Let's get moving: Unravelling how locomotion starts

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The Xenopus frog tadpole is a small, simple vertebrate

(Medical Xpress) -- Scientists at the University of Bristol have shed new light on one of the great unanswered questions of neuroscience: how the brain initiates rhythmic movements like walking, running and swimming.

While experiments in the 1970s using electrical brain stimulation identified areas of the brain responsible for starting locomotion, the precise neuron-by-neuron pathway has not been described in any vertebrate – until now.

To find this pathway, Dr. Edgar Buhl and colleagues in Bristol's School of Biological Sciences studied a small, simple vertebrate: the Xenopus frog tadpole.

They found that the pathway to initiate swimming consists of just four types of neurons. By touching skin on the head of the tadpole and applying cellular neurophysiology and anatomy techniques, the scientists identified nerve cells that detect the touch on the skin, two types of brain

nerve cells which pass on the signal, and the motor nerve cells that control the swimming muscles.

Dr. Buhl said: “These findings address the longstanding question of how locomotion is initiated following sensory stimulation and, for the first time in any vertebrate, define in detail a direct pathway responsible. They could thus be of great evolutionary interest and could also open the path to understanding initiation of locomotion in other vertebrates.”

When mechanisms in the brain that initiate locomotion break down – for example, in people with Parkinson’s disease – starting to walk becomes a real problem. Therefore, understanding the initiation of swimming in tadpoles could be a first step towards understanding the initiation of locomotion in more complex vertebrates, including people, and may eventually have implications for treating movement disorders such as Parkinson's.

The research is published today in the *Journal of Physiology.*

More information: ‘The role of a trigeminal sensory nucleus in the initiation of locomotion’ by Edgar Buhl, et al. Journal of Physiology

Provided by University of Bristol