

# How to Refine a Fly's Palate

Do *Drosophila* make their food choices because of their genes?

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When it comes to food preference, there are many factors that contribute to decision making in adult flies, some of which are genetically determined such as gustatory receptors and calorie sensing (1&2). *Drosophila melanogaster* are attracted to sweet things. We investigate whether we can “refine the palate” of flies by creating a lineage that chooses one sugar source over another.

***Drosophila melanogaster*:**  
**A sweet model organism for behavioral genetics**

- Short egg-to-adult maturation period
- Lay lots of eggs



Figure 1.

➔ **Are these choices influenced by a genetic factor? Is it possible to purify this trait?**

# Experimental Design: What's on the Menu?

Figure 2.



Hypothesis: If we can selectively breed flies to make a certain food choice then this suggests a genetically heritable factor to how flies decide what to eat.

Fly media sweetened with table sugar?

OR




Wild plums (natural sugars)?



Figure 3.

Food preference apparatus

## Methods:

-  Breed the offspring of sorted populations to adulthood; avoid any ontogenetic influences by allowing egg laying and larval development only in normal media.
-  Repeat sorting in food preference apparatus.
-  Breed the flies that made the same food choice as their predecessors to establish two lineages, Fruit and Sweet Food.

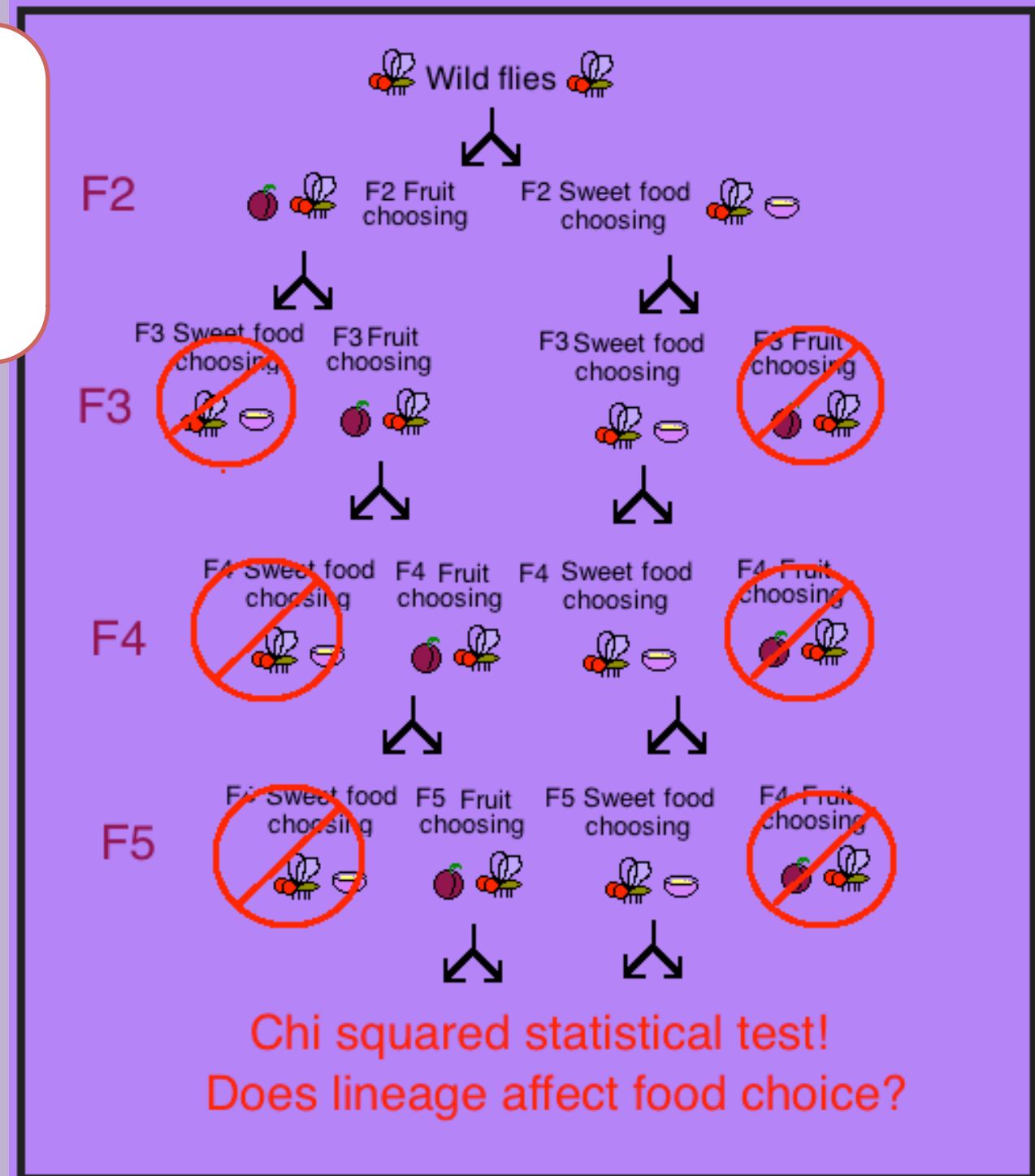
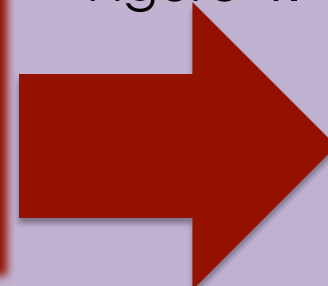


