

# MODULE: Cells

## Activity Sheet 1.5: The story so far

It is important that we understand the research that our client, Paul and his team, are carrying out, and the breakthroughs they have made so far. The following is an article from a popular science magazine about the discovery the team have made so far! I have suggested some tasks for you to complete when you have read the article.

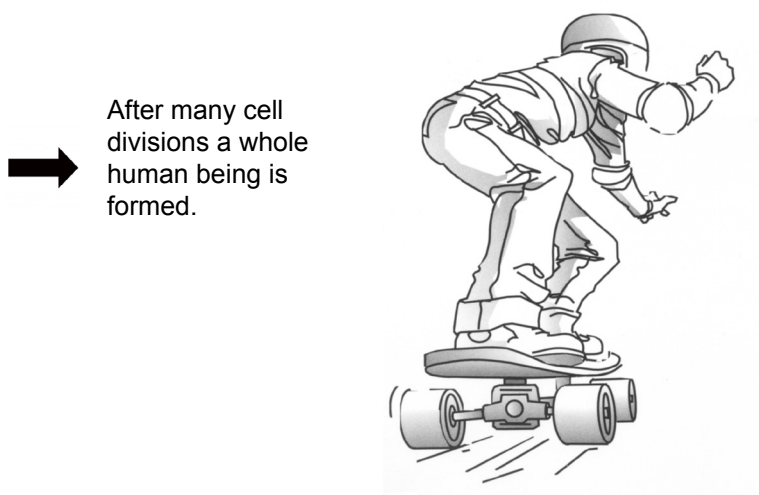
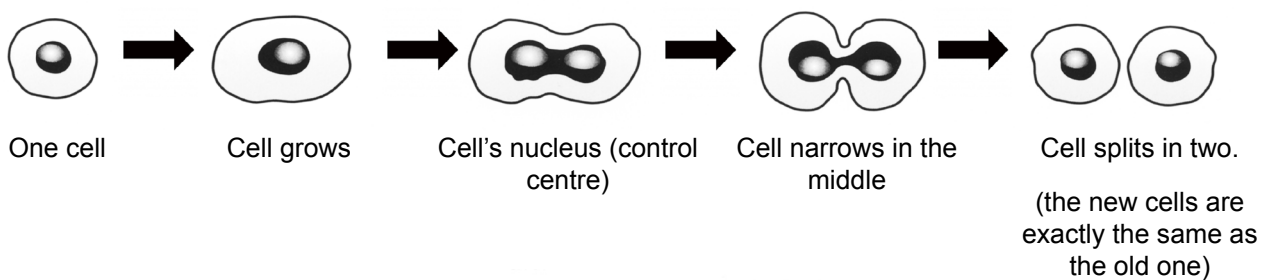
## To divide or not to divide

Sir Paul Nurse and other scientists working in the UK and America have made a significant breakthrough in their research on cancer and how cell division is controlled.

All living things grow. When they do their cells get bigger and bigger. When the time is right they reproduce by splitting in two to form two new cells. This process is called cell division. Sir Paul Nurse wanted to understand more about how this process is controlled so he carried out experiments on yeast cells.

Cell division is the process that takes place when one cell makes another cell. We all start off as just one single tiny cell - a newly fertilised egg cell. After many, many divisions an embryo is formed.

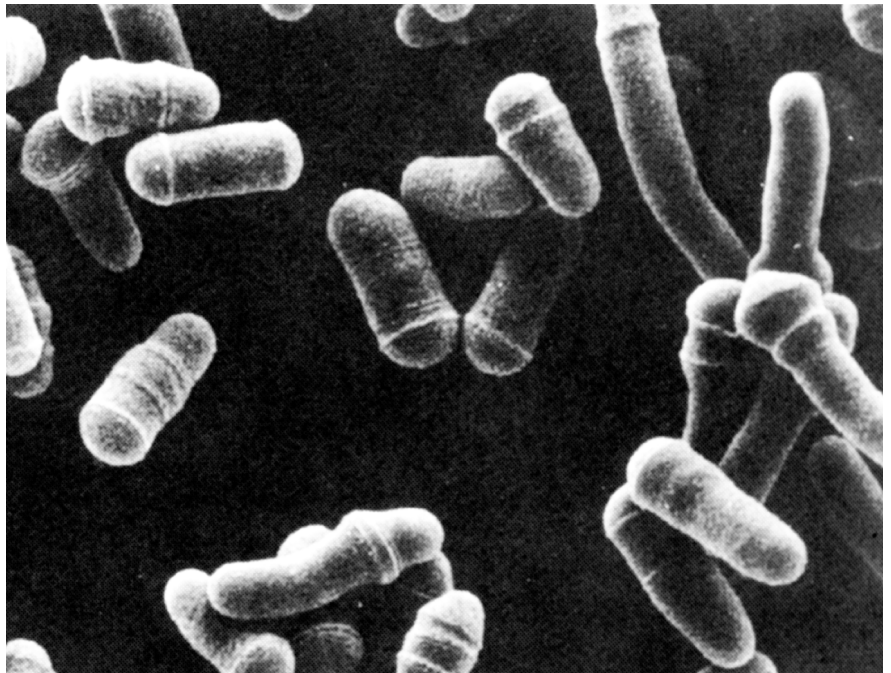
A fully-grown human is made up of over a million, million cells.



