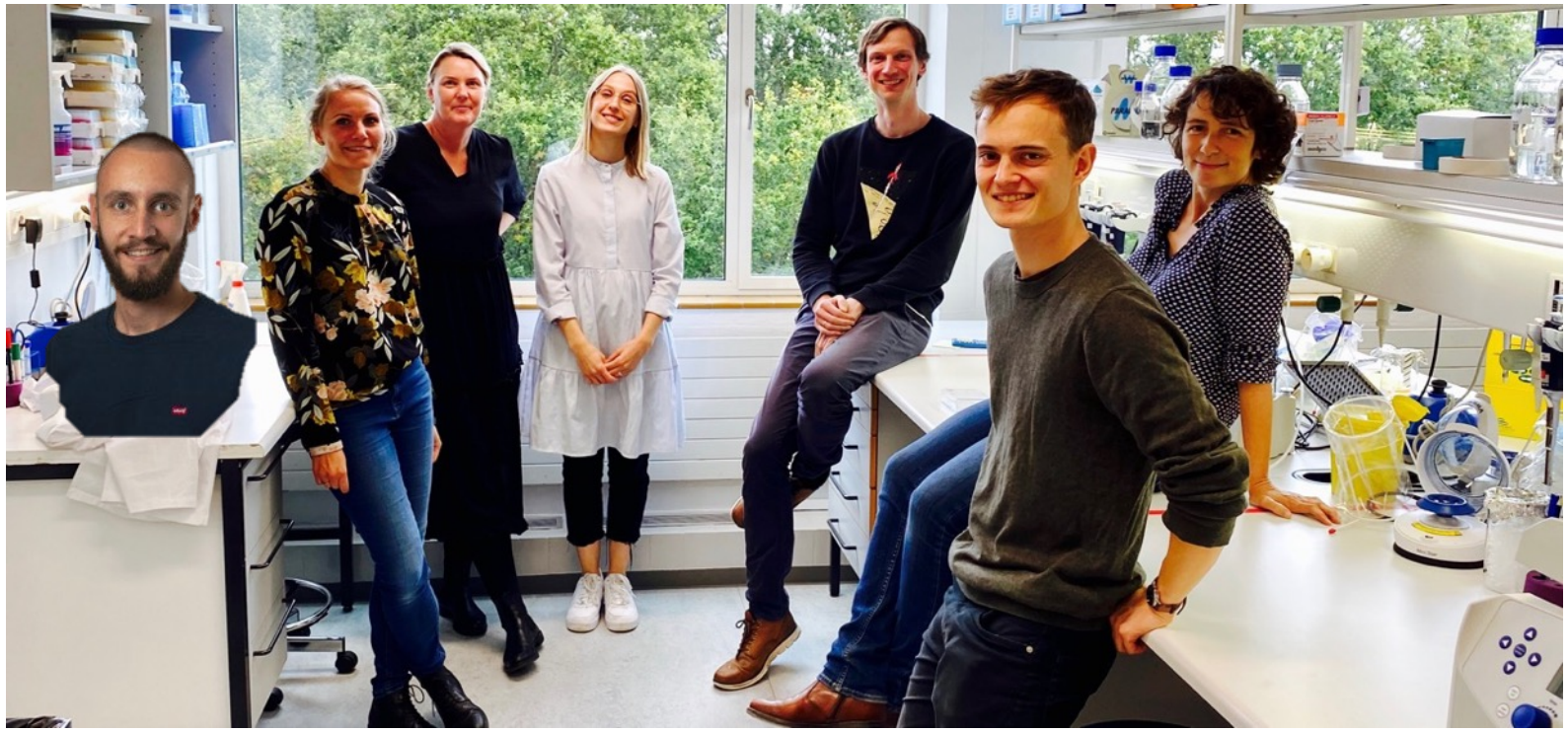
AARHUS UNIVERSITY

Functional consequences of genome defense arms race evolution

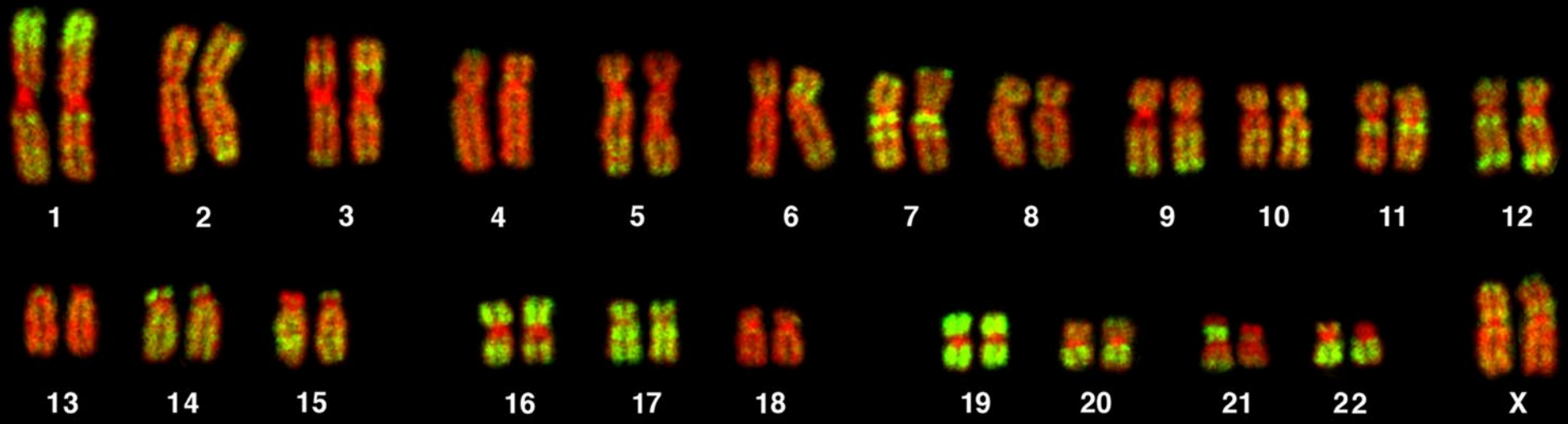
Master‘s Thesis Project

Peter Andersen Lab

Sebastian



Background: Genomes are (also) habitats for genetic parasites such as transposons and retroviruses