Figure 4. Graphical representation of breeding program



Test the F5 generation to see if lineage affects food choice!

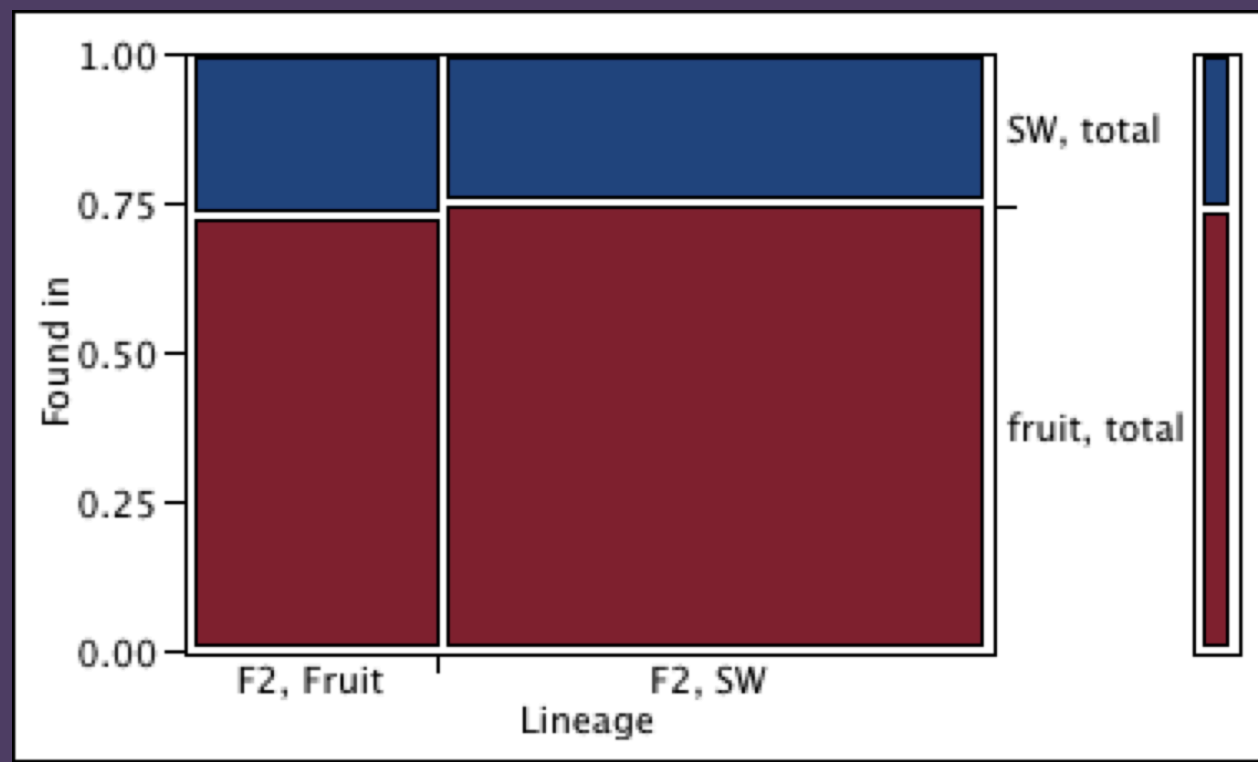


# Results

## Chi Square Test of Independence

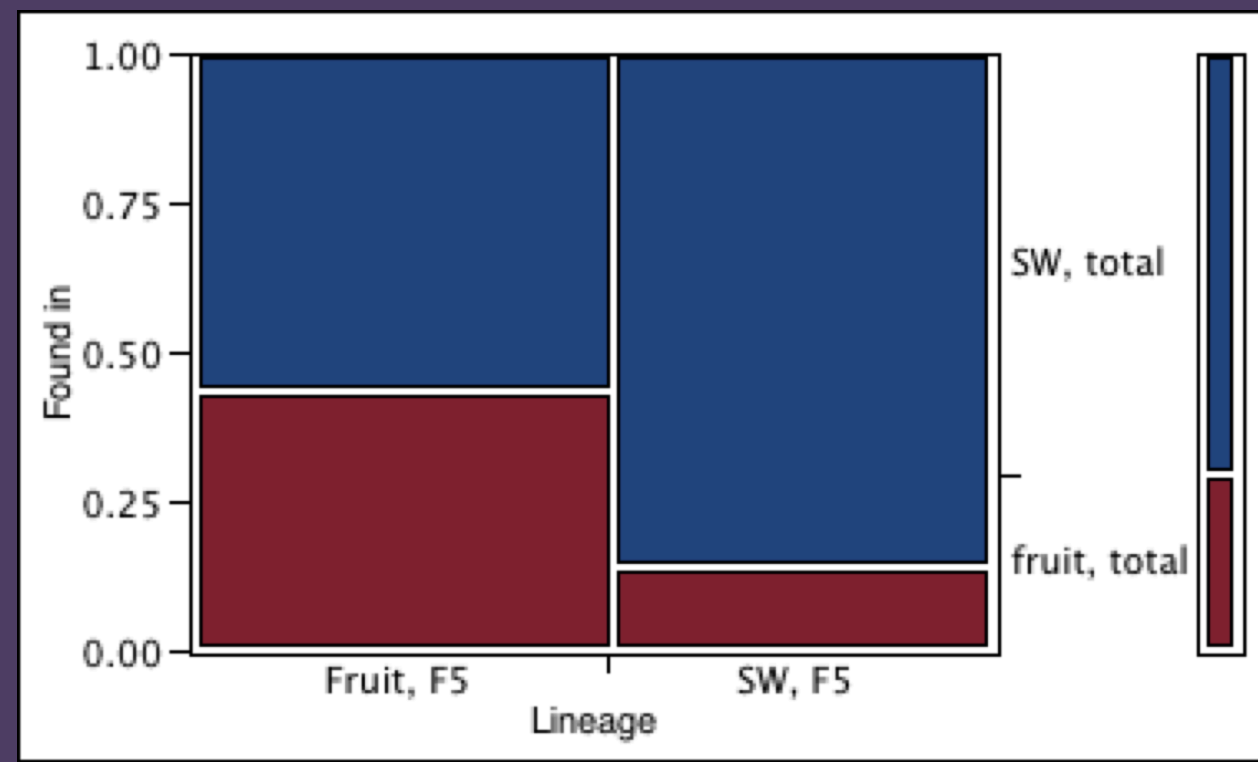
**F2:** Both lineages of F2 generation showed no significant food preference

**F5:** The sweet food lineage preferred sweet food



**p=0.8527**

F2 generation



**p=0.0002**

F5 generation



## Conclusions

The observed preference for sweet food in the F5 sweet food lineage support the hypothesis that selectively bred lineages will choose the according food.

## Future Directions

- ~For reliability of data: Test more generations and increase sample size, control for incubation temperature, add control food source chamber of fly media, water, and yeast only
- ~Record sex of flies in counts
- ~Manipulate the nutritive media of larvae to investigate development
- ~Manipulate sorting time to investigate the effects of different levels of fermentation on food choice
- ~Compare food preference and ovoposition site preference



Fig. 5

## References:

- (1) Slone J, Daniels J, Amrien H. 2007. "Sugar receptors in Drosophila." *Current Biology* 17: 1809-1816.
- (2) Stafford JW, Lynd KM, Jung AY, Gordon MD. 2012. "Integration of Taste and Calorie Sensing in Drosophila." *The Journal of Neuroscience* 23: 14767-14774.
- (3) ) Figure 1. <http://notsohumblepie.blogspot.com/2009/12/science-cookies-drosophila-melanogaster.html> 12/1/12..
- (4) Figure 2. <http://vinsanity-vino.blogspot.com/2009/11/super-fly.html> 12/1/12.
- (5) Figure 3. Taken by T. Myers
- (6) Figure 4. Produced by T. Myers
- (7) Figure 5. [http://3.bp.blogspot.com/\\_WhPHUKwckUw/SvfGpV4ENoI/AAAAAAAAABBI/Y8N6VYJxacA/s400/Drosophila\\_cookies2-f.JPG](http://3.bp.blogspot.com/_WhPHUKwckUw/SvfGpV4ENoI/AAAAAAAAABBI/Y8N6VYJxacA/s400/Drosophila_cookies2-f.JPG) 12/3/12.

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