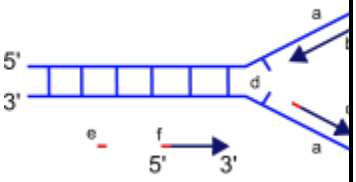
DNA Replication Cornell Notes

Chapter 12 & 13

Main Ideas	Details
Summary	■ **James Watson and Francis Crick** – Called the Fathers of DNA determined the structure of DNA molecules. o In 1953 they used Rosalind Franklin's DNA x-ray pictures to determine structure of DNA. X-ray showed a wide, tightly coiled molecule with a helix shape. ■ Shape – **double helix with 2 strands** o "**Backbone**" made of phosphate groups and 5 carbon sugar deoxyribose o "**Rungs**" made of nitrogen bases (A,T,G,C) ■ **Chromosomes** contain DNA o Found in nucleus of eukaryotic cells prokaryotes have no nucleus DNA is in middle of cell ■ Eukaryotes contain DNA packed with chromatin o **Chromatin** consists of DNA that is coiled around proteins called **histones** o DNA and histone molecules form beadlike structures called a **nucleosome** o **Nucleosomes** help fold enormous lengths of DNA ■ **Nucleotide** monomer of nucleic acids consists of: o 5-carbon sugar – deoxyribose o Phosphate group o One of 4 nitrogen bases o Adenine o Thymine o Guanine o Cytosine



A template strand
B leading strand
C lagging strand
D replication fork
E RNA primer
F Okazaki fragment

- Base pair rule – Chargaff's rule
  - **Adenine** always pairs with **thymine** with **2** hydrogen bonds .
  - **Guanine** always pairs with **cytosine** with **3** hydrogen bonds.
  - Thymine and Cytosine are **pyramidines.**
  - Adenine and Guanine are **purines.**
  - Purine always bonds to pyramidine.

- **DNA Replication** - Process by which DNA is copied
- Steps (initiate-elongate-terminate)
  1. DNA double helix unwinds.
  2. The helix unzips when enzymes called **helicases** break hydrogen bonds between bases, separating the 2 strands creating replication fork.
  3. Each parent strand of DNA serves as a template for each new strand.
  4. New strands are assembled from free nucleotides 5' to 3' on the anti-parallel strands.
  5. **DNA polymerase** matches the bases on parent strand creating new double helixes.

Replication process is said to be **semi conservative** – two new strands are made, two template strands are conserved.

This process is initiated at particular points in the DNA, known as **origins**.

The **leading strand** is the template strand so that the replication fork moves along it in the 3' to 5' direction. This allows the newly synthesized strand complementary to the original strand to be synthesized 5' to 3' in the same direction as the movement of the replication fork.

Summary

Summary	The **lagging strand** is the strand of the template that is oriented so that the replication fork moves along it in a 5' to 3' manner. Replication of the lagging strand is more complicated than that of the leading strand. **Okazaki fragments** are short, newly synthesized DNA fragments that are formed on the lagging template strand during DNA replication. **Ligase** is the enzyme that "glue" fragments back together. Sequence of nitrogen bases determines **proteins** eventually made by cell and therefore the **trait**s an organism will express.

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