

Natural selection

What is the mechanism driving evolutionary change?

Natural selection

Paradigm shift

Natural selection

Why must traits be heritable for evolution to occur?

Natural selection

Role of mutation in variation

Natural selection

Role of sexual reproduction in variation

Natural selection

Carrying capacity

Natural selection

Give an example of an abiotic, density-independent selection pressure.

Natural selection

Fitness

A fundamental change in the accepted theory of a field, e.g. Darwin's natural selection replacing Lamarckism.

Natural selection, operating continuously over billions of years and producing the biodiversity of life on Earth.

Mutation generates new alleles by changing the base sequence of a gene.

Only traits encoded in the base sequence of genes pass to offspring. Acquired characteristics are not encoded in genes, so are not heritable.

The maximum population size an environment can support sustainably. Limited by resources such as food, water, nest sites, light and minerals.

Generates new combinations of alleles: crossing over and random orientation in meiosis, plus random fertilisation.

The survival value and reproductive potential of a genotype compared with others.

Very high or very low temperatures, e.g. a hard frost; also drought or flooding.

Natural selection Sexual selection	Natural selection Endler's guppies: effect of a strong predator (Crenicichla)
Natural selection Endler's guppies: effect of no predator or Rivulus	Natural selection HL only Gene pool
Natural selection HL only Why do geographically isolated populations differ in allele frequencies?	Natural selection HL only Neo-Darwinism
Natural selection HL only Directional vs stabilizing vs disruptive selection	Natural selection HL only Artificial selection

Males evolved fewer spots: conspicuous males were eaten, so natural selection outweighed female preference.

Selection for traits that increase success in attracting a mate, e.g. plumage of male birds of paradise, which signals overall fitness.

All the genes and their different alleles present in a population.

Males evolved more spots, because sexual selection by female choice for colourful males dominated.

Darwin's theory of natural selection integrated with genetics: evolution as change in allele frequency in a gene pool.

No gene flow; different mutations, selection pressures and chance events, e.g. lactase-persistence alleles common in northern Europe, rare in East Asia.

Deliberate choice by humans of individuals with desirable traits for breeding, e.g. wild cabbage into broccoli and kale.

Directional favours one extreme; stabilizing favours the intermediate; disruptive favours both extremes. All change allele frequency.

Natural selection **HL only**

Is antibiotic resistance artificial selection?

Natural selection **HL only**

Hardy-Weinberg equations

Natural selection **HL only**

Hardy-Weinberg conditions

Natural selection **HL only**

What does a population not fitting Hardy-Weinberg show?

$p + q = 1$ and $p^2 + 2pq + q^2 = 1$. $p^2 = AA$, $2pq = Aa$, $q^2 = aa$.

No. It is an unintended consequence of human action, so it is natural selection.

At least one condition is not met, e.g. mating is non-random or survival rates vary between genotypes.

Large population, random mating, no mutation, no migration, no natural selection.