the United States, we saw parents introducing their kids to a hobby that may become a life's work, and we enjoyed camaraderie with friends we email and talk to on the phone much more often than we see.

The highlight of the digg for me was going out into the field at night, in the dark, and seeing the piles of rocks light up when I shone my new uv lamp on them. What a thrill! However many miles I traveled, whatever discomfort I endured, (however much money I spent on that lamp!) just seeing the miracle of those magic rocks lighting up made it all worthwhile. MAGIC! Real, live magic. And taking the upper mine tour was the fulfillment of a decades-long desire. Thanks to Jeff and Eric for their patience with me.

**POT LUCK DINNER** is coming up soon - Sunday May 17. It will take place in the same location as the monthly meeting - the Education Building behind Centenary United Methodist Church on the White Horse Pike (Rt. 30) in Berlin - on May 17. Sign up will be by [www.whoscoming/dvess](http://www.whoscoming/dvess) **at a future date** (website is not up yet). Come on out and join the fun! Our annual **Banquet** will take place in the same location as last year - Vitarelli's restaurant on Kings Hwy. in Cherry Hill. More details to follow later.

**FIELD TRIP** - Mutter Museum in Philadelphia - maybe in May.

Did you get up to the **Observatory** on Friday night? Did you make a great deal on a mineral specimen at the **yard sale**? Did you see the rusted, twisted 20-foot steel I-beam - a **9/11 Memorial** - near the parking lot? Did you see the 10-ft-long representation of the **Periodic Table of the Elements**? The 112 cubbyholes in this display contain samples of the actual element, a representative sample of ore from which that element is obtained, plus an item made from that element; currently we know of no larger or more complete display of the Periodic Table anywhere in the world. Did you see the more than **\$2,000,000** of fine mineral specimens in fifteen custom-designed cases in the **Oreck Mineral Gallery**? This is the finest display of minerals in the entire State of New Jersey.

If you answered "no" to any of these questions, you simply must come to Sterling Mine on the last Saturday of April next year. We'll be there.

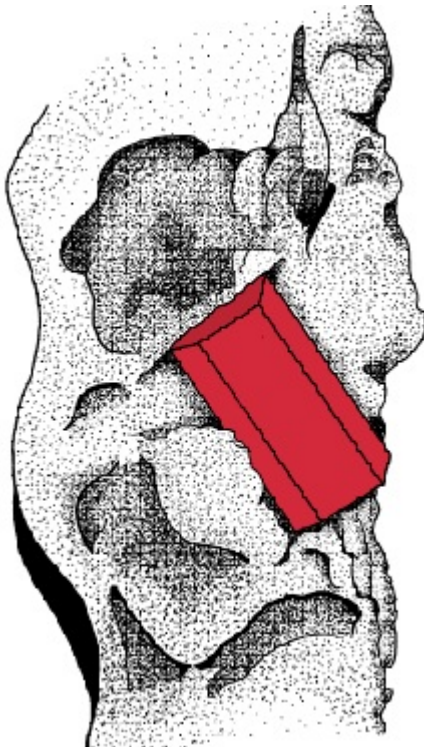
Are you a member of the Mineral of the Month Club yet? [www.mineralofthemonthclub.org](http://www.mineralofthemonthclub.org)  
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Keep building those collections! Be safe out there.



## Mineral of the Month

# Beryl



Chemical Formula:  $\text{Be}_3\text{Al}_2(\text{Si}_6\text{O}_{18})$

Crystal System: Hexagonal

Hardness: 7.5 - 8

Specific Gravity: 2.65 - 2.8

Cleavage: Imperfect in one direction

Fracture: Conchoidal (shell-like)

Luster: Glassy (Vitreous)

Color: Colorless, blue, green, red, light yellow, pink, white.

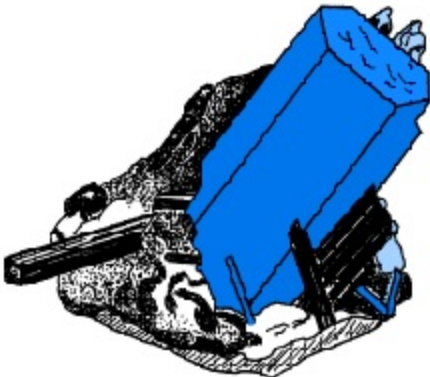
Streak: None

Uses: Gemstones.

Interesting Facts: Beryl is the main source of the very important element beryllium. Beryllium is a very light, very strong metal. When it is mixed with other light metals, like aluminum, the mixture

(called an alloy) is very strong. Aluminum - beryl alloys are used to make airplanes. Beryllium is also important in the nuclear industry.

Name: The green variety of beryl, emerald, is one of the most valuable gemstones. In fact, deep green, high quality emeralds are more valuable than diamonds! Emeralds are commonly created in laboratories. Only expert gemologists can tell the difference between natural emeralds and one created in a lab.





Above: Red beryl from Utah.

Lower Left: Deep blue aquamarine from Africa.

## Beryl, continued

Later in this issue of *Mini Miners Monthly* you will learn about what causes color in minerals. Some minerals have only one color, like azurite (which is always some shade of blue). Others, like beryl, can be found in many different colors. Here are some color varieties of beryl and their individual names.

Yellow beryl is called *heliodor*. It was named after the Greek words *helios* meaning sun and *doron* meaning gift in reference to the beautiful sun-yellow color of some specimens. This name was given in 1910. The color comes from extremely small amounts (called *trace amounts*) of iron and uranium trapped in the crystal.

To the left are two perfectly clear heliodor crystals on matrix. The specimen is from Russia.

Green beryl is called *emerald*. The name was created from the Greek word *smaragdus* which literally means a *light green, precious stone*. This name was originally given to any light green stone. Today it refers to the dark green variety of beryl only. The color is from trace amounts of chromium and vanadium in the crystal.

