

Abstract Submitted
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High-resolution architecture of Gram-negative bacterial cell wall

AHMED TOUHAMI, University of Texas at Brownsville, JOHN DUTCHER, University of Guelph — The major structural component of bacterial cell walls is the peptidoglycan sacculus, which is one of nature's strongest and largest macromolecules that maintains the large internal pressure within the cell while allowing the transport of molecules into and out of the cell and cell growth. The three-dimensional structure of this unique biopolymer is controversial, and two models have been proposed: the planar model, in which the glycan strands lie in the plane of the cell surface, and the scaffold model, in which the glycan strands lie perpendicular to the cell surface. We have used atomic force microscopy to investigate the high resolution structure of isolated, intact sacculi of *Escherichia coli* K12 bacteria. Atomic force microscopy-single molecule force spectroscopy was performed on single sacculi exposed to the tAmiB enzyme which cleaves the peptide-glycan bonds. Surprisingly, the measurements revealed individual strands of up to 250 nm in length. This finding combined with high resolution AFM images recorded on hydrated sacculi provide evidence for the validity of the planar model for the peptidoglycan structure in Gram-negative bacteria.

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