

Researchers Study Gene Regulation In Insects

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Susan Brown, an associate professor of biology at Kansas State University, is interested in how evolution generates so much diversity in insects shapes and forms.

Take the fruit fly and the beetle, for example. Even though they look very different, they have the same segmented body plan consisting of head, thorax and abdomen, Brown said. They differ, though, in how they make segments in the embryo. Fruit flies make segments all at once; beetles make segments one at a time.

"Imagine slicing a loaf of bread," Brown said. "Segmentation in fruit

flies is similar to a pre-sliced loaf of bread. In other insects and even humans, segments are added one at a time, like slicing a loaf of freshly baked bread."

It is this segmentation that is the basis of a paper by Brown and two K-State doctoral students. The appears in a recent edition of Proceedings of the National Academy of Science.

"We wanted to know how the same genes that slice a space like a loaf of bread can also add slices one at a time," Brown said.

According to Brown, the groundwork for this research was laid about 20 years ago when scientists first learned about the genes that regulate embryonic development in the fruit fly. She said one question that many scientists have been asking since is do other insects have those same genes? If they do, what role do these genes play to give insects such different ways of making segments?

Researchers first identified the genes associated with segmentation and discovered other insects, as well as humans, possessed the genes. But they wondered if the genes functioned the same in every organism.

"We figured that it would be good to start with another insect -- but an insect that looks very different," Brown said. "A fruit fly has a very specific shape and a beetle looks quite different. We thought it would be a good place to start, since they also develop very differently.

"Once the genes involved in segmentation were identified in other insects, we asked if they function the same as in fruit flies. If the function of these genes is eliminated, can the beetle still make segments?"

According to Brown, some of the genes that make segments in fruit flies

are also needed to make segments in beetles. Other genes were found not to be needed.

"These results will help us decide which genes to investigate in other insects and arthropods to better understand the basic process of segmentation and how it is regulated at the genetic level," Brown said.

Source: Kansas State University

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