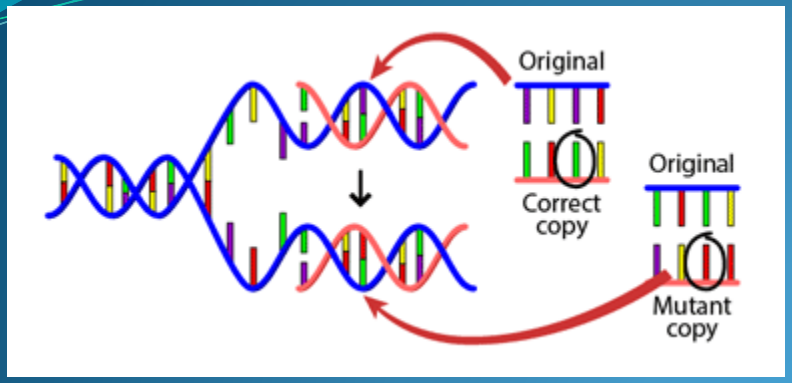

Mutation

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- Sudden heritable change in genetic material or character of an organism is known as mutation
- Individuals showing these changes are known as mutants
- An individual showing an altered phenotype due to mutation are known as variant
- Factor or agents causing mutation are known as mutagens
- Mutation which causes changes in base sequence of a gene are known as gene mutation or point mutation

Characteristics of Mutation

- Generally mutant alleles are recessive to their wild type or normal alleles
- Most mutations have harmful effect, but some mutations are beneficial
- Spontaneous mutations occurs at very low rate Some genes shows high rate of mutation such genes are called as mutable gene
- Highly mutable sites within a gene are known as hot spots.
- Mutation can occur in any tissue/cell (somatic or germinal) of an organism

Classification of mutation

Based on causes of mutation

1. Spontaneous mutation- Spontaneous mutation occurs naturally without any cause. The rate of spontaneous mutation is very slow eg- Methylation followed by deamination of cytosine. Rate of spontaneous mutation is higher in eukaryotes than prokaryotes. Eg. UV light of sunlight causing mutation in bacteria

2. Induced Mutation- Mutations produced due to treatment with either a chemical or physical agent are called induced mutation . The agents capable of inducing such mutations are known as mutagen. use of induced mutation for crop improvement program is known as mutation breeding. Eg. X- rays causing mutation in cereals

Based on direction of mutation

1. Forward mutation- When mutation occurs from the normal/wild type allele to mutant allele are known as forward mutation
2. Reverse mutation- When mutation occurs in reverse direction that is from mutant allele to the normal/wild type allele are known as reverse mutation

- Chromosome Mutations • May Involve: –Changing the structure of a chromosome –The loss or gain of part of a chromosome

