

KEY

DNA and DNA REPLICATION

Main Idea

Discovery of the Genetic Material

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Details

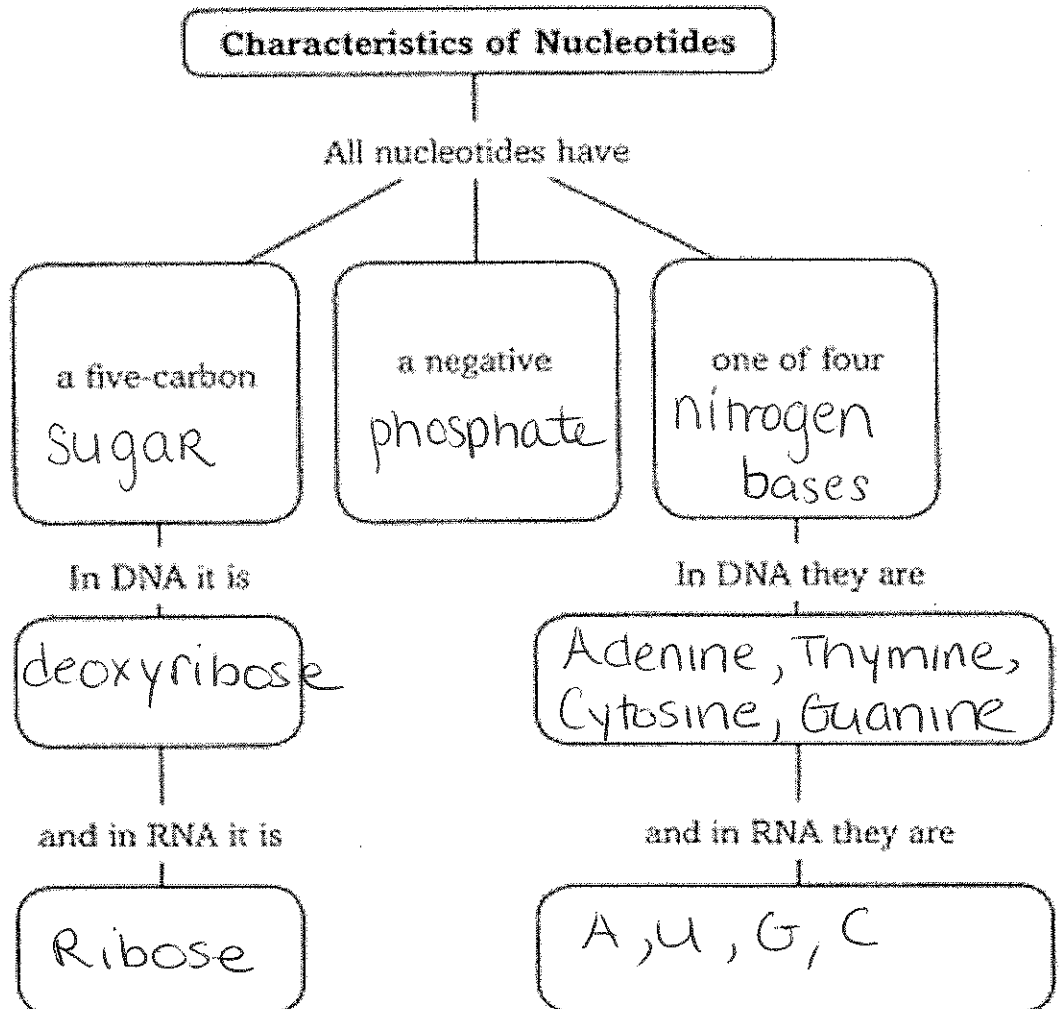
Complete the table below about geneticists and their discoveries.

| Scientist | Discovery | Year |
|---------------------------------|---|--------|
| Fredrick Griffith | Central role of DNA in heredity | 1928 |
| Oswald Avery | DNA is the material of which genes & chromosomes are made | 1952 |
| Alfred Hershey and Martha Chase | DNA is genetic material | 1952 |
| James Watson and Francis Crick | DNA structure - double helix | 1950's |

DNA Structure

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Organize the characteristics of nucleotides by filling in the graphic organizer below.



