

## 6.2 DNA Replication

LEARNING OUTCOMES :

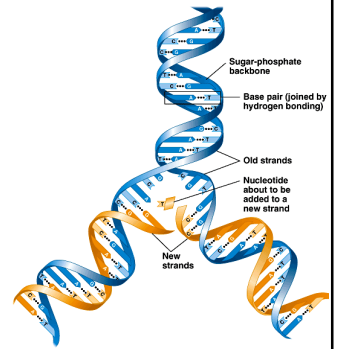
At the end of this topic, students should be able to:

- describe semi-conservative replication of DNA.
- describe DNA replication during cell division.

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## DNA Replication **Semiconservative**

- DNA carry **coded information** in its sequence of bases
- DNA could be precisely copied, a process known as **DNA replication**
- Each strands of DNA molecule could serve as a **template**, for the synthesis of the **new** daughter strands



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## Overview of DNA replication

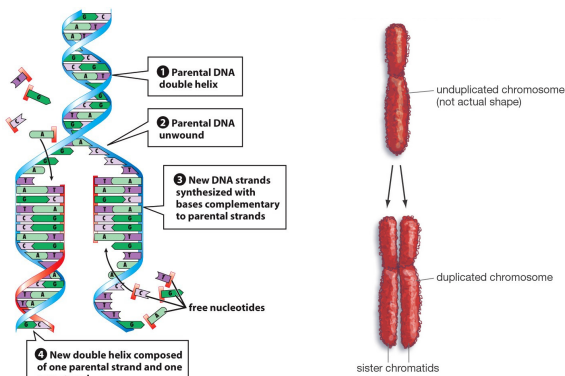
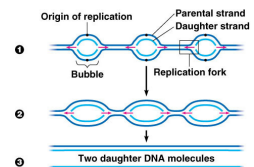
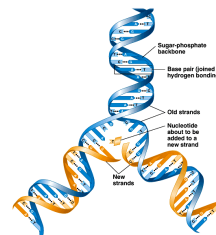


Figure 9-6 Biology: Life on Earth, 8/e  
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## DNA replication

- Replication begins at special sites called **origins of replication**
- In eukaryotic cell, the process is **speeded up** by having **multiple origin** of replication

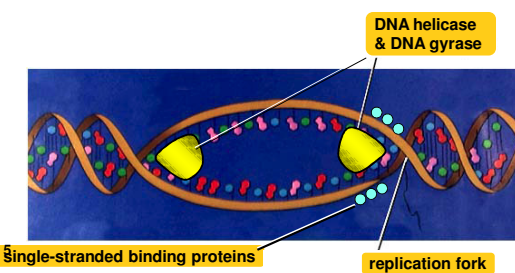


(a) In eukaryotes, DNA replication begins at many sites along the giant DNA molecule of each chromosome.

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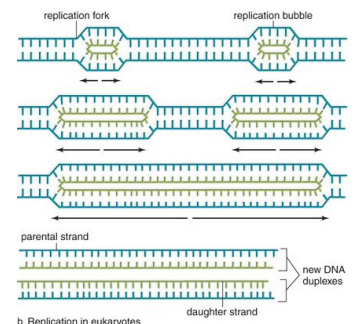
## Unwinding DNA

- DNA helix strands separate by enzymes – **DNA helicase** and **DNA gyrase**
- Each separated strands is bound by - **single-stranded binding proteins**

