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Drinking with a hairy tongue: viscous entrainment by dipping hairy surfaces ALICE NASTO, PIERRE-THOMAS BRUN, JOS ALVARADO, JOHN BUSH, ANETTE HOSOI, MIT — Nectar-drinking bats have tongues covered with hair-like papillae, enhancing their ability to take up viscous nectar by dipping. Using a combination of model experiments and theory reminiscent of Landau-Levich-Derjaguin dip coating, we rationalize this mechanism of viscous entrainment in a hairy texture. For the model experiments, hairy surfaces are fabricated using laser cut molds and casting samples with PDMS elastomer. Modeling the liquid trapped within the texture using a Darcy-Brinkman like approach, we derive the drainage flow solution. The amount of fluid that is entrained is dependent on the viscosity of the fluid, the density of the hairs, and the dipping speed. We find that there is an optimal hair density to maximize fluid uptake.

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