

# Cone snails have multiple venoms

March 27 2014, by Gemma Ward

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Professor Richard Lewis with a textile cone.

(Phys.org) —Cone snails change "weapons" depending on whether they are hunting or defending themselves, University of Queensland researchers have discovered.

The discovery provides insight into the evolution of venomous animals and could lead to new treatments for chronic pain in humans.

UQ Institute for Molecular Bioscience (IMB) lead researcher Professor Richard Lewis said his team found [cone snails](#) could rapidly switch between distinct venoms depending on how they were stimulated.

"Most venomous animals are thought to inject the same combination of venom toxins for both hunting prey and defending themselves from predators," Professor Lewis said.

"The species *Conus geographus*, commonly known as the geography cone, is a common but deadly cone snail with high levels of paralytic toxins that can block muscle nerves and potentially kill humans.

"We found that the geography cone only injects this lethal venom when it feels threatened and acts in defence.

"However, when hunting prey such as fish, they inject a less powerful and complex venom that isn't toxic to humans, effectively switching weapons to match the situation."

The team made the discovery by encouraging geography cones to hunt and sting prey such as a fish in a low-level threat environment, and also by imitating a predator in a threatening environment to encourage it to release a defensive sting.

In both cases, the researchers were able to collect the resulting venom for investigation.

The venoms were then analysed using advanced mass spectrometry techniques, which revealed that the defensive and predatory venoms were quite distinct and were produced in different regions of the snail's venom gland.

Professor Lewis said it was the first time anyone had been able to prove a venomous animal used different venoms for hunting prey and defending themselves from predators.

"It's a remarkable adaptation that we found was widely evolved across

fish and mollusc-hunting cone snails, and even ancient worm-hunting cone snails, but whether this finding extends to other [venomous animals](#) such as snakes and spiders remains to be seen," Professor Lewis said.

"In a practical sense, it provides a route to search for new venom toxins that act on human nerves and could be developed into treatments for chronic pain.

"We can now start to investigate how these predatory and defensive venoms are produced and regulated, and use these findings to target those toxins with direct therapeutic potential."

**More information:** "Evolution of separate predation- and defence-evoked venoms in carnivorous cone snails." Sébastien Dutertre, et al. *Nature Communications* 5, Article number: 3521 [DOI: 10.1038/ncomms4521](#) . Received 16 December 2013 Accepted 26 February 2014 Published 24 March 2014

Provided by University of Queensland

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