

Structure & Replication

April-01-18 9:02 PM

Biology 12
Unit D Notes #1

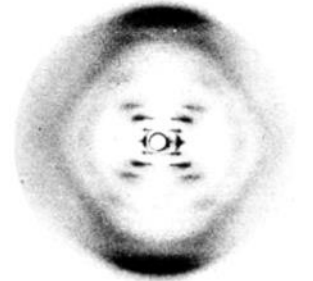
DNA The molecular Basis of Inheritance

Biologist: _____
Block: _____

I) DNA Structure

A) Discovery

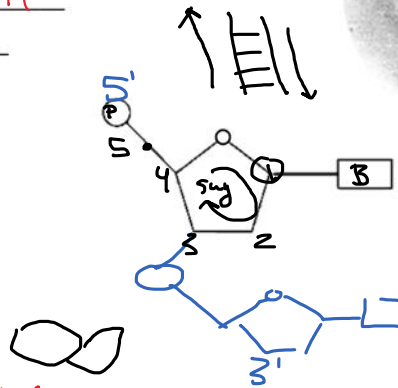
- 1) James Watson and Francis Crick won the Nobel Prize for determining the Structure of DNA in 1953
- 2) Rosalind Franklin was not given credit until after her death.
 - (a) She photographed DNA using X-rays; the pattern indicated DNA was shaped like a coil



B) DNA is a chain of nucleotides

C) Each nucleotide is composed of 3 subunits

- 1) phosphoric acid (phosphate)
- 2) A pentose sugar (deoxyribose)
- 3) A nitrogen-containing base



D) Four Possible Bases

- 1) Adenine (A) - a purine
- 2) Guanine (G) - a purine
- 3) Thymine (T) - a pyrimidine
- 4) Cytosine (C) - a pyrimidine



E) Complimentary Base Pairing

- 1) Adenine (A) always pairs with Thymine (T) using 2 hydrogen bonds
- 2) Guanine (G) always pairs with Cytosine (C) using 3 hydrogen bonds



F) The sequence of these bases determines an organism's traits

G) DNA is composed of 2 long strands of nucleotides

- 1) The strands are joined together like a ladder
- 2) The strands twist to form a DOUBLE HELIX
- 3) The hydrogen bonding of A to T and G to C provide the rungs with a constant width (what Franklin saw!)
- 4) The sugar phosphate molecules make up the sides of the ladder, while the nitrogenous bases make up the rungs



II) Replication of DNA

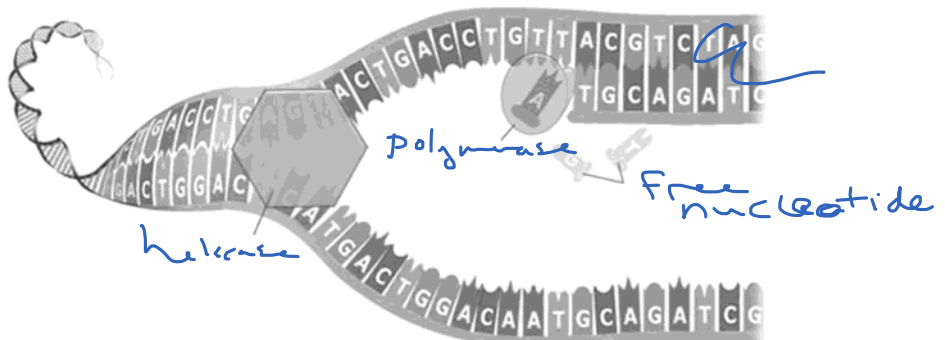
A) Semi-Conservative replication

- 1) Each daughter DNA molecule consists of one NEW chain of nucleotides and one from the parent DNA molecule
- 2) The two daughter DNA molecules will be IDENTICAL to the parent molecule

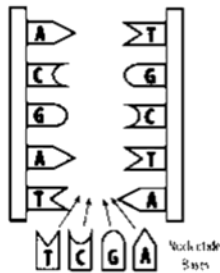
B) Process of Replication



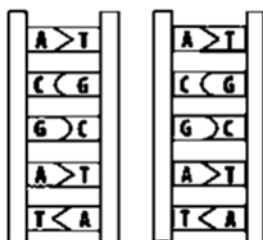
- 1) Before replication begins, the two strands of the parent molecule held together by hydrogen bonds
- 2) Enzyme DNA helicase unwinds and "unzips" the double stranded-DNA
- 3) New complementary DNA nucleotides fit into place along separated strands by complementary base pairing. These are positioned and joined by hydrogen bonds by the enzyme DNA polymerase
 - (a) DNA polymerase checks to make sure that each pairing is correct and removes and replaces incorrect nucleotides; if an error is not corrected this is a mutation
- 4) DNA ligase seals any breaks in the sugar-phosphate backbone
- 5) The two double helix molecules are identical to each other and to the parent molecule!



Parental DNA molecule contains so-called old strands hydrogen-bonded by complementary base pairing



Region of replication. Parental DNA is unwound and unzipped. New nucleotides are pairing with those in old strands.



Replication is complete. Each double helix is composed of an old (parental) strand and a new (daughter) strand.

Inquiry: Read 5.3 page 84 Answer these Questions

1. What two types of molecules are chromosomes made of?
2. What two roles do proteins play in chromosomes?
3. What is the function of histones in chromosomes?

Inquiry: Read page 503 Answer these questions:

1. What did Watson and Crick know from the work of others that helped them to build their model of DNA?
2. What is the significance of their statement, 'It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material'?

Inquiry: Read p503-505 Answer p505 Check Your Progress #1-3

THE CHROMOSOME

