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Myxobacteria Fruiting Body Formation[1]

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Myxobacteria are social bacteria that swarm and glide on surfaces, and feed cooperatively. When starved, tens of thousands of cells change their movement pattern from outward spreading to inward concentration; they form aggregates that become fruiting bodies, inside which cells differentiate into nonmotile, environmentally resistant spores. Traditionally, cell aggregation has been considered to imply chemotaxis, a long-range cell interaction mediated by diffusing chemicals. However, myxobacteria aggregation is the consequence of direct cell-contact interactions. I will review our recent efforts in modeling the fruiting body formation of Myxobacteria, using lattice gas cellular automata models that are based on local cell-cell contact signaling. These models have reproduced the individual phases in Myxobacteria development such as the rippling, streaming, early aggregation and the final sporulation; the models can be unified to simulate the whole developmental process of Myxobacteria.

[1]Collaboration with M. Alber, D. Kaiser, O. Sozinova, and M. Kiskowski