An antivenin for every snake

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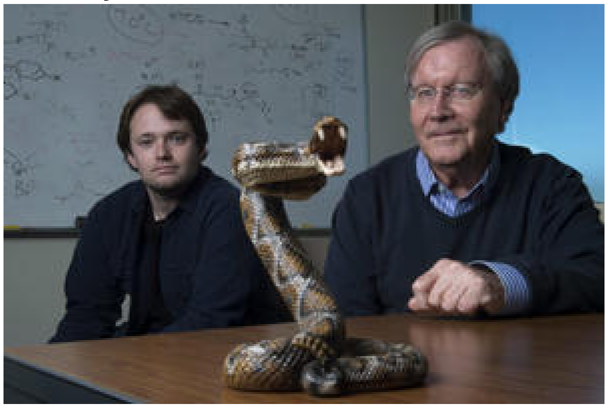

Ken Shea (right), pictured here with graduate student Jeffrey O'Brien (left), remembers when he first considered making an antivenin in his lab. “It was a very fundamental, basic question,” Shea says. “Could we create in the chemistry laboratory synthetic non-biological polymers that exhibited antibody-like properties?”

Picture Credit:

Steve Zylius / UCI

When a snake bites, it can inject a toxic cocktail of venom that can kill soft tissues in the body. The venom can be fatal — between 81,000 and 138,000 people die every year from snake bites, according to the World Health Organization — which is one of the reasons why Ken Shea in the Department of Chemistry, along with a team of researchers, just made a new synthetic antivenin that could help treat far more snake bites than is possible right now.

Shea and his lab started concocting the antivenin about ten years ago. Back then, they tested their antivenin on bee venom, not snake venom, because, as Shea explains, bee venom is easier to get ahold of for testing.

And their antivenin worked. “We were surprised it worked so well,” says Shea. This initial success started the chain of events that led to their new snake antivenin, which they reported on in January in the Journal of the American Chemical Society.

Traditional snake antivenin is hard to make, because each snake injects its own unique mix of toxins. But Shea and his team's antivenin is not specific to just one snake venom — it works on a swath of them. Traditional antivenin is also costly to make because the process requires injecting animals like horses and sheep with snake venom, and then harvesting the antibodies those animals produce as a natural reaction. Such antivenin is organic, though, so it has a relatively short shelf-life. That, and it needs to be geographically close to victims of snake bites so a victim can actually get treatment in time.

Because the team's new antivenin is synthetic, it can be more cheaply produced at very large scales. It has a longer shelf-life, and it can be broadly distributed in regions that need it the most, like tropical and subtropical places where snake bikes are very common. That, and a patient can take the antivenin immediately after a snake bites, whereas before you needed to be in a clinical setting to receive treatment.

"We're approaching this from an emergency response angle that would be applicable across multiple species of snake," says Shea. "Specifically, to perhaps minimize the rapid tissue necrosis that leads to many morbid injuries."

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