Showcase Facts & Questions

DISPLAY Facts *There are 10 display cases along the left hand wall of the Kuhlman Center. Below are a variety of facts or questions about each of the display areas. Feel free to use any of these or provide additional information of your own.*

1. Fluorescent Minerals: Patrick Pierce

Some minerals contain additional particles that react differently to different types of light. A mineral may appear to be one color under standard incandescent or fluorescent lighting.

However, when it is exposed to ultraviolet light the mineral will start to glow; this is called fluorescence. This is because the electrons are jumping out of orbit.

If the mineral continues to glow after the light has been removed, this is called phosphorescence.

Some minerals will glow when heated; this is called thermoluminescence.

And there are some minerals that will glow when they are struck or crushed; this is called triboluminescence.

Gemstones and minerals may glow differently under short-wave ultraviolet, long-wave ultraviolet, or X-rays.

There is a wide range of elements that react to this energy including manganese, calcium, uranium, europium, etc.

Some minerals that fluoresce are calcite, rubies, emeralds, diamonds, fluorite, opal, and willemite. While the color and intensity of the fluorescence varies greatly, usually specimens from the same geographical area will be the same color.

2. Agates: Mike Manning

See if you can identify the following types of agates in the case using the example cards.

Fortification Agate: Fortification agate is the most common and recognizable type of agate. Bands of color form concentrically surrounding a hollow cavity (sometimes there is a minimal cavity or no cavity). The name is derived from the appearance of the bands. If you cut one of these agates in half and look down on the bands, they will appear like a fortification structure around the cavity in the center.

Waterline Agate: This type of agate is also known as "Water Level" agate. This type of agate forms in such a way that gravity permits the bands to form in a straight parallel formation in one direction.

Shadow Agate: The best shadow agates in the world come from Lake Superior; Botswana, Africa; and Queensland, Australia. Shadow agates exhibit an optical effect of movement across the bands. Depth is perceived from light penetrating and bouncing between alternating clear and opaque layers. When you move these agates back and forth, shadows can be seen racing across the surface. Many factors contribute to the shadow phenomenon including the regularity, contrast, distance, and depth of the bands.

Tube Agate: With Tube Agate formation, extremely thin mineral rods grow inside the silica gel before the gel solidifies and the chalcedony forms. Sometimes these rods remain as inclusions, while other times they hollow out and fill with silica. They are visible as tube-like formations inside the resulting agate.

Eye Agate: Eye agates have a distinctive spotted appearance. The spots themselves may contain concentric bands of color, or they might be one solid color. Cavities in the stone drain of silica gel, and eventually fill with chalcedony micro-crystals, resulting in the 'eyes.'

Plume Agate: Plume agates have intriguing patterns that may look a bit like ferns. They are the result of formations existing on the outside of the stone before the chalcedony deposits grew. Later, the formations fell away, but the inclusions from them remain to mark their past presence.

Moss Agate: Similar to the plume agate, moss agate may have formations of inclusions which resemble ferns, trees, moss or landscapes. The inclusions are usually formed out of iron or manganese oxide. These types of agates may not have any chalcedony bands because the elements involved in the inclusion formations may inhibit their growth.

Geode Agate: These are related to fortification geodes. They have hollow centers, owing to the silica-water gel mixture running out before the entire stone was able to fill in. Many have agate banding around the hollow interior, like the fortification agates. Not all do, though. There may or may not be a wall of crystals inside surrounding the hollow space.

Seam Agate: Seam agates do not form in round pockets, but rather in narrower gaps within a rock (thus their name). They typically have rows of chalcedony bands, but are unlikely to form those bands in a circular fashion or have any special interior.

Polyhedral Agate: Polyhedral agate is agate which has grown in a flat-sided shape similar to a polyhedron.When sliced, it often shows a characteristic layering of concentric polygons. Polyhedral agate is thought to be found only in Paraíba State, Brazil. It has been suggested that growth is not crystallographically controlled but is due to the filling-in of spaces between pre-existing crystals which have since dissolved.

3. Midwestern Minerals: Harris Precht

All of these remarkable minerals can be found in the midwest. Harris Prect's mineral specimens were recently featured in a new book. His collection consists mainly of minerals collected in the midwest.

Celestite: The name Celestite comes from the Latin word "Caelestis" which means "of the sky." It is where we get the word "celestial," which refers to the heavens.

Celestite is the source of strontium, which is used in fireworks. Even though the stone is light blue, the strontium makes fireworks glow bright red.

