

A/L Biology

**Introduction To
Genetics**



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Genetics

Genetics is the branch of biology that studies heredity, the passing of traits from one generation to the next.

It explores the mechanisms of inheritance and the variation of traits in living organisms.



Mendelian Genetics

Gregor Mendel, the father of modern genetics, formulated the laws of inheritance based on his experiments with pea plants.

These laws include the principles of segregation and independent assortment





DNA and Genes

Genes, the units of heredity, are segments of DNA that code for specific traits.

*The structure of DNA, a double helix, was elucidated by **James Watson and Francis Crick**.*



Chromosomes & Genome

Genes are organized on **chromosomes**, thread-like structures in the cell nucleus.

The complete set of genetic material in an organism is its **genome**.



Genetic Variation

Genetic variation arises through processes such as

mutation

recombination

sexual reproduction

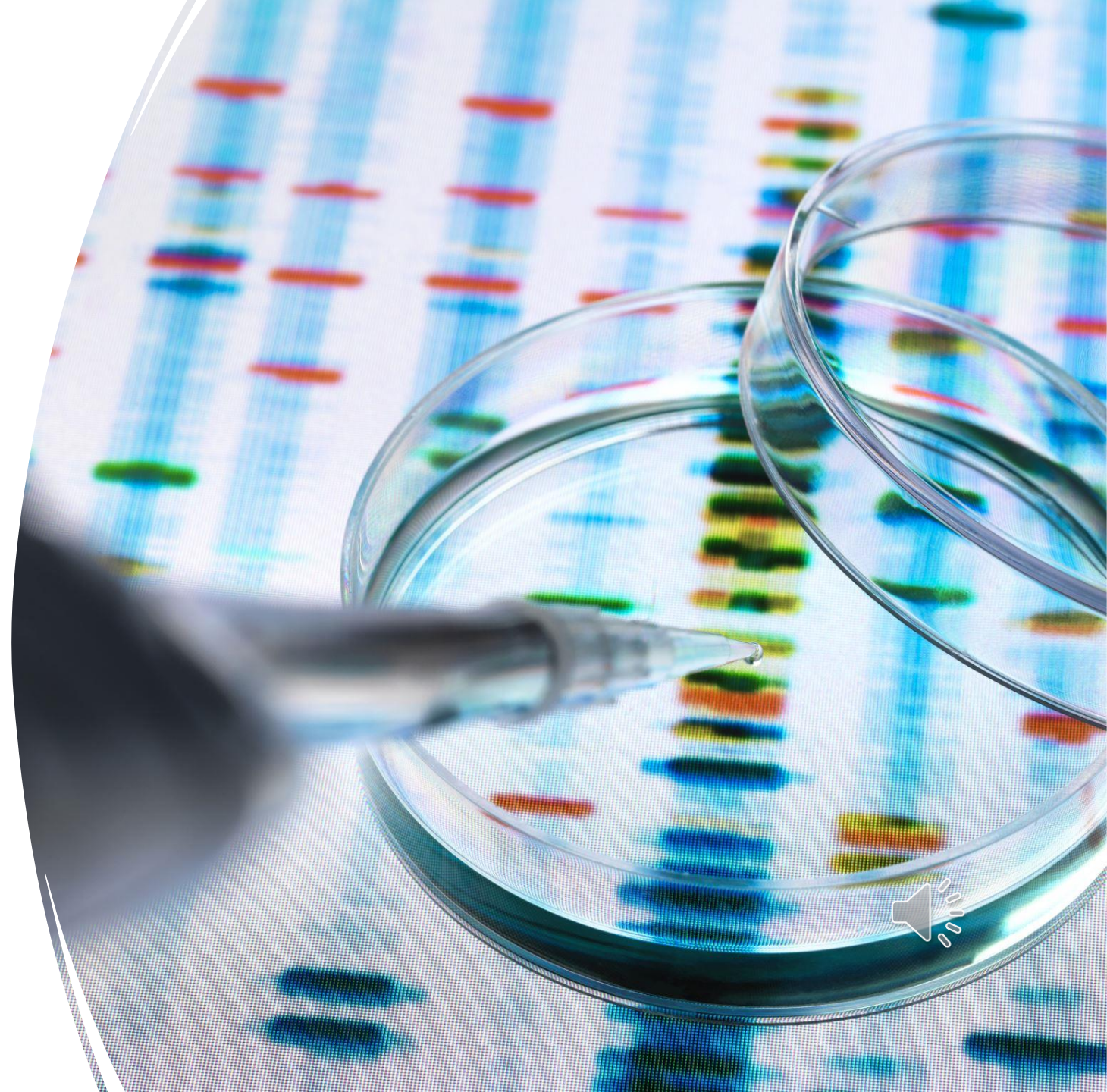
It contributes to the diversity observed within species.



