Sucker-footed bats don't use suction after all (w/ Video)

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Brown University researcher Daniel Riskin has discovered how a species of bat in Madagascar roosts head-up. The bat uses wet adhesion, not suction, as previously believed. Credit: None

There are approximately 1,200 species of bats worldwide. Of that total, only six are known to roost with their heads pointed upward. Investigators did not know why, because they knew next to nothing about one key group.

The sucker-footed bats of Madagascar, *Myzopoda aurita*, had rarely been seen in the wild and were listed as vulnerable to extinction by the International Union for Conservation of Nature. But several years ago,

biologists stumbled upon some colonies in a new-growth forest on the southeastern section of the island, opening the door to studies.

Daniel Riskin, a postdoctoral research associate in ecology and evolutionary biology at Brown University, traveled last summer to Madagascar to study one of the two species of sucker-footed bats with biologist Paul Racey. In first-time experiments in the wild, the pair made a surprising discovery: The bats don't use suction after all. Instead, they use wet adhesion, secreting a fluid, possibly sweat, that enables the pads on the bats' wrists and ankles to attach to surfaces. The pair's findings are published in the *Biological Journal of the Linnean Society*.

While the finding settles the question of how the bats roost, it means science has misnamed the bat. "*Myzopoda* literally means 'sucker foot,'" Riskin, the paper's lead author, said. "You can't change Latin names, so it's stuck with it."

Riskin used a force plate he had built to determine how *Myzopoda* clung to surfaces. He placed the sucker-footed bats on the plates, first with evenly spaced holes and then with the holes covered by tape underneath the plate. In both instances, *Myzopoda* had no problem adhering to the plate, effectively ruling out suction as the adhesive technique. (Had suction been used, the holes would have prevented the bats from establishing a seal on the surface.)

Next, Riskin sought to understand how the bats roost head-up by testing how they detach their limbs from a surface. Holding the bat so it was head up-and in a vertical position, Riskin discovered that he could easily "unpeel" the bats' pads from the surface. He also encountered little resistance when pushing the bat in an upward direction. But when Riskin tried to drag the bat downward, the animal clung doggedly to the vertical surface. Through further investigation, Riskin figured out the bats detach themselves from their roosting position by using tendons in their wrists

and ankles to decrease the pads' surface area of attachment. This explains why video footage shows the bats' pads peeling off the surface when they begin walking. It also explains why the bats would come unlatched if they tried to roost head down.

The finding helps scientists understand how *Myzopoda* lives in the wild. The bat, a small creature about two inches long and weighing one-third of an ounce, roosts on the slick surface of broad, fan-like leaves located high off the ground in an indigenous tree called Travelers' Palm (Ravenala madagascariensis).

The researchers' finding also settles speculation that *Myzopoda* differs from its head-up roosting alter ego, *Thyroptera*, which is a suction-footed species that lives in tropical climes in Central and South America. The question is, with two species living in similar tropical environments under similar competitive pressures, which adhesive technique came first?

Riskin believes that *Thyroptera* is a later stage of evolution of the two bats. Why? While *Myzopoda*, through wet adhesion, can only roost head-up, *Thyroptera*, using suction, can roost either head-up or head-down. In terms of evolution, Riskin noted, "It doesn't make sense to go through suction to get to wet adhesion, but it does make sense to go through wet adhesion to get to suction."

Source: Brown University (news : web)