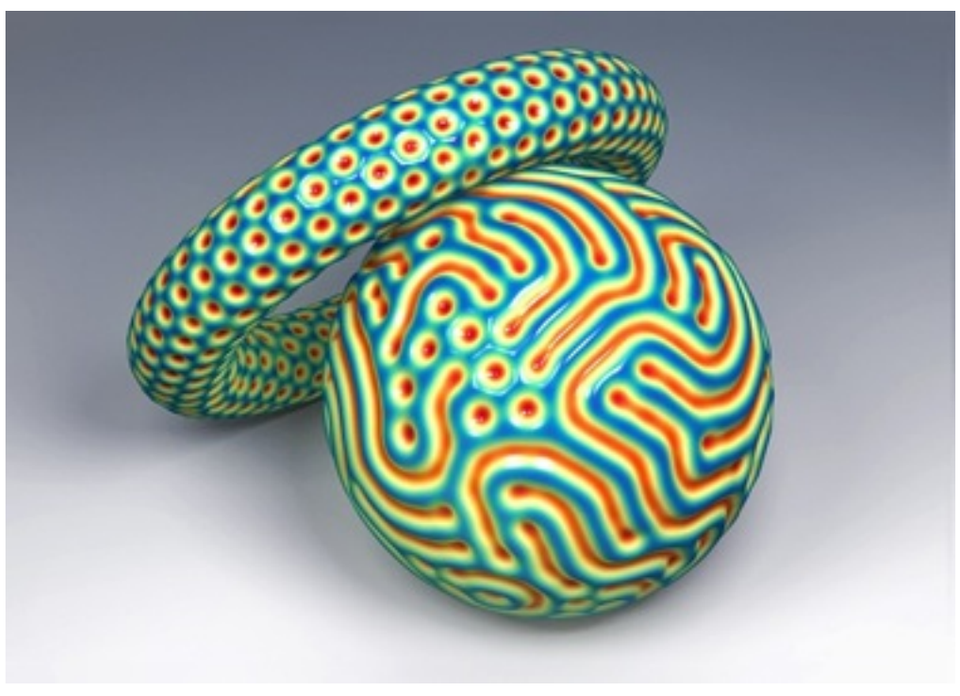
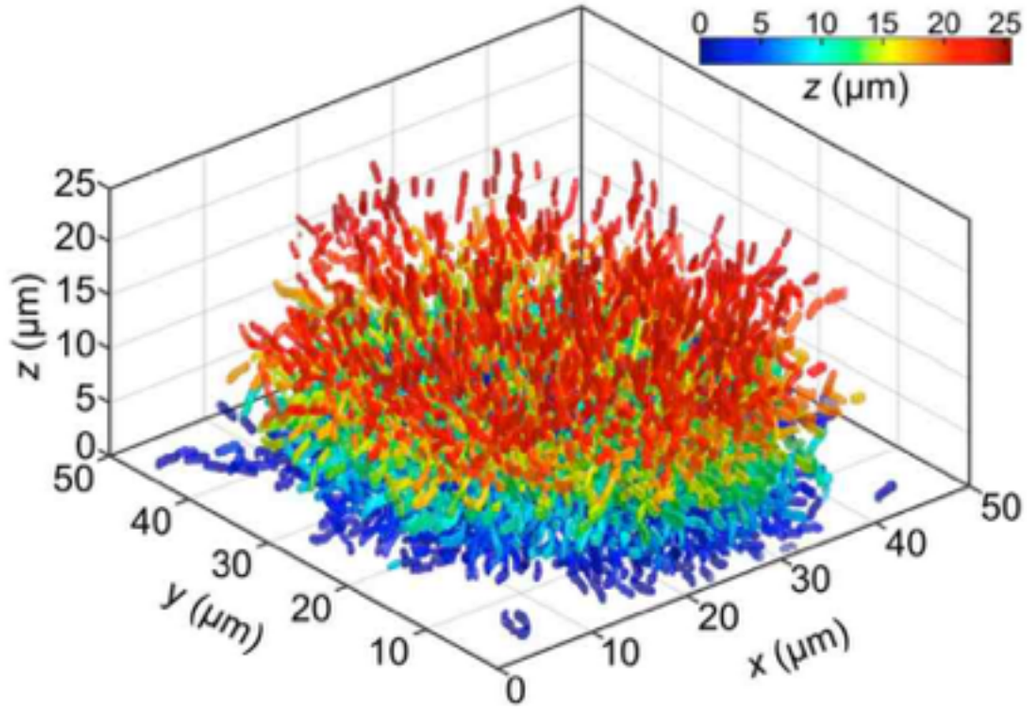
dunkel@math.mit.edu