The largest known celestine geode is located near the village of Put-in-Bay, Ohio on South Bass Island in Lake Erie. The geode is 35 feet in diameter at its widest point. It has been converted into a viewing cave, and the crystals which once composed the floor of the geode have been removed. The Crystal Cave has celestine crystals as wide as 18 inches across and weighing up to an estimated 300 lb.

Barite: Bladed or tabular crystals of Barite can form a concentric pattern of increasingly larger crystals outward. This has the appearance of a flower and when colored red by iron stains, these formations are called "Desert Roses."

Dogtooth Barite is shaped like the canine tooth, like a dog's tooth.

The name Barite is from the Greek word "barys" which means "heavy" referring to the mineral's high specific gravity.

Several hundred years ago, a massive, variety of barite from Italy was found to phosphoresce (glow) when it was lightly heated. It was called "Bologna stone" from its locale of discovery.

In the USA, barite has been found at locations in Connecticut, New York, New Mexico, and is quarried in Arkansas, Connecticut, Virginia, North Carolina, Georgia, Tennessee, Kentucky, Nevada, and Missouri.

Fluorite: Fluorite, also called fluorspar, is a mineral made up of calcium and fluoride or calcium fluoride.

The word fluorite comes from the Latin *fluere* which means "to flow."

It can come in every single color on the color spectrum, most commonly yellow, green, blue, or purple. Pure fluorite is colorless. When fluorite is colored it is because of various impurities.

Fluorite dates back at least to the 1500s and has many industrial uses. Its crystals are cubic shaped. Fluorite glows when it is exposed to UV light. Microscope manufacturers use fluorite in the production of its lenses. Because of its soft texture, fluorite is used in carving. Fluorite provides the minerals used in fluoride toothpastes.

Calcite: Calcite is a very abundant mineral found in the Earth's crust. It is found in sedimentary rock. Calcite contains carbon, calcium, and oxygen which are collectively known as calcium carbonate. It is usually mined from deep underground or quarried from the surface of the Earth.

Calcite comes in many different shapes and colors which makes it a popular choice among collectors. Found in over 300 different shapes, calcite has more different shapes than any other mineral.

Calcite is commonly used to make cement. Limestone, which is used in chalk, is made of calcite. It is very common to find calcite in the shells of certain marine animals. A distinctive characteristic of calcite is that it bubbles when exposed to a weak acid. When large, underwater rocks containing calcite are exposed to acid, they dissolve and make caves.

Calcite can be found in various countries in the world including Mexico, the US, England, India, and Germany.

Calcite in the form of limestone is used to make dog food.

Sea organisms whose shells are made of calcite help balance the amount of carbon dioxide in the ocean by absorbing it to make their calcite shells.

Calcite is an example of a fluorescent mineral in that it can emit light when connected to a non-visible UV light. Calcite is also phosphorescent in that after being disconnected from a non-visible UV light, it still glows.

Galena: The name Galena comes from the Latin word "galena" which means lead ore, and it is a primary source of both lead and silver ore.

Galena's characteristic cubes, distinctive cleavage and high density make it easy to identify and a favorite in high school geology labs.

Galena, back 75 years ago, was the "crystal" of crystal radio sets. Galena is a natural semiconductor and was the forerunner of all the electronic gadgets we have today, from telephones to TVs to GPS navigating systems, as well as all sorts of medical equipment.

One of the oldest uses of galena was as kohl, which in Ancient Egypt, was applied around the eyes to reduce the glare of the desert sun & to repel flies.

Galena was used as a solder used by the Romans for plumbing (which then polluted the water with lead, and may have been a contributor to the fall of the Roman empire).

Galena deposits are found worldwide in England, Bulgaria, British Columbia, Australia and Israel. In the United States, it occurs most notably in Missouri, Illinois, Iowa and Wisconsin. The economic importance of galena resulted in a city named Galena in Illinois.

Most lead is consumed in making batteries, however, significant amounts are also used to make lead sheets, pipe and shot. It is also used to make low-melting-point alloys. Other uses include cable covering, plumbing, and ammunition. The metal is very effective as a sound absorber and a radiation shield around X-ray equipment and nuclear reactors.

Ohio Flint: Ohio flint was designated the official state gemstone of Ohio in 1965. Large quantities of this gem can be found in Ohio, especially in the eastern and central parts of the state.

Used to make jewelry and highly prized by collectors, Ohio flint comes in a variety of color combinations that include red, pink, green, blue, yellow, gray, white, and black. Flint is a type of quartz, a hard and durable mineral.

