Geckos keep firm grip in wet natural habitat

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(Phys.org) —Geckos' ability to stick to trees and leaves during rainforest downpours has fascinated scientists for decades, leading a group of University of Akron researchers to solve the mystery.

They discovered that wet, hydrophobic (water-repellent) surfaces like those of leaves and tree trunks secure a gecko's grip similar to the way dry surfaces do. The finding brings UA integrated bioscience doctoral

candidate Alyssa Stark and her research colleagues closer to developing a synthetic adhesive that sticks when wet.

Principal investigator Stark and her fellow UA researchers Ila Badge, Nicholas Wucinich, Timothy Sullivan, Peter Niewiarowski and Ali Dhinojwala study the adhesive qualities of gecko pads, which have tiny, clingy hairs that stick like Velcro to dry surfaces. In a 2012 study, the team discovered that geckos lose their grip on wet glass. This finding led the scientists to explore how the lizards function in their natural environments.

The scientists studied the clinging power of six geckos, which they outfitted with harnesses and tugged upon gently as the lizards clung to surfaces in wet and dry conditions.

University of Akron researchers discover why geckos keep a firm grip on leaves and tree trunks in wet natural habitat. Credit: Alyssa Stark

Link between adhesion and 'wettability'

The researchers found that the effect of water on adhesive strength correlates with wettability, or the ability of a liquid to maintain contact with a solid surface. On glass, which has high wettability, a film of water forms between the surface and the gecko's foot, decreasing adhesion.

Conversely, on surfaces with low wettability, such as waxy leaves on tropical plants, the areas in contact with the gecko's toes remain dry and adhesion, firm.

"The geckos stuck just as well under water as they did on a dry surface, as long as the surface was hydrophobic," Stark explains. "We believe this is how geckos stick to wet leaves and tree trunks in their natural environment."

The discovery, "Surface Wettability Plays a Significant Role in Gecko Adhesion Underwater," was published April 1, 2013 by the *Proceedings of the National Academy of Sciences*. The study has implications for the design of a synthetic gecko-inspired adhesive.

More information: "Surface wettability plays a significant role in gecko adhesion underwater," by Alyssa Y. Stark et al. *PNAS*, 2013.

Provided by University of Akron