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Title:	The Escherichia coli nucleoid exists in a liquid- liquid phase separated state which seems to be responsive and tunable towards stresses. Biophysical Journal, 121(3), 357a.
Authors:	Gupta, Archit (/jspui/browse?type=author&value=Gupta%2C+Archit) Joshi, Ashish (/jspui/browse?type=author&value=Joshi%2C+Ashish) Mukhopadhyay, Samrat (/jspui/browse?type=author&value=Mukhopadhyay%2C+Samrat) Guptasarma, Purnananda (/jspui/browse?type=author&value=Guptasarma%2C+Purnananda)
Keywords:	Escherichia coli nucleoid liquid-liquid phase separated responsive and tunable towards stresses
Issue Date:	2022
Publisher:	Elsevier
Citation:	Green Chemistry, 24(17), 6707-6719.
Abstract:	The E. coli chromosome's (1,000-fold) compaction into the non-membrane-bound compartment called the nucleoid has remained a mystery. For several decades, predictions have existed that the nucleoid is phase separated, with macromolecular crowding playing a major role in DNA compaction. Here, we present evidence for 1) The dynamic nature of the nucleoid; 2) LLPS shown by a major log-phase non-sequence specific Nucleoid Associated Protein (NAP), under physiological conditions; 3) the potency of the NAP to phase separate with DNA (all possible conformations) and RNA; 4) the tunable nature of this phase separation, based on the relative amounts of protein homologs ; 5) Phase separation of another NAP, a stationary phase protein; and 6) Coacervation of two proteins in LLPS condensates, which could be relevant to the well-known crystallization potency of stationary phase NAP (a DNA protection mechanism) in cells. Together, these findings hint at the bacterial nucleoid existing as a highly compacted dynamic phase-separated compartment inside the bacterial cytoplasm. The non-sequence-specific binding to nucleic acids, and the great abundance of both the NAPs suggest that these proteins are the primary drivers of nucleoid phase separation, with the ease of phase separation of the nucleoid increasing with stress associated with cell growth phases.
Description:	Only IISER Mohali authors are available in the record.
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