## DNA REPLICATION

Monday, March 3, 2025 8:08 PM



Starting point (From Template to Unzipping):

- 1. Parent DNA template- the beginning of replication is marked with a 3' or 5' at the start.
- 2. DNA unwinding region- referring to the moment where the DNA unwinds
- 3. Replication fork- the 2 Y shapes at either end of the DNA unwinding region. Replication occurs here.

Enzymes:

- 4. DNA Gyrase- type of Topoisomerase. Present to prevent super coiling caused by unzipping parent DNA before the replication fork.
- 5. Helicase- the "unzipping" enzyme (unwinds double helix of parent DNA) does this by breaking H bonds between bases.
- 6. SSBPs- these stabilize the newly unwound strands.
- 7. DNA primase- these synthesize RNA primers to start DNA synthesis.
- 8. DNA Polymerase III Synthesizes the new DNA strands.
- 9. DNA Ligase- Seals the weirdness between Okazaki fragments on the lagging strand
- 10. Sliding Clamp- Holds DNA polymerase in place for processive synthesis.
- 11. Clamp Holder(Loader)- Loads the sliding clamp onto DNA.

Strands (Started and continuation):

- 12. Leading Strand (5'  $\rightarrow$  3')- Synthesized continuously toward the replication fork.
- 13. Lagging Strand (5'  $\rightarrow$  3')- Synthesized discontinuously in Okazaki fragments, away from the fork.
- 14. Okazaki Fragments- The short DNA fragments that are formed on the lagging strand.

15. RNA Primers- Placed by the primase to begin the synthesis of both strands. Additional:

- 16. 2 direction Replication- Replication proceeds in both directions from the origin.
- 17. DNA Polymerase (proofreading)-corrects the errors that can occur during replication
- 18. Template Strand Orientation:
  - $\circ~$  Leading strand template: 3' to 5'.

- $\circ~$  Lagging strand template: 5' to 3'.
- 19. Replication Termination (optional): Where replication ends
- 20. Histone proteins- they help package DNA that help wind DNA
- 21. There are opposite orientations of 5 to 3 and 3 to 5.