

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Beetle wings are inflatable origami RUI CHEN, Georgia Institute of Technology, JING REN, SIQIN GE, University of Chinese Academy of Sciences, DAVID HU, Georgia Institute of Technology — Beetles keep their wings folded and protected under a hard shell. In times of danger, they must unfold them rapidly in order for them to fly to escape. Moreover, they must do so across a range of body mass, from 1 mg to 10 grams. How can they unfold their wings so quickly? We use high-speed videography to record wing unfolding times, which we relate to the geometry of the network of blood vessels in the wing. Larger beetles have longer unfolding times. Modeling of the flow of blood through the veins successfully accounts for the wing unfolding speed of large beetles. However, smaller beetles have anomalously short unfolding times, suggesting they have lower blood viscosity or higher driving pressure. The use of hydraulics to unfold complex objects may have implications in the design of micro-flying air vehicles.

Rui Chen
Georgia Institute of Technology

Date submitted: 31 Jul 2015

Electronic form version 1.4