

8.7 Mutations

KEY CONCEPT

Mutations are changes in DNA that may or may not affect phenotype.

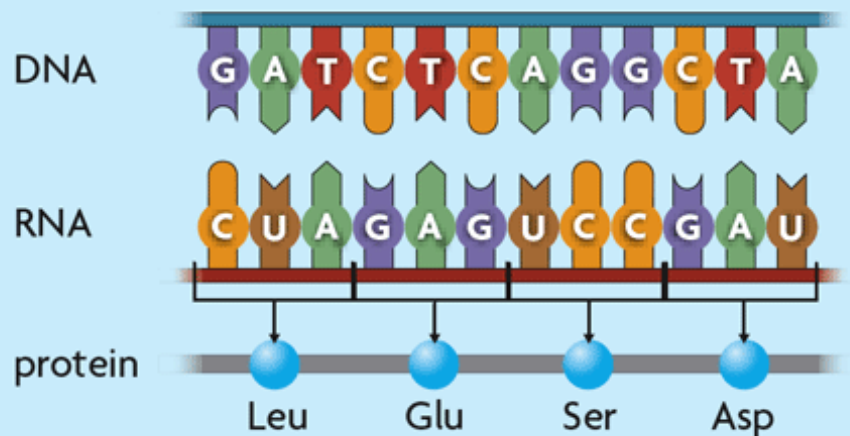


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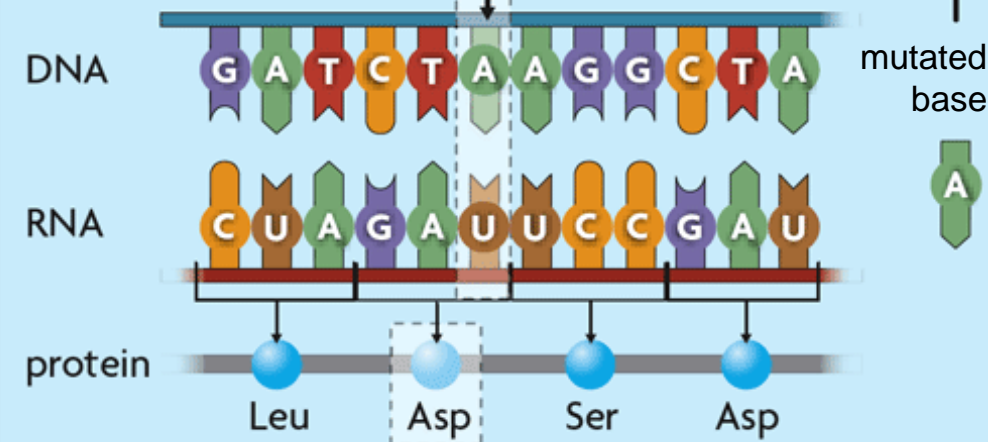
- ▶ **Some mutations affect a single gene, while others affect an entire chromosome.**
 - A mutation is a change in an organism's DNA.
 - Many kinds of mutations can occur, especially during replication.
 - A point mutation substitutes one nucleotide for another.

A **mutation** is a change in an organism's DNA.

