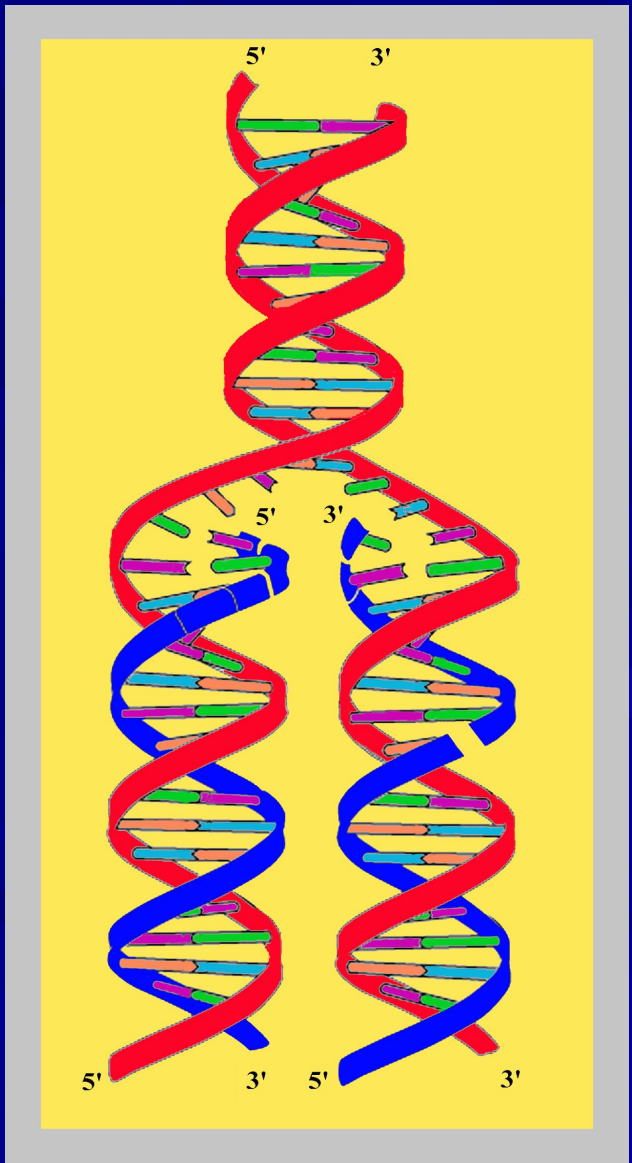
DNA Replication



DNA Replication

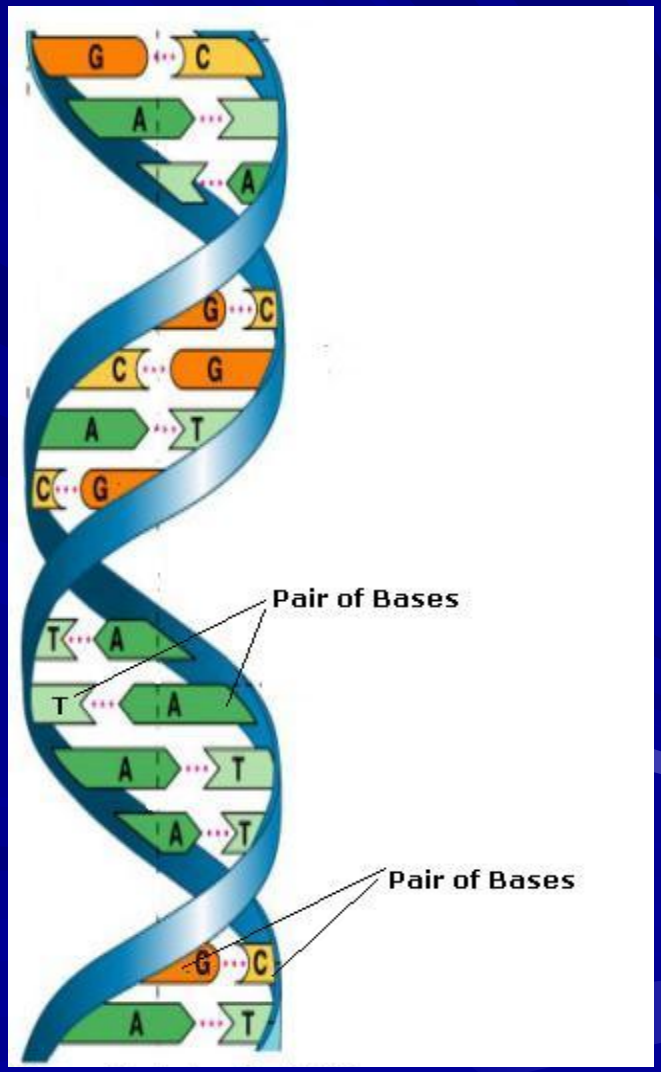
- Replication = The process of making a new copy of DNA
- Occurs within the nucleus during synthesis
- Any mistake in copying = mutation
- DNA mutation = chromosomal mutation