Pattern formation in soft and biological matter

Jörn Dunkel
Physical Applied Mathematics





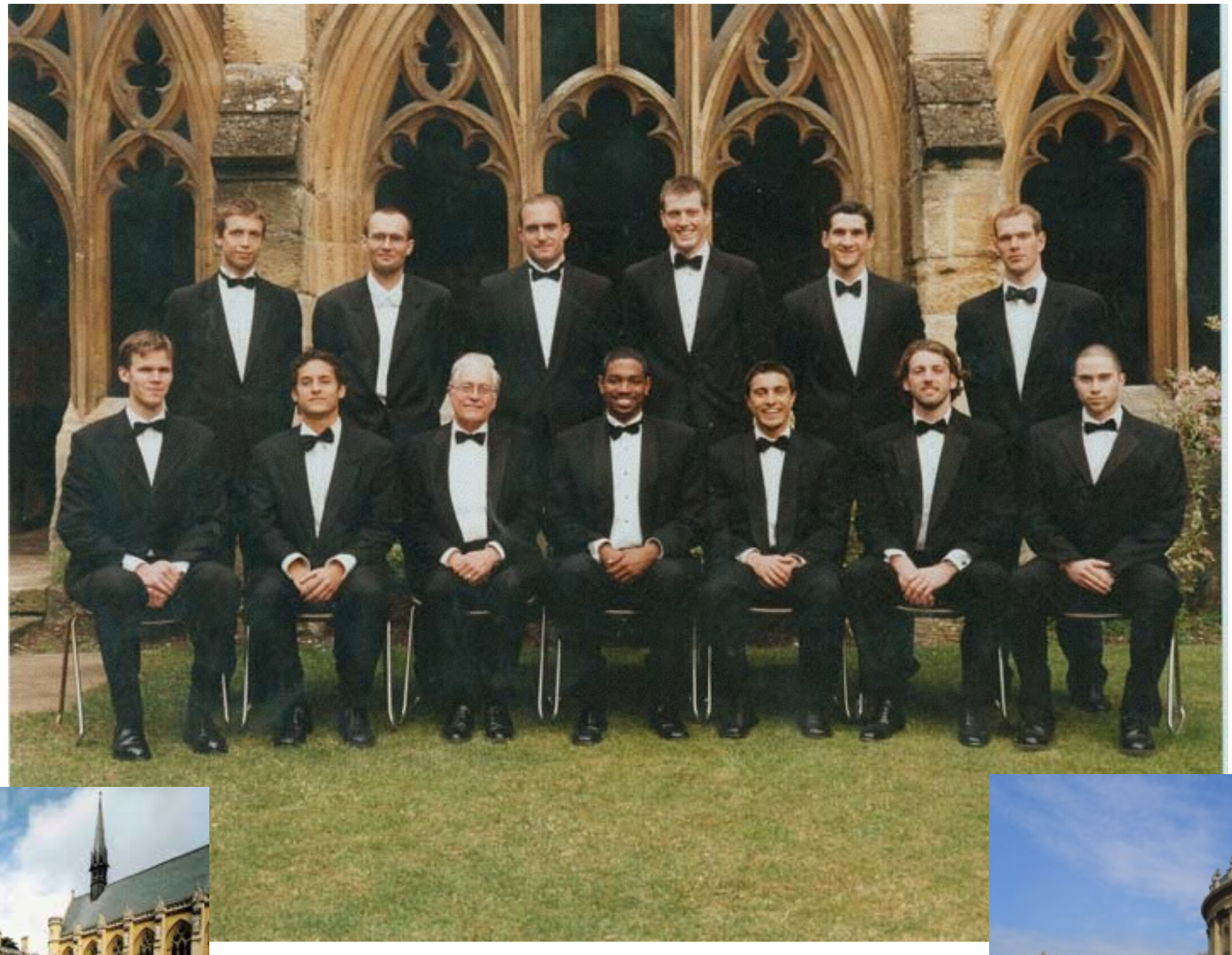






Math Olympiads
Mathematical Student Society “Leonard Euler”
Alexander von Humboldt Gymnasium Berlin
Physics & Mathematics at HU Berlin

