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Charting the Structure and Energetics of Packaged DNA in Bacteriophages XIANGYUN QIU, DONALD C. RAU, V. ADRIAN PARSEGIAN, National Institutes of Health, LI TAI FANG, CHARLES M. KNOBLER, WILLIAM M. GELBART, University of California, Los Angeles — Many bacterial viruses resort to pressure in order to infect bacteria, e.g., lambda phage stores its dsDNA genome at surprisingly high pressure and then uses this pressure to drive delivery of the genome. We report on a biophysical interrogation of the DNA configuration and pressure in lambda phage by combining structural and thermodynamic measurements with theoretical modeling. Changes in DNA organization in the capsid are monitored using solution small angle x-ray scattering (SAXS). We vary the DNA-DNA repulsion and DNA bending contributions to the capsid pressure by changing salt concentrations and packaged length, and augment SAXS data with osmotic stress measurements to elicit the evolving structure and energetics of the packaged DNA.

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