The LITHNICS

Volume 63 Issue 4
October 2025

THE LITHNICS

A QUARTERLY PUBLICATION OF
THE MID-OHIO MINERAL AND FOSSIL CLUB
MANSFIELD, OHIO

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OUR CLUB

PURPOSE: The purpose of the Mid-Ohio Mineral and Fossil Club, is to create an interest in and study of the earth sciences and all lapidary arts and to afford an opportunity to share knowledge and working techniques with others.

MEETINGS:

General club meetings are at 7:00 pm on the first Monday of the month at:

Gorman Nature Center, 2295 Lexington Avenue, Mansfield, Ohio.

If the first Monday falls on a holiday we meet one week later.

Visitors are always welcome.

Special Interest Group (Classes) meetings are held September through May at 7:00 pm on the second Monday of the month. See Special Interest Chair, Mike McCullough.

CANCELATION OF A MEETING

If for any reason the club officers feel that a meeting should be canceled you will be notified by email as soon as possible. If Mansfield schools are closed so are we. If for any reason you don't feel safe to drive to a meeting, please, please stay home.

Annual dues are:

Adults	**$ 15.00**
Children under 16	**$ 5.00**
Family	**$ 20.00**

Dues are due Jan. 1st of every year. Whether you join in January, December, or any month in between, the cost is the same.
Everyone's dues are due again the next January 1st .

LITHNICS: Our quarterly newsletter.

Permission is hereby granted to use any original **LITHNICS** articles, whole or in part, as long as proper recognition is noted with the reprint.

Club members are encouraged to make contributions to the LITHNICS.

Contact: Bryan Summer (bryansummer1@gmail.com)

The Mid-Ohio Mineral and Fossil Club

Presidents Message

Hello fellow Mineral, Stone, and Fossil collectors! It's been a very awesome summer. Sometimes all the activities we collectors seem to get in to like gardening, bird watching, squirrel chasing and grass mowing makes it hard to find time for rock projects. I have been hearing stories about some of the traveling and collecting and it's been a busy summer again!!

I didn't get a chance to go on the trip to Michigan this year. Everyone that went really had a great time and lots of good finds. Tom is really good at setting up the trips. Kim and Jillian did a great job on the club program in September. You could feel the excitement! A trip of a lifetime and a program that I'll never forget!! I believe there were 8 people that went on the Michigan trip and I'm sure they'll be going back!! I love Michigan collecting.

There are a lot of shows going on in the area. Make sure you get out and support the shows and the collectors! When you get to looking around, there's a lot of interest growing in this collecting hobby. Seems like a lot of younger people are getting into collecting by walking the rivers, digging in the mountains and it's good to see the hobby is very strong. Just remember, it only takes quarter inch of dirt to hide some beautiful specimens waiting to be found! Pieces that you find will always be your favorite because you remember those who were with you and the story that goes along with it!!

I hope everybody has a great fall. Make sure you stay safe when you are collecting. Take lots of water and watch out for snakes! (I ran into a big copperhead this year when collecting in Kentucky. Good thing he wasn't interested in me!! Because I was right on top of him!!!) Enjoy the cooler weather and keep those rock saws running!!!!

Lawrence Hull

Mid-Ohio Mineral and Fossil Club President

Upcoming Meetings – all meetings are at the Gorman Nature Center at 7:00 pm

Continue to watch for information about future meetings in your email.

- Monday, October 6 — 7:00 Meeting Gorman Nature Center
- Monday, November 3 — 7:00 Meeting Gorman Nature Center
- Tuesday, December 2 — Annual Christmas Dinner Golden Corral 5:30 - 8:00
- Monday, January 5 — 7:00 Meeting Gorman Nature Center

Area Events

No Area Events at this time

Mid-Ohio Mineral & Fossil Club

GEM, MINERAL, JEWELRY, BEAD, & FOSSIL SHOW 2026

Mineral Oddities and Pseudomorphs
JUNE 6 + 7, 2026
Saturday 10 - 6
Sunday 11 - 5

Richland Co. Fairgrounds
Fairhaven Hall
750 North Home Road
Mansfield, OHIO

Mineral Oddities or Pseudomorph Minerals

Geology In (geologyin.com)

Pseudomorph is a mineral formed by chemical or structural change of another substance, though retaining its original external shape. Although pseudomorphs give the appearance of being crystalline, they are commonly granular and waxy internally and have no regular cleavage; those that are crystalline have optical properties different from those required by their outward form.

