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Raven Hill Discovery Center, incorporated in 1991, is a 501(c)(3) tax-exempt corporation.

Mission: Raven Hill provides a place that enhances hands-on and lifelong learning for all ages by connecting science, history & the arts.

To: Friends and Family everywhere
From: Cheri and Raven Hill
Date: December 11, 2021
Re: Weekly update

Greetings, Everyone!

Copper was one of the first metals known to man. It is found many places in the western hemisphere (new world), including Chile, Peru and Mexico and played a major role in the economics of those regions. Copper is also found in the Upper Peninsula of Michigan. Because of its many uses as tools, weapons, coins and jewelry, it was traded for other goods in early civilizations. At Raven Hill, copper connects to science, history and the arts for visitors.



Oxidized piece of copper from the Keweenaw Peninsula of Michigan-- From the Lawrence Robinson Collection at Raven Hill.

When copper is found in the ground, it is mixed in with rock and is called copper ore. To extract the copper metal and purify it for use, the copper ore is crushed into small pieces and mixed with powdered charcoal (black chunks of wood from campfire). The mixture is heated hot enough for the copper to melt (1984°F) and form a puddle at the bottom of the fire pit. The copper is then pounded or planished and shaped into jewelry, tools or weapons.



Copper bowl decorated
By Ed Gray, retired CEO
Calumet Art Center



Planished copper sink on wood tripod
By Tim Leach, Raven Hill co-founder

Copper is ductile. The atoms in the copper move easily, when the metal is annealed or softened by heating. As the metal is pounded, the atoms move. The copper piece eventually “work-hardens” and the atoms can no longer move easily. The metal can be re-annealed by heating, which allows the atoms to move freely again and the piece can be worked or shaped further.

“The Sacred Elements are Earth, Air, Fire and Water. Using fire and water, the ancient Anishinabek (First Nations) worked copper ore from the rock. With stone tools they extracted the metal copper to make tools.”—The Art of Ed Gray (Jikiwe). Early Americans shaped the copper they smelted with hammer stones, on tree stumps, with a campfire for annealing and water for quenching or cooling.

Boyne City girl scouts visited Raven Hill this week to create copper pendants as part of a Jewelry badge they are working to complete. Each scout chose a hammer stone that felt comfortable in their hand and a piece of maple chopping block to work on. The copper pendants were annealed for them with a propane torch. Each pendant was heated to a bright light orange and then quenched in water to cool. First the girls planished or pounded their softened copper disc to the desired shape. Then they sanded any rough spots on pendant edges. Next the scouts polished their piece to a high shine with wax. Lastly the girls added copper wire, beads and a cord to finish their necklace, which they proudly wore home.



Above is a photo of the element copper in the Periodic Table of Elements display at Raven Hill.

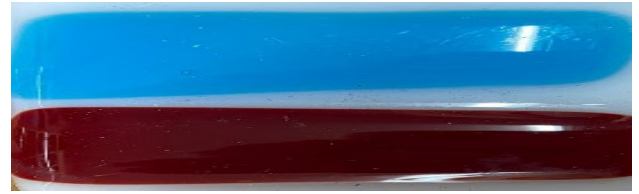
All the copper that appears here on Earth is almost 14 billion years old.

The same copper atoms keep “recycling” into pennies and wire and other materials, as do all the other elements. In fact, the water that we drink is made of hydrogen and oxygen atoms that could have been water in a glacier, cloud or dinosaur long ago.



This copper pendant has a piece of natural float copper mounted in the center. Float copper is copper that was moved from its original location by the glaciers.

The symbol for copper is “Cu”, which is the abbreviation for Cupris, the Latin word for copper. In air or with plenty of oxygen, the copper ore is oxidized. The copper combines with the oxygen in the air and shows up as a bluegreen color on the outside, just like the Statue of Liberty. The bluegreen is copper oxide or copper “rust”. If the copper is heated with no oxygen or no air, the copper is a dark red color.



Copper atoms will color glass aqua in the presence of oxygen and a dark red in the absence of oxygen.



A propane torch replaces a camp fire in a more “modern” version of annealing or heating copper to make it more malleable and easier to shape.



These girl scouts spent an evening at Raven Hill learning about the history of jewelry, plus common materials and tools used. In the process, they created their own copper pendant jewelry.

Raven Hill Discovery Center is open during the winter for regular weekend hours, which are noon to 4pm on Saturdays and 2pm to 4pm on Sundays. To make an appointment for other times, email info@miravenhill.org or call 231.536.3369. Bring your friends and relatives out to enjoy a fun afternoon of discovery and exploration. If you have been stuck inside and have a case of “cabin fever”, Raven Hill is the perfect place for the family to get out, take a class, learn something new and relieve the boredom of being cooped up at home!

Remember also that the Smithsonian **Labor Days: History of Work** exhibit remains on display during regular hours and other times by appointment.



Raven Hill Discovery Center is supported in part by the Michigan Council for Arts and Cultural Affairs and the National Endowment for the Arts through a 2022 Operational Grant Award.

Just a reminder: we continue to ask everyone to mask up while inside Raven Hill, for the sake of the vaccinated and unvaccinated.

We look forward to seeing you soon.

Cheri