

## Science on a Sphere: Attack of the Giant Cell

### LESSON #: 3

TITLE: Cells: How Can They Help Organisms to Survive?

OVERVIEW: Students research specific cells from different body structures that contribute to the organisms' ability to survive and reproduce. They diagram the cells or tissues and determine what is unique about them and how they help to fulfill a special function.

KEY CONCEPTS: Special adaptations that help organisms survive and reproduce are many and they vary a great deal. By examining a single characteristic, they can examine what is special or unusual about the cells and tissues that makes them "good" for that job, and different from "typical" plant or animal cells.

GRADE LEVEL: 7

#### BENCHMARK(S):

SC 7.4.2 Describe the basic structure of various types of cells (e.g., muscle, nerve, bone).

SC 7.5.4 Analyze how organisms' body structures contribute to their ability to survive and reproduce.

#### TEACHER BACKGROUND:

Different cells and tissues have very specific contents and structures to make them "good" for the job they do in an organism. There may be different substances or organelles in a certain type of cell or tissue, such as toxins that keep browsers from eating them, how frogs' eggs are adapted to water, or how pine pollen floats in the air.

DURATION: as a homework assignment & then an in-class presentation.

#### VOCABULARY: From the American Heritage Science Dictionary

**Cell:** The basic unit of living matter in all organisms, consisting of protoplasm enclosed within a cell membrane. All cells except bacterial cells have a distinct nucleus that contains the cell's DNA as well as other structures (called organelles) that include mitochondria, the endoplasmic reticulum, and vacuoles. The main source of energy for all of a cell's biological processes is ATP.

**Tissue:** A large mass of similar cells that make up a part of an organism and perform a specific function. The internal organs and connective structures (including bone and cartilage) of vertebrates, and cambium, xylem, and phloem in plants are made up of different types of tissue.

**Organelle:** A structure or part that is enclosed within its own membrane inside a cell and has a particular function. Organelles are found only in eukaryotic cells and are absent from the cells of prokaryotes such as bacteria. The nucleus, the mitochondrion, the chloroplast, the Golgi apparatus, the lysosome, and the endoplasmic reticulum are all examples of organelles.

Some organelles, such as mitochondria and chloroplasts, have their own genome (genetic material) separate from that found in the nucleus of the cell. Such organelles are thought to have their evolutionary origin in symbiotic bacteria or other organisms that have become a permanent part of the cell.

**Adaptation:** A change in structure, function, or behavior by which a species or individual improves its chance of survival in a specific environment. Adaptations develop as the result of natural selection operating on random genetic variations that are capable of being passed from one generation to the next. Variations that prove advantageous will tend to spread throughout the population.

**Survival:** The act or fact of surviving, esp. under adverse or unusual circumstances. Especially to reproduce the next generation.

**Reproduction:** The process by which cells and organisms produce other cells and organisms of the same kind. (1) The reproduction of organisms by the union of male and female reproductive cells (gametes) is called **sexual reproduction**. Many unicellular and most multicellular organisms reproduce sexually. (2) Reproduction in which offspring are produced by a single parent, without the union of reproductive cells, is called **asexual reproduction**. The fission (splitting) of bacterial cells and the cells of multicellular organisms by mitosis is a form of asexual reproduction, as is the budding of yeast cells and the generation of clones by runners in plants. Many plants and fungi are capable of reproducing both sexually and asexually, as are some animals, such as sponges and aphids.

**Structure:** (1) The arrangement or formation of the tissues, organs, or other parts of an organism. (2) A tissue, an organ, or other formation made up of different but related parts.

**Function:** (1) The physiological property or the special action of an organ or a body part. (2) Something closely related to another thing and dependent on it for its existence, value, or significance, such as growth resulting from nutrition.

#### MATERIALS NEEDED:

Materials for drawing (colored pencils, markers, paints)

#### PROCEDURE:

Start with a discussion about plant and animal adaptations, both physical and behavioral. Have them pick something they are interested in and do the research. Have them do a drawing of the tissues or cells involved. Have them write up what is unusual—thick cell walls for protection or structure; chromoplasts for coloring; alkaloids to deter predators; puffy red chests for mating dances, etc.

Have them choose more than one idea, in case they hit a dead end.

#### RESOURCES:

Web:

<http://www.innerbody.com/htm/body.html>

<http://www.anatomy.com/>

<http://www.netanatomy.com/>

<http://www.virtual-anatomy.com/>

Print:

Any basic biology text