

DNA Replication

-happens in SPhase - proceeds bidirectional

-copying a DNA molecule

-semiconservative

-DNA unwinds and unzips 2 strands

- Daughter DNA

parent strand and newly synthesized

-unzip = supercoiling

SUPERCOILING

DNA -enzyme topoisomerase

Gyrase -creates a nick to relieve 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

SemiConservative	Conservative	Dispersive
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-parent & new synthesis	-both original and new strands	-mosaic/hybrid
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-unwind each other	-rebase pair
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Theta Replication

-present in bacteria (prokaryotic)	- circular form
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LAGGING AND LEADING STRAND

Lagging Strand	Leading Strand
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-3' to 5'	-5' to 3'
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-discontinuous	-continuous
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-okazaki fragments	-no short fragments
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-each fragments requires its own set of primers	- requires only one primer
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-requires DNA ligase	-no DNA ligase
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LAGGING AND LEADING STRAND (cont)

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

REPLICATION ORIGINS

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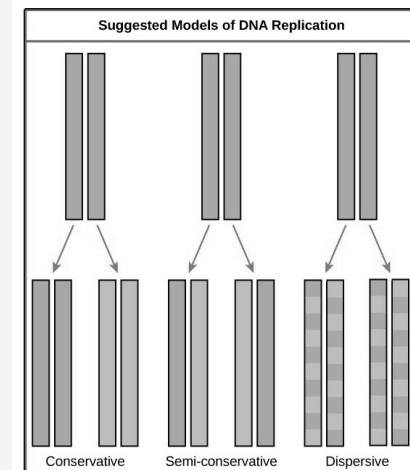
PROKARYOTIC DNA POLYMERASE

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



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	-re-seal -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	

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