The Effects of Population Density on Endospore Formation in Bacillus megaterium

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Imagine living in a world where nothing is ever truly clean. A world where diseases and pathogens are basically immortal. Endospores are a bacterial defense mechanism where “stressed " bacterial cells will enter a vegatative state and produce a structure of tightly packed DNA, coated in several layers of protein that averages about .25 micrometers wide. These cells have been known to survive autoclaving. This chain of events is usually caused due to a bacterial cell running out of nutrients and has drastically increased the life span of bacterial cells. As a result, interest has peaked in these pesky little time-capsule like structures. This study aims to see if there is a correlation between population density and sporulation in Bacillus Megaterium. It does so by creating three serial dilutions , plating them, obtaining a colony forming unit count, staining slides in order to distinguish endospores from the original cell s, and then using a random method of counting to establish the efficacy of sporulation for each dilution. This experiment was able to show that at a concentration of 100k cells, had a spectral absorbance of .927 and .669 at a wavelength of 519 and 906 respectively, and on average 59% of all cells successfully underwent sporulation. At a concentration of 10k cells, had a spectral absorbance of .312 and .211 at a wavelength of 519 and 906 respectively, and on average 38.9% of all cells successfully sporulated. This shows that when the cell concentration of Bacillus Megaterium decreases, the sporulation rate seems to decrease as well . Given that this correlation is true, these optical densities could be used to predict the sporulation efficacy of any given sample of bactria. If this correlation is in fact true it opens a microworld of possibilities.