



www.natureswayresources.com

JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

Over the years some readers have commented that I am too technical and others that I am not technical enough. So, for the technical loving readers enjoy the article summary below.

For the scientists reading this newsletter there was an article in the August issue of Physics Today titled "Does a New Physics Lurk Inside Living Matter?" Studies have suggested that classical physics does not explain some of the processes found in living microbes and plants. For example, why does life use left-handed amino acids and right-handed sugars?

Why does Slime Molds which are a collection of free single cells form cooperatives and function as a single organism with a common purpose? Why does their growth pattern look like fractals?

During development, how does an embryo know how to grow its cells in relation to other cells?

In physics there is a theory that information is actually a physical quantity (just like mass or velocity) and can actually affect the way matter behaves. "In biology, information transfer is a 2-way process, involving feedback loops and top down information flow".

As a result, it is believed that information is stored at the molecular level and the non-tribal quantum phenomena such as super position, entanglement, and tunneling, might be important for life after all. This has resulted in a new field of study called quantum biology and is under intense investigation.



www.natureswayresources.com

Topics include coherent energy transport in photosynthesis, the avian magnetic compass, and the olfactory response of flies. Many other studies have suggested that many biological important molecules, such as sucrose and vitamin D-3, have unique electron-conductance properties associated with the critical transition point between an insulator and a disordered metal conductor.

A group of scientists from the University of Zurich have been studying landscapes and published a paper in the journal Nature Communications (2020). They analyzed 5,000 landscapes for a period of 17 years and found that biodiverse landscapes function better than monocultures (e.g. grass). Landscapes that have a mix of landcovers including grasslands (grasses, forbs, wildflowers), forest, shrubs, and water bodies, improve the functioning and stability of the landscape. Irrespective of the plant species, diversity, region or climate.

A paper in the journal Nature Ecology & Evolution (2020) was on the benefits of biodiversity and energy use. The researchers found that energy flows through an ecosystem by the food chain from grasshoppers to spiders and other lifeforms. There is a fixed amount of energy reaching the ground from the sun. So how does this energy be captured and move through the ecosystem? How much stays in the system or how much is lost?

They looked at every tropic level looking at plants, herbivores, carnivores, omnivores, soil microbes, organic matter above ground and in the soil, and the decomposers that feed on organic matter.

Researchers studied a system for 18 years and found that the higher the plant diversity and ore energy was stored. Ecosystems with 60 plant species contained twice the amount of biomass than monocultures.

In our gardens this same principle applies: the more plant diversity the healthier it will be.



www.natureswayresources.com

By now we have all heard the term “Nature Deficit Disorder” originally coined by journalist Richard Louv in his book *Last Child in the Woods*. It was later used in the manual of psychiatric disorders the DSM-V a few years ago. To date there have been over 1,000 studies about the importance to our health by being in nature. Only 2-3 hours per week has tremendous health benefits. A 2019 study found that patients in psychiatric hospital benefited greatly from just working in a garden.

Gardening is so powerful as a health benefit in part due to what is called attention restoration theory. Being in a natural garden helps restore people’s ability to concentrate. Engagement in gardening activities has been associated with stress reduction, increased attention, social health, and increased self-worth.

These benefits are in addition to exercise, vitamin-D production, calming effect of the green color of plants, fresh oxygen rich air, and chemicals the plants produce that stimulate feel good hormones in our brain, stimulate our immune system and many more benefits.

When we design our landscape using modern organic methods, we gain so many health and environmental benefits with the added bonus is that they cost less and provide better results.

Below are two great books to help you get started:

"Bringing Nature Home - How You Can Sustain Wildlife with Native Plants"

by Douglass W. Tallamy, Timber Press, 2014, Edith Printing,
ISBN-13: 978-0-88192-992-8

"Nature’s Best Hope- A New Approach to Conservation That Starts In your Yard"

by Douglass W. Tallamy, Timber Press, 2019, ISBN-13: 978-1-60469-900-5



www.natureswayresources.com

We have known for years that photosynthetic bacteria have the ability to convert energy from sunlight into plant compounds made of carbon chains (stored energy). These organisms helped create the oxygen rich atmosphere we have today by their photosynthesis.

Researchers at Arizona State and Penn State universities have found that when cyanobacteria live in low-light environments (under water, beneath a mulch or leaf layer) they can convert their metabolism to use or harvest the low energy (weak) far-red sunlight that can filter down to them. Journal Science Advances (2020).

Phillip Callahan, PhD (now deceased) was an entomologist whom decades ago, proposed that insects living in the soil could harvest and use energy that penetrated into the soil from electromagnetic radiation (all types of energy from the sun both visible and invisible to humans). He stated, "If not, why do so many organisms in the soil have electromagnetic radiation absorbing antenna?"

A recent study published in the journal Bioscience (2020) was on fireflies facing extinction. They found that fireflies, of which they are 2,000 species are declining all over the world. They found that habitat loss, artificial light, and pesticides were the leading cause. For gardeners, fireflies are not only fascinating to watch but in their larval stage they are a voracious predator of many insect pests. Without them we will experience more insect problems in our garden.

The worse pesticides are the organophosphates and neonicotinoids which also threaten our butterflies, dragonflies, etc. These pesticides are also used for mosquito control. The organization Beyond Pesticides published an article in July on this issue.

They also mentioned that these same toxic chemicals make all respiratory illnesses like Covid-19 much worse.



www.natureswayresources.com

We often hear about excess CO₂ in the atmosphere in relation to climate change and growing plants like trees to sequester carbon. In the Journal of Environmental Quality (2019) there was an article on organic matter in soils. Soil is one of the largest carbon sinks due to its organic matter. Globally, SOM (soil organic matter) stores an estimated 1,460 Pg (petagram) of carbon. This is greater than the combined carbon storage of the atmosphere (760Pg) and vegetative pools (560 Pg).

If we as a society want to stop global warming, we have to take care of our soils...this means quit destroying it with artificial fertilizers, pesticides, herbicides, fungicides, hazardous waste like sewage sludge and heavy metals, etc.

When a gardener uses modern methods based on soil biology (organic) you become part of the solution. In addition, one gets better results (aka a beautiful lawn or landscape) at lower cost and less work.