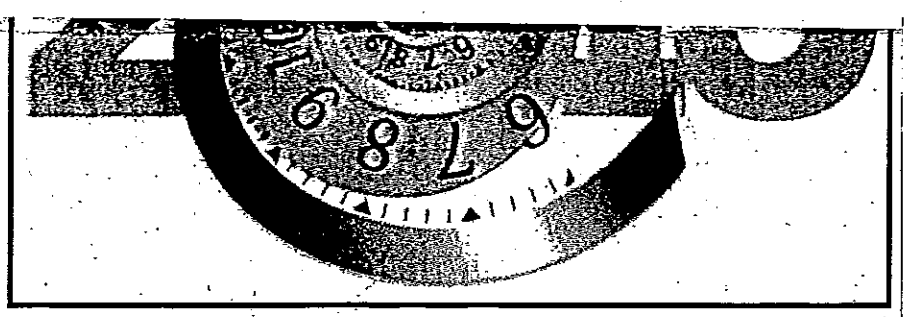
Every Wednesday You'll Find What's Happening in Southern Kansas and Northern Oklahoma by Re

MID-WEEK

The Ponca City News

SECTION C

DECEMBER 31, 2014



Happy New Year? Or Is It?

The Answer Depends On Where You're Standing... And What Calendar You Might Be Turning Over

Does anyone know what time it is? Ask someone what day it is and you are likely to get the date as per the Gregorian Calendar, the one commonly used by the United States and most of the world. The Gregorian Calendar is the currently accepted International Calendar date.

But did you know that there are at least four other calendars commonly in use? They are the Julian, Hebrew, Islamic, and Chinese. So, January 1, 2015 could really be December 19, 2014 (Julian Calendar with the Julian day being 2457023.5), or Teveth 10, 5775 (Hebrew), Rabi'al-Awwal 10, 1436 (Islamic) or Yi-Chou(Ox) (11th month), 11, 4712 (Chinese).

It can be a bit confusing, as these calendars are still in use for a variety of reasons. The Georgian Calendar, while the International Standard today, was not widely accepted until after 1752 when Britain and the British Colonies accepted the correction to the Julian Calendar. This calendar is named for Pope Gregory XIII, who proclaimed its use in 1582.

Astronomers still use the Julian Calendar. The Julian Calendar is based on the one adopted by Julius Caesar in approximately 46 BC with a few corrections and finalized in 8 CE.

The Georgian Calendar is a slight correction to the Julian Calendar in how it manages leap years. The average length of the Georgian year is 365.2425 days as measured from equinox to equinox, i.e. a solar tropical year. Using this calendar the error is only one day in every 3300 years as compared to the Julian Calendar which accumulates an error of 1 day in every 128 years. (The advantage of the Julian Calendar to astronomers is that all of the known astronomical observations have positive Julian dates, making the math easier.) Confused?

Maybe, but then most of us don't have to switch between calendar systems. So, knowing the time of day is much easier right?

Well, not really.

Time is a fundamental measurement; a second is defined as "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom."

Sure, everyone knows exactly what that means, right?

Think of it this way: An electron "hops" from one level to the next and back again, 9,192,631,770 times in 1 second. It behaves like a very fast pendulum. This definition of a second wasn't accepted until a meeting in 1967. Until then, the definition of a second was based upon the length of one solar day. However, there was a debate on the exact length of a solar day. Time and the synchronization of time is actually relatively new. For most communities, time was once a local issue. As commerce expanded, time and location became linked in what was known as the longitude problem, i.e. where was a ship located east or west of a given line.

The problem was solved by using sophisticated mechanical clocks measured against a reference. Hence, the establishment of Greenwich Mean Time or the GMT. The longitude problem was officially solved, as recognized by the awarding of a prize by the British Government, in 1773. Still, standardization of time was still at least a century away. What historical development finally made it an imperative to establish a standard time and time zones? The advent of the railroads.

