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Phase separation dynamics explains *Myxococcus xanthus* aggregation GUANNAN LIU, Princeton University , FATMAGUL BAHAR, ADAM PATCH, Syracuse University, SHASHI THUTUPALLI, NCBS, Bangalore, DAVID YLLANES, ROY WELCH, M. CRISTINA MARCHETTI, Syracuse University, JOSHUA SHAEVITZ, Princeton University — The soil-dwelling bacteria *Myxococcus xanthus* exhibits a wide range of self-organizing social behaviors during its developmental cycle. When nutrients are scarce, *M. xanthus* cells aggregate into multicellular structures and eventually form massive clusters called fruiting bodies, where cells sporulate as a self-preservation mechanism. In light of recent advancements in active matter theory, we identify the aggregation process of *M. xanthus* as a spinodal decomposition phase separation. We show that without long-range communication, local mechanical interactions are sufficient to drive the system out of equilibrium. *M. xanthus* cells actively modulate their gliding motility and reversal rate to cross a boundary in the Péclet Number-density phase plane to achieve phase separation.

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