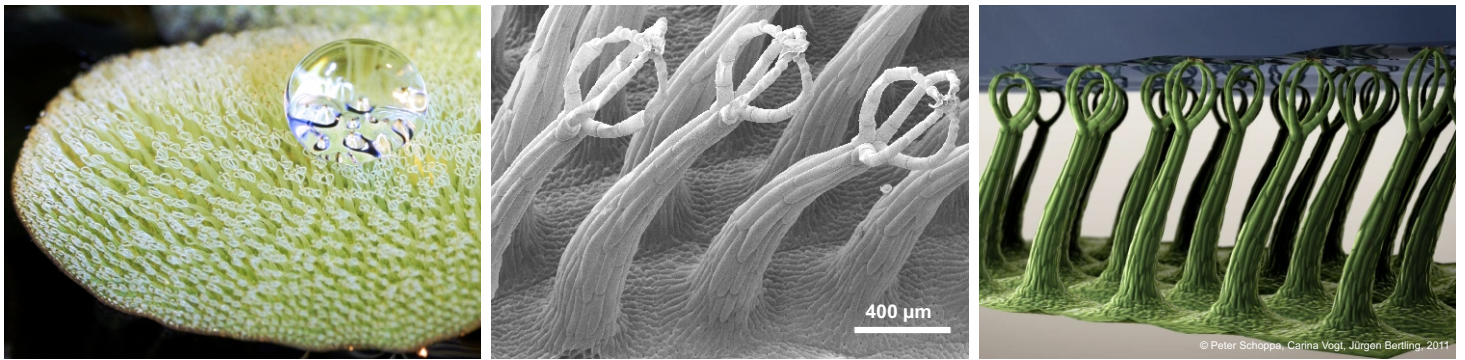


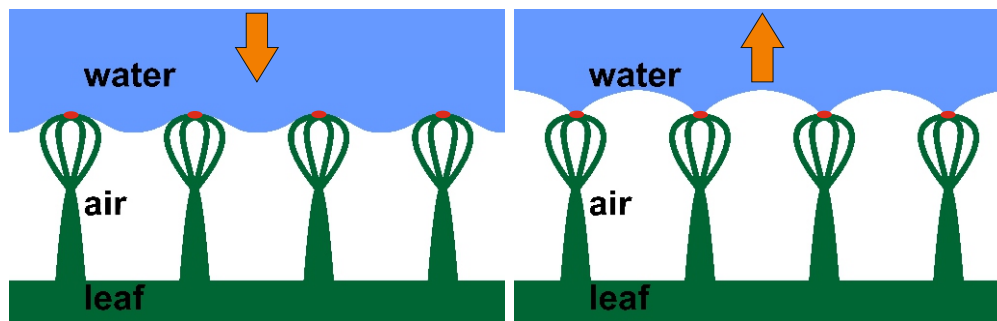
From Plants to Ship Coatings: Air Retaining Surfaces for Drag Reduction

Ships use a considerable amount of their total energy consumption to overcome friction between ship and water which could be reduced drastically by an air layer between ship and water. In close cooperation of scientists at the universities of Bonn, Karlsruhe and Rostock the *Salvinia* effect was discovered enabling the permanent stabilization of an air layer under water.

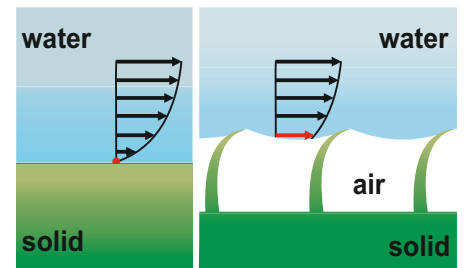


Biological air retaining species such as the floating ferns *Salvinia* and the backswimmer *Notonecta*, share a common feature: a water repellent, hairy surface.

The leaves of the floating fern *Salvinia molesta* developed a special feature: four hydrophilic patches at the tip of each of the otherwise hydrophobic hair, exhibiting a complex eggbeater like shape. These hydrophilic tips pin the air-water interface to the tips of the hairs, thereby effectively preventing the loss of air and stabilizing the air layer under turbulent conditions.



By understanding the underlying principles this mechanism can be transferred to technical applications, such as a drag reducing ship coatings. On first technical prototypes we already demonstrated a friction reduction of over 30%. The aim of the current project is to transfer our successful prototypes into technical ship coating.



W. Barthlott, Th. Schimmel, S. Wiersch, K. Koch, M. Brede, M. Barczewski, S. Walheim, A. Weis, A. Kaltenmaier, A. Leder and H. F. Bohn (2010). The *Salvinia* Paradox: Superhydrophobic Surfaces with Hydrophilic Pins for Air Retention Under Water. *Advanced Materials* **22**(21): 2325-2328.

Further information: www.schimmel-group.de / www.lotus-salvinia.de

