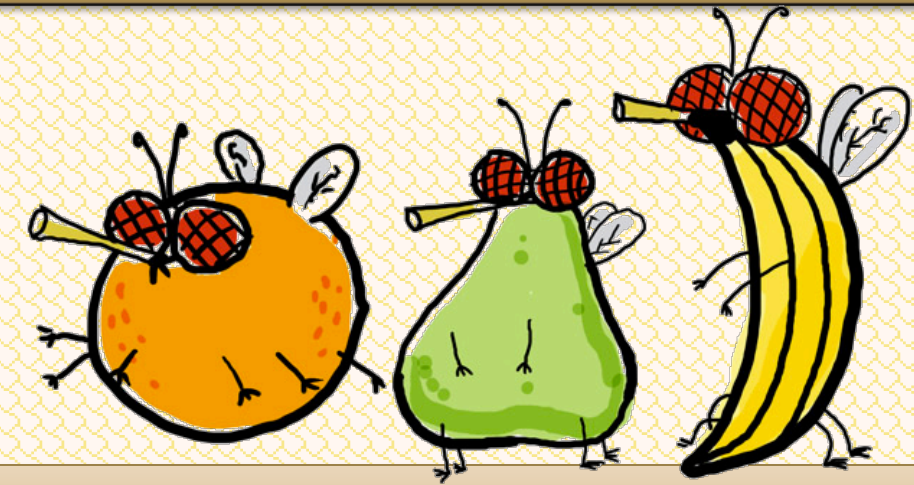


You Are (Not) What You Eat

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Diane Dodd identified food preference in *Drosophila* as a heritable trait (4). These genes, at work from the larval stage (3), can lead to speciation in fruit fly populations. Thus, fruit fly mutants that prefer one type of fruit to another might be selected for by limiting normal populations to a single food source over generations.

Drosophila melanogaster:

- Test subjects taken from Suzy Renn's lab stock. They had been raised on fly medium for several generations.
 - This stock was ideal because it had been isolated from either of the test foods.
 - They were separated into three initial populations:
 - A control population exclusively raised on fly medium
 - A population exclusively raised on apples
 - A population exclusively raised on bananas
- The parent generation was raised for 2 weeks on their food source. The experiment began with the first filial generation.

Experimental Design:

Will ontological exposure to a single food type cause flies to prefer that food in adulthood?

Hypothesis: Control flies will be evenly divided between available food choices while flies raised on apple or banana will prefer the food exclusively available to them and their preceding generations.

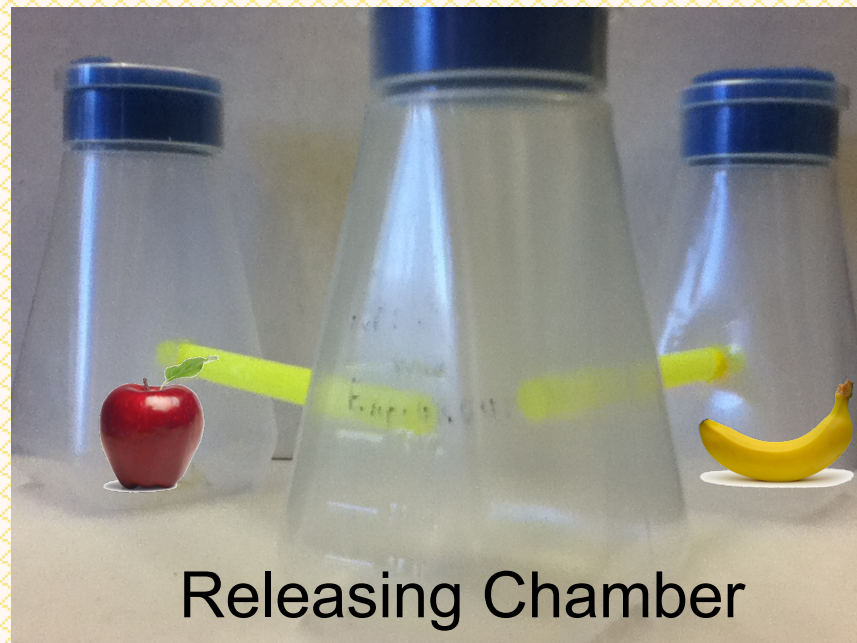


Figure 1. Y-maze set up.



