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Pattern Formation without Patterning Proteins in Cyanobacteria JUN ALLARD, ANDREW RUTENBERG, Department of Physics and Atmospheric Science, Dalhousie University, Halifax, Canada — Filaments of cyanobacteria respond to nitrogen starvation by differentiating one cell in ten into a heterocyst, which is devoted to fixing atmospheric nitrogen. This is an example of self-organized pattern formation. We present a dynamical model explaining the initial selection of heterocysts in mutated cyanobacteria that are effectively without normal patterning proteins. Our simulations of this model produce distributions of heterocyst spacings that are consistent with experimental data, and lead to new qualitative predictions on the mechanisms of pattern formation in filamentous cyanobacteria. We discuss possible experimental tests of our results.

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