

## D IS FOR DNA

When Charles Darwin first proposed his famous theory about how species evolve, in 1859, he had absolutely no idea about how characteristics are passed from a parent to their child. DNA was discovered inside the cell ten years later, but it was another 85 years before it was understood that the information that made parent and offspring similar was carried by the DNA. And it wasn't until 1953 that James Watson, Francis Crick and Rosalind Franklin discovered that DNA forms a double-helix of two DNA strands made up of nucleobases: Adenine, Guanine, Cytosine and Thymine. And then in the 1960's the genetic code was cracked, showing us that these genetic letters tell cells to make proteins.

The musical backing to this song was made by my friend Vlad, and switches between two musical styles, both beginning with the letter 'D'. Drum 'n' bass originated in England in the early 1990s, and has a very fast, busy drumbeat and a heavy bass sound. Dubstep originated in the late 1990s, also in England, and has a much slower, sparser drumbeat and usually lots of sub-bass (which means a bass sound that is too low for the human ear to hear, but that can really make the room shake).

**NUCLEAR MEMBRANE:** the soft shell that covers the cell's nucleus (the nucleus is the bit in the middle of the cell).

**MOLECULE:** a group of atoms that stick together because they share electrons.

**CHROMOSOME:** a molecule made of DNA.

**DEOXYRIBONUCLEIC ACID** (or **DNA** for short): well, let's break it down, starting from the end. An 'acid' is the name for any molecule or ion that causes the pH level of water to drop below 7 (the word 'acid' comes from the Latin for 'sour', because that's how they tend to taste). 'Nucleic' means 'inside the nucleus of the cell'. The 'ribo' bit means that it contains ribose, a form of carbohydrate. 'Deoxy' means 'without oxygen', which isn't actually true – DNA does have quite a lot of oxygen, it just has one fewer oxygen atom than RNA, which is another very interesting type of molecule that I won't go into here.

**NUCLEOBASE:** the building blocks of DNA. A strand of DNA consists of loads of pairs of nucleobases, twisted in a double helix shape.

**CELL DIVISION:** the process of a cell making a copy of itself, during which the two strands of the DNA helix separate from each other and each strand is then copied to make two new double helices of DNA.

**MUTATION:** a small mistake that creeps into the DNA code during cell division.

**EVOLUTION:** the way species change over time, which is made possible by random mutations and a process called natural selection.

**ENDONUCLEASE:** an enzyme (type of large molecule, usually a protein) that recognises a very specific DNA sequence and 'cuts' it. A 'programmable endonuclease' is an endonuclease designed in a lab with a certain function in mind, such as replacing a mutated gene with a correct copy of the gene.

**ADENINE, GUANINE, THYMINE, CYTOSINE:** the four nucleobases in DNA. They pair up in a very specific way: adenine pairs with thymine, and guanine with cytosine.

**GENE:** a set of lots of nucleobases in a row, somewhere along the strand of DNA, that operates together and has a certain function (for example a gene might influence your eye colour or the shape of your toes or whether you're born with cystic fibrosis).