

Misconceptions about Evolution

- Evolution does not tell us about how life first appeared on Earth
- Individuals do not evolve. Only populations can evolve.
- Not all changes are “good”
- Changes that happen to a person in their lifetime do not always get passed on to their children
- Evolution is not a ladder working towards a better species

Darwin's Theory of Evolution

- Evolution, or **change over time**, is the process by which modern organisms have descended from ancient organisms.



Natural Selection

Organisms that are best adapted to an environment *survive and reproduce* more than others.



There is no agent involved in natural selection.

Natural selection is a process of elimination

INDIVIDUALS THAT HAVE TRAITS THAT ARE BEST ADAPTED FOR THE CURRENT ENVIRONMENT ARE THE ONES THAT SURVIVE TO BREED AND PASS ON THEIR GENES TO THE NEXT GENERATION.

Organisms not possessing the beneficial traits either die or don't have as many offspring.

Natural Selection is Survival of the fittest

- **Darwin's Theory of Natural Selection occurs in four steps:**
 - **Overproduction**
 - **Variation**
 - **Competition**
 - **Selection**

Overproduction

- Each species produces more offspring that can survive



Variation

- Each individual has a unique combination of inherited traits.
 - **Adaptation**: an inherited trait that increases an organism's chances of survival



Why is Variation Important?

- **Because the environment changes.**
- **The more variation within a species, the more likely it will survive**
 - **EX: If everyone is the same, they are all vulnerable to the same environmental changes or diseases**
- **The more variation of types of species in an habitat, the more likely at least some will survive**

Competition



- Individuals **COMPETE** for limited resources:
 - Food, water, space, mates
- Natural selection occurs through “**Survival of the fittest**”
 - **Fitness:** the ability to survive and reproduce
- Not all individuals survive to adulthood

Selection

- The individuals with the **best traits / adaptations will survive and have the opportunity to pass on it's traits to offspring.**
 - Natural selection acts on the **phenotype** (physical appearance), not the **genotype** (genetic makeup)
 - Ex: When a predator finds its prey, it is due to the prey's physical characteristics, like color or slow speed, not the alleles (BB, Bb)

Evolution occurs when...

- **Individuals with traits that are not well suited to their environment either die or leave few offspring.**
- **Evolution occurs when good traits build up in a population over many generations and bad traits are eliminated by the death of the individuals.**

Natural Selection is Survival of the fittest

This does not mean that the biggest gets to live.

“He who has the BEST trait/adaptation to survive has the best chance of doing so.”

Using Germ-X kills 99% of the bacteria, it's the 1% that continues to live on. They possess a gene that makes them resilient to Germ-X and that gene is therefore passes on to the next generation.

Natural Selection is a mixture of both **Chance** and **necessity**

Natural selection in action

- As generations pass by, the proportions of the alleles for the different variants will change, in favour of those that provide the best adaptations
- Natural selection has been observed at work in populations of species over the past century
- Examples include:
 - pesticide resistance in insects,
 - antibiotic resistance in bacteria,
 - industrial melanism in moths,
 - tolerance to heavy metals in plants.

The Origin of Species by Natural Selection

- Darwin and Wallace argued that if natural selection proceeded for a long enough period of time it could bring about the evolution of new species
- Darwin favoured a long period of slow changes
- Recently refined to include the possibility of rapid changes over a short period of time (punctuated equilibrium).

Natural selection is not the only way

- Whether fast or slow, observing the evolution of a new species is not easy in the lifetime of a scientist
- That species evolve is a fact but that they evolve by natural selection is one theory
- Other mechanisms exist that can also lead to the evolution of species (e.g. **genetic drift**).

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FROM DIFFERENT SOURCES

THANK YOU