Elucidation of the Molecular Mechanism of Chromosome Evolution

Project Leader
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1. Objective

This project is aimed at:

Elucidating the molecular mechanism by which chromosome evolution is achieved. Chromosomes play a central role in the faithful transmission of eukaryotic genomes. Configuration of chromosomes is diverse across eukaryotes and even within a eukaryote. It is defined uniquely by centromeres and telomeres, the special chromosomal domains that act as 'grip' and 'end protector', respectively. The functions of centromeres and telomeres are essential for proper genome transmission, and therefore need to be associated firmly with each chromosome. However, both centromeres and telomeres inherently possess some instability in their presence and are able to disappear or form *de novo* at new sites. Such capricious behavior of centromeres and telomeres is believed to drive chromosome evolution, whose mechanism and regulation has hitherto been poorly understood. By recapitulating these spontaneous chromosome alterations in fission yeast *Schizosaccharomyces pombe* in the laboratory, we are going to investigate the molecular mechanism and cellular regulation.

2. Project Outline

To that end, the project will consist of the following phases:

(a) Chromosome engineering of fission yeast and passage-by-passage analysis
(b) Identification of chromosomal alterations and responsible genes
(c) Fluorescence live cell imaging using time-lapse microscopy

3. Expected Performance

In this project, the successful candidate would be expected to:

(a) Play a significant role in the research project
(b) Work actively and collaboratively with other member of the research group

4. Required Skills and Knowledge

The successful candidate for this project will have the following knowledge and skills:

(a) A solid understanding of molecular biology, cell biology and genetics
(b) An understanding of chromosome biology (preferred)
(c) General skills for molecular biology and cytogenetics

References

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(3) Ogiyama, Y. and Ishii, K. (2012) The smooth and stable operation of centromeres. Genes Genet. Syst., 87,

63-73.
(4) Ishii, K., Ogiyama, Y., Chikashige, Y., Soejima, S., Masuda, F., Kakuma, T., Hiraoka, Y. and Takahashi, K. (2008) Heterochromatin integrity affects chromosome reorganization after centromere dysfunction. Science, 321, 1088-1091.

See my webpage:
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See our admission guidelines:
https://www.kochi-tech.ac.jp/english/admission/ssp_aft19oct/ssp_application_guideline.html

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