Exchange of motor proteins measured in living cells

Judith P Armitage[1], Richard M Berry[2], Nicolas Delalez[1], Andreas Diepold[1]

[1]Department of Biochemistry and [2]Department of Physics, University of Oxford, Oxford, UK
Judith.armitage@bioch.ox.ac.uk

Previous work showed that the stators of the bacterial flagellar motor of *E. coli* exchange rapidly with a membrane diffusing pool of proteins, and the number of stator proteins engaged at any one time relates to the external force on the motor. Recently this work has been extended to investigate the surface swarming of *Pseudomonas aeruginosa* which has two different sets of stators. In collaboration with George O'Toole we have shown that different stator types allow movement through medium of increasing viscosity, and the engagement of the different stators is controlled by the concentration of the small molecule cyclic di GMP, controlling the switch between surface movement and biofilm formation. We are currently investigating the basis of the different torque outputs of the different stator types.

We have also shown that the proteins of the motor C-ring exchange with cytoplasmic pools, but only when the motor is rotating in a CW direction. This work has now been extended to investigate the behavior of the cytoplasmic components of the injectisome under secreting and non-secreting conditions. Using FCS and FCCS combined with fluorescence microscopy of living cells, we have measured the numbers, position and exchange dynamics of the cytoplasmic components of the injectisome and the behavior of the proteins diffusing in the cytoplasm, showing that they diffuse as dynamic complexes.