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**From:** jeffrey E. <jeevacation@gmail.com>  
**Sent:** Monday, April 24, 2017 12:14 PM  
**To:** Ed Boyden  
**Subject:** Re: Plants

glad to help. I think we might want to inquire=C2 re the similarities of plants and animals. . =stressors , disease. energy. . f=n. why do people and trees first get taller than =ider . i get it for plants.

On Mon, Apr 24, 2017 at 8:01 AM, Ed Boyden

> wrote:

Thanks f=r the metformin reminder! So far my immediate family has avoided diabetes by diet choice, but for my other relatives, I'll let them know.

I agree that mapping out the ways plants communicate, would be fascinating. Perhaps we can write down the words and rules akin to a<=r> language.

Very interesting on the aluminum front. We need ways to see how different building blocks are processed, trafficked, etc. in the body.

One hope I have for our project on the world's smallest mammal is that<=r> we can watch molecules and atoms throughout the entire "life cycle&quo=; of the processes of the body.

Ed

On Thu, Apr 20, 2017 at 6:23 AM, jeffrey E. <jeevacation@gmail.com <mailto:jeevacati=n@gmail.com>> wrote:

>

> dont forget the metformin, for insulin resistance.=C2 it is supposedly  
> a wonder drug.

>

> Not sure how to think about the neurobiology of plants. There is a rob=st  
> bunch of literature on how plant cells are stressed, how they respond =nd  
> how they build biological resilience along the way. Because they are s=ssile  
> 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 displac=s,  
> overcomes, outdoes or modifies a stressor to make it manageable.

>

> Plants don't have nerves per se but they have cells that behave in=a similar  
> way for similar purposes as our nerves. Plants do use what we call  
> neurotransmitters .... catecholamines like dopamine and norepi- they h=ve  
> tons of acetylcholine and the same degradation pathways, and even the =ame  
> glutamate pathways and receptors humans do. And, more.

>

> Classes of movements are common to almost all plants, just as with hum=ns.  
> Darwin described them pretty well. Breakdown in these movement systems=can  
> look similar in humans - we just have more types of motion to deal wit= than

> plants ... like when we get dopamine deficient in Parkinson or atrophy=d  
> alpha motor neurons in ALS. They have similar problems in their motor<=r> > systems, and usually they overcome them if they can adapt to or beat t=

> stressor.

>

> Plants also have memory (used mostly for growth and reproduction) and =ome  
> think different types of cognition too. While glutamate is a big playe= in  
> that process, it isn't the only one. Some of the chemicals have al=o evolved  
> to serve similar functions, including a lot of similarity in core func=ion  
> between chlorophyll and melanin. Chlorophyll serves to capture light a=d  
> create energy, the core function require to sustain a sessile plant. M=lanin  
> becomes dopamine, which allows humans to move and somehow plays other =ore  
> important roles that we don't yet understand as the melanocytes ar= derived  
> from neural crest cells (high priced embryologic real estate...)

>

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

>

> Water

> Sodium

> Temperature

> Heavy metals

> Pathogens (bugs)

>

> Also, light is very toxic to roots and certain type of internal cells =n  
> vascular plants.

>

> So can plants get Alzheimer-like protein aggregation diseases that slo=ly  
> disrupt cognitive function to the point of death?

> Can they get disordered movement disorders like Parkinson where they l=ck a  
> particular chemical or wasting diseases like ALS where their locomotio=

> capacity is slowly diminished.

>

> Yes, they do. And many more diseases too.

>

> In the case of acidified soil, aluminum (normally not particularly  
> bothersome unless in super high concentration) acts as a stressor in a=very  
> similar way to what we see in alzheimer pathology. Using metabolic pat=ways,  
> root absorption of other elements, or even transfer of nutrients from =oot  
> symbionts, plant cells that are not consumed by the stress can manage,=adapt  
> or clear the stressor. The pathology in a very specific part of the ro=t  
> appears very similar to plaques/tangles, as does the resulting behavio= in  
> plants.

