

11. ENZYMES

1. Discuss these questions

- Who do you take after? Your mother or your father?
- Which features have you inherited, from your mother and which from your father ?
- If you have a brother or a sister, do you resemble each other ?
- Why do you think it is so ?
- What are enzymes? Can you describe how they work?
- Do you know any uses of enzymes?

Reading: Scientists Spy Enzyme That Makes Us Unique

2. Pronounce correctly

enzyme	virus	sequence
height	crucial	structure
bacteriophage	sever	fundamental
agent	junction	nuclease
major		

3. Make sure you understand the following expressions

inherit	split DNA strands
unravel	derive from
offspring	be about to do st.
be at the heart	join at random points
rush	yeast

4. Answer the questions

- What have the researchers mapped ?
- What process is central for creating human individuality?
- Which enzyme is responsible for splitting DNA strands ?
- What method did the researchers use to discover the enzyme's structure ?
- What organism did they discover it in ?
- Why is the discovery a major breakthrough in research ?
- Describe the process in humans.

**5. Write a summary of the text in about 80 words
(= the length of the first two paragraphs of the article).**

When you are finished, re-read your summary. Make sure the grammar is correct.

Sample summary

The main points in the text below can be written in a shorter, summary form for inclusion in your own writing. Points about the summary:

- the main idea and reference is mentioned at the start (who wrote it, where was it published)
- it is about one third of the length of the original (88 words, compared to 273 in the original)
- the number of sentences has been reduced from 16 to 4
- the information has been compressed into these 4 sentences by
 - cutting out less important information, e.g. examples
 - reducing a whole clause or sentence to a phrase
 - using more simple language
 - linking ideas by simple use of commas

Original text

Solar power is energy generated from the sun. Many electronic devices, such as watches and calculators, can use the sun's energy directly to provide the power they need. Light energy from the sun changes the electrical conducting properties of the silicon crystals, and a tiny electric current starts to flow. This system is called a solar cell. Although solar cells used on earth do not provide much power, satellites in space run on the same principle; They get many times more energy because they are closer to the sun. In the future, workers in space may build huge power stations from solar cells many kilometers wide. The electricity generated could be beamed down as microwaves and then converted back into electricity. Most of the solar power that we use today is based on a much simpler principle than the silicon solar cell. Solar panels on the roofs of houses heat water directly for bathing and central heating systems. The industrial version of the solar panel is the solar furnace, in which huge, curved solar panels, together with a system of mirrors, concentrate a large amount of solar energy onto a small area. The heat energy makes steam for generating electricity. Solar power is clean, renewable, non-polluting and does not damage the environment. It is potentially one of the more important sources of energy in the world. A major disadvantage of solar energy is that the amount of energy generated depends on the season, the part of the world and the weather on a particular day. Another disadvantage is that the raw materials for solar panels, such as glass and aluminium, are quite expensive,

from Dr Trisha Greenhagh (1994) _Environment Today. Harlow, Longman

Sample summary

Dr Greenhagh explains how solar power works in two ways. Light from the sun can generate a tiny current in silicon crystals, creating a solar cell, which is used to run space satellites and in the future could provide electricity from space power stations. Solar panels, or the larger industrial solar furnace, generate heat directly through concentrating solar energy in a small area. Solar power is renewable, non-polluting and potentially an important energy source, but its value is limited by weather, region and the cost of raw materials.

Scientists Spy Enzyme That Makes Us Unique¹. by Clare Elsley.

ScienceDaily (Oct. 17, 2007) — Have you ever wondered why you inherited your mother's smile but not your father's height? Researchers at the Universities of Leeds and Dundee are one step closer to unraveling how nature combines both maternal and paternal DNA to create genetically unique offspring.

In a world first, Leeds researchers Professor Simon Phillips, Dr Stephen Carr and Dr Jonathan Hadden, together with Professor David Lilley at Dundee, have mapped the 3 dimensional structure of an enzyme responsible for splitting DNA strands – a process at the heart of human individuality.

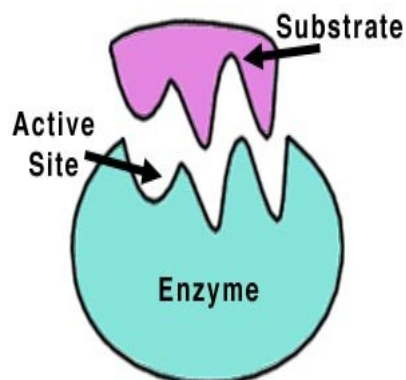
The discovery of the T7 endonuclease 1 enzyme's structure was made by using x-ray crystallography techniques. The enzyme is derived from a bacteriophage – a naturally occurring virus-like agent that attacks bacteria – but the molecular processes are expected to be similar in other organisms, including humans.

“Whilst the enzyme was known to play a central role, its physical structure, which is crucial to understanding the splitting process, has never been seen before. We've now got a 3D picture of it at work, and seen it at the point at which it is about to cut through the DNA strands. This is a major breakthrough in investigating the fundamental mechanisms at work behind the formation of a person's DNA and how viruses replicate their DNA in the body,” says Professor Phillips.

In humans, this process starts at conception when maternal and paternal DNA strands join together at random points in their sequence(1). Enzymes such as T7 endonuclease 1 are then responsible for severing the strands at this junction, thus creating a third, unique DNA sequence for the offspring.

However, Professor Phillips says it will be some time before this process can be observed in humans. “It's too important a discovery to rush. Our next step is to examine the process in a more complex system than bacteriophage, such as yeast,” he says.

The work is the result of a long collaboration between the research groups at Leeds and Dundee and has been funded by the Wellcome Trust and the Biotechnology and Biological Sciences Research Council (BBSRC) and Cancer Research UK.



6. Fill in the gaps with the right prepositions².

Enzymes are proteins, which themselves are long chains amino acids. Each enzyme is specific the substrate which it acts. The substrate is the substance that is present the beginning the chemical reaction. The substance which is made the enzyme is called the product. example, the digestive enzyme amylase, which is found saliva, acts the substrate to make glucose.

Each enzyme has a particular temperature range and pH which it works best. If an enzyme is subjected extremes pH or excessive temperatures, irreversible changes can occur the 3-dimensional structure the enzyme which can also affect the active site. This leads the denaturation the enzyme.

7. Listening/Watching.

What uses of enzymes do you know?

Watch the video (0-4.45) and note down all possible uses of enzymes that are mentioned.

5) Speaking: In pairs, summarize all that you have learnt about enzymes today.

Sources: ¹ Available at: <http://www.sciencedaily.com/releases/2007/10/071017131857.htm>

² Adapted from Wikipedia

³ Available at <http://www.youtube.com/watch?v=E90D4BmaVJM>

Lesson adapted from Milada Pavlovová.