



DN...EH?

Explore the structure, function and
role of DNA in science and society

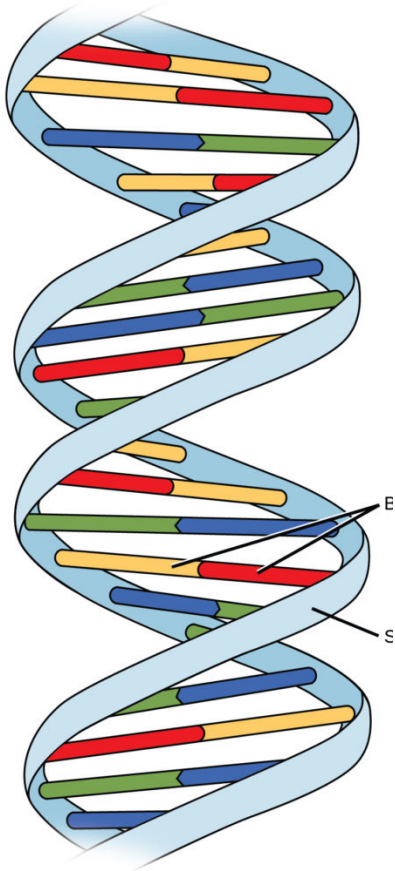


STEM Response Team



@STEMResponseWLV

DNA







DNA stands for **deoxyribonucleic acid**.

It is a chemical made up of two long molecules shaped in a twisted spiral, called a **double helix**.

There is DNA in the nucleus of every cell. DNA carries **genetic information** and has all the instructions that a living organism needs to grow, reproduce and function.

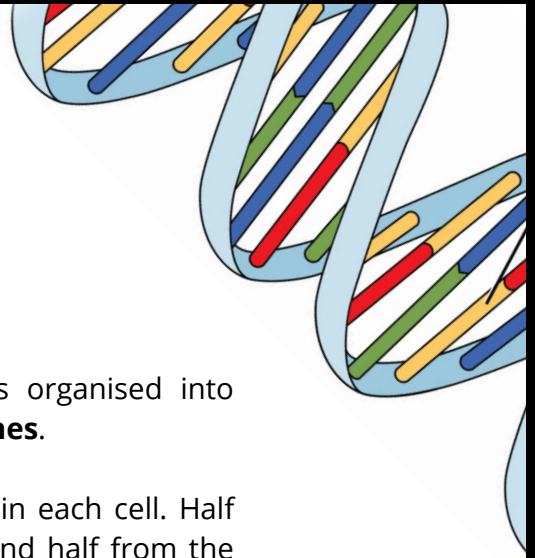
The molecules in DNA are called **nucleotides**, and each one contains a phosphate group, a sugar group (deoxyribose), and a nitrogen base.

Nitrogenous bases:

-  Adenine
-  Thymine
-  Guanine
-  Cytosine

There are four types of nitrogen bases; (**A**) adenine, (**T**) thymine, (**G**) guanine, and (**C**) cytosine. The order of these bases is what determines the **genetic code** of DNA.

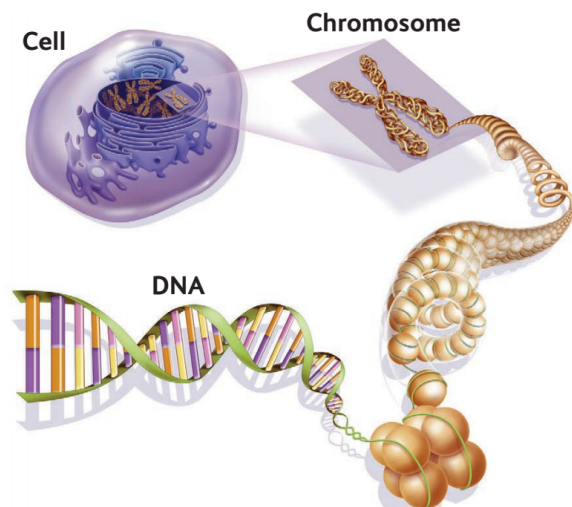
101



Within the cell nucleus, DNA is organised into coiled strands called **chromosomes**.

Humans have **46** chromosomes in each cell. Half are inherited from one parent and half from the other. This explains why we can share characteristics from both parents.

Inside one chromosome are many **genes**, which are short sections of DNA that carry information for particular **characteristics**, such as ear shape or eye colour. Different sets of genes carry information for different characteristics.



DISCOVERY



Gregor Mendel

suggested that characteristics are passed down between generations, and coined the genetic terms dominant and recessive.

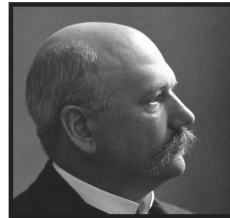
1866



Friedrich Miescher

identified "nuclein" by isolating a molecule from a cell nucleus that would later be known as DNA.

1869



Albert Kossel

identified nuclein as a nucleic acid, and isolated the nitrogen bases adenine, cytosine, guanine, and thymine.

