Study of isolated snakes could help shed light on venom composition

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While studying a way to more safely and effectively collect snake venom, University of Florida researchers have noticed the venom delivered by an isolated population of Florida cottonmouth snakes may be changing in response to their diet.

Scientists used a portable nerve stimulator to extract venom from anesthetized cottonmouths, producing more consistent extraction results and greater amounts of venom, according to findings published in August in the journal *Toxicon*.

The study of venoms is important for many reasons, scientists say.

"The human and animal health benefits include understanding the components of venom that cause injury and developing better antivenin," said Darryl Heard, B.V.M.S., Ph.D., an associate professor in the UF College of Veterinary Medicine's department of small animal clinical sciences. "In addition, the venom components have the potential to be used for diagnostic tests and the development of new medical compounds."

But in addition to showing the extraction method is safer, more effective and less stressful to both snake and handler than the traditional "milking" technique, Heard and Ryan McCleary, a Ph.D. candidate in biology in UF's College of Liberal Arts and Sciences, discovered the venom from these particular snakes differs from that of mainland snakes, likely because of their unique diet of dead fish dropped by seabirds.

Heard and McCleary collaborated to develop a safe, reliable and humane technique for collecting venom from cottonmouths as part of a larger study on a specific population of snakes that reside on Seahorse Key, an isolated island near Cedar Key on the Florida's Gulf Coast.

The venom collection study included data from 49 snakes on Seahorse Key.

"Snakes on this island are noted for their large size," said Heard, a zoological medicine veterinarian with additional expertise in anesthesia. He added that Harvey Lillywhite, Ph.D., a professor of biology at UF and McCleary's predoctoral adviser, has confirmed that cottonmouths on Seahorse Key eat primarily dead fish dropped by birds in a large seabird rookery.

Lillywhite also directs UF's Seahorse Key Marine Laboratory, located in the Cedar Keys National Wildlife Refuge. McCleary hopes to build on earlier studies about the snakes' ecology and to explore whether evolutionary changes may have affected the composition of the snakes' venom.

"My interest is in the evolutionary aspect," McCleary said. "If these snakes already have an abundant source of dead prey, why do they need venom?"

Preliminary findings show some differences in venom components, he added.

Traditionally, venom has been collected from venomous snakes by manually restraining the animal behind the head and having it bite a rubber membrane connected to a collecting chamber.

"This requires the capture of an awake snake, which increases the risk of

human envenomation and is also stressful to the snake," Heard said, adding that manual collection of venom also does not guarantee that all of the venom is collected.

The nerve stimulator is used in human anesthesia to measure the effect of muscle relaxants.

"It delivers a series of electric stimuli, of very low voltage and amperage, and causes no pain or tissue injury," Heard said. "The electrodes are placed behind the eye, across the area of the venom gland. The nerve stimulator sends a current across the gland, causing reflex contraction and expulsion of the venom."

The technique allows collection from snakes that might not otherwise give up their venom, which is an essential in the process of creating antivenins for victims of snake bite, Heard said.

"The stimulator is battery-powered and relatively inexpensive," he said. "In addition, the anesthetic we used, known as propofol, can easily be transported."

Propofol, which has been prominent in news headlines recently as being linked to the death of singer Michael Jackson, is a short acting anesthetic administered by intravenous injection. The drug is commonly used to anesthetize animals in veterinary clinical practice, but it is not believed to have previously been used to anesthetize snakes for venom collection.

Source: University of Florida (news : web)

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