ARNA Seminar Series

Wednesday, April 29 at 11:30 am (BBS auditorium)

Phase separation in the assembly of plasmid partition complexes: From trends to mechanisms

Jean-Yves Bouet
Bacterial Genome Dynamics, Centre de Biologie Intégrative (CBI), Toulouse

Faithful DNA segregation in bacteria is orchestrated by ParABS systems, which ensure the precise partitioning of both chromosomes and low-copy-number plasmids. Central to this process is the CTPase ParB, which assembles into dynamic condensates at centromere-like *parS* sites, and the ATPase ParA, which spatially organizes these complexes within the cell. Despite increasing evidence that ParB forms phase-separated assemblies, the mechanisms governing the formation, maintenance, and dynamics of these condensates remain poorly understood. I will present our recent work combining inducible chromosome degradation with quantitative imaging to dissect the kinetics and physical principles underlying ParB condensate dynamics *in vivo*. Our findings establish the $ParB_F$ partition complex of the *E. coli* plasmid F as a *bona fide* biocondensate and reveal how its dynamics are finely tuned by $ParA_F$ to ensure robust and faithful DNA segregation. These insights illuminate broader principles of biomolecular condensate regulation in cellular organization.

Host: Anaïs Le Rhun, ARNA