Chapter 13-3
p372-376
“Mutations”

Objectives

- Describe **point mutations** and **frameshift mutations**.
- Compare and contrast **gene mutations** with **chromosome mutations**.

Gene Mutations

- A change in the DNA sequence that takes place on a single gene.
  - **point mutation**: _____*, the rest of the nucleotides are unaffected*
  - includes _____
    - **substitution**: a single nucleotide is _____ _____
      - usually not as severe, if the _____ in a codon is changed, it often does not affect which amino acid is coded for

Gene Mutations

- **insertion/deletion:** a nucleotide is either inserted or deleted from the sequence
- these mutations are called **_____**:
  - the insertion/deletion _____ one place, which results in massive changes to the code
  - much more severe mutation!

Chromosome Mutations

- Result when the number, or the structure of chromosomes changes (usually during crossing-over in meiosis I)
  - **deletions**: a portion of a chromosome is _____
  - **duplication:** a portion of the chromosome is _____
  - **inversion**: a portion of the chromosome is _____
  - **translocation**: genes are _____ non-homologous chromosomes

- Severity of mutation depends on whether or not the genes are still intact!
  - deletions, if the gene's other allele is present, not too major
  - duplication, effect varies depending on how often the gene is used
  - inversion: same as duplication, possibly severe effect
  - transloacation: usually not a major problem, as the gene is still intact and present

Causes of mutations

- **mutagen**: _____
  - chemical mutagens include: plant toxins, tobacco, environmental pollutants
  - physical mutations include: UV radiation, x-rays, etc

Effects of Mutations

- harmful mutations: cause major changes in a protein's structure, which keep it from doing it's job
  - ex: _____
  - ex: arthrogryposis

- Helpful mutations: give rise to a _____ that is usable in some way by the organism
  - ex: evolving _____ or antibiotics
  - human mutations have led to _____ _____
  - polyploid fruits: have more than two sets of chromosomes