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Biomimetic Unidirectional Capillary Action ERIC RUPERT, PATRICK MORAN, JASON DAHL, University of Rhode Island — In arid environments animals require specialized adaptations to collect adequate water. The Texas horned lizard (P. cornutum) has superhydrophylic skin which draws water out of moist soil or directly from water sources. The water then makes its way into the lizard's unidirectional capillary system, made of overlapping scales, which serves to channel water to its mouth. Testing different channel geometries, repeated D shaped chambers as in Commans et al (2015) and truncated isosceles triangle chambers, as found in P. cornutum, we show the ability to have passive, unidirectional, fluid transport. Tests were carried out with the capillaries in a horizontal configuration. While both capillary geometries produced the desired traits, the triangular chambers showed superior unidirectionality, with no observed back flow, while D chambers showed back flow under testing conditions. The chambers provided similar flow rates. These types of channel systems will find use in microfluidics, notably in medical, printing, and lab-on-chip applications.

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