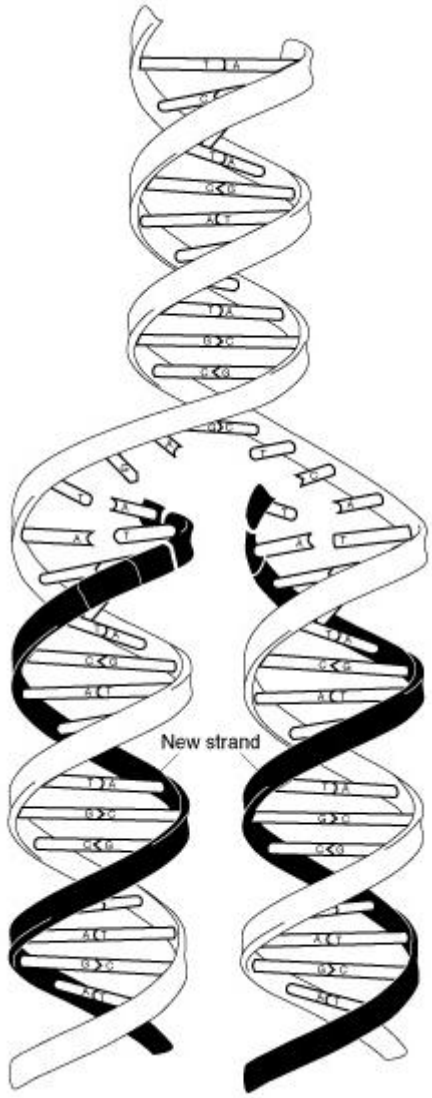
DNA replication

Replication: duplication of DNA, the two strands of original DNA separate from each other, and each serve as a template for synthesis of new DNA strands.
Required for cell division
Structure of DNA! Earlier seminars!!



Replication of DNA (from www.genome.gov)

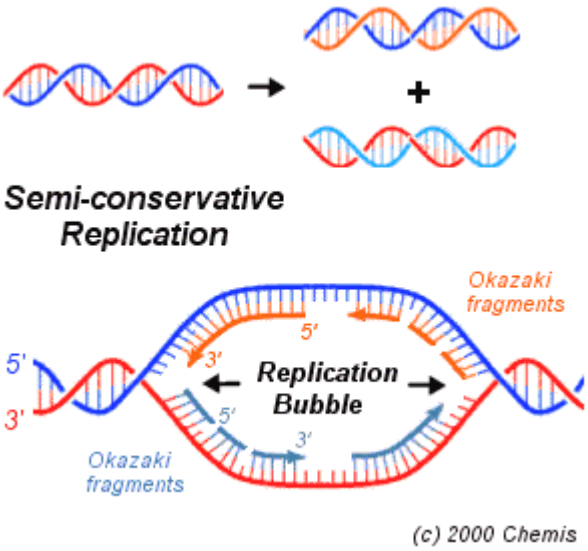
Mechanism of replication:

Ori: origin of replication, the sequence of DNA, where the replication starts
It binds proteins, which initiate replication (origo recognition complex)

Helicase: separates the two chains of DNA from each other
Cuts the H-bond between A and T or G and C

Ssb (single strand binding) proteins: bind to denatured DNA, to prevent renaturation

