

Lesson 3: DNA, chromosomes, and genes

Remember from last lesson that chromosomes are the structures in the nucleus of a cell that carry genes.

Chromosomes are made of a chemical called DNA. You have probably heard of DNA particularly if you watch any police television shows.

The full name of DNA is:

Deoxyribo **N**ucleic **A**cid.

The word *nucleic* provides a clue that DNA is found in the *nucleus* of cells.

There is a lot of the chemical DNA in every nucleus. In fact, if all the DNA in a nucleus is laid out end to end it would measure about 2 metres in length. This all fits into a tiny nucleus.

The structure of DNA

During the 1950's there was race on between scientists to be the first to work out the structure or the arrangement of DNA in the nucleus of a cell. Two men, Watson and Crick, are credited with the being the first to work the structure out.

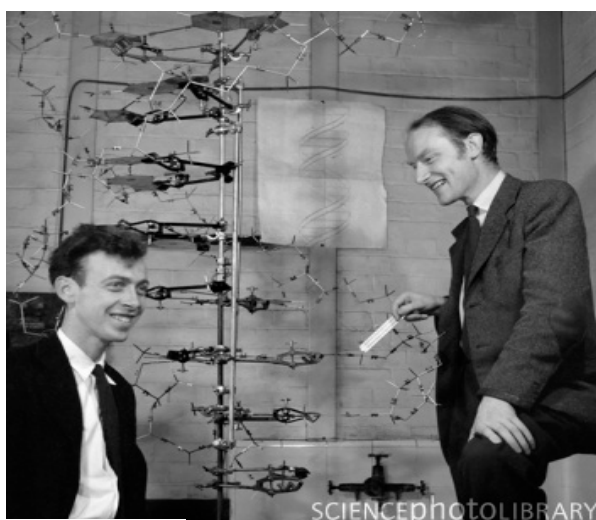
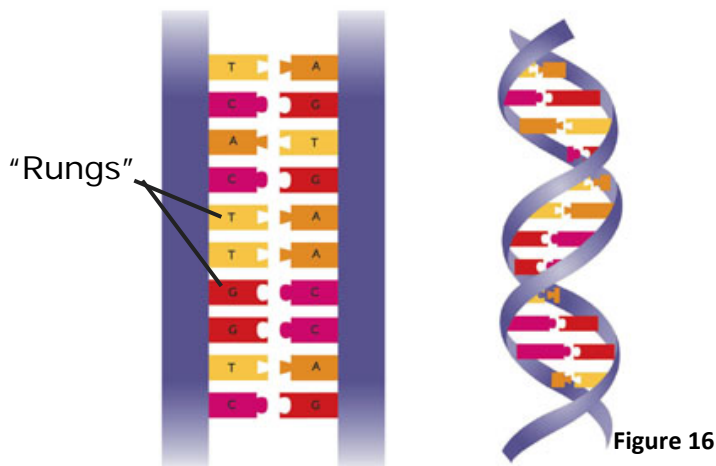


Figure 15

This is a picture of Watson and Crick with their model of DNA behind them. You can see that it is enormous and very complicated.

Watson and Crick worked out that DNA is a very long chain that is tightly coiled. The coiled shape is called a double helix. This double helix structure of DNA is known as *The Watson-Crick model of DNA*.

When the DNA chain making up the chromosome is uncoiled it looks like a ladder.



This is a diagram of a small section of a DNA chain.

You can see that when it is uncoiled it looks a bit like a ladder with struts and rungs.

Figure 16

Have a look at the "rungs" of the ladder. What do you notice?

Each rung is made up of two parts that fit together.

A will only fit with T

G will only fit with C

One teacher suggested a way of remembering how these fit together:

Two straight letters A and T go together

Two curved letters G and C go together

In biology the "rungs" of the ladder in a DNA chain are called *bases*.

This means we could say four bases make up the "rungs" of the ladder.

The four bases are A, T, C and G



Activity 6 – About DNA

Answer TRUE or FALSE to the following statements.

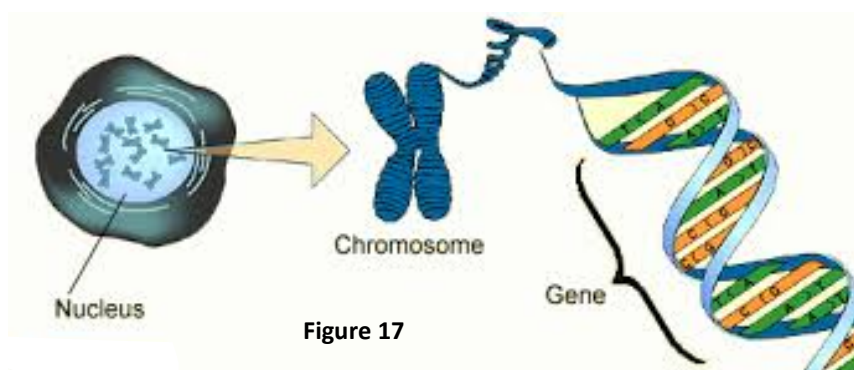
1. Chromosomes are made of a chemical called DNA. _____
2. DNA is short for oxyribo nucleic acid. _____
3. There is only a small amount of DNA in each nucleus. _____
4. DNA is a tightly-coiled chain called a double helix. _____
5. Watson and Crick were scientists who were the first to work out the structure of DNA. _____



Check your response by going to the Suggested answers section.

DNA and genes

A gene is one small section of the long DNA chain. Because each chromosome is made of very long chain of DNA there are many genes on each chromosome.



Each gene is a particular sequence of the four bases (or the “rungs” in the ladder). The number of bases in a gene can be as many as 1 million!



Activity 7 – Completing a summary

Complete the summary by drawing a line to match the term with its description.

Term	Description
Chromosome	A small section of a DNA chain that codes for a genetic trait.
DNA	A structure that is made of the chemical DNA
Gene	A chemical that is in very long coiled chains



Check your response by going to the Suggested answers section.



Complete the exercises for Lesson 3 in the Send-in exercises

Lesson 3

Complete the following sentences using the words below.

chains	DNA	ladder	code	20,000
section	many			

1. Each chromosome is made up of tightly-coiled, long c_____ of a chemical called D_____.
2. When uncoiled the DNA looks like a l_____, each rung of the ladder is made up of two bases that fit together. A fits with T, C fits with G.
3. A single gene is a s_____ of the DNA chain. There are m_____ genes in each chromosome.
4. Humans have between _____ and 30,000 genes in each cell.
5. Each of these genes is a piece of genetic information that is a c_____ for what we look like and how we grow.