How snakes drink reported in *New Scientist* 20 February 2012 and *Journal of Experimental Zoology* 6 February 2012 DOI: 10.1002/jez.1710. David Cundall of Lehigh University, Pennsylvania had observed boa constrictors sucking up water through a small hole in their mouths, as if they were drinking through a straw. However, he was unable to measure any suction when he tried using pressure sensors in the mouths of three different species of snakes. Furthermore, snake tongues are too small for them to lap up water, and they can't tip their heads back to scoop in water.

Cundall and a group of colleagues have now made a detailed study of the structure of snakes' mouths and throats, and the way the muscles work when they are drinking. They found the extensive folding of the surface inside a snake's mouth and throat that enables it to expand to envelop large prey, also acts like a sponge. Water flows into the sponge-like structure by capillary action and is squeezed down the snake's throat using muscle and bones of the head. This means the snake can take up water against gravity without having to make an airtight seal with its mouth and apply suction.

Kurt Schwenk, of the University of Connecticut, commented. "How animals drink is surprisingly complicated. I think they've pretty much nailed it in snakes." The researchers concluded: "The sponge mechanism of drinking may represent a macrostomatan exaptation of mucosal folds, the evolution of which was driven primarily by the demands of feeding."

New Scientist

Editorial Comment: In case you are wondering what "macrostomatan exaptation" means let us explain. "Macrostomatan" means big mouth. An "exaptation" is defined as "a biological adaptation where the biological function currently performed by the adaptation was not the function performed while the adaptation evolved under earlier pressures of natural selection." (See Biology Online dictionary) In other words, the research team believe the snakes evolved big mouths to eat big prey, and then found they could use the extra folds in their mouths to drink with.

However, as Kurt Schwenk commented, the process of drinking is quite complicated. As the research team found, it is not enough just to have the folded surface, the snake also needs the coordinated muscle movements. Drinking water is such a fundamental function for living it is

not a good idea to leave it to chance. Exaptation, therefore, is a typical evolutionary non-explanation for how snakes obtained the ability to drink water. If it came about by natural selection for eating large prey, the evolutionist has to explain not only how the presence of large prey enabled the snake's mouth to grow and develop the right muscle contractions for drinking, as well as the unhinging jaws that snakes also need to eat large prey, but more importantly how did it drink prior to this in order to survive.

The fossil evidence shows snakes' mouths have remained unchanged since snakes first were fossilised; which is totally consistent with them being designed for both eating and drinking. The fact that the folded structure facilitates both is an example of good design, not lucky accident. (Ref. reptiles, serpents, biomechanics)

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