Humble worm helps Queensland and US scientists in nerve research

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Australian and US scientists have developed a new technology for studying the genetics of a common roundworm used to understand nerve development and nerve degeneration.

Queensland Brain Institute (QBI) scientists at The University of Queensland (UQ) in Brisbane, Australia have worked closely with researchers at the Georgia Institute of Technology in Atlanta, to develop the technology.

The work will allow neuroscientists working with the small nematode worm, *Caenorhabditis elegans* (*C. elegans*), to study the genetics of its development and neurobiology in greater detail.

It is hoped that the findings in these animals can be applied to higher organisms, such as humans.

QBI scientists are working on conditions for which there are currently no cures, such as diseases of the brain, spinal cord injuries, and stroke.

Dr Hang Lu of Georgia Institute and QBI's Dr Massimo Hilliard lead the teams that developed the automated system that manoeuvres these worms for study.

“This 1 mm long animal is one of the simplest organisms with a nervous system, making it a very good model organism in neuroscience,” Dr Hilliard said.

"In addition, its DNA is known so we can alter the genes to piece together nerve cell function."

C. elegans was the first multicellular organism to have its genome completely sequenced (in 1998).

Dr Lu said the new project enabled the worms to be moved into lateral positions, so they were easier to study in determining developmental and disease processes.

She said recently, microfluidic devices had been used for high-throughput genetic screens, replacing traditional methods of manually handling *C. elegans*.

However, the orientation of nematodes within microfluidic devices is currently random and often not conducive to inspection, hindering visual analysis and overall throughput.

While previous studies had used methods to bias head and tail orientation, none of the existing techniques allow for orientation along the dorso-ventral body axis.

The curved device developed in the project encourages the worms to preferentially adjust themselves into a lateral position, instead of relying on the use of manual procedures.

"The lateral body orientation of *C. elegans* is commonly seen in freely-moving animals on an agar plate," Dr Hilliard said.

"This orientation is the most useful for analyzing neuronal processes that travel along the antero-posterior axis, as well as processes that travel laterally across the worm body.

“In this work, we show that *C. elegans* preferentially adjust themselves into this lateral orientation as a result of the curved geometry of our device,” he said.

Provided by University of Queensland