

Scorpion venom -- bad for bugs, good for pesticides

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Fables have long cast scorpions as bad-natured killers of hapless turtles that naively agree to ferry them across rivers. Michigan State University scientists, however, see them in a different light.

Ke Dong, MSU insect toxicologist and neurobiologist, studied the effects of [scorpion](#) venom with the hopes of finding new ways to protect plants from bugs. The results, which are published in the current issue of the *Journal of Biological Chemistry*, have revealed new ways in which the venom works.

Past research identified scorpion toxin's usefulness in the development of [insecticides](#). Its venom attacks various channels and receptors that control their prey's nervous and muscular systems. One major target of scorpion toxins is the voltage-gated sodium channel, a protein found in nerve and [muscle cells](#) used for rapid electrical signaling.

"Interestingly, some scorpion toxins selectively affect one type of sodium channels, but not others," Dong said. "The goal of our scorpion toxin project is to understand why certain scorpion toxins act on insect sodium channels, but not their mammalian counterparts."

Dong and a team of researchers were able to identify amino acid residues in insect sodium channels that make the channels more vulnerable to the [venom](#) from the Israeli desert scorpion. The team also discovered that an important sodium channel voltage sensor can influence the potency of the scorpion toxin.

"Investigating the venom's effect on the voltage-gated sodium channel could provide valuable information for designing new insecticides that work by selectively targeting insect sodium channels," Dong said.

Several classes of insecticides act on [sodium channels](#), but insects become resistant to them over time. The researchers are studying how insects develop resistance and what alternatives can be created to control resistant pests, Dong added.

Provided by Michigan State University

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