



Republic of the Philippines  
Department of Education  
Region IV (A) – CALABARZON  
**Schools Division Office of Antipolo**  
District I – A



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## **STUDENT's ACTIVITY SHEET (SAS) FOR GENERAL BIOLOGY 1**

### **STUDENT's ACTIVITY SHEET FOR MELC 1 (MODULAR MODALITY)**

**TITLE/LESSON: CELL THEORY**

**1.OBJECTIVES:** At the end of the lesson, you are expected to:

- describe the tenets of spontaneous generation;
- explain the postulates of the cell theory; and
- name some scientist who worked for the formulation of the cell theory

**A. Content Standard:**

The learners/students demonstrate understanding of cell theory.

**B. Performance Standard:**

The learners/students should be able construct a 3D model of a plant/animal/ bacterial cell using recyclable materials

**C. Most Essential Learning Competency/ies:**

Explain the postulates of the cell theory. **(STEM\_BIO11/12-la-c-1)**

## **II: LEARNING RESOURCES**

- Materials/IMs Needed
- References
- Additional Materials and Learning Resources

## **III: TIME FRAME: 100 minute or 2 days (30 min will be allotted for the lecture part)**

## **IV: INTRODUCTION/RATIONALE**

Welcome to the General Biology 1 Alternative Delivery Mode (ADM) **STUDENT's ACTIVITY SHEET (SAS)** on **Cell Theory!**

The hand is one of the most symbolized parts of the human body. It is often used to depict skill, action and purpose. Through our hands we may learn, create and accomplish. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

This **SAS** was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

Likewise, this learning resource hopes to engage you into guided and independent learning activities at your own pace and time. Furthermore, this also aims to help you acquire the needed 21st century skills while taking into consideration you need and circumstances.

This contained the concepts about cell theory which will give you further understanding on the processes that are important to sustain life. This **SAS** will help you explore the key concepts on topics and immersed you in various activities and hands-on tasks that will help you answer the questions pertaining to cell theory.

This SAS/Learning Materials has the following parts to guide you accomplish the task given:

<b><i>What I Need to Know</i></b>	This will give you an idea of the skills or competencies you are expected to learn in the SAS.
<b><i>What I Know</i></b>	This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.
<b><i>What's In</i></b>	This is a brief drill or review to help you link the current lesson with the previous one.
<b><i>What's New</i></b>	In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity or a situation.
<b><i>What is It</i></b>	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
<b><i>What's More</i></b>	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
<b><i>What I Have Learned</i></b>	This includes questions or blank sentences/paragraphs to be filled in to process what you learned from the lesson.
<b><i>What I Can Do</i></b>	This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.
<b><i>Assessment</i></b>	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
<b><i>Additional Activities</i></b>	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends to retention of learned concepts.

## **Answer Key**

This contains answers to all activities in the module.

At the end of this SAS you will also find:

## **References**

This is a list of all sources used in developing this **Student's Activity Sheet (SAS)**

The following are some reminders in using this **Student's Activity Sheet (SAS)**:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instructions carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. You are requested to have at least four (4) small thin notebooks which will be served as your **BIO-JOURNAL**. All your answers in each activity must be written/placed there to be submitted to me, Mrs. Zenaida P. Cristobal every week(Friday) with the help of your parents/guardian.
7. Return this SAS to your teacher/facilitator once you are through with it with the help of your parents or guardian.

If you encounter any difficulty in answering the tasks in the part of each SAS, **DO NOT** hesitate to consult your teacher, Mrs, **Zenaida P. Cristobal**. Always bear in mind that you are not alone.

**You can reach me via our Group Chat (GC), Cell Phone number and email address posted in our GC.**

I hope that through this material, you will experience meaningful learning and gain profound understanding of the relevant competencies. You can do it!

