

DNA Replication

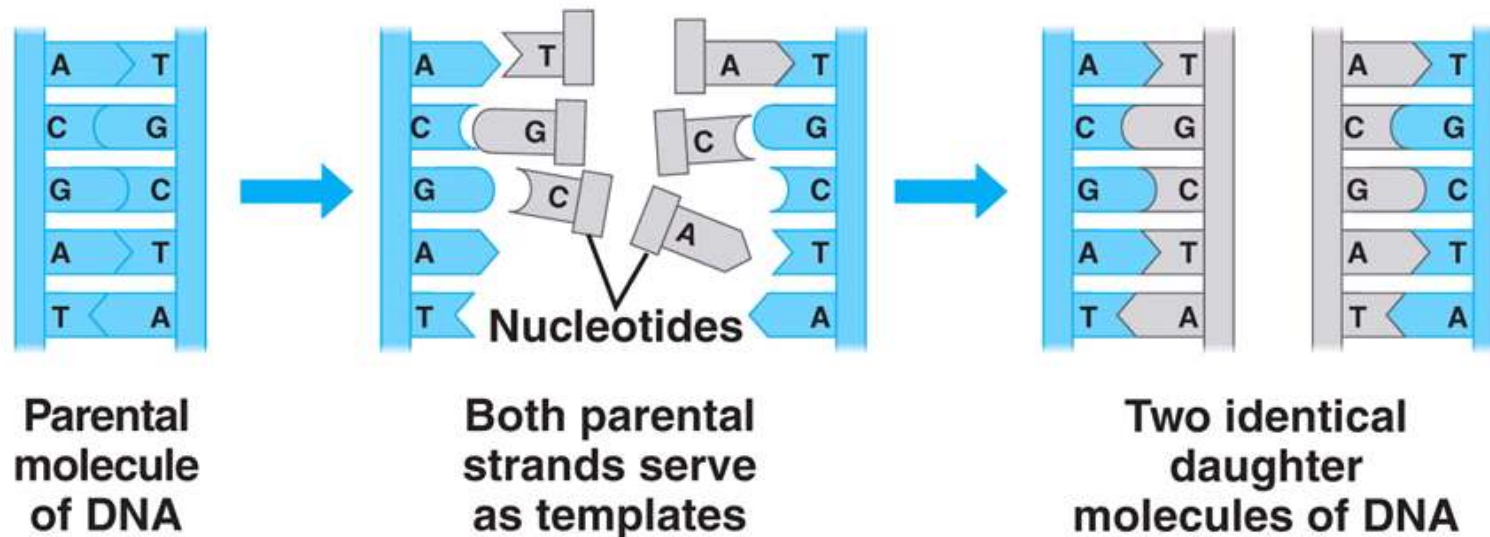
"It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material" -Watson and Crick, 1953



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The structure of DNA provides a built-in template for its replication

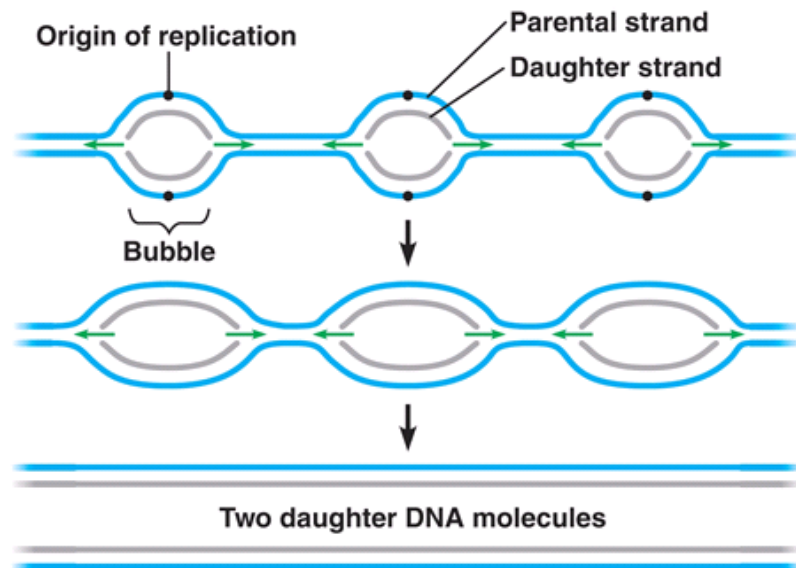
Each original ("parental") strand can be used to create an opposing complementary strand



