



General Biology 1

Module 1

The Discovery of the Cell



SELF-LEARNING MODULE



DEPARTMENT OF EDUCATION - SOCCSKSARGEN

GOVERNMENT PROPERTY
NOT FOR SALE

General Biology 1
Self- Learning Module (SLM)
Module 1: The Discovery of the Cell Theory
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Development Team of the Module

Writers: Jennifer B. Tuzon, and Paul Vincent B. Banados

Editors: Leoncio P. Tan, Lenie G. Forro, and Cynthia S. Bustillo

Reviewers: Yusof A. Aliudin, Agabai S. Kandalayang, Sheryl B. Bautista, Aida S. Delon,
Rowena P. Alterado, Ma.Kristine B. Latris, and Eloisa R. Agni

Layout Artist: Glen D. Napoles, Jay Ar O. Espartero, Alex C. Macale, and
Mark Daryl T. Lazaro

Management Team: Allan G. Farnazo - Regional Director

Isagani S. Dela Cruz - Schools Division Superintendent

Natividad G. Ocon - Assistant School Division Superintendent

Gilbert B. Barrera – Chief, CLMD

Arturo D. Tingson, Jr. – REPS, LRMS

Peter Van C. Ang-ug – REPS, ADM

Elpidio B. Daquipil – CID Chief

Juvy B. Nitura – EPSVR, LRMS

Lenie G. Forro – EPSVR, Science Coordinator

Marcelo B. Bocatera- ADM Coordinator

Printed in the Philippines by Department of Education – SOCCSKSARGEN Region

Office Address: Regional Center, Brgy. Carpenter Hill, City of Koronadal

Telefax: (083) 2288825/ (083) 2281893

E-mail Address: region12@deped.gov.ph

SHS

General Biology 1

Module 1

The Discovery of the Cell



Introductory Message

For the facilitator:

Welcome to the General Biology 1 Self- Learning Module (SLM) Module on The Discovery of the Cell.

This module was collaboratively designed, developed and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

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

In addition to the material in the main text, you will also see this box in the body of the module:



Notes to the Facilitator

Hello my dear Facilitator of learning. You are lucky to have this learning material which is easily deliver the lesson for our learners, enhance their knowledge on specific learning competency and help them achieve our learning objectives.

Please tell our learners to read, understand, analyze and answer all the activities and questions seriously as this material is designed and made for them. Inform also our learners to take some precautionary measures and some activities need extra care. Don't go beyond our objectives and main goal for our learners.

As a facilitator let us be an agent to let them love learning through this module.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the General Biology 1 Self- Learning Module (SLM) on Cell Theory!

The hand is one of the most symbolized part 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 module 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.

This module has the following parts and corresponding icons:



What I Need to Know

This will give you an idea of the skills or competencies you are expected to learn in the module.



What I Know

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.



What's In

This is a brief drill or review to help you link the current lesson with the previous one.



What's New

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.



What is It

This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.



What's More

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.



What I Have Learned

This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.



What I Can Do

This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.



Assessment

This is a task which aims to evaluate your level of mastery in achieving the learning competency.



Additional Activities

In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.



Answer Key

This contains answers to all activities in the module.

At the end of this module you will also find:

References This is a list of all sources used in developing this module.

The following are some reminders in using this module:

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. Do not forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction 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. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

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



What I Need to Know

Most Essential Learning Competency:

- Explain the postulates of the cell theory (**STEM_BIO11/12- Ia-c-1**).

This module is divided into of two (2) lessons, namely:

- Lesson 1 – Introduction of Cell Theory
- Lesson 2 – The Cell Theories

After going through this module, you are expected to:

- identify and explain the history of cell theory.
- organize the concept of cell theory into graphics organizer.
- appreciate the true nature of science as shown in the discovery of the cell.
- Explain how cell theory is an explanation for life.
- present an illustration of a cell theory; and
- recognize the true nature of science as shown in the discovery of the cell.



What I Know

Directions: Choose the letter of the best answer from the given choices. Write the chosen letter on a separate sheet of paper.