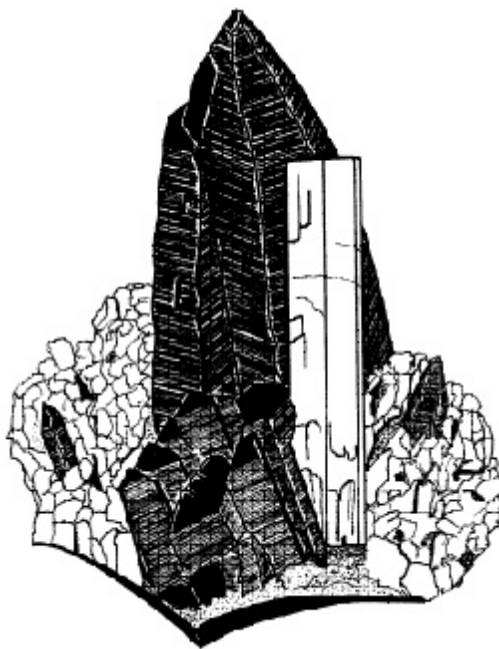
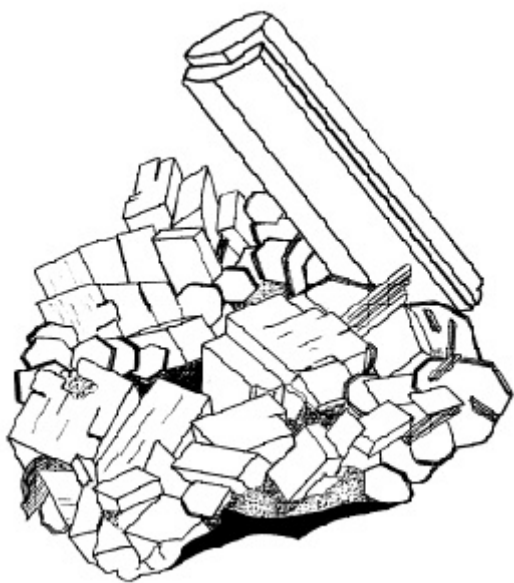
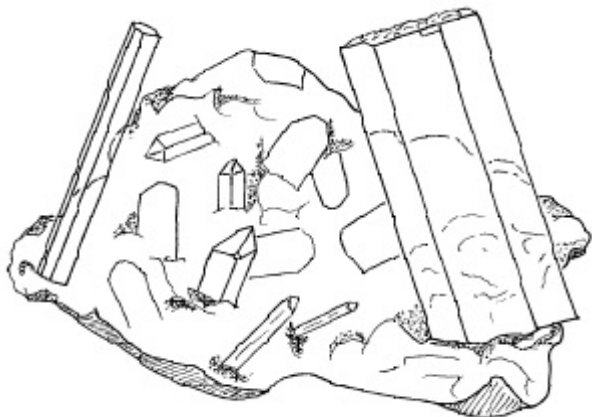
To the left is one of the finest emeralds ever found in the United States. The emerald sits on a matrix of mica and calcite.

It was discovered in an opening that the miners named *Aladdin's Cave*. The "cave" was 12 feet long and 5 feet wide. It contained quartz, calcite, pyrite, muscovite, emerald, and many other minerals. It was discovered

near Hiddenite, Alexander County, North Carolina.

Blue beryl is called *aquamarine*. This name came from the Latin phrase *aqua marina* meaning *sea water*, which is a description of the beautiful, light blue color of gem aquamarine crystals. Aquamarine gets its lovely color from trace amounts of iron trapped in the crystal. To the right is a single aquamarine with a group of smoky quartz crystals.

Pink beryl is called *morganite*. It was named after the famous American financier and mineral collector, John Pierpont Morgan (1837-1913). It is also called *rose beryl*.

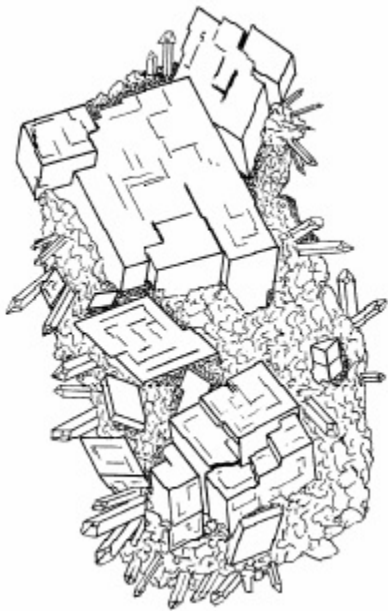


# Mineral Colors

Color is one of the physical properties used to identify minerals. It is not the best property to use, though. In this activity, you will learn that some minerals have only one color. You will also learn that others are found in many different colors. By the end, you will have fun seeing the beautiful colors of minerals.

## Activity 1: Minerals That Have One Color

Some minerals have only one color. Grab as many mineral picture books as you can find, or search for pictures on the internet, and look at as many different specimens of rhodochrosite, malachite, azurite, sulfur and galena as you can find.



Minerals that occur in only one color are called idiochromatic.

Left is Red rhodochrosite on quartz from Peru.

**Azurite** \_\_\_\_\_

**Malachite** \_\_\_\_\_

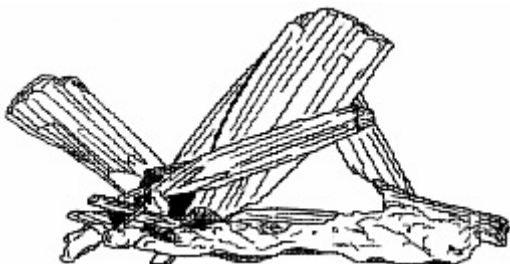
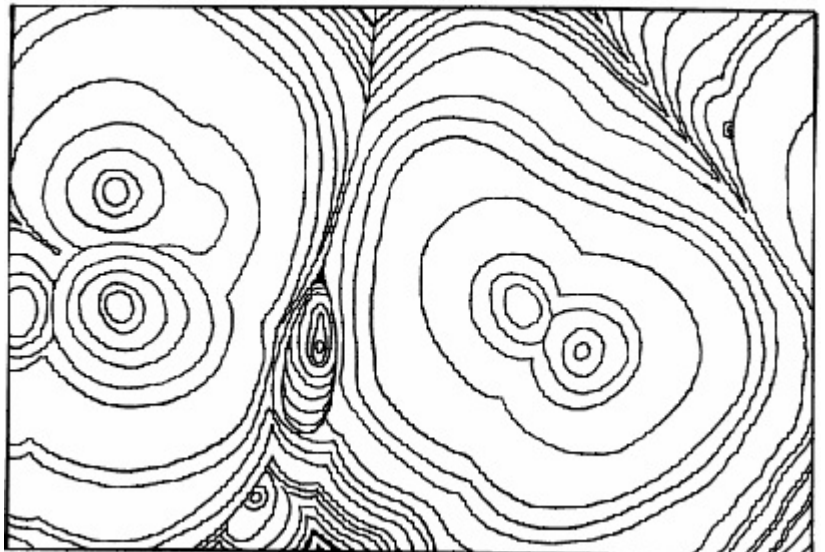
Here are some minerals that have only one color. Write the color next to the mineral name.