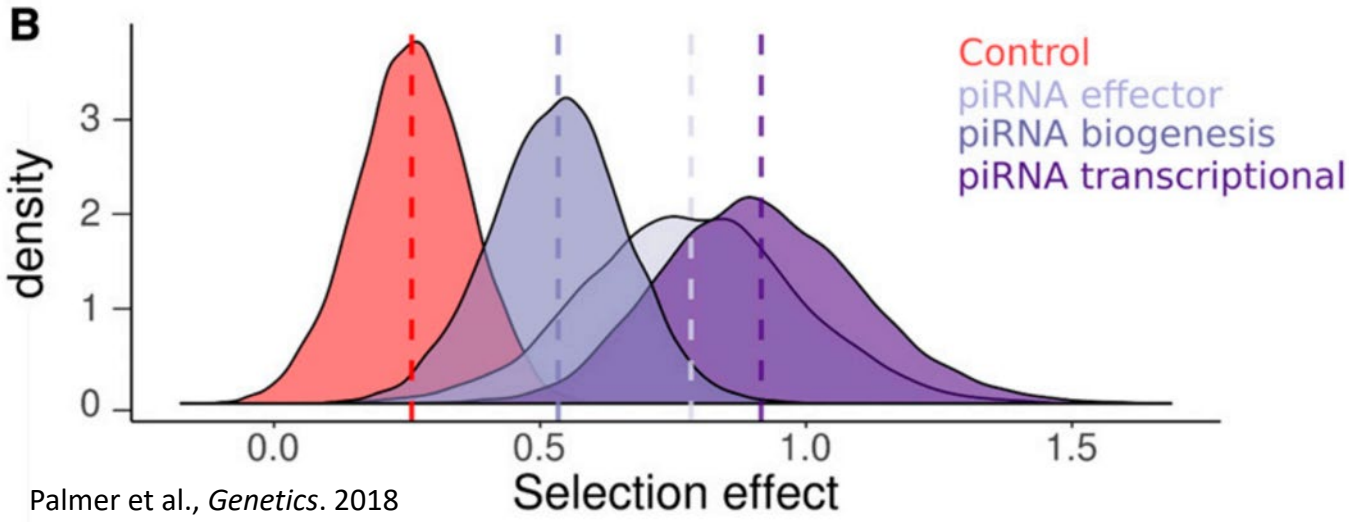
Human genomic DNA: red

Alu-element (simple genetic parasite): green

Bolzer *et al.* 2005, *PLoS Biol.*

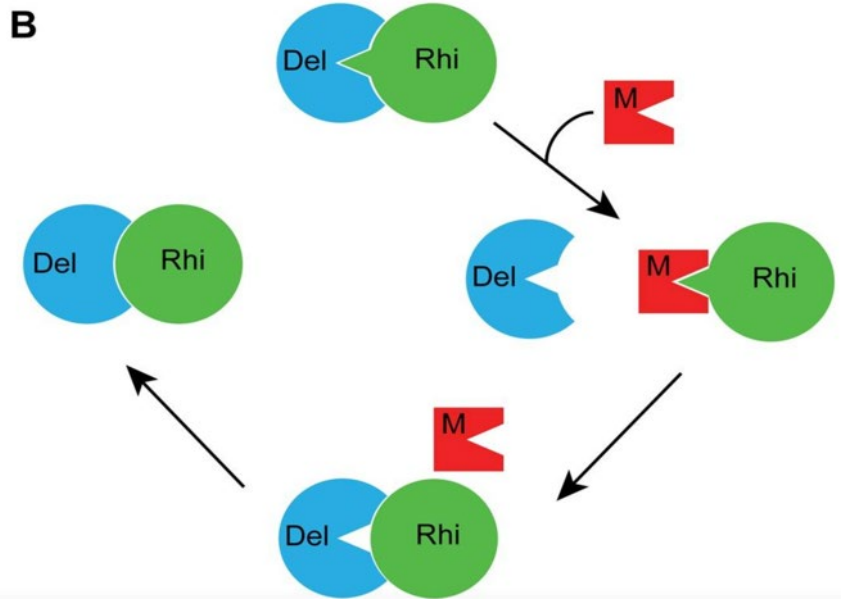
Question: why do genome defense genes evolve rapidly?

