

CHARLES DARWIN'S THEORY OF EVOLUTION BY NATURAL SELECTION

1. Darwin published his theory of evolution in *The Origin of Species* (1859).
2. Evolution is not something that can happen to any individual organism. Evolution is defined as a change in the relative frequency [defined as the ratio of the number of observations in a statistical category to the total number of observations] of a characteristic amongst a population of organisms.
3. Darwin's theory of evolution by natural selection can explain why biological organisms properties can be altered to be more suitable for surviving and reproducing without the need for any intelligent designer being involved.
4. Elliott Sober explains how natural selection works using the phrase "inherited variation in fitness." (p. 63). Organisms must *vary* or there would be no trait differences amongst the population to select among. If no traits make some organisms more likely to survive and reproduce than others then evolution will not occur. The variations must be capable of being genetically passed on from parents to offspring, and this is inheritance. If the traits cannot be biologically passed on to the offspring, then evolution could not occur. Lastly, the varying characteristics must affect the organism's fitness, or ability to survive and reproduce in a particular environment.
4. If inherited variation in fitness occurs then evolution occurs. That is, there will be a change in the relative frequency of characteristics (given certain background assumptions).
5. The background assumptions used to explain why evolution by natural selection occurs are these.
 - A. Organisms are mortal. (If organisms never died then there would be no need to change any traits of the individuals).
 - B. The offspring of organisms are varied. Thus some characteristics are more likely to permit the organism to survive and reproduce than others.
 - C. Resources are limited. (If food, shelter, reproductive partners, etc. were unlimited then evolution would not occur.)
 - D. These three factors together mean that there is *competition* amongst organisms and therefore a *struggle for survival*.
 - E. Since some traits make some organisms *fitter* than others (more likely to survive and reproduce) organisms with these fitter traits are more likely to survive and reproduce. This alters the relative frequency of the occurrence of these traits amongst a population of organisms and therefore *evolution* takes place.
6. Organisms that are ^{fitter} are not necessarily "better" in any objective sense. ^{fitter} traits are ^{these} in the given environment make it more probable that the organism will survive and reproduce. Thus, if arctic conditions start up it can be to an animal's advantage to have all white fur for camouflage purposes. If it then heats up and the environment is now mostly dark, it could be disadvantageous to be all white, etc. There is nothing good or bad in itself in having a white fur coat. It depends upon the environmental circumstances as to whether this is a fitness producing trait or not.
7. Darwin was unfamiliar with genetics, or DNA, or mutations, etc. The modern theory of evolution incorporates these new discoveries into how the theory is to be more fully understood.