## *What I Need to Know*

The SAS is divided into two sub-lessons, namely:

- Sub Lesson 1 – Postulates of the cell theory
- Sub Lesson 2 – Going Back in Time: Spontaneous Generation

After going through this module, you are expected to:

1. describe the tenets of spontaneous generation;
2. explain the postulates of the cell theory; and
3. name some scientist who worked for the formulation of the cell theory

# What I Know

## Activity 1.1 "How Far"

**Directions:** Read and understand each item pretest questions and choose the letter of the correct answer. Write it in your **Bio-Journal. (10 minutes)**

1. He discovered that all plants were made of cells, which contributed to the development of the cell theory:  
A. Anton van Leeuwenhoek  
B. Robert Hooke  
C. Theodor Schwann  
D. Matthias Schleiden
2. He advanced the cell theory with his conclusion that cells could only come from other cells:  
A. Anton van Leeuwenhoek  
B. Rudolph Virchow  
C. Theodor Schwann  
D. Robert Hooke
3. Which of the following is NOT one of the main components of the cell theory?  
A. cells must contain DNA  
B. all living things are made of cells  
C. cells can only come from other cells  
D. cells are the basic unit of life
4. Rudolph Virchow's observations helped to disprove the commonly held belief of the time?  
A. evolution  
B. the existence of molecules  
C. spontaneous generation  
D. atomic models
5. Which technology was essential for the development of cell theory?  
A. Telescopes  
B. Antiseptics  
C. Microwaves  
D. Microscopes
6. Which of the following is a key difference between Needham and Spallanzani's experiments testing the idea of spontaneous generation?  
A. Needham heated his broth while Spallanzani did not.  
B. Spallanzani heated his broth while Needham did not  
C. Needham sealed his flasks tightly while Spallanzani did not.  
D. Spallanzani sealed his flasks tightly while Needham did not.
7. Which scientist disproved spontaneous generation of large organisms by showing maggots came from flies not from rotting meat?  
A. Redi  
B. Needham  
C. Spallanzani  
D. Pasteur
8. Who stated that cell comes from a pre-existing cell?  
A. Matthias Schleiden  
B. Theodor Schwann  
C. Rudolf Virchow  
D. John Needham
9. Which scientist designed a special flask that allowed air in but kept microbes out and once and for all disproved spontaneous generation?  
A. Redi  
B. Needham  
C. Spallanzani  
D. Pasteur
10. This term means life comes from non-life

- |            |                |
|------------|----------------|
| A. Abiotic | C. Abiogenesis |
| B. Biotic  | D. Biogenesis  |

11. Which of the following statements is NOT part of the cell theory?
- Cells are the basic unit of structure and function in all living things.
  - All cells are produced from other cells.
  - Only animal cells are composed of cells.
  - All living things are composed of cells
12. It is one way in which all living things on Earth are alike.
- All living things have hair
  - All living things are made of cells and come from other cells
  - The cells of all living things have chloroplast
  - All living things can move
13. The first part of the cell theory states: "What happens in cell theory, stay in Cell Theory"
- |          |                    |
|----------|--------------------|
| A. True  | C. Sometimes true  |
| B. False | D. Sometimes false |
14. Why are microscopes important when studying most cells?
- |                              |                                 |
|------------------------------|---------------------------------|
| A. Most cells are very large | C. Most cells move very quickly |
| B. Most cells are very small | D. Most cells are dead          |
15. Which of the following scientists concluded that all ANIMALS are made up of cells?
- |                       |                    |
|-----------------------|--------------------|
| A. Rudolf Virchow     | C. Robert Hooke    |
| B. Matthias Schleiden | D. Theodor Schwann |

## What's In

### Activity 1.2: "Let's see what you got, find the right match!"

**Directions:** Match the items on the left to the items on the right. Write the letter and word for each number. This task will be accomplished within. **(5 minutes)**

- |   |                |
|---|----------------|
| 1. Determined that all animals were made of cells         | a. Hooke       |
| 2. Looked at cork and called it "cells"                   | b. Virchow     |
| 3. Determined that all cells come from pre-existing cells | c. Schwann     |
| 4. Invented the first compound microscope                 | d. Schleiden   |
| 5. Determined that all plants are made up of cell         | e. Leeuwenhoek |

## What's New

### Activity 1.3 "Guess What?"

**Directions:** Complete the three basic components of the cell theory by arranging these words in proper order. All your answers must be written in **Bio-Journal**.  
**(5 minutes)**

1. LIVING OF CELLS OR ONE ALL MORE THINGS COMPOSED ARE

2. IS UNIT THE BASIC CELL LIFE OF THE
3. FROM ARISE CELLS PRE-EXISTING CELLS ALL

Question: What did you form?

