

Fruit Flies
Supercomputer Challenge
Final report
April 4,2007
Melrose High School
Team Number 64

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Executive Summary

Our Project is over the breeding of the fruit flies. Fruit flies are commonly used in Biology class labs to show the principles of Genetics. In our project we will model the traits of fruit flies and how they are passed from generations to generation. We decided to do this report on fruit flies because a computer model will be faster, easier, and cheaper way to determine how fly traits will be inherited and how fly populations will change.

Fruit flies are common in homes, supermarkets and whatever else food is allowed to rot and ferment. Adults are about 1/8 inch long usually have red eyes. The front portion of the body is tan and the rear portion is black. Fruit flies lay their eggs on moist, organic materials. Upon hatching, the tiny larvae continue to feed near the surface of the fermenting mass. This surface-feeding characteristic of the larvae is significant in that portions of fruits and vegetables can be cut away to allow the collection of specimens for study. The reproductive potential of fruit flies is enormous; given the opportunity, they will lay about 500 eggs. The entire lifecycle from egg to adult can be completed in about two weeks. After the female lays eggs she dies.

In our model we will have different population of flies with unique combinations of eye color, wing shape, and body type. We are going to interbreed them and find the traits of the resulting offspring. We will use StarLogo to make a model of our system. We will have the programs set up to make and calculate Punnet squares, then track and record

the results. Next we will turn equal amount of the individual type of the flies loose and let them enter breed randomly to determine what traits survive to show up in the long run

Problem Statement!!

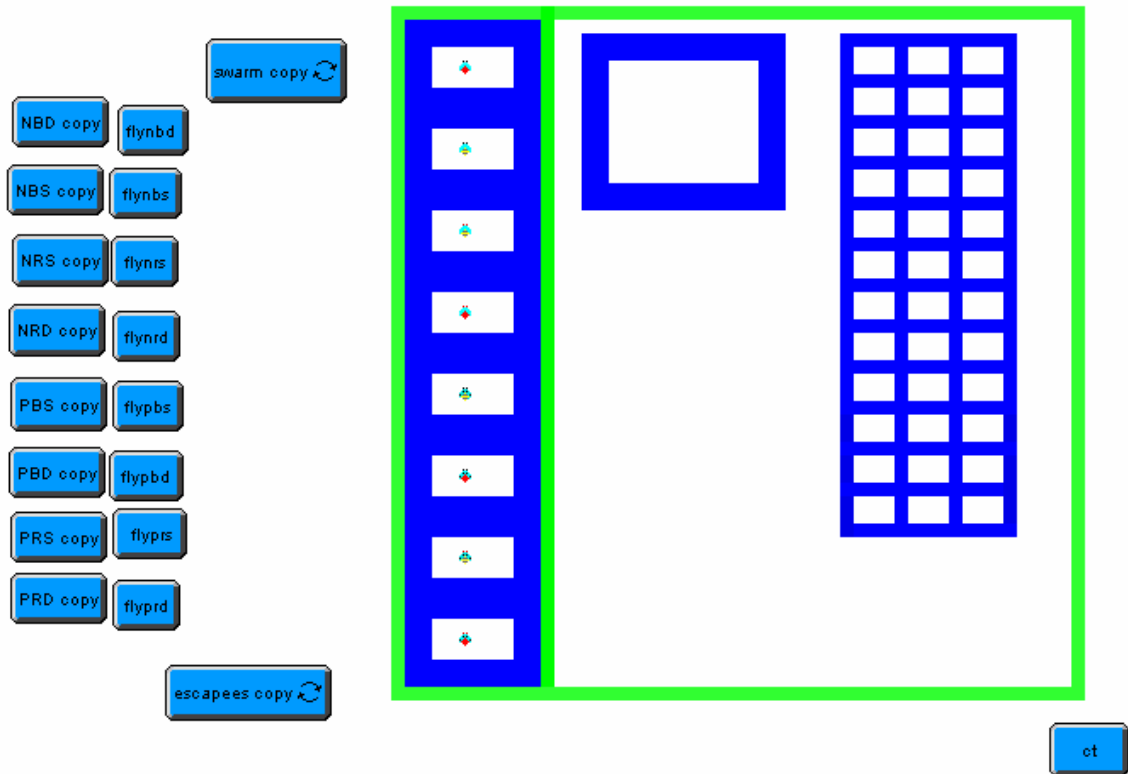
In our project we will be using the different genetic traits for eyes color, wing type, and body style.

