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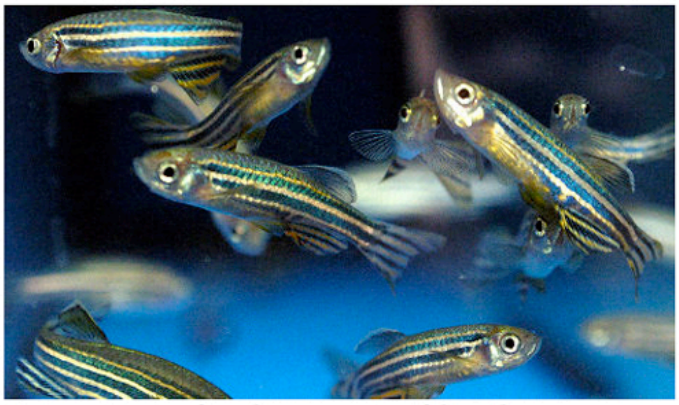

Scientists find secret of limb regeneration

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Scientists at the University of Konstanz in southern Germany announced Thursday they have worked out how some animals can re-grow amputated limbs, successfully completing three decades of research.

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Many animals have the ability to re-grow limbs, but the undisputed champion of the art is the zebrafish, a tropical freshwater fish found in the southeastern Himalayan region. The minnow-sized fish can re-grow lost fins, organs, and heart-muscles.

Scientists already knew that the tropical zebrafish somehow uses a special "retinoic acid" to rebuild its limbs, but no-one has know exactly how this worked. Konstanz doctoral student Nicola Blum, part of a team led by researcher Gerrit Begemann, was the first to show that the substance is essential to regeneration.

"It is a huge success for us," Begemann told The Local. The success is being hailed as a breakthrough because scientists have been puzzling for over a quarter of a century on the effect of artificially increasing retinoic acid to regenerate limbs.

"Up to now, no-one has really looked into what the actual function of this acid is. We have shown that retinoic acid is actually essentially to the process," said Begemann.

Before the zebrafish's fins regenerated, the wound is closed with multiple layers of tissue. The cells beneath the stump then lose their identity and form what is called blastema. Researchers found that the fish uses a special genetic trick that allows the acid to control the formation of blastema, which means the animal is able to produce a store of cells that can rebuild the limb.

Retinoic acid is produced by animals, including humans, from vitamin A and can activate the necessary genes for regeneration. It has been shown that pregnant women who do not take enough vitamin A in their diet can have underdeveloped foetuses.

But that does not mean that some mega-vitamin A supplements can help amputees grow their legs back. "I wish I could say there is some medical application," said Begemann. "The problem is humans can't regenerate tissue. And at the moment we don't understand enough about why not."

"Children under five or six, for example, who lose part of their finger up to the first knuckle can regenerate them," he explained. "As long as you don't sew it up and just clean it. But we don't know why we lose that ability so young in life. Ultimately we want to know why. The application for humans is a long way away, unfortunately."

Nor would some canny future genetic engineering help matters.

"No, that is utopian at the moment," said Begemann. "And I wouldn't support that ethically either. Interfering in human genes is ethically questionable and not really possible at the moment anyway."

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