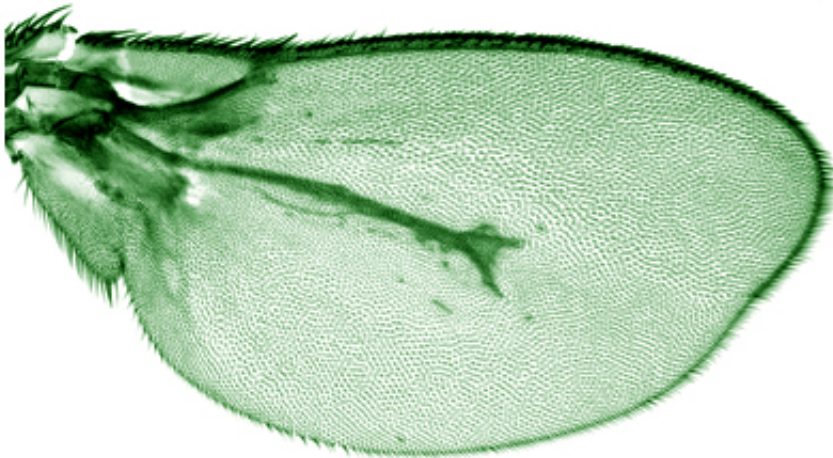
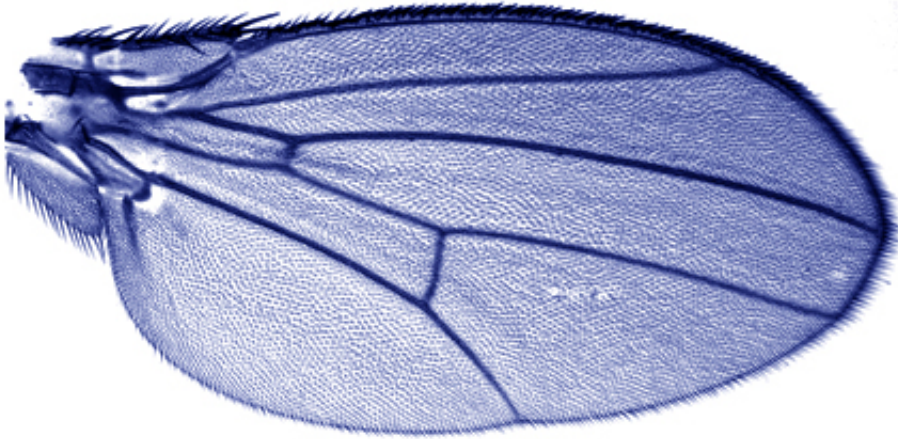


Drosophila brings to light the role of morphogens in limb growth

July 5 2017



The top and bottom of the image show how the Dpp concentration gradient affects the organisation of the wing structure of *Drosophila melanogaster*. In the centre, in the absence of Dpp, the wing does not grow. Credit: Lara Barrio

Researchers working in the Development and Growth Control Lab at IRB Barcelona reveal that the Dpp gene (BMP in humans) plays a double role in the structural organisation and growth of the wings of the fruit fly *Drosophila melanogaster*. This study, which has been published in the journal *eLife*, demonstrates that Dpp is necessary for tissue growth but that "its gradient does not direct wing growth," explains Marco Milán, ICREA research professor and head of the study. This and two other studies published simultaneously in the journal *eLife* settle the intense scientific debate regarding the function of Dpp and other morphogens involved in development.

Morphogens are molecules found in concentration gradients throughout tissues and they send signals from one cell to another. "The [wing](#) of *Drosophila melanogaster* has several morphogens, such as Dpp (BMP in humans) and Wingless (Wnt in humans), which are necessary for [growth](#)," explains Lara Barrio, the first author of the study and postdoctoral fellow in the Development and Growth Control Lab at IRB Barcelona. In this study, the scientists have examined how Dpp regulates growth and analysed how cells behave when Dpp levels are manipulated.

The role of the Dpp concentration gradient in the regulation of [tissue](#) is the subject of intense debate among scientists. Morphogens have been considered to be responsible for this process; however, using distinct techniques, these three studies now conclude that morphogens are necessary for growth but that their concentration gradients do not directly govern this process.

"We know that the gradient of this [morphogen](#) in particular affects the structural organisation or the identity of the tissue, but the different levels of Dpp across the tissue have no effect on growth. That is to say, whether a tissue grows or not depends on whether Dpp is present or absent. Its gradient has no influence", explains Marco Milán.

So what regulates the size of the final structural of the *Drosophila* wing? "Morphogen gradients don't. There must be another alternative and as yet unknown mechanism, and the fly wing is an ideal model to answer this question," says Marco Milán.

This research is consistent with knowledge about the morphogen Sonic hedgehog in vertebrate limbs. The gradients of this molecule affect tissue identity (for example, for the fingers of a hand to differ from each other) but do not regulate growth. Therefore understanding how the structures of *Drosophila* form and develop paves the way to studying vertebrate development and congenital defects in humans.

More information: Lara Barrio et al. Boundary Dpp promotes growth of medial and lateral regions of the *Drosophila* wing, *eLife* (2017). [DOI: 10.7554/eLife.22013](#)

Provided by Institute for Research in Biomedicine (IRB Barcelona)

Citation: *Drosophila* brings to light the role of morphogens in limb growth (2017, July 5) retrieved 26 June 2024 from <https://phys.org/news/2017-07-drosophila-role-morphogens-limb-growth.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.