

DNA Replication

Watson and Crick: Noted that a specific base pairing suggested a possible copying mechanism for genetic material.

* DNA Replication is when a parent molecule unwinds and two new daughter strands are built based on base-pairing rules

Semiconservative model: Double helix replicates and each daughter molecule will have one old strand (derived from the parent molecule) and one newly made strand

Vocabulary on the different parts of DNA Replication

Origins of replication: Replication starts here. This is where the two DNA strands are separated, opening up this replication “bubble”

-Replication proceeds in both directions from each origin until the entire molecule is copied

IMPORTANT- Prokaryotic chromosome: has one origin of replication

Eukaryotic chromosome: hundreds or even thousands origin of replication

Replication fork: This is at the end of the replication “bubble.” It is a U-shaped region where new DNA strands are elongating

Helicases: enzymes/ unwinds the parental double helix at the replication fork

Single-strand binding proteins: molecules of single-strand binding proteins stabilize single-stranded DNA (unwound template strands)

Topoisomerase: corrects overwinding ahead of replication forks. It does this by breaking, swiveling, and rejoining DNA strands.

Primer: Initial nucleotide strand is a short RNA primer

Primase: enzyme/ can start a RNA chain from scratch and adds RNA nucleotides one at a time using the parental DNA as a template

DNA polymerases: enzyme/ catalyze the elongation of new DNA at a replication fork/ proofread newly made DNA, replacing any incorrect nucleotides

*repair enzymes correct errors in base pairing

* DNA can be damaged by exposure to harmful chemicals or physical agents such as cigarette smoke and X-rays

Nucleotide excision repair:

1. A thymine dimer distorts the DNA molecule
2. A nuclear enzyme cuts the damaged DNA strand at two points so that the damaged section can be removed
3. To fill in the missing nucleotides= repair synthesis by a DNA polymerase
4. DNA ligaments seals the free end of the new DNA to the old DNA.
The strand is complete

