

# Scientists investigate role of stem cells in adult brain cell production

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*Procambarus clarkii*

(PhysOrg.com) -- Georgia State researchers in the university's Neuroscience Institute and the department of biology are investigating how stem cells create new brain cells in adulthood.

The scientists are looking at how new neurons — the basic cellular elements of the nervous system — are made during a process called neurogenesis in a species of crayfish called *Procambarus clarkii*.

“To drive the permanent production of cells in any given tissue, you need stem cells to support it,” said Manfred Schmidt, a Georgia State research scientist who led the project that was performed in the labs of professors

Don Edwards and Charles Derby, mainly by Cha-Kyong Song, a graduate student and Laurel M. Johnstone, a research technician.

Decades ago, scientists believed that addition of new neurons stopped at adulthood, but they now recognize that neurogenesis continues, for both crustaceans and mammals alike. It continues because neuronal stem cells, which create different types of brain cells, continue to exist into adulthood, though not in as great of numbers as in embryos.

Neuronal stem cells take different forms depending on the type of animal. In crustaceans, relatively large cells called neuroblasts are responsible for neurogenesis, located in a part of the brain responsible for processing odor information, called the olfactory midbrain.

In other crustaceans, the neuroblasts are located near to where the new neurons are generally located. But Schmidt and his colleagues found that the neuroblasts in crayfish brains are located farther from where the new neurons are needed — forcing them to travel down pathways to get to their destinations.

“In essence, these are similar organisms, except the stem cells are further away from the action,” Schmidt said. “Now you have to ship out the cells that the stem cells are producing, through a long path to finally reach their target.”

Schmidt said this might be due to the way crayfish have evolved to live in freshwater environments, rather than in saltwater.

“That is a big evolutionary step, and in making this step, they might have lost some of their olfactory capacity,” he explained.

In order for stem cells — legacies of embryonic development — to live in adult body tissues, the cells need particular areas that are suitable environments for them to live, or niches. In crayfish, the niches

surrounding neuroblasts are unique structures that can be distinctly identified as being clumps of cells associated with the stem cells.

“It seems that the mechanism of making a neuron in an adult animal is an extension of how this is done in the embryo,” Schmidt said, adding that he and other researchers hope to better understand these niches and how they support stem cells throughout adult life.

Provided by Georgia State University

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