

Practical Biology – DNA Notes

The DNA Molecule: Strands of DNA make up chromosomes. Sections of DNA make up genes that control traits of living things.

DNA Structure:

DNA stands for?

What is DNA?

The make-up of DNA was first described in the 1950's by two scientists, James Watson and Francis Crick. The shape is a "double helix", a twisted ladder.

The size of a DNA molecule is extremely microscopic so we often use models to illustrate a DNA molecule.

What are the sides of the DNA ladder made of?

What are the rungs (steps) of the ladder made of? _____

- **FOR US THIS IS THE MOST IMPORTANT PART OF THE DNA MOLECULE!**

The four nitrogen bases can only combine one way. **A with T & C with G**

Use the following strand of DNA and make the complementary strand.

#1. C G C T A T T G C T C C

#2. _____

DNA and Chromosomes:

DNA can be found where?

What are two ways to describe a gene?

1. _____

2. _____

Proof that DNA Controls Traits:

Write a short description from the 1928 experiments that told scientists that DNA controls the traits of living things? (1928 experiments)

How DNA Works:

The order of nitrogen bases spell out a code for a cell to make a certain protein. Proteins are long chains of amino acids and each amino acid has a specific DNA code.

Pretend that the DNA strand you finished earlier in the notes was for brown hair color. That exact code would produce a specific protein to make brown hair.

- Hair color is actually controlled by multiple genes. This is just an example.

Now look at strand #1: If you changed the only “A” to a “G” in this strand. This would be called a mutation and maybe instead of protein being made for brown hair now maybe it will produce a protein for blonde hair.

Making Proteins:

Where in the cell are proteins made?

Where are these cell parts located in the cell?

What messenger takes information from the nucleus to the ribosome?

What do these letters stand for?

Summary of Protein Synthesis:

The DNA (in the nucleus) contains the codes for all proteins. This code is taken from the nucleus to the ribosome by an RNA strand. The ribosome then translates the RNA code into amino acid code (remember amino acids make-up proteins). One by one the amino acids are determined by the RNA code until finally there is a long chain of amino acids called a “PROTEIN”.

Summarize how the order of nitrogen bases in DNA fit into the story of traits of living things?

How DNA Copies Itself:

- Before Mitosis or Meiosis chromosomes (DNA strands) must make a copy of themselves.

Summary: The DNA molecule opens up exposing the nitrogen bases. There are free nitrogen bases in the cell cytoplasm that may then attach to the open nitrogen bases on the original DNA molecule. Gradually as the DNA molecule completely opens the entire DNA strand is copied.

How the Genetic Message Changes:

Mutations:

A change in the nitrogen bases of the DNA.

- Who would show the mutation if the mutation occurs in your body cell?
- Who would show the mutation if the mutation occurs in your sex cell?

What can cause mutations?

Cloning:

Identical twins: How eggs were fertilized? _____

Genetically these individuals are?

Fraternal twins: How many eggs were fertilized? _____

Genetically these individuals are?

Is it possible to clone living things? Yes

There is a lot of debate as to whether cloning is ethical, especially humans.

Plant and Animal Breeding:

What is selective breeding?

Give examples of beneficial plants and animals humans have selectively bred.

Splicing Genes and Gene Therapy:

What is recombinant DNA?

What is Genetic Engineering?

What organism is frequently used for Genetic Engineering?

What is the name for adding a healthy gene into the body of a person with a bad gene?

What type of organism can possibly transfer these good genes?

What are some examples of disorders we may be able to cure?