Fishing-bait bloodworms have bee-sting bites

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Bloodworm, Glycera fallax. Credit: Cristoph Bleidorn

The bite of a bloodworm delivers venom that causes severe allergic reactions. Scientists studying the venom for the first time have discovered why it causes a reaction similar to that of a bee sting.

A team of Museum scientists studied bloodworms, small segmented worms that can grow up to 35cm long, in partnership with the University of Leipzig. They investigated the expression of venom genes – which genes were activated to produce venom proteins.

Museum zoologist Dr Bjoern von Reumont said that the study revealed

why people can have such a severe allergic reaction to bloodworm bites.

'We found that some bloodworm venom toxin genes are closely related to those expressed in bee and wasp venom,' he said.

The research was published yesterday in the journal *Genome Biology and Evolution*.

Nasty bite

Bloodworms commonly live in shallow tidal flats, and collecting them for fishing bait is a multimillion dollar business on the east coast of North America. Bloodworm collectors are frequently bitten, which occasionally causes a severe allergic reaction resulting in hospitalisation.

Until now, scientists knew that the worms injected venom as they bite with four sharp teeth, but they were not sure exactly which components of the venom caused the reaction.

Complex cocktail

As well as expressing toxin genes similar to those found in bee and wasp venom, the bloodworm venom glands also express components that more closely match the toxins of completely different venomous creatures such as sea anemones and duck-billed platypuses.

'It is very surprising to find that some bloodworm toxins are so similar to toxins of very distantly related animals,' said senior author and Museum zoologist Dr Ronald Jenner.

'This diversity of venom genes suggests that bloodworm venom is as complex as that found in some of the most dangerous animals in the

world, including scorpions and snakes.

It shows how predators from different walks of life have evolved similar solutions to the common problem of catching food.'

Diverse diets

Bloodworms will eat anything that passes by them and fits in their mouths. To catch prey, they evert (turn inside out) part of their digestive system, which includes their teeth, and launch it out of their mouth.

The researchers think that the different toxins found in bloodworm venom act on different prey. The team will now isolate the various toxins from the venom and test their effectiveness and specific activity on different potential prey animals, such as small molluscs, crustaceans and other worms.

From pain to medicine

Isolating the venom compounds may also have a medicinal use.

'The study of venom has a positive side to it,' said co-lead author and Museum zoologist Dr Lahcen Campbell.

'Venom toxins, such as those found in bloodworms, could potentially be used to develop new drugs. Painkillers and a treatment for adult-onset diabetes have already been developed from the venom of cone snails and the gila monster. Together with our colleagues at the University of Leipzig we plan to look into this in our future work.'

Provided by Natural History Museum