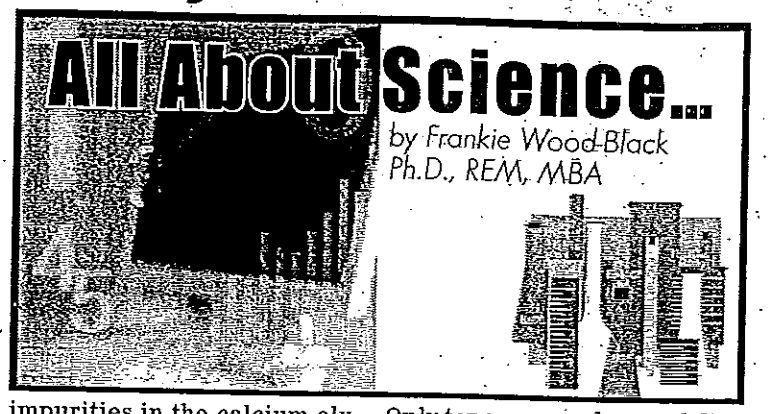
At noon on November 18, 1883, the U.S. and Canadian Railroads adopted what was then called the General Time Convention, which later became the known as "Railroad and Telegraph Time." The General Time Convention used the meridians (longitude) to establish time zones. The Naval Observatory was responsible for providing the noon signal which allowed the railroads and telegraphs to synchronize the clocks based upon the convention established. This occurred prior to formal establishment of GMT being the international standard at zero longitude. The international agreement came in 1884. Today, GMT is also referred to as Universal time (UTC) or Zulu time. So, do you really know what time it is or even day?

As most of us don't need the exact precision of knowing exactly where we are to the individual longitude or having to measure time in less than second increments, these details don't necessarily impact us. But if you fly in a plane, or need to communicate across country, it is reassuring to know that there are individuals who worry about these details.

Editor's note: This is the first in a series of science-related articles by author Frankie Wood-Black, Ph.D., REM, MBA, to appear in the Ponca City News. The author currently runs her own environmental consulting firm based in Ponca City, Sophic Pursuits, Inc., and also serves as a Physics Instructor and the Director for Process Technology at Northern Oklahoma College

About January Birthstones

By Frankie Wood-Black
Sophic Pursuits



Ever wonder about birthstones?

What are they? And why did they come to be associated with certain properties?

According to the American Gem Society, the history associated with wearing birthstones goes back to the Breastplate worn by Aaron representing the 12 Tribes of Israel.

Other sources indicate that the tradition of wearing birthstones is related to the 12 signs of the Zodiac. Whatever the source of the tradition, there are numerous legends and myths about each birthstone's particular healing powers and various associations.

Over time the list of which stone corresponds with which month has changed. The current list dates back to 1912, and the stone for January is garnet. Garnet is supposed to signify eternal friendship, passion, loyalty, success, and faith.

The traditional garnet is generally red and is associated with the myth of Persephone, as the red garnet has the color of a pomegranate seed which is what Hades presented to Persephone. The name garnet comes from the Latin "granatus" meaning seed. Garnets actually come in a variety of colors.

The traditional red (almandine), a red to orange (grossular), red and pink (pyrope), green-brown (spessartite), brown/black (andradite), and emerald green (uvarovite). The color of any gemstone is a result of the way the stone absorbs light.

The color usually is the result of a particular impurity in the crystal structure of the material that makes up the stone. Garnets are made from calcium aluminum silicate ($Ca_3Al_2(SiO_4)_3$) and are considered silicates.

