

Structural analysis of Legionella pneumophila Dot/Icm type IV secretion system core complex

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One important way bacterial pathogens establish infections is by transporting effector proteins into a host cell across multiple membranes. Bacteria have evolved elaborate strategies to accomplish this, including the Type IV Secretion System (T4SS). The Legionella pneumophila Dot/Icm T4SS translocates hundreds of effector proteins and is essential for pathogenesis, leading to the potentially fatal pneumonia Legionnaires' Disease. The components used by bacteria to move virulence factors across membrane have been thoroughly catalogued. In fact, formative work identified 27 protein components of the large, dynamic Dot/Icm T4SS. Still, our mechanistic understanding of how these components fit together and move substrate lags behind. Using biochemistry, genetics, and cryo-electron microscopy, I have isolated the ~5.5 MDa Dot/Icm T4SS core complex and determined its macromolecular structure, revealing distinctive structural characteristics and previously unknown components.