



Contribution ID: 244
compétition)

Type: Oral (Student, Not in Competition) / Orale (Étudiant(e), pas dans la

Can bacterial filaments regrow ?

Thursday 19 June 2014 14:00 (15 minutes)

Many bacteria swim in their environment by rotating a number of rigid helical filaments each anchored to their bodies by a rotary nano-engine. This fascinating system has been the subject of numerous biophysical studies in the past decades that have provided great insight into the world of biological nanomachines and intracellular signalling. The subject of this particular study was the assembly of the flagellar filament.

Each individual filament extends many body lengths (10-15 μ m) outside of the cell and is constructed of as many as 20000-30000 protein subunits (called flagellin). These flagellin are all synthesized inside of the cell (in the cytoplasm) and need to be exported through the filament to be assembled at its distal end with the help of a small structure called the "cap". From cryo-EM and X-ray crystallography, we know that the filament has a diameter of about 23 nm with a central channel of about 2 nm.

Using femtosecond laser ablation, we cut individual bacterial filaments and watched whether they could regrow with fluorescence microscopy. We did not observe any regrowth, contradicting the results of Berg et al. from Harvard who recently reported that mechanically broken (sheared) filaments do grow back. We also investigated the rate at which filaments grow as a function of their length to shed light on the mechanism by which flagellin is transported. The prediction of the recently proposed chain mechanism is a length-independent rate (also observed by the Berg group), but this model is controversial and needs independent verification.

Author: Mr PARADIS, Guillaume (Universite Laval)

Co-author: Prof. RAINVILLE, Simon (Universite Laval)

Presenter: Mr PARADIS, Guillaume (Universite Laval)

Session Classification: (R2-3) Biophysics/Soft Condensed Matter VI - DMBP-DCMMP / Biophysique et matière condensée molle VI - DPMB-DPMCM

Track Classification: Medical and Biological Physics / Physique médicale et biologique (DMBP-DPMB)