The colors arise from the impurities in the calcium aluminum silicate crystal. The red of the traditional almandine garnet comes from iron, while the green color of the uvarovite comes from chromium. To get the orange color a bit of manganese gets mixed in with the iron. Thus, the color of the garnet comes from the "flaws" in the crystal, those substitutions of the other metals for the calcium or the aluminum in the crystal structure. The gemstone is found in metamorphic rocks — rocks that are subjected to high heat (300 degrees to 400 degrees Fahrenheit) and pressures 1500 BAR or about 22,000 psi. These types of conditions are generally associated with the formation of granite and volcanic rocks. The current source for most garnets is Africa (Zimbabwe, Tanzania, Kenya, Mozambique and Madagascar), Sri Lanka and India. The pyrope garnets have also been found in Brazil, Australia, United States, Mexico and Myanmar, while almandine garnets have been found in Alaska, Brazil and Greenland. In addition to being pretty, and oftenworn as part of jewelry, garnets have a variety of uses. The gemstone has a rating of 6.5 to 7.5 on the hardness scale (depending on the specific type of garnet). This means it has about the same hardness as quartz. Only topaz, corundum and diamonds are harder. The process of making garnets is an excellent source for abrasive materials. According to Geology.com, in 2012 75 percent of the industrial use of garnets in the United States was for abrasive activities such as waterjet cutting, blasting and as an abrasive powder.

The other use of garnet is in water filtration. Garnets are also used as watch gears, and in semiconductor manufacturing. There are numerous traditions associated with garnet like that of Noah using a garnet lantern to light the way in the dark or of Hades using the garnet as a sign of fidelity, loyalty and faith. These properties seem to have some physical basis — the stone is strong, and durable. It has a vitreous luster, i.e. it has reflective properties. And is not artificially enhanced in any way.

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Science Programs Offered at Stillwater Public Library

STILLWATER — Monty Harper and Oklahoma State University scientists have teamed up to inform and entertain children about science topics at the Stillwater down the science. It's a great way to connect your family with critical thinking, genuine wonder and real-life everyday science!"

This year's sessions the human body is essential for health, but how do the body's cells know exactly how much to make? Find out how some special fish

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JANUARY 14, 2015

All About Science...

by Frankie Wood-Black
Ph.D., REM, MBA

Let There Be Light

There are several colorful stories that surround the invention of the incandescent light bulb and Thomas Edison.

On January 27, 1880, Thomas Edison received his second and probably the most important patent on the incandescent light bulb. Edison wasn't the first inventor of the light bulb, but did invent the first commercially viable, i.e. practical, light bulb.

Prior to Edison's invention bulbs that produced light had very short lifespans, were expensive, and required a lot of electricity. The January invention changed how electric lighting was viewed and set the stage for its use. The first incandescent lamp was invented by William Sawyer and Albon Man and the first light bulb by Joseph Swan in England. Yet, it was Edison's work that allowed the technology to be useful and widely accepted.

What was the key feature of Edison's technology? It was the filament. Incandescent, which means glowing or white with heat, light is produced by the heat generated due to the resistance of electricity flowing through the material. Edison tested over 6,000 different materials as possible filaments. (Want to make your own light bulb? Go to http://www.invention.smithsonian.org/centerpieces/edison/000_light bulb_01.asp)

What was the filament material that made the difference? Carbonized sewing thread. However, in 1883 Edison found that bamboo could give lamps a lifetime up to 1,200 hours. The other secret that Edison discovered that provided an advantage over Swan's was that he could produce lamps with a higher vacuum. By using a vacuum, the filament only produces light and is not destroyed by oxidation or burning. Thus, the better vacuum allows for a longer life of the filament. Tungsten became the filament of choice in about 1911. Incandescent light has one big detractor, its energy usage. Only about 10 percent of the energy is converted into light, making the light very inefficient. The race for energy efficient light was on.

