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How dogs lap: open pumping driven by acceleration SEAN GART, JOHN SOCHA, Virginia Tech, PAVLOS VLACHOS, Purdue Univeristy, SUNGHWAN JUNG, Virginia Tech — Dogs drink by lapping because they have incomplete cheeks and cannot suck fluids into the mouth. When lapping, a dog's tongue pulls a liquid column from a bath, which is then swallowed, suggesting that the hydrodynamics of column formation are critical to understanding how dogs drink. We measured the kinematics of lapping from nineteen dogs and used the results to generate a physical model of the tongue's interaction with the air-fluid interface. These experiments with an accelerating rod help to explain how dogs exploit the fluid dynamics of the generated column. The results suggest that effects of acceleration govern lapping frequency, and that dogs curl the tongue ventrally (backwards) and time their bite on the column to increase fluid intake per lap. Comparing lapping in dogs and cats reveals that though they both lap with the same frequency scaling with respect to body mass and have similar morphology, these carnivores lap in different physical regimes: a high-acceleration regime for dogs and a low-acceleration regime for cats.

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