

# MUTATIONS

Changes in genetic material

# Point Mutations

- Result from a change in only one base pair
- Types:
  - Substitution
    - Missense
    - Nonsense
    - Silent
  - Insertions/Deletions
    - Frameshift mutations

# Substitution Mutations

- A base pair is replaced with another pair of nucleotides
- Does not necessarily change the amino acid; therefore, doesn't change the protein (silent mutation)
  - UUU & UUC both code for PHE
- Could change the amino acid, but not the protein (missense)
  - Ex. The fat kat ate the wee rat.

- Could change an amino acid codon to a stop codon, which would terminate translation and the incorrect protein will be made (nonsense); proteins are non-functional.
  - Ex. The fat cat.

# Insertions/Deletions

- Addition/loss of nucleotides in a gene
- Causes harmful effects on the protein
- Results in frameshift mutations—grouping of codons is altered and therefore changes the amino acid sequence.
- Protein is usually non-functional
  - Ex. Thf atc ata tet hew eer at
  - Ex. The fat cat xlw ate the wee rat.
  - Ex. The fat ate the wee rat.

# Mutagens

- Spontaneous mutations are caused by errors in DNA replication or repair
- Mutagen—physical or chemical factor that causes mutations
  - X-rays (*Drosophila*)
  - UV radiation
  - Environmental factors