Edison and Tesla both experimented with fluorescent lights, which last longer and are more energy efficient. Fluorescent lighting, which produces light through the excitation of the mercury vapor in the lamp which in turn excites the phosphor coating on the inside of the glass, was adopted by many industrial plants during the 1940s, and by 1951 more light was being produced using fluorescent lamps than incandescent bulbs. Compact fluorescent lights (CFLs) were introduced in the 1980s. The light-emitting diode lamp or LED lamp is rapidly taking over the lighting industry. Light-emitting diodes produce light using a semi-conductor to convert the electricity into light. These lamps are the most efficient currently available. According to the Department of Energy, the LED replacement bulbs have a luminous efficacy of between 70 to 120 lm/W (lumens per Watt) with an average of 85 lm/W as compared to a typical 60- to 100-W incandescent bulb which has an efficacy of 15 lm/W, roughly six times the efficacy. In 2012, driven by energy efficiency policies, 49 million LED lights were installed and approximately $675 million was saved in energy costs (Energy.gov). LEDs and CFLs have come down in cost as companies have focused on their production due to the phase out of the manufacture of the incandescent bulbs, the remaining incandescent bulbs will be phased out by 2020 unless they meet specific efficacy targets. Even with the higher initial cost of the LEDs and CFLs, the overall cost of operation and working life makes them a cost effective choice. Yet, they are different than incandescent bulbs.

The spectrum of light that produces the white light is different due to how the lamps produce the light. The CFLs have specific peaks at particular wavelengths. These can be readily seen using a diffraction grating. The spectrum from LEDs is broader and does not have the same peaks, but LEDs tend to have narrower beams, i.e. the cone of light from a single bulb is not as broad. Because of how they generate light from electricity, some people may notice flickering with the CFLs. Colors may also appear different due to the spectrum produced from the light. Thus, as with any change, the conversion to the alternatives is going to take some getting used to, but you will notice the savings in your energy bill.

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Every Wednesday You'll Find What's Happening in Southern Kansas and Northern Oklahoma by Reading...
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JANUARY 21, 2015
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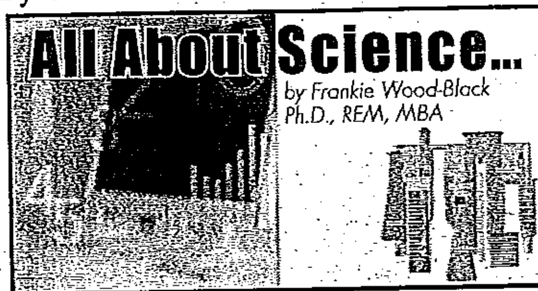
SECTION C

Copper Is The Common Link

What Does One If By Land and Two If By Sea Have To Do With Ponca City?



Almost everyone has heard the theory that everyone and everything is six or fewer steps away, known as six degrees of separation.

But did you know the link between Paul Revere, who was born in January 1735 and Ponca City is only one step?

The step involves copper.

In 2003, the new entrance to Ponca City's City Hall was unveiled. This new entrance designed by Lewis Associates Architects featured a copper design. According to the designer Richard Winterrowd, the copper was chosen due to the ease of maintenance, its malleability, and the finish that will gradually take on a patina over time.

Now for the one step.

The copper used for City Hall came from Revere Copper Products, Inc. Paul Revere, the revolutionary war figure, was a well-known metal artisan and is usually recognized for his work in silver and pewter (a gray alloy of tin, copper and antimony or lead). He was also a great industrialist, and his businesses included production of iron products such as firebacks, window weights, bolts, and spikes and a bronze foundry which produce both cannons and bells.

But it was in 1800 that the ultimate connection between Ponca City began with the purchase of a gunpowder mill in Canton, Massachusetts. The purchase and a subsequent loan from the United States led to the establishment of what is now Revere Copper Products, Inc. The mill became the United States' first copper rolling mill.

Copper (Cu), a ductile metal with high thermal and electrical conductivity, has a wide variety of uses. Copper is a component of bronze (alloyed with tin) and brass (alloyed with zinc). It is used in wiring, radiators, motors, and plumbing due to its chemical, electrical, and thermal properties, in addition to the architectural use at City Hall. Copper is even used in coins both in antiquity and today.

Copper occurs in many forms. It can be found pure (although that is rare) and as an ore. There are 15 copper ores that are commercially mined in 40 countries (From How Products are Made).