They retain the external shape and form of a pre-existing mineral, called the protolith, but their internal composition has been transformed into a different mineral, called the neomorph. Imagine a mineral wearing a mask, its true chemical identity hidden beneath the familiar form.

A common example of this is petrified wood, in which all the cellulose fibers have been replaced by silica, even those in the bark. Pseudomorphs can be formed by deposition of one mineral on the surface of crystals of another (see also epitaxy).

Copper Smelting and Early Metallurgy

August 19, 2025

Story by Steve Voynick

Copper smelting stands as one of the greatest achievements in early human history. While native gold or copper may have been the first metals collected, it was copper that truly led mankind out of the Stone Age.

The First Use of Native Copper

Unlike gold, native copper was harder and could be shaped into tools and weapons by hammering or casting. Yet native copper was too rare to sustain widespread use. The breakthrough came when early metallurgists discovered that abundant copper ores such as malachite could be transformed into metallic copper through the process of smelting—a discovery that changed the course of civilization.

Ores and the Need for Copper Smelting

Although copper is a relatively abundant metal, most is locked up in such minerals as chalcopyrite, cuprite and chalcocite, which are now the primary ores of copper. The term "ore" refers to any mineral containing a valuable constituent for which it is mined and worked. The valuable constituent in copper ores, of course, is copper, which is recovered in metallic form by the process of reduction smelting.

How the Copper Smelting Process Works

Smelting is not simply a matter of "melting" a metal out of its ore, but a complex, two-stage, thermo-chemical reaction. In the first stage, copper compounds are converted by thermal decomposition into copper oxide. In the second stage, a high-temperature, reduction reaction in the presence of a reducing agent such as carbon chemically reduces the copper oxide to metallic copper.

One of mankind's greatest early achievements was learning that copper could be obtained from certain minerals that exhibited no obvious metallic properties, and devising a basic smelting process to accomplish just that.

Malachite: The First Copper Ore for Smelting

The first mineral mined specifically for smelting was malachite, or basic copper carbonate, an oxidized mineral with a distinctive, bright-green color that frequently occurs in association with native copper. It is unclear, however, exactly how early metallurgists learned that copper could be extracted from malachite.

Ancient Theories About Early Copper Smelting

Initially, anthropologists theorized that malachite-bearing rocks in fireplaces were converted to copper by the heat of fires, but undrafted fires are not hot enough to smelt copper ores. Another possibility focused on malachite's early use as a green pigment, and suggested that heating powdered malachite might have produced metallic copper. But no known, ancient pigment-making process would have generated the required level of heat.

The Role of Charcoal Furnaces

A prerequisite to smelting copper ores, therefore, was the development of drafted charcoal furnaces that produced temperatures in excess of 1300°F. These had appeared by 6000 BCE and were first used to fire ceramics. Because powdered malachite was a common pigment in early pottery glazes, it is possible that firing malachite-glazed ceramics could have produced metallic copper.

Anthropologists now believe that the more likely scenario was that impure masses of native copper were melted in drafted charcoal furnaces preparatory to casting. This native copper, likely associated with substantial quantities of malachite, would have been heated in direct contact with burning charcoal fuel. Ancient metallurgists may have observed that the resulting molten copper exceeded the original amount of native copper. They could then have logically deduced that the additional metal could only have come from the malachite—and that malachite itself could be mined and converted to copper.

From Malachite to the Copper Age

The mining and smelting of malachite, along with associated azurite and other brightly colored, oxidized copper minerals, made metallic copper relatively plentiful and led to the emergence of the Copper Age.

By 5000 B.C., various techniques for smelting malachite ores had been developed independently in southeastern Europe, the Middle East, and the Far East. Few technological advances have had greater significance. Realizing that metallic copper could be derived from relatively abundant and easily identifiable, green-blue "rocks" represented a quantum leap in mankind's understanding of the natural world.

The basic principles of copper smelting were later applied to other ores, including those of iron. Smelting iron from such abundant ore minerals as hematite and magnetite ushered in the Iron Age, another major step in the technological progression that began some 7,000 years ago when early metallurgists began heating malachite together with charcoal in drafted furnaces.

Flint and Pyrite: Fire-Making Minerals

By **Toni Rahn**
August 14, 2025

Pyrite Mineral jonnysek/Adobe Stock

Flint and pyrite are more than just striking-looking minerals—they were once the literal spark behind humanity's ability to create fire. For thousands of years, their unique hardness and chemistry made them indispensable tools in survival, weaponry, and exploration. From the Stone Age to the early modern era, these minerals shaped human history, with evidence of their use found in cultures worldwide.