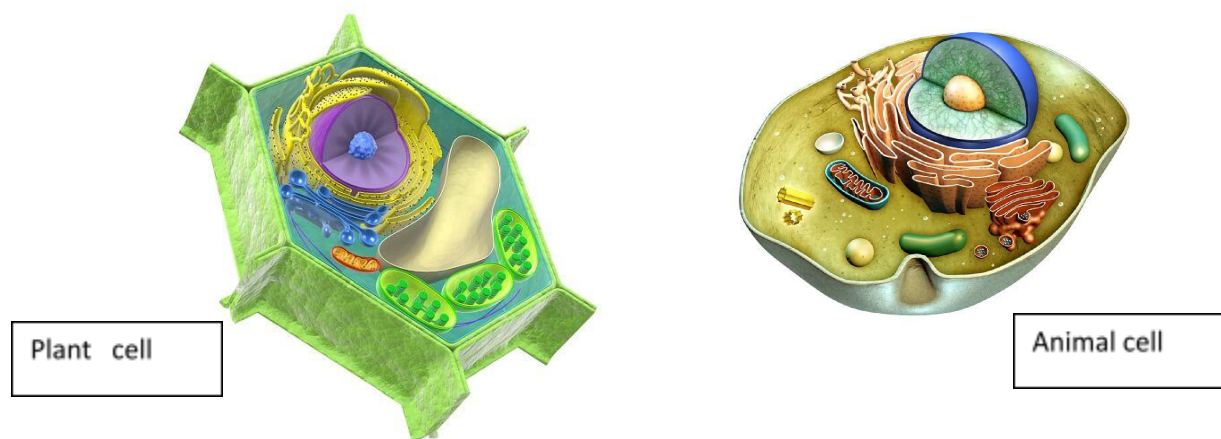
## *What Is It*

### Lesson 1: Cell Theory

Cells are the basic building blocks of all living things. The human body is composed of trillions of cells. They provide structure for the body, take in nutrients from food, convert those nutrients into energy, and carry out specialized functions.

Cells also contain the body's hereditary material and can make copies of themselves. Cells have many parts, each with a different function. Some of these parts, called organelles, are specialized structures that perform certain tasks within the cell.

In this lesson, you are to explain the postulates of the cell theory. The three postulates of the cell theory offer the basis on how an organism is considered as a living thing.



Prior to the invention of the very first microscope, everything that could not be seen by the naked eye was unexplainable. In 1665, English physicist Robert Hooke used the first light microscopes to look at thin slices of plant tissues.

One of these, a slice of cork, especially caught his eye. Under the microscope, the cork seemed to be made of thousands of tiny chambers. Hooke called these chambers —cells because they reminded him of a monastery's tiny rooms, which were also known as cells.

Until 1676, Anton van Leeuwenhoek published his observations on tiny living organisms which he named animalcules. It was believed that Leeuwenhoek was the first to observe under his microscope the structure of a red blood cell of different animals as well as a sperm cell.

One of the leading botanists in his time, Robert Brown in 1831 was able to compare diverse kinds of plant specimens under the microscope. He markedly indicated that there is a common thing about them—they are all composed of cells, and inside the cell is a dark dense spot which he termed as the nucleus.

A few years later, German botanist Matthias Schleiden (1838) concluded that all plant parts are made of cells. Theodor Schwann (1839), also a botanist and a close friend of Schleiden, stated that all animal tissues are composed of cells, too. In 1858, Rudolf Virchow concluded that all cells come from pre-existing cells.

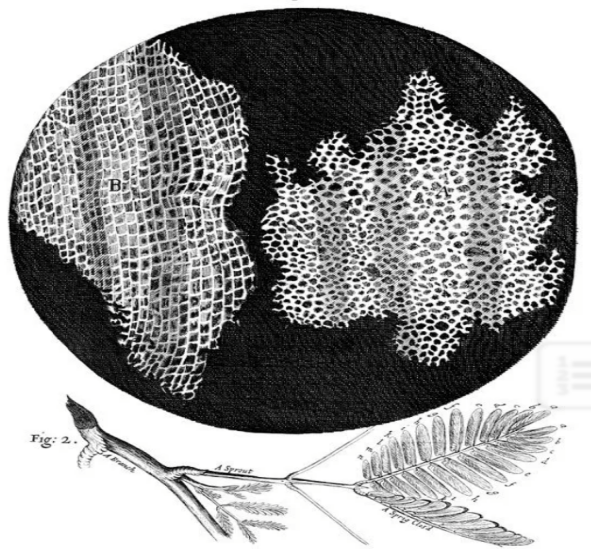


### Figure 3. Structure of cork using a microscope as seen by Robert Hooke (1665)

In the advent of technology, discovery of cells and cell theory arise.

