Effect of larval diet variability on fecundity in *Drosophila melanogaster*

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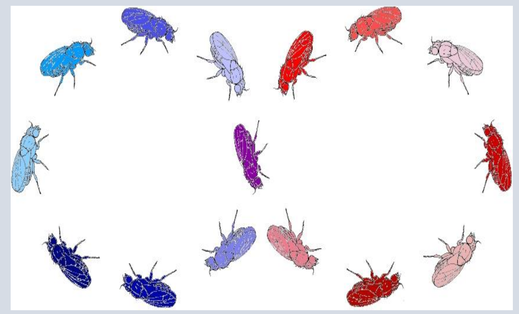


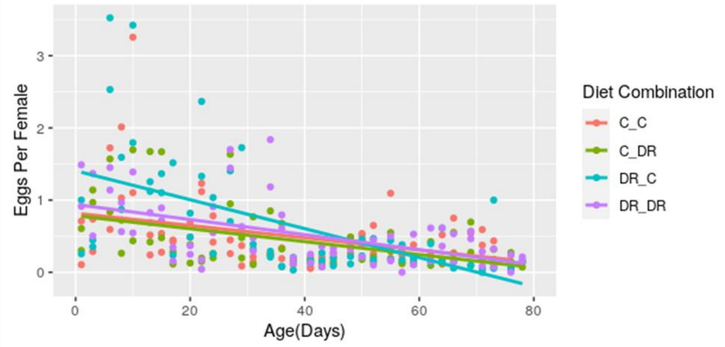
Diet and Resource Allocation

An organism's diet can have considerable effects on both its phenotype and how it behaves and reproduces. In adult *Drosophila melanogaster*, the variability has been demonstrated to affect life history traits such as fecundity. This allocation of resources, however, is not as well documented if diet change happens at the larval fly stage. We tested the hypothesis that flies raised on a nutrient rich diet as larvae would have higher fecundity while flies with calorie poor larval diets would exhibit lower fecundity.

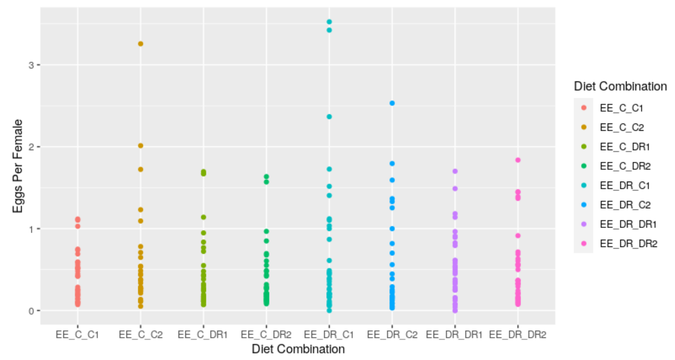
Data Analysis

- Fecundity was quantified with logarithmic mean scatter plots as well as a combined logarithmic mean line and dot plot.
- Per-Female Fecundity was found by reverse-counting dead flies to get remnant counts and dividing egg counts by those numbers
- Analysis included ANOVAS and pairwise t-testing Significant differences were assessed at the P-value threshold of <0.05.

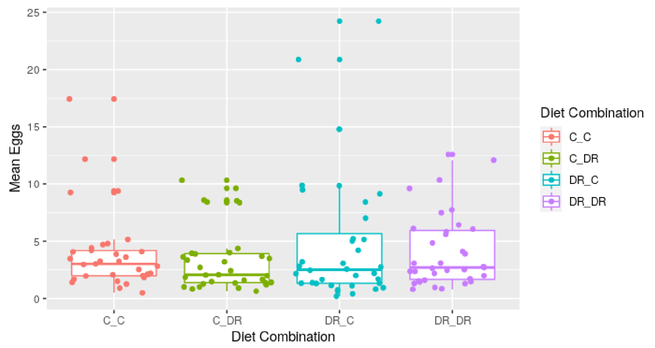
Per-Female Fecundity



This dot plot shows the mean number of eggs on the y-axis against the age of flies in days on the x-axis. This shows that for each diet combination, flies were more reproductively active in the first 40 days of life, which dropped off steadily until death. It also shows periods of alternating high and low fecundity for some lines. There does not seem to be any consistent trend for any one combination having higher overall counts.



