

## Activity I

# Living Cells

Christine Harrison  
King's College, University of London

## Introduction

Pupils usually find it easy to locate information about scientists and the work that they have done in books and on the Internet. However, they often find it difficult selecting relevant information and tend to extract description about the scientist rather than explanations of the importance of the scientist's work in taking ideas forward. Constructing questions forces learners to look at work at a deeper level. Studies have shown that children who wrote and answered each other's exam questions did better in the final tests than those who had spent an equal amount of time answering exam questions. This activity also utilises modelling of the idea before pupils improve a first attempt at devising questions and also incorporates peer assessment.

## Objectives:

Pupils will learn about the evidence supporting cell theory.

## Outcomes

By the end of the lesson, pupils will be able to:

- construct ideas and evidence questions;
- read for understanding;
- describe how ideas about cells have developed.

## Notes for Teachers

The activity uses 'Observing Cells', p132 from Thinking Through Science, Book 1. This has been provided on the CD-ROM by kind permission of John Murray Publishers Ltd.

## Teaching Sequence

- Give out *Living Cells* handout (pupil activity sheet 1) either at start of lesson or for a previous homework.
- Ask pupils to read and then individually write 4-6 questions that would show that someone understood this piece of text.
- Get pupils to work in pairs to look at *Observing Cells* (p132 Thinking Through Science: Book 1) and work out the answers.
- Get pupils to look at questions and decide what type of question each is. Can they categorise them?
- Class discussion about categorisation in relation to ideas and evidence. Possible categories might be:
  - Questions that ask about the scientist
  - Questions that ask about what the scientist found out
  - Questions that ask about how ideas have changed
- Extension: Think of some other questions that you could ask about *Observing Cells* and decide which category of question they are.
- Pupils look at their partner's questions on *Living Cells* and categorise the questions. They then negotiate and check in pairs. For any category that has no or few questions, they write questions in pairs. Class feedback involves selecting questions for each category and deciding how useful it is.
- **Extension/HW**  
Pupils swap questions with other class members and read *Living Cells* again and answer the questions that they have been given.

## Living Cells

A chemist, Stanley Miller, carried out an experiment in the 1950's that hints at how living things might have been made. First, he tried to create the conditions on Earth before life began. He filled a large glass container with a mixture of the gases thought to make up the early atmosphere over three billion years ago. The glass container was connected to a jar of boiling water. This modelled the warming of the Earth's oceans and production of water vapour. The atmosphere and water vapour were allowed to travel along a cooled pipe so that the vapour condensed and fell back as rain. Lightning was also created from sparks jumping between two wires.

Miller left his "model Earth" bubbling away for a week before switching it off and sampling the liquid to see what chemicals were now present. His results were remarkable! In addition to the chemicals that he had used, he found several others, including amino acids. Amino acids are the building blocks of protein. From his results Miller suggested that this was how life on Earth might have begun. First amino acids formed, then proteins, and then living things made of proteins. Fossils show that life existed on Earth nearly 3.5 billion years ago.

Robert Hooke, an English scientist, first described and named cells in 1665, when he looked at a slice of cork under a microscope. However, it was not until nearly two hundred years later that the true significance of cells was understood. Theodor Schwann, a German biologist, was one of the first scientists to realise that animals, as well as plants, were made of these tiny units called *cells*. Schwann helped to develop the **cell theory**, which states that all organisms are made up of one or more cells, that cells are the basic living units and that cells are formed by the division of other cells.

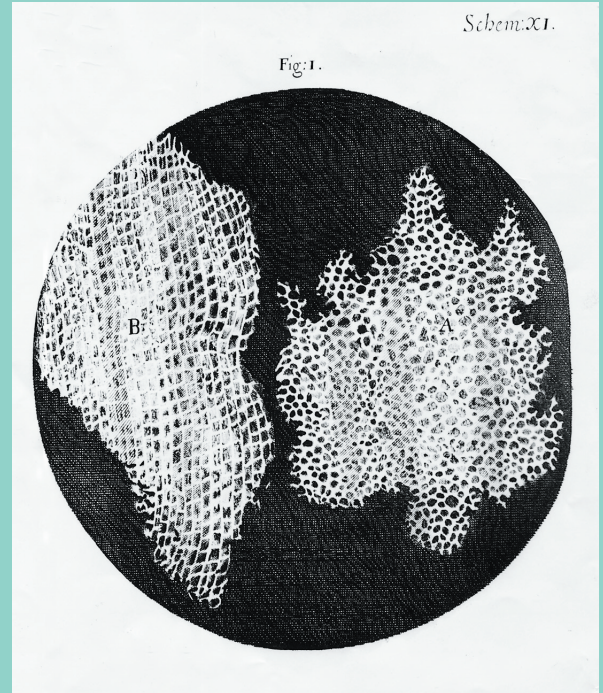
The cell theory still holds today. However, we do know that a few organisms do not fit with this theory. These are fungi that have units a bit like cells, except that the cytoplasm is connected from part to part.

## Key words

- \* microscope
- \* cell

## Observing cells

Science and technology often work together. In the 1660s, the first **microscopes** were invented. Scientists, for the first time, were able to see things that were too small to see with their eyes alone. One of the first men to build and use a microscope was Robert Hooke (1635–1703), who worked at the Royal Society for Science. He was an astronomer, physicist and naturalist. He wrote a book that included the first illustrations of what various objects looked like under a microscope. One of the materials that Robert Hooke studied with his microscope was cork that is found under tree bark. Hooke noticed that the cork was made up of tiny boxes. These reminded him of the rows of monk's rooms in a monastery, and so he called each little box a **cell**.



- 1 When was Robert Hooke born?
- 2 How old was Robert Hooke when he died?
- 3 Robert Hooke was an astronomer, physicist and naturalist. Explain what is studied in each of these areas of science.
- 4 What word would we use instead of naturalist today?
- 5 How did the fact that Hooke studied three areas of science help with the invention of the microscope?
- 6 What was special about the book that Hooke produced?
- 7 Why did Hooke choose the word cell for the small units he saw when he looked at plant material with his microscope?