1. What are the tiny units of life discovered by a British scientist?
 - A. Atoms
 - B. Cells
 - C. Molecules
 - D. Nucleus
2. Who and when does the basic building blocks of life discovered?
 - A. Robert Hooke- 1665
 - B. Rudolf Virchow- 1850
 - C. Zacharias Janssen- 1599
 - D. Anton Van Leeuwenhoek- 1674
3. How would you prove that bacterium is an organism?
 - A. Bacterium can can invade our cells and will cause diseases.
 - B. Bacterium has the basic qualification of life and can to carry out its functions.
 - C. Bacterium is microscopic which means very small that can only be seen by the use of microscope.
 - D. Bacterium can perform reproduction. Anything that can reproduce its own is considered an organism.

4. What was the Latin word and the meaning of the word used by the scientist who first discovered the cell?
 - A. Cellulae- means "little rooms"
 - B. Cellulea- means "little rooms"
 - C. Cellulose- means "main substance"
 - D. Cellulease- means "immense rooms"
5. How did Anton van Leeuwenhoek contribute to the development of cell theory?
 - A. Van Leeuwenhoek determined that all living organisms are composed of cells.
 - B. Van Leeuwenhoek stated that the new cells in an organism are produced by pre-existing cell.
 - C. Van Leeuwenhoek used lenses to make simple microscopes that could view living organisms under greater than 200x magnification.
 - D. Van Leeuwenhoek used a microscope to view a piece of cork that he determined was made up of small compartments he called "cells."
6. Theodor Schwann and Matthias Schleiden has been recognized for their discovery of cell. Is the statement correct?
 - A. No, because Schwann and Schleiden discovered the vaccine penicillin.
 - B. No, because Schwann works with animal cells while Schleiden work with the plant cell.
 - C. Yes, because Schwann and Schleiden prosposed the cell theory and coind its term "cell".
 - D. Yes, because Schwann discovered the plant cell while Schleiden discovered the animal cell.
7. Who are the first inventors of microscope which was used to view the cells?
 - A. Hans and Gretel
 - B. Hans and Zacharias Janssen
 - C. Anton van Leeuwenhoek and Theodor Schwann
 - D. Anton van Leeuwenhoek and Matthias Schleiden
8. What type of microscope is the first invented microscope used to view the cell?
 - A. Digital microscope
 - B. Stereo microscope
 - C. Acoustic microscope
 - D. Compound microscope
9. Matthias Jakob Schleiden was the first to state that cells are the building blocks of all of plants. Is the statement correct?
 - A. Yes, because he stated that embryonic plant arose from one single cell.
 - B. No, because he stated that that new cells come from already existing cells.
 - C. No, because he is known for his invention of the compound optical microscope.
 - D. Yes, because he saw that the cork was made-up of many tiny units' room like structure.

10. What are the three cell theories?

- I. All living things are made up of cell.
- II. Cells comes from a pre-existing cell.
- III. Cells are the most basic building blocks of organisms.
- IV. All cells are essentially the same in chemical composition.

- A. I, II and III only
- B. I, II and IV only
- C. I, III and IV only
- D. II, III and IV only

11. Who is the first to observe living cells, and also the inventor of microscope which has an improved lens that could magnify objects from 270 to 300-fold?

- A. Robert Hooke
- B. Theodore Schwann
- C. Zacharias Janssen
- D. Anton van Leeuwenhoek

12. Teacher Elvina wants to explain cell theory to her class. Which of the following statements about cell theory should she present to the class and why?

Cell theory states:

- I. All living cells require glucose for survival.
- II. All living cells must have a cell wall.
- III. The basic unit of life is a cell.

- A. I, II and III, because all the statements are correct.
- B. III only, because all organisms is composed of cells.
- C. II only, because all cells have cell wall that protects the cell from the other cells.
- D. I only, because cell needs glucose as a source of energy to maintain its functions.

13. Who among the scientists discovered that animals are made up of cells?

- A. Robert Hooke
- B. Theodor Schwann
- C. Zacharias Janssen
- D. Matthias Schleiden

14. Which of the following applies the theory that cell comes from free existing cell.

- A. A plant germinate on top of a broken rock
- B. Virus reproduce drastically causing infections in chickens
- C. A bacteria undergoes binary fission in the laboratory experiment
- D. Maggots was discovered in meat after the meat exposed to the air.

15. Which of the following was **NOT** a major event in the history of the development of cell theory?
- A. Virchow determining that all cells are produced by pre-existing cells.
 - B. Hooke viewing the remains of cells in a slice of cork under a microscope.
 - C. Schwann identifying that bacteria and viruses were single-celled organisms.
 - D. Van Leeuwenhoek viewing living cells from algae and protists under his microscope.

