GTR
Nagoya University

アドバンス生命理学特論/
Topics in Advanced Biological Science

Mitosis and Meiosis in *Drosophila* Germ Cells.

11月9日（木） 9:30～11:00

理学部E館 E131

名古屋大学客員教授

Dr. Jean-René HUYNH

Group Leader

CNRS, Collège de France, Paris, France

Germline cells produce gametes, which are specialized cells essential for sexual reproduction. Germline cells first amplify through several rounds of mitosis before switching to the meiotic program. In many vertebrate and invertebrate organisms, these mitosis are incomplete resulting in the formation of interconnected groups of cells called germline cysts. We found that mutating the Usp8 gene was sufficient to transform incomplete divisions into complete divisions, and, conversely, overexpressing USP8 in Drosophila germline stem cells was sufficient to create ectopic cytoplasmic bridges with their daughter cells.

Once mitosis stop, germline cells enter meiosis. In the early stages of meiosis, maternal and paternal chromosomes pair with their homologous partner and recombine to ensure exchange of genetic information and proper segregation. These events can vary drastically between species and between males and females of the same species. In Drosophila, in contrast to females, males do not form synaptonemal complexes (SCs), do not recombine, and have no crossing over; yet, males are able to segregate their chromosomes properly. We found that chromosome movements in males are much slower than in females and we demonstrate that this slow dynamic is compensated in males by having longer cell cycles. In agreement, slowing down cell cycles was sufficient to rescue pairing-defective mutants in female meiosis. Our results demonstrate that although meiosis differs significantly between males and females, sex-specific cell cycle kinetics integrate similar molecular mechanisms to achieve proper centromere pairing.

Juliette Mathieu, Pascale Hissier, Virginie Boucherit and Jean-René Huynh :
Deubiquitinase USP8 targets ESCRT-III to promote incomplete cell division, Science, 2022 376:818-823.

Thomas Rubin, Nicolas Macaisne, Ana Maria Valles and Jean-René Huynh:
Pre-meiotic pairing of homologous chromosomes during Drosophila male meiosis ,PNAS, 2022 119 :e2207660119

Nicolas Christophorou, Thomas Rubin, Isabelle Bonnet, Marion Arnaud and Jean-René Huynh:
Microtubule-driven nuclear rotations promote meiotic chromosome dynamics. Nature Cell Biology 2015 doi: 10.1038/ncb3249

お問い合わせ 生殖生物学グループ 田中 実（内線2979）