The discoveries made by Hooke, Leeuwenhoek, Schleiden, Schwann, Virchow, and others led to the formulation of the cell theory. The cell theory describes the properties of all cells. This theory can be summed up into three basic components: (1) all living things are composed of one or more cells; (2) the cell is the basic unit of life; and (3) all cells arise from pre-existing cells.

#### Little is much: Understanding the Cork



A thin slice of cork

The discovery of cells was made possible by the development of the microscope in the 17<sup>th</sup> century. In 1665, an English scientist, **Robert Hooke**, examined a thin slice of cork under the microscope. He observed that the piece of cork was composed of many tiny compartments which resembled little rooms with a surrounding wall. Hooke named these compartments cells. The cells that Hooke observed were not living. He concentrated his study only on the structure, particularly on the cell wall, and did not pursue his investigation of the cell content.

In 1674, the Dutch inventor **Antoine Van Leeuwenhoek** observed red blood cells, sperms and a myriad of single-celled organisms in pond water. He discovered free cells and observed the nucleus within some red blood cells. Leeuwenhoek was a contemporary of Robert Hooke. He had more success in living cells in action despite his smaller, simpler, handheld microscopes.

Over the next 200 years after Hooke, another scientist, a Scottish botanist named **Robert Brown**, made a general conclusion in 1831. He discovered the nucleus and theorized that this structure is a fundamental and a constant component of the cell.

In 1835, a French biologist, **Felix Dujardin** found out that living cells contained an internal substance. Not knowing exactly what this substance was, Dujardin gave it the name sarcode. It was a Bohemian physiologist, **Jan Evangelista Purkinje**, who made a thorough investigation of this internal material. He gave it the name protoplasm, a term coined for the colloidal substance in the cell which is currently known as cytoplasm.

In 1838, **Matthias Schleiden**, a German botanist, stated that all plants are composed of cells. After him, in 1839, **Theodore Schwann**, a German zoologist, concluded that all animals are composed of cells. Jointly, Schleiden and Schwann came out with the theory that all living things are composed of cells. Twenty years later, in 1858, a German biologist, **Rudolph Virchow**, theorized that all living cells come from pre-existing living cells. His conclusion arose from observing dividing cells while he was at work.

These observations became the major components of the cell theory.

The **cell theory** states that:

1. All living things are composed of one or more cells and cell products.
2. All living cells come from other living cells by the process of cell division.
3. Cells are the basic units of structure and function on organism

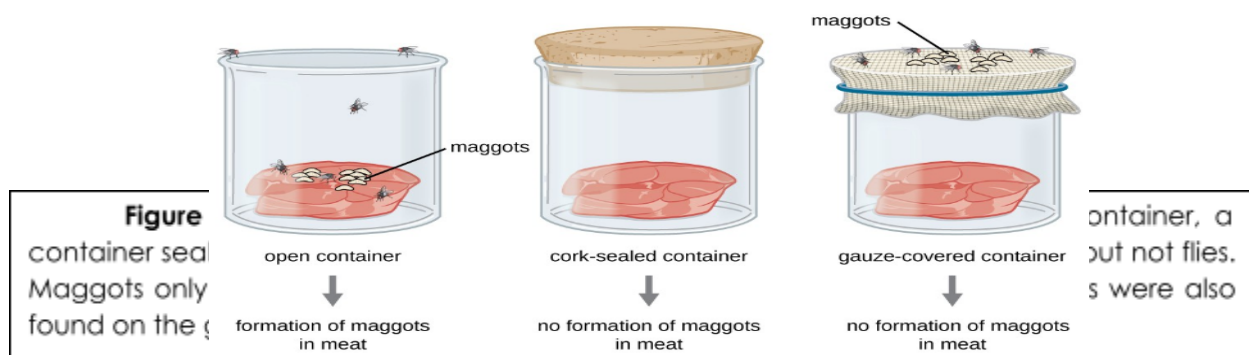


## Lesson 2: Going Back in Time: Spontaneous Generation

The Greek philosopher **Aristotle** (384–322 BC) was one of the earliest recorded scholars to articulate the theory of spontaneous generation, the **notion that life can arise from nonliving matter**. Aristotle proposed that life arose from nonliving material if the material contained *pneuma* ("vital heat"). As evidence, he noted several instances of the appearance of animals from environments previously devoid of such animals, such as the seemingly sudden appearance of fish in a new puddle of water.