Ötzi the Iceman's Flint and Pyrite

One of the oldest and best-preserved human mummies ever found is that of Ötzi, a man who lived some 5,300 years ago near the present border of Austria and Italy. His remains, preserved in an alpine glacier high in the Ötztal Alps, were found in 1991. That Ötzi lived during the transition between the late Stone Age and the dawning Copper Age is evident from his possessions: a flint knife and a copper axe. Also among his possessions were pieces of flint and pyrite, the key materials of early percussion fire-making.

The Mineral Properties Behind Flint and Pyrite Sparks

Flint, hard and durable, was easily shaped into striking edges that could fragment pyrite or steel to create sparks. (Image courtesy iRocks.com)

Anthropologists believe humans first created artificial fire between 250,000 and 700,000 years ago using simple drills in which wood-on-wood friction generated ignition heat. Much later, they learned to make fire by striking certain mineral materials with hard objects.

The first mineral-sparking material was pyrite, or iron disulfide. The striking material was flint, a form of microcrystalline quartz. Harder than pyrite, flint could be easily shaped into a striking edge. When flint strikes pyrite, part of the pyrite surface shatters and emits a shower of sparks, which can ignite dry tinder.

It is uncertain when percussion fire making with pyrite began, but it was common in many cultures worldwide long before the time of Ötzi. It was quickly replaced during the early Iron Age when flint and steel became the preferred materials. Fire-making "kits" of flint and variously shaped steel strikers were still used by a few isolated cultures in the late 1800s.

Pyrite survived as a sparking material only into the 16th century, notably in wheel lock firearms, in which a mechanical arm securing a piece of pyrite was placed against a serrated steel wheel. When the trigger was depressed, the spring-driven wheel rotated rapidly, abrading the pyrite and delivering a shower of sparks to ignite the powder charge.

From Pyrite to Steel: The Evolution of Fire-Making Minerals

A big advance in weaponry came in 1570 with the invention of the flintlock firing mechanism, which employed shaped flints mounted on metal arms. Depressing the trigger moved the arm forward, striking the flint against an iron plate to produce sparks, which ignited the powder. During the 1700s, the manufacture of precisely shaped "gunflints" was an important industry in England and France. Both countries exported millions of gunflints each year around the world.

The introduction of modern percussion firing caps made gunflints obsolete in the 1830s. At the same time, the appearance of the friction-chemical match negated the need for other types of flint-steel percussion fire-making devices. By then, chemists had finally answered the centuries-old question of why pyrite and steel emitted sparks when struck with harder objects. The explanation was instantaneous chemical oxidation.

The Chemistry of Flint and Pyrite Ignition

Ötzi had no knowledge of chemical oxidation, but he was quite adept at making fire with dry tinder, flint and pyrite. (Image courtesy WIKIMEDIA COMMONS)

Pyrite is unstable and undergoes slow oxidation, combining with water and atmospheric oxygen to break down into ions of iron and sulfur, which ultimately recombine into sulfuric acid and various iron hydroxides. This slow, natural process emits much heat—enough to warm the walls of pyrite-rich, underground mines.

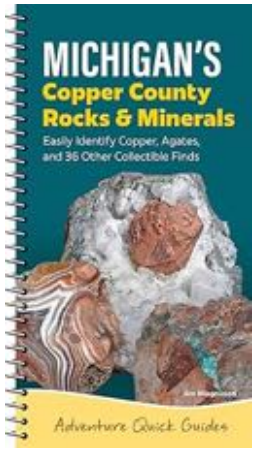
In percussion fire making, hard, sharp flint shatters the pyrite surface into microscopic particles, breaking its covalent bonds and releasing heat. Now exposed to atmospheric oxygen, these already hot pyrite particles instantaneously oxidize and release even more heat. Because this heat is released too quickly to dissipate, it forms a shower of visible sparks.

A similar process occurs in flint-steel percussion. Because pure iron will not spark, fire-making requires harder, less brittle carbon steels. When struck with flint, the steel's metallic bonds part, fragmenting the steel and releasing heat. These tiny particles of hot steel then contact atmospheric oxygen and undergo complete, instantaneous oxidation, releasing additional heat in the form of visible sparks.