Native Americans used flint to make a wide variety of tools, weapons, and ceremonial pieces such as knives, arrowheads, and pipes. Early European settlers of Ohio also used flint for objects like millstones and rifle flints.

Flint Ridge (in Licking and Muskingum Counties) was a major source of flint for Ohio's Indians, who traded flint with other Native Americans across the continent. Archaeologists have discovered artifacts made from Flint Ridge flint as far west as the Rocky Mountains and south to the Gulf of Mexico.

4. Petrified Wood: Scott Gibson

-- Can you see the rings in some of the pieces of petrified wood?
-- Look for a "spotted" slice of wood. That is palm wood. Palm trees do not have "rings." They have capillaries that run up and down the trunk delivering water and minerals to the tree. That's what makes the dots.
-- There are two more pieces of palm wood in the case: can you find bark that looks like a palm tree?
-- Can you find the green wood? That is wood that was fossilized in a bog or swamp.
-- Some of the most colorful petrified wood comes from Arizona
-- Sometimes crystals form on the wood; can you find two examples?
-- Look for a piece that looks like wood grubs (worms) fossilized in the wood.

Petrified wood is a fossil. It forms when plant material is buried by sediment and is protected from decay by oxygen and organisms. Then, groundwater rich in dissolved solids flows through the sediment replacing the original plant material with silica, calcite, pyrite or another inorganic material such as opal. The result is a fossil of the original woody material that often exhibits preserved details of the bark, wood and cellular structures.

Some specimens of petrified wood are such accurate preservations that people do not realize they are fossils until they pick them up and are shocked by their weight. These specimens with near perfect preservation are unusual; however, specimens that exhibit clearly recognizable bark and woody structures are very common.

The most famous locality for observing petrified wood is Petrified Forest National Park in northeastern Arizona. About 225 million years ago this area was a lowland with a tropical climate and covered by a dense forest. Rivers flooded by tropical rain storms washed mud and other sediments into the lowlands. Enormous coniferous trees up to 9 feet in diameter and 200 feet tall lived and died in these lowlands. Fallen trees and broken branches were often buried by the river sediments. Nearby volcanoes erupted numerous times. These eruptions blanketed the area in volcanic ash with a high silica content.

Rapid burial allowed the plant debris to escape destruction by oxygen and insects. The soluble ash was dissolved by groundwater flowing through the sediments. The dissolved ash served as a source of silica that replaced the plant debris, creating petrified wood.

5. Assorted Minerals: Scott Gibson

Selenite Selenite is a crystallized form of Gypsum. The most common selenite crystals are white and translucent and with beautiful striations (stripes). It makes this stone look almost like a silky pearl. It's usually tubular in shape.

Because it is white and seems to glow, Selenite is named after the Greek goddess Selene, which is the goddess of the moon.

When cut across the fibers and polished on the ends, satin spar exhibits an optical illusion when placed on a printed or pictured surface: print and pictures appear to be

on the surface of the sample. It is often called and sold as the "television stone"

Selenite crystals are most often found in the USA, Mexico, Poland, Russia, Greece, Japan, Australia, Argentina and Brazil.

Gypsum crystals are colorless (most often selenite), white (or pearly – most often satin spar), gray, brown, beige, orange, pink, yellow, light red, and green. Colors are caused by the presence of other mineral inclusions such as, copper ores, sulfur and sulfides, silver, iron ores, coal, calcite, dolomite, and opal.

Azurite Malachite is a blend of two distinct and popular gems: blue azurite and green malachite. The name azurite comes from lazhward, a Persian word for "blue," while "malachite" originally comes from the Greek word molochitis, meaning "mallow plant."

The oldest mine known is in Israel, in operation for over 3,000 years.

These two copper-based gemstones are frequently found in copper mines, or near mines of other copper-based gemstones such as turquoise and chrysocolla.

In ancient Egypt, Azurite--as a component of lapis lazuli--was used to create the protective blue eye of Horus. It was also ground for used for pigment.

Many medieval paintings of the Virgin Mary in a blue robe were long thought to be painted using lapis lazuli; chemical analysis has since indicated that azurite was used instead, from the well-known mines in France.

Malachite was ground into eyeshadow powder (unfortunately toxic), and the Egyptians referred to their love goddess Hathor as "the lady of malachite." They thought wearing malachite around their heads and arms protected them from epidemics.

Malachite Stalagmite cross-section malachite is a copper based mineral. It can be deposited in seams but can also grow as stalactites hanging from the ceilings of caves or as stalagmites, growing up from the bottoms of caves as water drips carrying copper minerals. This is a cross section of one of those stalactites. The circular bands are the layers deposited as the stalagmite grew.