Lesson

1

Introduction of Cell Theory

Hello, My dear learner! How's your cells? I hope everything is fine, despite of this pandemic we are facing right now. Since the classroom setting of teaching is not yet allowed, we as an educator made ways to make sure that the learners like you will continue to earn knowledge and skills. That was our main objective in making this module.



What's In

Before we go deeper on this module, take time to read the lyrics of the song "The Cell Theory Song" composed by Mr. Tamez. The song explains the discovery of the cell. After reading, answer the questions and write it in a clean sheet of paper.

The Cell Theory Song

Mr. Tamez

CHORUS

All living things are composed of cells
Cells are the basic units of structure and function in living things
New cells are produced from existing cells

VERSE 1

Back then was a guy named Hooke, cut some cork and he had a look
Underneath his microscope tiny rooms that he saw in groups
Empty rooms that looked like shells He's the one that called them cells
Listen up cause we're not done Cell theory had just begun
Add one scientist to know the inventor of the microscope
Anton von Leeuwenhoek saw cells move and he was like "That's dope"

PRE-CHORUS

Cell theory, cell theory, cell theory, cell theory, cell theory, go!

VERSE 2

If you thought this was complete, take a breath and have a seat
 Two scientists to have their say Schleiden and Schwann to save the day
 Schleiden said all plants have cells they are alive, and we can tell
 The next year Mr. Schwann could see all animals have cells that live and breathe
 Oh, they live and breathe Live and breathe

BRIDGE

In 1855, Rudolph Virchow proposed that all cells
 Come from other cells
 This was the final discovery
 That ended cell theory cell theory

- A. Based on the song, how were the cells discovered, and who discovered them?
- B. What are the theories stated on the song?

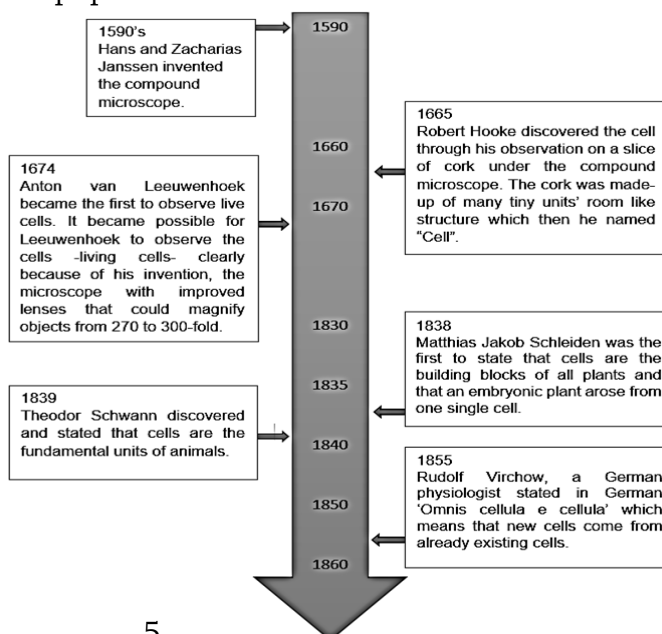
Rubrics:

Categories	Excellent 5pts	Good 4 pts	Fair 3pts	Needs remediation 2pts
Correctness	All needed info is provided with no misconception	All needed info is provided with some misconception	Most information given is faulty	Information is not related to the topic asked
Technicalities (Grammar, spelling, neatness)	Grammars and spellings are correct with no erasures	Most of the grammars and spellings are correct and with some erasures	Grammars and spellings are somehow correct with erasure	Grammars and spellings are mostly incorrect and many erasures



What's New

Directions: Study the diagram and answer the question below. Write your answer on a separate sheet of paper.



Guide Question:

What is the information you can gather from the given diagram? Discuss.

Rubrics:

Categories	Excellent 5pts	Good 4 pts	Fair 3pts	Needs remediation 2pts
Correctness	All needed info is provided with no misconception	All needed info is provided with some misconception	Most information given is faulty	Information is not related to the topic asked
Technicalities (Grammar, spelling, neatness)	Grammars and spellings are correct with no erasures	Most of the grammars and spellings are correct and with some erasures	Grammars and spellings are somehow correct with erasure	Grammars and spellings are mostly incorrect and many erasures



What is It

The Cell Theory

Zacharias Janssen and Hans were a contributor on the discovery of the cell. The two are known for their invention the compound optical microscope. They invented the microscope in 1590's. Their invention played a great role in the discovery of the cell theory, by making it easier and more practical when observing cells. The microscope invented by Janssen and Hans was used by Robert Hooke, the earliest scientist to study living things under a microscope.