Modern Genetics

Advances in molecular biology and biotechnology have revolutionized genetics.

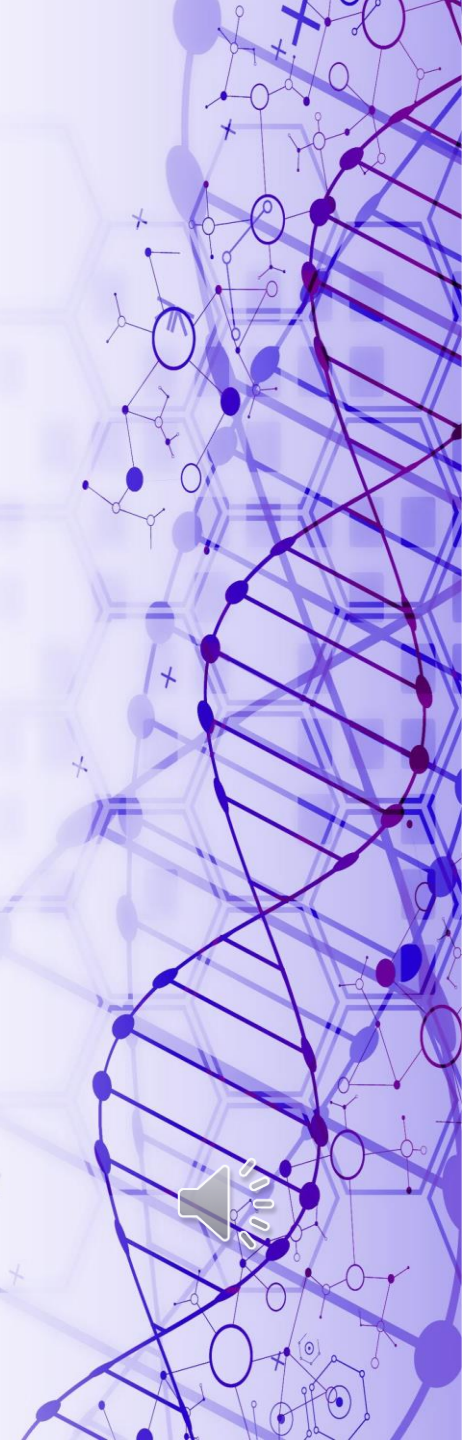
Techniques like DNA sequencing and gene editing enable precise manipulation of genes.



Genetic Engineering

Genetic engineering involves modifying an organism's DNA to achieve desired traits.

Applications include *agriculture, medicine, and biotechnology.*



Future Directions of Genetics

Ongoing research in genetics continues to unravel the complexities of inheritance, evolution, and the molecular basis of life. The field holds promise for addressing global challenges in health, agriculture, and conservation.



Covered Points:

- Introduction to Genetics
- Mendelian Genetics
- DNA and Genes
- Chromosomes and Genome
- Genetic Variations
- Modern Genetics and Genetic Engineering
- Future Direction of Genetics



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