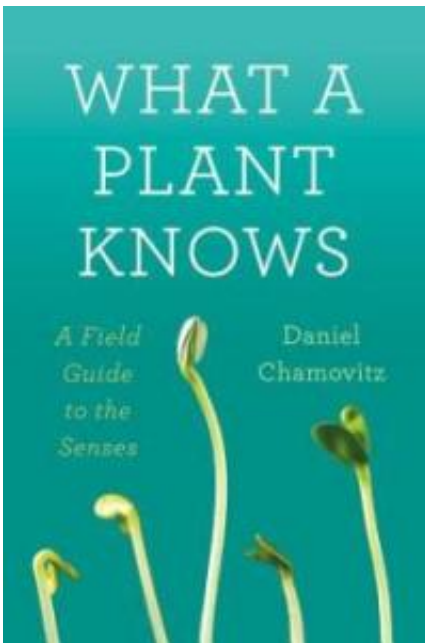


# Tel Aviv University researcher says plants can see, smell, feel, and taste

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Increasingly, scientists are uncovering surprising biological connections between humans and other forms of life. Now a Tel Aviv University researcher has revealed that plant and human biology is much closer than has ever been understood — and the study of these similarities could uncover the biological basis of diseases like cancer as well as other “animal” behaviors.

In his new book *What a Plant Knows* (Farrar, Straus and Giroux) and his

articles in Scientific American, Prof. Daniel Chamovitz, Director of TAU's Manna Center for Plant Biosciences, says that the discovery of similarities between [plants](#) and humans is making an impact in the scientific community. Like humans, Prof. Chamovitz says, plants also have "senses" such as sight, smell, touch, and taste. Ultimately, he adds, if we share so much of our genetic makeup with plants, we have to reconsider what characterizes us as human.

These findings could prompt scientists to rethink what they know about biology, says Prof. Chamovitz, pointing out that plants serve as an excellent model for experiments on a cellular level. This research is also crucial to food security, he adds, noting that knowledge about plant genetics and how plants sense and respond to their environment is central to ensuring a sufficient food supply for the growing population — one of the main goals of the Manna Center.

## **Seeing the light**

One of the most intriguing discoveries of recent years is that a group of plant genes used to regulate responses to light is also part of the human DNA. These affect responses like the circadian rhythm, the immune system, and cell division.

A plant geneticist, Prof. Chamovitz was researching the way plants react to light when he discovered a group of genes that were responsible for a plant "knowing" whether it was in the light or in the dark. He first believed that these genes were specific to plant life, but was surprised to later identify the same group of genes in humans and animals.

"The same group of proteins that plants use to decide if they are in the light or dark is also used by animals and humans," Prof. Chamovitz says. "For example, these proteins control two seemingly separate processes. First, they control the circadian rhythm, the biological clock that helps

our bodies keep a 24 hour schedule. Second, they control the cell cycle — which means we can learn more about mutations in these genes that lead to cancer." In experiments with fruit flies who had a mutated version of one of these genes, Prof. Chamovitz and his fellow researchers observed that the flies not only developed a fly form of leukemia, but also that their circadian rhythm was disrupted, leading to a condition somewhat like permanent jet-lag.

Plants use light as a behavioral signal, letting them know when to open their leaves to gather necessary nutrients. This response to light can be viewed as a rudimentary form of sight, contends Prof. Chamovitz, noting that the plants “see” light signals, including color, direction, and intensity, then integrate this information and decide on a response. And plants do all this without the benefit of a nervous system.

And that's not the limit of plant "senses." Plants also demonstrate smell — a ripe fruit releases a "ripening pheromone" in the air, which is detected by unripe fruit and signals them to follow suit — as well as the ability to feel and taste. To some degree, plants also have different forms of "memory," allowing them to encode, store, and retrieve information.

## **Just like us**

Beyond the genes that regulate responses to light, plants and humans share a bevy of other proteins and genes — for example, the genes that cause cystic fibrosis and breast cancer. Plants might not come down with these diseases, but the biological basis is the same, says Prof. Chamovitz. Because of this, plants are an excellent first stop when looking for a biological model, and could replace or at least enhance animal models for human disease in some types of research.

He is working alongside Prof. Yossi Shiloh, Israel Prize winner and incumbent of the David and Inez Myers Chair of Cancer Genetics at Tel

Aviv University's Sackler Faculty of Medicine, to understand how the [genes](#) Chamovitz discovered function in protecting human cells from radiation.

Provided by Tel Aviv University

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