**Rhodochrosite** \_\_\_\_\_

**Galena** \_\_\_\_\_

**Sulfur** \_\_\_\_\_

Here is a slab of banded malachite from Africa. The bands alternate between dark green and light green.



This dark blue azurite crystals from Morocco.

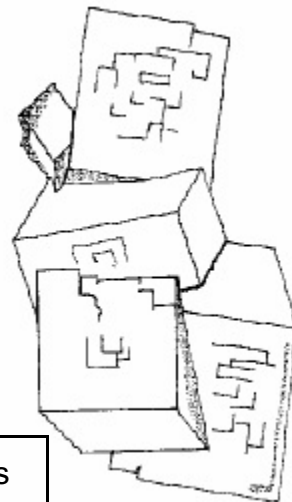
## Activity 2: Minerals With Many Colors

Most minerals can have different colors. Their other physical properties will be the same (like hardness, specific gravity and cleavage).

Once again grab your collection of mineral picture books. Or, get ready to search for mineral pictures on the internet. This time you are to look at specimens of three different minerals that are found in many different colors: fluorite, calcite and gypsum. Minerals that occur in two or more different colors are called *allochromatic*.

Make a list of the different colors you see in these minerals?

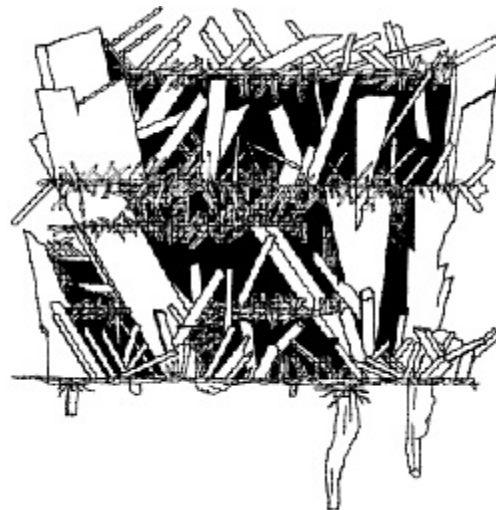
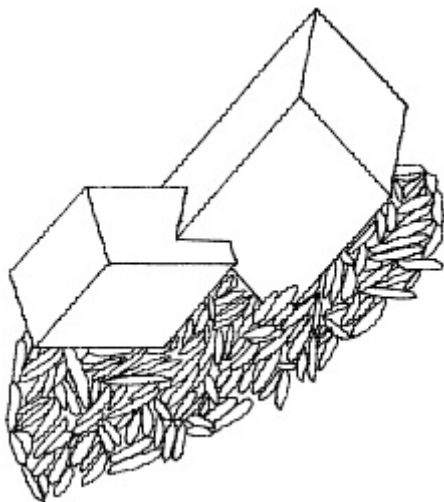
Yellow fluorite from Illinois



**Fluorite:** \_\_\_\_\_

**Calcite:** \_\_\_\_\_

**Gypsum:** \_\_\_\_\_



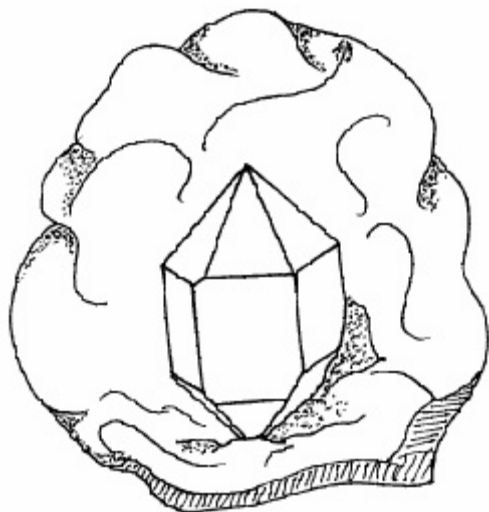
With the permission of:

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Don't forget there are more pages in your e-mailed newsletter because of mailing constraints. Look for photos of our meetings, coming soon



# Activity 3: The Colors of Quartz

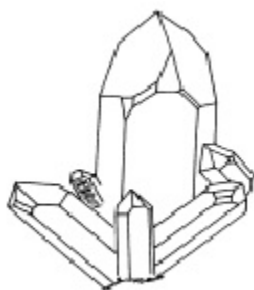


Quartz is found in many different colors. Unlike the minerals you looked at in Activity 2, the different colors of Quartz have different names. In this activity, you will name the different color varieties of quartz and discover what causes each color. Use a good mineral field book and find the special names of the different color varieties of quartz.

Colorless: \_\_\_\_\_  
Purple: \_\_\_\_\_  
Yellow: \_\_\_\_\_  
Green: \_\_\_\_\_  
White: \_\_\_\_\_  
Black and Brown: \_\_\_\_\_  
Pink: \_\_\_\_\_

Purple quartz on dark brown rock from Russia.

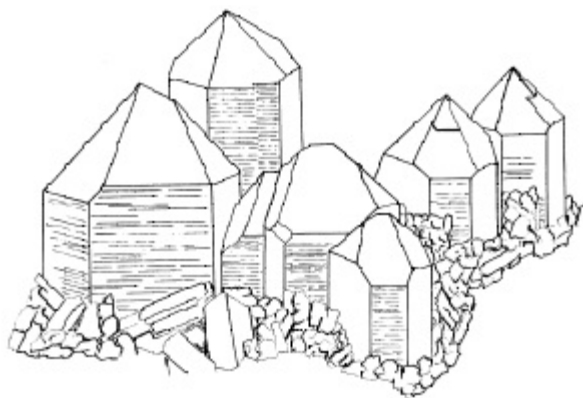
Many times there is an element trapped inside a mineral that gives it its color. Sometimes other minerals are trapped inside a mineral and the trapped mineral creates the color. Sometimes something has happened to the mineral while it was forming that caused the color. Let's look at the mineral quartz and discover what causes its different colors.