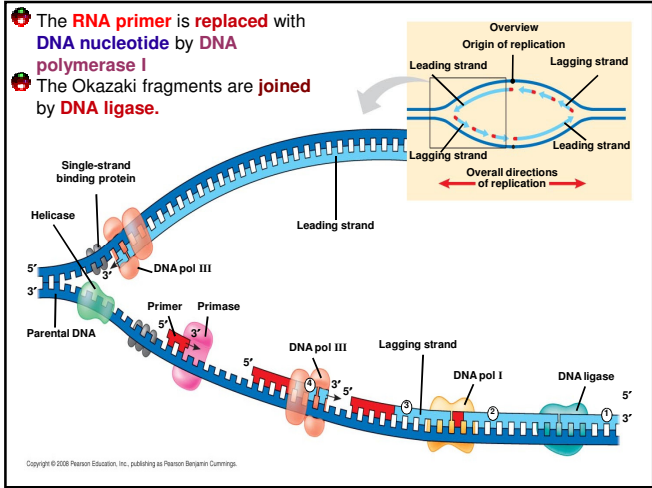
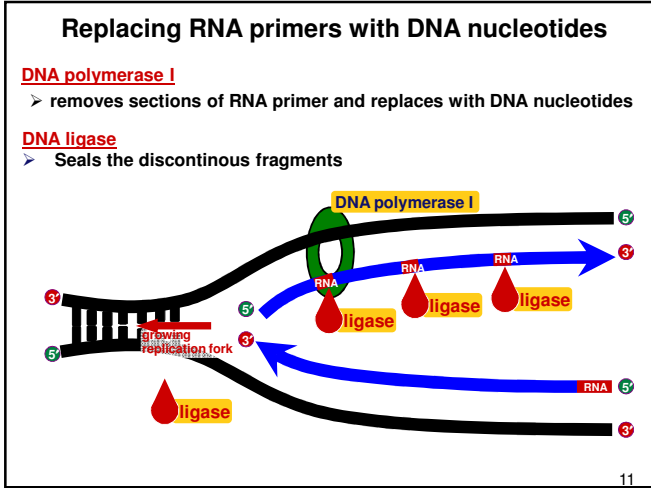
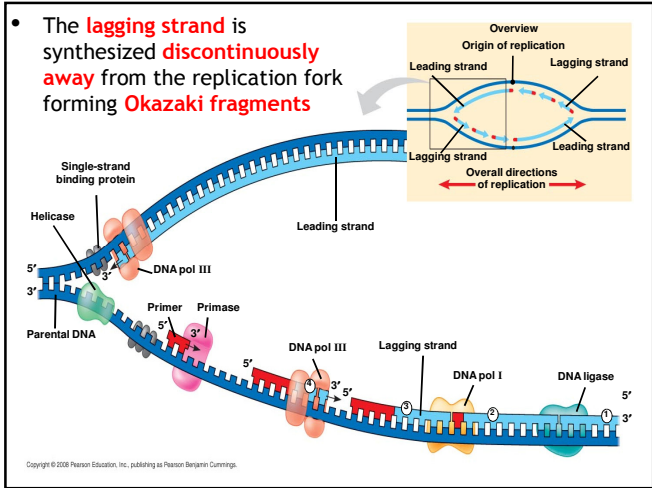
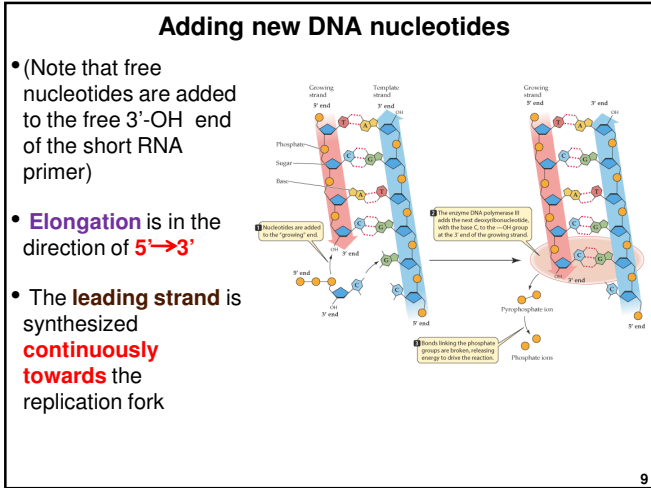
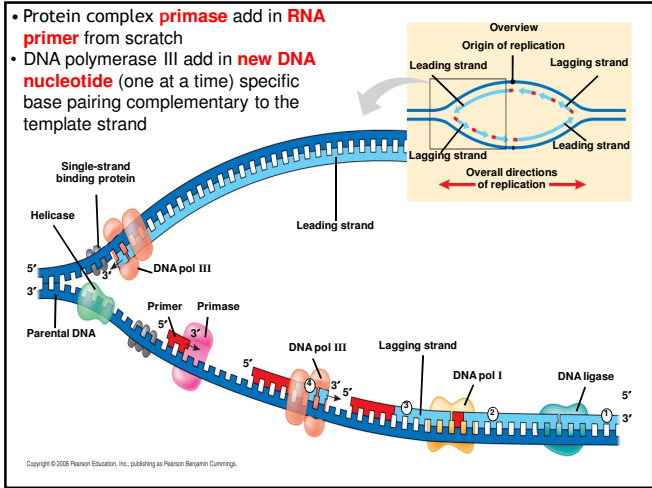
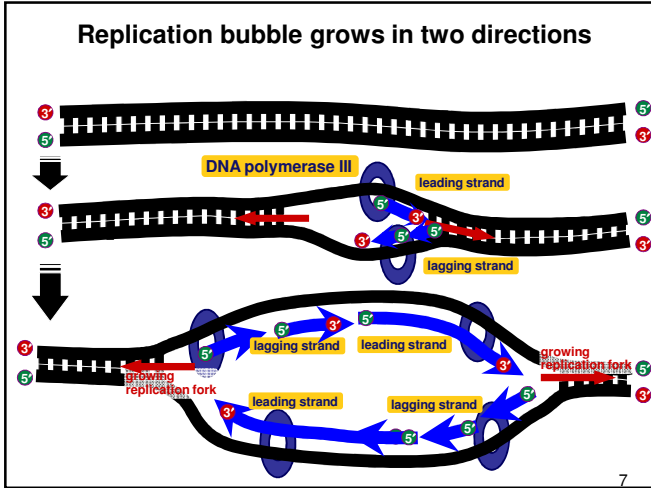