This point plot shows the total counts of eggs-per-female for each cage replicate. Here it can be seen that some replicates even had differences from their own matching cages. There also looks to be a slightly higher count for flies on DR larval diets, but not major.

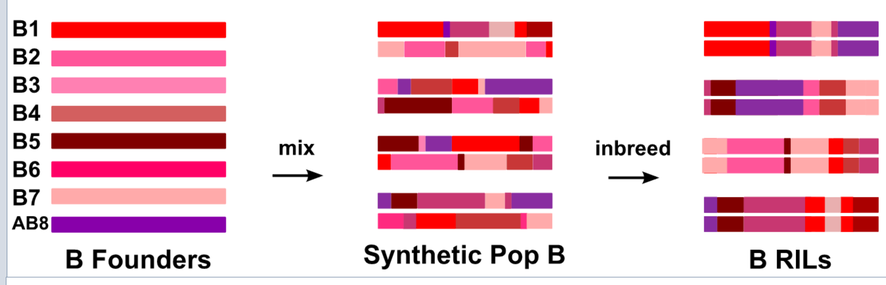


This box and whisker plot illustrates the fecundity for each diet combination. The counts are very sporadic with some very high numbers that could be throwing the results. Again, we see DR adults having a slightly higher mean number of eggs.

Questions

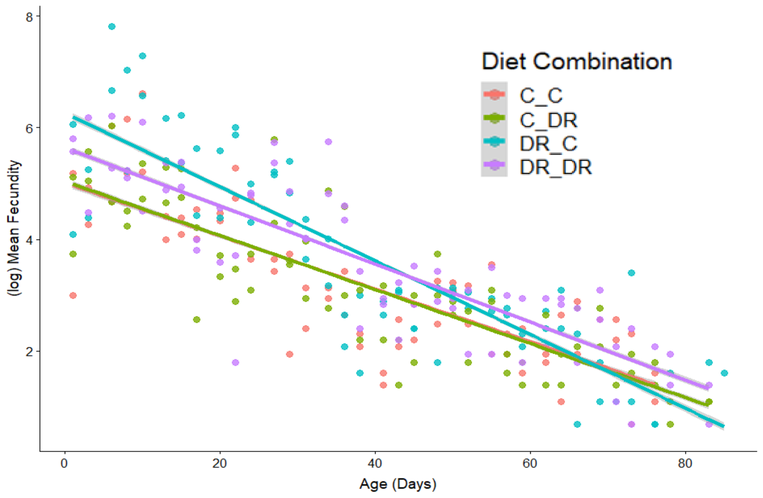
1. If larvae are raised on a poor diet, is fitness higher on a rich or poor adult diet?
2. If larvae are raised on a rich diet, is fitness higher on a rich or poor adult diet?