Oxford University Basketball Team 2000/01







PhD 2005-2008



Universität Augsburg University







Postdocs 2008-2013









Surface patterns

Fingerprints

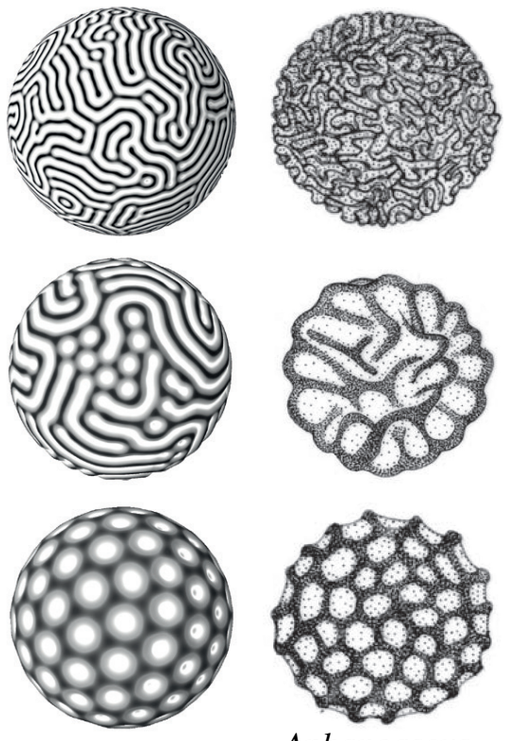


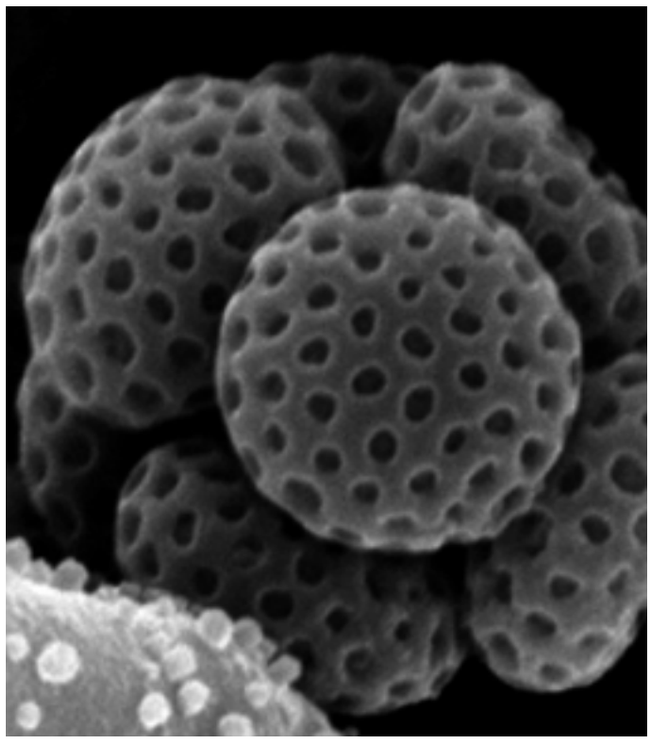
Brain corals





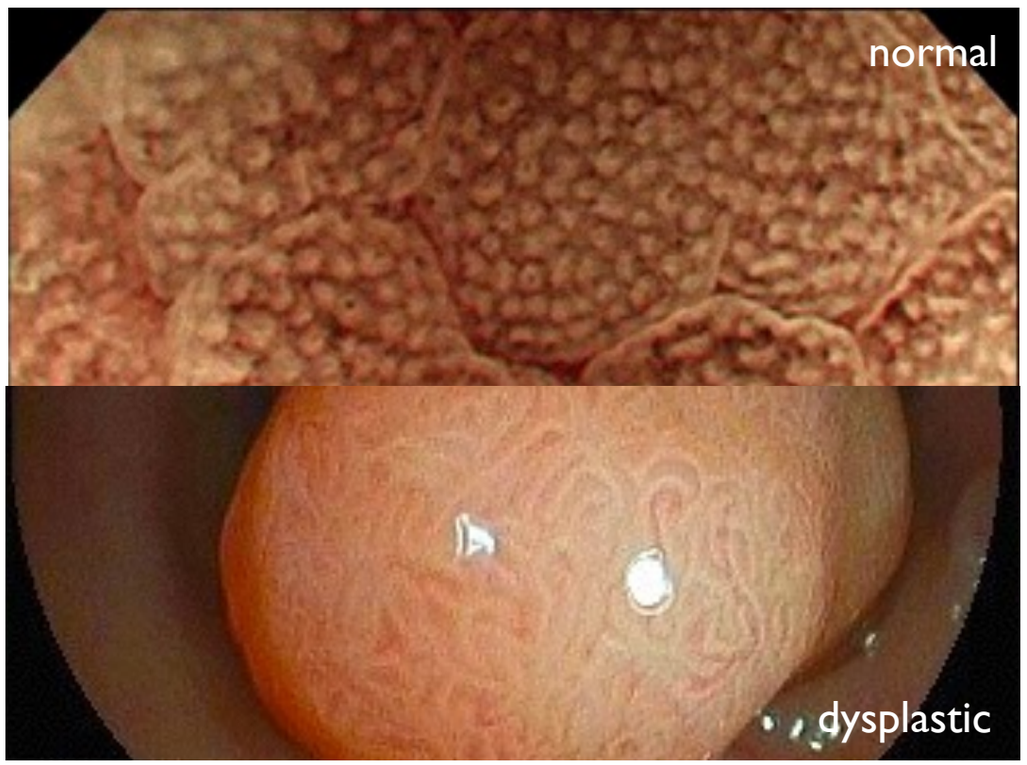
Fungal sporulation





Courtesy of Nico Dam
Netherlands' Mycological Society