Genes of the animal "piRNA" genome defense pathway evolve very fast



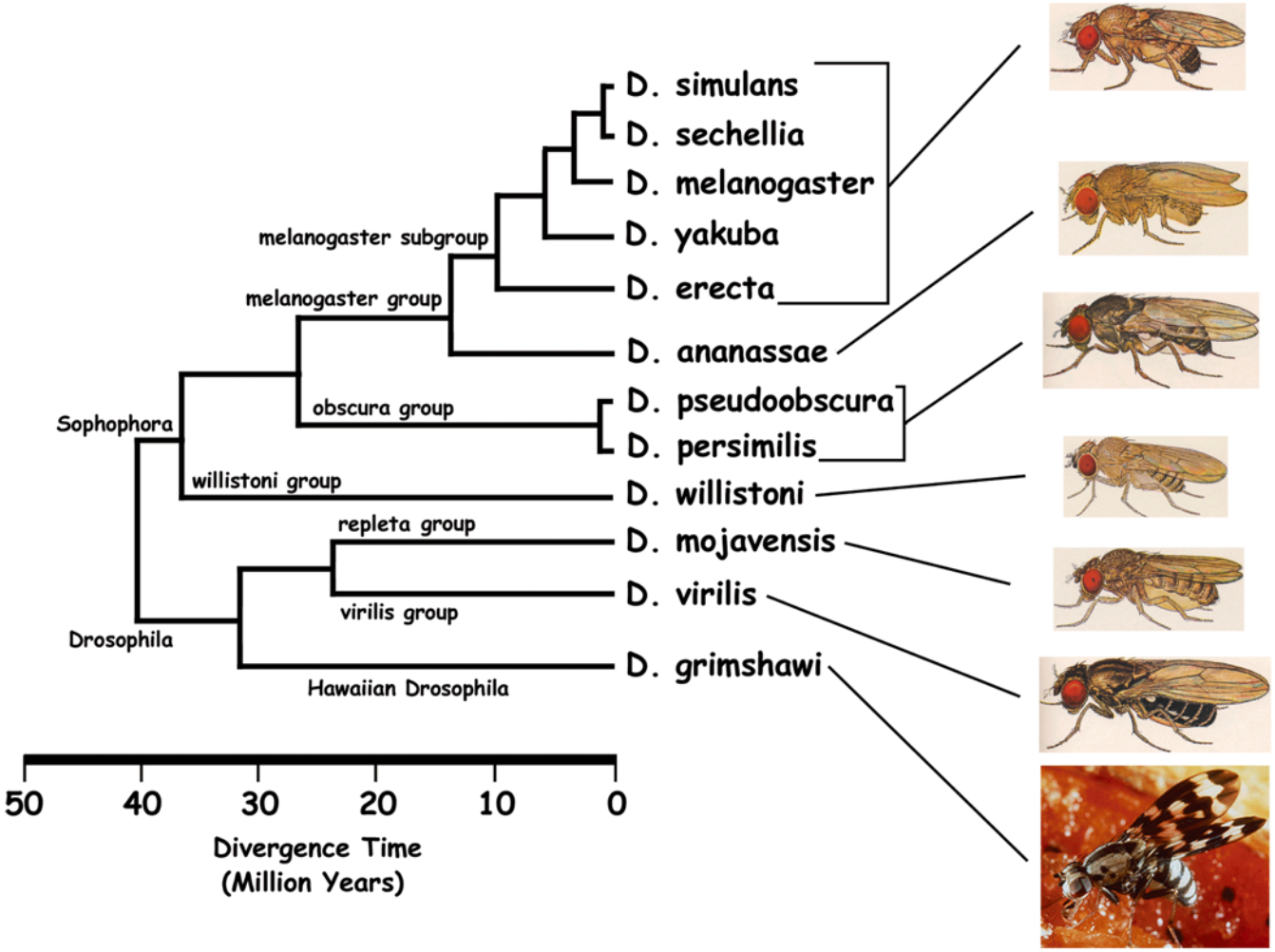
Palmer et al., *Genetics*. 2018

Evolutionary arms race model

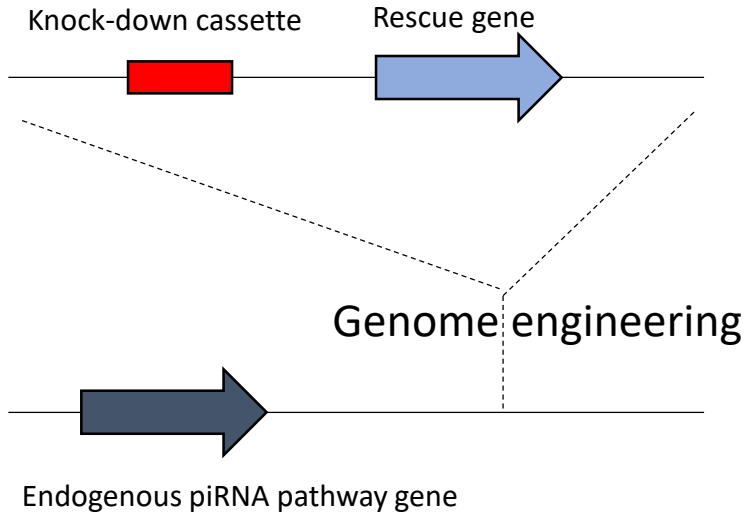