Drosophila Synthetic Population Resource

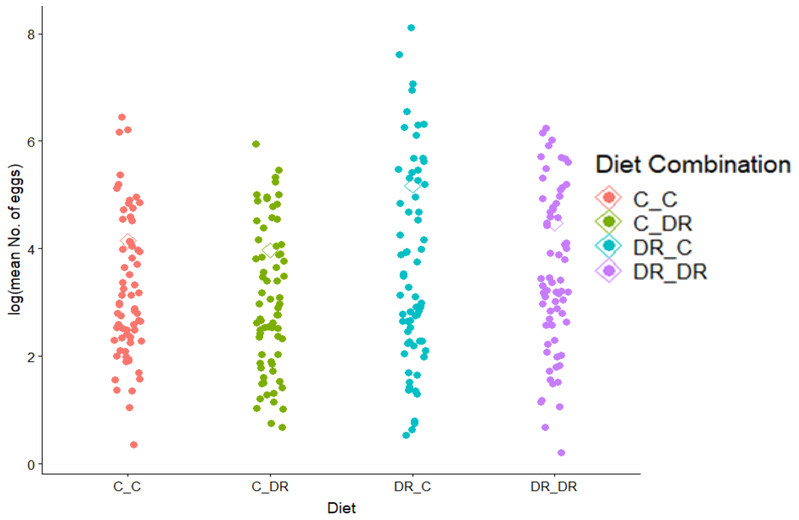


The ***Drosophila* Synthetic Population Resource** is a linkage-based panel that uses a synthetic population approach. This community resource consists of over 1,700 recombinant inbred lines. The DSPR was created using 8 founder lines and inter-mixing them for 50 generations then inbreeding them for 25 generations to create ~835 separate lines. These lines were remixed to create one base population (BP) for this experiment.

Fecundity Results

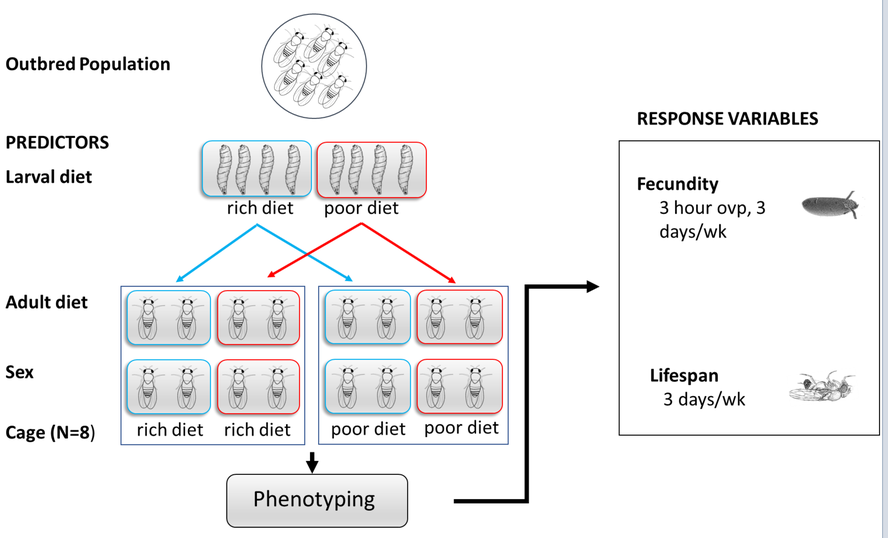


This logarithmic point plot highlights the difference in mean fecundities foreach diet combination. Here it would appear that larval diet determines the trend of the data more so than does adult diet. DR_C exhibited the highest number of eggs laid and below that was the other line raised on restricted diet. This is contrary to our hypothesis that nutrient poor larval flies would have a lower fecundity.



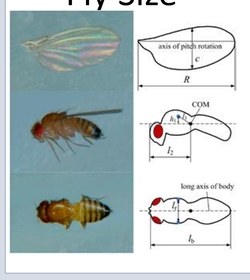
A combined logarithmic mean plot showcasing the number of eggs laid for each of the four diet combinations. Diamonds represent mean number of eggs for each diet combination. Here the trend shows that larval diet DR and adult diet C reflected higher number of eggs laid. This is not correlated to the number of females per cage, however.

Methods

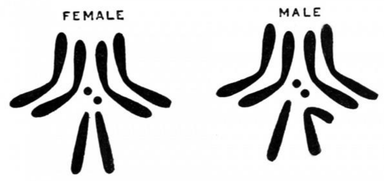


Future Directions

Fly Size



Genetic mapping of phenotypic pathways



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