## Copying the DNA

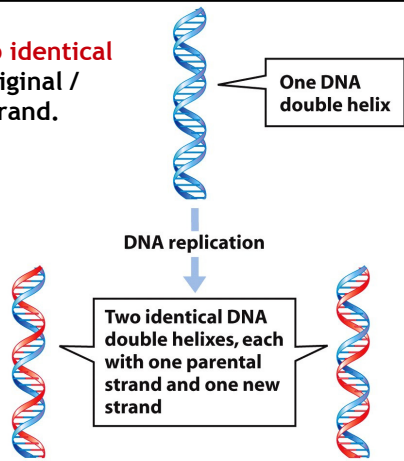
- Each DNA / both parental strand serves a **template**
- There are many points of origins
- The replication bubbles grow in **both directions** until two daughter DNA molecules are formed



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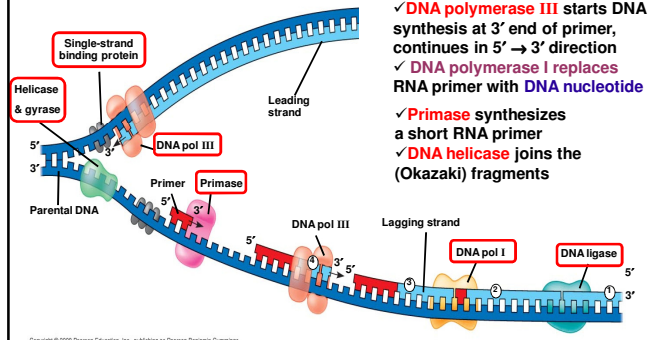


- Resulting in **two identical copies** of the original / **parental DNA strand**.



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### Enzymes and protein involved in DNA replication



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- ✓ **DNA helicase** and **DNA gyrase** separate double helix DNA strands
- ✓ **single stranded binding protein (SSB)** bind to separated DNA strand to while replication occurs
- ✓ **DNA polymerase III** starts DNA synthesis at 3' end of primer, continues in 5' → 3' direction
- ✓ **DNA polymerase I** replaces RNA primer with **DNA nucleotide**
- ✓ **Primase** synthesizes a short RNA primer
- ✓ **DNA helicase** joins the (Okazaki) fragments