**Colorless quartz** is pure quartz. It has no element or particle or other mineral trapped inside of it that gives it any color. You can see right through colorless quartz (which is also called *Rock Crystal*). This is *pure* quartz.

**Purple quartz** (called amethyst) has a defect or deformity inside the crystal. The defect is so small that you can't see it with your eye (or even with a microscope!). Mineralogists and gemologists call this defect a color center. There are many different kinds of "color centers" in minerals. One kind of color center or defect in quartz can create different shades of purple. If you want to learn more about color centers, go to <http://www.webexhibits.org/causesofcolor/12.html>.





**Pale yellow to brown quartz** (called citrine) gets its color from iron trapped inside the crystal. It was discovered that when amethyst is heated, it becomes brown to yellow. Be aware: a lot of "citrine" that is sold at shows and in mineral shops is actually heat-treated amethyst!

*A substance that is trapped inside a mineral, and which gives that mineral its color, is called a chromophore.*

**Green quartz** (called aventurine) is quartz that has green mica (called fuchsite) trapped inside.

**White quartz** (called milky quartz) is white due to microscopic inclusions of gas and fluids that were trapped in the crystal as it was formed.

**Black quartz** (called smoky quartz) is another variety of quartz that gets its color from a color center (remember the amethyst above?). The cause is pretty complicated to explain. A simple explanation is that when radiation moves through clear quartz, it causes changes inside the crystal. These changes create a hole and the holes make the crystal look black. The "holes" are actually places where pieces of atoms, called electrons, used to be. I know, it's complicated.

Pink quartz (called rose quartz) gets its color because it contains very, very small amounts of the elements titanium, iron or manganese.

**What causes the color in these minerals?**

Azurite: \_\_\_\_\_

Malachite: \_\_\_\_\_

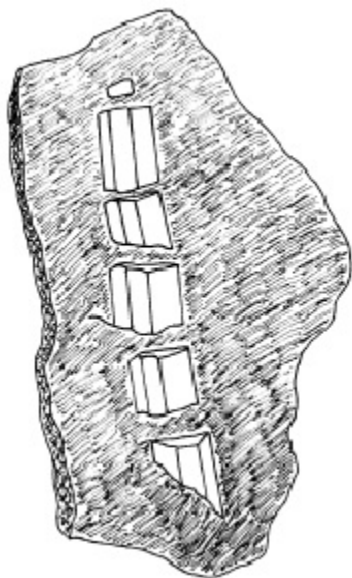
Rhodochrosite: \_\_\_\_\_

Galena: \_\_\_\_\_

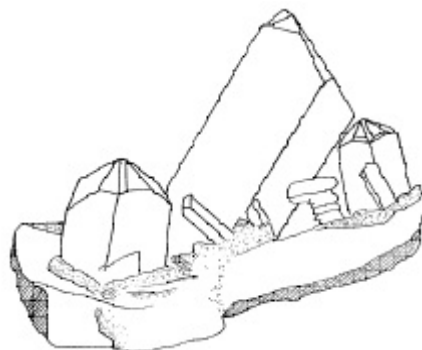
Celestite: \_\_\_\_\_

Emerald: \_\_\_\_\_

anazinite (a variety of Zoisite): \_\_\_\_\_



Just in case you couldn't find the answers in a mineral book, go to the next page. You will find the answers there!





## The most common *chromophores* in minerals.....

Do you remember what a “*chromophore*” is? Go back one page (near the top). Read it again.

Here is a list of the most common elements that can be trapped inside mineral crystals and which give the crystals their colors:

Iron (Fe), Manganese (Mn), Copper (Cu), Chromium (Cr), Cobalt (Co), Nickel (Ni) and Vanadium (V).

Here is a list of the most common materials or other minerals that can be trapped inside mineral crystals and which give the crystals their colors:

Chlorite, Manganite (manganese oxide), Hematite (iron oxide), Goethite and Limonite (iron oxide with water). Chlorite gives a green color. Hematite produces red. Limonite produces yellows.

Answers:

**Azurite:** Do you remember that azurite is a copper mineral? The blue color comes from copper.

**Malachite:** Malachite is also a copper mineral. Its color comes from copper, too.

**Rhodochrosite:** Rhodochrosite gets its color from the manganese in its crystal structure.

**Galena:** Metallic minerals, like galena, get their color from the elements in their crystal structure. Galena is lead sulfide. The silver gray color comes from the lead in galena.

**Celestite:** The color of light blue celestite is believed to come from minute amounts of gold trapped in the celestite crystals.

**Emerald:** The deep green color of emerald comes from minute amounts of chromium or vanadium in beryl.

**Zoisite:** Zoisite can be white or gray. Deep blue, gem zoisite (called tanzanite) gets its color from the element vanadium.

For activity # 4 see the newsletter on line.

These pages can be printed and colored for your note book to build your collection's information base.

**MEMBERSHIP** Thank you to all of those who already renewed your membership for 2009 – this is a good start to the new year. I would like to get filled out renewal forms for all renewals this year to put in a Membership Binder so I have current records for everyone. I have attached a renewal form with this issue of the DVESS Newsletter for that purpose, and I would appreciate all of you renewing, including those of you who have already renewed, but make sure I get a filled out Renewal form with current information. It can be copied and emailed to me at either of the e-mail addresses in the info box Thank you. CDC. Editor, DVESScapades

### PROGRAMS:

A number of other speakers are being lined up, including Chet Lemanski (After February 2009 Tucson show). Since we will have meetings at the Centenary United Methodist Church in Berlin, NJ during the summer, Gary will show/plan additional programs.

