BDR SEMINAR in Kobe

"CDB SEMINAR" and "QBiC SEMINAR" have been renamed "BDR SEMINAR".

Nicholas F. Parrish

RIKEN IMS (Genome Immunobiology RIKEN Hakubi Research Team)

Thursday, October 31, 2018

16:00-17:00, Seminar Room, Building A 7F

Interfering Small RNAs Derived from Viral Sequences in Mammalian Genomes: a CRISPR/Cas-like Immune System?

Summary

Endogenous bornavirus-like nucleoprotein elements (EBLNs) are sequences within vertebrate genomes that were made via reverse transcription and integration of ancient bornaviral nucleoprotein mRNA via the host retrotransposon machinery. While species with EBLNs appear relatively resistant to bornaviral disease, the nature of this association is unclear. We hypothesized that EBLNs could give rise to antiviral interfering RNA in the form of PIWI-interacting RNAs (piRNAs), a class of small RNA known to silence transposons but not exogenous viruses. In both rodents and primates, which acquired their EBLNs independently some 25–40 million years ago, EBLNs are present within piRNA-generating regions of the genome far more often than expected by chance. EBLNs were integrated into pre-existing piRNA clusters, and piRNAs derived from EBLNs are antisense relative to the proposed ancient bornaviral nucleoprotein mRNA. These observations are consistent with a role for EBLN-derived piRNA-like RNAs in interfering with ancient bornaviral infection. They raise the hypothesis that retrotransposon-dependent virus-to-host gene flow could engender RNA-mediated, sequence-specific antiviral immune memory in metazoans analogous to the CRISPR/Cas system in prokaryotes.

Host: Kyogo Kawaguchi

Nonequilibrium physics of living matter RIKEN Hakubi Research Team

Contact: kyogo.kawaguchi@riken.jp

RIKEN BDR

RIKEN Center for Biosystems Dynamics Research (BDR)