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Cellular dynamics and embryonic morphogenesis

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The elongated body axis is a characteristic feature of many multicellular animals. Axis elongation occurs largely through cell rearrangements that are coordinated across a large cell population and driven by an asymmetric distribution of cytoskeletal and junctional proteins [1]. To visualize cellular dynamics during this process, we performed time-lapse confocal imaging of cell behavior in the Drosophila embryo. These studies revealed that rearranging cells display a steady increase in topological disorder that is accompanied by the formation of transient structures where 5-11 cells meet [2,3]. These multicellular rosettes form and resolve in a directional fashion to produce a local change in the aspect ratio of the cellular assembly, contributing to an overall change in tissue structure. We propose that higher-order rosette structures link local cell interactions to global tissue reorganization during morphogenesis. [1] J. Zallen and E. Wieschaus, Developmental Cell 6, 343 (2004). [2] J. Zallen and R. Zallen, J. Phys.: Condens. Matter 16, S5073 (2004). [3] J. Blankenship et al., Developmental Cell 11, 459 (2006).