Fruit Flies Eyes The compound eye of *Drosophila* is a marvel of precisely organized structural elements. There are a lot of different types of fruit fly eyes! In our project we used red, black, and eyeless.

Fruit Flies Wings The wings are mostly clear with a small dark spot neat the tip. The three different types of wings are: shriveled wings, wings with dots on them, and normal wings.

Fruit Flies Body The adult flies is very small insects, about 3/16 inches long (4-5 mm). The normal body color is usually a light yellow to tan color or a reddish-brown in color. The two other types of bodies are tan with black strips, or yellow body with red triangle of its abdomen.

STARLOGO CODE IN ACTION



This shows our setup screen that has eight original types of flies and has a area for them to breed.

CODE

```
turtles-own [wing [N n] eye [R r] body [S s]]

to flynbd
  if xcor = 0 [setshape 12 setbreed nbd set wing N set eye r set body s setxy -20 21]
end

to flynbs
  if xcor = 0 [setshape 13 setbreed nbs set wing N set eye r set body S setxy -20 15]
end

to flynrs
  if xcor = 0 [setshape 14 setbreed nrs setbreed nrs set wing N set eye R set body S setxy
-20 9]
end

to flynrd
  if xcor = 0 [setshape 15 setbreed nrd set wing N set eye R set body s setxy -20 3]
end

to flypbs
```

```
    if xcor = 0 [setshape 16 setbreed pbs set wing N set eye R set body S setxy -20 -3]
end

to flypbd
    if xcor = 0 [setshape 17 setbreed pbd set wing n set eye r set body S setxy -20 -9]
end

to flyprs
    if xcor = 0 [setshape 18 setbreed prs set wing n set eye R set body S setxy -20 -15]
end

to flyprd
    if xcor = 0 [setshape 19 setbreed prd set wing n set eye R set body s setxy -20 -21]
end
```

The Programming

We used StarLogo to graphically represent the fruit flies in our model. We designed different colonies of flies with all the possible combinations of traits. We have programmed our flies to start the breeding process so that we can calculate how many generations we are going to get out of every two that we breed. We have eight different flies that we can breed each of them has their own little cage and they all have different traits. We came up with a possible of 27 different types of offspring. We used Star logo to complete Punnett Square to show the results of the interbreeding. We did the Punnett Square's by hand before we did them on the computer. Our Punnett Squares were developed using standard genetic principles and we used those same squares to graphically show trends of trait changes in fly populations over time.

Punnett Squares

<u>BDN</u>	<u>BDn</u>	<u>BdN</u>	<u>Bdn</u>	<u>bDn</u>	<u>bDn</u>	<u>bdN</u>	<u>bdn</u>
<u>BDN</u>	BBDDNN	BBDDNd	BBDdNn	BbDDNN	BbDDBn	BbDbNN	bbDdBb
<u>BDn</u>	BBDDNn	BBDDnn	BBBbNn	BBDdnn	BbDDbn	bBDDbb	BBdBb
<u>BdN</u>	BBdBb	BBdBB	BBddb	BbdDBB	BbDdNn	Bbddnn	Bbddnn
<u>Bdn</u>	BBdDBb	BBDdbb	BBdNn	BBddb	BbdDNn	Bbddnn	Bbddnn
<u>bDN</u>	bBDDnN	bBDbNN	bBDdBb	bbDDBB	bbDDBb	bbDDNn	bbDDnn
<u>bbD</u>	bBDDNn	bBDDnn	bBDdnn	bBDdnn	bbDdNn	bbDDnn	bbdDBb

<u>bdN</u>	bBDdNn	bBddNN	bBddBb	bbbDBB	bbdDNn	bbDDNN	bbddnn
<u>bdn</u>	bBdDNn	bBdDnn	BbddNn	bBddnn	bbdDBb	bbdDNN	bbddNn

Original Achievement

We designed and made a computer model that simulated fruit flies. Our achievement is that we learned more computer skills and learned to work with Star logo code; we also learned how to solve a problem on a computer. Our original achievement was to know how many types and different flies we could come up with if we just started with those many fruit flies...

Biography

Biology the study of life prentice hall 5th edition William D. Sharer, Herbert J. Stoolze
1993

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[Http://www.ceolas.org](http://www.ceolas.org) July 14, 2004

<http://www.uky.edu> December 16, 2005

<http://www.aIreptiles.com> December 16, 2005

Acknowledgment

We would like to thank all of our teachers and sponsors that have help us and have let us out of class. We would like to also thank the Supercomputing officials. It's been a great experience working with this program for the last couple of years.

