The Role of Polycomb Group Proteins in Animal Activity

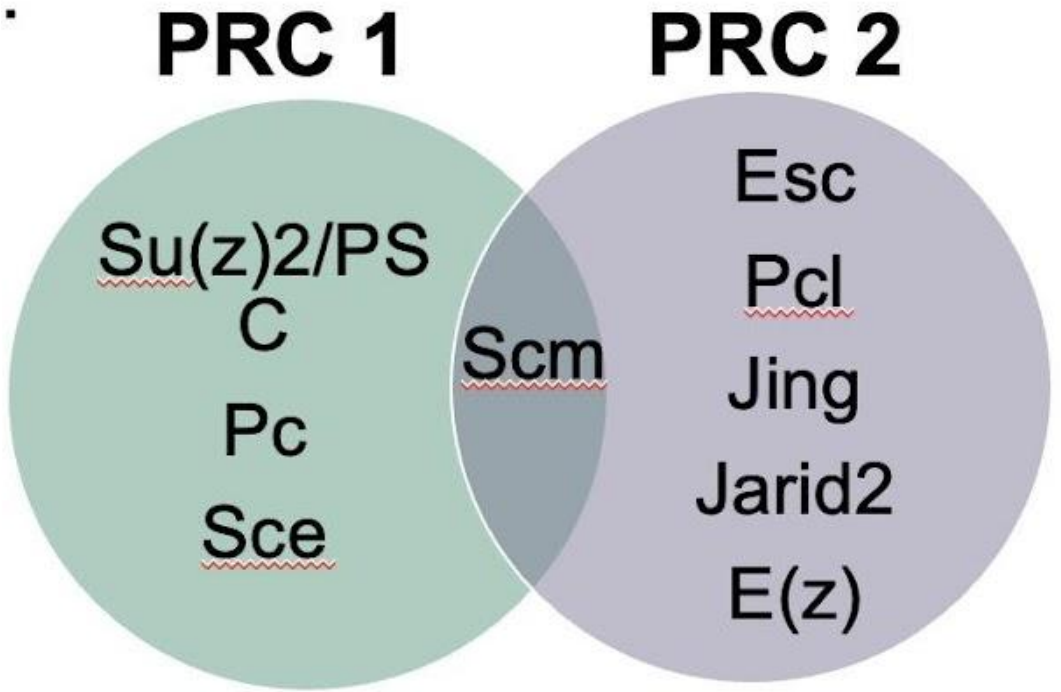
Rachel E. Ferris

Dr. Nicole Riddle's Lab

University of Alabama at Birmingham

Background

- Chromatin dysfunction has been suggested as a possible source of the physical decline seen with aging and activity.
- There are two chromatin-based silencing systems: the HP1/H3K9me2 system and the Polycomb/H3K27me3 system. While the HP1 system has a documented impact on lifespan and aging, little is known about the role of the Polycomb system in aging.
- The Polycomb Group (PcG) proteins modify histones and repress developmentally regulated genes through the action of two complexes, PRC 1 and PRC 2.



AIM: In this study, we remove individual components of PRC 1 and PRC 2 in target tissues to identify the PcG protein involved in the control of animal activity levels. We seek to discover the specific tissues involved and used the UAS/Gal4 system to remove a gene product in a specific tissue within the animals.

Methods/Results

Methods:

- Performed a fly cross between a tissue specific promoter and a target gene driver.
- Set up a lifespan and activity assay.

Lifespan Assay set up

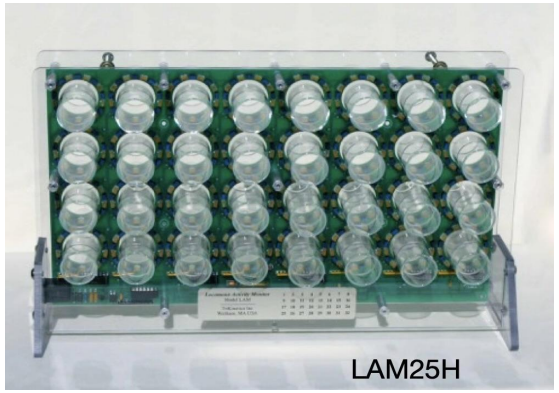
Parent Bottles
15 Females
10 Males

→ Collect Virgins
Days 3-5 →

10 Vials of 10 Flies
Per Sex
Per Genotype
600 total

→ Count Fly Deaths Every 2 Days
Flip Every Other Count or 4 Days

Activity Assay

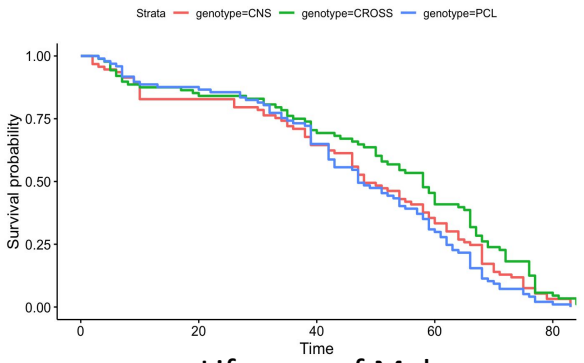


The Drosophila Activity Monitoring System (DAM) was used to monitor activity over a **48-hour period**.