Parhad et al., *Dev Cell.* 2017

Strategy: swap genes across evolution



Knock-down of endogenous gene + rescue attempt with ortholog gene



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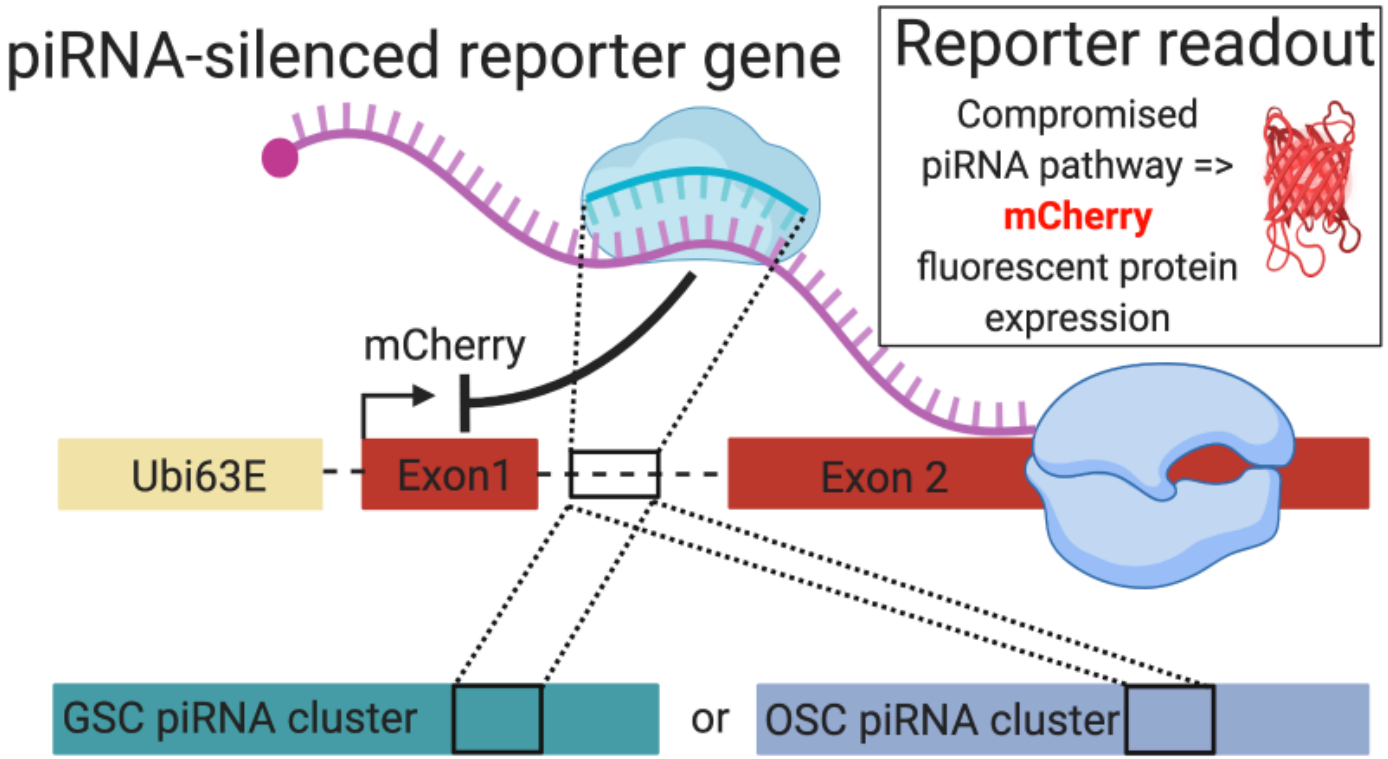

