Karen Alim

"Adaptation by fluid flow in the slime mold Physarum polycephalum"

The network-forming slime mold *Physarum polycephalum* lacks any central coordination center, yet it shows often-termed intelligent dynamics in the way it grows and adapts its network morphology. We investigate the role of cytoplasmic flows for transport and signal transfer during the morphological dynamics of this network-like slime mold. We combine experimental observations of the cytoplasmic flows and its driving force with the development of the theoretical concept of transport by peristaltic flow in a network. This synergy allows us to show that the slime mold actively controls its internal fluid flow by establishing a peristaltic wave. This peristaltic wave always spans the total extent of an individual independent of its size. Thus, we find that the slime mold actively adapts its flows as to maximize transport. The quantitative description of flows in *P. polycephalum* enables a new view on the slime molds growth dynamics during the encounter of food or toxins and how their location can be "remembered", an important step to perform an informed decision during an individuals network growth and adaptation.