

Summary of Lecture-3 (Genetics) – An Introduction to BB101

Dear Students,

In Lecture 3, we delved into Mendel's garden to revisit the laws of inheritance through practical crosses with various examples that either adhered to or deviated from Mendel's rules.

Basics & Terminology:

Genetics explores heredity and trait variations by examining genes and their different forms, known as alleles. These alleles, located on homologous chromosomes, collectively determine an organism's genotype, influencing observable traits or phenotype.

Mendel and Inheritance:

Gregor Mendel, the pioneer of modern genetics, conducted ground-breaking pea plant experiments in the 19th century. His meticulous observations on true-breeding traits set the stage for understanding how characteristics are inherited from one generation to the next.

Laws of Inheritance:

Mendel's First Law, the *Law of Segregation*, explains how alleles separate during gamete formation, ensuring each gamete receives only one allele. His Second Law, the *Law of Independent Assortment*, underscores the independence of genes on different chromosomes during this segregation process.

Genetics & Probability:

Probability is pivotal in genetics, providing a mathematical framework for predicting genotype and phenotype likelihood. Tools like *Punnett Squares* help visualize and calculate these probabilities, contributing to a deeper understanding of genetic outcomes.

Examples & Deviations:

Genetic expressions sometimes deviate from Mendelian patterns. Incomplete dominance results in intermediate phenotypes, while codominance sees both alleles contributing visibly. Multiple alleles introduce complexity with more than two variations for a specific gene.

Blood Grouping Experiment:

Applying Mendelian principles practically, the ABO blood group system involves co-dominant expression of A and B antigens on red blood cells. The Rh factor, determining blood positivity or negativity, adds complexity to this genetic puzzle. These experiments illustrate tangible applications of Mendelian genetics in understanding and categorizing blood types.

Resource Update:

The course handout and reference materials have been updated and are accessible through the provided Google Drive link:

<https://drive.google.com/drive/folders/1FgzzCom1n6WKlgheQrFLA1U8rkJuISGT>

In our journey through Genetics, our next lecture will delve into DNA as the genetic material.

Best wishes,
Sanjeeva