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Nucleotides are added (using rules for base pairing) to create two new "complementary" daughter strands

Enzymes do the work of replicating DNA



Replication occurs at multiple points simultaneously

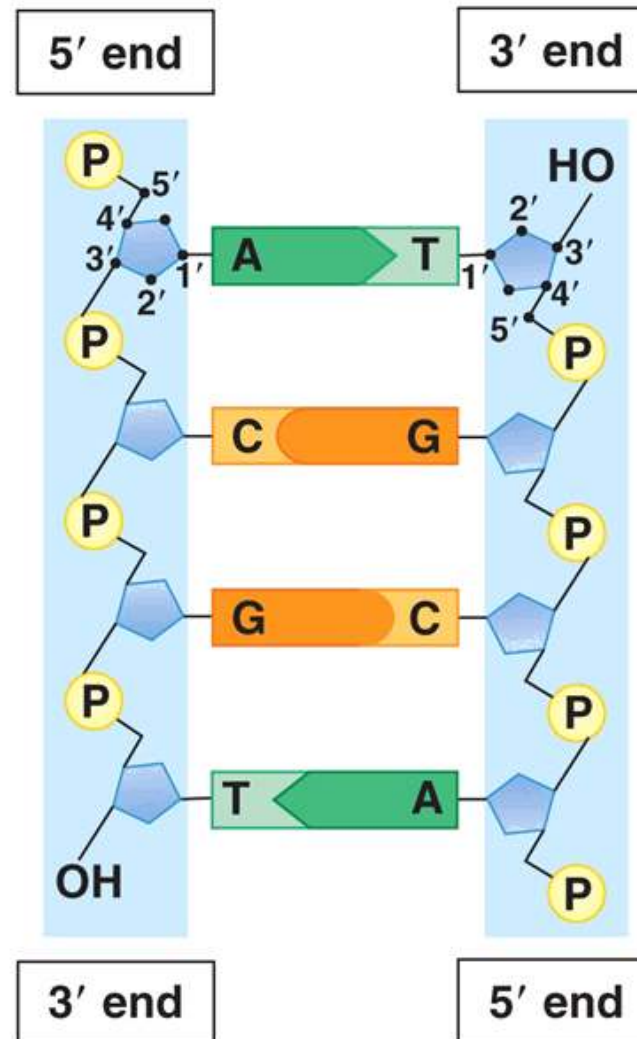
Helicase: unzips DNA double helix to expose base pairs...results in replication bubbles

Polymerase: begins at origins of replication and builds complementary daughter strands by adding nucleotides