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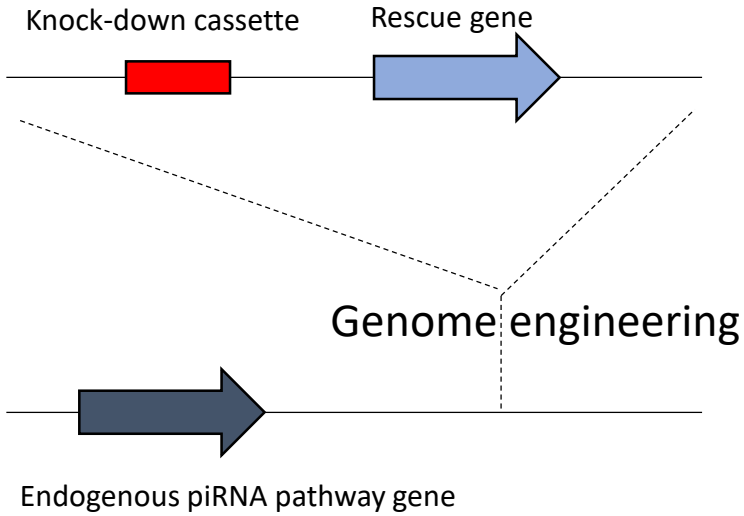