Colon cancer



Courtesy of Bas Oldenburg
University Medical Center Utrecht

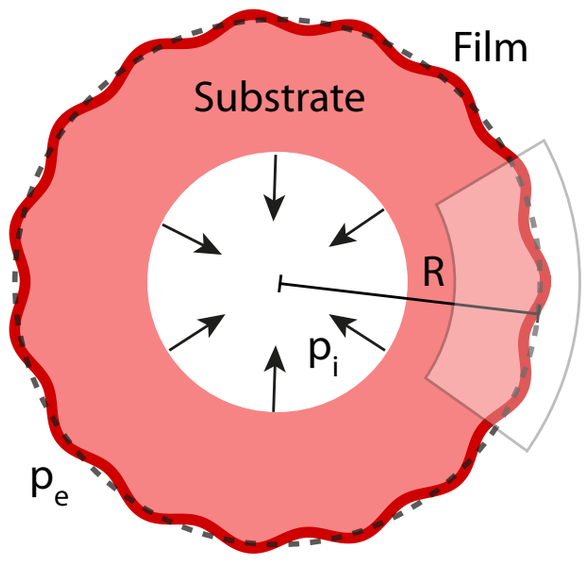
Nonlinear Partial Differential Equations

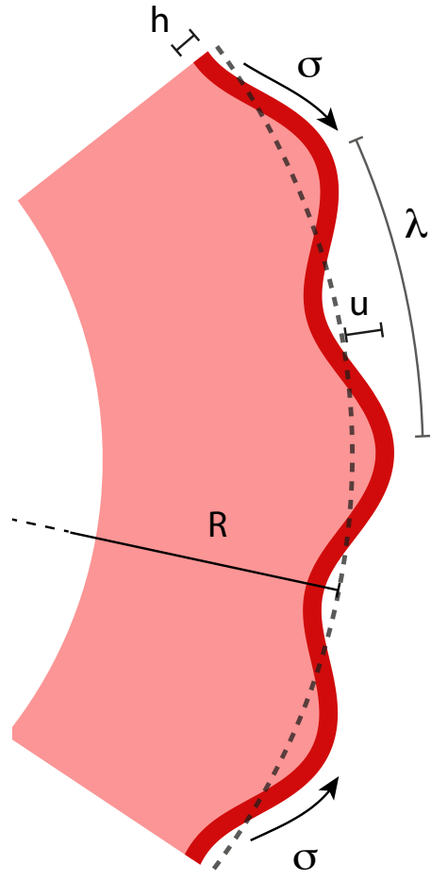


$$\partial_t u = \gamma_0 \Delta u - \gamma_2 \Delta^2 u - au - bu^2 - cu^3$$

$$+ \Gamma_1 \left[(\nabla u)^2 + 2u\Delta u \right] + \Gamma_2 \left[u(\nabla u)^2 + u^2 \Delta u \right]$$

