Dictyostelium cells shown to lay 'breadcrumb trail' as first step in multicellular formation

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When starved of their food source and then presented with a chemoattractant signal like cAMP, individual Dictyostelium cells acquire a polarized morphology and aggregate to form a migrating stream. This is the first step in a developmental program that culminates in the formation of a multicellular organism. Kriebel et al. show how this streaming response is coordinated at a single-cell level in the December 1, 2008 issue of the *Journal of Cell Biology*.

Besides acquiring a polarized morphology and beginning to chemotax, Dictyostelium cells respond to cAMP signals by making their own cAMP, thereby recruiting yet more cells to join the parade. The team previously discovered that ACA—the enzyme that makes cAMP—is highly enriched at the back of migrating cells.

They thus proposed that the attractant is released mainly from the rear of cells, which prompts fellow cells to align and generate head-to-tail streaming structures. Kriebel et al. now show that ACA is packaged into intracellular vesicles that cluster at the rear of cells in a process that is dependent on actin and microtubule networks. They also show that de novo protein synthesis is required to maintain the asymmetrical distribution of the ACA vesicles.

Interestingly, the ACA-containing vesicles themselves, not just their contents, are deposited behind the Dictyostelium cells like a breadcrumb trail as the cells crawl along. As cAMP is a small and diffusible molecule, perhaps the vesicles serve to package the chemoattractant so

that it doesn't immediately diffuse away, says author Carole Parent.

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