Figure 2. Y-maze aerial view

- Flies were run through a Y-maze constructed with three plastic vials and two 10 cm plastic drinking straws
- Each branch of the “Y” contained a different food type (apple or banana)
- The trial began by freeing an average of 37 flies in a releasing chamber that contained no food.
- The trials lasted 5 hours in an incubator at 25 °C
- At the end of five hours, the number of flies were tallied in each chamber

Results:

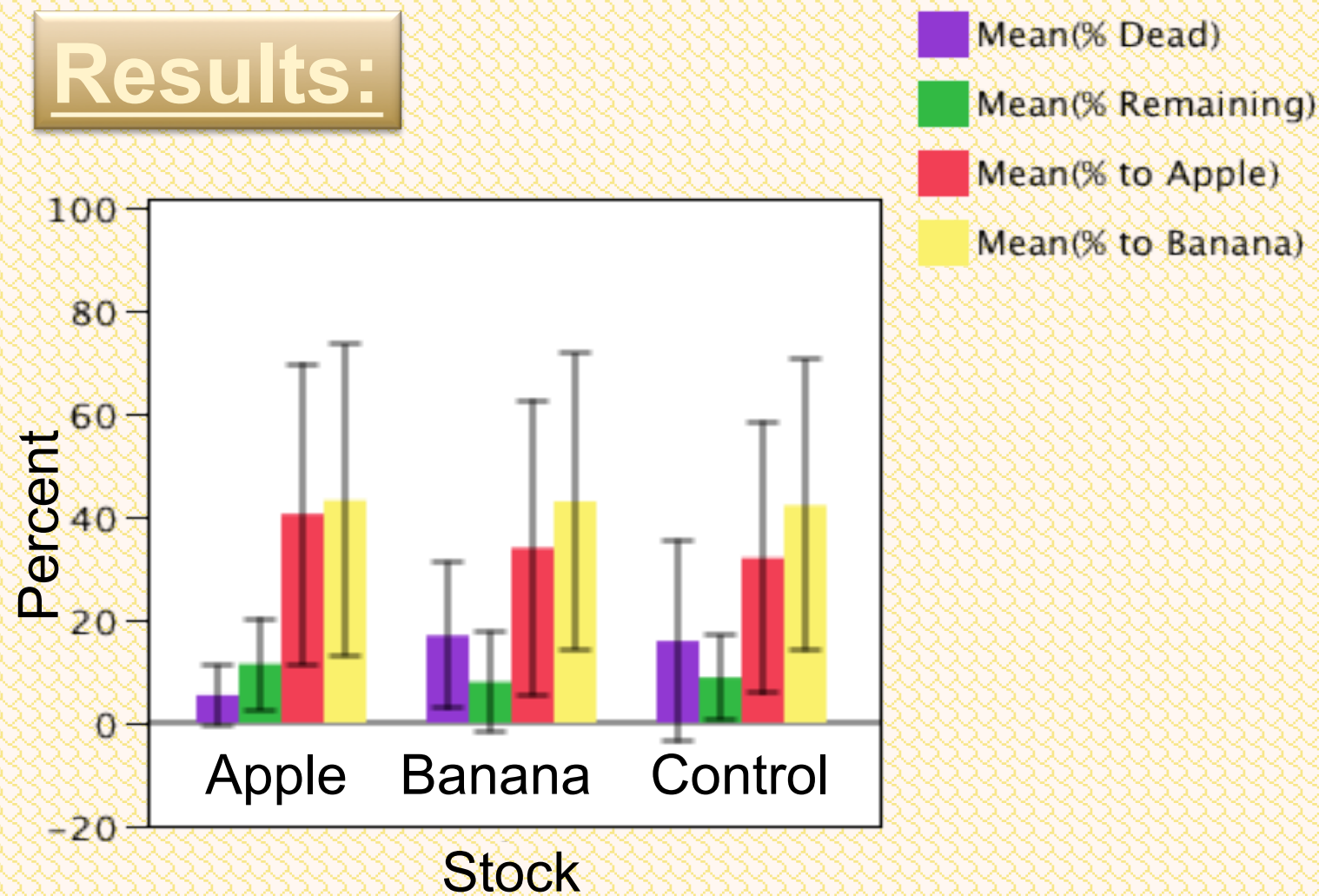


Figure 3. Mean percentage by stock to perform one of four possible actions: go to the apple vial (red), go to the banana vial (yellow), stay in the releasing vial (green), or die (purple).

