

Topic - Frameshift mutation

Frameshift mutation occurs when nucleotides are inserted or deleted, shifting the reading frame.

There are two types of frameshift mutation.

(a) Insertion

Extra nucleotide is added

egs -

Normal - ATG GAA TTC

Mutated - ATG GCA ATT C

Effect -> Entire protein is changed.

(b) Deletion

One or more nucleotides are removed

egs -

Normal ATG GAA TTC

ATG AAT TC

Effect - Wrong protein formed

Frameshift mutations are usually very harmful.

Effect of Gene mutation

1. Harmful Mutations -

Cause diseases

- * Cancer
- * Sickle cell anemia
- * Hemophilia

2. Neutral mutation

No effect on organism

3. Beneficial Mutation

Provide advantages -

- * Antibiotic resistance in bacteria
- * Evolution and adaptation

Mutation is the main source of evolution

DNA Repair Mechanism

Cells can repair mutation using enzymes

Types of DNA repair

1. Proof-reading

DNA polymerase correct errors during replication

2. Excision Repair

Damaged DNA is removed and replaced.

3. Mismatch Repair

Incorrect base pairs are corrected

Importance of Gene Mutation

- Creates genetic variation.
- Helps in evolution
- Causes genetic diseases
- Helps organism adapt to environment
- Important in research and biotechnology

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