Rhodochrosite Stalagmite cross-section This is another example of a stalactite or stalagmite formation. See the growth rings? In its (rare) pure form, it is typically a rose-red color, but impure specimens can be shades of pink to pale brown. It streaks white, and its Mohs hardness varies between 3.5 and 4.

It is found near silver mines, mostly in Argentina, but also in Colorado.

The minerals in rhodochrosite are extremely destructive to the process used to concentrate silver ores, and so until quality mineral specimens became highly sought after by collectors, they were often discarded on the mine dump.

Apophyllite and stilbite The name apophyllite is derived from the Greek apophyl-liso, meaning "it flakes off", a reference to this minerals's tendency to flake apart when heated. This mineral specimen is from India. The Apophyllite is white and the Stilbite is green. Stilbite is usually colorless or white, also yellow, brown, pink, salmon, orange, red, green, blue or black. The two minerals are often found close to each other.

Fluorite This is another example of fluorite which you looked at in Case #3. Do you remember some of the things fluorite is used for? (telescope lenses, flux for soldering, fluoride for toothpaste)

6. Self-Collected Calcites: Dave Straw

These are "self-collected" crystals. This means that Dave Straw went out and found the crystals himself (he did not buy them). They are from a variety of locations in Indiana, Ohio, and Michigan. Some are from a road cut on Rt 101 between Liberty and Brookville. They are mostly calcite with a coating of red hematite. There are some with barite (look for blade-shaped crystals) and also iron-rich dolomite (may be ankerite ?) The crystals formed within openings in masses of fossilized coral. The darker the crystal, the more iron is in it.

7. Minerals in the Home

There are lots of minerals around your home. Minerals are used in many everyday objects. See the display case for a variety of minerals that can be found in everyday objects. Can you think of any others? Below are a few more examples of minerals that can be found in your home.

Light bulbs: Light bulbs contain Tungsten, which has the highest melting point of all metals. Light bulbs can get very hot, so tungsten is a good metal to use to make the filaments in light bulbs.
Pens : The writing tips of pens are made with a strong metal called tungsten.
Paper: Paper is usually made of wood pulp mixed with minerals like clays, mica, talc and barite.
Pencils: Lead pencils do not contain lead. The 'lead' is made of a mixture of clay and a mineral called graphite - a form of carbon.
Paint: Rutile and ilmenite are the main sources of titanium metal, which is used to make a white pigment in paints. House paint used to contain lead, but now we know it is poisonous, so titanium is used instead.

Film: Before digital cameras, to take a photo you needed to have film. Photographic films are coated with different mineral salts. Silver, argentite and other silver-bearing minerals are often used in photography. These minerals reacted with light to help create images on the film.
Flower Pots: Clay minerals are used to make ceramic flower pots. When clay is dried and fired in a kiln, it produces hard-wearing pots. Vermiculite is a mineral which expands when it is heated. It is used as an ingredient in potting mixes to improve drainage.
Salt: used in various chemicals, water softening, highway & road de-icing, agriculture & foods
Clays: used to make floor and wall tiles, dinnerware, kitty litter, bricks, cement, ceramics, face masks, paper
Zinc: used to make metals rust-resistant, various metals and alloys, paint, rubber, skin creams, sunscreen, healthcare and nutrition
Sand, Stone, Gravel: used to make concrete, asphalt, roads, building blocks and bricks
Petroleum: products include transportation fuels, fuel oils for heating and electricity generation, asphalt and road oil; also used to make chemicals, plastics, and synthetic materials found in nearly everything we use today.
Lead: 87% used for batteries, also used in electrical, communications and TV screens.
Natural Gas: used as a source of energy for heating, cooking, and electricity generation. It is also used as fuel for vehicles and as a chemical feedstock in the manufacture of plastics and other commercially important organic chemicals.
Cement: used to make roads, sidewalks, bridges, buildings, schools and houses.
Iron Ore: used to make steel -- buildings, cars, trucks, planes, trains, containers, etc.
Bauxite (aluminum): used to make buildings, beverage cans, autos, airplanes, foil, etc.
Coal: a fossil fuel, used to provide energy and electricity.
Phosphate Rock: used to make fertilizers to grow food, and as animal feed supplements.
Gold: used for currency, jewelry, electronics and computers (it is a highly efficient conductor of electricity and is used in cell phones, GPS units, computers, TVs and more), dentistry for fillings, and in the medical field for some radiation treatments and diagnosis. It is also used in aerospace to lubricate mechanical parts, conduct

electricity and to protect astronauts from infrared radiation and heat.
Copper: used in buildings, electrical and electronic parts, wiring, plumbing, transportation, jewelry.

