J Appl Bioinforma Comput Biol 2018, Volume 7
DOI: 10.4172/2329-9533-C1-006

How does nucleoid complexity affect cell dimensions and shape during the division process in bacillary bacteria

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Cell width W of *Escherichia coli* is correlated with the mean complexity of its nucleoid, which is expressed as the ratio between the mean times to replicate it and to duplicate the cell, *aka* the number of replication positions n. A set of old, puzzling observations of cell size and dimensions is qualitatively consistent with the view that *W* is determined by *n*, and that branching results from breaching a maximum possible value. This maximum *nmax* is interpreted in terms of a minimal distance possible between successive moving replisomes, so-called eclipse. The data is subject to analytical quantification designed to model the correlations in a way that may (1) shed light on the necessary coupling between the only two unique structures in a bacterial cell, nucleoid and sacculus, and (2) lead to decipher the primary signal transduced from DNA to the peptidoglycan biosynthetic pathway in the divisome. The first approximation is not sufficient to account for the rate at which average cell size rises with time (Po-Yi H and Amir A, personal communication), hence two additional causes are considered to reconcile this discrepancy: loss of division capacity of some DNA-less cells and dependence of the time needed for division on *W*. Another physical signal is invoked, related to transcription/translation of membrane protein genes coupled to membrane-insertion of these proteins termed "transertion", but means to measure the reciprocal stress imposed by transertion strings on both nucleoid and cell envelope are sorely lacking.

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