Plant Consciousness and the Networked Intelligence

An article in New Scientist (6 December 2014) entitled “Roots of Consciousness” summarizes the growing body of evidence that plants have memory, sensory perception, attentiveness, intelligence and consciousness. Indeed there even exists today the Society for Plant Neurobiology based at the University of Florence in Italy.

It seems the mighty Charles Darwin first started the debate with his book “The Power of Movement in Plants”. He put forward the “root brain” hypothesis. The root of the plant is actually a very complex structure. The root has a cap for protection as it spreads through the soil, and is also capable of detecting various physical properties such as gravity, humidity, light, oxygen and nutrients. After the cap is a section called the meristem. The cells in this section are said to divide rapidly. After this comes the transition zone which was originally thought to have no purpose, and then there is the elongation zone where the cells actually lengthen allowing the root to grow and propagate through the soil. Charles Darwin said in his book: “It’s hardly an exaggeration to say that the tip of the radicle (primary root) acts like the brain of one of the lower animals.” It is now being seriously argued at the Society for Plant Neurobiology that this transition zone in the root is actually the nerve center of the plant.

An Indian biophysicist Jagdish Chandra Bose, writing in 1900, pointed out that plants are capable of actively exploring their environments, and can modify their behavior and indeed learn new behaviors when necessary. Bose thought that plants had a nervous system located in the vascular system which transports nutrients, but most importantly recognized that information is constantly travelling around the plant via electrical signals. He saw electrical current running along fibers by means of differences in chemical potential. What he had discovered was signals passing as electromagnetic waves. Some of these electromagnetic waves run along fibers and appear to be chemical, but the majority of electromagnetic waves produced in the body are referred to as biophotons. There is a Chapter on Biophotons in my book and there you will find that they actually emanate from the DNA. This is the great discovery of Fritz-Albert Popp in the
1980s that the DNA of all living creatures, including plants, absorbs and emits light (electromagnetic waves).

Also in my book I demonstrate that the Hindu Inner Self is actually located in the embryo brain region of the brain. This is the part of the brain that appears first in the embryo very soon after conception. It consists of the thalamus, hypothalamus, midbrain and brainstem. These new revelations that plants actually have a nervous system and something akin to a brain also indicates that plants actually have an Inner Self just like all other living creatures with DNA in their cells. The fact is that it is emerging more and more that plants have many mental attributes that can be compared with such humble creatures as mollusks, crustaceans and the like. So why shouldn’t they likewise have an Inner Self like all other living creatures. Charles Darwin clearly recognized that plants had some limited intelligence and there is no reason to believe that intelligence in plants is essentially different from intelligence in all other creatures, including humans.

Obviously their intelligence is very limited but the fact is plants know how to do a great many things that not even humans can do. For instance, it is common knowledge that a plant can detect water flowing in an underground pipe at considerable distances away. Its roots will gravitate to that pipe and will wrap around it. A human can’t do this, and the plant doesn’t have the benefit of the conventional senses of being able to see the pipe, or hear or smell the water flowing in it. Somehow the plant just “knows” not only that there is a pipe there underground but that there is water flowing in it. If we ever came across an alien that could do that, we would call it an extra-terrestrial intelligence and recognize this alien’s intelligence as being far superior to our own.

The article in New Scientists lists several mental features of plants that have been discovered over the years. Some twenty years after Bose’s initial hypothesis that information was travelling around the plant via electrical signals, it was discovered that when a tomato plant is wounded there is a rapid plantwide release of certain proteins. The speed of the response could only be due to electrical signals, or so it was thought. This was in 1922 when research into proteins was in its infancy. Quite clearly the release of these proteins throughout the plant must come from signals in the DNA. And let’s be clear on this. This is a plantwide release of proteins with such speed that it appears to be due to electrical signals.

In the 1930s, Anthony Trewavas at the University of Edinburgh, UK defined plant intelligence “as the ability to sense one’s environment, to process and integrate such sensory perceptions, and decide how to behave.” The only problem with this definition is that a plant doesn’t have any of the sensory inputs that the rest of us have. If you deprived a human being of all the five senses, then you would undoubtedly say that he/she has become a “vegetable”, that is to say he/she is now leading the life of a plant.
Sometimes intelligent behavior can actually be witnessed in plants. Now-a-days with time lapse cameras, we can film the parasitic vine Cuscuta seedling “sniffing” the air “looking” for a host, this notwithstanding that it has no nose and no eyes. When it finds one, it lunges and wraps itself around its victim, and will show a preference for tomato over wheat. Trewavas said: “It is remarkably snakelike in the way it behaves. You’ll stop doubting that plants aren’t intelligent organisms, because they are behaving in ways that you expect animals to behave.” Surely if this seedling behaves like a snake it would need to have a level of intelligence similar to that of a snake.

