Plant Intelligence

The following is excerpted from the PowerPoint presentation “Natural Selection” in the 2015 edition of The Unshakeable Faith: An Apologetics Course. The series “Evolution and Science” with its 16 multimedia PowerPoint presentations is part of this course. The Unshakeable Faith is available from Way of Life Literature, www.wayoflife.org.

The Bible says that the evidence for God is in the creation, and that man has no excuse for not believing.

“For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead; so that they are without excuse” (Rom. 1:20).

“The heavens declare the glory of God; and the firmament sheweth his handywork. Day unto day uttereth speech, and night unto night sheweth knowledge. There is no speech nor language, where their voice is not heard. Their line is gone out through all the earth, and their words to the end of the world. In them hath he set a tabernacle for the sun” (Psa. 19:1-4).

Indeed, the evidence is everywhere. Look anywhere in the universe, look high and low, look at the infinitesimal and the mega-tesimal, everywhere we see the handiwork of an Almighty God.
Consider lowly plant life. Modern science is gazing into the mysteries of vegetative life and finding complexity upon complexity at every level.

**CONSIDER PLANTS AND THEIR ECOSYSTEM**

“[There] is interconnectedness between soil, microbes, plants, pests, and human health. Once you start to connect all the dots, you begin to understand the depth of nature’s intelligence, which always strives to maintain balance” (“Plants Can Hear Themselves Being Eaten,” Mercola.com, Oct. 11, 2014).

This description by a non-creationist speaks of the earth in terms of intelligence.

Dr. Suzanne Simard of the University of British Columbia, who has studied the large trees of British Columbia, says:

“We think of these individuals [trees] as just competing with each other, and that’s really led a lot of the thinking, and we have long ignored a lot of the other interactions other than competition. But at the same time there is a community effect that we haven’t understood, and we are just starting to re-look at this and understand that this is a system; it’s not just a bunch of individuals competing against each other. They are working together to make this system work” (“What Plants Talk About,” Nature, PBS).

**CONSIDER PLANT MATH**

The plant is constantly monitoring the light and performing complex calculations in order to ration its store of starch until the sun reappears.

“If the starch store is used too fast, plants will starve and stop growing during the night. If the store is used too slowly, some of it will be wasted” (Dr. Alison Smith, metabolic biologist, “These Plants Do Math,” Business Insider, June 24, 2013).

At the John Innes Center in Norwich, researchers studied the *Arabidopsis*, a small flowering plant of the mustard family. They attempted to trick the plants by changing light conditions, introducing windows of sunlight during the night, etc., but the plants adapted to every situation. It is obvious that the starch balance and light conditions are being monitored continually and recomputed according to the condition.
CONSIDER PLANT COMMUNICATION

The following report summarizes some of the findings of this field of science today:

“It’s now well established that when bugs chew leaves, plants respond by releasing volatile organic compounds into the air. By Karban’s last count, 40 out of 48 studies of plant communication confirm that other plants detect these airborne signals and ramp up their production of chemical weapons or other defense mechanisms in response. ‘The evidence that plants release volatiles when damaged by herbivores is as sure as something in science can be,’ said Martin Heil, an ecologist at the Mexican research institute Cinvestav Irapuato. ‘The evidence that plants can somehow perceive these volatiles and respond with a defense response is also very good.’ ...

“Karban started off as a cicada researcher, studying how trees cope with the plague of sap-sucking bugs that descends upon them every 17 years. Back then, the assumption was that plants survived by being tenacious, adapting their physiology to hunker down and suffer through droughts, infestations and other abuse. But in the early 1980s, the University of Washington zoologist David Rhoades was finding evidence that plants actively defend themselves against insects. Masters of synthetic biochemistry, they manufacture and deploy chemical and other weapons that make their foliage less palatable or nutritious, so that hungry bugs go elsewhere. For Karban, this idea was a thrilling surprise—a clue that plants were capable of much more than passive endurance.

