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Free Energy Landscapes of DNA Stretching Using Crooks Fluctuation Theorem[1] ERIC FREY, CHING-HWA KIANG, Rice University — Free energy landscapes can be reconstructed from nonequilibrium, single-molecule manipulation by using nonequilibrium work theorems. Previous studies have reconstructed landscapes of the unfolding of RNA, DNA hairpins, and proteins. Such landscapes have thus far exhibited one single pathway, or the free energy is that of the combined molecule-plus-force-probe system used in the experiments. Here we reconstruct a multiple-pathway, branched free energy landscape of poly(dA), as a function of molecular end-to-end extension, from nonequilibrium single-molecule measurements. We show that the Crooks fluctuation theorem can be used to reconstruct the landscape of poly(dA) stretching.

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