

BIOTECH Discover the secrets of DNA

Nearly all living things, including us humans, are built up from tiny pockets, called cells. Cells are so small that they can only be seen under a microscope.

In the centre of every plant cell – from algae to sunflowers – and in the centre of every animal cell – from snails to you and me – there's a copy of the organism's genetic material. This material, called DNA, carries a complete blueprint of the organism. It's what transfers characteristics from one generation to the next. At the chemical level the cells of all plants and all animals contain DNA in the same shape – the famous "double helix".

GENETICS

Genetics is about storing and passing on messages. These genetic messages are stored in your DNA, which is inside almost every cell in your body. DNA tells cells what they're supposed to do, when, where and how – to keep your body working well. Our understanding of genetics stems from the discovery of the DNA molecule in every cell, which carries the genetic information.

CELEBRATING DNA

This year, the world is celebrating the 50th anniversary of the discovery of the DNA structure. In 1953, Francis Crick and James Watson published the first accurate model of the DNA molecule.

WHAT IS DNA?

DNA is an acid that carries (as genes) all the information which we inherit from our parents. It controls everything about the way you look, from the colour of your eyes to how tall you are to the width of your feet. Your DNA is like your thumbprint. It is yours and yours alone.

Watson and Crick found out that DNA looks like two threads twisted around each other, held together by many bridges between the strands. It almost looks like a

spiral staircase. This shape is called a double helix. The genetic information is stored on the threads.

WHERE CAN DNA BE FOUND?

In the nucleus of almost every cell in your body is the collection of DNA needed to make you. DNA in the nucleus is grouped into 23 sets of chromosomes that are called your "genome." In each chromosome, the DNA is grouped into "genes." Your genome contains about 35 000 genes. Each gene carries information that tells the cell to make a unique protein that will perform a special function.

How does something as small as a DNA molecule contain all of the instructions to make your whole body and keep it working? Just as a large number of words can be made from only a few letters, so DNA can make lots of different instructions from a few building blocks.

HOW KNOWLEDGE ABOUT DNA AFFECTS US

Now that scientists understand what DNA is and how it works, they are using this information in many different ways to improve our lives. Foods are being made more healthy and nutritious (such as potatoes that absorb less oil to make chips); better medicines and treatments are being developed for people with illnesses and genetic diseases; vaccines to prevent infectious diseases are being delivered in foods; and micro-organisms that help protect the environment by breaking down poisonous plastics found in water and soil are also being developed.

DNA fingerprinting is also an important tool to help catch criminals, who leave samples of their DNA at crime scenes in the form of hair, blood or other cells from their bodies.



EASY

SCIENCE



PUBLIC UNDERSTANDING OF BIOTECHNOLOGY

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The Department of Science and Technology has launched a Public Understanding of Biotechnology programme to make sure South Africans understand the scientific principles, related issues and potential of biotechnology. Biotechnology is the part of science that uses the DNA building blocks of life to make useful products from living things. If you have opinions, questions or concerns about any area of biotechnology, let's hear from you at

speakup@pub.ac.za or fax 012 320 7803 or visit www.pub.ac.za for more information.



DEPARTMENT OF SCIENCE AND TECHNOLOGY