DVESS General Meeting Future Dates 2009,      June 10;              July 8, Aug. 12;              Sept. 9,  
Oct. 14;              Nov. 11,              Dec. 9

### NOTE NEW DATES NOW INCLUDED, FOR JULY AND AUGUST

### UPCOMING EVENTS

#### New Jersey State Museum Sunday Science Lecture Series

**June 14              Robert Denton**, Discoverer and leading paleontologist of the famous Ellisdale Fossil Site  
*Space is limited. Reserve your seats early!*

**WHAT YOU NEED TO KNOW** Free Admission - Free Parking, Museum Auditorium

**Each lecture begins at 4pm. Light refreshments will be served.** For more information, or to make reservations, please call (609) 292-8594

**DVESS MEETING LOCATION** : Centenary United Methodist Church, 151 South White Horse Pike, (route 30) in Berlin, 856-767-3881 or 856-767-7453. Located between Estaugh Ave and W Taunton Ave on your left, the church is on the right hand side.

### **MEMBERSHIP INFORMATION**

Regular members are entitled to participate in all DVESS activities. Sponsoring members are entitled to the same plus a specially chosen mineral specimen. Dues are renewable each year in January. Membership rates for the Society:

#### **Regular Membership:**

\$15.00 for the 1<sup>st</sup> family member + \$5.00 for each additional family member

\$10.00 for the 1<sup>st</sup> Senior ( 65+ ) member + \$5.00 for each additional family member

#### **Sponsoring Memberships ( each additional family member - \$5.00 ):**

"Silver" \$50.00 for 1<sup>st</sup> family member - receive a Geode Specimen

"Gold" \$75.00 for 1<sup>st</sup> family member - receive a Native Gold Specimen

"Platinum" \$100 for 1<sup>st</sup> family member - receive a Premium Specimen

### **SOCIETY INFORMATION**

The Delaware Valley Earth Science Society, Inc., ( DVESS ), a non-profit organization, was founded in 1956 and incorporated in the state of New Jersey in 1957.

The Society:

- \* promotes interest , knowledge and the development of skills in the "earth sciences". These interests include mineralogy, paleontology, lapidary arts, archeology and local preservation.
- \* supports the conservation of natural resources, advocates the availability of collecting sites and maintains close contact with those in the academic field.
- \* is a member club of the Eastern Federation of Mineralogical and Lapidary Societies  
( <http://www.AmFed.org/EFMLS> )

### **MEETINGS**

The Society meets the 2<sup>nd</sup> Wednesday of each month throughout the year at Centenary United Methodist Church, 151 South White Horse Pike, (route 30) in Berlin

Anyone with info for the newsletter please share with me. You can be published!

Stuff you did in school, on a trip etc., see my info below.

Editor's Notes: Editor is not responsible for authenticity of information in any articles submitted for publication. Nor are the opinions expressed in the "DVESScapades" necessarily those of the officers of the Delaware Valley Earth Science Society, Inc., and/or the editor.

To submit an article for publication in the DVESScapades contact the Newsletter Editor. [decuzzic@comcast.net](mailto:decuzzic@comcast.net), or Delaware Valley Earth Science Society Inc., DVESS, P O Box 372 Maple Shade, New Jersey 08052 or DVESS Website: <http://www.dvess.org> [garyskyrock@comcast.net](mailto:garyskyrock@comcast.net)

*Should Armageddon occur in our lifetime, I fear this type of event as the most likely (More than asteroid/comet impact, nuclear conflict, etc) disaster to affect human civilization. Yellowstone leaves me quite nervous.*

### **SUPERVOLCANOS**

A supervolcano is a volcanic eruption that is substantially larger than any volcano in historic times. This type of volcanic eruption occurs when magma in the Earth rises into the crust from a hotspot but is unable to break through the

crust. A large, growing magma pool is built because of pressure until the crest is unable to contain this pressure. Throughout history, there have been only a handful of these eruptions which typically causes a long-lasting change to weather. . . . .

FOR THE REST OF THIS ARTICLE LOOK AT THE PAGES ONLINE !

## AFMS CODE OF ETHICS (American Federation of Mineralogical Societies)

- I will respect both private and public property and will do no collecting on privately owned land without the owner's permission.
- I will keep informed on all laws, regulations of 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 - fences, signs, buildings.
- I will leave all gates as found.
- I will build fires in designated or safe places only 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 supply.
- 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.

<i>DVESS Directory 2008</i>	President Ann Lynne Benson 856-783-0969 <a href="mailto:SeleniteQueen@gmail.com">SeleniteQueen@gmail.com</a>
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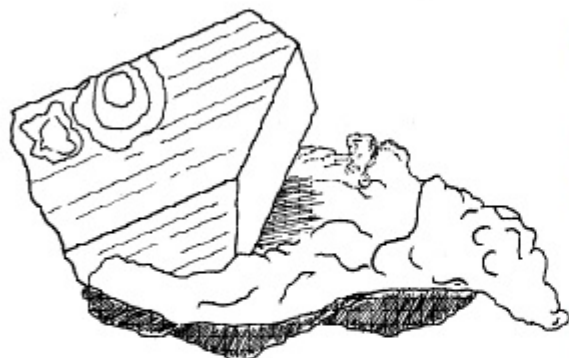
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## Activity 4: Colorful Mineral Names

Did you know that some mineral names tell you about their color?

Here are some examples . . .



. . . Azurite is from the word *azure* which means *sky blue*, so this name tells you about azurite's BLUE color.

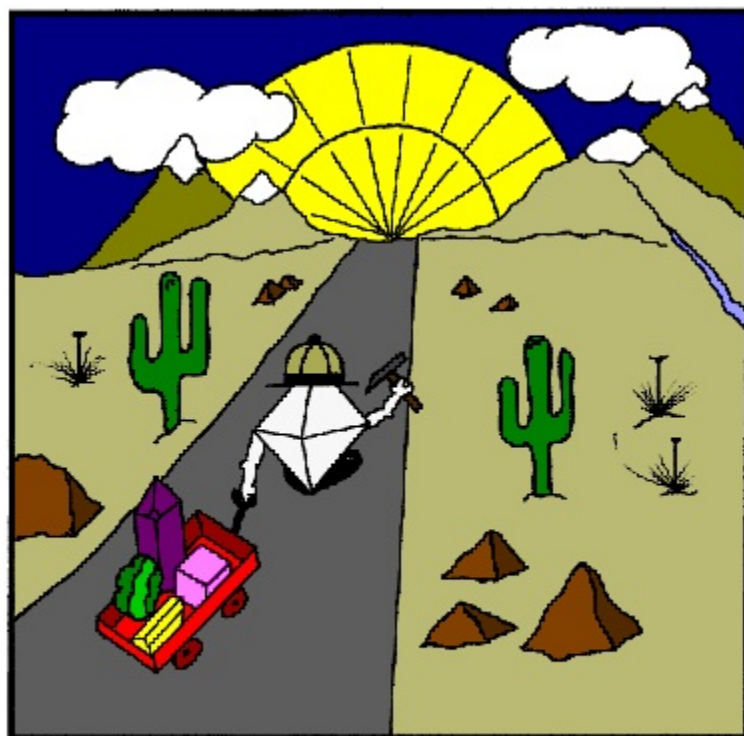
. . . Malachite is from the Greek word *moloche* which means *mallow*. "Mallow" is a plant, so this name tells you about malachite's GREEN color. (To the left is a specimen of azurite with rings of malachite.)

