Researchers clarify neuronal function that prevents insects from producing eggs in winter

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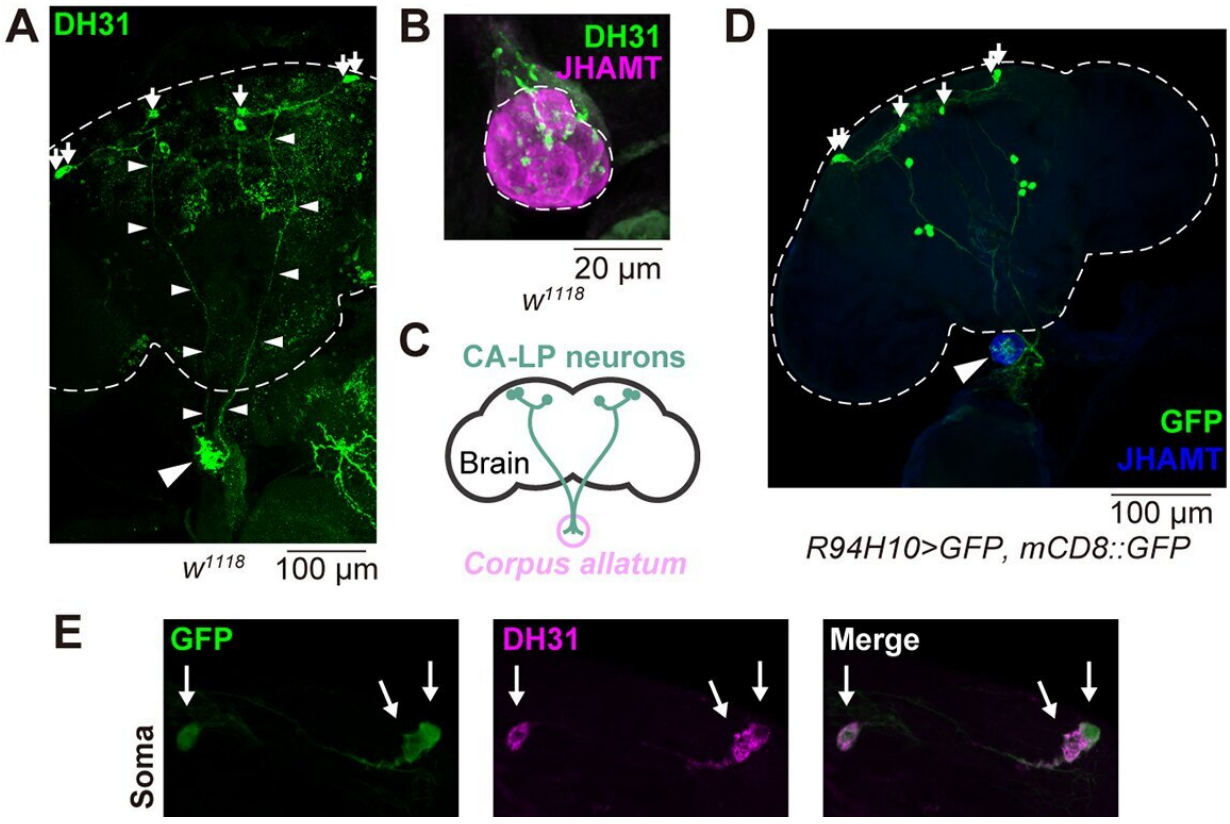

Anatomical characterization of CA-LP neurons. (A) Immunostaining with anti-DH31 antibody in the adult central brain (outlined by dashed lines) and the corpus allatum (CA) of wild-type (w^{1118}) adult females. The upper and lower parts of the photograph correspond to the dorsal and ventral sides of the central brain, respectively. Axonal processes from the cell bodies to the CA (large arrowhead) are indicated by the small arrowheads. Small arrows indicate the cell

bodies of CA-LP neurons. (B) Immunostaining signal in the CA of wild-type (w^{1118}) adult females 4 days after eclosion. The anti-DH31 antibody (green) was employed along with the anti-JHAMT antibody, which was used to visualize the CA (magenta). DH31-positive puncta are observed in the CA region. Note that DH31-immunoreacive varicosities were observed inside the CA. Dashed line indicates the outline of the CA. (C) A schematic representing the anatomy of brain, CA-LP neurons and CA. (D) Transgenic visualization of CA-LP neurons by GFP driven by R94H10-GAL4, which specifically labels CA-LP neurons and other small subsets of neurons. Samples were immunostained with anti-GFP (green) and anti-JHAMT (blue) antibodies. The CA is marked with a large arrowhead. Dashed line indicates the outline of the brain. Small arrows indicate the cell bodies of CA-LP neurons. (E) Immunostaining signal with anti-GFP (green) and anti-DH31 (magenta) antibodies in the brain region, including the soma of CA-LP neurons (arrows), and in the CA region in an adult female R94H10-GAL4 UAS-GFP UAS-mCD8::GFP. Credit: *Development* (2023). DOI: 10.1242/dev.201186

Dormancy is a survival strategy for many organisms that involves suppressing development and reproduction for a period of time to reduce energy consumption in unfavorable environments. In some insects, reproductive dormancy occurs during seasons unsuitable for reproduction due to a decrease in the amount of juvenile hormone, which is a well-known insect hormone.

Although neurons projecting from the brain to the juvenile hormone-producing organ (corpus allatum) have been known to regulate reproductive dormancy for >50 years, the specific neurosecretory factors controlling the amount of juvenile hormone have remained unclear.

Researchers used the fruit fly Drosophila melanogaster to demonstrate for the first time that the neuropeptide diuretic hormone 31 (DH31)

regulates reproductive dormancy. They discovered that neurons projecting from the brain to the corpus allatum produce DH31 and that DH31 secreted by these neurons is crucial for reproductive dormancy. Additionally, they found that DH31 receptors are expressed in the corpus allatum and that receiving DH31 suppresses juvenile hormone production, inducing reproductive dormancy. The work is published in the journal *Development*.

Given the evidence that neurons projecting to the corpus allatum regulate reproductive dormancy in various insects and that DH31 is conserved, it is likely that DH31 controls reproductive dormancy in a broad range of insect species. Understanding the mechanisms of insect dormancy control could lead to the development of new technologies to control agricultural pests and infectious disease vectors.

More information: Yoshitomo Kurogi et al, Female reproductive dormancy in Drosophila is regulated by DH31-producing neurons projecting into the corpus allatum, *Development* (2023). DOI: 10.1242/dev.201186

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