Seminar

GTR Seminar

GTR Transformative Chem-Bio Research Nagoya University

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Current Topics in Biological Science seminar

大学院理学研究科アドバンス生命理学特論

5:2 molecular motors: from bacterial motility to anti-phage defense

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日　時：7月8日（月）16:00 ～17:30

場　所：理学部A館 2階　222号室

Bacteria move through the rotation of large filaments know as flagella. Flagellar rotary motion is powered by a flagellar motor, driven by stator units (MotAB). The MotAB proteins convert the ion motive force across the bacterial inner membrane into rotation of the filament, but it was not understood how this occurred. Using cryo-EM we have determined structures of the MotAB complex, which we show has a 5:2 stoichiometry shared across different species. By visualizing MotAB in its plugged, inactive state, as well as mimics of its active state, we come up with models for how torque is generated in the flagellar motors, as well as how direction switching in the flagellar motor occurs (ref: 1,2).

I will also present unpublished results on a newly discovered bacteriophage defense system, Zorya, that uses a 5:2 motor complex to sense bacteriophage infection. Using a combination of structural biology, functional assays, light microscopy and mass spectrometry, we provide novel insight into the unique Zorya mechanism of action. We provide data indicating that Zorya detects phage infection by monitoring integrity of the peptidoglycan layer. Upon phage infection, the ZorAB motor proteins get activated and through a 700 Å long tail locally recruit and activate ZorD nuclease that can degrade the phage genome, halting the infection (ref: 3).

1) Santiveri et al, Cell (2000), 2) Hu et al, Nat.Comm. (2023), 3) BioRxiv. 10.1101/2023.12.18.572097v1

Taylor博士は細菌べん毛モーターのエネルギー変換ユニットである固定子のクライオ電顕構造解き明かした新進気鋭の研究者で、**EMBO Young Investigator**に選ばれています。IUPAB2024の後、名古屋にお招きし、GTRとEMBOのサポートを得て開催します。**本セミナーは対面とzoomによるオンラインのハイブリッドで開催いたします。**アドバンス生命理学特論の受講生でzoomで参加される場合は、TACTにzoom情報を載せますのでご参照ください。**学生以外でzoomで参加される方は、小嶋までご連絡いただければzoom情報をお送りいたします。**

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