COPPER—THE ANCIENT METAL

Man's first use of the Earth's natural resources was in the form of grasses, trees, animals and stone. Tools and weapons were made from wood, bone and stone. Flint was one of the stones first because it is a hard, dense mineral. It is one of the purists native forms of silica. A steel knife, today, is no sharper than an obsidian knife or spear point. Obsidian is a hard, glassy rock that is formed by volcanic eruptions.

Ancient people were our first "geologists" and "miners." They not only determined which rocks were best to use, but they learned how to make them into tools, hunting spears, arrows, fishhooks and ornaments. Shaping the stone was done by flaking it with sharp blows on the edges using another stone or deer antlers.

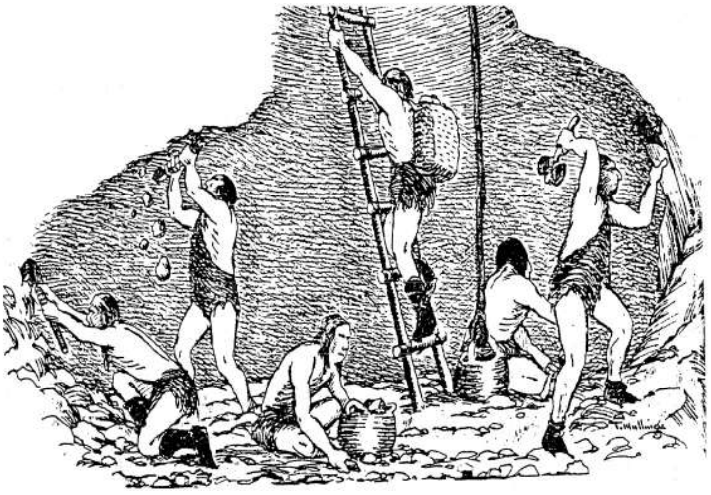
Stone-Age people knew nothing of metal. Colorful minerals were used for decoration or for barter. When emerald-green **malachite** (a copper ore) or a rusty-red **hematite** iron ore were found, they would be ground to a powder and used as pigments to decorate the face and body. They also used these and other colorful minerals pigments to paint the walls of caves and protected coves. Today, many minerals are used for paint pigments.

Can you imagine how excited these people were when they found native copper? It could be formed into decorative shapes and tools more easily by pounding it with a stone on a hard surface. This was after 6000 B.C. and is known as the *Copper Age*.

Both methods—flaking and pounding— were society's first forms of manufacturing. Therefore, Earth's resources were converted for man's use! The island of Cyprus, from which the word copper is derived, was a major source of copper for the Roman empire.

Over 4,000 years ago, when it was discovered that minerals could be melted, curiosity led man to combine melted metals (alloys). By accident they made bronze by adding tin to copper (the *Bronze Age*). Another combination of zinc and copper made brass. Both bronze and brass are stronger than pure copper. They do not corrode in air or water. Without these combinations of minerals and man's knowledge of mining and separating them, we would not have enough copper to take care of our needs today.

When copper tarnishes, it turns green to black on the surface. Some of the biggest deposits of copper were found by accident when prospectors noticed greenish rock sticking out of the ground (this is called an outcrop). Many of these discoveries were huge mountains of copper ore that also contained other important minerals.



Throughout the thousands of years since native copper was discovered, man has made great use of this element. Copper has a chemical symbol, as do all elements. It is Cu. Minerals are seldom found in a pure state. They are found bonded together with other minerals.

Copper is one of the most useful of the metals, and probably the one first used by man. It is found native and in a variety of combinations with other minerals. It is often a by-product from silver and other mining. Copper has many colors from yellowish-to-reddish brown, red, pink, blue, green, and black. The colors are determined by the other elements (minerals) combined with the copper.

Copper is malleable, ductile and long lasting. Copper conducts heat and electricity better than any other metal except silver. It has a wide use in electric and electronic equipment. It is used for tubing and pipes for plumbing and can be made into sheets for roofing. Copper also is used in chemical compounds. Copper chemicals are used in plant sprays and to treat swimming pools to keep algae from growing. Copper and its alloys are important for parts of automobiles, airplanes, missiles and satellites.

Recycling of copper has been ongoing for many, many years. It is collected as scrap metal and separated from other metals and materials by smelting and refining. Recycled copper is called secondary copper and it is used at brass mills and made into new things for our use.