Paul is trying to find out how cell division is controlled, because sometimes this process goes wrong in the human body. This causes a disease called cancer.

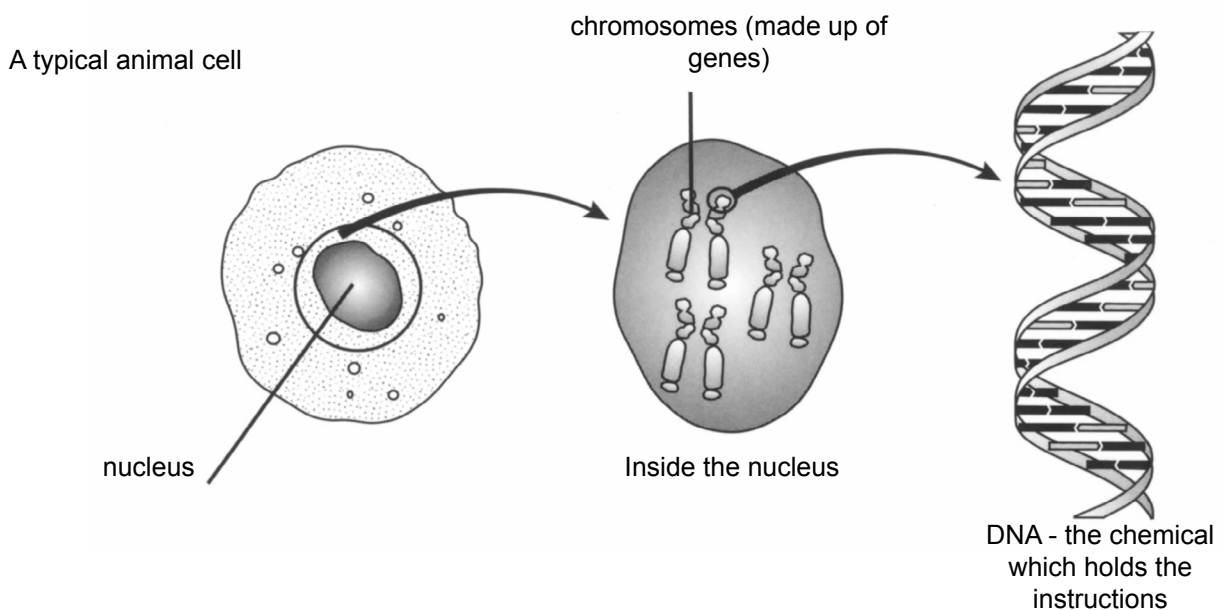
He has worked with scientists from around the world such as Leland Hartwell, a scientist working in America, and Timothy Hunt from the UK.

Together they have shown how living things control cell division with the hope of working out ways to treat and prevent cancer.



Paul studies one of the smallest of all living things - yeast. Yeast is a very useful microorganism. It is used in making bread and beer. More importantly it can be grown easily and quickly in a laboratory Paul carries out his experiments using a special type of yeast called fission yeast. Fission means to split. So, to make a new cell, a yeast cell just splits into two!

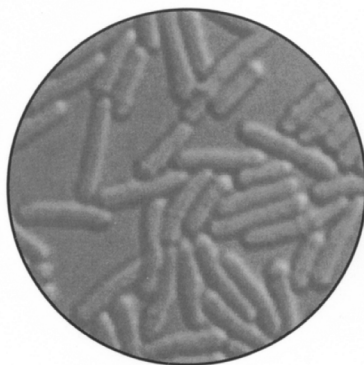
Paul knows that inside every cell there is a nucleus. The nucleus controls all the activities of the cell. The nucleus contains structures called genes. Genes are sections of DNA. This is a chemical that contains the instructions needed for a healthy cell to grow. These instructions tell the cell to divide, stop dividing and eventually die.



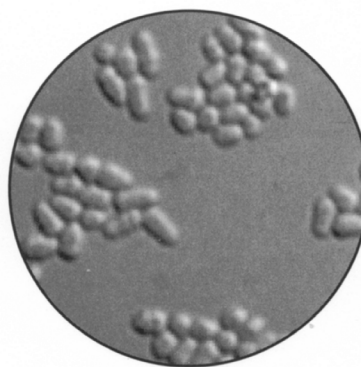
Paul added a substance, a mutagen, to the yeast cells. The mutagen damaged the DNA. After he had treated the cells he left them to grow. When he looked at the cells with a microscope this is what he saw.



