

Snakes on a rope: Researchers take a unique look at the climbing abilities of boa constrictors

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(PhysOrg.com) -- In a unique study involving young boa constrictors, University of Cincinnati researchers put snakes to work on varying diameters and flexibility of vertical rope to examine how they might move around on branches and vines to gather food and escape enemies in their natural habitat. The findings by Greg Byrnes, a University of Cincinnati postdoctoral fellow in the department of biological sciences,

and Bruce C. Jayne, a UC professor of biology, are published in the December issue of *The Journal of Experimental Biology*.

For many Americans, it was the most dreaded moment in gym class: the challenge to wrap oneself around a vertical rope and climb as high as possible. Some of us couldn't even get off the floor. But for other [animals](#) – even with no arms, no hands, no legs and no feet – that climbing ability is a necessity to survive.

The UC researchers sent the [snakes](#) climbing up varying widths and tensions of ropes as they explored snake movement in relation to their musculoskeletal design and variation in their environment.

They found that regardless of diameter or flexibility of the rope, the snakes alternated curving between left and right as they climbed the ropes. On the thicker ropes, they were able to move greater portions of their bodies forward as they climbed. As the ropes became thinner and more flimsy, the snakes used more of their bodies – including their back, sides and belly – to manipulate the rope for climbing.

"Despite the likely physical and energetic challenges, the benefits of the ability to move on narrow and compliant substrates might have large ecological implications for animals," write the authors. "Arboreal organisms must often feed or hunt in the terminal branch niche, which requires the ability to move safely on narrow and compliant substrates."

Jayne points out that although the large muscles of boa constrictors make them fairly stocky and heavy compared to other snakes, this anatomy probably increases their strength. All of the snakes gripped the ropes using a concertina mode of locomotion, which is defined by some regions of the body periodically stopping while other regions of the body extend forward. "It turns out boa constrictors are strong enough so that they can support their weight with a modest number of gripping

regions," adds Jayne.

The researchers say their findings are the first study that has explicitly examined the combined effects of diameter and compliance on how an animal gets around. Future research is underway to compare differing muscular anatomies in snakes and relate it to their function in terms of their behavior and their environment.

More information: jeb.biologists.org/current.dtl

Provided by University of Cincinnati

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