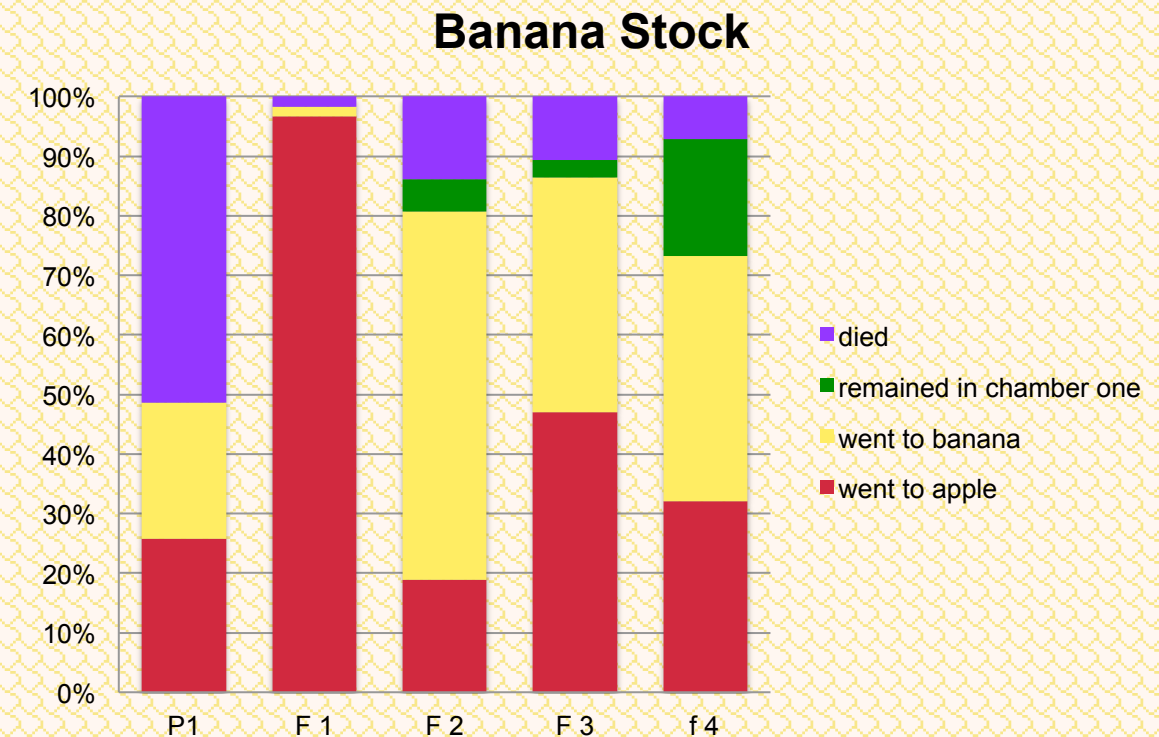


Figure 4. Example of a mean percentage by generation in one stock to perform one of the four possible actions: go to the apple vial (red), go to the banana vial (yellow), stay in the releasing vial (green), or die (purple).

ANOVA found no significant correlation between stock type and food choice

- % to Apple
 - $p = 0.7395$
- % to Banana
 - $p = 0.9963$

A significant correlation ($p = 0.1176$) was found between stock type and likelihood to die in the Y-maze

We Conclude that:

There was no genetic effect on food preference in *Drosophila melanogaster*

Future Directions:

Although no significant results supported genetically-based food choice in fruit flies, our findings were limited by the total length of the experiment. In prior experiments it has taken up to 40 generations for food preference to be observed in *Drosophila* (1). That being stated, earlier research has shown that the North American apple maggot prefers the food source introduced during its larval development (2), a finding not supported by this study of *D. melanogaster*.

Future experiments would benefit from a greater number of tests conducted over a greater number of generations.

References:

- (1) D.M.B. Dodd, Reproductive isolation as a consequence of adaptive divergence in *Drosophila pseudoobscura*, *Evolution* 43:6:1308-1311 (1989).
- (2) Powell, THQ et al. On the scent of standing variation for speciation: behavioral evidence for native sympatric host races of *Rhagoletis pomonella* (diptera: tephritidae) in the southern United States. *Evolution* 66:9:2739-2756 (2012).
- (3) Ryuda, M et al. A gene involved in the food preferences of larval *Drosophila melanogaster*. *Journal of Insect Physiology* 54:10-11:1440-1445 (2008).
- (4) Wisotsky, Z et al. Evolutionary differences in food preference rely on Gr64e, a receptor for glycerol. *Nature of Neuroscience* 14:12:1534-U161 (2011).

Picture References:

Banana:

<http://hometowncolumbia.wordpress.com/2010/03/21/banana-mango-smoothie/>

Apple:

<http://blog.acorn-is.com/2012/09/preparing-for-apple-maps.html>

“Fruit” flies:

http://1.bp.blogspot.com/_Wuut9L9NvBE/TCpgAB8YUJI/AAAAAAAAAEg4/gJU-IQuTd8A/s1600/Fruitflies.jpg

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