

# Systems Biology Seminar

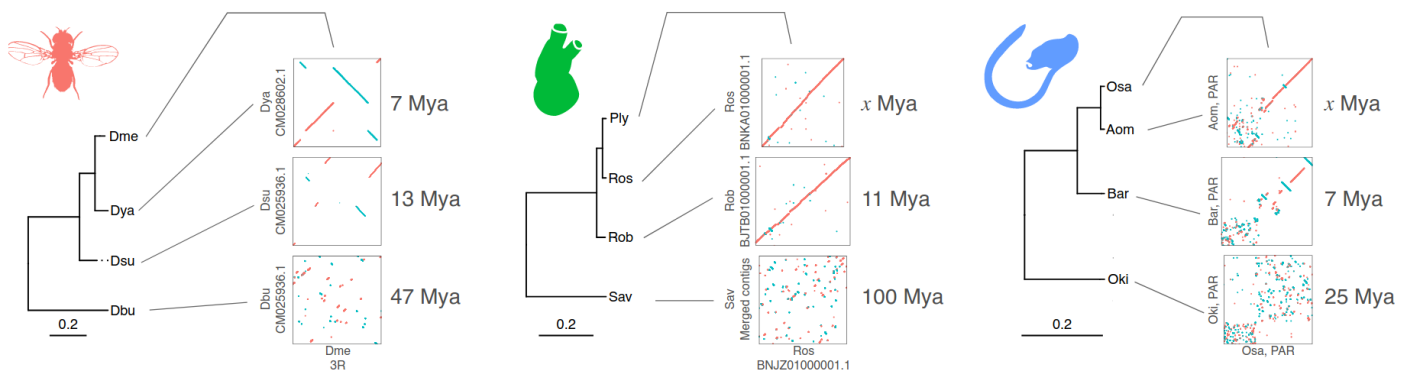
Monday, July 24, 2023

15:00-16:00 (@IPR 2F, Main conference room)

**Charles Plessy** Okinawa Institute of Science and Technology Graduate University

## Massively scrambled genomes producing animals with conserved morphology

The conservation of gene order (synteny) on chromosomes reflects the existence of regulatory mechanisms relying on proximity and is also essential to the formation of crossovers during meiosis. Some synteny remains between animals having their last common ancestor 500 million year ago. The zooplankton *Oikopleura dioica* has one of the fastest-evolving animal genomes. We assembled genomes of single *O. dioica* individuals from cryptic species of the North Atlantic, North Pacific, and Subtropical Pacific and developed a bioinformatics pipeline automating pairwise genome comparisons using the Nextflow system. We observed an unexpected extent of chromosome rearrangements given the strictly conserved morphology of these animals. Gene order in genomes of distinct *O. dioica* cryptic species is subject to considerable changes, suggesting that regulatory circuits in *O. dioica* are less dependent on long-range interactions than other chordate animals. We computed molecular clocks and estimated that the last common ancestor of these genomes dates from only a few 10s of millions of years ago. In comparison with other pairs of invertebrate species in the *Ciona* and *Drosophila* genera that diverged at a similar time scale, the number of breaks of synteny in *O. dioica* genomes is the highest. A survey extending this search to pairs of species broadly sampled from the Tree of Life suggests that the rate of structural changes in *O. dioica* is among the highest in animals. We propose that the *O. dioica* genome can be used as a contrast model to decipher the principles constraining gene order, with the prospect of applying these rules to the synthesis of artificial genomes designed in silico.



*Oikopleura* species have the fastest rate of genome scrambling

Zoom ID:

<https://us04web.zoom.us/j/76092595568?pwd=hUp3vMIL5Ni18VECqxbOYfUqIhCQkl.1>

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