

Mapping lizard venom makes it possible to develop new drugs

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Lizards and other reptiles are not normally considered venomous, but a number of lizard species actually do produce and use venom. The most classic venomous lizard is no doubt the gila monster – a heavy-bodied lizard. As the first in the world, a group of researchers at Aarhus University has made a comprehensive description of the proteins in the venom. This knowledge not only provides insight into the function and evolution of venom proteins, but can also prove to be relevant in connection with developing new types of drugs.

Venom and lizards

Gila and beaded lizards are the classic venomous lizards. However, it was recently shown that venom is also used by a number of other species, such as the awesome Komodo monitors - the largest present-day lizards. Lizard venom has much in common with [snake venom](#), and the current theory is that the venom production apparatus in lizards and snakes is related, but has developed in different directions. Gila and beaded lizards mainly use venom to defend themselves, while snakes use their venom to attack prey. However, the composition of venom proteins is similar in lizards and snakes.

Potential in venom

Venom research is a large field, especially due to the pharmaceutical potential of the venom proteins. The idea here is that venom proteins are capable of affecting the body's cells. Excessive amounts can be harmful and even lethal in some circumstances, but if the right dose is used, the venom proteins can be used to treat certain diseases. Snake proteins that normally cause prey to bleed can be used in small doses to treat blood clots, for example.

In the same way, work is currently being done to develop spider venom proteins to provide pain relief. The Aarhus researchers focused on gila lizards, and these are currently being used in pharmaceutical contexts. Gila lizards produce exendin-4, a small venom [protein](#) used in the treatment of diabetes and obesity, which is a competitor to Victoza - produced by Novo Nordisk.

New venom proteins identified

A method called proteomics was used in the Aarhus study to make the first overall description of venom proteins in gila [lizards](#). Individual proteins such as exendin-4 used to be purified from gila lizard venom,

and this resulted in a number of interesting results. However, an overall analysis of all the venom proteins has not been undertaken before, which therefore made it easy to overlook the potentially important components in the venom.

Making a comprehensive analysis of the venom protein composition was not an easy task. "The work was complicated by the fact that the gila lizard genome hasn't been isolated, and genomes normally provide a map to navigate when you're using proteomics for protein identifications," says Associate Professor Kristian Wejse Sanggaard. "We therefore used a more manually based approach to identify the proteins in the gila lizard venom. This succeeded, and we've identified nineteen proteins that no one previously knew existed in the venom," he concludes.

Based on these identifications, the researchers have gained new knowledge about the function of the venom proteins, and have also gained greater insight into the evolutionary contexts of venom proteins. In addition, there are now new proteins that can potentially be used to develop future drugs.

Provided by Aarhus University

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