“What Rhoades found next was even more surprising—and controversial. He was looking at how the Sitka willow altered the nutritional quality of its leaves in response to infestation by tent caterpillars and webworms. In the lab, when he fed the insects leaves from infested trees, the worms grew more slowly. But their growth was also stunted when he fed them leaves from undamaged willows that lived near the trees being eaten. The same biochemical change seemed to be happening in both groups of trees, and Rhoades’ conclusion, published in 1983, was that the untouched willows were getting a message from those under attack. That same year, Ian Baldwin and Jack Schultz from Dartmouth University found that seedlings of poplar and sugar maple began pumping out anti-herbivore phenols when placed in a growth chamber next to saplings with shredded leaves. They described it as plant communication. ...

“During the next decade, evidence grew. It turns out almost every green plant that’s been studied releases its own cocktail of volatile chemicals, and many species register and respond to these plumes. For example, the smell of cut grass—a blend of alcohols, aldehydes, ketones and esters—may be pleasant to us but to plants signals danger on the way. Heil has found that when wild-growing lima beans are
exposed to volatiles from other lima bean plants being eaten by beetles, they grow faster and resist attack. Compounds released from damaged plants prime the defenses of corn seedlings, so that they later mount a more effective counterattack against beet armyworms. These signals seem to be a universal language: sagebrush induces responses in tobacco; chili peppers and lima beans respond to cucumber emissions, too.

“Plants can communicate with insects as well, sending airborne messages that act as distress signals to predatory insects that kill herbivores. Maize attacked by beet armyworms releases a cloud of volatile chemicals that attracts wasps to lay eggs in the caterpillars’ bodies. The emerging picture is that plant-eating bugs, and the insects that feed on them, live in a world we can barely imagine, perfumed by clouds of chemicals rich in information. Ants, microbes, moths, even hummingbirds and tortoises (Farmer checked) all detect and react to these blasts” (“Plants Can Hear Themselves Being Eaten, and Can Communicate the Threat to Their Neighbors,” Oct. 11, 2014, Mercola.com)

Plants can detect sounds of insects eating them.

“As reported by IFL Science, when a bug such as a caterpillar chews on a plant’s leaf, the plant actually ‘hears’ the vibrations of the chewing, and produces a phytochemical to defend itself from further harm. ... The study was published in the journal Oecologia and involved recording plant responses to vibrational sounds by placing reflective tape on a leaf. Using a laser beam, they were able to measure the leaf’s response when a caterpillar chewed on it.

“They also played a recording of the near-inaudible vibrational sound of a caterpillar chewing, and interestingly enough, plants that had been previously exposed to these feeding sounds released higher amounts of chemicals that deters bugs.

“Even more interesting, these phytochemicals are also what give a plant many of its medicinal qualities, such as glucosinolates, which have anti-cancer properties, and other antioxidants. When a plant has increased levels of these chemicals, insects will not feed on it.

“In a nutshell, the vibrational sound of a bug chewing on a plant’s leaf causes a change in the cellular metabolism of the plant, creating chemicals that repel the attacker” (“Plants Can Hear Themselves Being Eaten, and Can Communicate the Threat to Their Neighbors,” Oct. 11, 2014, Mercola.com).
The potato protects itself with a system of hair triggers.

“The Bolivian potato defends itself using tiny hairs on its leaves called trichomes. There are roughly the same number of tall and short trichomes on the leaves, and they work together to provide a complete defense system for the plant. The hairs are so closely spaced that even a tiny aphid cannot avoid them. The end of each hair has a sack filled with defense chemicals. The short trichomes release their chemicals only when disturbed. The longer trichomes continuously release their chemicals. When an aphid gets on a leaf, its legs cannot avoid coming in contact with the sticky fluid the short trichomes release. To make certain that the aphid collects enough of the sticky stuff, the plant also releases a chemical that agitates the aphid. This gooey liquid finally sets up into a hard mass, leaving the aphid to starve. It also appears that a scent emitted by one of the trichomes makes the leaves completely distasteful to potato beetles” (Creation Moments, Feb. 20, 2015; reference Bombardier Beetles and Fever Trees, William Agosta, pp. 22-25).

