

Far left: James Watson and Francis Crick stand beside their model of DNA which is now on display in the Science Museum, London. The drawing from their Nature paper is behind them on the wall

Left: A facsimile of the Nature paper

Discovering DNA

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases.

There are four bases in DNA:

A (adenine) **T** (thymine)
G (guanine) **C** (cytosine).

...it is found that only specific pairs of bases can bond together. These pairs are: adenine (purine) with thymine (pyrimidine), and guanine (purine) with cytosine (pyrimidine).

The two strands are cross-linked. Relatively weak hydrogen bonds formed between the inward-pointing bases zip the two strands together. Adenine always pairs with thymine and guanine always pairs with cytosine. When DNA 'unzips', these bases are re-exposed.

COPYING THE CODE

Not only did Watson and Crick work out the structure of DNA, they also spotted something else. They knew that inherited information had to be copied exactly from cell to cell — there cannot be mistakes in the instructions for making an organism or it will not develop or work properly.

It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

DNA can copy itself by unzipping from one end. As it unzips, a new strand of DNA is built by adding bases, and sugar and phosphate groups, on each side. The opened DNA is used as a template and the rules of pairing between the different bases are followed (Figure 2). In this way two molecules of DNA, each identical to the original, are produced. When the cell divides, each daughter cell has its own identical copy of the DNA molecule.

In the last 50 years there has been a great leap in what we understand about DNA. Some of the other articles in this issue of CATALYST describe these advances.

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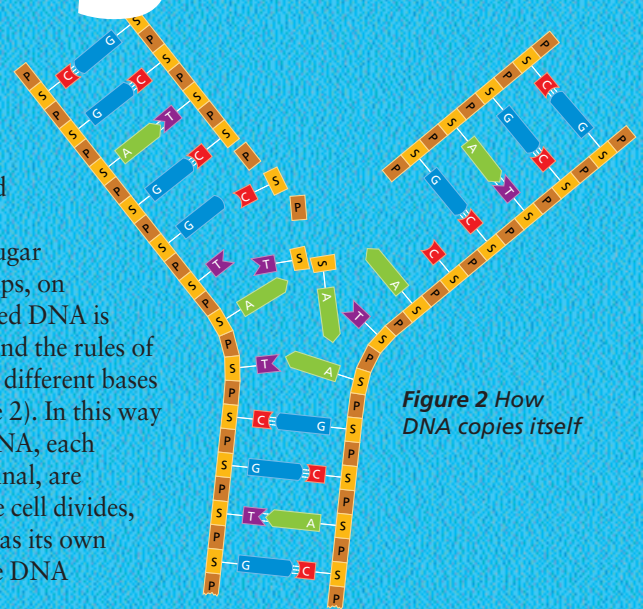


Figure 2 How DNA copies itself