These notes are posted on my site for the following reasons:

- **for students to copy in their own hand-writing**
  - **in order to complete their class notes**
  - **if student did not have enough time in class**
  - **if student was away and missed this section**
- **for assistants and tutors to follow progress of the concepts taught**

Photocopied/printed notes can not be used during the Unit Notebook Check in class.

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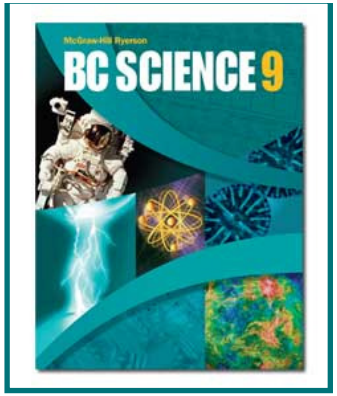


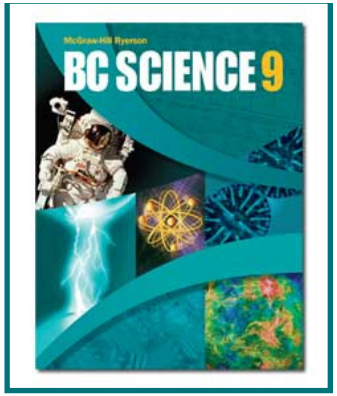
4.2 Mutation

- Gene mutations may produce proteins that are beneficial or harmful to the organism, or may have no effect at all.
- A gene mutation involves a change in the order of bases (A,C,T,G) that make up the gene. There are several types of gene mutation:
  - Deletion (base missing)
  - Addition (extra base added)
  - Substitution (one base substituted for another)
- Example: a particular mutated gene produces white coat Kermode bears - they occur as only a small percentage of the population (they are normally black in colour).

GNU License Photo

See pages 136 - 138

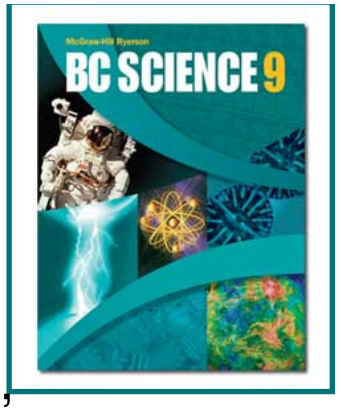
Effects of Mutations



- Positive Mutations
  - When a gene mutation benefits the individual.
  - Example: Some plants have developed resistance to bacterial and fungal infections.
- Negative Mutations
  - When a gene mutation harms the individual
  - Example: Sickle cell genes in affected humans cause blood cells that are abnormally shaped.
- Neutral Mutation
  - When a gene mutation has no effect on the individual
  - Example: The white Kermode bear

See pages 139 - 140

Mutagens & Mutation Repair



- Mutagens are substances or factors that cause mutations
- Environmental mutagens such as mercury, cigarette smoke,
- X-ray and UV radiation, and certain viruses can cause mutations
- Correcting mutations is difficult, but new techniques such as **gene therapy** offer hope.
- Gene therapy is complicated and experimental:
  - A virus in engineered to carry a normal gene
  - The virus must somehow be targeted to the cells with the defective gene
  - The normal gene must then replace the defective gene
  - The normal gene must then be “switched on” so that the replacement normal gene produces the proper healthy proteins. It is also important that the normal gene make the correct amount of healthy protein.

Take the Section 4.2 Quiz

See pages 141 - 143