Electronic Supplementary Material (ESI) for Soft Matter.

SUPPLEMENTARY MATERIALS

A computational model of amoeboid cell motility in the presence of obstacles

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1. Sensitivity of reaction-diffusion parameters to Turing patterns

R1, #3

Figure S1 shows the phase plots in terms of $\beta = D_3/D_1$, s_1 and r_1 of the RD equations showing different Turing patterns that can be generated on a rigid sphere, and the sensitivity of the parameters. For cell motility simulations, we select parameters giving rise to bifurcating patterns, as these patterns can eventually generate bifurcating pseudopods.

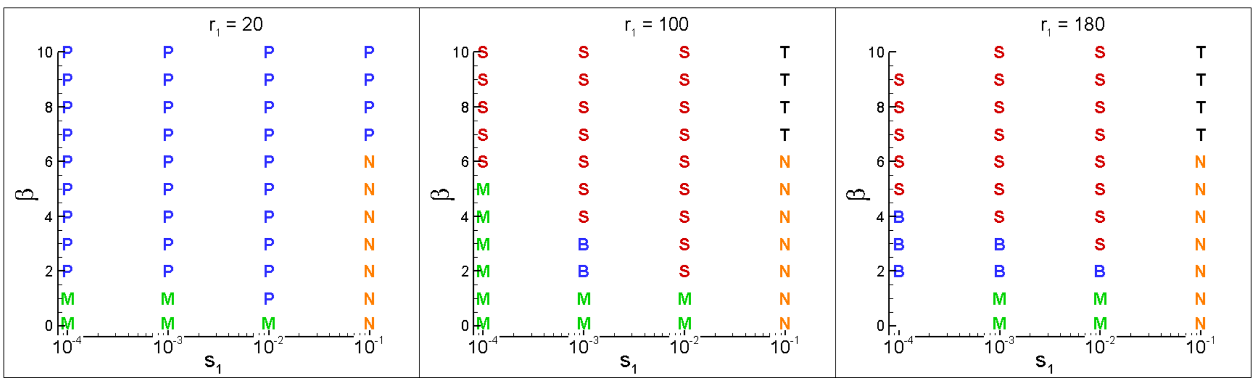


Fig. S1. Turing patterns generated by the RD equations on a rigid sphere: Single, steady patch of activator (P), travelling patch (M), bifurcating patch (B), multiple stable patches (S), stripes (T), and noisy patterns (N). The bifurcating pattern appears over larger space with increasing reaction rate r_1, since the RD system becomes more unstable.

2. Effect if viscoelastic membrane

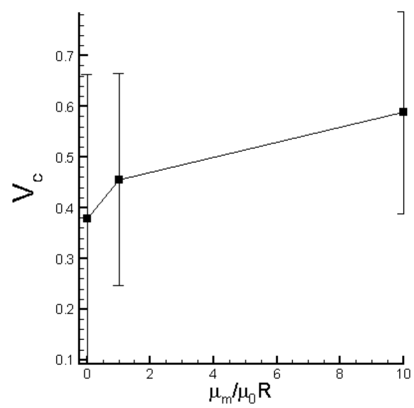
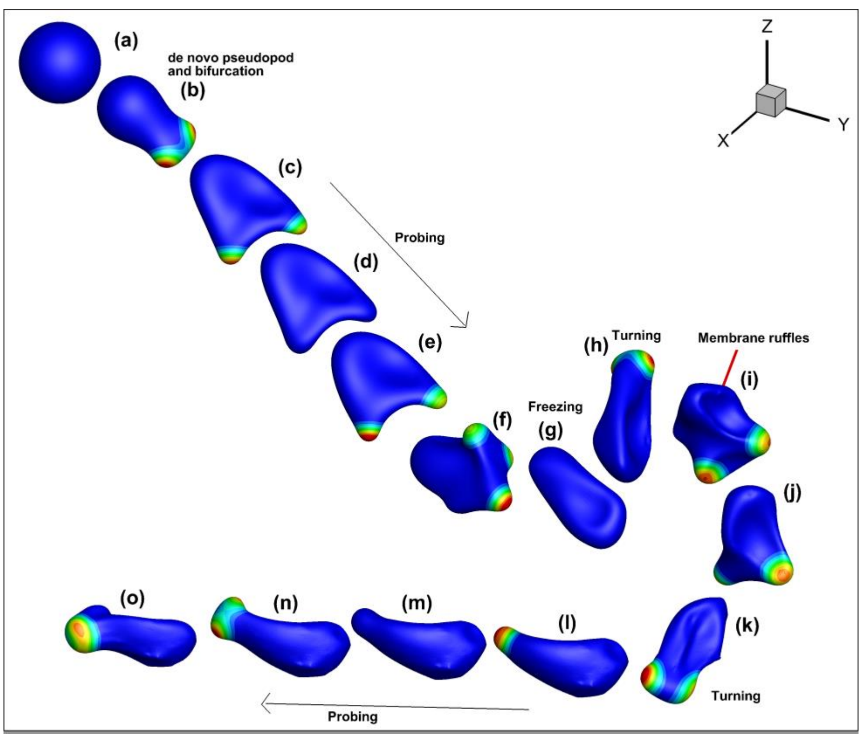


Fig. S2. Influence of membrane viscosity on average cell speed. Variables are defined in main article. Error bars are RMS.



