

Researchers discover how gene silencing works in plants

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The group of Dr. Myriam Calonje Macaya from the University of Seville, and the group of Franziska Turck from the Max Planck Institute have recently published a study in *Genome Biology* that advances the knowledge of epigenetic regulation by means of Polycomb-group proteins in plants.

All the cells in an organism contain the same information in their DNA. In order for two different cellular types to exist with two different developmental processes, the genes that are not needed at a specific moment have to be switched off. This process is what is known as [gene silencing](#).

"When a seed is created, a great number of its genes are silenced until the plant is adult and needs their activity," explains Dr Calonje.

This repressed or silenced state is transmitted to the daughter cells after division so that a cellular memory is established. The Polycomb group (PcG) proteins participate in this process. These proteins are organised into two complexes, PRC1 and PRC2, which incorporate modifications in the histones that, together with the DNA, constitute the chromatin. The [histone modifications](#) do not alter the DNA sequence, but do alter the structure of the chromatin, which affects the expression of the genes.

Gene silencing controlled by marks in the chromatin occurs in both animals and [plants](#). The PcG complexes were first characterised in animals; PRC1 modifies the histone H2A via monoubiquitination, and

PRC2 has trimethyltransferase activity on the histone H3. It was previously observed that the PcG complex action mechanism in plants was similar to that observed in animals, in which the trimethylation mark established by the PRC2 serves to anchor the PRC1, which also has a monoubiquitin effect on the H2A.

Scientists like Zhou, Romero-Campero and their collaborators researched the localisation of these modifications of the genome in wild and mutant plants to determine if this sequence happened, but they found that it did not. The activity of the PRC2 is dispensable for establishing monoubiquitination marks; what is more, the inverse sequence is required for the majority of [genes](#).

"This study supports a change in the paradigm of a decade that was taking the understanding of PcG function in plants nowhere," says Dr. Calonje.

This study was carried out using the plant *Arabidopsis thaliana*, but the experts believe that the findings can be extrapolated to other plants, which would mean future biotechnological applications for physiological improvement and development of plants.

More information: Yue Zhou et al. H2A monoubiquitination in *Arabidopsis thaliana* is generally independent of LHP1 and PRC2 activity, *Genome Biology* (2017). [DOI: 10.1186/s13059-017-1197-z](https://doi.org/10.1186/s13059-017-1197-z)

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