. . . Rhodochrosite is from the Greek word *rhodochros* which means *rose-colored*, so this name tells you about rhodochrosite's PINK to RED color.

. . . Rhodonite was named from the Greek word *rhodon* meaning a *rose*. This tells you about the rose-pink color of pure rhodonite specimens.

. . . Rubellite, a variety of tourmaline, probably got its name from the Latin word *rubellus* which means *reddish*. What color do you think a Rubellite tourmaline is?

. . . Some specimens of chalcopyrite and bornite can show numerous colors all at once, including blues, reds, and greens, all flashing at you in the light. Mineral collectors like to call these specimens *Peacock Ore* because they have the bright, iridescent colors of Peacock feathers.



As the pyrite sun sets, Diamond Dan is grateful for another fine day of digging!



# IMPORTANT MINERAL DISCOVERY ANNOUNCED



A team of mineralogists from The Smithsonian, The American Museum of Natural History and NASA have been involved in detailed study of the mineral *pyrite* for the past 10 years. In one of the most important scientific articles published this century, Dr. Amy Thyst, Dr. Feldon Spar, and Dr. Mallard A. Kyte revealed their discovery. Here is a quote from their article:

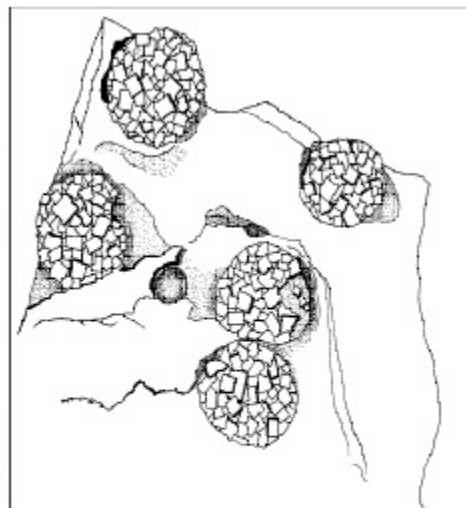
*"For centuries the mineral known as 'pyrite' has been believed to be composed of iron and sulfur. Hundreds of so-called miners have died in poverty because they discarded their 'fool's gold.' Well-meaning but ill-informed amateurs told them they did not have gold, but pyrite or fool's gold."*

*Our detailed studies of the inner atomic bonding of the molecules in "pyrite" have revealed that pyrite is composed of very little iron and sulfur. As a matter of fact, the iron and sulfur is present only as an included impurity. **Pyrite is actually a densely packed variety of gold.** We have concluded that "pyrite" specimens should be labeled as "dense gold." It is the density of the closely packed gold atoms that gives "pyrite" its hardness. Informed mineralogists and mineral collectors already know that gold and "pyrite" crystallize in the same crystal system (isometric, also called cubic). Now we know that this is not by chance or accident.*

*Curators at The Smithsonian Institution, The American Museum of Natural History, as well as hundreds of large and small museums around the world have begun the painstaking task of relabeling their "pyrite" specimens as "dense gold." It goes without saying that the value of nearly every mineral collection in the world - museum, professional and amateur - have jumped dramatically in value due to this important discovery.*

*If you have "pyrite" in your collection, please change your labels to read "dense gold." You may also wish to have your collection insured, too."*

And if you believe any of this . . . . . April Fools!





# LET'S SEE WHAT YOU LEARNED

OK, Mini Miners. Have you been reading this issue of *Mini Miners Monthly* carefully? Have you pulled out your mineral books, done a little work and reading and learned a lot about color in minerals? You have! Let's see what you know.

1. A mineral that occurs in only one color is called \_\_\_\_\_.
2. A mineral that occurs in two or more colors is called \_\_\_\_\_.
3. Brightly colored specimens of chalcopyrite and bornite are commonly called \_\_\_\_\_.
4. Yellow beryl is called \_\_\_\_\_ which means \_\_\_\_\_.
5. Milky quartz is white due to \_\_\_\_\_ trapped in the crystal.
6. Iron gives \_\_\_\_\_ quartz its yellow-brown color.
7. Which variety of beryl is commonly more valuable than diamonds? \_\_\_\_\_
8. Blue beryl is called \_\_\_\_\_ which means \_\_\_\_\_.
9. Which copper mineral is always green? \_\_\_\_\_
10. Which copper mineral is always blue? \_\_\_\_\_
11. When trace amounts of \_\_\_\_\_ are trapped in celestite, the celestite is blue.
12. What do you call a person who practices the art of working with stones to make precious and semi-precious gems for jewelry and other decorative items? A \_\_\_\_\_.
13. What makes the mineral *rhodochrosite* red? \_\_\_\_\_
14. A substance that is trapped inside a mineral and which gives the mineral its color, is called a \_\_\_\_\_.
15. Which magazine has a complete list of mineral shows around the U.S.A.? \_\_\_\_\_
16. The finest emerald ever found in the United States was found in which state?  
\_\_\_\_\_
17. True or False. "Pyrite" is not fool's gold but is actually a variety of *real* gold that has closely packed molecules and so it is harder than common gold. \_\_\_\_\_
18. Green quartz gets its color from what mineral trapped inside? \_\_\_\_\_

*Should Armageddon occur in our lifetime, I fear this type of event as the most likely (More than asteroid/comet impact, nuclear conflict, etc) disaster to affect human civilization. Yellowstone leaves me quite nervous.*

## **SUPERVOLCANOS**

A supervolcano is a volcanic eruption that is substantially larger than any volcano in historic times. This type of volcanic eruption occurs when magma in the Earth rises into the crust from a hotspot but is unable to break through the crust. A large, growing magma pool is built because of pressure until the crust is unable to

contain this pressure. Throughout history, there have been only a handful of these eruptions which typically causes a long-lasting change to weather. There have been many films and documentaries on supervolcanoes throughout the years. A two-part television docudrama titled *Supervolcano*, looked at the events that would take place if the *Yellowstone* supervolcano

erupted. Computer-programming enacted the devastating events that would take place all over the world. It was stated in the docudrama that all of the United States would be covered with at least one centimeter of volcanic ash, which would cause mass destruction in the nearby vicinity, killing plants and wildlife all across the continent.

