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*Stochastic Models of Plastic Development in Cyanobacterial Filaments*

When deprived of fixed nitrogen, filamentous cyanobacteria differentiate nitrogen fixing heterocyst cells in a regular pattern. By including uniform cellular fixed-nitrogen storage in a filamentous model of nitrogen dynamics, growth, and heterocyst differentiation we can explain the stochastic timing of heterocyst commitment. Stochasticity arises mostly from the natural population structure of cell lengths in the filament. Later events in heterocyst differentiation were consistent with deterministic heterocyst development following commitment. Our computational model has qualitatively reproduced many of the measurements associated with heterocyst differentiation including the initial and steady state heterocyst patterns.