New perspectives for the study of the bacterial cell enveloppe: The Myxococcus xanthus motility complex, moving parts, rotation and fixed anchor points

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Résumé

Bacterial moves across surfaces by a mysterious process called gliding motility. During this ERC project we elucidated this mechanism in the model social bacterium *Myxococcus xanthus*. Using genetics and single cell approaches we found that *Myxococcus* uses a novel class of intracellular motors to move protein complexes along the cell surface, promoting surface motility when they become anchored to the underlying surface. During this process, the so-called Agl motor, a flagellar stator homolog, interacts with a trans-envelope protein complex to propel the cell. Using high-resolution single cell approaches revealed the fine molecular dynamics of the motility proteins and unveiled critical aspects of the propulsion mechanism. Together, the results show that transient connections between the inner and outer membrane occurring through the peptidoglycan layer create a molecular rotor in the cell envelope that propels the cell. The evolutionary implications of this mechanism to the maintenance and integrity of the bacterial cell enveloppe will also be discussed.

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