



## Cell Death and Division Position Maintenance in Escherichia Coli

**By Steven Brown**

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**Abstract:**

In modern models of cell growth and division in *Escherichia coli*, a parental cell grows and divides asymmetrically to produce two identical daughter cells. However, once a cell pole is formed, no new pole will be formed between the nucleoid and any existing cell pole. This creates a time-related asymmetry after further rounds of division wherein one cell pole has existed for a longer time than the opposite cell pole. We previously reported that the rate of death of old-pole cells increases as the replicative age of the cell increases. To investigate the mechanism of this changing death rate, we characterized the mode of death for thousands of old-pole cells. We find that the change in the rate of cell death is attributable to a change in nucleoid positioning within aging cells. This change in nucleoid positioning is associated with changes in cell septum formation position and cell length which ultimately produces non-growing anucleate cells at the old cell pole. The formation of anucleate cells does not appear to involve obvious nucleoid pathologies, suggesting that these events are not “death” in the sense that genetic information ceases to replicate. Excluding the formation of anucleate cells, the rate of death by other mechanisms is approximately constant with replicative age between 0.001 and 0.002 per cell per generation.

**Bio:**

Steven Brown studied organic chemistry at the University of Wisconsin - Madison with Laura Kiessling before coming west to earn a doctorate in chemical biology from The Scripps Research Institute with M.G. Finn where, as a fellow of the Pfeiffer Foundation, he developed bacteriophage-derived nanoparticles as programmable scaffolds. After a brief engagement in the financial industry, Steve returned to academia as a postdoctoral scholar in Suckjoon Jun’s laboratory at UCSD and he very recently began studying the microbiome in human disease with Amir Zarrinpar and Alan Saltiel.

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