Normal

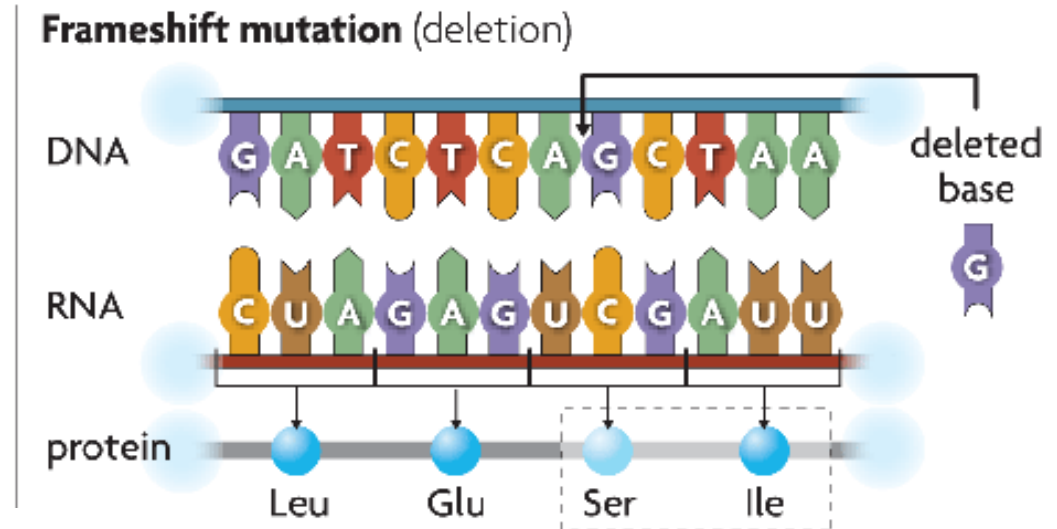
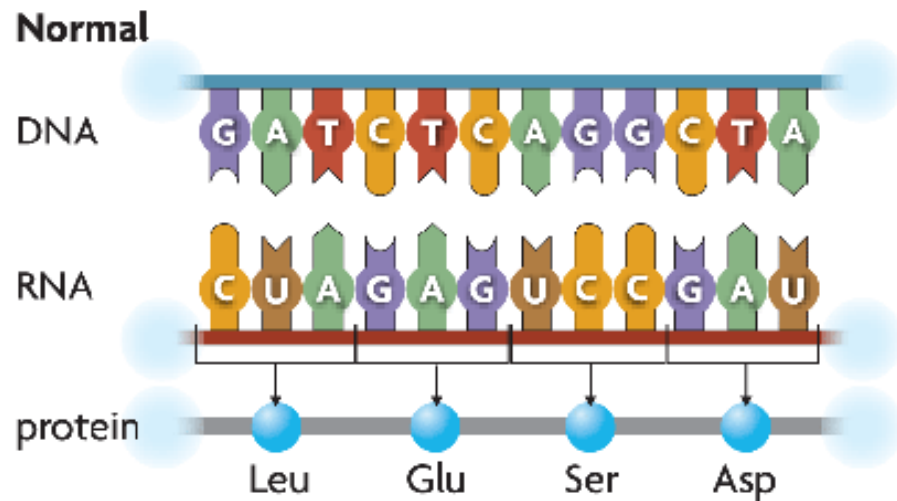


Point mutation



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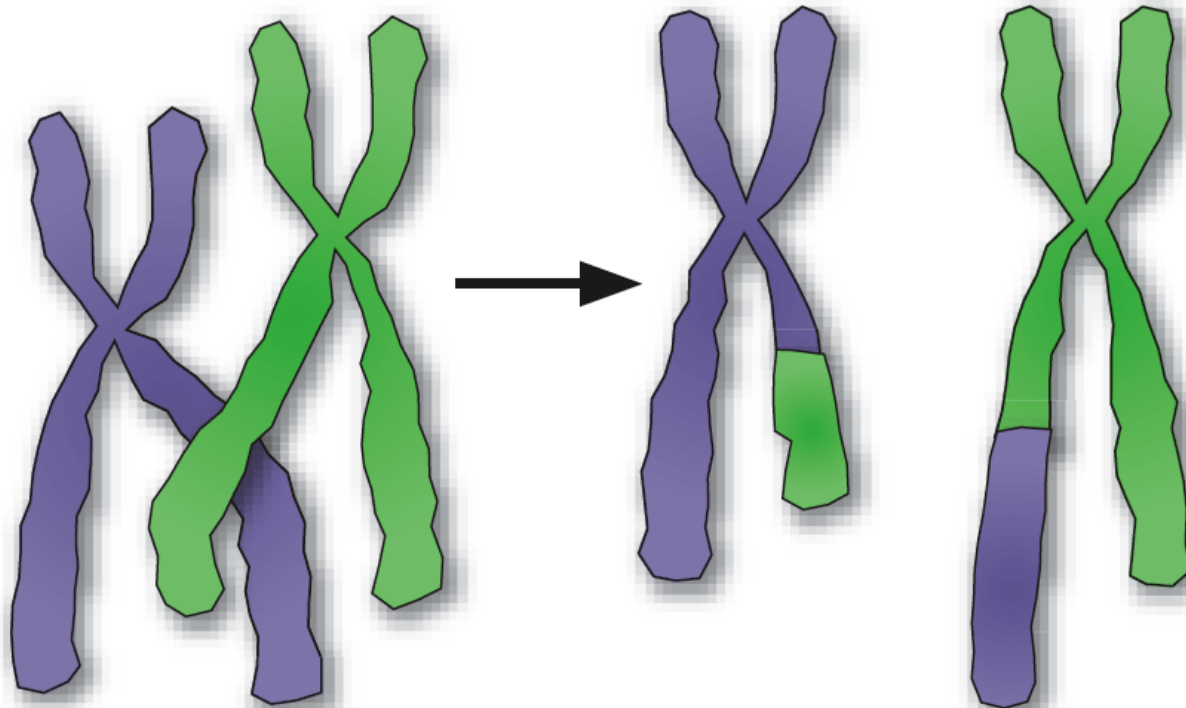
- Many kinds of mutations can occur, especially during replication.
 - A frameshift mutation inserts or deletes a nucleotide in the DNA sequence.