### **Massive explosive eruptions**

Eruptions with a Volcanic Explosivity Index of 8 (VEI-8) are colossal events that throw out at least 1,000 km<sup>3</sup> Dense Rock Equivalent (DRE) of ejecta; VEI-7 events eject at least 100 km<sup>3</sup> (DRE). VEI-7 or 8 eruptions are so powerful that they often form circular calderas rather than cones because the downward withdrawal of magma causes the overlying mass to collapse and fill the void magma chamber beneath. One of the classic calderas is at Glen Coe in the Grampian Mountains of Scotland. First described by Clough et al (1909) [4] its geology and volcanic succession has recently been re-analyzed in the light of new discoveries.[5] There is an accompanying 1:25000 solid geology map.

By way of comparison, the 1980 Mount St. Helens eruption was at the lower end of VEI-5 with 1.2 km<sup>3</sup>, and both Mount Pinatubo in 1991 and Krakatoa in 1883 were VEI-6 with 25 km<sup>3</sup>

### **Known super eruptions**

Estimates of the volume of ejected material are given in parentheses. VEI 8 eruptions have happened in the following locations.

Lake Taupo, North Island, New Zealand - Oruanui eruption ~26,500 years ago (~1,170 km<sup>3</sup>)

Lake Toba, Sumatra, Indonesia - ~75,000 years ago (~2,800 km<sup>3</sup>)

Whakamaru, North Island, New Zealand - Whakamaru Ignimbrite/Mount Curl Tephra ~254,000 years ago (1,200-2,000 km<sup>3</sup>) [6]

Yellowstone Caldera, Wyoming, United States - 640,000 years ago (1,000 km<sup>3</sup>)

Island Park Caldera, Idaho/Wyoming, United States - 2.1 million years ago (2,500 km<sup>3</sup>)

Kilgore Tuff, Idaho, United States - 4.5 million years ago (1,800 km<sup>3</sup>)

Black Tail Creek, Idaho, United States - 6.6 million years ago (1,500 km<sup>3</sup>)

La Garita Calder, Colorado, United States - Source of the truly enormous eruption of the Fish Canyon Tuff ~27.8 million years ago (~5,000 km<sup>3</sup>)

The Lake Toba eruption plunged the Earth into a volcanic winter, eradicating an estimated 60% [7] [8] [9] [10] [11] of the human population (although humans managed to survive, even in the vicinity of the volcano [12]), and was responsible for the formation of sulfuric acid in the atmosphere.

**VEI-7 volcanic events**, less colossal but still supermassive, have occurred in the geological past. The only ones in historic times are:

Tambora, in 1815, Lake Taupo (Hatepe), around 180 AD, [13] and possibly Baekdu Mountain, around 979 AD. [14]

Tambora, West Nusa Tenggara, Indonesia - 1815 (160 km<sup>3</sup>)

Baekdu Mountain, China/North Korea - ~969 AD (96±19 km<sup>3</sup>)

Lake Taupo, North Island, New Zealand - Hatepe eruption ~181 C.E. (120 km<sup>3</sup>) [13] Kikai Caldera, Ryukyu Islands, Japan - ~6,300 years ago (~4,300 BC) (150 km<sup>3</sup>)

Campi Flegrei, Naples, Italy - ~12,000 years ago (~ 10,000 BC) (Could be as much as 300 km<sup>3</sup>)

Aira Caldera, Kyushu, Japan - ~22,000 years ago (~ 20,000 BC) (~110 km<sup>3</sup>)

Reporoa caldera, New Zealand - 230,000 years ago (~100 km<sup>3</sup>)

Aso, Kyushu, Japan - four large explosive eruptions between 300,000 to 80,000 years ago (last one > 600 km<sup>3</sup>)

Long Valley Caldera, California, United States - ~760,000 years ago (600 km<sup>3</sup>)

Valles Caldera, New Mexico, United States - ~1.12 million years ago (~600 km<sup>3</sup>)

Mangakino, North Island, New Zealand - three eruptions from 0.97 to 1.23 million years ago (each > 300 km<sup>3</sup>) [15]

Henry's Fork Caldera, Idaho, United States - 1.3 million years ago (280 km<sup>3</sup>)



