Abstract Submitted
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Butterfly proboscis: natural combination of a drinking straw with a nanosponge[1] KOSTYA KORNEV, DARIA MONAENKOVA, PETER ADLER, Clemson University, WAH-KEAT LEE, Argonne National Lab, MATTHEW LEHNERT, TARAS ANDRUKH, CHARLES BEARD, BINYAMIN RUBIN, ALEXANDER TOKAREV, Clemson University — The ability of Lepidoptera, or butterflies and moths, to drink liquids from rotting fruit and wet soil, as well as nectar from floral tubes, raises the question of whether the conventional view of the proboscis as a drinking straw can account for the withdrawal of fluids from porous substrates or of films and droplets from floral tubes. We discovered that the proboscis promotes capillary pull of liquids from diverse sources due to a hierarchical pore structure spanning nano- and microscales. X-ray phase-contrast imaging reveals that Plateau instability causes liquid bridges to form in the food canal, which are transported to the gut by the muscular sucking pump in the head. The dual functionality of the proboscis represents a key innovation for exploiting a vast range of nutritional sources. A transformative two-step model of capillary intake and suctioning can be applied not only to butterflies and moths but also potentially to vast numbers of other insects such as bees and flies.

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