



APS Science Curriculum Unit Planner

Grade Level/Subject	Biology – Cell Structure and Function
Stage 1: Desired Results	
Enduring Understanding	
All organisms are composed of cells that carry on the many functions needed to sustain life.	
Correlations	
Unifying Understanding	(3) Form and composition are related to function. (4) Our world is comprised of a multitude of interrelated systems.
VA SOL	BIO.2 The student will investigate and understand the history of biological concepts. Key concepts include a) evidence supporting the cell theory; BIO.4 The student will investigate and understand relationships between cell structure and function. Key concepts include a) characteristics of prokaryotic and eukaryotic cells; b) exploring the diversity and variation of eukaryotes; c) similarities between the activities of a single cell and a whole organism; and d) the cell membrane model (diffusion, osmosis, and active transport).
NSES (grade level)	C.1.1 Cells have particular structures that underlie their functions. Every cell is surrounded by a membrane that separates it from the outside world. G.1.1 Individuals and teams have contributed and will continue to contribute to the scientific enterprise. G.3.3 Occasionally, there are advances in science and technology that have important and long-lasting effects on science and society. Science as Inquiry A.1.1, A.1.2, A.1.4
AAAS Atlas	<ul style="list-style-type: none"> • A living cell is composed of a small number of chemical elements mainly carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur. Carbon, because of its small size and four available bonding electrons, can join to other carbon atoms in chains and rings to form large and complex molecules. 5C/H8 • Every cell is covered by a membrane that controls what can enter and leave the cell. 5C/H1a • In all but quite primitive cells, a complex network of proteins provides organization and shape and, for animal cells, movement. 5C/H1b • Within the cells are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, passing information, and even movement. 5C/H2a • In addition to the basic cellular functions common to all cells,

	<p>most cells in multicellular organisms perform some special functions that others do not. 5C/H2b</p> <ul style="list-style-type: none"> • The work of the cell is carried out by the many different types of molecules it assembles, mostly proteins. Protein molecules are long, usually folded chains made from 20 different kinds of amino acid molecules. The function of each protein molecule depends on its specific sequence of amino acids and its shape. The shape of the chain is a consequence of attractions between its parts. 5C/H3
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Essential Questions

- What is a cell?
- How can we prove cells exist?
- How did technology aid in the building of Cell Theory?
- How are models used to build ideas?
- How do cells maintain homeostasis in single-celled and multicellular organisms?
- How does an organelle’s structure allow it to do its job?
- How are specialized cells similar and different from single-celled organisms?
- How are cells like ecosystems?
- If we are all made of cells, why don’t we all look alike? Why are there so many different types of cells? If cells come from other cells, where did the first one come from?
- How does a cell regulate what enters and leaves the cell?
- Where else in nature do we see movement across concentration gradients?

Knowledge and Skills

Students should know:

- 3.1 Cells are the basic unit of life.
- 3.2 Eukaryotic cells share many similarities.
- The different internal structural parts inside the cell that carries out specialized life functions.
- 3.3 The cell membrane is a barrier that separates a cell from the external environment.
- 3.4 Materials move across membranes because of concentration differences.
- 3.5 Cells use energy to transport materials that cannot diffuse across a membrane.

Students should be able to:

- Describe why cells are small.
- Summarize and describe the important discoveries that led to Cell Theory.
- Differentiate between eukaryotic and prokaryotic cells.
- Make a wet mount slide and properly use a microscope.
- Compare plant and animal cells.
- Describe the structure and function of cell organelles.
- Develop an analogy for the cell organelles and describe how the structure relates to its function.
- Describe the different ways substances can move across a cell membrane.
- Explain how cellular transport help maintain homeostasis within a cell.
- Compare and contrast diffusion and osmosis.

Stage 2: Assessment Evidence	
Prior Knowledge and Skills	
<ul style="list-style-type: none"> Review the concept of theory and theory development in science. Review the proper use of a microscope. Administer Ch 3 Diagnostic Test - Assessment Book pp.23-24. 	
Formative Assessment	Summative Assessment
<ul style="list-style-type: none"> Time line of Cell Theory Analogies for organelles Modeling activities Webquest: Organelle Dysfunction Interactive reviews @ClassZone.com Section quizzes 	<ul style="list-style-type: none"> Unit Project on p. 67 and in Unit Resources book, pp. 95-99, or Cell City Webquest: with links below to both the Webquest and additional materials. Unit Test
Stage 3: Learning Plan	
References to Adopted Materials	
<ul style="list-style-type: none"> Ch 3: Cell Structure and Function pp. 68-97. Use Lesson Plan Ch 3 pp. 18-24 for daily plans and suggestions for differentiation both by level and by interest. The Lab Binder Unit 2: Cells offers paper and electronic versions of investigations, mini-labs and practice sheets. 	
Suggested Investigations	
<ul style="list-style-type: none"> 3.1 Students create a time line or other representation of events leading to Cell Theory. Investigate scientific hypothesis of how the first cells arose and the evolution of eukaryotes (text pp. 370-374). 3.2 Develop analogies for the organelles and their functions. Options for Inquiry: Comparing Cells, p. 92 (note: current lab safety documents do not recommend using human cheek cells and questions or a lab regarding microscope magnification should be added) and Modeling the Cell, p. 93. Webquest: Organelle Dysfunction. 3.3 Modeling the Cell Membrane, p.83 and / or the Teacher Demo on pp. 68-69. 3.4 Design Your Own Investigation: Diffusion Across a Membrane, p. 88. 3.5 Animated Biology: Get through a Cell Membrane. 	
Outdoor Education Applications	
<ul style="list-style-type: none"> N/A 	
Resources	
Web Sites	
<ul style="list-style-type: none"> Online Biology at ClassZone.com Resources available after creating a login and password. Under Chapter 3: <ul style="list-style-type: none"> Animated Biology: (Under Ch 1:Cells through Different Microscopes), Cell Structures, Get Through a Cell Membrane Reviews Quizzes Webquest: Organelle Dysfunction SciLinks: Active Transport Teacher Toolkit: Webquest key 	

<ul style="list-style-type: none"> • Cell City Webquest: http://shs.westport.k12.ct.us/asr/Bio%202/webquests/Cell%20City%20page%201.htm • Supporting materials: http://virginiabiology.com/bio%20files/Microsoft%20Word%20-%20Unit%203%20cell%20city%20webquest.pdf
Videos
<ul style="list-style-type: none"> • The Magic of Cells (Allied Video, 1994) • National Geographic’s “Discovering the Cell”
Online clips
<ul style="list-style-type: none"> • Assignment Discovery: Cells (24:40) It’s been more than 350 years since the microscope was invented, but scientists still use it to see the world at a different scale. Take a larger-than-life look at human and plant cells, and watch these tiny building blocks of life in action. Observe how the body repairs damaged cells after an encounter with boiling water. (Discovery Streaming) • United Streaming/Discovery Education- Life Science: Cells
Field Trips
<ul style="list-style-type: none"> • None
Other
<ul style="list-style-type: none"> • None