The largest producers of copper today are Chile, China, Peru and the United States. The most common copper ore is chalcopyrite ($CuFeS2$). Once the copper ore is mined, concentrated and smelted, a copper blister or ingot is produced. These ingots are then used by a variety of industries to produce the materials we use.

Why was a rolling mill necessary and why would the Navy be interested?

The purpose of the mill was to take blocks or ingots of copper and produce "sheathing." Sheathing is the process of covering an outer layer of wood or other material. Thus, sheathing was a means of covering ships hulls to protect them from barnacles, wood worms, and other potential damage.

Copper was ideal as the oxide that is formed due to the exposure to seawater was particularly good at preventing the build-up of barnacles. The fact that the copper will "patinate" is also a result of exposure, and the formation of oxides. Thus, the patina or coloration that will eventually develop is the result of the thin oxide layer.

The production of the sheathing began at the Canton mill using a rolling process was developed by Revere and his colleagues. The rolling process is accomplished by taking the blocks and slowly using mechanical and/or thermal means to flatten the material, much like using a rolling pin to flatten dough. Revere Copper was commissioned to provide the copper sheets for the USS Constitution.

As with the entry to Ponca City's City Hall, copper sheets are still used in a variety of applications.

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Wednesday: Your Link to What's Happening in Southern Kansas and Northern Oklahoma by Reading
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JANUARY 28, 2015
Ponca City News
SECTION C

All About Science...

by Frankie Wood-Black
Ph.D., REM, MBA

Inventions Affect Impressionist Art

"Without color in tubes... there would be no Impressionism."

What does an invention in the United States have to do with Impressionist Art? Seems like an odd question, doesn't it? Yet, that invention is prevalent in your home today — and who would have thought it had the capacity to create a revolution in the art world?

The invention was the collapsible metal paint tube.

Today that little invention, which was the brain child of John G. Rand, a South Carolina painter, has allowed a number of products to be transported and used, including toothpaste, glues, and food products.

But, just how did Rand's invention in 1841 revolutionize the world of art? In the late 1700s, artists (both professional and amateur) had to either produce the oil paints they used themselves or obtain them from the "colour man." Up until the early 1800s, paints used by artists had changed little from those used by the old masters of the Renaissance and Baroque periods.

These paints were a mixture of a pigment, binder, and thinner. The binder, typically an oil such as linseed oil, was mixed with a powdered natural pigment such as iron oxide for red or lead(II)-antimonate for yellow or azurite (copper(II)-carbonate) for blue, followed by a bit of turpentine or other material to thin the mixture. The thinning was required to allow the paint to be applied to the canvas.

With the Industrial Revolution came new discoveries in chemistry. Forty-four new elements were discovered between 1750 and 1850, including cobalt (which was the basis for cobalt green in 1780 and cobalt blue in 1807), cadmium (cadmium yellow in 1820), and chromium (viridian in 1838).

There is a great web exhibit titled "Pigments through the Ages" (www.webexhibits.org/pigments) that details an individual color, its introduction, and the chemical identity. Examples of use by artists are included.

Understanding the source of the color or pigment and the time period of its introduction is a tool in the determination of forgeries. The Oklahoma Museum of Art is hosting an exhibit this year "Intent to Deceive: Fakes and Forgeries in the Art World." The exhibit runs from Feb. 14 through May 10.

With these chemical discoveries, more than 20 new colors were added to the artist's palette. These new colors were intense yellows, greens, blues, reds, and oranges.

Yet, there was still a problem: The artists struggled to keep the paints from drying before they could be used. Paints were transported in a variety of containers, such as pig bladders and jars. These were difficult to transport, and in the case of the bladders, could not be resealed. Thus, if you wanted to paint outside of your studio, it was an extremely difficult task.

Rand's invention, the collapsible tube with a screw top, provided the perfect solution. The tube gave the paint a longer shelf life. It did not leak. It could be opened and closed, repeatedly.