A. Basic Facts of DNA Replication

Complementary base pairing makes replication possible

C - G

A - T



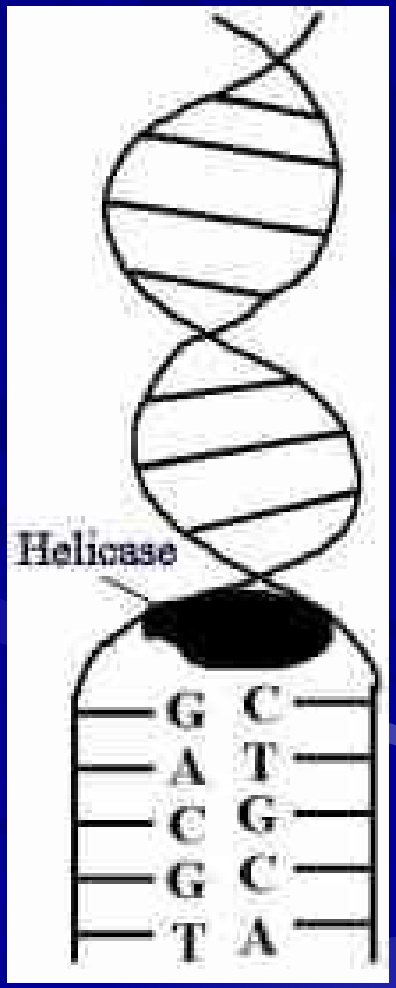
A. Basic Facts of DNA Replication

One side of DNA molecule is a *template* for making the other side (strand)