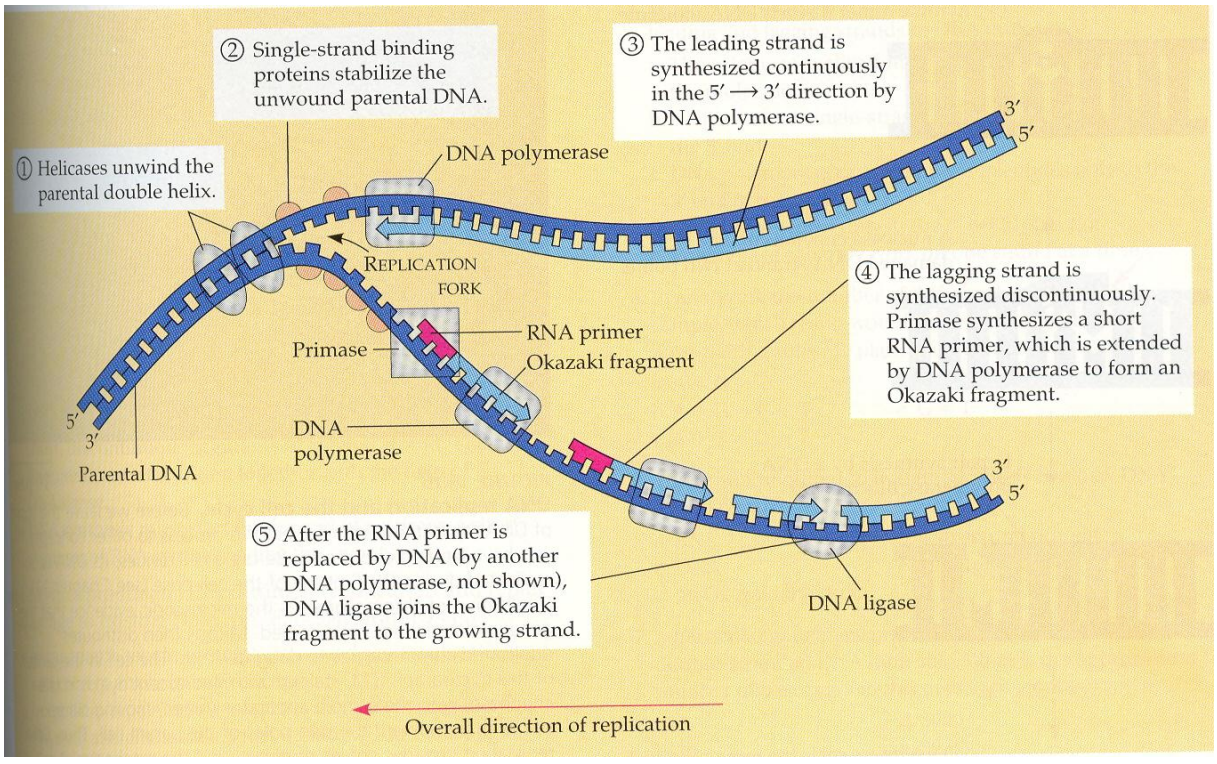
Primase: special RNA polymerase, which synthesizes primers



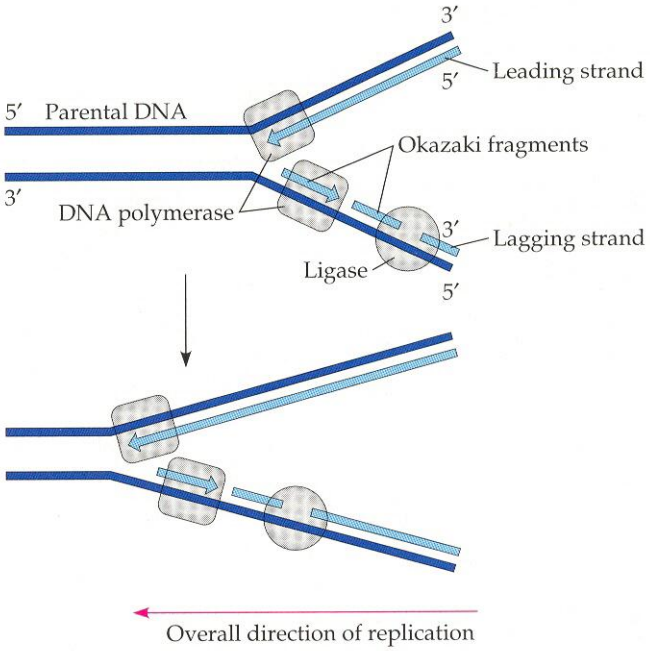
Replication bubble (from www.geneticengineering.org)

DNA polymerase enzymes:
Synthesize new strands using the original as template
Complementary base pairing
Leading and lagging strand
Proofreading activity
Removal of primers

DNA ligase: links Okazaki-fragments to each other



Enzymes of replication (from Campbell: Biology)

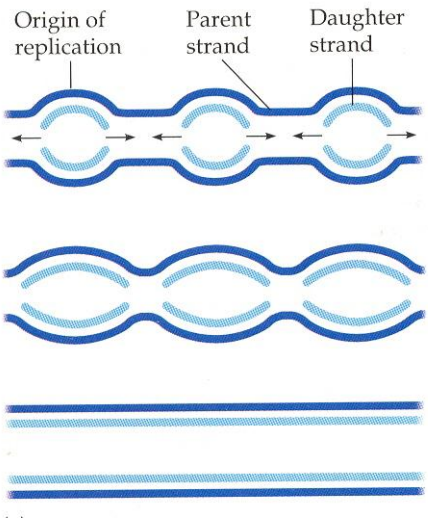


Joining of Okazaki-fragments (from Campbell: Biology)

General features of replication:

- Template dependent: determines the sequence (base order) of the new strand by complementary base-pairing
- Primer dependent: DNA polymerase needs free –OH group, to synthesize the new strand – the primer is RNA in living cell
- Bidirectional: goes in both direction from ori
- Semiconservative: one strand is "old" (template strand), the other is newly synthesized
- Semidiscontinuous: one strand is synthesized continuously, the other in parts (Okazaki-fragments), which are later connected with each other

Eukaryotic replication: begins on more sites (more ori-s)



Eukaryotic replication (from Campbell: Biology)