

GLUE OR STAPLE SPACE

GLUE OR STAPLE SPACE



THE CELL & MODERN CELL THEORY

Caro



GLUE

OR STAPLE

SPACE

THE INTRODUCTION

Imagine shrinking down smaller than the eye can see-so small you could walk right into the building blocks of life. Welcome to the microscopic world of cells! In this unit, you'll explore what makes cells the most important part of every living thing-from tiny bacteria to the tallest trees and even you.

We'll kick things off by uncovering the Cell Theory-the big three ideas that explain how all life is built. Then, we'll zoom in on the two main types of cells: prokaryotic and eukaryotic. One is simple and ancient, while the other is complex and full of compartments (kind of like rooms in a house). You'll learn what sets them apart, and what they still have in common.

Next, we'll take a guided tour through the organelles, the "little organs" that keep cells alive and working. From the nucleus that holds your genetic blueprint, to the mitochondria that power the cell like a battery, each part has a special job. You'll even get to compare plant and animal cells and discover how structures like the chloroplast help plants make their own food!

By the end of this unit, you'll be able to:

- Explain the Cell Theory and why it's so important.
- Compare prokaryotic and eukaryotic cells like a true cell expert.
- Identify the parts of a cell and explain what each one does.

Whether you're solving mysteries about how your body works, or thinking about life on other planets, understanding cells is your first step. Get ready to explore life at its smallest-and most fascinating-level!

		Q	Aa	VOC	ABULARY
OR STAPLE SPACE	Vocabulary Word		De	efinition	
	autotrophs				
	cell				
	cell membrane				
GLUE	cell theory				
	cell wall				
	chloroplast				
	cytoplasm				



VOCABULARY CONTINUED

Vocabulary Word	Definition			Vocabulary Word	Definition	
eukaryote				mitochondrion		
endoplasmic reticulum		GLUE OR STAPLE	GLUE OR STAPLE	nucleus		
equilibrium				organelles		
Golgi bodies		SPACE		prokaryote		
heterotrophs				ribosome		
lipid bilayer				vacuole		
lysosome						

VOCABULARY CONTINUED

THE PHENOMENA



"The Red Frontier"

The hatch of the rover hisses open as you take your first step onto the rusty surface of Mars. Your boots crunch into the orange-red soil as you scan the empty horizon. The silence is unreal-no wind, no birds, just the distant hum of your life support system. You were only supposed to collect rock samples near Olympus Mons, but something strange catches your eye near a cluster of jagged basalt outcroppings.

A dark, pulsating mound sits half-buried in the dust. It's unlike anything in your mission training. The surface shimmers faintly, like it's coated in a thin film of slime, and tiny bubble-like pockets expand and collapse along its side. Is it moving... or are you just imagining it? You quickly pull out your sampling tool and secure a piece in a sterile container. Back in the Mars HAB, you prep your makeshift lab. This could be the discovery of the century-but first, you have to figure out: Is this growth alive?

The 8 Characteristics of Life

To be considered alive, an organism must exhibit all eight of these characteristics:

- Made of cells All living things are made of one or more cells.
- Reproduction Living things reproduce, either sexually or asexually.
- Based on a universal genetic code (DNA) Organisms use DNA to pass on traits.
- Growth and development All living things grow and change over time.
- Obtain and use energy Living things perform metabolism (chemical reactions to build or break materials).
- Response to environment Organisms respond to stimuli (light, sound, temperature, etc.).
- Homeostasis Living things maintain a stable internal environment.
- Evolution/adaptation Over generations, living things change and adapt to their environments.

In this unit, you'll learn how scientists define what "life" actually is, starting with cell theory -the idea that all living things are made of cells, and all cells come from other cells. Using the strange Mars growth as your mystery case, you'll explore how we use the 8 characteristics of life to decide what counts as living. Get ready to think like an astrobiologist, observe like a cell biologist, and uncover what it really means to be alive.



GLUE OR STAPLE SPACE

GLUE OR STAPLE SPAC

1. Based on your initial observations, list three characteristics of life you could test in the HAB to help determine if the Mars growth is living. Explain why each • "One characteristic of life I would test is _____ because • "Another important characteristic to test is _____. This helps us determine life by _____." • "A third characteristic I would investigate is ______ since 2. The Mars growth appears to respond to changes in light and temperature. Which characteristic of life does this suggest, and why does this matter in deciding if it's alive? "The characteristic of life this observation supports is ______. • "This matters because living things must be able to _____ • "If the growth responds to its environment, it suggests that 3. You break down a piece of the sample and place it under a microscope. Describe what you would be looking for at the cellular level to support the claim that this growth is alive. "Under the microscope, I would look for _____." • "If I observe _____, it would support the idea that the growth is made of cells." • "According to the Cell Theory, all living things _____, so this evidence would be important."



Discoveries



- In 1665, used a microscope to examine a thin slice of cork.
 - What he saw looked like
 - He called these boxes after the rooms that monks lived in.
- In 1673, _____ (a Dutch microscope
- maker), was first to view organisms (living things).
- Leeuwenhoek used a simple, handheld microscope to view pond water & scrapings from his teeth.
- In 1838, a German botanist named concluded that all plants were made of cells.
 - Schleiden is a cofounder of cell theory.
- In 1839, a German zoologist named concluded that all animals were made of cells.
- Schwann also co-founded cell theory.
- In 1855, a German medical doctor named

observed, under the

microscope, cells dividing.