B. Process of DNA Replication

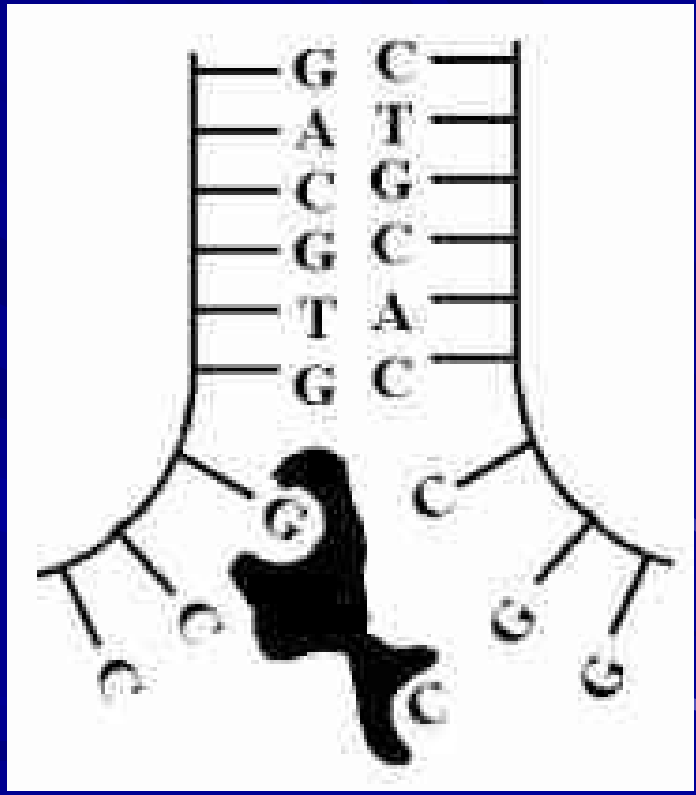
STEP 1:
DNA double Helix unwinds

Enzymes called DNA helicase breaks *weak* Hydrogen Bond between bases



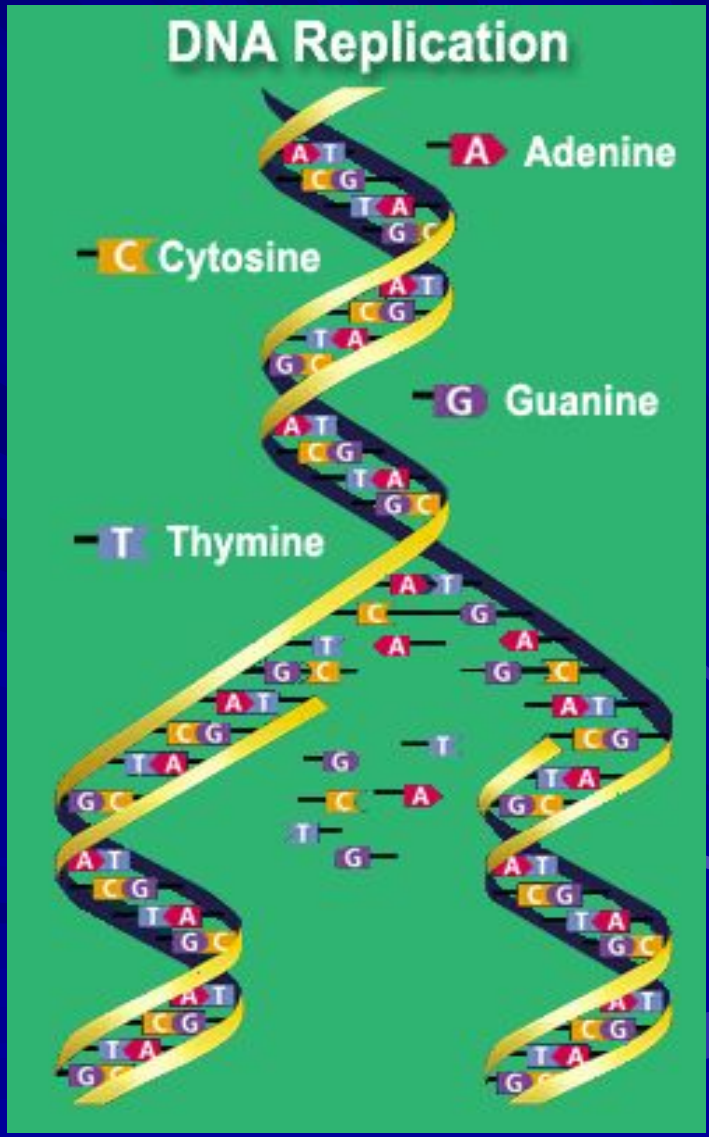
B. Process of DNA Replication

- Additional proteins attach to each strand holding them apart.
- Replication Fork- the area where the double helix separates (Y-shape)