8. Coprolite (Dinosaur "doo"): Mike Manning

House-sized dinosaurs had to eat hundreds of pounds of plants or meat every day to maintain their weight--so as you can imagine, there was a lot of dinosaur poop littering the ground during the Mesozoic Era. Dinosaur feces was an abundant source of nutrition for smaller animals (including birds, lizards and mammals), and an assortment of bacteria.

Dinosaur droppings were also crucial for ancient plant life. Just as modern-day farmers scatter manure around their crops (which replenishes the nitrogen compounds that make soil fertile), the millions of tons of dinosaur dung produced every single day during the Triassic, Jurassic and Cretaceous periods helped keep the world's forests lush and green.

This, in turn, produced a near-endless source of vegetation for other dinosaurs to feast on, and then turn into poop, and so on and on in an endless symbiotic cycle.

Dinosaur droppings are important for modern-day paleontologists. Occasionally, researchers stumble across huge, well-preserved piles of fossilized dinosaur dung—or "coprolites," as they're called. By examining these fossils in detail, researchers can figure out if they were created by plant-eating, meat-eating, or omnivorous dinosaurs—and they can sometimes even identify the type of animal or plant that the dinosaur ate a few hours (or a few days) before going Number 2.

While scientists can figure out what the dinosaur had eaten, they can't look at the droppings and figure out what type of dinosaur left it. They can only guess based on what types of dinosaur bones were found in the area.

Every now and then, a coprolite can even help to settle evolutionary disputes. For example, a batch of fossilized dung excavated recently in India proves that the dinosaur responsible fed on types of grass that weren't thought to have evolved until millions of years later.

One of the most famous coprolites was discovered in Saskatchewan, Canada, in 1998. This gigantic poop fossil (which looks pretty much the way you'd expect) measures 17 inches long and six inches thick, and was probably part of an even larger chunk of dinosaur dung. Because this coprolite is so big--and contains fragments of bone and blood vessels--paleontologists believe it may have derived from a Tyrannosaurus Rex that roamed North America about 60 million years ago.

No discussion about fossilized poop would be complete without a mention of England's once-prosperous coprolite industry: during the mid-18th century, a curious parson at Cambridge University discovered that certain coprolites, when treated with sulfuric acid, yielded valuable phosphates in demand by the chemical industry. For decades, the east of England was a hotbed of coprolite mining and refining, to the extent that even today, in the town of Ipswich, you can take stroll down "Coprolite Street."
http://dinosaurs.about.com/od/dailylifeofadinosaur/a/dinosaurpoop.htm

9. Quartz Crystal: Judy Burton

Quartz is a mineral composed of silicon and oxygen atoms. There are many different varieties of quartz, several of which are semi-precious gemstones. Since antiquity, varieties of quartz have been the most commonly used minerals in the making of jewelry and hardstone carvings, especially in Eurasia.

Quartz gemstones include Amethyst, Blue quartz, Dumortierite quartz, Citrine, Milky quartz, Rose quartz, Smoky quartz and Prasiolite. Other varieties include Herkimer diamonds, Ametrine, Chalcedony, Carnelian, Aventurine, Agate, Onyx, Jsaper, Tiger Eye, and Rutilated Quartz.

The word is derived from the Ancient Greek "kruos," meaning "icy cold", because some philosophers believed the mineral to be a form of super-cooled ice.

Quartz is very hard and it cannot be scratched by steel (see Mohs scale). The ideal crystal shape is a six-sided prism terminating with six-sided pyramids at each end. Well-formed crystals typically form in a 'bed' that has unconstrained growth into a void. However, doubly terminated crystals do occur where they develop freely without attachment, for instance within gypsum. A quartz geode is such a situation where the void is approximately spherical in shape, lined with a bed of crystals pointing inward.

Pure quartz, traditionally called rock crystal or clear quartz, is colorless and transparent or translucent, and has often been used for hardstone carvings, such as the Lothair Crystal. Common colored varieties include citrine, rose quartz, amethyst, smoky quartz, milky quartz, and others.[13]

Quartz is very common in sedimentary rocks such as sandstone and shale.

9. Geology Trip: Earlham College

Each year the Eastern Indiana Gem and Geological Society donates money to help Earlham geology students go on a field trip. This showcase gives the details of their trip.

Where did the geology students go on their trip?
Why did they go there?
What did they find?
What did they learn by going?
What do you think was the best part of their field trip?