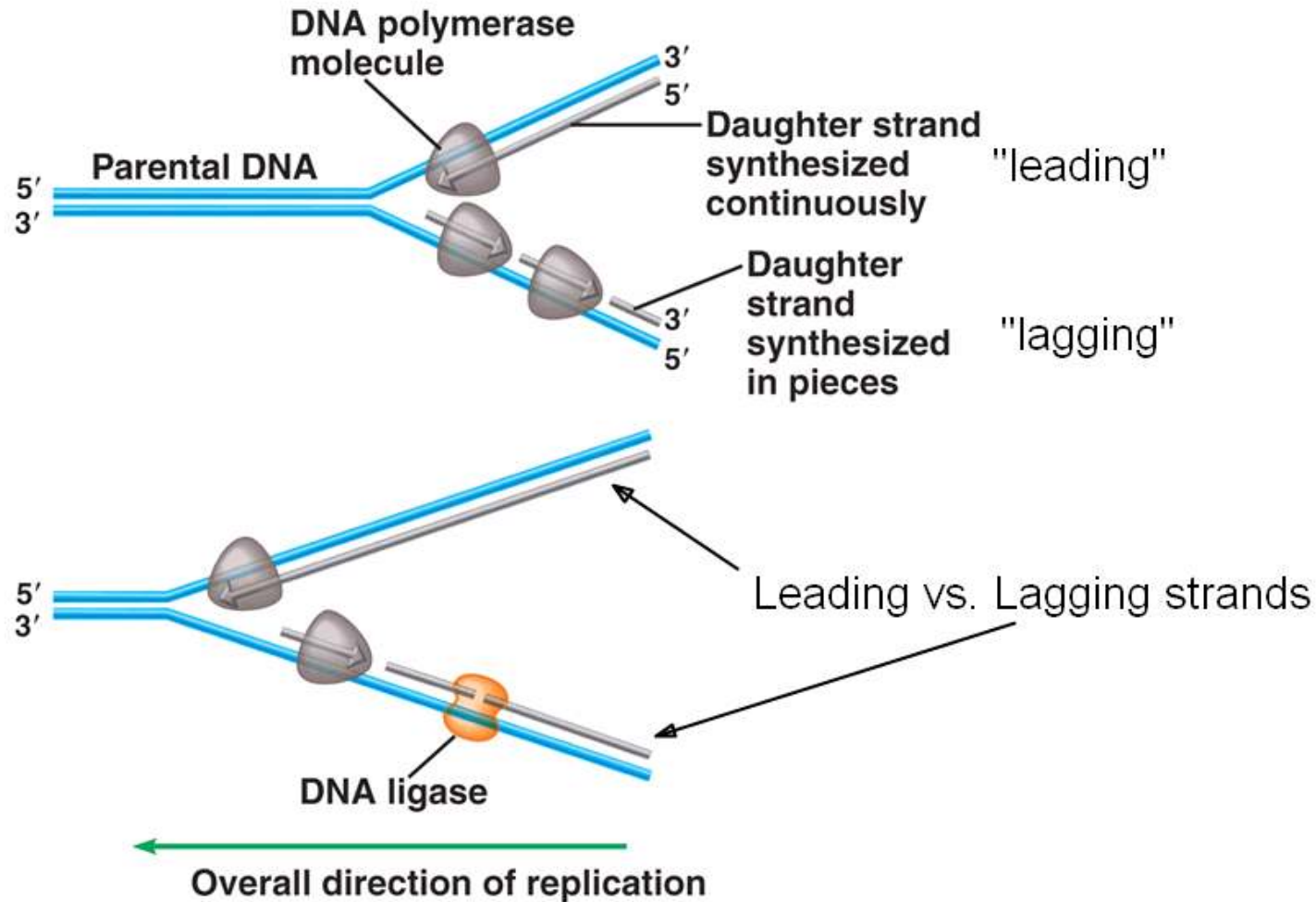
Ligase: "stitches" together daughter fragments of DNA

