Dr. Campbell's answers to questions

From minute papers

1. **Does selecting for longer lifespan result in irreversible plasticity?**

This isn't really plasticity but adaptation, since effect of the selection was to change allele frequencies in the O-lines. Thus the O's are not genetically the same as the B's.

2. **Do offspring of flies bred at later dates reach reproductive stages slower than the flies bred at 14 or 20 days?**

We haven't measured this but No… not in a noticeable way (i.e. within a day or so the same)

3. **What are applications of the fly breeding program? How does studying longevity in fruit flies relate to humans? Or other species?**

Humans (and other verts e.g. dogs and cats) share around 2/3 of their genes in common with flies, especially the really basic ones, including many of our lifespan candidates. We hope these kinds of studies will lead to therapeutic treatments to help humans live longer healthier lives.

4. **Are there any tradeoffs known phenotypically that allows the O-populations of flies to live longer? Have these phenotypic changes been looked at genetically?**

At first the O-lines had greatly reduced reproductive ability … but now (after 30 years of adaptation) they reproduce at the same level as the B's. Thus, it seems this trade-off is caused by balancing selection (contradicting selection forces) rather than antagonistic pleiotropy (incompatible genetic interactions). We are investigating, phototaxis, feeding behavior, and aggression for genetic analysis. The O-lines eat less, move faster and live longer. See Rose's work (1981, 1984a and 1984b) for more.

Emailed questions

5. **What are the reasons to choose Drosophila melanogaster besides it being fertile with the short life span as well as being ecological?**

Easy to rear, cheap, small space requirements, considerable phenotypic variation, easy to keep track of, and 100 years of genetic and phenotypic data resources and the most studied genome of any animal.

6. **Would the degree/kind of phenotypic plasticity and environmental canalization obtained from the study reflect those of any existing organisms today to some extent?**

Yes, FlyLand represents a sampling of the natural variation present in the local Raleigh population of D. melanogaster.

7. **Was technology available a limiting factor in the study?**

We have full genome and transcriptome data and supercomputers to analyze them and we still always seem to need a little bit more. But generally time and money are more limiting.

8. **Are the transcripts influencing environmental canalization fast-evolving like those for phenotypic plasticity?**

Generally speaking no.

9. **How long did it take to write the paper? Have follow-up studies been conducted?**

This project was part of Dr. Zhou's (now Dr. Magwire) dissertation work. ~ 2 years to collect the data. (6 months for my team to get the lifespan data.) ~ 6 months for Dr. Zhou to analyze, write and publish the paper. Dr. Zhou is continuing this investigation at the epigenetic level and also using transcriptome data from the DGRP across 5 of the FlyLand test environments.

10. **Has this methodology been tried on more complex model organisms to see if the about a phenotypically plastic genes is the same throughout all organisms, and if so what were the results?**

The next step up in complexity would be a vertebrate (e.g. fish or more likely mouse). Most of the traits are not easily investigated in mice (avg. lifespan ~ 2.5 years)… but a NCSU team called the Collaborative Cross is studying many aspects of plasticity in mice.

11. **Have you personally followed up on any of the question you proposed in your discussion section, and if so which ones, and what were the results?**

No. Plasticity is not the general focus of my own research. However, the Mackay-Anholt Lab continues to use various methods to investigate plasticity, especially Dr. Zhou (see above).