Fungi, Wild & Crazy

January 2015 – *Cyathus stercoreus*, a "birds' nest" fungs usually associated with animal dung and grasses. They spread their spores in splashing from raindrops.

Wildergarten 4.1 includes this first brief attempt at a chapter on fungi. It will grow. It is not for a lack of attention to the topic, but ignorance on my part and the slow pace (and potentially large expense) at which one can acquire information, due in part that not every year is good for mushrooms. 2013-14 were particularly bad.

Wildergarten 4.1

This book was originally produced under the name *The Responsible Party* for which there were two revisions, 1.0 & 2.0. Major revisions are for complete rewrites. Decimal revisions are for revised chapters or navigational changes and are not archived. Directories for back rev chapters are viewable at the numbered links below.

Revision History 1.0 2.0 3.0 3.1 3.2 3.3 3.4 3.5 4.0 4.1

Vande Pol, Mark Edward, 1954 –

Other writings by Mark Edward Vande Pol:

Natural Process: That Environmental Laws May Serve the Laws of Nature, ©Wildergarten Press, 2001, 454pp, ISBN: 0-9711793-0-1, LOC Control #2001092201.

Shemitta: For the Land is Mine: ©Wildergarten Press, 2009. Contains: 217pp text, 980pp overall, 14 picture books, 2 tables, 963 photographs, 9 maps, 2 drawings, 2 charts, 145 footnotes, 358 citations, and 216 other source references, not including external Internet links. ISBN 978-0-9711793-1-8

Articles at Wildergarten Press: collected writings on Constitutional history and regulatory racketeering by tax-exempt “charitable” foundations

Wildergarten Press
P.O. Box 98
Redwood Estates, CA 95044-0098
www.wildergarten.com

January 2015 – *Contumyces rosellus*

The Santa Cruz Mountains region of California is one of the hot-spots for fungal research in the world. It is home to David Arora, who wrote and (just as importantly) *maintains* a huge book on keying North American fungi, *Mushrooms Demystified*, which should be on every ecologist's shelf. With the generous assistance of Christian Schwarz in assessing hundreds of photographs, I have catalogued many of our fungal species here and have even keyed a few myself! Like the above example, sometimes it's easy because they are so distinctive. Most of the time it is not. Often it takes at least a microscope.

Some, on the other hand are easy. *Omphalotus olivascens* are not only huge, but somewhat slimy, toxic, and very floppy. If you stepped on one at night, you'd have a very good chance of landing badly, but at least they do glow in the dark under ultraviolet light!

To me, a mere saprophyte is a useful and sometimes beautiful curiosity (above)…

…while I see a fungal tree pathogen as a threat, like this exotic *Botryosphaeria dothidea* rotting our local madrones that do so much to feed bird life. Then there is the $70 per board foot I could have made on a big old tree like this, but can't because an irresponsible scientific community probably imported it with Eucalyptus as a replacement for supposedly "inferior" domestic timber, which is definitely inferior now! I grow fewer madrones because the hazard presented by this fungus makes it unlikely the trees will reach full maturity.

We seem to host a disproportionate number of poisonous varieties, like this “Satan’s bolete.” It is colorful though.

…although we do have this rather large Coccora *(Aminita calyptrata)*, which might be edible… maybe? So I'm wondering if there would be any harm done if I introduced some more reliably edible flavors. We do have a lot of wood to rot.

March 2014 – *Pyronema omphalodes*

With 72 species already distinguished with minimal education and with only two years' opportunity for identification work, so far it looks like we probably do not have a shortage of species. Given that many require disturbance to express themselves (sound familiar?), it should not be considered conspicuously unusual that I have found one species here that was unrecorded in this County.
Perhaps that is because it requires fire to express itself.

But the really interesting fungi (to me) are those that are mycorrhizal, because they directly support plants, associations that sometimes require more than one species at a time to work at all! Recall the case above, wherein it may have been an actino-mycorrhizal (AM) fungal symbiote of clover *(Glomus mosseae)* capable of exuding gibberellic acid, that triggered these blue dicks into germinating.

Hyphae of ectomycorrhizal fungi among roots of white spruce.
Author: André Picard Ph. D., Laval University.
Source: Wikimedia Commons Très belle photo, André.

Mycorrhizal fungi wrap around and/or penetrate plant roots to exchange moisture and nutrients for sugars. They are particularly critical to perennial grasses. Functionally similar to roots, mycorrhizal hyphae (above) are largely composed of a protein called glomalin which, when it decomposes comprises 20-35% of soil organic matter, binding mineral particles into structures more capable of storing moisture. Grassland soils (mollisols) are the single largest source of agricultural soils on earth. Grassland soils start with annual forbs. Without them, soil fungal activity is likely to be less efficient.

Recall those amazing blue curls that keep the bees going for harvests. It is almost a certainty that the only reason this annual plant could germinate in March and bloom and grow until late September is an association with mycorrhizal fungi with which to obtain water.

August 2015 – *Pseudognaphalium ramosissimum*

Similarly, these amazing pink cudweeds grow to 4-5 feet tall over summer. Similar to the exotic *Gamochaeta spp.* mentioned in the grasslands chapters, they too snarf nitrate from the soil. Yet unlike the exotic cudweeds, these monsters are annuals, that therefore return the nitrate to the surface when they decompose every year. Hence, these plants might help maintain the nitrogen cycle in a soil that would otherwise leach out nitrates very rapidly. I don't think these plants would make it without fungal associations either.

February 2015 – *Thelephora terrestris*, an "Earth Fan," like me

Many mycorrhizal fungi either rarely make visible fruiting bodies (above), do so below ground (such as truffles), or do not make them at all. In the case of plant symbiotes lacking fruiting bodies, without sophisticated analytical capability one can only surmise that they are there. To identify them, one must then rely upon genetic sequencing, which takes computerized analytical isolation techniques with which to select chemical "primers" with which to isolate useful genetic strings. Lucky for me, my daughter Natalie is doing exactly such work at Michigan State University, so maybe we'll get some answers to what would have been (until recently) unaffordably complicated questions. To you young people reading this**:** Learn all you can to help us help the land. There is plenty of work that needs doing. Don't ever let anyone ever steal the dream that you can find answers. We need you to do that work.

January 2013 – This is a slime mold.

We really do know so very little. Despite the massive funding that has gone into life sciences over the last several decades, we are only scratching the surface when it comes to plant-fungal interactions, never mind plant-fungal-bacterial interactions, of which the association between grasses, fungi, legumes, and diazotrrophic (nitrogen fixing) bacteria responsible for the largest renewable source of nitrate for plants on earth is but one of them. It's a big deal, our survival depends upon soil, and we know so very little about it.

So although I have lots of charming pictures of fungi, this chapter will have to wait until I can gather more information.
That starts with learning how to acquire and ship samples for genetic analysis.

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