The Society for Plant Neurobiology have pointed out that this transition zone in the root that seems to be the central nervous system is electrically active. They tell us that a hormone called auxin is ferried around this area in protein containers called vesicles that release their load and then are reused. They say that this is similar to the transport of neurotransmitters in animal brains. Also, the transition zone is a major consumer of oxygen similar to the human brain. Their arguments are all directed towards similarities with the neuronal network in animal brains, but surely the plant has no neurons. It does however have DNA and RNA and the electrical signals, the synthesis of proteins and the consumption of oxygen are all more likely to be concerned with that.

Professor Manusco of the Society for Plant Neurobiology says that many plant cells are capable of neuron-like activity. “In plants, almost every cell is able to produce and propagate electrical signals. In roots, every single cell is able to do so.” He also confirms the initial findings of Bose that the phloem, the vascular system used to transport nutrients, is extremely electrically active, and results in fast electrical signaling. Professor Baluska also of the Society for Plant Neurobiology says: “It is some kind of huge axon, running from the shoot tip to the root tip.” Here again we see them trying to draw similarities with neurons. Referring to the phloem as a “huge axon” for example he is talking about the electrical signals that are known to propagate along nerve fibers by means of action potentials. This is electrical current caused by chemical potential differences in the fiber. But all the rest of the electrical activity he is talking about, especially in the roots, are actually biophotons (electromagnetic waves) emanating from the DNA, and have nothing whatsoever to do with a neuronal network.

Indeed, the Society for Plant Neurobiology has been forced to change its name to the Society of Plant Signaling and Behavior because of pressure from scientific colleagues. Professor Chamovitz at Tel Aviv University says that the term “plant neurobiology” is an oxymoron, plants just don’t have neurons. He does however recognize that plants can communicate with each other through invisible and undetectable means, that they can integrate sensory information even though they have no sensory organs, and that they have memory. He attributes the memory of the Venus flytrap for example to the buildup of molecules in the trap’s sensory hairs. When the build-up of molecules exceeds a threshold level it triggers an action potential that causes the trap to snap shut. But surely this is more likely to be something that can come directly from the DNA.
In my book I describe the new field of optogenetics where it has been found that light (electromagnetic waves) can switch neurons on and off. In other words any action potential can be triggered by biophotons coming from the DNA. Biophotons are thus capable of causing electrical signals to propagate along “axon-like” fibers in the plant as well.

The Society for Plant Neurobiology pointed out that plants can have long-term memories. *Mimosa pudica*, the touch-me-not plant can remember when it is being touched by something that it “knows” is non-threatening and won’t close its leaflets. “Even after one month, they were able to discriminate and be able to understand whether the stimulus was dangerous or not,” Manusco says.

Here again, although Professor Chamovitz admits that this is very clever of the touch-me-not plant, it is not intelligence. He says: “I don’t like the term plant intelligence. We don’t even know what intelligence is for humans. If you get five psychologists together you will get 20 different definitions.” Other scientists agree with him. Professor Murch of University of British Columbia is not convinced that plants have intelligence even though they have sensing, awareness, integration of information, long-term memory and adaptive learning.

The problem seems to be that although all these scientists agree that plants are displaying an awful lot of behavior that appears to be the product of intelligence, they are divided on this point that plants don’t have neurons and therefore can’t be intelligent. If it is not produced by a neuronal network, it is not intelligent: it is something else. Given all this seemingly intelligent behavior by plants without neurons, instead of bending over backwards trying to point out similarities in plant cells to neuron-like properties, shouldn’t they be asking the more basic question: “Well maybe intelligence does not come from the neurons after all. Plants do have DNA in common with intelligent animals like humans and snakes, and hamsters and whales. If plants are doing intelligent things just like these other animals, and in some cases doing things that these other animals can’t even do, then it must mean that all intelligence actually comes from the DNA.”