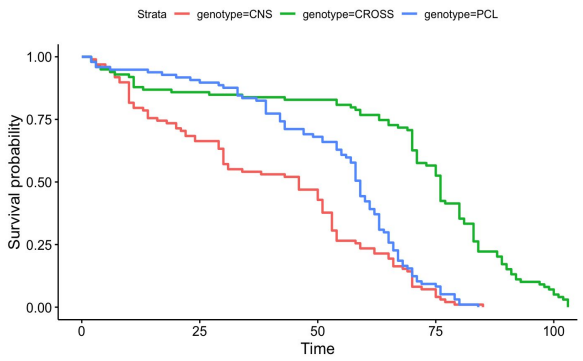
*Flies were put on DAMs every 10 days

Results

Lifespan Plots:

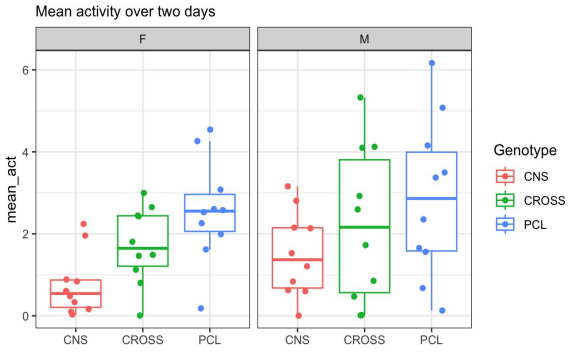


Lifespan of Males

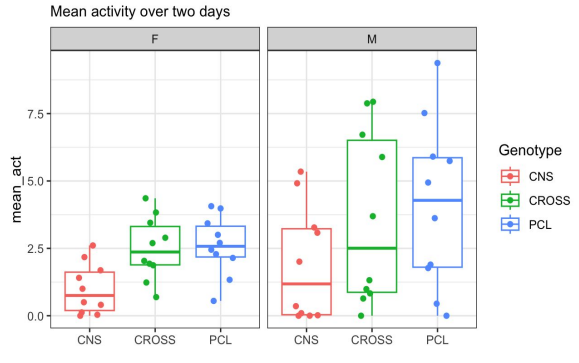


Lifespan of Females

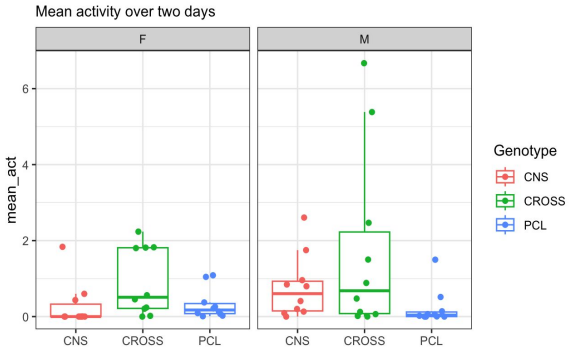
Activity Plots:



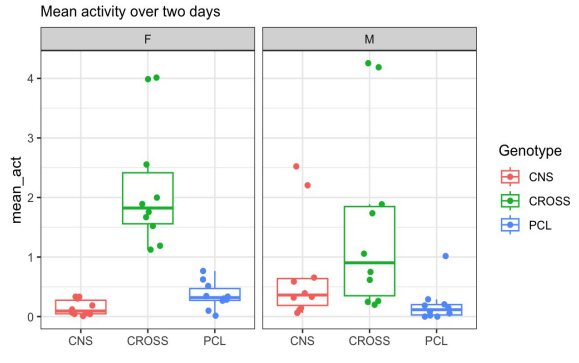
Age 9-11



Age 20-22



Age 29-31



Age 49-51

Conclusions/Future Directions

Conclusions:

- Our findings confirm the potential role of the PRC complexes in the control of animal activity comparing the knockdown cross to the parent controls.
- Even as the animals age, we still see a difference in between the knockdown versus the controls. This is also mirrored in the lifespan data.

Future Directions:

- We would like to gather more activity data by growing out larger quantities to specific ages to avoid losing power as the flies age.
- We would also like to target other tissues such as the brain, gut, etc. currently we have only tested the central nervous system.

What I learned:

- Consistency in data collection such as labeling is very important if running programs like R.
- Knowing how other research in your animal model affects your project is important.