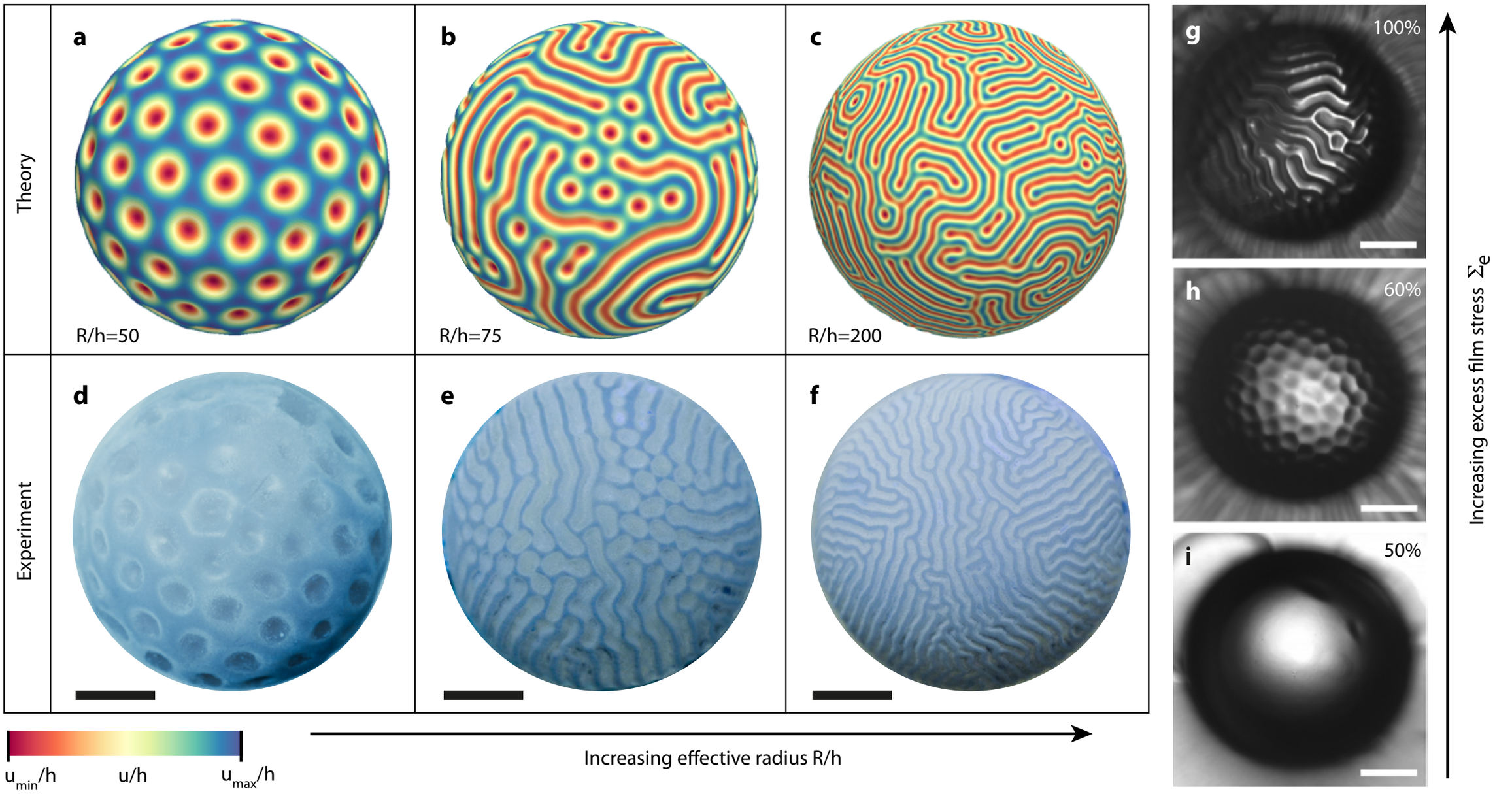






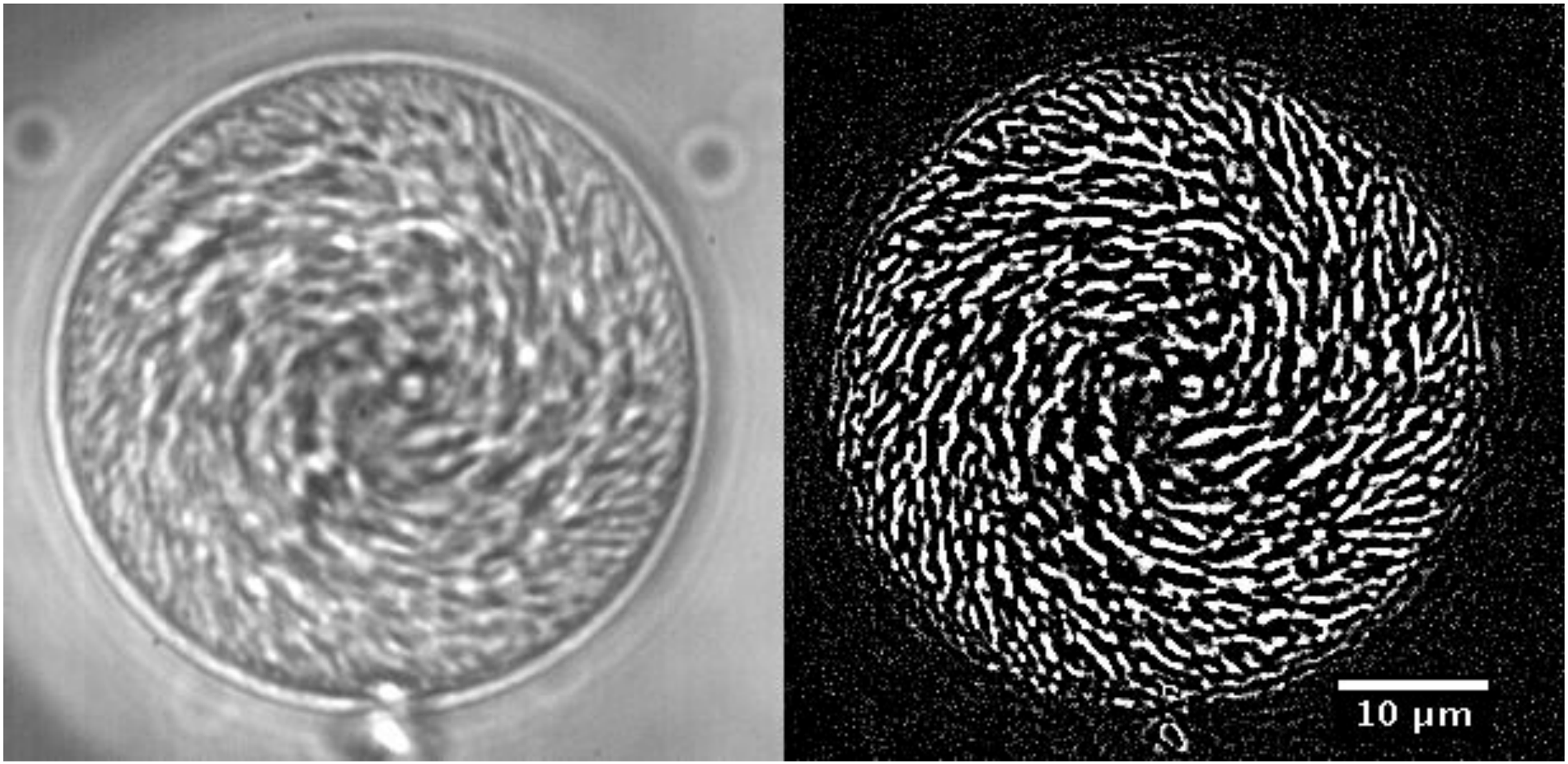
Model *vs.* experiment





Nature Materials 2015

Bacterial spiral vortex



Vortex life time ~ minutes

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