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Domino-Like Water Transport on Tillandsia by Flexible Trichome Wings[1] NAMI HA, SANG JOON LEE, Pohang Univ of Sci Tech — Epiphytes have evolved to take up multiscale water such as rain, fog and debris under extreme conditions. *Tillandsia* species in epiphytic bromeliads have no absorptive roots, but they developed trichomes instead. Although previous studies revealed how *Tillandsia* absorbs water and prevents water loss, it is still unclear how *Tillandsia* transports water. Considering the flow velocity being too slow in internal narrow tracheids, we question whether the tracheids are the main pathway to transfer water for effective water harvesting. Here, we show that *Tillandsia usneoides*, a common species of *Tillandsia*, rapidly transports water on the surface as the water film propagates through the exterior trichome arrays with flexible wings. We found that the transport distance at the macroscopic scale grows like $t^{2/3}$ unlike the conventional capillary flow scaling like $t^{1/2}$. We confirm that this domino-like water transport overcomes the limitations of internal vascular transfer, and simplify the wings' reconfiguration by designing the biomimetic trichomes. These findings provide the evidence of novel flow behaviors in nature, and may inspire technologies for designing capillary pumps, water treatment devices and shape-morphing materials.

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