He reasoned that all cells
come from other pre existing cells by cell
division.







- a. All liv
- b. Cells
 - orga
- c. Cells
 - divisi
 - What we Antonie theory?
 How did with anin
 Why is Rustep in the step in the A. How did cells?

]	
arts	
/ing things	
are the	in an
inism (basic unit of life)	
s come from the reproduction of	(cell
ion)	
at were some key scientific observations made by	Robert Hooke and

- Antonie van Leeuwenhoek that contributed to the development of the cell theory?
- 2. How did Matthias Schleiden's work with plants and Theodor Schwann's work with animals contribute to our understanding of cells?
- 3. Why is Rudolf Virchow's concept of "cellular pathology" considered a crucial step in the development of the cell theory?
- 4. How did the development of microscopes impact the discovery and study of cells?





• Factors Affecting Cell Size

(plasma membrane surface) is determined by multiplying length times width (L x W) of a cell is determined by multiplying length times width times height $(L \times W \times H)$ • Therefore, Volume increases FASTER than the surface

• When the surface area is no longer great enough to get rid of all the wastes and to get in enough food for

BASIC CELLULAR STRUCTURE

are cells that have a nucleus and membrane-

Includes protists, fungi, plants, and animals

More complex type of cells

Contain 3 basic cell structures:

• Once they get too large, then the cell must

• Therefore, the cells of an organism are close in size



2. How do parts of eukaryotic cells surrounded by membranes, called organelles, make these cells more complex?



- 4. How did finding the nucleus inside eukaryotic cells help us understand them better?
- 5. What do mitochondria and chloroplasts do in eukaryotic cells, and how are their jobs different?





Nucleoid region Chromosome (DNA)	KARYOTE
Some	Fimbriae
he basic units of organisms	llum
only be observed under microsco	ope
es of cells:	
ALL living things are made of cells	s, organisms may
– composed of one cell	
composed of many cells	s that may
ze into tissues etc	
be	
yotes include& lack a _	or
rane-bound structures called	
votes have	
that contains the P	NA

- 1. What makes prokaryotic cells different from other cells, and how are they unique?
- them function? 3. How do prokaryotic cells make more of themselves, and what are plasmids?

2. How do prokaryotic cells look inside, and what parts do they have that help

4. Can you name some places where we find prokaryotic cells, and what are they like?

5. How do prokaryotic cells get energy, and what do ribosomes do for them?

EUKARYOTES - "TRUE NUCLEUS"



- Found in the

STAPLE SPACE

GLUE OR :

GLUE OR STAPLE SPACE



proteins

• Characteristics:

Very small (Microscopic)

• Perform various functions for a cell

• May or may not be





- Powerhouse" of the cell.
- Generate cellular energy () Surrounded by a double membrane.
- Folded inner membrane called (increases surface area for more chemical reactions).
- Interior called
- Breaks down to release energy (ATP).
 - Active cells like have more mitochondria.
 - Both cells have mitochondria.
 - Site of
 - Has its own DNA.
 - Mitochondria come from cytoplasm in the egg cell during fertilization. You inherit your mitochondria from your mother!





und only in (organisms con <mark>taining chlorophyll)</mark>				
ontains its own DNA.				
ontains enzymes & for				
ever in or cells.				
irrounded by a double membrane.				
Outer membrane smooth.				
Inner membrane modified into sacs called				
Thylakoids in stacks are called and are				
interconnected.				
– gel like material surroundin <mark>g thylakoids.</mark>				
ade of proteins and rRNA.				
for cell.				
in amino acids together to make prot <mark>eins.</mark>				
ocess is called				
an be attached to				
Can be free (unattached) in the cyto <mark>plasm.</mark>				



d sacs for	
absent in animal cells.	
Is have a large	
oles in bacterial cells.	
store , Water	
ole	
es,	
Vacuole	
d in unicellular protists like	
water intake by pumping out excess	
neostasis).	
s the cell from lysing (bursting).	
	000
	//





SUMMARY

do. 3.What does the nucleus do?

1. What are the three main parts of the cell theory?

• Sentence Starter: The three parts of the cell theory are...

2. What is the main difference between prokaryotic and eukaryotic cells?

• Sentence Starter: Prokaryotic cells do not have a _____, but eukaryotic cells

• Sentence Starter: The nucleus...

4. What does the mitochondrion (mitochondria) do?

• Sentence Starter: The mitochondria...

5. What is the job of the cell membrane?

• Sentence Starter: The cell membrane...

6. Why are viruses not considered living?

• Sentence Starter: Viruses are not living because...

7. What do viruses need in order to reproduce?

Sentence Starter: Viruses must...

8. What are the 8 characteristics of living things?

• Sentence Starter: Living things all...

















ORGANELLE	DESCRIPTION
CELL WALL	
CELL MEMBRANE	
NUCLEUS	
CYTOPLASM	
MITOCHONDRIA	
ROUGH ER	
RIBOSOMES	
GOLGI BODY	
CHLOROPLAST	
VACUOLES	
LYSOSOMES	