Robert Hooke was a British scientist. In 1665 Hooke made an important discovery under a compound optical microscope. When he looked at a thin slice of cork under his microscope, he saw that the cork was made-up of many tiny units' room like structure, he saw tiny little shapes that looked like little rooms with walls around each of them. He named them "cellulae" or simply "Cell". This Latin word means "little rooms". That was the first discovery of the cell. In 1674, Anton van Leeuwenhoek became the first to observe live cells. It became possible for Leeuwenhoek to observe the cells -living cells- clearly because of his invention, the microscope with improved lenses that could magnify objects from 270 to 300-fold.

In 1838, a German botanist, Matthias Jakob Schleiden was the first to state that cells are the building blocks of all plants and that an embryonic plant arose from one single cell. In the following year, another German botanist, Theodor Schwann stated that cells are the fundamental units of animals too. These statements ended the notion that plants, and animals have fundamental differences in structure.

Their discoveries led to the formulation of the 'Cell Theory' which states that cells are the basic units of all living organisms (plants and animals). But the cell theory failed to explain how new cells arise. In 1855, Rudolf Virchow, a German

physiologist stated in German ‘Omnis cellula e cellula’ which means that new cells come from already existing cells (Wakim et.al., Discovery of Cells and Cell Theory 2020, Butte College).

Therefore, the three important points of the modified cell theory are as follows:

- The cell is the basic structural and functional unit of all living organisms.
- All living organisms (plants and animals) are made up of cells.
- All cells arise from pre-existing cells.

