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Vertical Gap Crossing in Close Relatives of Flying Snakes

Though limbed animals possess the ability to reach across horizontal and vertical gaps, limbless animals must find alternative methods of overcoming gaps in the arboreal environment. One strategy employed by snakes is cantilever locomotion. When navigating from one surface to another, snakes extend their bodies headfirst into the gap until they have reached their target. The snakes must provide proper stability and rigidity with the body in order to prevent themselves from buckling or pitching into the gap. How do snakes cope with gaps oriented in the vertical axis? Here, we investigated the vertical gap-crossing abilities of snakes, focusing on the effect of the substrate curvature on a snake's ability to cantilever. In this experiment, 6 painted bronzebacks (Dendrelaphis pictus) and 6 Asian vine snakes (Ahaetulla prasina) were allowed to cross from a base to a target perch, starting from one of four origin perches of varying curvature (diameter = 27, 43, and 157 mm, and a flat plane). The target perch was initially set at a small vertical distance (based on the size of the snake in percentage of snout-to-vent (SVL) length. As the snake rose to cross the gap, the distance was increased manually until the snake reached its maximum cantilever height and failed to reach the perch. Based on preliminary data, it is expected that the snakes will be able to gap cross at least 70-75% SVL. This research was supported in part by the National Science Foundation (NSF) under grant numbers 1922516 and 2027523.

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