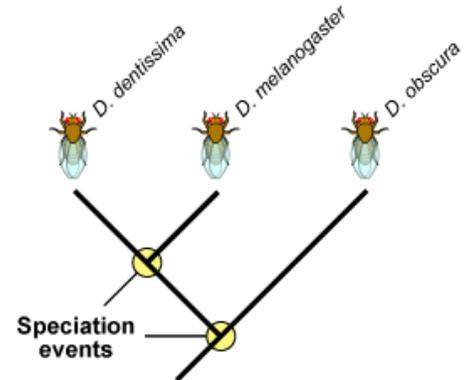


# Defining Speciation

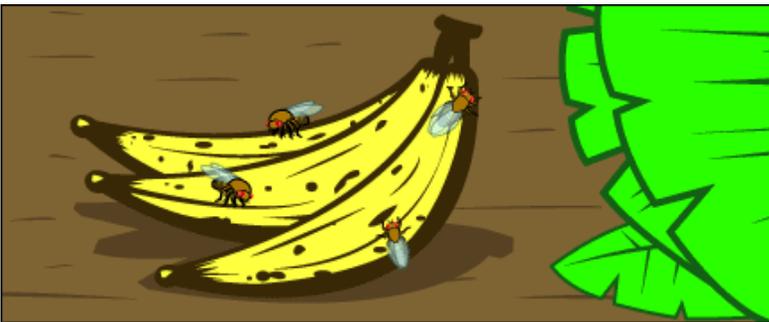
**Speciation** is an event that produces two or more separate species from one single population within a species. Imagine that you are looking at a tip of the tree of life that constitutes a species of fruit fly. Move down the **phylogeny** to where your fruit fly twig is connected to the rest of the tree. That branching point, and every other branching point on the tree, is a speciation event. At that point genetic changes etc. resulted in two separate fruit fly lineages, where previously there had just been one lineage. But why and how did it happen?

The branching points on this partial *Drosophila* phylogeny represent long past speciation events that could have taken place many thousands of years ago.

Here is one scenario that exemplifies how speciation can happen:

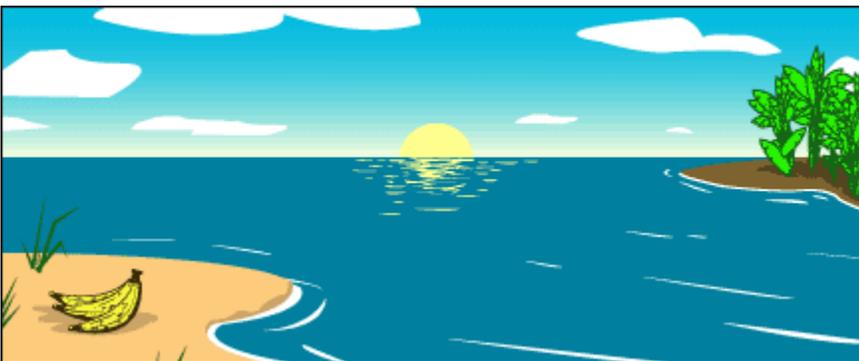


**The scene:** a population of wild fruit flies minding its own business on several bunches of rotting bananas, cheerfully **laying their eggs** in the mushy fruit...

