Faculty Talk by Dr. Ines Anna Drinnenberg

Institut Curie, Paris, France.

Friday, 19th February at 7pm.

Title:

Evolution of centromeres: Conserved function, yet diverse architectures

Abstract:

Despite their essentiality for faithful chromosome segregation, centromere architectures are diverse among eukaryotes and embody two main configurations: mono- and holocentromeres, referring respectively to a localized or unrestricted distribution of centromeric activity. Previous studies revealed that holocentricity in many insects strongly coincides with the loss of the otherwise essential centromeric marker CenH3 (CENP-A), suggesting a molecular link between the two events.

Here, we aim to characterize this unique CenH3-deficient chromosome segregation pathway. Using proteomic and genomic approaches in *Bombyx mori* (silk moth) cell lines, we aim to determine the mechanism of CenH3-independent kinetochore assembly that led to the establishment of their holocentric architecture.

In this context, we have recently identified additional inner kinetochore components including CENP-T and determined their contribution to kinetochore assembly independent of CenH3. In addition, we also leveraged the identification of these kinetochore components against which we also generated antibodies to map and characterize the centromeres of *B. mori*. This uncovered a robust correlation between centromere profiles and regions of low chromatin dynamics found anywhere along the chromosome. Transcriptional perturbation experiments showed that centromeres become excluded from regions of active chromatin but can form *de novo* in regions where chromatin activity is low. The identified link to chromatin dynamics helps to discuss the plasticity of centromere identity. In this context, our study points to a novel mechanism of centromere formation that occurs in a manner recessive to the chromosome-wide chromatin landscape rather than being defined by the presence of CenH3. Based on similar profiles observed in additional Lepidoptera, we propose an evolutionarily conserved mechanism that underlies the establishment of holocentromeres through loss of a specified centromere.

About the Speaker:

Dr. Drinnenberg graduated with a PhD from the Massachusetts Institute of Technology in 2011, and went on to work as a postdoctoral researcher in the Fred Hutchinson Cancer Research Centre. Since February 2016, she has been at the Institut Curie in Paris. Her lab integrates tools from molecular biology, genomics, evolutionary biology, and biochemistry to study the evolution of chromatin and genome architecture, specifically, centromeres.

Lab Website: https://drinnenberg-lab.com/research