The new colors, along with the tube, allowed artists to be free of the studio and to portray natural light in their paintings. These attributes appealed to the French painters of the time, as it allowed them to capture their surroundings as they saw them rather than living with the prior limitations. Renoir was once quoted as saying "Without colors in tubes, here would be no Cezanne, no Monet, no Pissarro, and no Impressionism." (Smithsonian Magazine)

As January is National Hobby Month, and the 176th anniversary of Cezanne's birth occurs on January 19, it seems like apt time to reintroduce the power of a little collapsible tube. So the next time that you squeeze that tube of toothpaste or super glue, stop and recognize how that little tube created a revolution.

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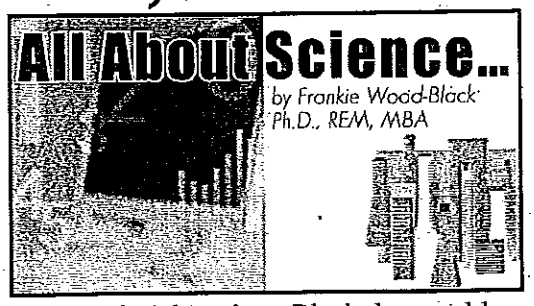
SECTION C
MID-WEEK
FEBRUARY 4, 2015

Science: Wax On, Wax Off



What do crayons, candy lips, Halloween fangs, and Ponca City have in common?

If you said wax, you would be absolutely correct.

If you go to the Conoco Museum, you will see a display indicating that for a period Conoco provided the wax used to make Crayola crayons. (One of the primary patents for crayons was granted during the month of February.) But, paraffin wax, a product of the refining of crude oil can be found in a host of products including candles, wax lips, wax fangs, and sealing wax.

Additionally, paraffin wax can be found in cosmetics, and is used as a lubricant. But, what is that stuff?

A barrel of crude oil is a mixture of hydrocarbons. Hydrocarbons are molecules comprised of hydrogen and carbon atoms. These molecules can contain anywhere from two carbon atoms to greater than 50 carbon atoms.

The molecules can be straight chained, branched, cyclic or aromatic, which is why one barrel of crude can be used to produce a host of products ranging from ethane, propane, and butane to petroleum coke. Paraffin wax is generally comprised of straight chained hydrocarbons containing twenty to forty carbons. Paraffin wax at room temperature is a soft white (or colorless) solid.

The white appearance results from the inability of light to pass through the material. The material has a melting point between 115 degrees Fahrenheit and 154 degrees Fahrenheit making it a perfect material for candles and sealing wax.

While paraffin wax candles are very familiar items today, candles weren't made from paraffin until relatively recently: In fact, it wasn't until after 1850 when chemists found a way to make paraffin from petroleum. Prior to then, candles were made from a variety of sources such as tallow, bees wax, and whale oil.

The first paraffin crayons were produced around 1900. The name of the crayon (according to David Katz, the origin of the word goes back to 1644 when a waxy substance was blended with a pigment for use by artists) and Crayola comes from the French words for chalk (craie) and oily (oleaginous). The first crayons were black made from a mixture of carbon black and paraffin wax.

The Crayola brand's first box of crayons contained eight colors: Black, brown, blue, red, purple, orange, yellow and green.

Crayons are actually a mixture. The pigments or colors are added to liquid paraffin and molded into the typical crayon shape. The pigments used in crayons for children are comprised of non-toxic natural and blended finely ground minerals. Reds come from iron oxides; yellows from ochers which are limonites mixed with clay; and some blues from lime plasters.

According to the Smithsonian, since 1903 Crayola (which is now a whole owned subsidiary of Hallmark Corporation headquartered in Kansas City, MO.) has produced over 600 colors.

The crayon is one of those iconic items that is familiar to just about everyone. In addition, Crayola crayon has been associated with family farms, which hand rolled the paper wrappers on to crayons during the Great Depression, and one of the most recognizable items from most childhoods in the United States. The change of the names of the colors has sparked significant controversy. And, the crayon is so familiar to children in the U.S. that according to a Yale study it is number 18 of the most recognizable smells to an American adult.