New Vocabulary

Use your book or dictionary to define the following terms. Then look through the section to find a sentence with each term. Write the sentence.

DNA polymerase

enzyme responsible for adding complementary DNA nucleotides for DNA replication

Okazaki fragment

fragments of new DNA being made on lagging strand

semiconservative replication

two new DNA strands are made, each w/ an old & new part

Main Idea

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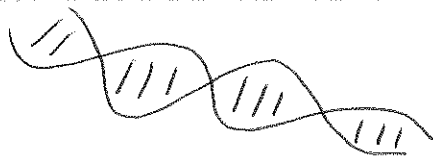
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Create a memory device to help you remember how the nitrogenous bases are always paired.

At Cg

Analyze the DNA molecule by explaining how each word applies to the molecule. Use a sketch to back up your explanation in each case.

bases

| Word and What It Means | Sketch of Effect |
|---|--|
| complementary: match together in DNA |  |
| helix: twisted DNA |  |
| double (as in "double helix"); two strands of DNA | |

Chromosome Structure

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Synthesize and rephrase how a DNA strand that is 200 million bases long can fit inside a cell.

DNA is wound up and twisted so tightly it can fit in the nucleus

SUMMARIZE

Chargaff's rules.

State how Watson and Crick's DNA structure supported

Chargaff states that the # of A will be equal to the # of T in DNA. This is because A bonds to T. This corresponds to Watson + Crick's model of DNA.

| | |
|---|---|
| A | T |
| T | A |
| C | G |
| G | C |

Main Idea

Semiconservative Replication

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Describe semiconservative DNA replication.

| Model | During replication, the parental strands | The new DNA molecule is composed of |
|------------------------------|--|-------------------------------------|
| Semiconservative replication | Separates & is used to make new DNA | one old and new strand |

Sequence and model each step in the replication of a DNA molecule. Write about what happens, and draw a DNA molecule going through each step. In the last box, describe and draw the products of replication.

| | |
|-----------------------------------|-----------------------------|
| <p>A. Helicase splits H bonds</p> | <p>B. Primase</p> |
| <p>C. DNA polymerase</p> | <p>D. Semi Conservative</p> |

Analyze how a DNA molecule acts like a template.

the DNA get read and is used as instructions to make something a (protein) make more of itself.

Main Idea

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Complete the table below on the role of each protein in DNA replication. The first one has been done for you.

| Protein | Stage of DNA Replication | Activity |
|---------------------------------|---------------------------|---|
| DNA helicase | unwinding | unwinds and unzips the DNA |
| DNA ligase | links okazaki fragments ↔ | |
| DNA polymerase | building | brings in complementary DNA nucleotides |
| RNA primase | starter | tells DNA polymerase where to begin |
| Single-stranded binding protein | N/A | N/A |

- holds apart DNA -

Comparing DNA Replication in Eukaryotes and Prokaryotes

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Contrast the differences between prokaryotic and eukaryotic DNA replication.

| | Eukaryotes | Prokaryotes |
|---|------------|-------------|
| Number of origins for DNA replication | | |
| Where replication takes place in the cell | Nucleus | |