Flint & Pyrite: Final Thoughts

Flint and pyrite demonstrate how specific mineral properties were harnessed for early fire-making. The hardness of flint allows it to fracture pyrite effectively, producing microscopic particles that rapidly oxidize and release heat. Ötzi, as he made his way across the Ötztal Alps some 5,300 years ago, had no knowledge of chemical oxidation, but he was nevertheless quite adept at making fire with dry tinder, flint and pyrite. This process illustrates the interplay between mineral structure, chemical reactivity, and practical application in human technology. Studying these minerals provides insight into both ancient survival techniques and the fundamental chemistry behind spark generation..

Geology Books



Michigan's Copper Country Rocks & Minerals:

Unearth Upper Michigan's geological treasures—from Lake Superior agates to rare copper formations—with this quick guide to finding, identifying, and collecting.

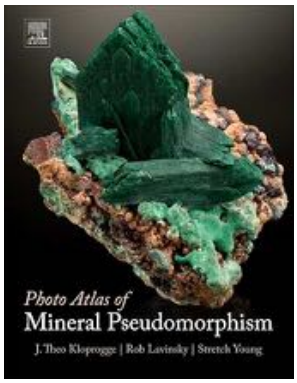
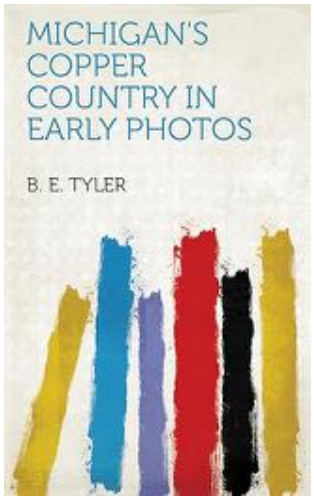


Photo Atlas of Mineral Pseudomorphism

by J. Theo Kloprogge, Rob Lavinsky,
Aug 18, 2017

Photo Atlas of Mineral Pseudomorphism provides a comprehensive overview on the topic of pseudomorphism—in which one mineral is replaced by another but still maintains its original crystal form—a phenomenon that is far more common than currently thought and is extremely important in understanding the geologic history of rocks.



Michigan's Copper Country in Early Photos Paperback

March 29, 2025
by B E Tyler (Author)

Michigan's Copper Country in Early Photos" offers a captivating glimpse into the industrial heartland of Michigan's Upper Peninsula. Through carefully curated historical photographs, B. E. Tyler documents the copper mining industry that shaped the region.

YouTube

Michigan Copper Mining: The Black Powder Era

445K views • 9 years ago

RochesterHillsTV

America's Industrial Revolution was founded on copper mined from Michigan's Upper P...

20 chapters Intro | Copper Mining | Trap Rock | Early Michigan...

$49.00

Prehistoric Survival: Making fire with Flint and Pyrite!

8.3K views • 4 years ago

Memma the Cavewoman

What will you do if you don't have your Ferro-rod? learn how to make fire the prehistoric survival way with flint and iron pyrite.

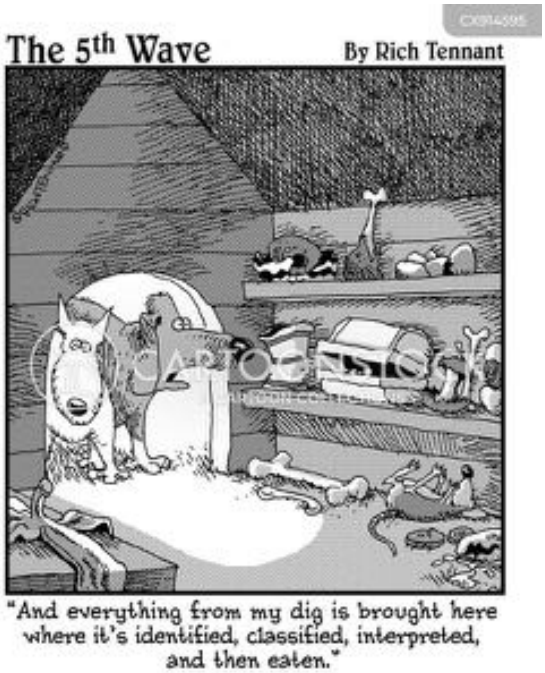
Pseudomorphs, Paramorphs & Epimorphs

825 views • 3 years ago

Rock On! with Rick & Maritta

Rick explains the different changes some minerals can undergo during their formation, ...

3 moments Pseudomorph | Limbcast | Paramorph




"You know, I used to like this hobby. ... But shoot! Seems like everybody's got a rock collection."

