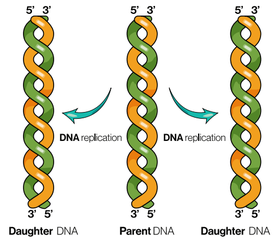
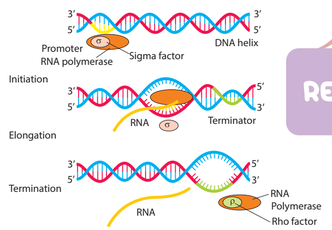
MOLECULAR BASIS OF INHERITANCE

REPLICATION

Replication is the copying of DNA from parent DNA



DNA dependent DNA polymerase	Initiates DNA synthesis
Primase	Aids the formation of primers
DNA ligases	Joints fragments of lagging strand
Helicase	To unwind DNA helix
Topoisomerases	Relieve stress on DNA due to unwinding

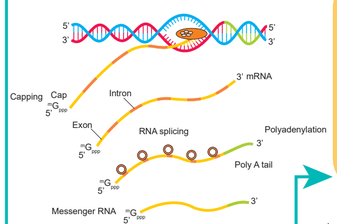


Transcription Units

3'end (down stream)	Terminator (Transcription stop site)
Between promoter and terminator	Structural gene
5'end (up stream)	Promoter (Transcription start site)

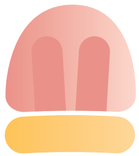
Transcription

- Prokaryotes
- Eukaryotes



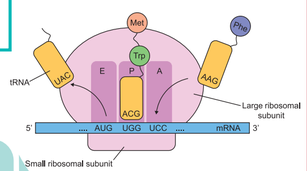
DNA → Transcription → mRNA → Translation → Protein

RIBOSOMAL RNA (rRNA)



MESSENGER RNA (mRNA)

TRANSLATION



1) Charging of tRNA (aminoacylation)

Aminoacyl tRNA synthetase catalyze aminoacylation

2) Initiation

Binding site (A – site)

Peptidyl site (P – site)

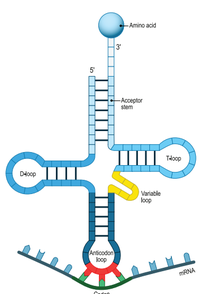
3) Elongation

Amino acids linked by peptidyl transferase

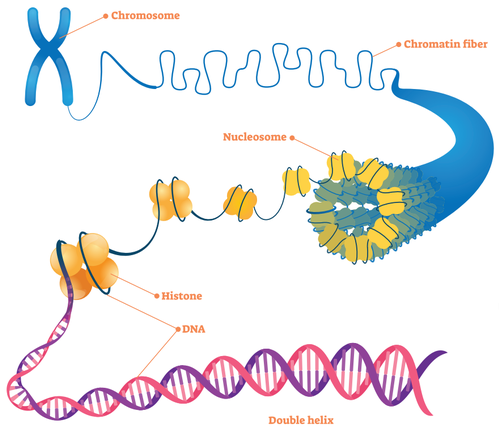
4) Termination

Release factor recognise STOP codons (UAA, UAG/UGA)

STRUCTURE OF tRNA

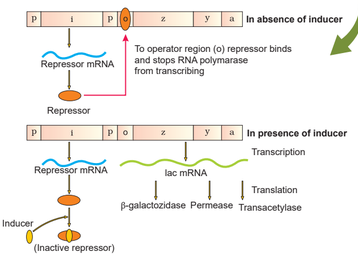


- Anticodon loop
- Acceptor end
- 2D – Clover – leaf shaped
- 3D – Inverted L shaped

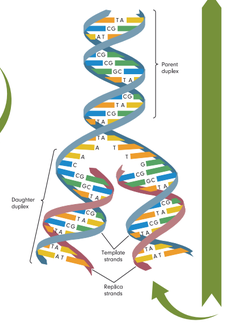


PACKAGING OF DNA HELIX

LAC OPERON



SEMI-CONSERVATION MODEL



Matthew Messelson and Franklin Sthal

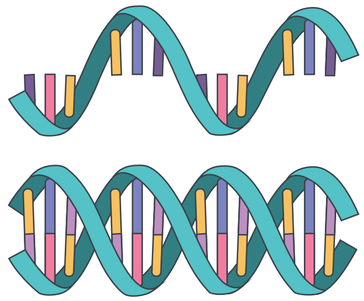
Experimented on bacterium

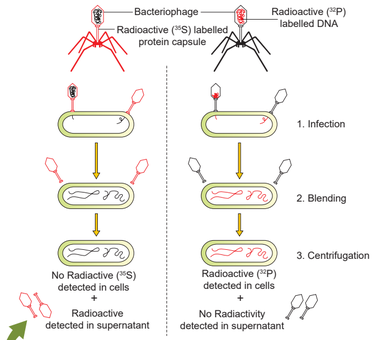
Observed – DNA in chromosome replicated in a semi – conservative manner

REGULATION OF GENE EXPRESSION

STRUCTURE

- RNA
- DNA





Hershey – Chase Experiment

Conducted experiment on Bacteriophage and bacteria

Observed – DNA is the genetic material

BIOCHEMICAL NATURE OF TRANSFORMING PRINCIPLE

Oswald Avery, Colin Macleod and Maclyn McCarty

Observed that DNA is hereditary material not protein, RNA, etc.

TRANSFORMING PRINCIPLE

Fredrick Griffith

Experimented on mice and Streptococcus pneumoniae

SEARCH FOR GENETIC MATERIAL

HUMAN GENOME PROJECT (HGP)

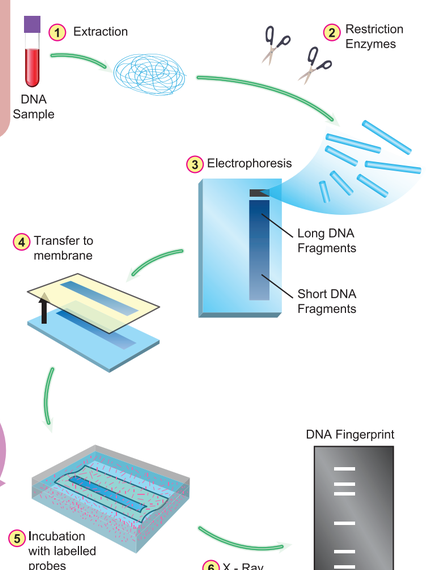
Conducted to identify all the estimated genes in human

To determine 3 billion chemical base pairs

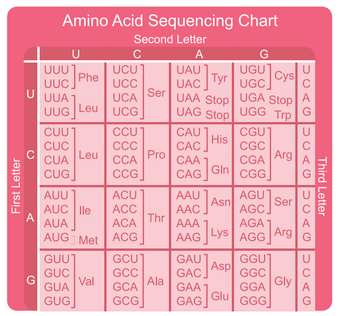
Introduction to tools for data analysis and storage

DNA FINGERPRINTING

Principle – Variable Number Tandem Repeats (VNTR)

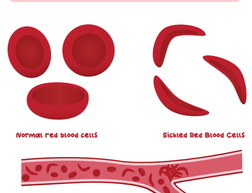


GENETIC CODE



Salient features

- Triplet in nature
- Codeis degenerate
- Contiguous in manner
- Universal, Unambiguous
- Initiator codom (AUG)
- Stop/ Terminator codons (UAA, UAG, UGA)

MUTATION

- Point mutation
- Deletion or frame shift mutation