This theory persisted into the seventeenth century, when scientists undertook additional experimentation to support or disprove it. By this time, the proponents of the theory cited how frogs simply seem to appear along the muddy banks of the Nile River in Egypt during the annual flooding. Others observed that mice simply appeared among grain stored in barns with thatched roofs. When the roof leaked and the grain molded, mice appeared. **Jan Baptista van Helmont**, a seventeenth century Flemish scientist, proposed that mice could arise from rags and wheat kernels left in an open container for 3 weeks. In reality, such habitats provided ideal food sources and shelter for mouse populations to flourish.

However, one of van Helmont's contemporaries, Italian physician **Francesco Redi** (1626–1697), performed an experiment in 1668 that was one of the first to refute the idea that maggots (the larvae of flies) spontaneously generate on meat left out in the open air. He predicted that preventing flies from having direct contact with the meat would also prevent the appearance of maggots. Redi left meat in each of six containers (Figure 1). Two were open to the air, two were covered with gauze, and two were tightly sealed. His hypothesis was supported when maggots developed in the uncovered jars, but no maggots appeared in either the gauze-covered or the tightly sealed jars. He concluded that maggots could only form when flies were allowed to lay eggs in the meat, and that the maggots were the offspring of flies, not the product of spontaneous generation.



In 1745, **John Needham** (1713–1781) published a report of his own experiments, in which he briefly boiled broth infused with plant or animal matter, hoping to kill all preexisting microbes. He then sealed the flasks. After a few days, Needham observed that the broth had become cloudy and a single drop contained numerous microscopic creatures. He argued that the new microbes must have arisen spontaneously. In reality, however, he likely did not boil the broth enough to kill all preexisting microbes.

**Lazzaro Spallanzani** (1729–1799) did not agree with Needham's conclusions, however, and performed hundreds of carefully executed experiments using heated broth. As in Needham's experiment, broth in sealed jars and unsealed jars was infused with plant and animal matter. Spallanzani's results contradicted the findings of Needham: Heated but sealed flasks remained clear, without any signs of spontaneous



growth, unless the flasks were subsequently opened to the air. This suggested that microbes were introduced into these flasks from the air. In response to Spallanzani's findings, Needham argued that life originates from a "life force" that was destroyed during Spallanzani's extended boiling. Any subsequent sealing of the flasks then prevented new life force from entering and causing spontaneous generation (Figure 4).



**Figure 5.** (a) Francesco Redi, who demonstrated that maggots were the offspring of flies, not products of spontaneous generation. (b) John Needham, who argued that microbes arose spontaneously in broth from a "life force." (c) Lazzaro Spallanzani, whose experiments with broth aimed to disprove those of Needham.

The debate over spontaneous generation continued well into the nineteenth century, with scientists serving as proponents of both sides. To settle the debate, the Paris Academy of Sciences offered a prize for resolution of the problem. **Louis Pasteur**, a prominent French chemist who had been studying microbial fermentation and the causes of wine spoilage, accepted the challenge. In 1858, Pasteur filtered air through a gun-cotton filter and, upon microscopic examination of the cotton, found it full of microorganisms, suggesting that the exposure of a broth to air was not introducing a "life force" to the broth but rather airborne microorganisms.

Later, Pasteur made a series of flasks with long, twisted necks ("swan-neck" flasks), in which he boiled broth to sterilize it (Figure 3). His design allowed air inside the flasks to be exchanged with air from the outside, but prevented the introduction of any airborne microorganisms, which would get caught in the twists and bends of the flasks' necks. If a life force besides the airborne microorganisms were responsible for microbial growth within the sterilized flasks, it would have access to the broth, whereas the microorganisms would not. He correctly predicted that sterilized broth in his swan-neck flasks would remain sterile as long as the swan necks remained intact. However, should the necks be broken, microorganisms would be introduced, contaminating the flasks and allowing microbial growth within the broth.

Pasteur's set of experiments irrefutably disproved the theory of spontaneous generation and earned him the prestigious Alhumbert Prize from the Paris Academy of Sciences in 1862. In a subsequent lecture in 1864, Pasteur articulated "Omne vivum ex vivo" ("**Life only comes from life**"). In this lecture, Pasteur recounted his famous swan-neck flask experiment, stating that "life is a germ and a germ is life. Never will the doctrine of spontaneous generation recover from the mortal blow of this simple experiment.

