7. DROSOPHILA EYES- LEFT-NORMAL(60X) / RIGHT-MUTANT (30X)

On the left side of this slide is a picture of the head of a normal fruit fly. It has red eyes. On the right side of the slide is a fly with white eyes. The white-eyed mutant was the first of many that scientists observed. The gene that produces this abnormality has been located to be on a chromosome that is involved in the production of females (the X chromosome). This means that it is "sex-linked".

An example of a human sex-linked mutation is Hemophilia, a serious blood abnormality. If both parents are NORMAL, only MALE children will develop hemophilia. *Why*? These males inherit the "bad" X-chromosome from their mother who is a HYBRID. A girl may inherit the condition from a NORMAL-mother only if the mother is HYBRID ***and*** the father had the "bad" X-chromosome. (Males have X and Y chromosomes. Females have X and X)

Notice that the surface of the normal eye is not smooth but made up of tiny lenses. Each of these lenses focuses light onto a receiving cell. Flies see images differently than you do.

Other Drosophila mutations include: Maroonlike eyes, scalloped wings, yellow body, wing hairs and veins, curly wings, truncated (dumpy) wings, ebony bodies, wrinkled wings, eyeless, ruby eyes, pointed wings and narrow body, wingless.

8. ANOTHER DROSOPHILA MUTANT (75X)

Compare the eye seen in this slide with the eyes seen in Slide 7. This mutant form is called "Bar eyes"(**B**). Not only are they shaped differently than normal Drosophila eyes, they are also smaller. (*Check the magnifications.*)

When scientists studied the stripes on the chromosomes of the larval salivary glands of this kind of abnormal fly, they noticed that these flies had chromosomes with *abnormal stripes.* The genes of this fly were not normal. This was very strong evidence that an organism's traits are the result of what the genes cause to develop before and after birth.

This is known as the **GENE THEORY OF HEREDITY**. The genes continue their influence even as an individual develops and functions as an adult.

The unusually large number of mutants in the Drosophila population helped scientists discover important evidence in favor of the GENE THEORY. Remember however that adding evidence only increases the probability that a theory is true. If one piece of clear negative evidence is found, the theory collapses.

THE DROSOPHILA

INTRODUCTION

This Set is about a tiny fruit fly that is only one sixteenth of an inch long but that has played a major role in our understanding of genetics. It's full name is **DROSOPHILA melanogaster** (drow-SOF-uh-luh MEL-uh-NO-gas-tuh). In 1933 a scientist named Thomas Hunt Morgan won a Nobel prize for his work that, based on his studies of the Drosophila, established the fact that genes are located in linear order in chromosomes. As their common name implies, fruit flies are usually found around fruits. They feed on yeast cells that grow on juices that ooze from fruits.

Drosophila do not have bones. They have exoskeletons. That means their skeletons are on the outside of their bodies. Their bodies also have segments. This is evidence that they had worm-like ancestors.

Classical genetic experiments of the type done by Morgan use the following procedures:

1. Count each type of off-spring produced in experimental mating.

2. Since the life cycle of a fruit fly (from egg to adult) takes only 8 days, you can get many offspring in a short time. This is important, since large numbers of data points are needed for accurate statistical evaluation of the different types produced in mating.

3. Fruit fly mating produced many hidden changes in off-spring genes, called **mutations** (mew-TAY-shunz).

4. Many of the resultant mutants (MEW-tants) would have died in nature. However they are kept alive in the laboratory for study and breeding.

5. Genes are found on the chromosomes in the nuclei of cells. The chromosomes in the salivary glands of Drosophila larvae are particularly enlarged and can be easily studied. You will see an example in Slide 7.

In this set you will be using the Micro-Slide-Viewer™ to examine photographs of Drosophila and Drosophila parts. The magnification given, for example, Microslide 1-(20x) - means that the microscope was set at that power when the photograph was taken.

1. DROSOPHILA MALE (20X)

Drosophila are members of the insect group called Diptera (Dip-tuh-ruh), which means two wings. Actually, they have two **pairs** of wings. The ones you see in this slide (W) and a second pair (hidden here) that looks like tiny sticks. This second pair is used to help the insect balance during flight.

By Herbert A. Nestler