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**From:** jeffrey E. <jeevacation@gmail.com>  
**Sent:** Thursday, April 20, 2017 10:23 AM  
**To:** Ed Boyden  
**Subject:** Fwd: Plants

dont forget the metformin, for ins=lin resistance. it is supposedly a won=er drug.

Not sure how to think about the neuro=iology of plants. There is a robust bunch of literature on how plant cells=are stressed, how they respond and how they build biological resilience al=ng the way. Because they are sessile and can't just call their doc for=a prescription, whatever they do has to be relatively simple and part of a=very basic process that either displaces, overcomes, outdoes or modifies a=stressor to make it manageable.

Plan=s don't have nerves per se but they have cells that behave in a simila= way for similar purposes as our nerves. Plants do use what we call neurot=ansmitters .... catecholamines like dopamine and norepi- they have tons of=acetylcholine and the same degradation pathways, and even the same glutama=e pathways and receptors humans do. And, more.

Classes of movements are common to almost all plants, just as wi=h humans. Darwin described them pretty well. Breakdown in these movement s=stems can look similar in humans - we just have more types of motion to de=l with than plants ... like when we get dopamine deficient in Parkinson or=atrophied alpha motor neurons in ALS. They have similar problems in their =otor systems, and usually they overcome them if they can adapt to or beat =he stressor.

Plants also have memory=(used mostly for growth and reproduction) and some think different types o= cognition too. While glutamate is a big player in that process, it isn<sup>l</sup>=;t the only one. Some of the chemicals have also evolved to serve similar =unctions, including a lot of similarity in core function between chlorophy=l and melanin. Chlorophyll serves to capture light and create energy, the =ore function require to sustain a sessile plant. Melanin becomes dopamine,=which allows humans to move and somehow plays other more important roles t=at we don't yet understand as the melanocytes are derived from neural =rest cells (high priced embryologic real estate...)

Stressors to motor or cognitive processes include(there are=more):

<=r style="font-family:arial,sans-serif;font-size:12.8px">Water  
Sodium  
Temperature  
Heavy metals  
Path=gens (bugs)

Also, light is very toxi= to roots and certain type of internal cells in vascular plants.

So can plants get Alzheimer-like protein aggregation disease= that slowly disrupt cognitive function to the point of death?

Can they get disordered movement disorder= like Parkinson where they lack a particular chemical or wasting diseases =ike ALS where their locomotion capacity is slowly diminished.

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Yes, they do. And many more diseases too.

Recently, a common type of drug (PPI / proton pump inhibitor) taken for heartburn, acid reflux or peptic ulcers was correlated = Alzheimer (Sample from 74,000 people over age 75 from 2004-2011 in German=). Specifically, patients on PPI are thought to have a 44% increased risk =f dementia. But in my view the mechanism doesn't quite make sense - wh=t does make sense is that patients with heartburn reflux or ulcers also ta=e antacids. And the most common ingredient in antacids is aluminum. Not ju=t regular aluminum but straight to the most acidified part of the human bo=y, so that the aluminum becomes quite reactive. Some of the aluminum will =e uptaken by the bidirectional parasympathetics (vagal) and transported in=o the nervous system, but some of the aluminum will also pass through the =ut and upset both the microbiome and the gut (enteric) nervous system as w=ll. It doesn't take much and it doesn't even have to stay for very=long, but if you are taking aluminum (or other active heavy metal) almost =very day for many years, you will pay the price - even if your body can fi=d a way to remove it pretty quickly. Meanwhile the inflammation in the cel=s will continue.

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I do think there is a similar situati=n happening in the enteric nervous system that is the trigger for Parkinson=s - which is why there are gastric, integumentary and gut symptoms very ea=ly and persistently throughout. My suspicion is that it affects either the=microbiome and/or eventually the dopmainergic neurons of the gut. Over tim=, this will migrate up the vagus or along some melanin/dopaminergic pathwa= to make trouble. Whatever pathway that allowed the melanin to migrate to =he brain the first place is allowing the stressor to follow, probably boun= to some form of co-variable. MOre later on ALS.

But w=at do plants do, how do they do it and why aren't we doing it?<=div>

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JEE

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