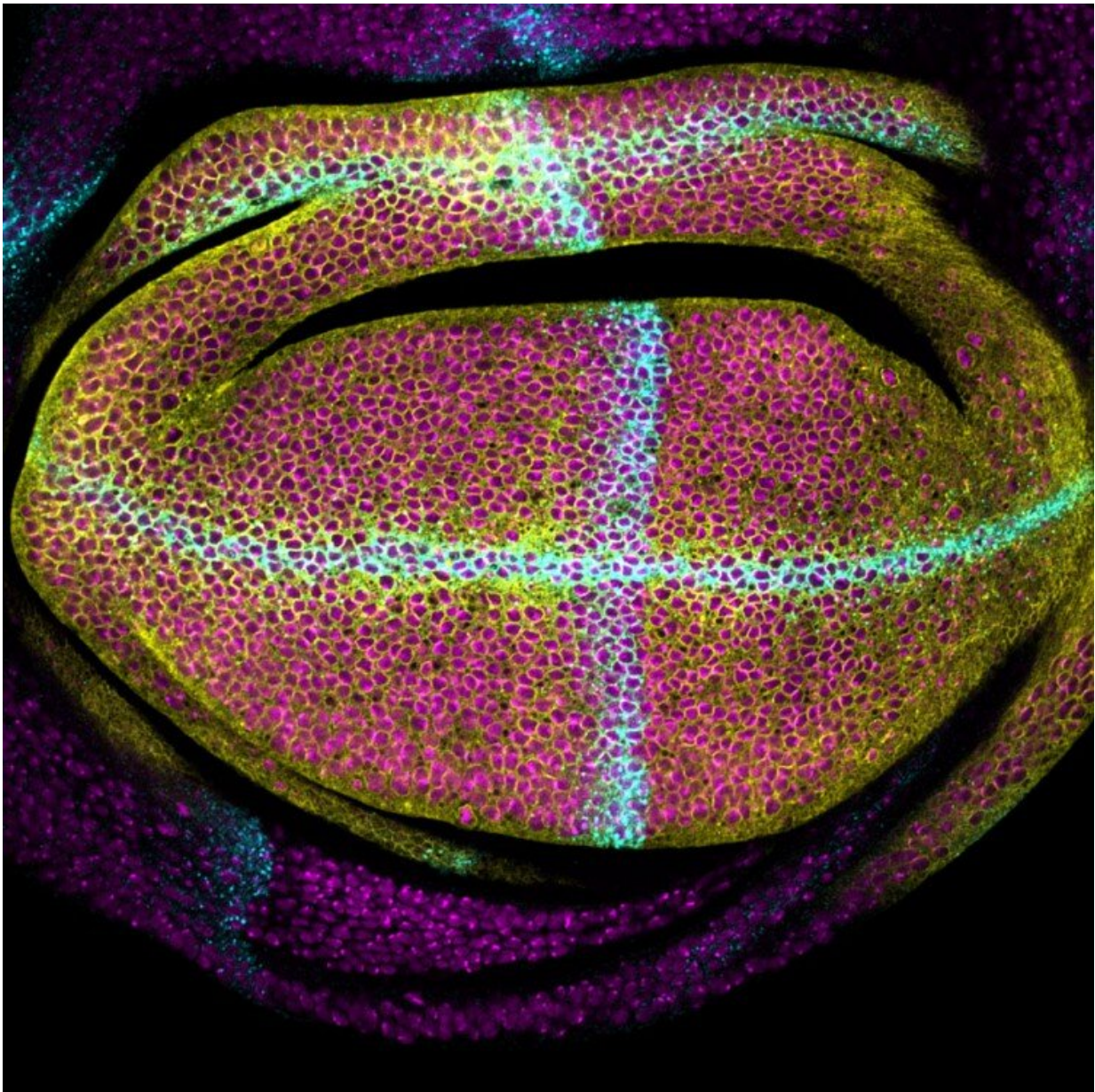


Deciphering the mechanism that determines organ size and shape

February 21 2020



Credit: Institute for Research in Biomedicine (IRB Barcelona)

A study by IRB Barcelona's Development and Growth Control Laboratory, headed by ICREA researcher Marco Milán, reveals how Dpp and Wg morphogens regulate organ proportions and patterning of the fly wing through independent mechanisms. Given that these morphogens are present in vertebrates, these results are highly significant for understanding the development and growth of human limbs. "The regulatory mechanism that we describe in this study may pave the way to new research lines on malformations and congenital diseases in humans," says Marco Milán.

Size is not determined by gradients

Morphogens are distributed throughout tissues in a concentration gradient, informing cells about their "location" and providing instructions on how they should develop. Several studies have also reported that these morphogens are responsible for the growth of these tissues. While the presence of morphogens along a gradient defines the spatial distribution of the different structures, the study by the Development and Growth Control Laboratory demonstrates that the gradient itself is not indispensable to promote growth. In a previous study, published in 2017 in the journal *eLife*, this same group proposed that wing growth was independent of the Dpp gradient. These new findings, which have been published in *Developmental Cell*, "confirm that the presence of Wg is necessary throughout development, but, as occurs with Dpp, its distribution along a [gradient](#) is not an indispensable requirement," explains Lara Barrio, first author of the study.

Morphogens stimulate directional growth

The two morphogens addressed in this study, namely Dpp and Wg, promote the growth of the fly wing, but through two independent and non-interchangeable pathways. Dpp stimulates growth along the anteroposterior axis in a unique and exclusive manner, while Wg favours proliferative activity along the proximodistal axis. The work carried out by Barrio and Milán demonstrates that the capacity of these morphogens to promote growth in two distinct directions is due to their restricted expression in two perpendicular bands and to the need for both to be present for the tissue to grow. These findings thus reveal the mechanism through which organ proportions are regulated by [morphogen](#) activity.

This study has been funded by the Ministry of Science and Innovation, the Severo Ochoa Centres of Excellence Award, the programme "A way to build Europe," supported by the European Development Fund (ERDF) and the CERCA Programme, run by the Government of Catalonia.

More information: Lara Barrio et al, Regulation of Anisotropic Tissue Growth by Two Orthogonal Signaling Centers, *Developmental Cell* (2020). [DOI: 10.1016/j.devcel.2020.01.017](https://doi.org/10.1016/j.devcel.2020.01.017)

Provided by Institute for Research in Biomedicine (IRB Barcelona)

Citation: Deciphering the mechanism that determines organ size and shape (2020, February 21) retrieved 3 May 2024 from <https://phys.org/news/2020-02-deciphering-mechanism-size.html>

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