1881



Walther Flemming

discovered mitosis in his study of chromosome division, supporting his theory of inheritance.

1882



Theodor Boveri & Walter Sutton

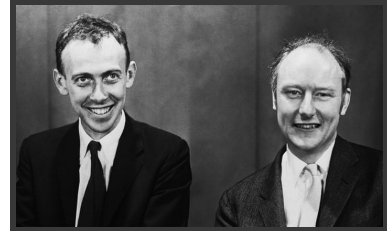
conducted work on the chromosomal theory of inheritance, understanding how genetic material passes from generations.

1990

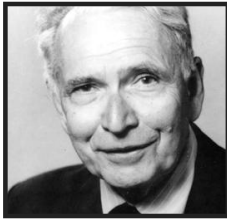
OF DNA

James Watson & Francis Crick

published the double helix structure of DNA, which had been first discovered by **Rosalind Franklin**. After her death, Crick admitted Franklin's critical contributions to their study.



1953



Erwin Chargaff

discovered that DNA varies between species and coined Chargaff's Rule.

1950

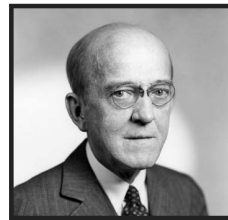
1951



Rosalind Franklin's

work in x-ray crystallography discovered the double helix structure of DNA. Her findings were only acknowledged after her death.

1944



Oswald Avery

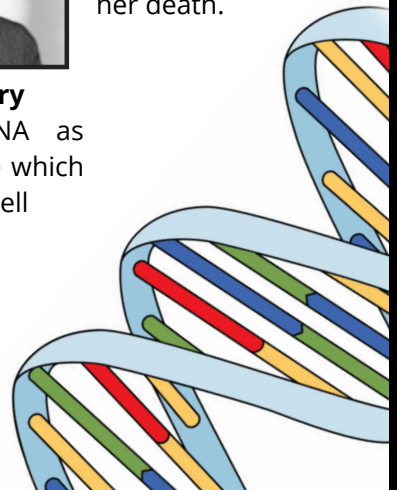
outlined DNA as the principle which transforms cell properties.

1902



Sir Archibald Edward Garrod

published recessive inheritance and opened the door to understanding genetic disorders from chemical errors within the body.



RNA

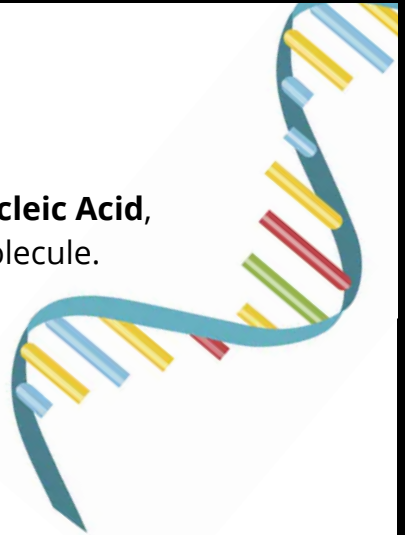
Unlike DNA, RNA or **Ribonucleic Acid**, is a **single stranded** molecule.

RNA codes for **amino acids** and acts as a **messenger** between DNA and ribosomes to make proteins.

RNA is composed of **ribose** sugar, a phosphate backbone, and four nitrogen bases; (**A**) adenine, (**G**) guanine, (**C**) cytosine, and (**U**) uracil.

RNA is more reactive than DNA, and is often used when creating vaccines. In RNA vaccines, messenger RNA molecules (**mRNA**) which code for disease-specific proteins are introduced inside of the body's cells. The body's cells use this genetic information to produce an **antigen**, which stimulates an immune response. The body then creates matching **antibodies** which it will use to fight off the disease if it comes into contact with it again.

RNA vaccines, such as the COVID-19 vaccines, provide many benefits over conventional vaccines. The main benefits are their safety and efficiency, as they are made only with mRNA rather than particles from the disease itself; making them non-infectious with minimal side-effects in healthy individuals.



IS BIOCHEMISTRY FOR YOU?

Biochemistry is the branch of science that explores the **chemical processes** that take place inside all living things, from bacteria to plants and animals. A laboratory based science that brings together **biology** and **chemistry**.

If you're interested in a career as a biochemist you'll need a **university degree**. This means you will need to study at least **biology** and **chemistry** at A level along with your other subjects or **applied science** BTEC Extended Diploma in most cases to be considered for entry.



After university, you may find employment in these areas:

- Biotechnologist or biomedical scientist working for the NHS (accredited degree courses only)
- Clinical scientist or medicinal chemist
- Forensic Scientist

And many other areas where scientific skills can contribute to a successful career in areas such as business.



To learn more about biochemistry careers, scan the QR code with your smart phone camera, or visit **[biochemistry.org/education/careers](https://www.biochemistry.org/education/careers)**



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