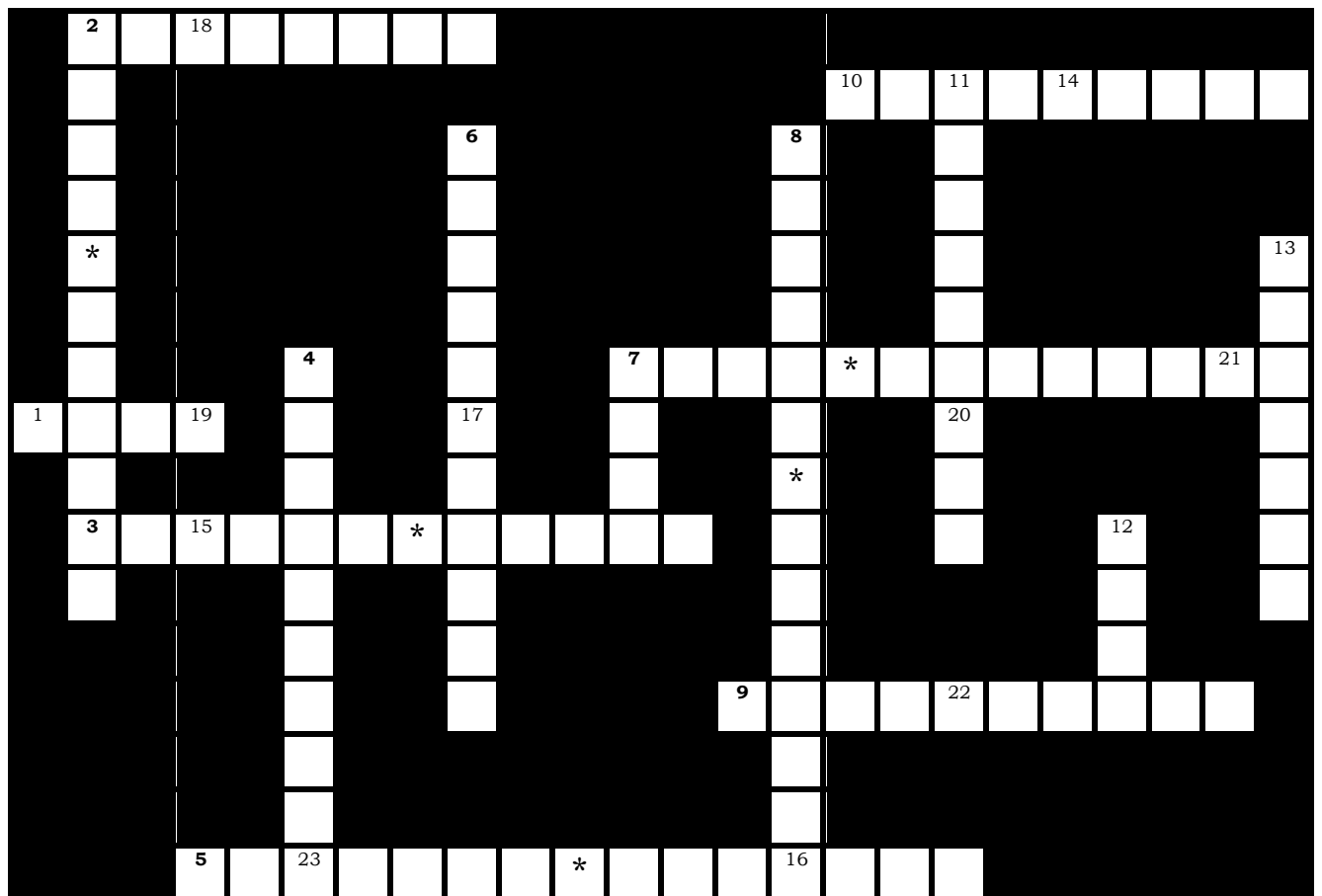


What's More

Activity: Discovering The Hidden Word!

Directions: Solve the crossword puzzle in order to reveal the hidden word. The numbers from 1 to 13 are for the first letters of every word, while numbers from 13 to 23 are the letters for the hidden word. Write your answer on a separate sheet of paper.

Note: ‘’ are for space between words. Also you can copy the puzzle and make it as your activity sheet.



Hidden Word

13	14	15		16	17	18	19		20	21	22	23	!
----	----	----	--	----	----	----	----	--	----	----	----	----	---

Hints for Crossword Puzzle

Across

1. basic building block of organism
2. Latin word, it means "little rooms"
3. he discovered the cell
5. animals made up of cell
7. done by cells to create tissue organ etc.
9. Profession, they study science
10. act of finding something

Down

2. Historic scientific theory
4. Used to discover cell
6. he discover living cells
7. used by Hooke, it has dead cells
8. German Physiologist, "Omnis cellula e cellula"
11. states that plants are made up of cells
12. } the pioneers in the invention of
13. } a compound microscope



What I Have Learned

Activity: Fill Me Up!

Directions: Fill the blanks with the missing words using the choices inside the box. Write your answer on a separate sheet of paper. Note: You can use choices more than once.

- | | |
|--|--|
| <ul style="list-style-type: none">• Anton van Leeuwenhoek• cells are the basic units of all living organisms.• cells are the fundamental units of plants and animals.• compound microscope• Matthias Jakob Schleiden | <ul style="list-style-type: none">• Robert Hooke• Rudolf Virchow• slice of cork• that new cells come from already existing cells.• Theodor Schwann |
|--|--|

The History in the Discovery of Cell Theory

Hans and Zacharias Janssen in the years of 1590's invented the (1)_____. Their invention has a great contribution in the discovery of cell and cell theory. In the year 1665, British scientist (2)_____ coined the term cell for the box-like structures he observed when viewing (3)_____ through a microscope. In the year 1674 because of his invented microscope with improved lens, (4)_____ was able to view living cells of algae spirogyra while examining his pond water.

In the year 1838 the botanist and zoologist named (5)_____ and (6)_____ discovered that (7)_____. The discovery of the two leads to the conclusion that (8)_____. They have also proposed

spontaneous generation or known as the abiogenesis as the method for cell origination, but it was later disproven. In the year 1855 a German Pathologist and Biologist named (9)_____ famously stated the words “Omnis cellula e cellula” in German language, which means “(10)_____”.



What I Can Do

Directions: Explain how everybody are benefited in the discovery of the cell theory. Write your answer on a separate sheet of paper.

Rubrics:

Categories	5pts excellent	4 pts good	3pts fair	2pts needs remediation
A. Correctness	All needed info is provided with no misconception	All needed info is provided with some misconception	Most information given is faulty	Information is not related to the topic asked
B. Technicalities (Grammar, spelling, neatness)	Grammars and spellings are correct with no erasures	Most of the grammars and spellings are correct and with some erasures	grammars and spellings are somehow correct with erasure	grammars and spellings are mostly incorrect and many erasures
Total Score				
Average Score				



Assessment

Directions: Choose the letter of the best answer from the given choices. Write the chosen letter on a separate sheet of paper.