Ode to the Rock Enthusiasts - a Poem
(For the ones who carry mountains in their hearts)

They roam where granite whispers low, Where fault lines tell the tales below - With hammers, packs, and maps in hand, They seek the bones that built the land.

Their eyes see more than hills and clay, They see the Earth in disarray - The folds of time, the pressure's scar,

The stardust locked in feldspar.

They kneel where others merely pass, And cradle shards of ancient mass. To them, a pebble in the dirt
Is history's voice in quartz and dirt.

They speak in tongues of slate and shale, Of dolomite and flint's grey veil. They praise the layers deep and wide That held the oceans, turned the tide.

At night they dream of basalt flows, Of magma's heat and glacier's throes - The slow ballet of crust and core,
A patience mortals can't ignore.

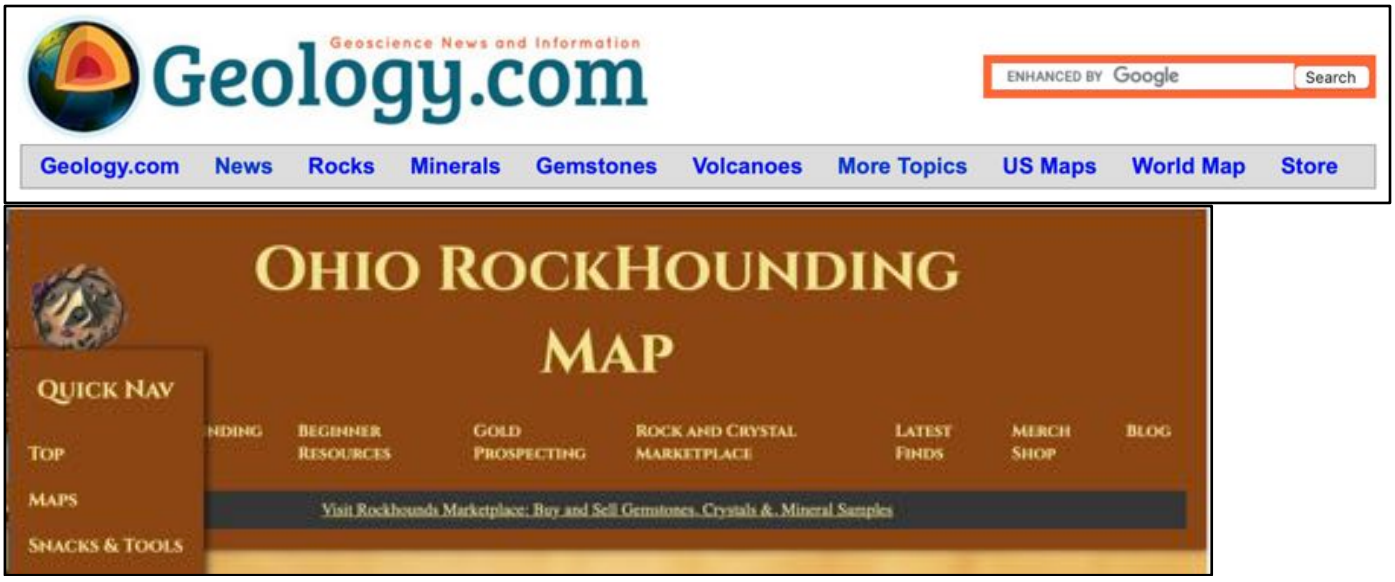
To some, a stone is just a stone, But rock enthusiasts have known - Each mineral, each grain of sand, Was shaped by time's relentless hand.

So raise a toast with dusty boots,
To those who chase Earth's ancient roots - For in their hearts, the planet spins, And every rock a tale begins.

Thanks, Chat GPT

Interesting Web Sites

1. Mineralogy4kids
    a. https://min4kids.org
2. Minerals by Name
    a. http://www.galleries.com/Minerals_By_Name
3. Ology - the science website for kids from the American Museum of Natural History
    a. https://www.amnh.org/explore/ology?channel=earth
4. Fascinating Geology for Kids
    a. https://littlebinsforlittlehands.com/geology-for-kids/
5. Geology for Elementary Schools
    a. https://study.com/academy/topic/geology-for-elementary-school.html
6. Elementary School Science
    a. https://www.elementaryschoolscience.com/lesson-plan-intro-rocks-minerals



2025 Rockhound Holidays (Rock + Gem Magazine)

People often say there's a holiday for everything, and they're right. The good news is there are some fun holidays for Rockhounds to enjoy and celebrate.