Plants communicate via an underground plant “Internet.”

“Plants also communicate with other plants—even with plants of other species—through a complex underground network that includes, (1) the plants' rhizosphere (root ball), (2) aerial emissions (volatile gasses emitted by the plants), and (3) mycelial networks in the soil. These three systems work together forming a ‘plant internet,’ if you will, where information about each plant’s status is constantly exchanged. One of the organisms responsible for this amazing biochemical highway is a type of fungus called mycorrhizae.

“The name mycorrhiza literally means fungus root. These fungi form a symbiotic relationship with the plant, colonizing the roots and sending extremely fine filaments far out into the soil that act as root extensions.

“Not only do these networks sound the alarm about invaders, but the filaments are more effective in nutrient and water absorption than the plant roots themselves—mycorrhizae increase the nutrient absorption of the plant 100 to 1,000 times. In one thimbleful of healthy soil, you can find several MILES of fungal filaments, all releasing powerful enzymes that help dissolve tightly bound soil nutrients, such as organic nitrogen, phosphorus, and iron. ...

“Previous research has shown that when a plant becomes infested with a pest like aphids for example, it warns surrounding plants of the attack via this network of mycorrhizal fungi. This ‘heads up’ gives the other plants time to mount their chemical defenses in order to repel the aphids. Mycorrhizae fungi can even connect plants of different species, perhaps allowing interspecies communication.
“The study in question used bean plants and aphids, and in this case, the alerted bean plants deployed not only aphid-repelling chemicals, but also produced other chemicals that attract wasps, which are aphids’ natural predators!

“In bean plants where the researchers had removed the mycorrhizae connecting them together, the plants quickly succumbed to the infestation, presumably because they didn’t receive the warning to mount their defenses.

“Another 2012 article in the Journal of Chemical Ecology describes mycorrhizae-induced resistance as part of plants’ systemic “immune response,” protecting them from pathogens, herbivores, and parasitic plants. ... More than 90 percent of plant species have these naturally occurring symbiotic relationships with mycorrhizae, but in order for these CMNs to exist, the soil must be undisturbed. Erosion, tillage, cultivation, compaction, and other human activities simply destroy these beneficial fungi networks, and they are slow to colonize once disrupted. Therefore, cultivated or tilled farmed plants don’t develop mycorrhizae and are typically less healthy, as a result” (“Plants Can Hear Themselves Being Eaten, and Can Communicate the Threat to Their Neighbors,” Oct. 11, 2014, Mercola.com).

**Plants use electric signals to communicate danger and initiate chemical warfare**

“How does one leaf know it’s being eaten, and how does it tell other parts of the plant to start manufacturing defensive chemicals? To prove that electrical signals are at work, Ted Farmer’s team placed microelectrodes on the leaves and leaf stalks of *Arabidopsis thaliana* (a model organism, the plant physiologist’s equivalent of a lab rat) and allowed Egyptian cotton leaf worms to feast away. Within seconds, voltage changes in the tissue radiated out from the site of damage toward the stem and beyond. As the waves surged outward, the defensive compound jasmonic acid accumulated, even far from the site of damage. The genes involved in transmitting the electrical signal produce channels in a membrane just inside the plant’s cell walls; the channels maintain electrical potential by regulating the passage of charged ions. These genes are evolutionary analogues to the ion-regulating receptors that animals use to relay sensory signals through the body. ‘They obviously come from a common ancestor, and are deeply rooted,’ Farmer said. ‘There are lots of interesting parallels. There are far more parallels than differences’” (“How Plants Secretly Talk to Each Other,” Wired.com, Dec. 20, 2013).

This report claims that the electric signals in plants are “evolutionary analogues to the ion-regulating receptors that animals use,” but no evolutionist has explained how that such incredibly complex mechanisms can “evolve” either in plants or animals.
CONCLUSION

These scientific discoveries disprove evolution. Such complicated mechanisms could not possibly have evolved through any proposed Darwinian process (e.g., natural selection, mutations).

For those who have not closed their eyes to the truth, these discoveries provide irrefutable evidence of a Creator.

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