To Pasteur's credit, it never has. See the details of his experiment below:

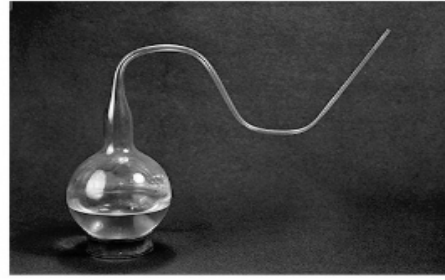
Now, that you have an insights/understanding of the history of the cell theory, answer the activity that follows.

**Figure 6.** (a) French scientist Louis Pasteur, who definitively refuted the long-disputed theory of spontaneous generation. (b) The unique swan-neck feature of the flasks used in Pasteur's experiment allowed air to enter the flask but prevented the entry of bacterial and fungal spores. (c) Pasteur's experiment consisted of two parts. In the first part, the broth in the flask was boiled to sterilize it. When this broth was cooled, it remained free of contamination. In the second part of the experiment, the flask was boiled and then the neck was broken off. The broth in this flask became contaminated.

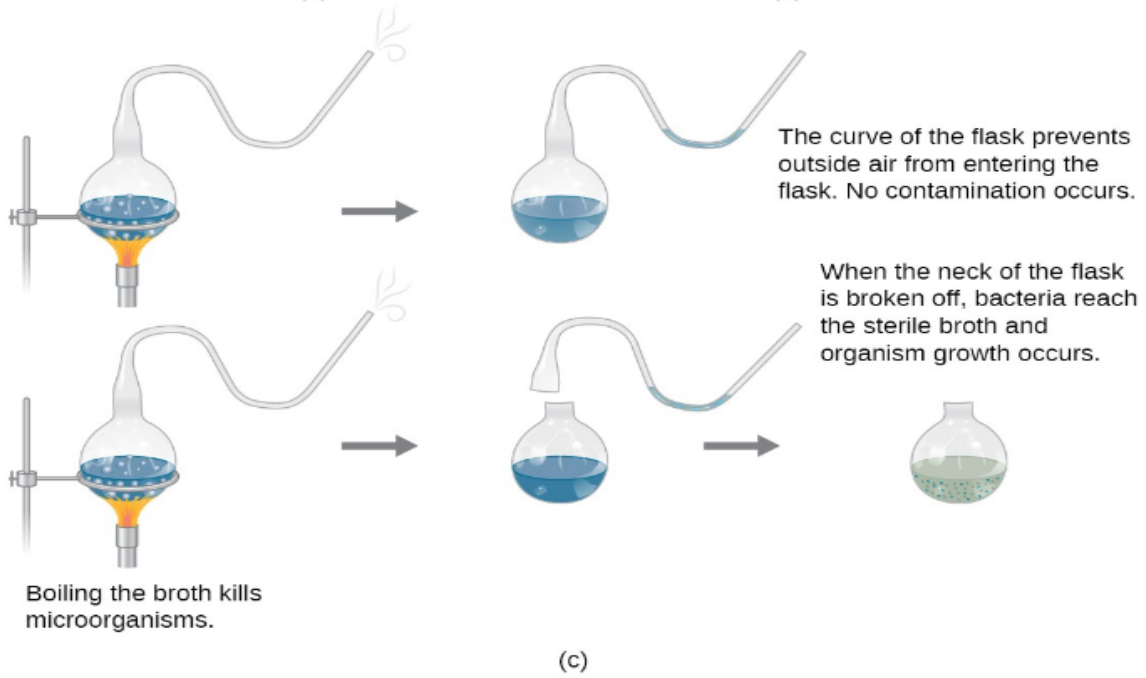
(Credit by: modification of work by "Wellcome Images"/Wikimedia Commons)



(a)



(b)



What's More

Activity 1.4 "How Spontaneous Am I"

Directions: Complete the table by filling in the information, your answers must be written in your BIO-Journal. (10 minutes)

SPONTANEOUS GENERATION SUMMARY TABLE

Scientists and date	Experiment performed (Brief description)	Main idea
1.		
2.		
3.		
4.		
5.		