- What does “Omnis cellulae cellula” in English means?
 - “Cells are composed of smaller cells”.
 - “Plant cells are come from a single cell”.
 - “New cells come from already pre-existing cell”.
 - “Cells are the basic building blocks of organisms”.
- Which of the following was **NOT** a major event in the history of the development of cell theory?
 - Schleiden concluding that all plants are comprised of cells
 - Hooke viewing the remains of cells in a slice of cork under a microscope.
 - Schwann identifying that bacteria and viruses were single-celled organisms.
 - Van Leeuwenhoek viewing living cells from algae and protists under his microscope.

3. Which of the following is the correct sequence of events for the development of cell theory? Defend your answer.

- I. Manufacturing and using simple microscopes → determining that all living organisms are comprised of cells → determining that plants are comprised of cells → understanding that new cells are produced by preexisting cells
- II. Manufacturing and using simple microscopes → determining that plants are comprised of cells → determining that all living organisms are comprised of cells → understanding that new cells are produced by preexisting cells
- III. Determining that plants are comprised of cells → determining that all living organisms are comprised of cells → manufacturing and using simple microscopes → understanding that new cells are produced by preexisting cells
- IV. Manufacturing and using simple microscopes → understanding that new cells are produced by preexisting cells → determining that plants are comprised of cells → determining that all living organisms are comprised of cells

- A. I. Because cell discovery was after the microscope was discovered. Other discovery just followed.
 - B. II. Because After the microscope was discovered, the first organism observed under the microscope was plant and other cell of organism Were also observe afterwards.
 - C. III. Because the term cell was first used after Robert Hooke found “tiny units “ structure like a room of a cork.
 - D. IV. Because before we can tell there the presence of cell, we have to determine first that its an organism.
4. How did Robert Hooke contributed to the development of cell theory?
- A. Hooke determined that all living organisms are composed of cells.
 - B. Hooke stated that the new cells in an organism are produced by preexisting cells.
 - C. Hooke used lenses to make simple microscopes that could view living organisms under greater than 200x magnification
 - D. Hooke used a microscope to view a piece of cork that he determined was made up of small compartments he called “cells.”
5. Do you agree that the discovery of the cell discards the idea that organisms can generate spontaneously?
- A. Yes I agree since cell discovery results more discovery about cell.
 - B. Yes I agree since spontaneous generation has no scientific bases like of the cell discovery.
 - C. No I disagree since spontaneous generation has been base on actual observation as seen by the naked eye.
 - D. No I disagree because since then spontaneous generation has been accepted even by the known scientists.
6. Which two scientists are involved in the development of cell theory, determined that living organisms are made up of cells?
- A. Rudolf Virchow and Robert Hooke
 - B. Rudolf Virchow and Theodor Schwann
 - C. Matthias Schleiden and Theodor Schwann
 - D. Robert Hooke and Anton Van Leeuwenhoek

