

Abstract Submitted  
for the DFD12 Meeting of  
The American Physical Society

**The Adventures of the Diving-Bell Spider** RAPHAELE THEVENIN, GUILLAUME DUPEUX, KEYVAN PIROIRD, CHRISTOPHE CLANET, DAVID QUERE, Physique et Mecanique des Milieux Heterogenes, CNRS, ESPCI, Paris France - Ladhyx, CNRS, Ecole Polytechnique, Palaiseau, France, INTERFACES & CO. TEAM — The Argyroneta Aquatica is a unique spider that has every features of a usual terrestrial spider, but constantly lives under water. To however still be able to breath oxygen, it builds an underwater bell of air (hence its other name “the diving-bell spider”): using its superhydrophobic abdomen, it pulls an air bubble at the surface by leaving the latter very rapidly. It then enters the bell formed under aquatic plants or under its under-water web, and leaves it more slowly so as to entrain the least air possible. We study these dynamics that take place at the air/water interfaces. We reduce the spider to two beads, one for the hydrophobic abdomen, one for the hydrophilic head, and measure and model the air entrainment according to the size and surface properties of the abdomen and to the velocity of motion.

Raphael Thevenin  
Physique et Mecanique des Milieux Heterogenes, CNRS,  
ESPCI, Paris France - Ladhyx, CNRS,  
Ecole Polytechnique, Palaiseau, France

Date submitted: 01 Aug 2012

Electronic form version 1.4