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- Chromosomal mutations affect many genes.
- Chromosomal mutations may occur during crossing over
 - Chromosomal mutations affect many genes.
 - Gene duplication results from unequal crossing over.

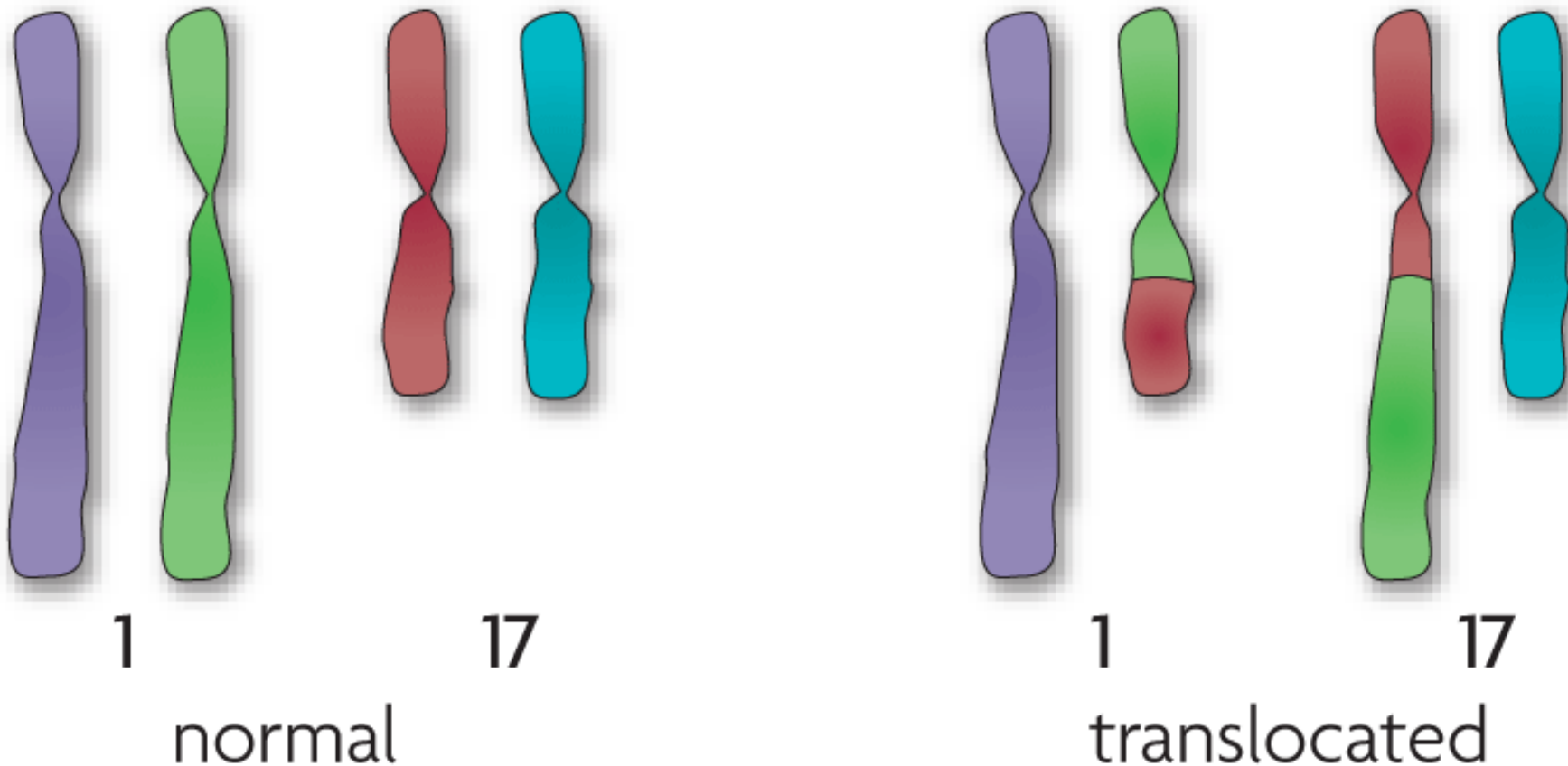
Gene duplication



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- Translocation results from the exchange of DNA segments between nonhomologous chromosomes.

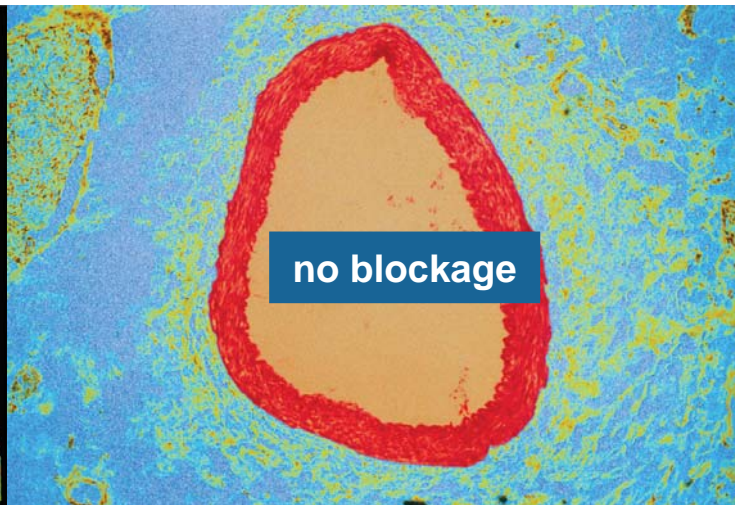
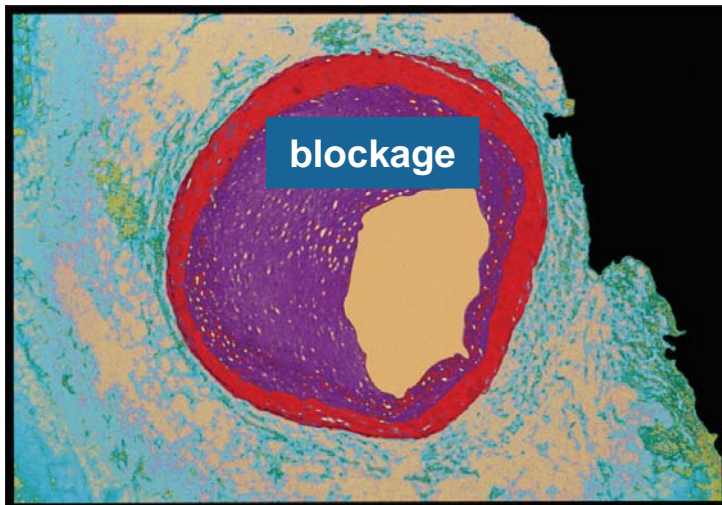
Gene translocation



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▶ Mutations may or may not affect phenotype.

- Chromosomal mutations tend to have a big effect.
- Some gene mutations change phenotype.
 - A mutation may cause a premature stop codon.
 - A mutation may change protein shape or the active site.
 - A mutation may change gene regulation.



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- Some gene mutations do not affect phenotype.
 - A mutation may be silent.
 - A mutation may occur in a noncoding region.
 - A mutation may not affect protein folding or the active site.

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- Mutations in body cells do not affect offspring.
- Mutations in sex cells can be harmful or beneficial to offspring.
- Natural selection often removes mutant alleles from a population when they are less adaptive.

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▶ Mutations can be caused by several factors.

- Replication errors can cause mutations.
- Mutagens, such as UV ray and chemicals, can cause mutations.
- Some cancer drugs use mutagenic properties to kill cancer cells.