Functional Groups and the "orientation" of sugar-phosphate backbones

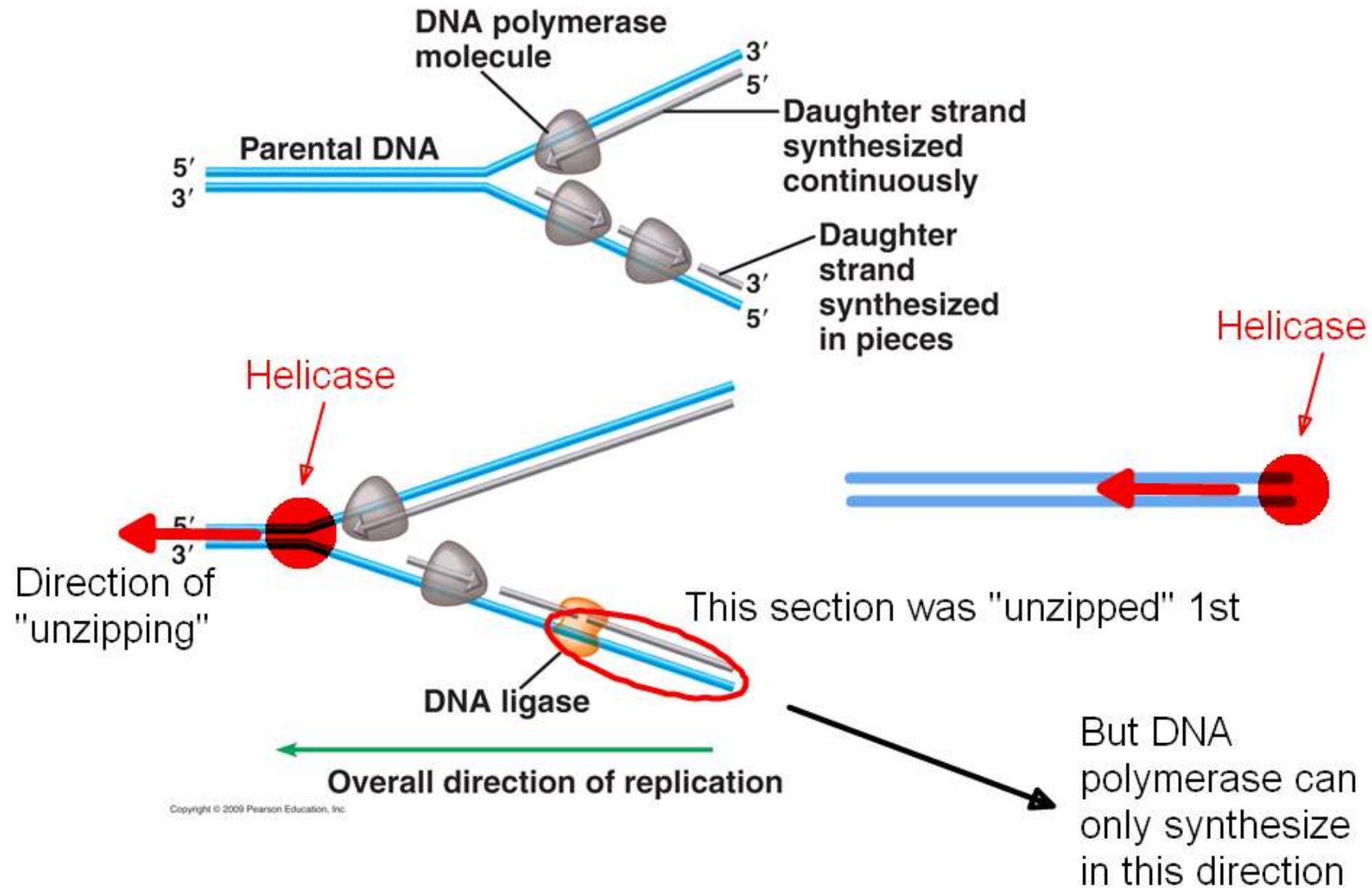
5' and 3' refer to carbon atoms in the sugar molecule of the backbone...function groups are attached to these carbon atoms and are involved with holding the nucleotides together



Replication is one-directional - 5' to 3' direction...DNA polymerase can only add nucleotides to the 3' end of the daughter strands



Why is there a "leading" and "lagging" strand?



A "Genetic Material" Molecule (i.e. DNA) must be able to...

- 1. Replicate (Copy)** → *each half of the molecule can be used as a template*
- 2. Store information** → *sequence of N-bases can vary (length and specific sequence of bases)*

How does the structure of DNA relate to the two important functions?