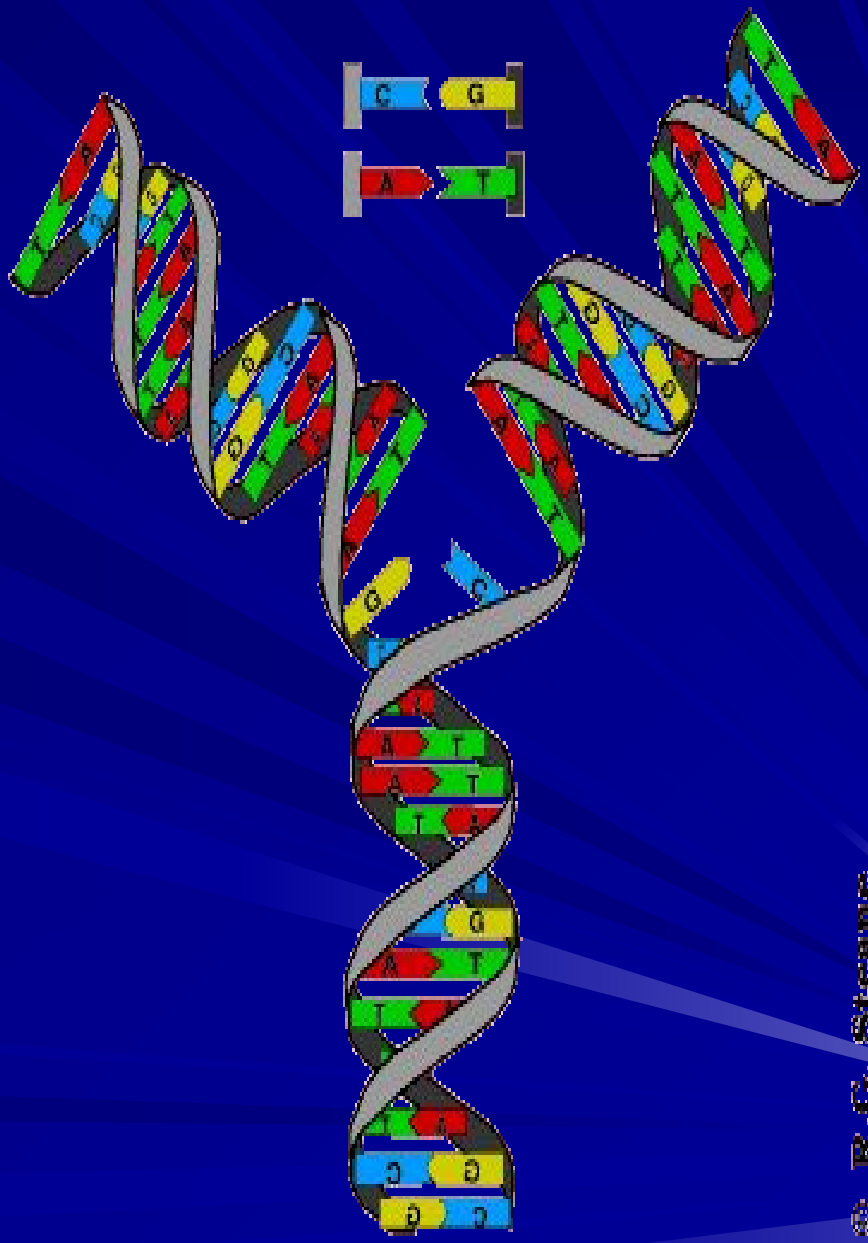


B. Process of DNA Replication

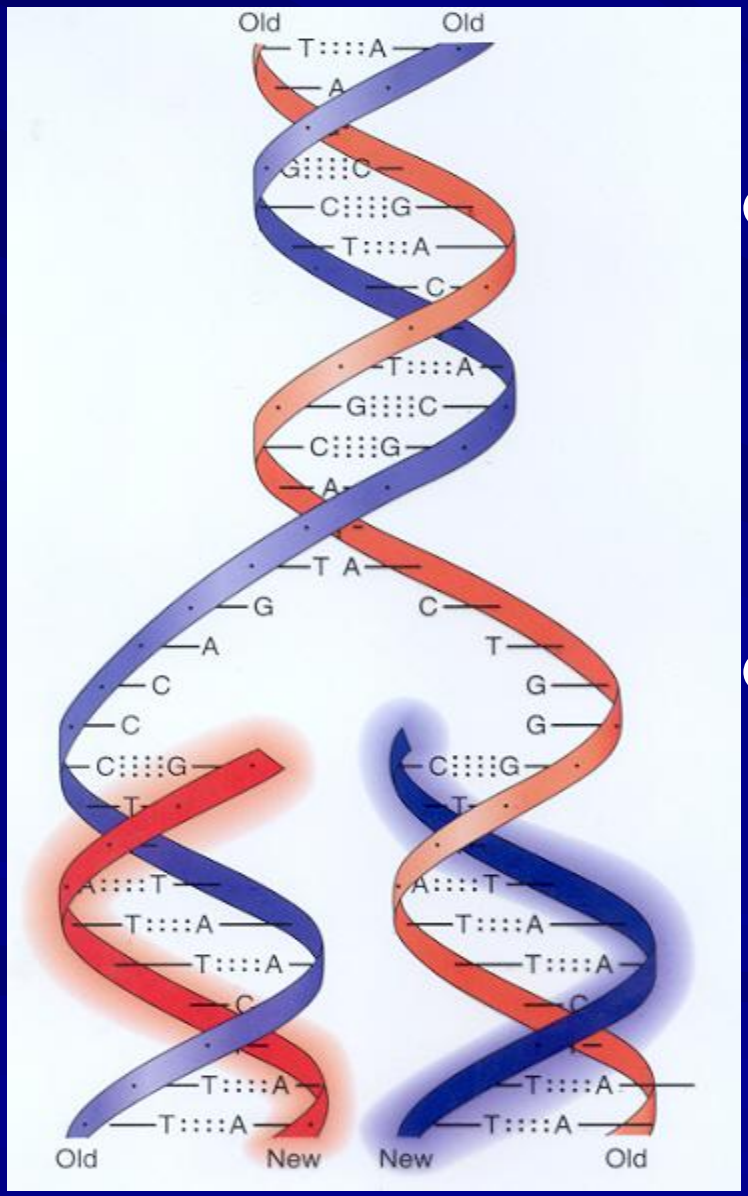
- DNA polymerases move along each of the DNA strands.
- DNA polymerases add nucleotides to the exposed bases
- Forming two new double helixes



- Polymerase will continue until all of the DNA is copied then it will detach



Semi-conservative replication



- Each new DNA molecule contains one old strand & one new strand
- The new DNA molecules are identical to the original DNA molecules

Checking for Errors

- Error can occur where the wrong base is added by the polymerase
- DNA polymerases have a “proofreading”
- The polymerase can backtrack to remove incorrect nucleotides and replace it with the correct one
- Error Rate- one error per one billion nucleotides

Rate of Replication

- Replication does not start at one end of DNA and end at the other
- Prokaryotes- have circular DNA
    - Replication forks begin at opposite ends moving away from each other until they meet on the opposite side.

Bacterial chromosomes have a single point of origin.

