

# Telltale moss: Mother Nature gives clues for improving stem cell techniques

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Hikers know that moss on a tree trunk always points north. According to new research by Israeli and German scientists, this ancient plant may also provide a new "compass" for stem cell research, telling scientists how better to program stem cells for medical purposes.

Dr. Nir Ohad of Tel Aviv University's Department of Plant Sciences and Prof. Ralf Reski of the University of Freiburg have discovered a new use for the Polycomb group proteins (PcG) found in moss. They reported their findings recently in the journal *Development*. PcG proteins play an important role in telling [stem cells](#) how to develop, they believe. The research is being funded by the German-Israeli Foundation.

Moss is a kind of plant that shares basic development processes with those found in humans. "We may not have found the switch that turns stem cells into tissue," comments Dr. Ohad, "but we have found a key component which makes this switch work."

## Stopping the runaway gene

In their new paper, the researchers describe an ancient mechanism that alters the way DNA organizes inside the [cell nucleus](#), which in turn, affects [gene expression](#). This finding has important implications in stem cell therapies, which can go awry if implanted stem cells aren't reprogrammed properly.

The researchers examined the "central regulatory function" of the PcG complex and how it programs an organism's development, including the first divisions of cells as a new organism is born. Insights from this research have implications for plant and human development alike, and with time could be applied to cancer research. "As far as we know, there are some instances in cancer where the cellular mechanisms are defective or impaired," Dr. Ohad says. "When this happens, it can lead to the misregulation of the [genetic code](#), which can then lead to the breakdown of a healthy cell."

He adds that this "switch," which ensures the proper development of the organism, emerged early in the evolution of all organisms with a nucleus and organized DNA, long before animals and plants evolved into vastly different species and genera.

## **Towards a less "moss-ist" world**

In some scientific disciplines, mosses are considered "lower-class," or less advanced, organisms. But Dr. Ohad defends mosses as highly adaptive organisms, which after 450 million years are still with us. "The original moss — *Physcomitrella patens* — hasn't endured all these years, but its descendents have," he says. He adds that the study of the biology of moss is similar to the study of the biology of other ancient creatures, like crocodiles and flies, helping scientists to understand the evolution and function of basic biological mechanisms.

The researchers suggest that the basic function of the PcG mechanism in moss, common to its function in plants and humans, is in regulating cell differentiation, describing the point at which a stem cell "decides" to become a leaf or flower, for example.

"As they develop, stem cells go from having a non-defined function to a specific one," says Dr. Ohad. "If you don't know how to manipulate the

type of tissue you want to modulate, replace or heal, you might cause the malfunction of another type of tissue."

According to Dr. Ohad, this research has direct implications for the study of plant biology, providing basic information on how the plant body and reproduction are regulated. It gives science a tool to control tissue specification, timing of reproduction and the development of traits in seeds that serve as the source for human and animal feed.

Source: Tel Aviv University ([news](#) : [web](#))

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