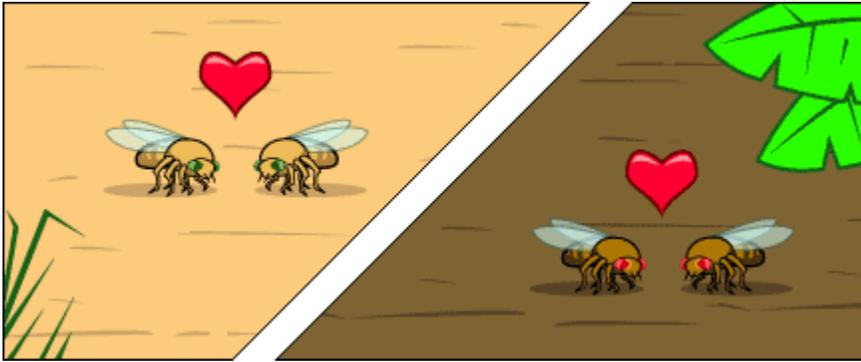


**Disaster strikes:** A hurricane washes the bananas and the immature fruit flies they contain out to sea. The banana bunch eventually washes up on an island off the coast of the mainland. The fruit flies mature and emerge from their slimy nursery onto the lonely island. The two portions of the population, mainland fruit flies and island fruit flies, are now too far apart for **gene flow** to unite them. At this point, speciation has

not occurred—any fruit flies that got back to the mainland could mate and produce healthy offspring with the mainland flies.



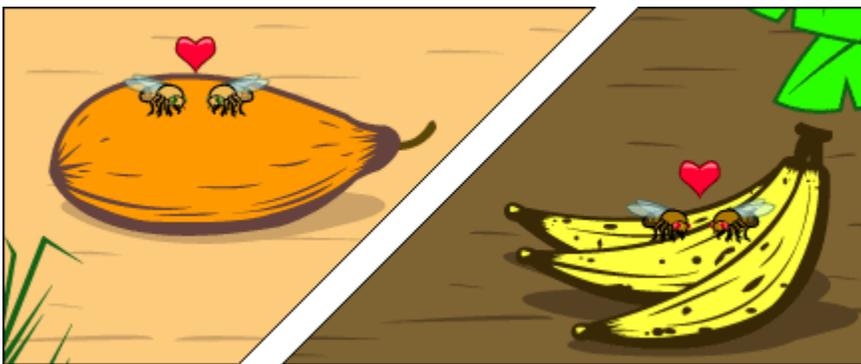
**The populations diverge:** Ecological conditions are slightly different on the island, and the island population **evolves** under different **selective pressures** and experiences



different random events than the mainland population does.

Morphology (phenotypes), food preferences, and courtship displays change over the course of many generations of **natural selection**.

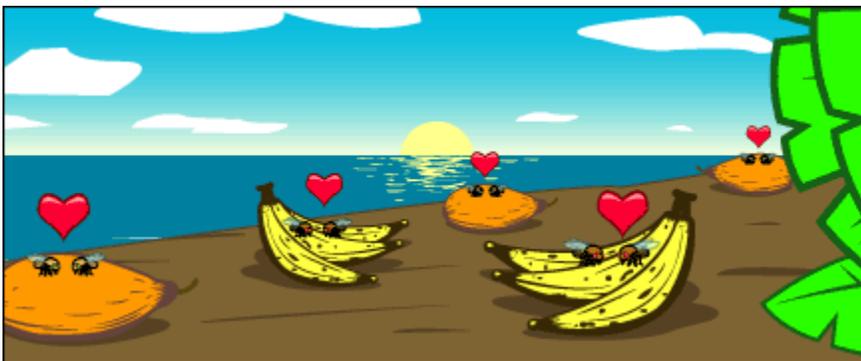
**What might have caused that to happen?** Different fruits were abundant on the island. The island population was selected to specialize on a particular type of fruit and evolved a



different food preference from the mainland flies. Since there were no bananas to eat and lay their eggs in they had to make use of the fruit that was available or die out!

Could this small difference be a barrier to **gene flow** with the mainland flies? Yes, if the flies find mates by hanging out on preferred foods, then if they return to the mainland, they will not end up mating with mainland flies because of this different food preference. Gene flow would be greatly reduced; and once gene flow between the two species is stopped or reduced, larger genetic differences between the species can accumulate.

**So we meet again:** When another storm reintroduces the island flies to the mainland,



they will not readily mate with the mainland flies since they've evolved different courtship behaviors. The few that do mate with the mainland flies, produce inviable eggs because of other genetic differences between the two populations. The lineage has

split now that genes cannot flow between the populations.