Flying snakes, caught on tape (w/ Video)

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This is the flying snake *Chrysopelea paradisi.* Credit: Copyright Jake Socha.

(PhysOrg.com) -- New video analysis and mathematical modeling by engineers at Virginia Tech reveals how certain types of snakes can "fly" by flinging themselves off their perches, flattening their bodies, and sailing from tree to tree -- work presented today at the American Physical Society Division of Fluid Dynamics meeting in Long Beach, Calif.

Five related species of tree-dwelling snakes found in Southeast and South Asia may just be the worst nightmares of ophidiophobes (people who have abnormal fears of snakes). Not only are they snakes, but they can "fly" -- flinging themselves off their perches, flattening their bodies, and gliding from tree to tree or to the ground.

To Virginia Tech biologist Jake Socha, these curious reptiles are

something of a biomechanical wonder. In order to understand how they do what they do, Socha and his colleagues recently studied Chrysopelea paradisi snakes as they launched themselves off a branch at the top of a 15-meter-tall tower.

Four cameras recorded the curious snakes as they glided. This allowed them to create and analyze 3-D reconstructions of the animals' body positions during flight -- work that Socha is presenting today at the American Physical Society Division of Fluid Dynamics (DFD) meeting in Long Beach, CA.

The reconstructions were coupled with an analytical model of gliding dynamics and the forces acting on the snakes' bodies. The analyses revealed that the reptiles, despite traveling up to 24 meters from the launch platform, never achieved an "equilibrium gliding" state -- one in which the forces generated by their undulating bodies exactly counteract the force pulling the animals down, causing them to move with constant velocity, at a constant angle from the horizon. Nor did the snakes simply drop to the ground.

This is the flying snake *Chrysopelea paradisi.* Credit: Copyright Jake Socha.

Instead, Socha says, "the snake is pushed upward -- even though it is

moving downward -- because the upward component of the aerodynamic force is greater than the snake's weight."

"Hypothetically, this means that if the snake continued on like this, it would eventually be moving upward in the air -- quite an impressive feat for a snake," he says. But our modeling suggests that the effect is only temporary, and eventually "the snake hits the ground to end the glide."

More information: The presentation, "Gliding flight in snakes: non-equilibrium trajectory dynamics and kinematics" is on Monday, November 22, 2010. Abstract: meetings.aps.org/Meeting/DFD10/Event/133681

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