

Science on the Sphere: Attack of the Giant Cell

LESSON #: 4

TITLE: The Literary Cell; You, Me and Da Tree

OVERVIEW:

Research what happens to a particular cell/tissue/organ/organ system when some type of disease or illness invades. Write it up in correct scientific fashion, then as some type of literary work (poem, Icelandic saga, Hawaiian oli, detective story, ...). Compare and contrast. See how creative you can be. Discuss what might be the value of a more literary work.

KEY CONCEPTS:

Students learn how plants and animals are affected by viruses.
They will also express themselves in scientific and literary fashion.

STANDARD(S)-BENCHMARK(S):

SC 7.4.3 Describe the levels of organization in organisms

LA 7.4.1 Write in a variety of grade-appropriate formats for a variety of purposes and audiences (narrative, poem, report, letters, statements, responses to literature, functional pieces, learning/problem solving pieces)

TEACHER BACKGROUND:

Viruses occupy a special taxonomic position: they are not plants, animals, or prokaryotic bacteria (single-cell organisms without defined nuclei), and they are generally placed in their own kingdom. In fact, viruses should not even be considered organisms, in the strictest sense, because they are not free-living; i.e., they cannot reproduce and carry on metabolic processes without a host cell.

All true viruses contain nucleic acid—either DNA (deoxyribonucleic acid) or RNA (ribonucleic acid)—and protein. The nucleic acid encodes the genetic information unique for each virus. The infective, extracellular (outside the cell) form of a virus is called the virion. It contains at least one unique protein synthesized by specific genes in the nucleic acid of that virus. In virtually all viruses, at least one of these proteins forms a shell (called a capsid) around the nucleic acid. Certain viruses also have other proteins internal to the capsid; some of these proteins act as enzymes, often during the synthesis of viral nucleic acids. Viroids (meaning “viruslike”) are disease-causing organisms that contain only nucleic acid and have no structural proteins. Other viruslike particles called prions are composed primarily of a protein tightly complexed with a small nucleic acid molecule. Prions are very resistant to inactivation and appear to cause degenerative brain disease in mammals, including humans.

Viruses are quintessential parasites; they depend on the host cell for almost all of their life-sustaining functions. Unlike true organisms, viruses cannot synthesize proteins, because they lack ribosomes (cell organelles) for the translation of viral messenger RNA (mRNA; a complementary copy of the nucleic acid of the nucleus that associates with ribosomes and directs protein synthesis) into proteins. Viruses must use the ribosomes of their host cells to translate viral mRNA into viral proteins.

Viruses are also energy parasites; unlike cells, they cannot generate or store energy in the form of adenosine triphosphate (ATP). The virus derives energy, as well as all other metabolic functions, from the host cell. The invading virus uses the nucleotides and amino acids of the host cell to synthesize its nucleic acids and proteins, respectively. Some viruses use the lipids and sugar chains of the host cell to form their membranes and glycoproteins (proteins linked to short polymers consisting of several sugars).

The true infectious part of any virus is its nucleic acid, either DNA or RNA, but never both. In many viruses, but not all, the nucleic acid alone, stripped of its capsid, can infect (transfect) cells, although considerably less efficiently than can the intact virions.

The virion capsid has three functions: (1) to protect the viral nucleic acid from digestion by certain enzymes (nucleases), (2) to furnish sites on its surface that recognize and attach (adsorb) the virion to receptors on the surface of the host cell, and, in some viruses, (3) to provide proteins that form part of a specialized component which enables the virion to penetrate through the cell surface membrane or, in special cases, to inject the infectious nucleic acid into the interior of the host cell. <http://www.britannica.com/eb/article-910600/virus>

Plant virus-any of a number of agents that can cause plant disease. Plant viruses are of considerable economic importance because many of them infect crop and ornamental plants. Numerous plant viruses are rodlike and can be extracted readily from plant tissue and crystallized. The majority of them lack the fatty membrane found in many animal viruses, and all contain ribonucleic acid (RNA).

Plant viruses are transmitted in a number of ways, the most important of which is through insect bites, primarily by aphids and plant hoppers. One of the most well-studied viruses, tobacco mosaic virus (TMV), is spread mechanically by abrasion with infected sap. Symptoms of virus infection include colour changes, dwarfing, and tissue distortion. The appearance of streaks of colour in certain tulips is caused by virus. <http://www.britannica.com/eb/article-9060313/plant-virus#cite>

DURATION: 3-5 class periods self study time not included. The three class periods include, introduction, assistance in research, and review time.

VOCABULARY:

Cell: cell ((biology) the basic structural and functional unit of all organisms; they may exist as independent units of life (as in monads) or may form colonies or tissues as in higher plants and animals)

Virus: **virus** ((virology) ultramicroscopic infectious agent that replicates itself only within cells of living hosts; many are pathogenic; a piece of nucleic acid (DNA or RNA) wrapped in a thin coat of protein)

Icelandic Saga: The Icelandic Sagas are prose histories describing mostly events that took place in Iceland during the Age of Settlement. They are written in Old Norse in Iceland during the 12th to 15th centuries and mostly during the centre of that epoch.

en.wikipedia.org/wiki/Icelandic_Sagas

Hawaiian Oli: a Hawaiian Chant.

Types of poems...

Haiku: Japanese non-rhyming poem.

Five syllables

Seven syllables

Five syllables

Cinquain: A Cinquain has 5 lines-based on the number of syllables or words:

the title 2 syllables

a description of the title in 4 syllables or words

a description of the action in 6 syllables or words

a description of the feeling on 8 syllables or words

another word for the title in 2 syllables or words

Free verse: A fluid form of poetry, which conforms to no set rules.

In Acrostic poems, the first letters of each line are aligned vertically to form a word. The word often is the subject of the poem.

Rhymes - There are several rhyming poetry forms. Couplets are poems with two rhyming lines. Triplets have three rhyming lines. Combinations use a variety. For example, every line may rhyme with a couplet at the end. Limericks are fun poems that combine a couplet with a triplet. Lines 1, 2 & 5 rhyme with each other. Lines three and four rhyme.

MATERIALS NEEDED:

Books on viruses

Pictures/slides of viruses

List of viruses

PROCEDURE:

This is a lesson to extend the students knowledge of cells and body systems. It is better if this follows a lesson on cells.

- 1) Introduce the topic of virus, illness and disease.
- 2) Find out what they know about viruses.
- 3) Show students a variety of pictures and slides regarding viruses. Don't forget to use both plant and animal examples.
- 4) Students research about viruses and their affect on cells. (lists for the names of different types of plant and animal viruses)
- 5) Instruct the students in writing the information found in a brief scientific report.
- 6) Write the information in a different literary medium. (Poem, Icelandic Saga, Hawaiian Oli, Mystery...)
- 7) Compare the two styles.

EXTENDED ACTIVITIES: [optional]

Act it out: make hand puppets, shadow puppets, stick figures, and explain what happens to cells when they meet viruses.

Use a variety creative of ways to explain what happens to viruses and cells, where did they meet, what happens when they first meet, where and how did it go wrong, it maybe be a tragedy or comedy.

RESOURCES:

Web: <http://wordnet.princeton.edu/>
[http://medical-dictionary.thefreedictionary.com/Virus+\(biology\)](http://medical-dictionary.thefreedictionary.com/Virus+(biology))
http://101science.com/xxxxxvirus_link.htm virus links
<http://image.fs.uidaho.edu/vide/refs.htm> Plant virus online
<http://image.fs.uidaho.edu/vide/sppindex.htm> list of plant viruses
<http://www.innerbody.com/htm/body.html> information about different body systems