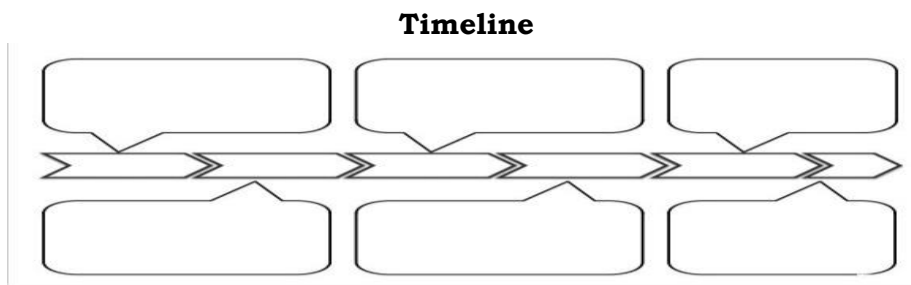
7. Which of the following BEST defines cell theory?
- A. It is the scientific theory that states that cells will divide, replicate, and mutate throughout their lifetime.
 - B. It is the scientific theory that states that cells are the basic unit of life and make up all living organisms.
 - C. It is the scientific theory that states that all living animals are made up of groups of differently specialized cells.
 - D. It is the scientific theory that states that all cells are genetically and structurally identical across all living organisms.
8. How did Rudolf Virchow contributed to the development of cell theory?
- A. Virchow determined that all living organisms are composed of cells.
 - B. Virchow stated that the new cells in an organism are produced by preexisting cells.
 - C. Virchow studied plant tissues and determined that plants are composed of cells.
 - D. Virchow used a microscope to view a piece of cork that he determined was made up of small compartments he called "cells."
9. Which of the following is **NOT** a principle that cell theory is based on?
- A. All cells are made from preexisting cells.
 - B. All living organisms are made up of one or more cells.
 - C. The basic functional unit of all living organisms is the cell.
 - D. Cells are the smallest structures found within an organism.
10. How did Theodor Schwann contribute to the development of cell theory?
- A. Schwann determined that all living organisms are composed of cells.
 - B. Schwann studied plant tissues and determined that plants are composed of cells.
 - C. Schwann stated that the new cells in an organism are produced by preexisting cells.
 - D. Schwann used a microscope to view a piece of cork that he determined was made up of small compartments he called "cells."
11. Which of the following is **NOT** a postulate of cell theory?
- I. All cell arises from other cell.
II. All cell contains subcellular organelles.
III. All living things are composed of cells.
- A. I only
 - B. II only
 - C. I and II only
 - D. II and III only
12. What did Schleiden and Schwann both discover individually?
- A. All cell has organelles.
 - B. All living things engage in metabolic functions.
 - C. All living things are composed of one or more cells.
 - D. Spontaneous generation of cells is an incorrect theory.
13. Whose microscope was first used to study cell?
- A. Robert Hooke
 - B. Anton Van Leuwenhoek
 - C. Matthias Jakob Schleiden
 - D. Zacharias Janssen and Hans

14. What was the great contribution of Anton Van Leuwenhoek in the field of cytology?
- He was able to observe living cells- clearly.
 - His finding of the animalcules and sperm cell.
 - His rejection of the spontaneous generation theory.
 - His invention of the microscope with improved lenses.
15. Who was able to explain how new cell arise?
- Anton Van Leuwenhoek
 - Matthias Jakob Schleiden
 - Robert Hooke
 - Rudolf Virchow



Additional Activities

Directions: Construct a timeline that leads to the discovery of the cell theory. You can use the suggested format below or you can create any type of graphic organizers that fits to this idea. Write it on a separate sheet of paper.



Rubrics for the Timeline Making.

Category	4 Outstanding	3 Very Satisfactory	2 Satisfactory	1 Needs Remediation
Quality and Quantity of Content	All the Important events are presented. The timeline contains the 6 major events.	Most of the important events are presented. The timeline contains 4-5 major events.	Some of the important events are presented. The timeline contains at least 3 major events.	Many important events are excluded. The timeline contains fewer than 3 major events.
Accuracy of Content	The presented facts are accurate for all the events on the timeline. (100%)	The presented facts are accurate for almost all the events on the timeline. (75%)	The presented facts are accurate for most of the events on the timeline. (50%)	The presented facts are often inaccurate for the events on the timeline. Accuracy is only 25%.
Sequence of Content	All of the events are placed in correct and exact order.	Almost all the events are placed in correct and exact order.	Most of the events are placed in correct and exact order.	Most of the events are incorrectly placed on the timeline.
Dates	All the events on the timeline are dated correctly.	Almost all of the events on the timeline are dated correctly.	Most of the events on the timeline are dated correctly.	Most of the dates on the events are inaccurate or missing for several events.
Sentence Fluency	Events are clearly stated.	Almost all events are clearly stated.	Most of the events are clearly stated.	Most of the events are not stated clearly.



What I Know

Directions: Read and understand the question carefully. Write the letter of your choice on a separate sheet of paper.

For items 1-9. Fill in the table with the needed information. Choose your answer inside the box.

