NATURE'S WAY RESOURCES
an organically based service company

www.natureswayresources.com

JOHN'S CORNER:

MINERALS - The Elements and What They Do (Part 26)

by John Ferguson

34) Selenium (Se) - In general selenium is found in igneous rocks at 0.05 ppm, shale at 0.6 ppm, sandstone and limestone at 0.05-0.08 ppm, fresh water at 0.02 ppm, sea water at 0.00009 ppm, and soils at 0.2 ppm. However, selenium is not evenly distributed hence much higher levels can occur in some areas while some areas of the earth have none.

Marine plants can have 0.8 ppm, land plants can have 0.2 ppm, and land animals at 1.7 ppm. Selenium has an electrical oxidation state that ranges from -2 to +6, which allows it to combine with many elements creating over 50 known minerals.

The lowest amounts of selenium occur in light sandy soils. Clay soils have the ability to absorb selenium as do organic soils. Soil microbes play an important part in making selenium available for plants to absorb.
Selenium is another element that has the property "hormesis" which means small amounts are beneficial and large amounts are bad. It was first discovered that selenium was critical to human health in 1975 by a researcher in Galveston, Texas.

Selenium was first used in pottery to give a red glaze and later as a pigment for dyes to get an orange and maroon color. Selenium was used in many solid-state electronics before silicon and germanium semi-conductors became available.

Selenium photocells were used in photographer's light meters and Xerographic photocopiers and laser printers. They use selenium in a form that when dark it acts as an insulator but when exposed to light it becoms a conductor of electricity.

Selenium sulfide (Se_3S_5) is a common ingredient in dandruff shampoos.

Selenium is an efficient anti-oxidant (anti-peroxident) and is found in the molecule glutathione peroxidase enzyme system. It prevents body fats from going rancid.

Higher levels of selenium in the blood are associated with a decreased risk of developing liver cancer (American Journal of Clinical Nutrition, International Agency for Research on Cancer, 2016).

Many areas of the United States (Texas, southwest, lower southeast, and northwestern mountain states) have very selenium deficient soils hence plants grown in the are also selenium deficient. Medical studies have found that America's "Stroke Belt" runs right across America where selenium content in soils is low.

Selenium is important in protecting humans against chronic degenerative diseases, as it is required in the production of powerful antioxidants such as vitamin E and glutathione perioxidase.

The amount of beta-carotene and vitamins C and E contained in herbs (mints), are linked to the amount of selenium in soil. The effectiveness of anti-oxidants in our bodies have also been linked to the presence of this element. Animals and humans obtain selenium from the foods they eat, however, if it is not in the soil then it will not be in the food.

A lack of the mineral selenium leads to muscular dystrophy, cancer, heart disease, cirrhosis of the liver, and cataracts along with cardiomyopathy and joint problems.

Selenium is a co-factor for at least 25 enzymes that cannot function without it. It helps protect the body from DNA damage, and it helps eliminate toxic heavy metals from the body. As long as the body has adequate levels of selenium then the body also rids itself of excess beryllium. Selenium helps protect the body against toxic metal poisoning as it can block heavy metal bioavailability and reduce the toxicity.

Mercury can cause a depletion of selenium in our bodies. Methyl mercury blocks selenium related enzymes from functioning correctly.

Studies show that those with lower selenium levels have much higher incidence of all forms of cancer. Studies of colon cancer survivors with highest levels of selenium were found to be the least likely for reoccurrence.

The body cannot absorb selenium very well in some forms like L-selenomethionine, however one of the best forms for the human body to absorb selenium is from selenium enriched yeasts (fungi).

Cardio-myopathy (heart attacks), white muscle disease in animals, liver spots and age spots are all linked to selenium deficiency. Low levels of selenium have been associated with pancreatic cancer. As we get older, we tend to lose the ability to absorb selenium. As men's level of selenium decrease, their sperm count does also.

Some of the health problems and diseases that have been linked to a selenium deficiency are:

HIV (Aids)
Anemia (RBC fragility)
Age spots and Liver spots,
Fatigue
Muscular weakness
Myalgia
Scoliosis
Muscular Dystrophy
Cystic Fibrosis
Cardiomyopahy
Multiple Sclerosis (associated with mercury poisoning)
Heart palpitations
Irregular heartbeat
Liver cirrhosis
Pancreatic atrophy
Lou Gering's Disease (also with mercury poisoning)
Alzheimer's disease (with high vegetable oil consumption)
Infertility, Low birth weight babies

High infant mortality
Sudden Infant Death Syndrome (SIDS)'
Cancer
Sickle Cell Anemia

As one Doctor stated, "a high intake of vegetable oils, cooking oils, and margarine concurrent with a selenium deficiency is a quick way to a heart attack".

Most of the selenium we absorb, 50-80% is excreted in our urine. It is not common but excess selenium can cause garlic breath and is the first sign of selenium poisoning.

Selenium in the form hydrogen selenide gas (H_2Se) is extremely toxic.

A few sources of selenium are s odium selenite a simple chemical salt (Na_2SeO_3), Selenium-methyl L-selenocysteine, and high selenium brewer's yeast.

Gardening and Landscaping Problems Associated with Selenium (Se)
Some plants require selenium while other does not. Members of the *Astragalus* family tend to colonize selenium rich soil, as they require it. Some members are known as "Locoweed' due to the high levels of selenium they absorb and its effects on animals whom eat it. Its presence often indicates soils with high selenium levels.

Rhizobium bacteria and root exudates stimulate the oxidation (adds an extra oxygen atom to the molecule) of SeO_3 to SeO_4 which increases the availability of selenium to plants.

Some studies have found that adequate selenium in the soil stimulates the growth of grasses and other plants, while too much can be toxic.

Brassica plants have a high ability to absorb selenium from the soil, as do many mushrooms and ferns that can absorb selenium in larger amounts. The mushroom *Albatrellus pes-caprae* that is a popular food in Italy can have 3,700 ppm of selenium.
Sources: Brazil nuts, free-range turkey and pork, fish, free range eggs, shellfish, some coal ash (10-6,000 ppm), Coconuts.