Direct observation of spontaneous veins formation and thickness oscillations in Physarum polycephalum

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Physarum polycephalum (or slime mold) is a giant biological cell of the myxomycete family, which size is typically in the several cm range. Though primitive, this system displays complex spatiotemporal behaviors. In particular, this organism exhibits thickness oscillations (with temporal period around 1 min.) that generate cytoplasmic movement and a structuration of the cell with channels and veins [1].

Here we focus on experimental analysis (by infrared microscopy) of velocity fields in regions where a transition occurs from liquid cytoplasm to gel state, i.e., at places of vein formation. In addition, we present study of the thickness oscillations by the laser imaging technique LOFI [2].

The main objective is to obtain time-resolved, quantitative data, against which microfluidic theories of vein formation will be developed and tested.

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[2] E. Lacot, O. Hugon, Applied Optics, 2004, 43, 4915