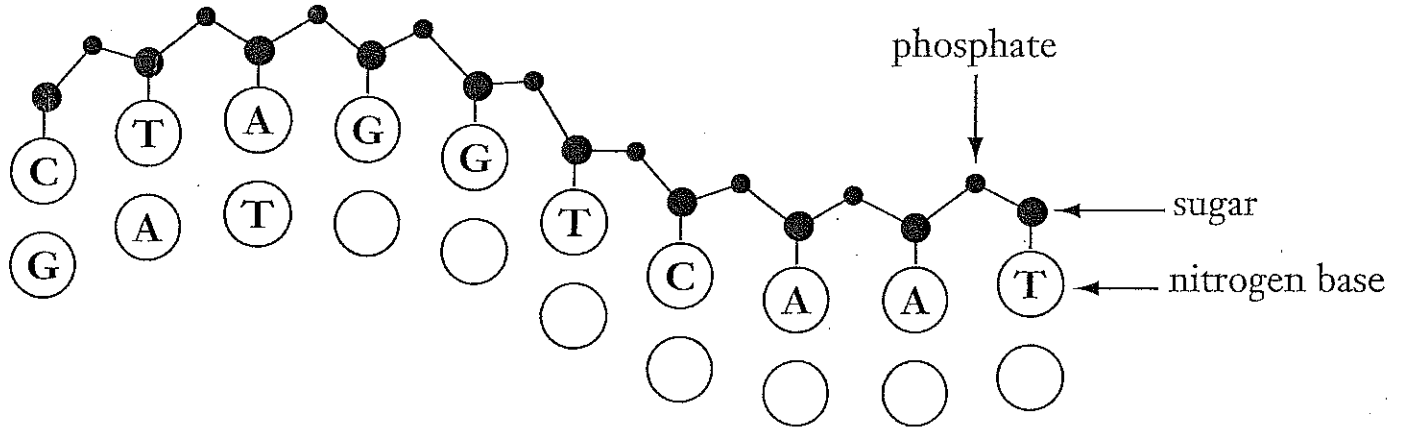
GENES AND CHROMOSOMES

Section 13.1 DNA: The Molecule of Heredity

Study the Diagram

When the DNA ladder replicates—copies itself—the ladder breaks apart. You can think of the ladder breaking apart as a zipper unzipping. When the two sides of the ladder are apart, free nucleotide bases attach to the bases already on the sides of the ladder, and two copies of the DNA are formed. The copies are the same as the original because adenine (A) usually pairs with thymine (T). Cytosine (C) usually pairs with guanine (G).

The diagram below shows an unzipped strand of DNA. Write the letters—A, T, C, or G—of the bases that will pair with the bases on the strand. Some of the bases have been paired for you.



1. **True or false?** Nucleotide bases already attached to proteins form the copied side of the DNA ladder. F

2. **True or false?** The process of DNA replication results in a copy of the original strand of DNA. T

3. **True or false?** Sugar and phosphates provide the energy for DNA replication. F

4. **True or false?** The final result of DNA replication is two copies of the original DNA strand. F

each w/
original + new DNA

DIRECTIONS. Answer the following questions about DNA replication in complete sentences.

1. Why does DNA replicate? For cell replication
2. Is DNA replication describe as conservative or semi-conservative? Why?
3. What ~~z~~ enzymes are used during DNA replication? Describe what each does during replication. helicase + DNA polymerase (primase + Ligase)
4. When does DNA replication occur in a cell? S phase of Interphase
5. Where does DNA replication occur in a cell? Nucleus

True/False – If the statement is false, correct the statement.

- T or F – Cytosine, guanine, thymine and adenine are referred to as phosphates. nit. bases
- T or F – DNA is in the shape of a helix.
- T or F – A nucleotide is made up of a sugar, phosphate and two nitrogen bases. one
- T or F – Replication is performed prior to cell division.
- T or F – Adenine always pairs with guanine. Thymine
- T or F – Complementary base pairing matches up complementary sugars. bases
- T or F – The sides of the DNA molecule are made up of repeating nitrogen bases and sugars. phosph.
- T or F – The letters that make up the DNA molecule code for genes. bases
- T or F – Replication results in two strands of DNA, each of which has half of the original strand.
- T or F – hydrogen Covalent bonds hold nitrogen bases together, forming the rings of the DNA ladder.

Sentence Arrange – Put the steps of DNA replication in order by writing a number in the space before each statement.

- 4 Two new molecules of DNA are created.
- 3 DNA polymerase attach the free-floating nucleotides to the exposed nitrogen bases.
- 1 Helicase begins to break the hydrogen bonds between nitrogen bases.
- 5 Cell starts into the mitosis phase of the cell cycle.
- 2 Free floating nucleotides pair up with exposed nitrogen bases.

Complete the statement

- Adenine, guanine, cytosine, and thymine are the four nitrogen bases.
In DNA, Cytosine always forms hydrogen bonds with guanine.
The sequence of bases carries the genetic information of an organism
The process of DNA Rep. produces a new copy of an organism's genetic information.
The double coiled shape of DNA is called a helix.

