NUS National University of Singapore

Department of Biological Sciences
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SEMINAR

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Hosted by Assoc Prof Henry Mok

Challenges and solutions for deployment of gene drive

Gene drive alleles bias inheritance in the favor, allowing them to quickly spread throughout a population after a small release of transgenic individuals. They could combat vector-borne diseases such as malaria and dengue from mosquitoes by rapidly spreading a cargo gene that blocks pathogen transmission. Gene drives could directly suppress vector populations or others such as invasive species or agricultural pests. However, CRISPR gene drives often generate resistance alleles when DNA cleavage is repaired by end-joining instead of homology-directed repair, which impedes the spread of the drive. Additionally, our computational modeling predicts that suppression drives may not succeed in spatially structured natural populations due to the “chasing” phenomenon that causes chaotic, long-term persistence of both drive and wild-type alleles. To overcome resistance allele formation, we combined several methods, allowing homing-type drives to succeed in cage studies. We’ve also constructed another successful drive using a new “toxin-antidote” mechanism to spread. This highly efficient class of gene drives could allow modification or suppression to be confined to a specific target population. Additional self-limiting gene drive designs enable SIT-like suppression strategies with substantially reduced release requirements.

By Jackson Champer

Center for Bioinformatics, School of Life Sciences & Center for Life Sciences, Peking University

About the Speaker

Jackson Champer was born in New York City in 1986. He received a B.S. in physics and mathematics from the University of Oregon and a M.S. in physics from UCLA. Jackson then switched his focus to biology, receiving a Ph.D. from City of Hope Beckman Research Institute in 2015. He was a postdoctoral fellow at Cornell University starting in May 2016 and then opened his lab at Peking University in May 2021. Since then, Jackson has been an assistant professor in the Center for Bioinformatics, School of Life Sciences, and Center for Life Sciences. His lab focuses on experiments and modeling of gene drive and related areas of genetic population engineering.