Why does puberty trigger us to stop growing?

November 27 2023, by Emily Stone

Credit: Pixabay/CC0 Public Domain

All animals start out as a single-celled organism and then start growing. At some point, of course, they need to stop getting bigger, but the process by which this happens is poorly understood.

New research from Alexander Shingleton at the University of Illinois

Chicago and colleagues identifies a potential trigger that makes fruit flies stop growing, which has implications for understanding human development. The research is published in the *Proceedings of the National Academy of Sciences.*

In humans, the body's signal to stop growing happens around puberty, though it takes several more years before growth actually ceases. It is important to better understand this process in part because of recent changes in how children experience puberty.

"We know that the onset of puberty is getting younger and younger. But in order to understand why something is changing, you need to understand how it works," said Shingleton, a professor of biological sciences.

So the researchers looked at fruit flies, which undergo the equivalent of puberty when they metamorphosize from larvae into adults. The theory among many biologists has been that a larva stops growing when it reaches a certain body size, which triggers it to start the process of becoming an adult. Other insects do this, such as the kissing bug, which uses a "stretch receptor" in its abdomen to monitor its size, Shingleton explained.

But Shingleton and his co-authors weren't convinced that fruit flies were using such a mechanism. They hypothesized that it had something to do with a steroid hormone involved in fruit fly growth called ecdysone, which is similar to estrogen and testosterone in humans.

The researchers used a mathematical model to explore their idea. The model showed that body size is not the trigger that causes a fruit fly to stop growing. Instead, a "stop growing" switch is triggered by the gland that makes ecdysone. In the larval stage, that gland receives lots of nutritional information that helps it decide how to regulate ecdysone

production. But once ecdysone reaches a certain level, the gland no longer needs that nutritional information to make decisions and starts regulating itself.

The researchers believe this switch from needing nutritional information is what triggers the fruit fly to stop growing. "It's not that the fly is measuring itself in a direct way," Shingleton said.

He'd like to see similar studies done on mammals, which could shed more light on the growth-stopping process in humans. But Shingleton suspects that the fruit fly experience is related to ours, given that both involve similar steroid hormones and both fruit flies and humans convey nutritional information via insulin.

The other researchers on the project are UIC undergraduate student Amirali Monshizadeh, John Tyson at Virginia Tech and Stanislav Shvartsman at Princeton.

More information: Tyson, John J. et al, A dynamical model of growth and maturation in Drosophila, *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2313224120. doi.org/10.1073/pnas.2313224120

Provided by University of Illinois at Chicago