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Pilus biogenesis at the outer membrane of bacterial pathogens

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Gram-negative pathogens commonly exhibit adhesive pili on their surface that mediate specific attachment to the host. A major class of pili is assembled via the chaperone/usher (CU) pathway. Type 1 and P pili have served as model systems for the elucidation of the CU biosynthetic pathway. Pilus assembly requires a periplasmic chaperone (FimC and PapD for type 1 and P pili, respectively) and an outer-membrane assembly platform termed “usher” (FimD and PapC for type 1 and P pili, respectively). CU pilus subunits are produced in the cytoplasm, translocated to the periplasm by the Sec translocation machinery, and then taken up by a chaperone to cross the periplasmic space to reach the outer-membrane. At the outer-membrane, chaperone-subunit complexes are recruited to an outer-membrane assembly platform, the usher, which orchestrates recruitment and polymerization of subunits. Previous work has elucidated the molecular basis of chaperone function. Recent progress has shed light into the mechanism of pilus subunit assembly at the usher, leading to the elucidation of the entire cycle of pilus subunit incorporation.

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