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The Role of MreB in Escherichia Coli's Cellular Rigidity

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Bacteria possess homologs of all three classes of eukaryotic cytoskeletal proteins. These filamentous proteins have been shown to localize proteins essential for a number of cell-biological processes in prokaryotes such as cell growth and division. However, to date, there has been no direct evidence that the cytoskeleton in bacteria bears mechanical loads or can generate physical forces than are used by the cell. I will present evidence from combined fluorescence and force microscopy measurements that MreB, an actin homolog, is responsible for half of Escherichia coli's cellular rigidity. These data support an interpretation in which the cytoskeleton, the peptidoglycan cell wall and a large turgor pressure work together to give gram-negative cells their mechanical properties.