

I. DNA – the molecule of heredity

A. Structure of DNA

1. Simple polymer, 4 nitrogenous bases
 - a. purines (G, A), pyrimidines (C, T)
 - b. ribose sugar (deoxy-ribose)
 - i. 5' position has phosphate, 3' position OH
 - ii. phospho-diester linkage makes long polymer
 - c. two anti-parallel strands (5'→3' paired with 3'→5')
 - d. A=T, G=C; hydrogen bonding between complementary bases holds complementary strands together
2. denaturing (melting) and renaturing (anneal, hybridize) DNA

B. Replication occurs by opening double helix

1. DNA polymerase (III) copies by placing complementary base and making phospho-diester linkage
 - a. DNA polymerases extend only in 5'→3' direction
 - b. Some polymerases have exonuclease functions
 - 5' → 3' exonuclease (for repair)
 - 3' → 5' exonuclease for proofreading
 - c. two DNA strands require different method of replication
 - d. also requires an RNA polymerase (primase) and ligase
 - e. multiple DNA polymerases

II. Using polymerases in the lab

A. FISH

B. Preparing DNA for hybridization

1. nick translation
2. random priming

C. Polymerase Chain Rx