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**Capillary rise in cellulose sponges** JUNGCHUL KIM, HO-YOUNG KIM, Seoul National University, L. MAHADEVAN, Harvard University — A cellulose sponge, commonly used for clean-up jobs, can absorb and hold a significant amount of water within its pores, whose size ranges from micrometers to millimeters. We investigate the dynamics of capillary rise of water in the sponge using a combination of experiment and theory. We find that the rate of the capillary rise is significantly lower than Washburn's rule that assumes the sponge as a row of adjoined pores and the liquid flow to be driven by the Laplace pressure. We introduce a novel theory to model the flow in the hygroscopic porous media by combining Darcy's law based on the moisture concentration and the modified Young-Laplace equation. The scaling law constructed through this work agrees well with the experimental results.

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