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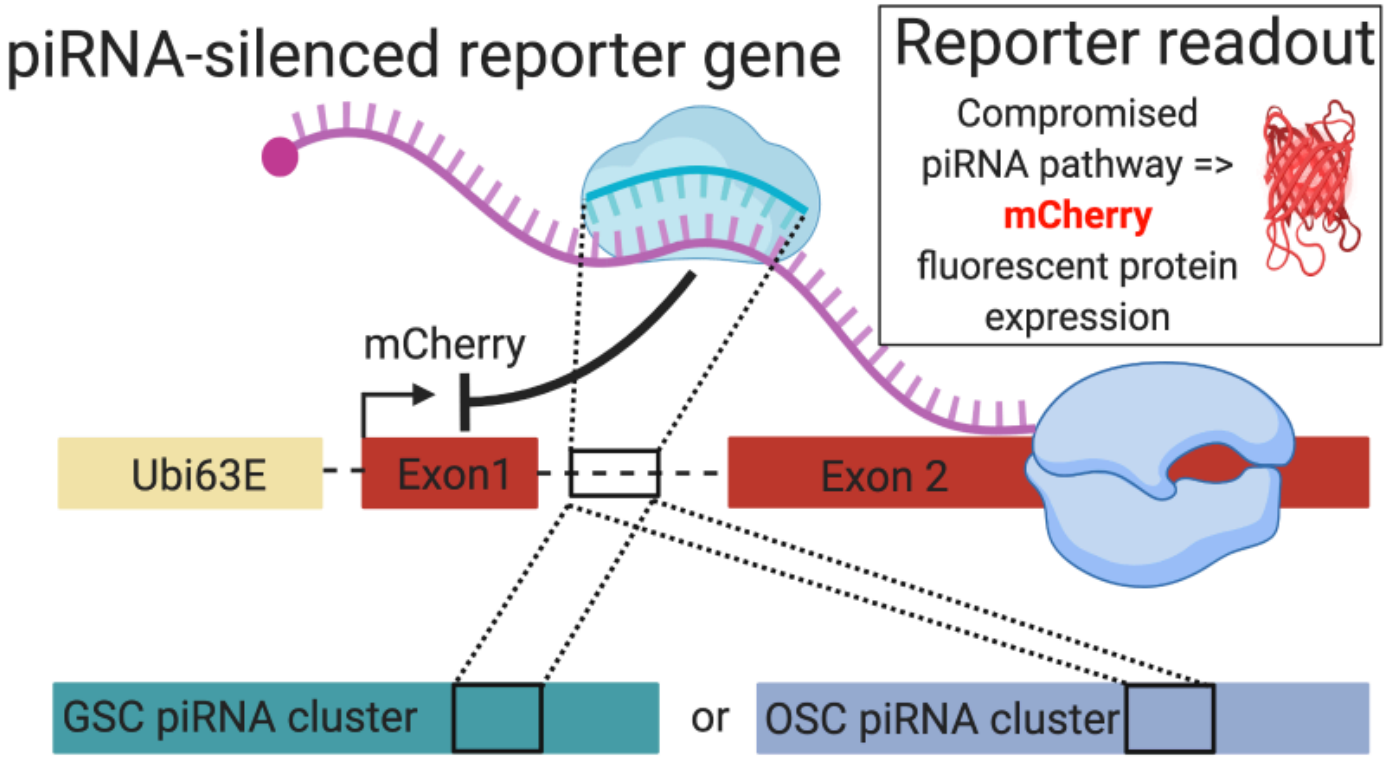
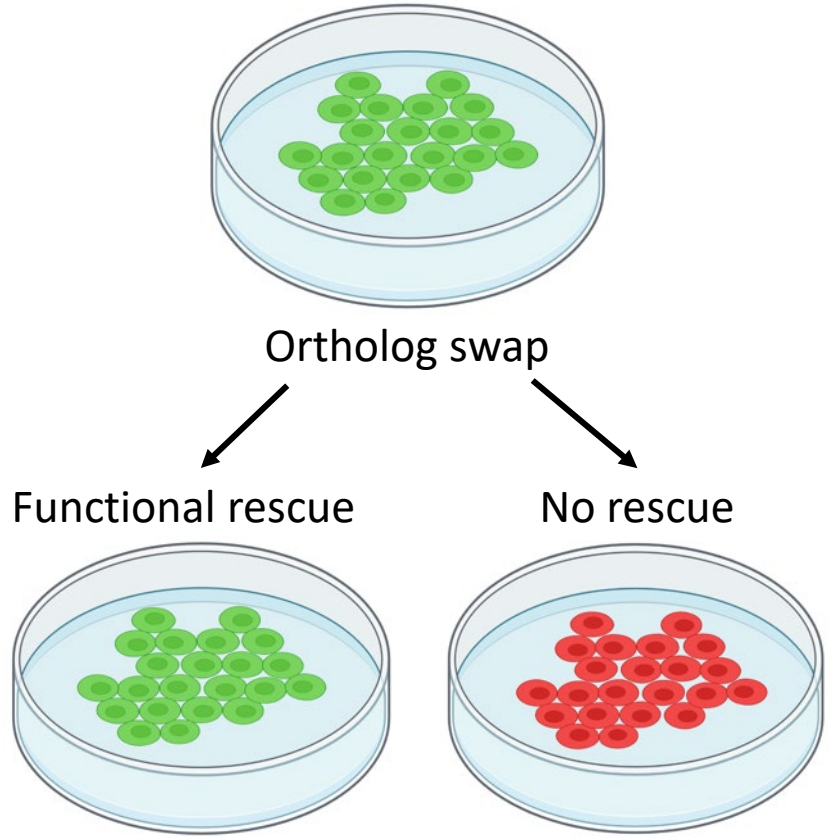


Fluorescent read-out from genome-engineered germline cell culture



More info about the group

- We aim to understand how animal genomes battle and befriend selfish genetic elements. To achieve this, we study genetic innovation in the context of **genome regulation, germline biology and intragenomic conflicts**.
- We apply a diverse range of complementary approaches including genetics in both in vivo and cell culture Drosophila systems, genome editing, chemical genetics, high-resolution microscopy, interaction proteomics and high-throughput sequencing for transcriptomic and genomic bioinformatic analyses.
- For further info about the lab and our projects see www.mbg.au.dk/pra or contact Peter (pra@mbg.au.dk)
- **Relevant recent publications**
  - ElMaghraby, M.F.* and **Andersen, P.R.***, et al. A Heterochromatin-Specific RNA Export Pathway Facilitates piRNA Production. Cell 178, 964-979.e20. (2019)
  - **Andersen, P. R.,** Tirian, L., Vunjak, M. & Brennecke, J. A heterochromatin-dependent transcription machinery drives piRNA expression. Nature 549, 54–59 (2017)