Diet significantly affected starvation resistance (as defined by time until death with no access to food) among an **experimentally evolved** population of *D. melanogaster*.

Dietary impact on starvation resistance in an evolved multiparent population of *Drosophila melanogaster*

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The base population

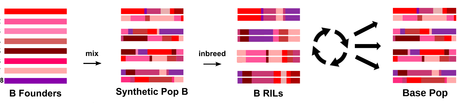

Figure 1. This population[1] started from eight inbred founders representing global standing variation in *Drosophila melanogaster*. They were mixed *en masse* for 50 generations and about 800 recombinant inbred lines (RILs) were inbred from this population. The RILs were then re-mixed to create a base population for experimental evolution.

Methods

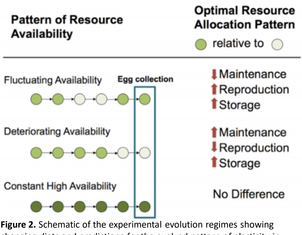

Figure 2. Schematic of the experimental evolution regimes showing changing diets and predictions for the evolved pattern of plasticity in resource allocation. Dark green circles indicate high sugar food, green circles indicate standard food, and light tan circles indicate low yeast food.

Starvation resistance assay

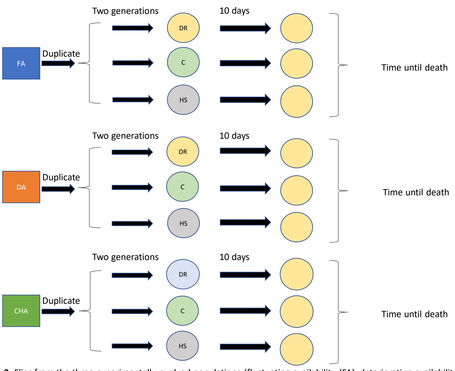

Figure 3. Flies from the three experimentally evolved populations (fluctuating availability (FA), deteriorating availability (DA), and constant high availability (CHA)) were duplicated and fed a standard diet for two generations. The following generation was placed on three different diets (dietary restriction (low yeast), control, and high sugar; $n_{Batch1,\ Batch2}$ = 323, 324; n_{diet} = 10) for 10 days before being placed on nutrition-less agar. Starvation resistance was quantified as time until death starting from the moment flies were placed on nutrition-less agar.

Results

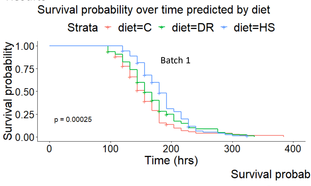

Figure 4. Survival probability of fruit flies from three different diet treatments over time in hours. Batch 1 corresponds with the first group of flies we ran through the starvation resistance assay.

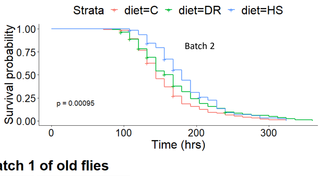

Figure 5. Survival probability of fruit flies from three different diet treatments over time in hours. Batch 2 corresponds with the first group of flies we ran through the starvation resistance assay.

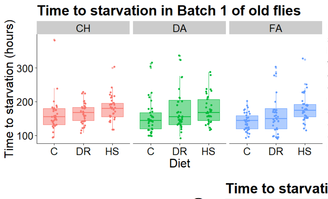

Figure 6. Each vial's time until starvation separated by diet treatment in the first batch of flies. Diets include control (C), low yeast (DR), and high sugar (HS). Colors correspond to the selection regime that each treatment came from. Selection regimes include constant high food availability (CH), deteriorating food availability (DA), and fluctuating food availability (FA). Time to starvation is in hours.

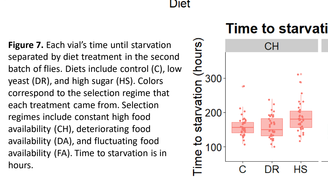

Figure 7. Each vial's time until starvation separated by diet treatment in the second batch of flies. Diets include control (C), low yeast (DR), and high sugar (HS). Colors correspond to the selection regime that each treatment came from. Selection regimes include constant high food availability (CH), deteriorating food availability (DA), and fluctuating food availability (FA). Time to starvation is in hours.

Extra figures

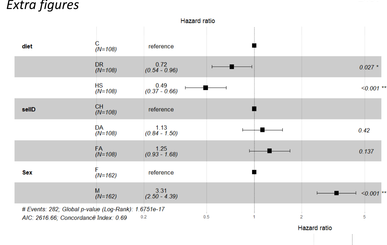

Figure 6. Cox proportional hazard model for time until death due to starvation in flies from Batch 1

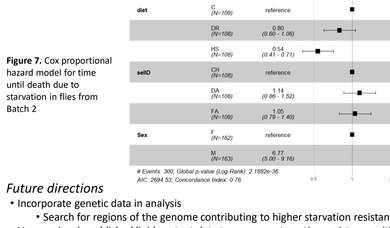

Figure 7. Cox proportional hazard model for time until death due to starvation in flies from Batch 2

Future directions

- Incorporate genetic data in analysis
  - Search for regions of the genome contributing to higher starvation resistance
- Use previously published lipid content data to compare starvation resistance with lipid composition of flies within the three selection regimes

References

[1] http://FlyRILs.org

Acknowledgements

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