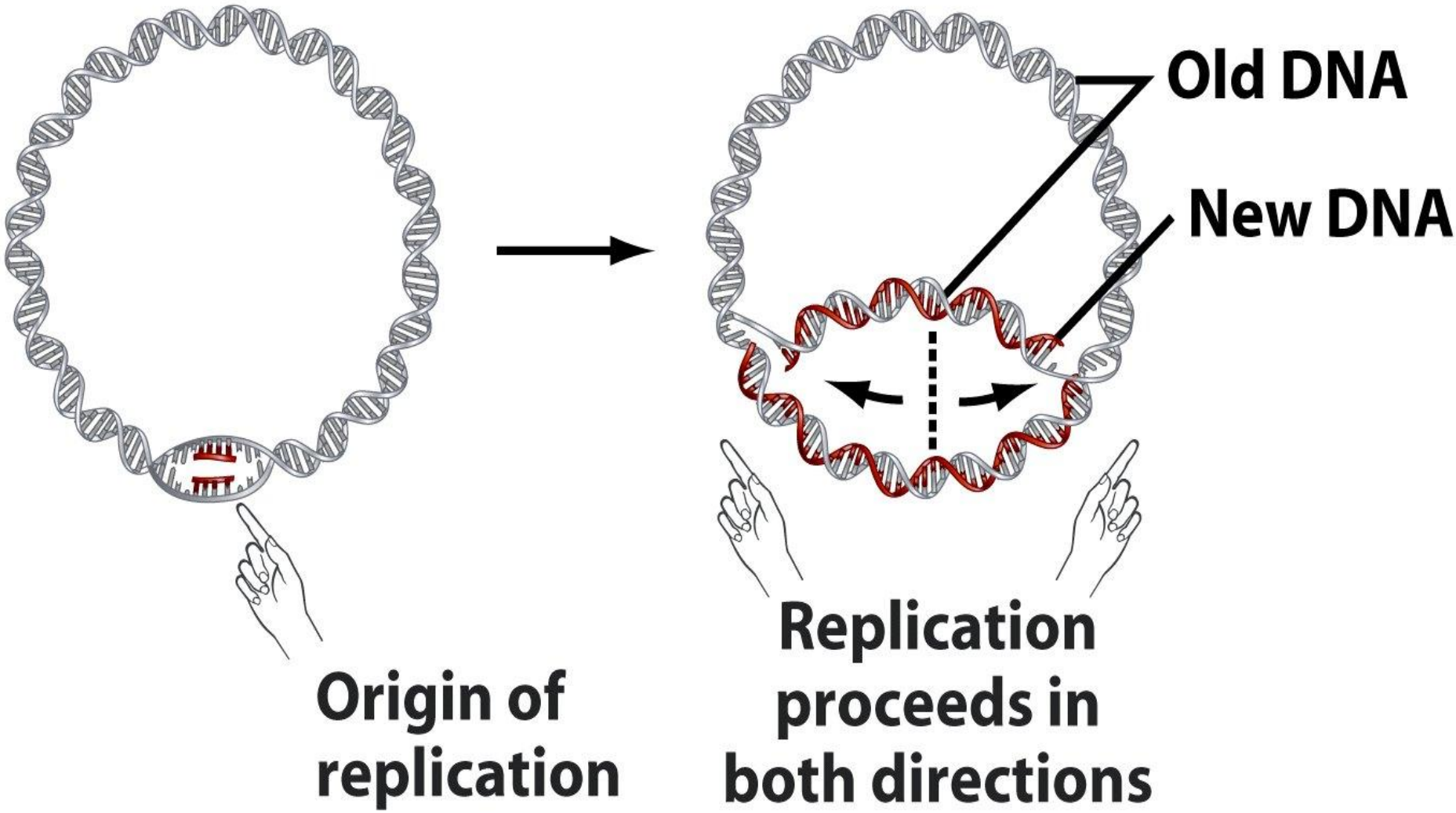
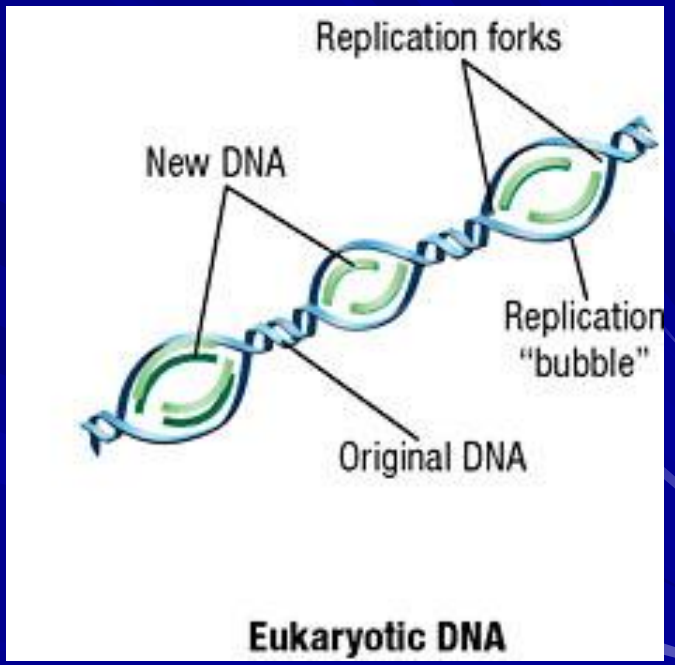
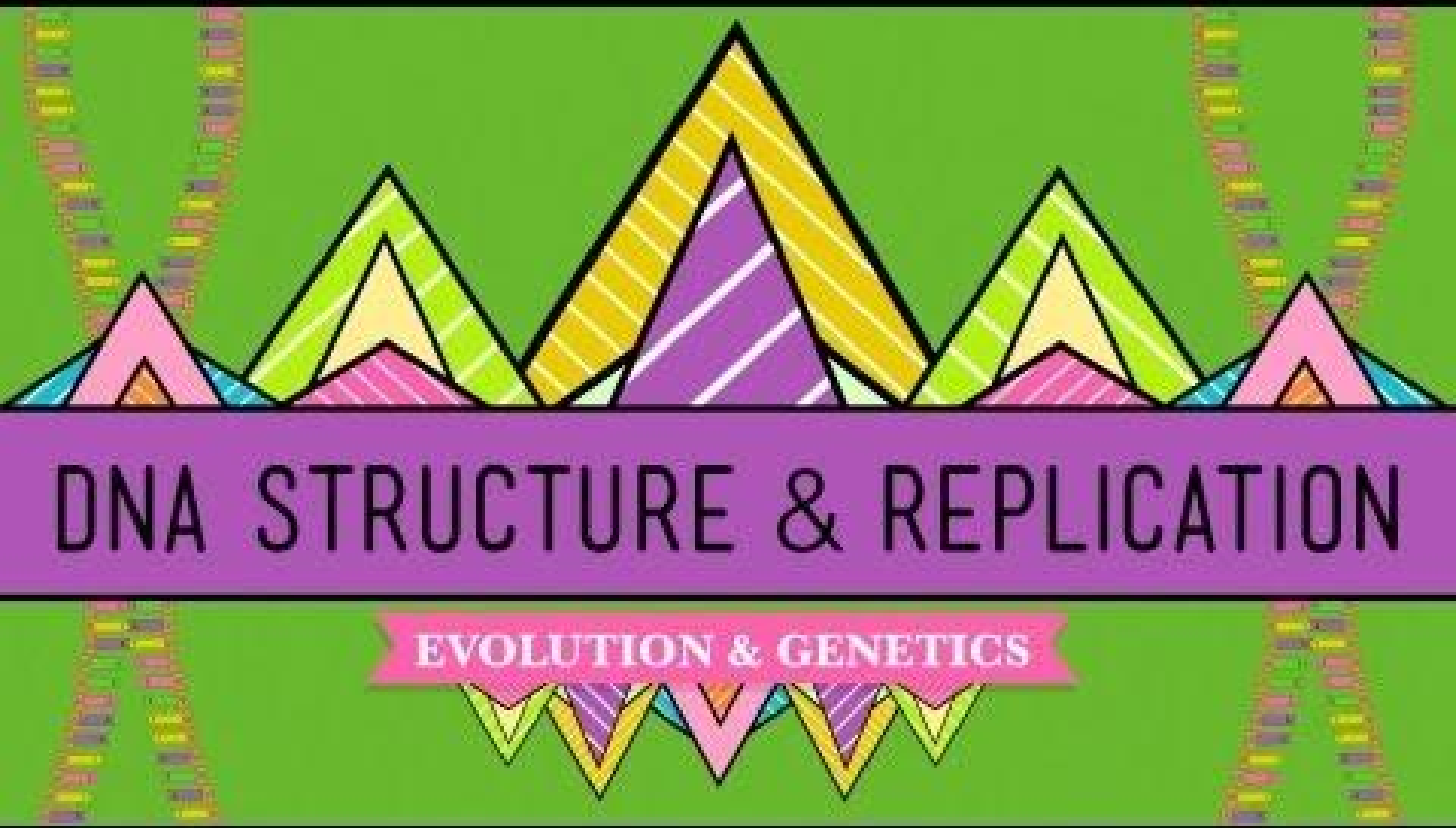


Figure 14-11b Biological Science, 2/e

Eukaryotic Replication

- Each human chromosome is replicated in about 100 sections that are 100,000 nucleotides long
- Each section has its own starting point, with multiple replication forks replicating simultaneously




DNA STRUCTURE & REPLICATION
EVOLUTION & GENETICS

Assignment

Page 200 Q 1-5 (Classroom Assignment)