



NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

By John Ferguson

Plants have microbes on their leaves just as humans have microbes on our skin. A group of microbes that are beneficial or neutral to their hosts are called commensals.

A pathogen called *Pseudomonas* often infects our landscaping plants and vegetables causing disease. However, researchers discovered that wild species of these plants can live in harmony with these bad microbes. They discovered that there were commensal *Pseudomonas* that suppressed the growth of their pathogenic kindred.

If researchers can discover the mechanism that turns bad organisms into good guys, it would open up another avenue of environmentally friendly disease control. *Nature Ecology & Evolution*, 2022

For me, it also raises the question of why they are non-pathogenic in Nature, but cause problems when the plants are grown in our landscapes?

We continue to learn about the importance of microbes to our lives every day. A new study from Harvard University has found that some species of microbes can breathe rocks!

They use electrons in the rocks for energy. The genes required for this process is called EET (extracellular electron transfer) and has been found in several species of microbes all over the planet. It seems that many species of microbes have acquired this ability.

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This is analogous to how installing an APP on one's phone gives it a new functionality. mBio, 2022

A new phenomenon has been discovered by scientists at North Carolina University that is called ghost forest tree "farts". These are caused by methane gas being released by microbes living in the trees that were killed by rising seawater.

Methane is a major greenhouse gas hence it is very important to understand how it moves through the environment. Frontiers in Environmental Science, 2022 and Biogeochemistry, 2021

A study from the University of Illinois has found the mechanism of how the toxic heavy metal cadmium gets into the cacao plant (think chocolate). Chocolate is a major source of cadmium in non-smokers. As soils become more acidic, cadmium becomes more soluble hence plants absorb more cadmium from the soil. PLOS ONE, 2022

The USGS has found that as deeper phosphate deposits are being mined for artificial fertilizers, the deeper layers are contaminated with cadmium. Artificial fertilizers tend to acidify the soil making the issue worse. More reasons to only use organic fertilizers.

A while back I had a person comment to me that it was a waste to preserve wetlands. It is hard to imagen someone so ignorant of the value of wetlands and the plants that grow in them, to our planet's health.

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For example, scientists at the University of Waterloo released a study of wetlands in just a small area of southern Ontario. They found the wetlands performed many ecosystem services including sediment removal and phosphorous filtration.

The value of this service is \$4.2 Billion per year in this small region. To use conventional water treatment facilities to provide the same service would cost \$164 Billion per year!

One way a gardener can help our planet is putting in rain gardens and bioswales in one's yard, and only use modern biological methods (organic). Hydrological Processes, 2021

Another study published in the journal (Cell, 2021) re-enforced the importance of the element magnesium in our diet. Researchers at the University of Basel found that magnesium is essential for our immune system to fight cancer and viral diseases.

From our study of the elements, 80% of all Americans are magnesium deficient! Without a healthy soil full of organic matter and microbes, plants cannot absorb magnesium easily from the soil. Using and eating foods with the herbicide glyphosate on and in them prevents the absorption of magnesium from the food even as it digests.

GMO foods have the highest levels of glyphosate on them which prevents the absorption of magnesium and many other essential elements.

More reasons to plant modern Victory Gardens and grow our own food, using compost, organic fertilizers, and re-mineralizer to ensure one is getting all the essential elements to be healthy.

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Talking about elements and nutrition density, I was at a class on foraging (eating wild native plants) this week. I was able to eat a couple dozen different edible wild plants that actually tasted very good. The instructor was Mark Vorderbruggen, PhD in biochemistry and expert on foraging.

Many of our edible wild plants have many times more vitamins and minerals than our conventionally grown foods and they are very low in calories. Many of these nutrient dense plants, we were taught to call weeds. We as gardeners need to rethink our perception of plants, as God does not make mistakes and all plants have a purpose. Note: Mark will be speaking at the OHBA organic education day in August at the United Way Center.

Another international study has found a link between gut microbiota and chronic inflammatory diseases like arthritis. They found that if we do not have a healthy gut microbiome, molecules can form that make these diseases worse. Journal of Clinical Investigation Insight, 2022.

When we constantly use chemicals from soaps and disinfectants to pesticides and fungicides, we are killing off the microbes we need to be healthy.

One of the advantages of gardening as a hobby is that we are constantly exposed to beneficial microbes when we handle healthy organic soil and compost. Also when we eat wild foods like from foraging above or fruits and vegetables from our garden our bodies receive beneficial microbes.

Last week I mentioned chemicals in foods called flavonoids. Researchers at Penn State University have found that people with Parkinson's disease whom eat richly colored foods that

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are high in flavonoids have a lower mortality risk in men than those whom don't. The effect did not show up for women.

Previous studies have shown that eating foods high in flavonoids reduced the risk of developing this disease. Journal Neurology, 2022

Last week I mentioned a group of fluorinated chemicals (8,000) known collectively as PFAS that are found in sewage sludge. These chemicals are in sewage sludge from the food we eat and they are absorbed by our skin through contaminated items when we touch or hold them. This sewage sludge is often used in agriculture and horticulture as a fertilizer.

Consumer Reports tested many the packaging of many fast foods and other products and found these toxic chemicals in them. From their newsletter "**The longer food sits in packaging, the more likely it is for PFAS to migrate to your food, especially for hot food** that comes in wrappers made with these chemicals. Per- and polyfluoroalkyl substances (PFAS) are known as 'forever chemicals' because they are so difficult to break down. It's estimated that *97 percent of Americans have PFAS in their blood*, and frequent exposure to these chemicals has been linked to certain cancers, immune system, and other health problems".

Consumer Reports' investigation that found high levels of these 'forever chemicals' in some food wrappers of four fast food chains, Arby's, Nathan's Famous, Chick-fil-A and Burger King.

For more information: <https://www.consumerreports.org/pfas-food-packaging/dangerous-pfas-chemicals-are-in-your-food-packaging-a3786252074/>

I read an article this morning that these toxic chemicals have been found in beef. Guess what the pastures had been fertilized with?

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