

01: Introduction to Evolutionary Thought

Key Evolution Terms

Evolution: Descent, through genetic inheritance, with modification.

Lamarckism: A discredited theory of evolution based on the inheritance of acquired characteristics. Also known as the use or disuse theory of evolution.

Theory of Natural Selection: The theory of evolution originated by Charles Darwin that states a character can evolve if there is variation for that trait, the trait is heritable, and there is differential reproductive success due to the trait.

Modern Evolutionary Synthesis: The integration of Darwin's Theory of Natural Selection with genetics in the 1st part of the 20th century.

Key Evolutionary Scientists

Jean-Baptiste Lamarck: The purveyor of the now discredited theory of evolution best known as the inheritance of acquired characteristics.

Charles Darwin: The godfather of modern evolutionary biology and originator of the theory of natural selection.

Gregor Mendel: Austrian monk who unknowingly founded the basis of modern genetics with his work on pea plants.

Charles Lyell: Geologist and author of "Principles of Geology", a book about the gradualism of geological formations that influenced Darwin.

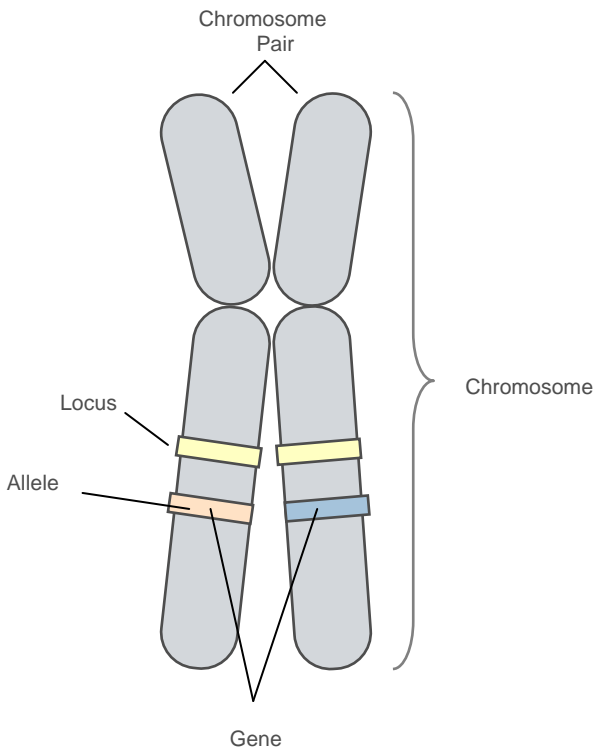
Thomas Malthus: Demographer and economist who influenced Darwin with his work on human population growth and his idea of "struggle for existence."

T.H. Morgan: Geneticist who worked with *Drosophila* mutants and discovered the chromosomal basis of heredity.

R.A. Fisher: Statistician who derived the first statistical model explaining Mendelian inheritance.

Theodosius Dobzhansky: *Drosophila* geneticist who integrated genetics, population genetics, and evolution in "Genetics and the Origin of Species."

Genetic Structure



Evolutionary Biology

Interdisciplinary area of biology that studies the history of life on Earth and is concerned with the origin, descent, distribution, and change in species and allele frequencies over time.

Genetic Terms

Chromosome: Structure containing all of the genetic information of an organism.

Diploid: An organism having two copies of each chromosome.

Locus (loci): The location of a gene on a chromosome.

Gene: Portion of chromosome that codes for a particular trait.

Allele: A version of a particular gene.

Genotype: The allelic makeup of a trait.

Phenotype: Observable expression of the genotype.

Homozygous: Having two copies (in a diploid organism) of the same allele at a locus.

Heterozygous: Having different alleles at a locus.

Dominant: In a heterozygote, the allele that is expressed in the phenotype.

Recessive: In a heterozygote, the allele that is not expressed in the phenotype.

Punnett Square: A tool that assists in determining the genotypes of offspring resulting from a cross between two individuals of known genotype.

Mendelian Inheritance

The following are Mendel's Laws of Inheritance:

Law of Dominance: When two individuals, homozygous for contrasting traits (e.g. TT and tt) are crossed only one of their phenotypes will be observable in their offspring.

Law of Segregation: Chromosomes, and consequently, alleles, separate during gamete formation, which means that in a diploid organism an offspring will only inherit one of two possible alleles from its parent.

Law of Independent Assortment: Genes at different loci are not inherited together. For example, the inheritance of eye color is independent of heart development.

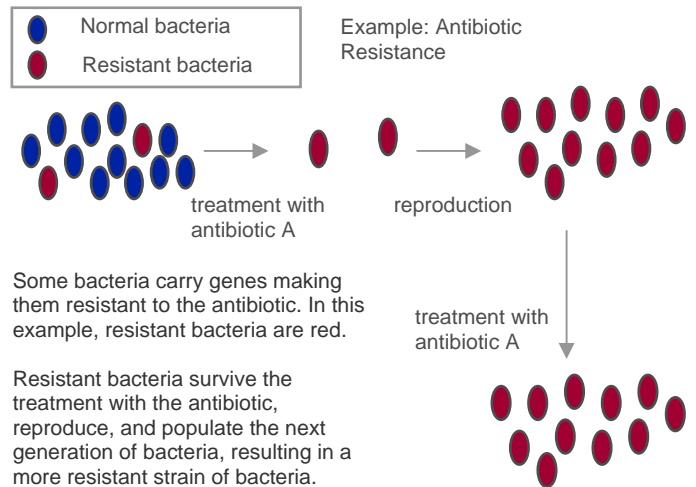
Darwinian Theory of Natural Selection

The following are the principles of the Theory of Natural Selection:

Variation: A trait must have variation.

Differential Reproductive Success: There must be a benefit to having a particular version of this trait, resulting in a greater success in reproduction.

Heritability: The trait must have a genetical basis and thus be heritable.



Some bacteria carry genes making them resistant to the antibiotic. In this example, resistant bacteria are red.

Resistant bacteria survive the treatment with the antibiotic, reproduce, and populate the next generation of bacteria, resulting in a more resistant strain of bacteria.

If we treat the bacteria again, using the same antibiotic, we will find that the antibiotic is no longer effective at treating these bacteria.

How to Use This Cheat Sheet: These are the keys related to this topic. Try to read through it carefully twice then recite it out on a blank sheet of paper. Review it again before the exams.