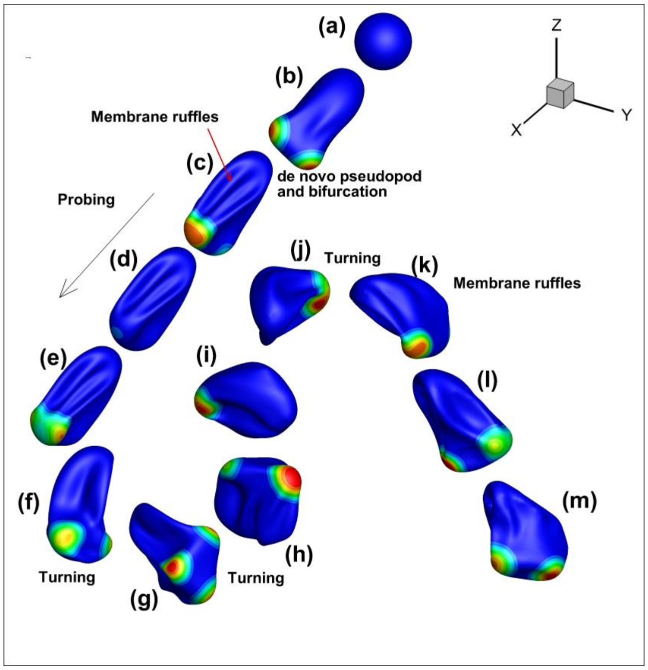


Fig. S3. Effect of viscoelastic membrane on cell motility. $\mu_m/\mu_0 R$ = 1 (top) and 10 (bottom). Similar motile dynamics are observed as for elastic membrane.

3. Effect of membrane bending stiffness

R1, #4

Average cell speed and RMS velocity fluctuations are shown in figure S4 for varying dimensionless bending stiffness.

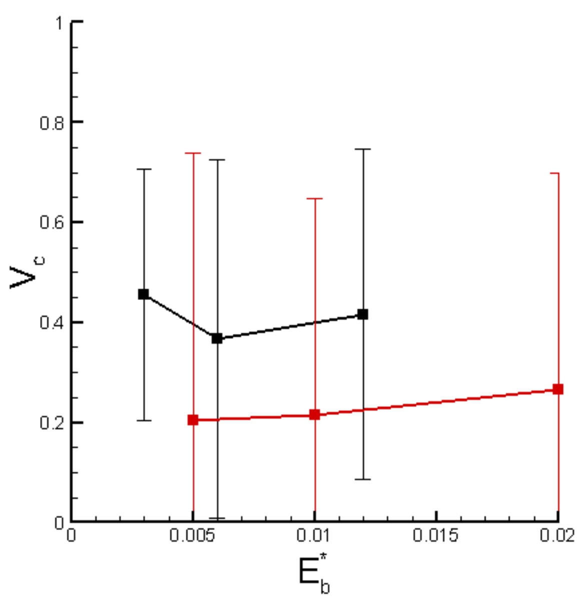


Fig. S4. Average cell speed (black, γ =1; red, γ = 0.5) as a function of dimensionless bending rigidity E_B*. Error bars represent RMS velocity fluctuations over time.

4. Preservation of cell volume

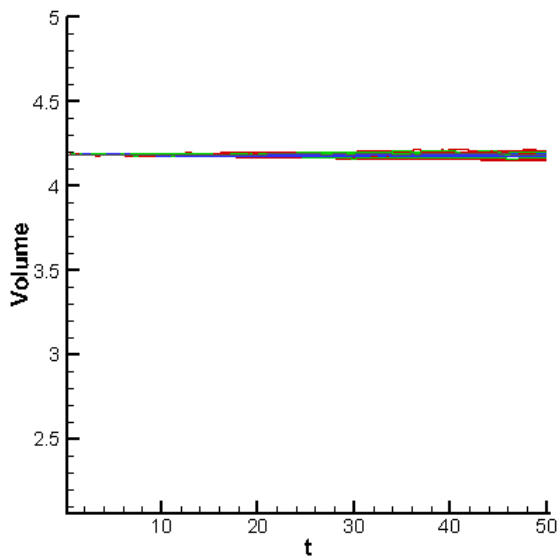


Figure S5. Variation of cell volume (dimensionless) over time for several simulations.