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#### AP Lab 12: Fruit Fly Behavior

#### Introduction

Drosophila melanogaster, also known as the fruit fly, has been studied by scientists for just over 100 years. Now it's your turn to study not their genetics, but their behavior. What environmental factors trigger a fruit fly response?

#### Background

The fruit fly can be found throughout the world and feeds on ripe or rotten fruit and the fungi growing on rotting fruit. Despite Drosophila's small size, fruit fly studies have enlightened many areas of scientific understanding. Drosophila exhibit many interesting physical and behavioral characteristics. Its genome has been sequenced, its physical traits have been documented and mutated, and its behavior has been well chronicled. Because of all of their scientific applications, Drosophila are considered a model organism for geneticists and behaviorists.

Drosophila obtained its name based on observations of its characteristics. Fruit flies follow circadian rhythms that include sleeping in the dark and emerging as adults from pupa in the early morning. The latter behavior gave rise to the name Drosophila which means "lover of dew." The explanation for the species name melanogaster is based on physical features — Drosophila have a black abdominal area.

#### Physical Characterization

Like all insects, Drosophilo have three main body parts — the head, the thorax, and the abdomen (see Figure 1). The major structures of the head of the wild-type fruit fly are the large red compound eyes, the olfactory antennae, and the mouth. Between the eyes are two antennae the fly uses to sense odors. The mouth is a proboscis — the fly lowers it to suck up food like a vacuum cleaner. The thorax has six legs, two wings and, on the dorsal (top) side, a number of long dark bristles.



Figure 1: Drosophila

#### Sexing Files

Identification of sex is most reliably done by examination of the genital organs with the aid of magnification. The external reproductive organs of both the male and the female are located on the ventral-posterior part of the abdomen. The male genitalia are surrounded by heavy, dark bristles which are not present in the female (see Figure 2, Part A). This characteristic is quite distinct even in a fly that has just emerged from the puparium.

As flies age, the posterior portion of the abdomen becomes very dark in males and considerably lighter in females. The tip of the abdomen is rounded in males and more pointed in females. Generally, male fruit flies tend to be smaller than females but this is not a reliable characteristic to sort the sexes. Females have stripes on every segment of their abdomen. Males have shorter abdomens, and the last few segments of the abdomen are solid black. Males also have a set of brown anal plates on the ventral (bottom) side of the abdomen. The front legs can also be used to distinguish sexes. There are sex combs on the front legs of the male fly (see Figure 2).

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