>

> In humans, there is no viable use for aluminum and toxicity has long b=en  
> known. It is unlikely there is much concern on an environmental basis,=but  
> maybe. I think there is probably enough silica . silicates in our wate= to  
> balance in out. But on a tiny scale, focused hits of aluminum can be v=ry  
> deadly and especially when they are in an acidic environment.

>

> Recently, a common type of drug (PPI / proton pump inhibitor) taken fo=

> heartburn, acid reflux or peptic ulcers was correlated w Alzheimer (Sa=ple  
> from 74,000 people over age 75 from 2004-2011 in Germany). Specificall=,

> patients on PPI are thought to have a 44% increased risk of dementia. =ut in  
> my view the mechanism doesn't quite make sense - what does make se=se is  
> that patients with heartburn reflux or ulcers also take antacids. And =he  
> most common ingredient in antacids is aluminum. Not just regular alum=um  
> but straight to the most acidified part of the human body, so that the=br> > aluminum becomes quite reactive.

Some of the aluminum will be uptaken =y the

> bidirectional parasympathetics (vagal) and transported into the nervou= system, but some of the aluminum will also pass through the gut and up=et both the microbiome and the gut (enteric) nervous system as well. It d=esn't take much and it doesn't even have to stay for very long, but if y=u are taking aluminum (or other active heavy metal) almost every day for man= years, you will pay the price - even if your body can find a way to re=oive it pretty quickly. Meanwhile the inflammation in the cells will contin=e.

>

> I do think there is a similar situation happening in the enteric nervo=s system that is the trigger for Parkinsons - which is why there are gas=ric, integumentary and gut symptoms very early and persistently throughout.=My suspicion is that it affects either the microbiome and/or eventually t=e dopmainergic neurons of the gut. Over time, this will migrate up the v=gus or along some melanin/dopaminergic pathway to make trouble. Whatever p=thway that allowed the melanin to migrate to the brain the first place is al=owing the stressor to follow, probably bound to some form of co-variable. MO=e later on ALS.

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> But what do plants do, how do they do it and why aren't we doing i=?

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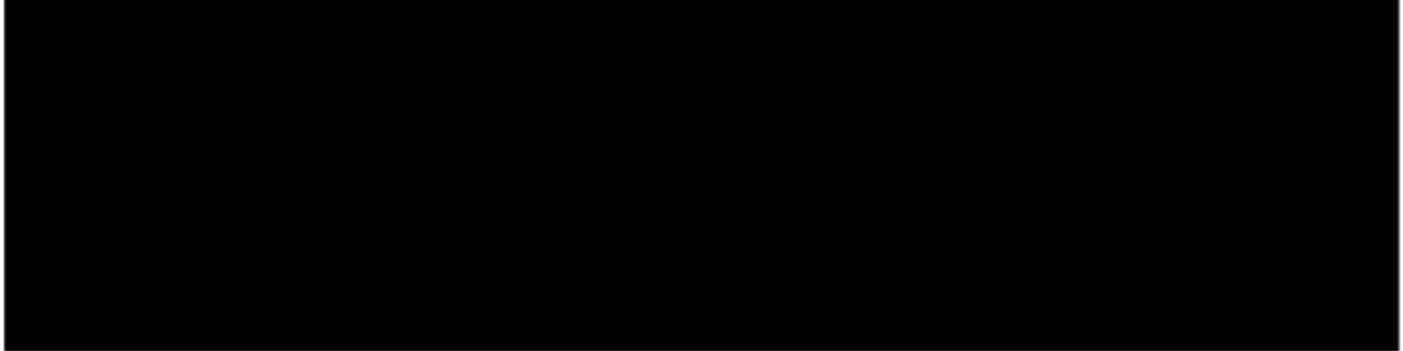
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Ed Boyden, Ph. D.  
Leader, Synthetic Neurobiology Group  
Associate Professor, MIT Media Lab and McGovern Institute,  
Departments of Biological Engineering and Brain and Cognitive Sciences  
Co-Director, MIT Center for Neurobiological Engineering  
Massachusetts Institute of Technology  
Building E15: E15-421, 20 Ames St., Cambridge, MA 02139 (mailing address) Building 46: 46-2171C, 43 Vassar  
Street, Cambridge, MA 02139



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