Paraffin wax, one of the off products of the production of kerosene, gasoline and diesel; is a household item in the form of many useful products. But it is its use in crayons and wax lips that makes it a part of the fabric and memories of our lives.

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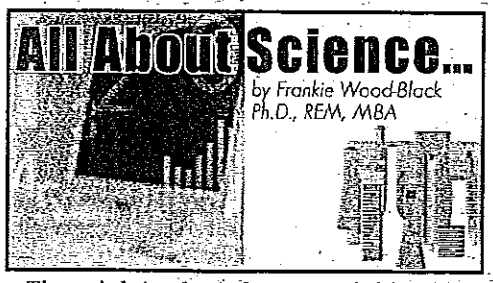
MID-WEEK
FEBRUARY 11, 2015

Flowers Can Be Good For More Than The Heart



Roses are red; violets are blue — or at least, that is how the poem goes. (Note: the original poem is attributed to Sir Edmund Spencer in "The Faerie Queene" in 1590.

However the phrasing has become part of the culture with multiple variations, including the traditional Valentine's poem: Roses are red; violet are blue, honey is sweet and so are you (1784). Thus roses and violets have been associated with February for quite some time. But did you know that roses and violets have been used since the time of Hippocrates for their medicinal properties? Both roses and violets are included on the list of edible flowers.

According to Dr. Micozzi, a physician and medical anthropologist, there are multiple uses for the rose. He cites sources from Mesopotamia, Persia, China, India, Greece, and Rome indicating that roses have been used as pain relievers, to treat burns, ulcers, hemorrhoids, and fever reducers. Currently, there are clinical trials looking at various compounds in roses to treat Alzheimer's dementia.

The most prevalent use of the rose, besides its pleasant fragrance and its use in teas and Middle Eastern dishes as flavoring, is as a source of vitamin C. The rose hip, the blub that forms as a result of pollination, is an excellent source of vitamin C. Syrups made from rose hips were carried on ships to prevent scurvy. WebMD lists a variety of uses for rose hips.

While there is but one predominate medicinal compound for the rose, violets seem to be loaded with medicinal compounds. Botanical Online indicates that the medicinal uses for violets were well known to the Greeks.

Violets were used ease pain, ease the symptoms of gout, as a laxative, and to facilitate the healing of wounds. Apothecaries (druggists) in the 1600's used violets to ease queasiness and treat other stomach ailments.

The roots of the violet contain a class of compounds called saponins. Saponins are a type of glycoside that produces a distinctive foaminess, essentially a type of soap. Glycosides are molecules formed from a sugar molecule bound to a "non-sugar" molecule. Several cardiac drugs are derived from glycosides.

The violet plant has a soluble fiber called mucilage. The mucilage has anti-inflammatory properties. The mucilage is the likely source of the medicinal properties that aid in the treatment of ulcers, gastritis, and constipation. The combination of the mucilage and the saponins seem to make violets useful in the treatment of a number of respiratory ailments including bronchitis and coughs. Several older cookbooks include recipes for violet syrup. Methyl salicylate is found in the essential oil. A more familiar form of salicylate is found in aspirin; acetylsalicylic acid. Salicylates are used as fever reducers and for pain. So it is no surprise that violets were used to ease headaches.

Roses and violets are rich sources of flavonoids. Flavonoids are a class of compounds that are getting a lot of attention due to antioxidant properties. Researchers have shown that flavanol found in cocoa powder increase the concentration of nitric oxide in blood vessels which support the pliability of vessel walls.

Thus, there may be even more potential health benefits from these colorful Valentine flowers.

While these two edible flowers, may have lots of potential medicinal benefit, there is one benefit that we all enjoy when we see these lovely plants: They smell wonderful. And just by stopping and enjoying the smell, your stress level may be reduced.

So, roses are red and violets are blue — they do smell sweet... and may even be good for you too.

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