Natural Selection

Biology

Objectives

- Students will be able to explain and describe natural selection
- Students will be able to describe how natural selection relates to evolution
- Students will understand the similarities and differences between natural selection and evolution
- Students will be able to discuss examples and make predictions about natural selection

What is Evolution?

- A change in “allele frequencies” (not the number of alleles, as that will change based on the number of individuals)
- Allele frequency tells us how common a certain allele is compared to all of the alleles in a population for a certain gene (it’s a percentage!)
- Allele frequencies change because of births and deaths – so evolution can only occur for a population over time, as new individuals are born and other individuals die

Biological Fitness

- A way of expressing how likely an individual is to survive in a particular environment or set of conditions

- More fit organisms are likely to have more offspring (due to their increased survival)

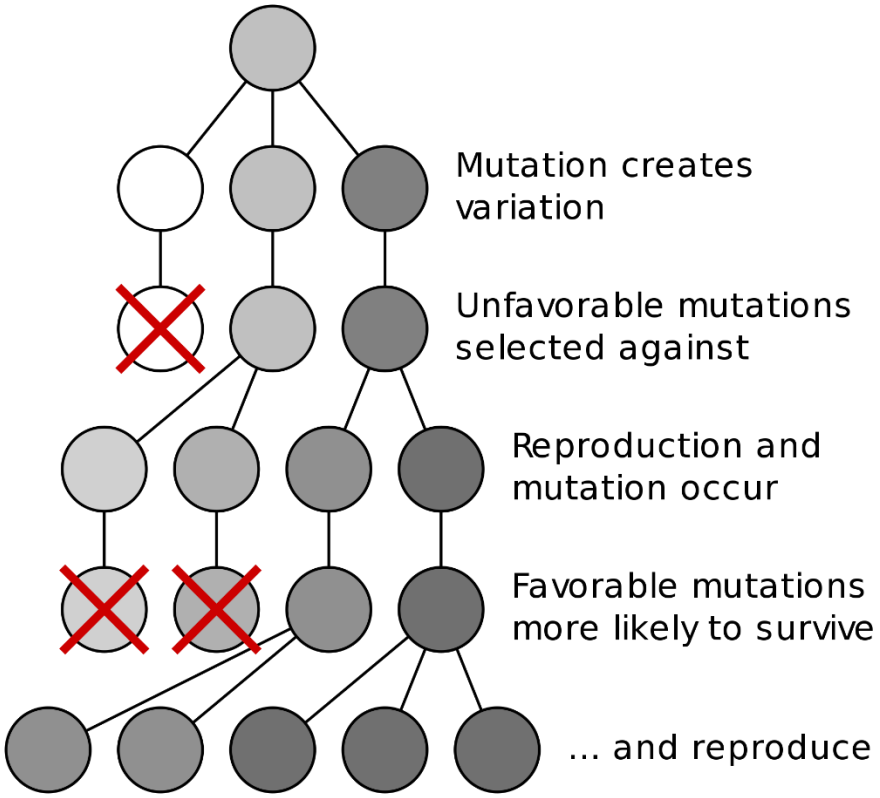
Fitness and Environment

- A organism's fitness depends on the environment in which the organism lives

- The fittest organism during an ice age, for example, is probably not the fittest organism once the ice age is over

Natural Selection

- A process in which organisms that have greater biological fitness have a greater likelihood of reproducing and passing on their alleles
- Since their alleles help make them more fit, their offspring will be more fit as well
- Since they are reproducing in greater numbers, their alleles will be more abundant in future generations – evolution will have occurred!



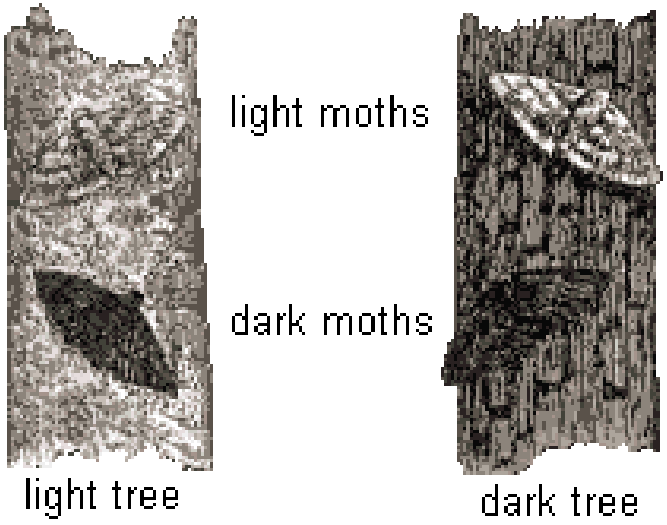
What Natural Selection is NOT!

- First, natural selection is not all-powerful; it does not produce perfection

- Second, it is mindless and mechanistic - it has no goals; it's not striving to produce "progress" or a balanced ecosystem

What are the implications?

- Alleles that allow organisms to be more fit will become more abundant over time
- This is evolution: a change in the allele frequency of a population over time
- Therefore, natural selection can cause evolution (it is a “mechanism” for evolution)



Raw Materials of Natural Selection

- Natural selection requires variation – the presence of different alleles that cause fitness to vary between individuals
- Natural selection requires “selection pressure” – the environment or other conditions must make it more likely for biologically fit organisms to be able to survive and/or reproduce