

# GENETIC INFO CARRIERS

A cell which synthesises proteins needs to be able to store information about the sequences of amino-acids in those proteins and to translate the coded information into a real sequence. Both these properties are conferred by nucleic acids.

Nucleic acids are polymers formed from nucleotides. A nucleotide is composed of a carbohydrate, a phosphate group and a nitrogen base, and in the nucleic acids the polymer chain consists of alternating carbohydrate and phosphate units. There are only two general types of nucleic acid: ribonucleic acid (RNA), in which the carbohydrate is ribose and the bases are cytosine and uracil and adenine and guanine and deoxyribonucleic acid (DNA), in which the carbohydrate is deoxyribose and the bases are the same as in RNA except that thymine replaces uracil.

In DNA, two nucleic acid chains, each in the form of the helix, are intertwined. The two strands are held together by hydrogen bonds between the bases. This arrangement is only possible when the right pairs of bases are opposite each other. In DNA the sequences

of the two strands are always complementary to each other.

The double-helical structure of DNA fits it exactly for its role as a store of information. When a cell reproduces itself, the DNA molecules first separate into their individual strands and each then acts as a template for the synthesis of a new strand. The synthesis is carried out by an enzyme. The translation of this coded information for specifying the sequence of amino-acids in a protein involves RNA. RNA molecules have only a single strand, and they are synthesised, using one of the two strands of DNA as a template.

Two types of RNA molecules are synthesised: a smaller type known as transfer RNA (tRNA), and a larger type known as messenger RNA (mRNA). They have different roles in protein synthesis: mRNA specifies the sequence of amino acids in the protein and tRNA translates the message in the mRNA by ensuring that a particular amino-acid recognises the appropriate sequence of three bases in the mRNA.

(from: Norman-Waddington, *Modern Organic Chemistry*, Bell & Hyman)

Answer these questions about Genetic info carriers.

- What do nucleic acids enable protein-synthesising cells to do?
- What are nucleic acids?
- What is a nucleotide made up of?
- What does the polymer chain in a nucleic acid consist of?
- What are the two types of nucleic acids?
- What do they consist of?
- What are the two types of RNA molecules?
- What is their different role in protein synthesis?