

Section 1: The Structure of DNA

DNA is often compared to a ladder or a spiral staircase. Look at Figure 4 and answer the following questions.

How is the structure of DNA similar to that of a ladder or spiral staircase?

How is it different from that of a ladder or spiral staircase?

DNA: The Genetic Material

The instructions for inherited traits are called genes. A _____ is a small segment of deoxyribonucleic acid, or DNA, that is located in a chromosome.

_____ is the primary material that causes inheritable characteristics in related groups of organisms.

DNA is a simple molecule, composed of only four different subunits.

Searching for the Genetic Material

Three major experiments led to the conclusion that DNA is the genetic material in cells. These experiments were performed by Griffith, Avery, and Hershey and Chase.

Griffith worked with two related strains of _____ which cause pneumonia in mice.

_____ discovered that when harmless live bacteria were mixed with heat-killed disease-causing bacteria and then injected into mice, the mice died.

Searching for the Genetic Material, *continued*

These results led Griffith to discover transformation. _____ is a change in genotype that is caused when cells take up foreign genetic material.

Griffith's experiments led to the conclusion that genetic material could be _____ between cells.

Visual Concept: Transformation

Griffith's Discovery of Transformation

Searching for the Genetic Material, *continued*

Avery wanted to determine whether the transforming agent in Griffith's experiments was protein, RNA, or DNA.

Avery used _____ to destroy each of these molecules in heat-killed bacteria.

Avery's experiments led to the conclusion that _____ is responsible for transformation in bacteria.

Searching for the Genetic Material, *continued*

Hershey and Chase studied _____ Bacteriophages are viruses that infect bacterial cells and cause the cells to produce viruses.

By using radioactive isotopes, Hershey and Chase showed that DNA, not protein, is the _____ material in viruses.

Visual Concept: Hershey and Chase's Experiments

The Shape of DNA

A DNA molecule is shaped like a spiral staircase and is composed of _____ parallel strands of linked subunits.

The spiral shape of DNA is known as a _____

Each strand of DNA is made up of linked subunits called _____.

Visual Concept: Double Helix

The Shape of DNA, *continued*

A _____ is made up of three parts: a _____ group, a _____ group, and a _____ base.

The phosphate groups and the sugar molecules of nucleotides link together to form a " _____ " for the DNA strand.

The five-carbon sugar in DNA is called _____ e, from which DNA gets its full name, *deoxyribonucleic acid*.

DNA

Visual Concept: DNA Overview

The Information in DNA

The information in DNA is contained in the _____, while the base-pairing structure allows the information to be copied.

In DNA, each nucleotide has the same sugar group and phosphate group, but each nucleotide can have one of _____ nitrogenous bases.

The four kinds of bases are _____ (A), *guanine* (G), _____ (T), and *cytosine* (C).

Bases A and G have a double-ring structure and are classified as _____.

The Information in DNA, *continued*

Bases T and C have a single-ring structure and are classified as _____.

A purine on one strand of a DNA molecule is always paired with a pyrimidine on the other strand. Specifically, adenine always pairs with _____, and guanine always pairs with _____.

_____ rules are dictated by the chemical structure of the bases.

The _____ bonds between bases keep the two strands of DNA together.

Visual Concept: Complementary Base Pairing

The Information in DNA, *continued*

Paired bases are said to be _____ because they fit together like puzzle pieces.

Because of base-pairing rules, if the sequence of bases is known for _____ strand of DNA, then the sequence of bases for the complementary strand can be quickly identified.

Discovering DNA's Structure

_____ used information from experiments by Chargaff, Wilkins, and Franklin to determine the three-dimensional structure of DNA.

Chargaff showed that the amount of _____ always equaled the amount of _____, and the amount of _____ always equaled the amount of _____.

Franklin and Wilkins developed X-ray diffraction images of strands of DNA that suggested the DNA molecule resembled a tightly coiled _____.

Discovering DNA's Structure, *continued*

Watson and Crick used both Chargaff's data and the _____ X-ray diffraction studies to create a complete the three-dimensional model of DNA.

Their model showed a " _____ " in which two strands of nucleotides twisted around a central axis.

Summary

DNA is the primary material that causes inheritable characteristics in related groups of organisms.

Three major experiments led to the conclusion that DNA is the genetic material in cells. These experiments were performed by Griffith, Avery, and Hershey and Chase.

A DNA molecule is shaped like a spiral staircase and is composed of two parallel strands of linked subunits.

Summary, *continued*

The information in DNA is contained in the order of the bases, while the base-pairing structure allows the information to be copied.

Watson and Crick used information from experiments _____ by Chargaff, Wilkins, and Franklin to determine the three-dimensional structure of DNA.