

Exploring Human Genetic Analysis Tools

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Summer-Class

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Outline



- What is Human Genetic Analysis Tools.
- Basic genetic analysis tools

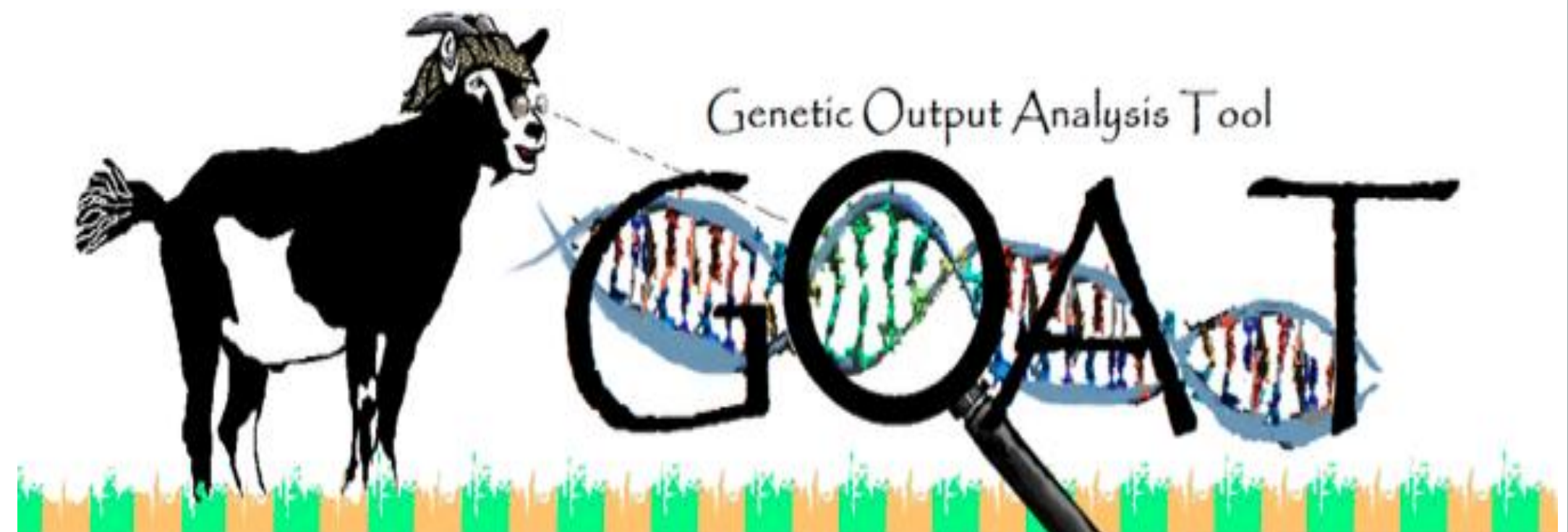
■ Objectives

- By the end of this practical session, students should be able to understand the principles behind genetic analysis tools.

❖ What is Human Genetic Analysis Tools?



- Are essential for studying **genetic variation**, **identifying mutations**, **diagnosing genetic disorders**, and advancing **personalized medicine**.
- These tools are used in **research**, **clinical diagnostics**, and **forensic investigations**.



❖ Basic genetic analysis tools:

1. **DNA Extraction and Purification Tools:** These tools are the first step in genetic analysis, allowing researchers to isolate DNA from biological samples.



DNA Extraction Kits



Automated DNA Extractors

2. Polymerase Chain Reaction (PCR):



- PCR is used to amplify specific DNA regions for analysis. Types of PCR:



Conventional PCR



Multiplex PCR



Real-Time PCR (qPCR)



RT-PCR

3. DNA Sequencing Technologies:



- Sequencing tools are used to read the nucleotide sequence of DNA, identifying mutations and genetic variations.