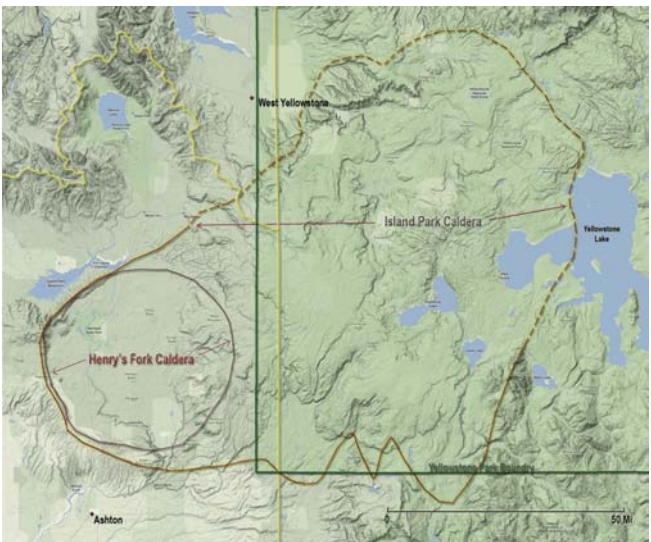
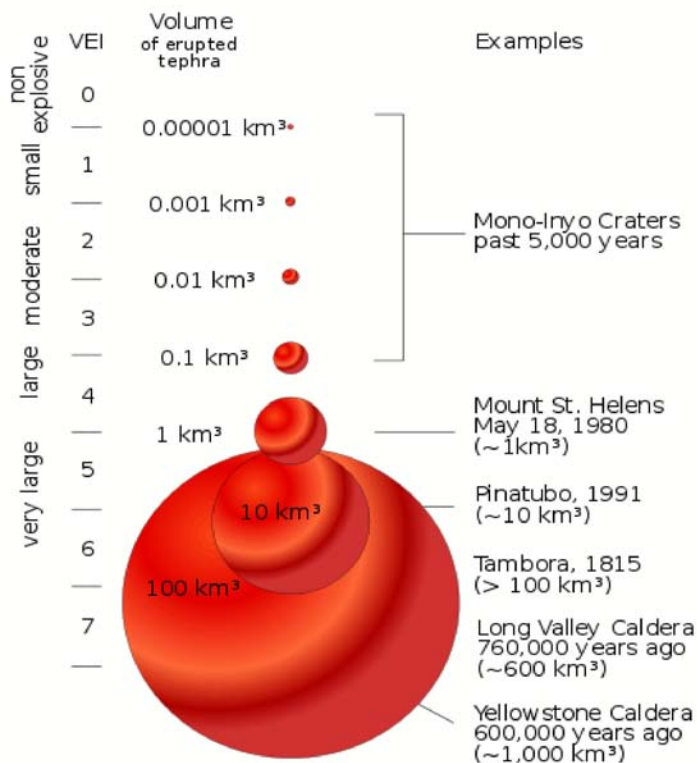
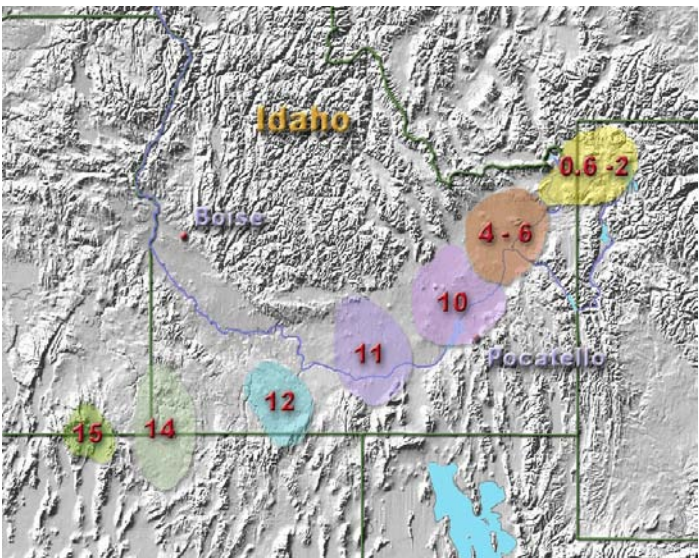
Walcott Tuff, Idaho, United States - 6.4 million years ago (750 km<sup>3</sup>)

Bennett Lake Volcanic Complex, British Columbia/Yukon, Canada - ~50 million years ago (850 km<sup>3</sup>)

Bruneau-Jarbridge, Idaho, United States - ~10-12 million years ago (>250 km<sup>3</sup>) (responsible for the Ashfall Fossil Beds ~1,600 km to the east [16])

The **Yellowstone hotspot**, also referred to as the **Snake River Plain-Yellowstone hotspot**, is

a volcanic hotspot responsible for large scale volcanism in Oregon, Nevada, Idaho, and Wyoming, United States. It created the eastern Snake River Plain through a succession of caldera forming eruptions. The resulting calderas include the Island Park Caldera, the Henry's Fork Caldera, and the Bruneau-Jarbridge caldera. The hotspot currently lies under the Yellowstone Caldera [1] The Yellowstone hotspot is one of the few volcanic hotspots underlying North America; others include the Anahim and Raton hotspots.





***Science and Romance meet on the beach*** - submitted by our Pres **AnnLynne Benson**

There's something special about May 9 - when the full moon will cast its cold glow on the Jersey shore. Love birds and shore birds alike await this special night - when the horseshoe crabs come out of the water to mate.

How could you describe a horseshoe crab? They aren't exactly pretty. They aren't exactly crabs either! They're more like scorpions, ticks and spiders, but they aren't actually like anything else on earth - that's why they have their own classification (Class Merostomata). Horseshoe crabs are one of the Earth's oldest creatures - 100 million years **older** than the dinosaurs - they have evolved little in the last 250 million years. The largest population of horseshoe crabs in the world lives in Delaware Bay region.

At the pharmaceutical company I work for, I was preparing a document which described the *limulus amebocyte lysate* (LAL) test. That stopped me cold! I called the chemist and asked if her limulus was my Limulus - the horseshoe crab. Yes, indeed, she said - one and the same. An extract of the horseshoe crab's blood, LAL, is used by the pharmaceutical and medical device industries to ensure that their products, such as intravenous drugs, vaccines, and medical devices, are free of bacterial contamination. No other test works as easily or reliably for this purpose. Limulus also gives us proteins that show anti-viral and anti-cancer activity

and a new test for fungal infections.

The crabs are captured in shallow water, by hand, using a clam rake, or in deeper water using a dredge. Those caught by hand are not usually injured (injured crabs are released immediately and most survive). Captured crabs are transported to the laboratory by truck, up to 30 percent of their blood is removed, then they are returned to the water, where their blood volume rebounds in about a week.

Conch and eel fishermen also use horseshoe crabs as bait. That brings us to the Red Knot - a reddish-brown shorebird about the size of a dove, which annually migrates 9,300 miles from Tierra Del Fuego at the southern tip of South America to its breeding grounds in the Canadian Arctic. Nothing is wasted in Nature's economy, and the red knots have timed their passage over South Jersey to exactly coincide with millions of horseshoe crab eggs being laid on the beaches near Delaware Bay. The Red Knots stop to refuel on their long migration northward.

At Reed's Beach (past the end of Rt. 55) or one of the other locations, you can witness nature's wonder - by night, the Romance of the horseshoe crabs, and by day, the Grand Buffet of the migrating shorebirds (and migrating photographers recording the occasion).