DNA Replication

-happens in SPhase	- proceeds bidirectional
-copying a DNA molecule	
-semiconservative	
-DNA unwinds and unzips 2 strands	
- Daughter DNA *parent strand and newly synthesize*	
-unzip = supercoiling	

SUPERCOILING

DNA Gyrase	-enzyme topoimerase -creates a nick to relief torsional strain and release
Helicase	-Destabilizing protein -promotes unwinding by binding to RF
SSB	-stabilize single stranded regions

DNA POLYMERASE

-polymerization at 5' to 3'	|add in 3' end
-requires template to copy	|complementary strand
Types of dNTPs	
dATP, dGTP, dCTP, dTTP	
Primer	
Organisms	RNA, DNA in some organisms
Viruses	Protein
DNTP - deoxynucleotide triphosphate adenine (dATP), cytosine (dCTP), guanine (dGTP), and thymine (dTTP)	

DNA POLYMERASE

-polymerization at 5' to 3'	|add in 3' end
-requires template to copy	|complementary strand
Types of 4dNTPs	
dATP, dGTP, dCTP, dTTP	
Primer	
Organism	RNA , but DNA in some organism
Virus	Protein
DNTP - deoxynucleotide triphosphate adenine (dATP), cytosine (dCTP), guanine (dGTP), and thymine (dTTP)	

Models of DNA Replication

SemiConse-rvative	Conservative	Dispersive
-parent & new synthesis	-both original and new strands	-mosai-c/hybrid
-unwind each other	-rebase pair	

Theta Replicaion

-present in bacteria (prokaryotic)	- circular form

LAGGING AND LEADING STRAND

Lagging Strand	Leading Strand
-3' to 5'	-5' to 3'
-discontinuous	-continuous
-okazaki fragments	-no short fragments
-each fragments requires its own set of primers	- requires only one primer
-requires DNA ligase	-no DNA ligase

LAGGING AND LEADING STRAND (cont)

-grows away from RF	-grows in direction of RF
-synthesis of new strands SLOW	-synthesis of new strands FAST
RF - Replication Fork	

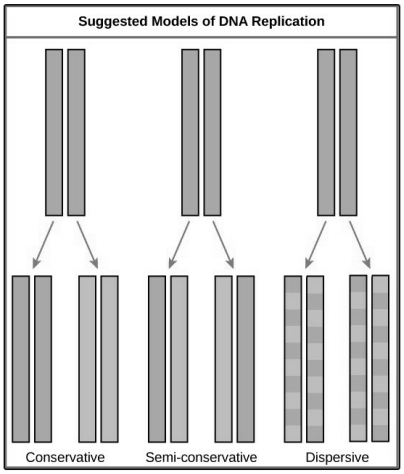
REPLICATION ORIGINS

-unique DNA segments	contains multimeric origin-binding protein
-ATrich stretch	less energy to melt A-T bp due to Hbonds

PROKARYOTIC DNA POLYMERASE

DNA polymerase I	-RNA primer removal, DNA repair
DNA polymerase II	-DNA repair
DNA polymerase III	-Chromosome replication

MODELS OF DNA REPLICATION



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Not published yet.
Last updated 22nd August, 2023.

PROTEINS INVOLVED IN DNA REPLICATION	
Protein	**Activity**
DNA Polymerase	-initiates -add nucleotide at 3' end
DNA Helicase	-unzip/unwind DSDNA -separates DNA strands
SSBS	-stabilizer -preventing bp from reforming before lagging strand is replicated
DNA Topoisomerase	-reseal -unravel twists in DNA -reduce torsional strain & positive supercoil
Sliding Clamp	-keeps DNA polymerase attached to template
Clamp Loader	-lock sliding clamp to DNA (uses ATP hydrolysis)
Primase	-synthesis RNA primers in lagging strand
DNA Ligase	-sealed/connect okazaki

SSBS - Single Strand DNA Binding Protein
DSDNA- Double Strand DNA