Question: What is the major concept you have learned in this activity?\_\_\_\_\_

Activity 1.5 "All About Cell Discovery"

CELL THEORY SUMMARY TABLE

Directions: The table below indicates events that led to the cell theory. Complete the table by filling in the blank spaces. (10 minutes)

Date	Scientist	Discovery
1665	a. _____	Examine the thin slice of cork
b. _____	Anton Van Leeuwenhoek	c. _____
1838	Matthias Schleiden	d. _____
e. _____	f. _____	Stated that all animals are made up of cell
1858	g. _____	h. _____

Task: Give one good sentence describing the CELL THEORY SUMMARY TABLE

\_\_\_\_\_

\_\_\_\_\_

What I Have Learned

- 1. The theory of spontaneous generation states that life arose from nonliving matter. It was a long-held belief dating back to Aristotle and the ancient Greeks.
- 2. Experimentation by Francesco Redi in the seventeenth century presented the first significant evidence refuting spontaneous generation by showing that flies must have

access to meat for maggots to develop on the meat. Prominent scientists designed experiments and argued both in support of (John Needham) and against (Lazzaro Spallanzani) spontaneous generation.

3. Louis Pasteur is credited with conclusively disproving the theory of spontaneous generation with his famous swan-neck flask experiment. He subsequently proposed that **“life comes from life.”**

4. The postulates of the cell theory was made possible through the invention of the microscope.

5. The postulates of the cell theory are:
- a. Cell is the basic unit of life
  - b. All organisms are made up of cell
  - c. Cell comes from pre-existing cell

Activity 1.6 “Making Connections”

**Directions:** Make a comic strips explaining the postulates of the cell theory to your 4-7-year-old baby brother/sister. You can refer to the Rubric below as your guide in accomplishing your task. **(10 minutes)**

	Poor 1 pts	Fair 2 pts	Good 3 pts	Excellent 4 pts
Choice of Scenes	Shows some events related to the story, but information is incomplete or focused on less important points.	Shows most important events related to story, highlights unimportant points.	Shows most of the important related to the story, however their is at least one discrepancy/conflict with the original	Shows events that are relevant and reasonably accurate as a sequel to the novel
Captions	Captions do not relate well to the scenes. There seems to be no connection or connections are very general.	Captions are related to the scenes and the story, but the connections are less obvious.	Captions are related to the scenes and the story, and most connections are easy to understand.	Captions are related to the scenes and the story, and the connections are easy to understand.
Characters	It is hard to tell who the main characters are, or main characters in the comic are not the main characters in the story.	The main characters are identified, but actions and dialogue are too general to show their relationship to the story.	The main characters are clearly identified, and their actions and dialogue match actions and dialogue in the story.	The main characters are clearly identified, and their actions and dialogue are well-matched to their actions and dialogue in the story.
Artwork	No pictures or little detail.	Some pictures show detail, but detail is inconsistent	Most boxes are neat with some detail in all scenes.	All boxes are complete. Excellent detail in all scenes.
Thought/Speech Bubbles	No Thought/Speech Bubbles are present.	Some Thought/Speech Bubbles are present and reveal some character's thoughts or relay some dialogue	Most Thought/Speech Bubbles are present and somewhat reveal a character's thoughts or relay dialogue.	Thought/ Speech bubbles are present and clearly reveal a character's thoughts or relay dialogue efficiently.

**Question:** How do you find doing comic strips explaining the postulates of the cell theory\_\_\_\_\_

# What I can do

## Activity 1.7 “REFLECTIVE WRITING”

**Directions:** Write a short paragraph discussing why is it necessary for a student like you to

understand and to look back on the history of the development of the cell theory. Make your answer brief and concise, express your answer using 5-10 sentences only. Rubric on the next page will be the basis of your teacher in giving scores. **(10 minutes)**

Rubric for Student Reflections

	Above Expectations	Meets Expectations	Approaching Expectations	Below Expectations
	4	3	2	1
Reflective Thinking	The reflection explains the student's own thinking and learning processes, as well as implications for future learning.	The reflection explains the student's thinking about his/her own learning processes.	The reflection attempts to demonstrate thinking about learning but is vague and/or unclear about the personal learning process..	The reflection does not address the student's thinking and/or learning.
Analysis	The reflection is an in-depth analysis of the learning experience, the value of the derived learning to self or others, and the enhancement of the student's appreciation for the discipline.	The reflection is an analysis of the learning experience and the value of the derived learning to self or others.	The reflection attempts to analyze the learning experience but the value of the learning to the student or others is vague and/or unclear.	The reflection does not move beyond a description of the learning experience.
Making Connections	The reflection articulates multiple connections between this learning experience and content from other courses, past learning, life experiences and/or future goals.	The reflection articulates connections between this learning experience and content from other courses, past learning experiences, and/or future goals.	The reflection attempts to articulate connections between this learning experience and content from other courses, past learning experiences, or personal goals, but the connection is vague and/or unclear.	The reflection does not articulate any connection to other learning or experiences.

