

Chemical weapon in spider silk repels ant attack: study

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Nephila antipodiana. Image credit: nus.edu.sg (by Joseph K H Koh)

Researchers have shown for the first time how Golden orb web spiders (*Nephila antipodiana*) add a chemical to their web silk to repel invading ants.

The finding adds a chemical defense to the impressive properties of spider [silk](#), already known to be very strong, elastic and adhesive, and may provide new opportunities for pesticide design.

The study was led by researchers from the National University of Singapore (NUS) and the University of Melbourne, and is published in the journal [Proceedings of the Royal Society B](#) today [Wednesday, 23 November 2011].

Associate Professor Daiqin Li, who led the team at the National University of Singapore, said that ants rarely occur on the web of [orb web](#) spiders, despite their abundance, so his team set out to discover why.

"We found that large Golden orb web spiders add a defensive alkaloid chemical onto the silk, which stops the ants from walking onto the web when they come into contact with it," said Assoc Prof Li from the Department of Biological Sciences, NUS.

Professor Mark Elgar from the University of Melbourne's Department of Zoology said the team was impressed by the strength of the ant repellent in the web silk.

"The type of chemical deterrent found in the [spider silk](#) is known as a pyrrolidine alkaloid, which acts as a predator deterrent in many species of ants, [moths](#) and [caterpillars](#)," Prof Elgar said.

The team found that only large Golden orb web spiders produce the defensive compound, suggesting that the younger, smaller spiders could rely on their thinner web silk to physically prevent ants being able to climb into their webs.

They made the discovery by allowing the Golden orb web spider to spin webs in the lab and then analyzing the compounds in the silk. Once the defensive alkaloid compound was identified, the researchers observed the behaviour of ants in its presence.

"The orb spider is potentially vulnerable to attack from groups of ants while sitting in its web waiting for prey, so the chemical defense in web silk may have evolved to not only protect the spider, but to reduce the time and energy that would otherwise be required to chase away invading [ants](#)," said Prof Elgar.

The Golden orb web spider is typically found in the forests of Australia, Asia, Africa and America.

Provided by University of Melbourne

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