*Biology > Big idea BCL: The cellular basis of life > Topic BCL1: Cells > Key concept BCL1.3: Cell shape and size*

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| **Response activity** |
| **Giant cells** |

**Overview**

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| Learning focus: | Cells are usually too small to be seen without a microscope, but have a range of three-dimensional shapes and sizes. |
| Observable learning outcome: | Recall that most (but not all) cells are too small to be seen without a microscope. |
| Activity type: | Challenge to thinking – demonstration |
| Key words: | cell |

This activity can be used after the following diagnostic question in order to challenge students’ thinking about the size of cells by demonstrating that while most cells are too small to be seen without a microscope there are some exceptions that can be seen with the naked eye:

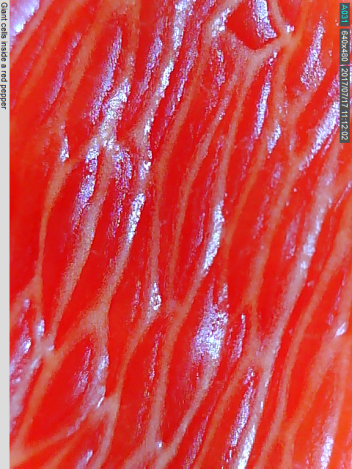
* Diagnostic question: Too small to see?

**What does the research say?**

A number of researchers have reported that children aged 11-16 lack an appreciation of size and scale, and that this impacts their understanding of the relative sizes of cells and other biological structures (e.g. Arnold, 1983; Dreyfus and Jungwirth, 1988; Driver et al., 1994).

Dreyfus and Jungwirth (1989) acknowledge that the cell is, when first introduced, an abstract concept. When introducing ideas about cells, several sources advocate starting with hands-on light microscopy of cells from a range of tissues and organisms, to enable students to build their own understanding of the size of cells and what they look like (AAAS Project 2061, 2009; Skinner, 2011).

**Ways to use this activity**

This simple demonstration can be used to challenge students’ thinking about the size of cells, using the giant cells present in the wall (pericarp) of a bell pepper.

The fruit develops from the ovary of a fertilised flower. The wall of the fruit is called the pericarp and consists of several different tissues: epidermis (outermost, waxy layer), hypodermis, mesocarp, giant cells and endocarp (innermost layer).

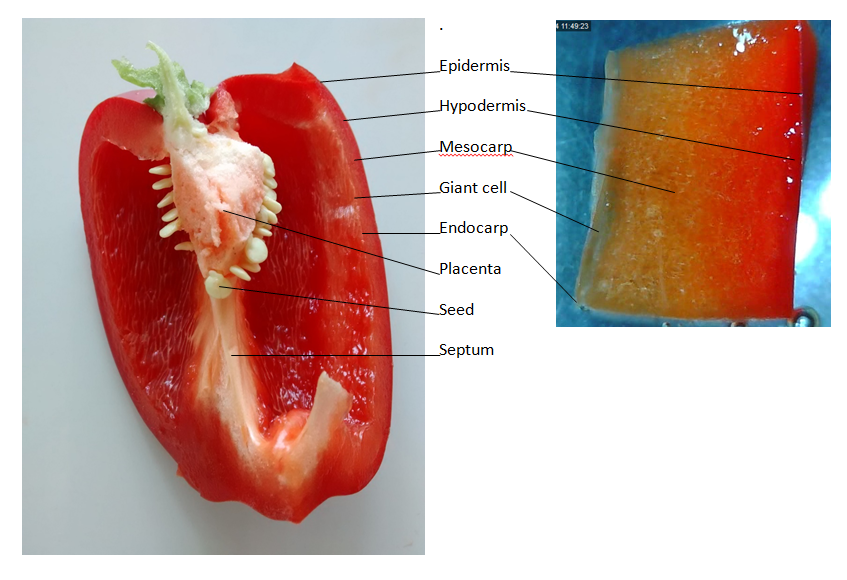
Cut open a bell pepper and allow students to closely observe the structure of the inside wall of the fruit. Long, thin structures can be seen with a hand lens or even with the naked eye – these are the giant cells.

It be helpful to use a visualiser or similar technology to project an image of the giant cells in the pepper for the whole class to see.

Explain to students that most plant cells are between 0.01 mm and 0.1 mm (10–100 μm) in diameter, but the giant cells in a bell pepper can be up to 50 mm (50,000 μm / 5 cm) long. These giant cells are important in making the fruit succulent as they have a high cell volume, very elastic cell walls, and water can enter them easily.

The giant cells are covered with a thin layer of much smaller (regular sized!) cells which make up the endocarp layer; these could only be seen using the high power objective lens of a light microscope.

If a giant cell is pressed with the end of a mounted needle it may burst, releasing its watery sap contents.



Note: students may ask whether the juicy, cell-like structures that make up the edible segments of citrus fruits are also giant cells. These are not giant cells; they are juice vesicles, which are multi-cellular structures.

**Equipment**

For teacher demonstration to the class:

* bell pepper (*Capsicum annuum*)
* knife or scalpel
* mounted needle (optional)
* visualiser (optional)

**Technician notes**

Bell peppers are widely available from greengrocers and supermarkets.

The pepper(s) should be stored in a plastic box or bag in the refrigerator prior to use, to minimise dehydration and help ensure the giant cells look big and plump when the pepper is cut open.

**Health and safety**

Check for known allergies to bell pepper in the class, and wear appropriate personal protective equipment when handling the pepper tissue if you are aware that you are allergic to it. CLEAPSS Student Safety Sheet 74 provides information about assessing the risk posed by plant material.

Care must be taken when using sharp instruments such as knives, scalpels and mounted needles.

Practical work should be carried out in accordance with local health and safety requirements, guidance from manufacturers and suppliers, and guidance available from CLEAPSS.

**Acknowledgments**

Adapted by Alistair Moore (UYSEG) from the *Science and Plants for Schools* (SAPS) activity “Osmosis in bell pepper pericarp tissue” by Bev Goodger.

Images: SAPS/Bev Goodger

**References**

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