IQSE AMO QO Seminar Series

Tuesday, October 4th, 11:30 am ZOOM & IQSE seminar room (MPHY 578)

Pizza will be served for IQSE members at 11:00 am. The talk will start around 11:30 am

Dr. Matthias Koch

Department of Biology, Texas A&M University

The bacterial sense of touch: how micron-small cells measure substrate mechanics using molecular-scale fingers

Host colonization by commensal or pathogenic bacteria has traditionally been studied in terms of the chemical and biological factors associated with the environment. Although the mechanical environment of a cell can vary tremendously and can be as rigid as bone or as soft as mucus, it has not gained much attention as a determinant of bacterial infections. Here, I will show that the clinically important pathogen Pseudomonas aeruginosa distinguishes substrates by their stiffness and tunes over 100 virulence related genes to substrate rigidity. These results suggest that P. aeruginosa can distinguish its broad spectrum of infection sites by substrate mechanics and modulate virulence factors specifically to each site. Specifically, I will explain how stiffness sensing is facilitated by a fascinating nanomachine: the type IV pilus (TFP). TFP are large membrane-spanning complexes that use two dedicated molecular motors for quickly extending and retracting of a micrometer-long polymeric fiber (the pilus) to the environment. Combining different experimental biophysical tools, mathematical modeling, and numerical simulations, I will show how TFP retraction deforms the substrate and is used to measure its rigidity much like molecular-scale human fingers squeezing a fruit to check its ripeness. I will further explain how the two motors of TFP are coordinated biophysically to generate the observed cycles of extension and retraction that ultimately facilitate stiffness sensing.

ZOOM information:

https://tamu.zoom.us/j/98156251523?pwd=QVdSdGxtL1UyY0g1L083SU5QR0QrUT09

Meeting ID: 981 5625 1523
Passcode: 297578

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