Old Rock Day – January 7
National Jewel Day – March 13
Geologists Day – April 6
Earth Day – April 22
Nickel Day – May 16
Dinosaur Days – June 1
National Caves & Karst Day – June 6
World Oceans Day – June 8
International Drop a Rock Day – July 3
International Rock Day – July 13
National Pet Rock Day – September 7
Collect Rocks Day – September 16
National Fossil Day – October 15

Upcoming Events and Rock Shows – (Ohio and close to Ohio)

Check the Midwest Federation of Mineralogical + Geological Societies for Calendar Updates

October

17-19—MASON, MICHIGAN: Annual show; Central Michigan Lapidary and Mineral Society; Ingham County Fair Grounds, 700 E Ash Street; Fri. 1-7, Sat. 10-6, Sun. 10-4; Adults - $5, Teens - $3, Kids under 12 Free with paying Adult (cash only) Scouts in Uniform Free; Largest lapidary, fossil, mineral and jewelry show at the Ingham County Fairgrounds. Wall-to-wall dealers, Children's Rock Table and Free Craft Table, Raffle, Silent Auction, Hourly Door Prizes. Free Parking. ATM on site. www.facebook.com/MasonRockShow/; contact Robin Smith, (517) 290-4891; Email: rsmith@radssmith.com; Website: www.Michrocks.org

25-26—CUYAHOGA FALLS, OHIO: Show and sale; Summit Lapidary Club and Akron Mineral Society; Emidio & Sons Expo Center, 48 E Bath Rd; Sat. 10-6, Sun. 10-5; Adults $6, Seniors (55+) and students $5, Children 7-14 $1, Children 6 and under and scouts in uniform, free; Wheelchair accessible, credit cards acceptable for admission. 38 quality vendors, gem mine and crafts for children, door prizes, geode cracking, displays and demonstrations of lapidary arts, food truck; contact Evelyn Tryon, (330) 673-9664; Email: Gemboree76@gmail.com; Website: SummitLapidaryClub.com/gemboree

November

22-23—TOLEDO, OHIO: Show and sale; Northwest Ohio Rockhounds; St James Lutheran Church, 4727 Sylvania Ave; Sat. 9-5, Sun. 10-5; Free admission; Free Kid's Activities Rock Identification, Geode Cracking, Mineral Specimens, and Fossils. Slab, Rough, and Polished Materials Handmade Jewelry and Crafts Decorative Art and more; contact Suzanne Shimatzki, (419) 376-2650; Email: sshimatzki@gmail.com; Website: https://www.facebook.com/NWORockhounds/

December

No Area Show

Our Club's Craft Program

We will send out information about craft classes as we get them planned and scheduled.

MIDWEST FEDERATION OF MINERALOGICAL & GEOLOGICAL SOCIETIES

New Website: https://www.mwfed.org

New Juniors Website: https://www.mwfed.org/juniors

FUTURE ROCKHOUNDS OF AMERICA

(American Federation of Mineralogical Societies)

Lora Hall, AFMS Youth Director
youth@amfed.org

Future Rockhounds of America (FRA) is a whole lot more than just the badge program! The new FRA website is packed FULL of lots of resources for activities with kids and teens in YOUR club - Any Midwest Federation Club. Features like **Rock Pals, the Junior Volunteer Award, Contests and rock-related activities for Kindergarten-12th grade kids** can make your club attractive to families and increase your membership. Check out the links below for ideas, and visit www.juniors.amfed.org/rock-mineral-activities for more!

The Midwest Federation of Mineralogical + Geological Societies

You can check out all the Shows and Events in our Midwest Region (Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska) at the Midwest Federation of Mineralogical + Geological Societies https://www.mwfed.org

USGS science for a changing world

The U.S. Geological Survey Youth and Education in Science (YES) Team.

Revamped their web presence to better assist with online and home learning.

The new USGS learning from home portal for lesson plans and activities, grades K – 12.
www.usgs.gov

Students of all ages can always tap into the USGS Resources for Teachers for over 140 years of USGS research in the natural sciences in the form of lesson plans and activities, maps, podcasts, online lectures, videos and animations, and much more. Browse thousands of ideas for using these resources in elementary, secondary, university, and informal education settings

Don't Forget to Check Out our Website for Club Information:

http://www.midohiomineralandfossilclub.com

The Lithnics

If you have any club news, articles you would like share with members, updates on your committee, etc. please email info to:

Bryan Summer – bryansummer1@gmail.com
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