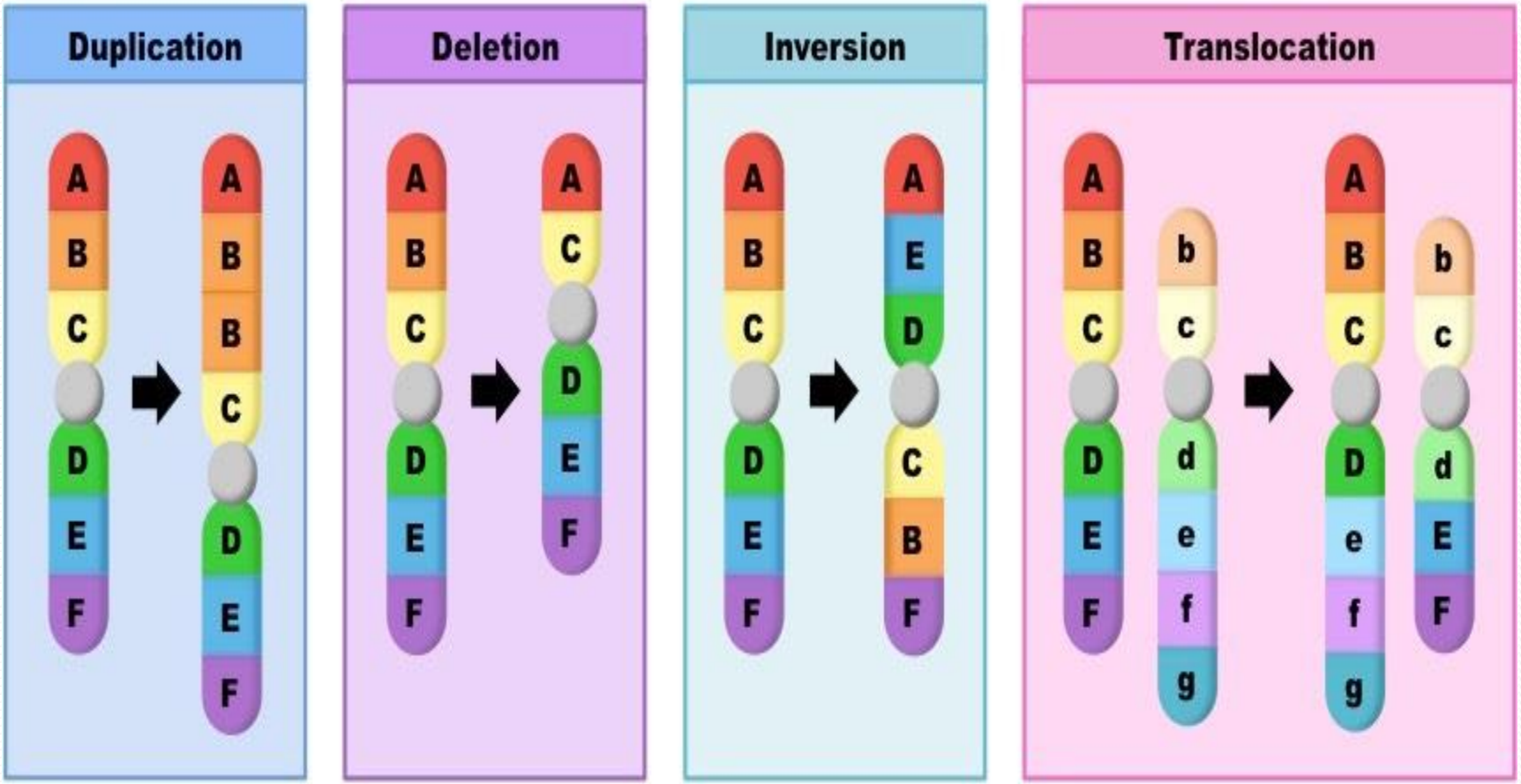
Five types exist: –Deletion –Inversion –Translocation –Nondisjunction –Duplication

Deletion –

- Due to breakage • A piece of a chromosome is lost

Inversion –

• Chromosome segment breaks off • Segment flips around backwards • Segment reattaches


Duplication
A
B
C
D
E
F
A
B
B
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Deletion
A
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Inversion
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Translocation
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E
F

Duplication –

- Occurs when a gene sequence is repeated

Translocation-

- Involves two chromosomes that aren't homologous • Part of one chromosome is transferred to another chromosomes

Nondisjunction –

- Failure of chromosomes to separate during meiosis
- Causes gamete to have too many or too few chromosomes
- Disorders: – Down Syndrome – three 21st chromosomes – Turner Syndrome – single X chromosome – Klinefelter's Syndrome – XXY chromosomes

Types of Gene Mutations

- Point Mutations
- Substitutions
- Insertions
- Deletions
- Frameshift

Point Mutation -

- Change of a single nucleotide
- Includes the deletion, insertion, or substitution of ONE nucleotide in a gene

Frame shift Mutation –

- Inserting or deleting one or more nucleotides • Changes the “reading frame” like changing a sentence
- Proteins built incorrectly

Thank you

reference Book Genetics By B. D. Singh (Kalyani Publications)