Pushing the Boundaries of Genome Engineering and In Vivo DNA Assembly via Bacterial Conjugation

Tigran Yuzbashev
Owain Meek

Abstract:

Bacterial conjugation is a natural DNA-transfer process that enables direct transfer of genetic material between cells on rapid timescales (≈15-100 minutes, depending on DNA size). In contrast, many current cloning and genome engineering workflows rely on iterative switching between in vitro and in vivo steps, such as DNA isolation, assembly and transformation, extending timelines from minutes to days. In this presentation, I will describe how conjugation, combined with state-of-the-art genome engineering platforms including CRISPRs, can streamline and accelerate Engineering Biology by enabling efficient in vivo DNA assembly, delivery and integration. I will highlight our recent experimental advances that leverage conjugation for microbial genome engineering and scalable DNA assembly, illustrating how this approach can expand the speed, scope, and practicality of building and rewriting microbial genomes.