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Cell speeds, persistence, and information transmission during signal relay and collective migration in Dictyostelium discoideum COLIN MCCANN, MEGHAN DRISCOLL, University of Maryland, PAUL KRIEBEL, CAROLE PARENT, National Institutes of Health, WOLFGANG LOSERT, University of Maryland — Upon nutrient deprivation, the social amoebae Dictyostelium discoideum enter a developmental program causing them to aggregate into multicellular organisms. During this process cells sense and secrete chemical signals, often moving in a head-to-tail fashion called a 'stream' as they assemble into larger entities. We compare key metrics of motion – speed, persistence in direction, and directionality toward a chemical signal - in streaming cells versus mutants unable to stream, and we find that speed and directional persistence on short timescales remain unchanged under all conditions tested. These results point to the presence of an intrinsic motility machinery with inherent persistence and speed that is unaffected by the complicated external signaling environment. However, chemoattractants steer cells on longer timescales. We find that signal relay allows cells to move toward a point source of chemoattractant with equal accuracy independent of distance to the source and strength of the source.

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