Since ancient man and his use of flint and obsidian we have learned a lot about our Earth and its many resources.

Each day, scientists learn more about the mineral wealth locked in our planets crust. More is learned about new mineral wealth being born through volcanic activity. Earthquakes sometimes take away ore deposits. And at other times earthquakes bring new

mineral deposits closer to the Earth's surface.

Science and technology have shown us how to find, extract, process, and use mineral resources to the benefit of man. We are lucky to live in this time of history.

COPPER FACTS

Copper is a *native element*. The crystal system of native copper is cubic. It has a metallic luster and a specific gravity of 8-9 with a hardness of 2-1/2 to 3 and can be easily scratched with a knife. Native copper has no cleavage and its fracture is hackly. This element is heavy, ductile and malleable. Native copper is copper red on fresh fracture but may be greenish or bluish or tarnished if weathered. It is often found with small amounts of arsenic, antimony, bismuth, iron, and silver.

Copper Ores

Malachite (pronounced mala-kite) is usually a bright green color and has a nonmetallic luster. It has a light green streak and can always be scratched with a knife. Malachite, a copper carbonate, is an important ore of copper and is a good indicator of copper deposits. In its pure form it contains 57% copper, the rest is made up of carbonate and water.

Azurite also is a copper carbonate. It's streak is light blue. Malachite and azurite frequently occur together and are found in the upper weathered (oxidized) zones of copper ore bodies. Azurite is the scarcer of the two has a soft blue color.

Chalcopyrite is an iron-copper sulfide. It has a brass yellow color. It is distinguished from pyrite by being softer and yellower. Its golden glint when in small specks in quartz often is mistaken for gold. The glint will disappear when turned at certain angles to the light while gold appears the same at all angles. Chalcopyrite is the primary ore of copper and is prevalent wherever copper ore is being mined below the surface zone.

Chalcocite is a copper sulfide. It is one of the highest grade and most important ores of copper and is opaque with a dark lead gray to black color. Chalcocite is often associated with and shows alteration to azurite, bornite, covellite, malachite, and native copper. Important deposits are found in Arizona's Bagdad, Jerome, and Superior areas. Other localities include Bingham, Utah; Santa Rita, New Mexico; Ely, Nevada, and the Genesee Valley district in California.

Bornite is a copper-iron sulfide. Its color is a natural bronze, but on exposure it tarnishes to the varigated colors that have caused it to be nicknamed "Peacock ore." It is rarely found on the surface but is prevalent in deeper levels of copper mines.

Turquoise is a hydrous aluminum phosphate with copper. To be desirable for gems the color should be green blue. The color is due to the presence of copper and is found near the surface of copper deposits. Sometimes in may appear as an outcrop.

Chrysocolla has various shades of blue to green and is a hydrous copper silicate. It is often found with azurite and malachite. Although its color is attractive, it is too soft to make good gem stones. Be aware of this fact when buying jewelry. Sometimes chrysocolla is passed off as turquoise.

The Sewing Machine—Its Story

Attempts to invent a sewing machine date as far back as 1775. But not until 1830 was a practical machine invented. Its inventor was Bathelemy Thimmonier of France. It made a "chain stitch" with a hooked needle and was built out of wood.

Around 1848, Elias Howe (an American) invented the "eye needle" which made a "lock stitch" and had a small shuttle that carried the thread through the loop made by the needle. An improved sewing machine was developed in 1850 with the invention of a round bobbin and hook by Allen Benjamin Wilson. Both machines were hand operated. **Isaac Singer** invented the foot treadle and a presser foot that kept the fabric in place.

Today, electricity has replaced the foot treadle. Sewing machines have motors. Motors are powered by electricity—which is another gift from **copper**!

DIG A LITTLE DEEPER

- What other elements are classified as *native*?
- Take the new words you have learned today and put them in a list. Now, use them to make a Word Search. Try your word search on a classmate or someone at home.
- If there is copper or another mineral in your area, is it being mined? If so, write a letter to the mining company to find out if they give school tours. Maybe the company has a speaker who would come to your class to tell you more. Ask!
- If you look around your classroom or your home you will find many things in which copper is used. Some are hidden — like the wiring inside a wall that brings electricity into your home or school. How many other uses can you discover?