NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

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SEMINAR

Tues, 10 Nov 2026 | 3 pm | S3-05-02 Conference Room 1

Hosted by Assist Prof Hu Chunyi

Diverse mechanisms of DNA integration enzymes

Dr. Hiroshi Nishimasu is a highly accomplished Japanese structural biologist and professor at the Research Center for Advanced Science and Technology (RCAST), The University of Tokyo. He is globally recognized for his pioneering work in deciphering the molecular structures of CRISPR-Cas systems and revolutionary genome editing technologies. He earned his PhD and dedicated much of his earlier career to investigating the structural engineering of RNA-guided effector nucleases.



By Hiroshi Nishimasu

The University of Tokyo, RCAST

Transposons, or “jumping genes,” move within genomes through the action of diverse enzymes. Although their transposition mechanisms have long been studied, much remains unclear owing to their complexity and diversity. Because the enzymes that catalyze transposition possess unique properties, they have recently attracted attention for genome engineering applications, including the integration of long DNA sequences. We recently reported that the recombinase responsible for the transposition of IS110-family insertion sequence (IS) elements forms a complex with a non-coding RNA, termed bridge RNA, and catalyzes recombination between target and donor DNA. We further determined the cryo-EM structure of the bridge recombinase complex, revealing an unprecedented mechanism of RNA-guided DNA recombination. We have also uncovered the distinctive DNA integration mechanisms of R2 retrotransposons and large serine recombinases. In this seminar, I will present the diverse working mechanisms of these DNA integration enzymes, and will also reflect on the personal connections that underlie the research behind them.