Sanger Sequencing



NGS

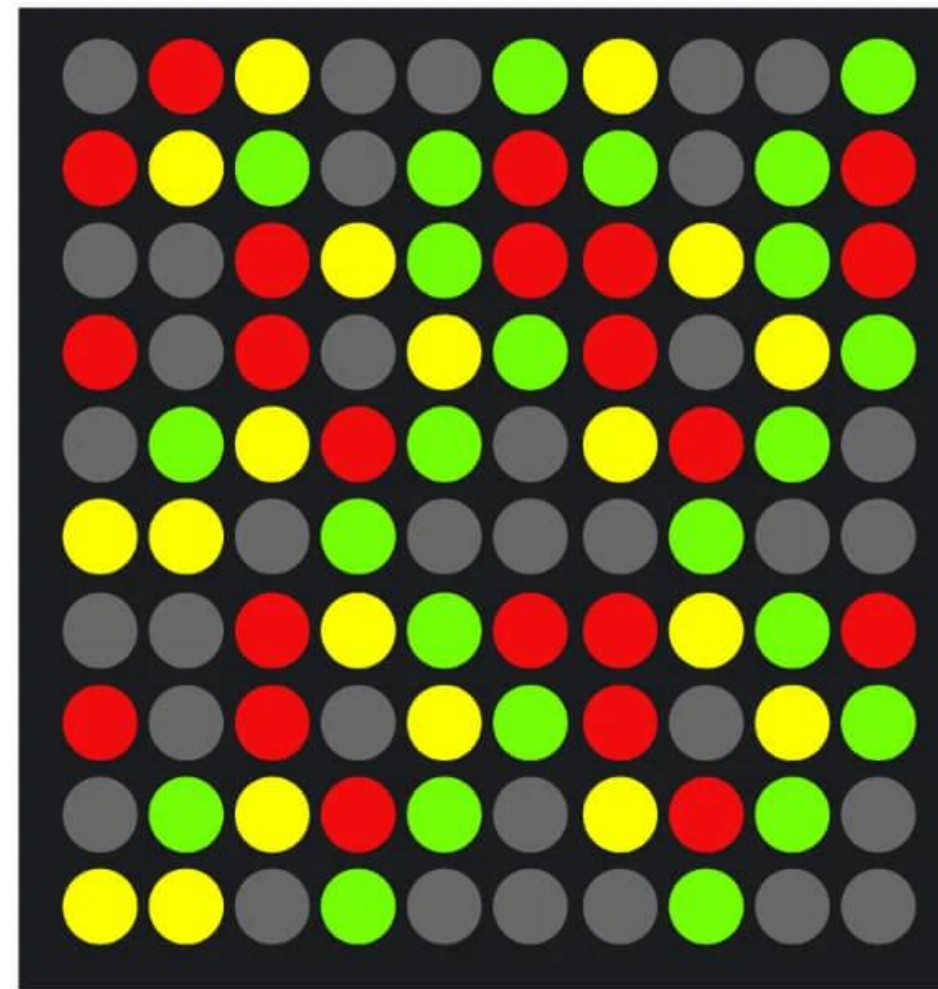
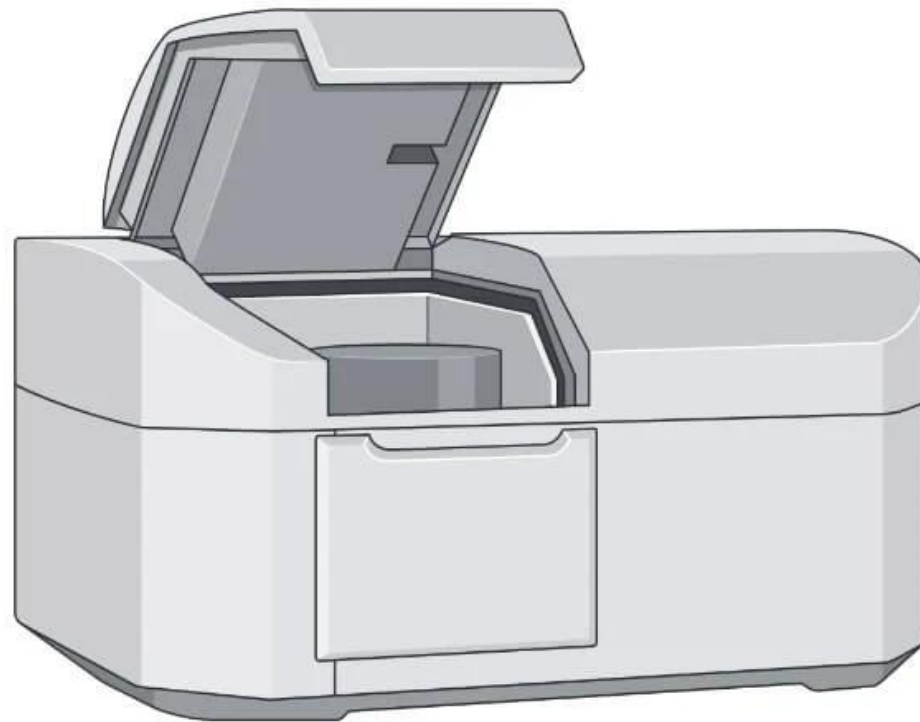


Third-Gen Sequencing - PacBio

4. Mutation Detection Tools:

- These tools analyze genetic variations such as SNPs (single nucleotide polymorphisms).

DNA Microarray



5. Chromosomal Analysis Tools:

- These tools help detect chromosomal abnormalities linked to genetic disorders.
- Karyotyping.
- Fluorescence In Situ Hybridization (FISH).
- Comparative Genomic Hybridization (CGH)



□ Applications of Human Genetic Analysis Tools:



- Medical Diagnostics.
- Personalized Medicine.
- Gene Therapy.
- Forensics.

References



- Babcock, E. B., & Collins, J. L. (1918). Genetics laboratory manual. McGraw-Hill Book Company Incorporated.
- Blair, C. (2018). BIO2450L Genetics Laboratory Manual.
- VENNISON, S. (2009). Laboratory manual for genetic engineering. PHI Learning Pvt. Ltd..



Thanks