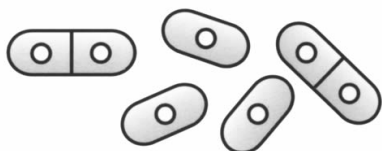
yeast cells without treatment



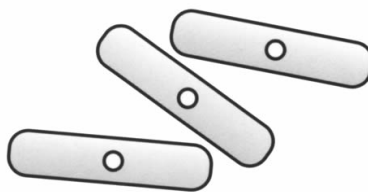
yeast cells with treatment



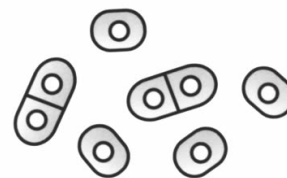
Paul soon realised that the section of DNA he had damaged must control how the yeast cell divides. He had produced mutant yeast cells. He gave the two types of mutants a name.



normal cells



cdc mutants



wee mutants

By doing this he discovered a particular gene. This gene controls how the yeast cell divides. This gave him an idea. He thought that the same gene might be found in all living cells.

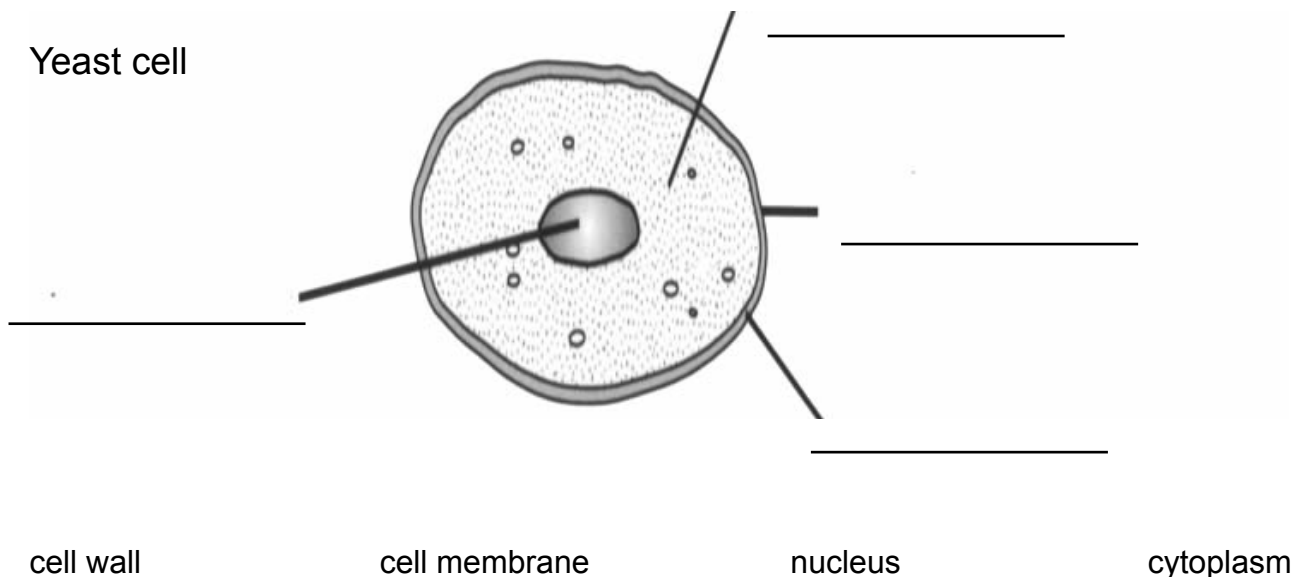
Meanwhile, in Canada and the USA, scientists were carrying out similar experiments on other living things. They compared their results and agreed - all living things, including humans, control cell division in the same way.

Healthy human cells behave in a very controlled way. They grow, divide, stop dividing and eventually die. In cancer, this process goes wrong. Paul can now use the yeast cells to study how a cancer cell divides and grows into a tumour. A tumour is a swelling or growth that can occur almost anywhere in the body. The yeast cells may help scientists, like Paul, find new ways to treat and prevent cancer.

Discuss the following questions and write the answers in your research log.

1. What is cell division?
2. What is the normal process of cell division?
3. What experiment did Paul carry out?
4. What were the outcomes of the experiment?
5. What did he discover?
6. Why did the scientists decide to carry out the experiments on other living things?
7. Why are yeast cells useful in the search to find new ways of treating cancer?

The drawing below shows a diagram of a yeast cell. It contains many of the same parts as plant and animal cells. Label the diagram by choosing words from the list. A yeast cell also has a cell wall.



Paul made some notes about the experiment with yeast cells. Complete the sentences below.

I carried out my experiment using \_\_\_\_\_ cells. I treated the cells with a chemical which damages the DNA inside the \_\_\_\_\_. When I looked at the cells using a \_\_\_\_\_ I noticed that some cells looked very small and other cells looked very \_\_\_\_\_. I think that the smaller cells have divided too \_\_\_\_\_ and that the larger cells have not at all.