# Assessment

### Quiz Number 1

**Multiple Choice.** Choose the letter of the best answer and write it in your Bio-Journal.  
**(15 Minutes)**

1. This term means life comes from non-life
- A. AbioticC. Abiogenesis

B. Biotic

D. Biogenesis

2. Which of the following statements is NOT part of the cell theory?
  - A. Cells are the basic unit of structure and function in all living things.
  - B. All cells are produced from other cells.
  - C. Only animal cells are composed of cells.
  - D. All living things are composed of cells
3. It is one way in which all living things on Earth are alike.
  - A. All living things have hair
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  - C. The cells of all living things have chloroplast
  - D. All living things can move
4. The first part of the cell theory states: "What happens in cell theory, stay in Cell Theory"
  - A. True
  - B. False
  - C. Sometimes true
  - D. Sometimes false
5. Why are microscopes important when studying most cells?
  - A. Most cells are very large
  - B. Most cells are very small
  - C. Most cells move very quickly
  - D. Most cells are dead
6. Which of the following scientists concluded that all ANIMALS are made up of cells?
  - A. Rudolf Virchow
  - B. Matthias Schleiden
  - C. Robert Hooke
  - D. Theodor Schwann
7. Which of the following is NOT one of the main components of the cell theory?
  - A. cells must contain DNA
  - B. all living things are made of cells
  - C. cells can only come from other cells
  - D. cells are the basic unit of life
8. Rudolph Virchow's observations helped to disprove was commonly held belief of the time?
  - A. evolution
  - B. the existence of molecules
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  - D. atomic models
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  - A. Telescopes
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  - C. Microwaves
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10. Which of the following is a key difference between Needham and Spallanzani's experiments testing the idea of spontaneous generation?
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  - B. Spallanzani heated his broth while Needham did not
  - C. Needham sealed his flasks tightly while Spallanzani did not.
  - D. Spallanzani sealed his flasks tightly while Needham did not.
11. He discovered that all plants were made of cells, which contributed to the development of the cell theory:

- A. Anton van Leeuwenhoek
- B. Robert Hooke

- C. Theodor Schwann
- D. Matthias Schleiden

12. He advanced the cell theory with his conclusion that cells could only come from other cells:

- A. Anton van Leeuwenhoek
- B. Rudolph Virchow

- C. Theodor Schwann
- D. Robert Hooke

13. Which scientist disproved spontaneous generation of large organisms by showing maggots came from flies not from rotting meat?

- A. Redi
- B. Needham

- C. Spallanzani
- D. Pasteur

14. Who stated that cell comes from a pre-existing cell?

- A. Matthias Schleiden
- B. Theodor Schwann

- C. Rudolf Virchow
- D. John Needham

15. Which scientist designed a special flask that allowed air in but kept microbes out and once and for all disproved spontaneous generation?

- A. Redi
- B. Needham

- C. Spallanzani
- D. Pasteur

## Additional Activities

### Activity 1.8 "What time is it?"

**Directions:** Make a timeline consisting of people and events who worked for the development of the cell theory. Use the template below in completing your timeline. **(5 minutes)**

A horizontal timeline template consisting of a black line with an arrow pointing to the right. Below the line are four empty blue-outlined boxes for writing names or events.

A second horizontal timeline template, identical to the first one, consisting of a black line with an arrow pointing to the right and four empty blue-outlined boxes below it.

### V: REFLECTION: (5 minutes)

Accomplish the 3, 2, 1 exit card by writing your:

Three concepts learned:

1. \_\_\_\_\_
2. \_\_\_\_\_



3. \_\_\_\_\_

Two real-life realizations after finishing the topic

1. \_\_\_\_\_

2. \_\_\_\_\_

One most favorite part of the lesson

1. \_\_\_\_\_

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