A. 1590's	I. invented the compound microscope
B. 1674	J. Stated that cells are the secondary building blocks of all organism.
C. 1839	K. stated the 'Omnis cellulae cellula' which means that new cells come from already existing cells
D. 1845	L. observed the living cells through his microscope that could magnify 270 to 300 times
E. Robert Hooke	
F. Rudolf Virchow	
G. Theodor Schwann	
H. stated that all plants are made of cells	

The Development of the cell Theory

Date	Scientist	Discovery
1. _____	Hans and Zacharias Janssen	2. _____.
1665	3. _____	Observed the remains of dead plant (cork) cells.
4. _____	Anton van Leeuwenhoek	5. _____.
1838	Matthias Jakob Schleiden	6. _____.
7. _____	8. _____	Stated that all animals are made of cells.
1855	9. _____	stated the 'Omnis cellulae cellula' which means that new cells come from already existing cells

10. Decide if the postulates of the cell theory could have been possible if the discovery of theodore Schwann that cells were the fundamental units of animals was not recognized.

- No, its not possible because microscope was crude and needs advancement for the cells to be seen.
- Yes, it is possible because cells from organism was already observed by Antoin Van leewenhoek in his microscope.
- No, its not possible because all information must be based only from scientific result and proof must be presented.
- Yes, it possible because plants presence of cell was already discovered and animal as organism will be assumed to have cells at the same time.

11. Which statement is not related to the three postulates of the cell theory?

- All cells arise from pre-existing cells.
- All living organisms (plants and animals) are made up of cells.
- The cell is the basic structural and functional unit of all living organisms.
- Cells contain genetic information in the form of DNA passed on from cell to cell during division.

12. What ideas validate the first cell theory that all cell is the basic unit of all living things?

- I. Based on the discovery of cell by Robert Hooke in a sliced cord
- II. Based on the discovery of Matthias Jacob Schleiden about embryonic plant arose from single cell and Theodore Schwann that cells are the fundamental units of animal too.
- III. Based on the discovery of living cells by Leewenhook

- A. I only
- B. II only
- C. III only
- D. Both I and II

13. What can you point out about Zacharias Janssen and Han in their contribution about cell theory?

- I. They are the first inventors of the compound microscope that later played a important role in the cell theory.
- II. They were able to observe living cell because of their microscope invention.
- III. They were able to state the cells are basic units of all living organisms

- A. I only
- B. II only
- C. III only
- D. Both I and II

14. What was the most important contribution of Rudolf Virchow?

- I. "*Omnis cellula cella*" which means new cells come from already existing cells.
- II. His explanation how new cells arise
- III. His discovery of plant cell

- A. I only
- B. II only
- C. III only
- D. Both I and II

15. Robert Hooke invented the microscope and was used in studying the slice of cork? Is this statement correct?

- A. Yes, the statatement is correct.
- B. No, it was Anton Van Leuwenhoek who discovered it.
- C. Yes, he was assisted by Stephen William Hawking.
- D. No, they were Hans and Zacharias Janssen who discovered the cell.

Lesson**2****The Cell Theories*****What's In***

Directions: On your own words, explain how was the cell theory discovered.

Rubrics:

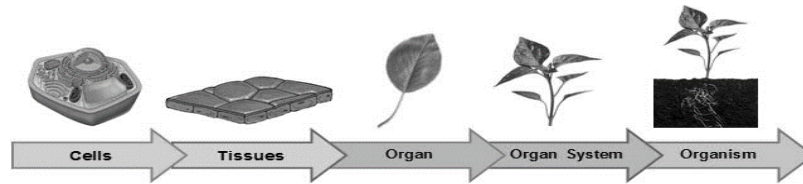
Categories	Excellent 5pts	Good 4 pts	Fair 3pts	Needs remediation 2pts
Correctness	All needed info is provided with no misconception	All needed info is provided with some misconception	Most information given is faulty	Information is not related to the topic asked
Technicalities (Grammar, spelling, neatness)	Grammars and spellings are correct with no erasures	Most of the grammars and spellings are correct and with some erasures	Grammars and spellings are somehow correct with erasure	Grammars and spellings are mostly incorrect and many erasures



What's New

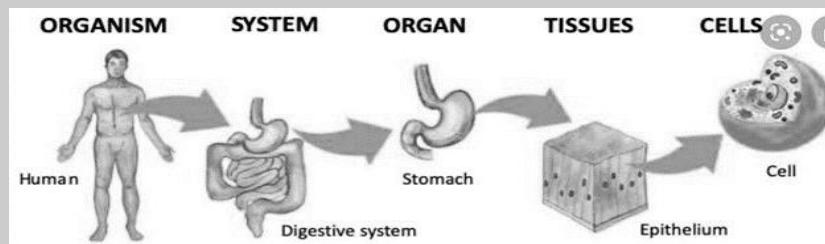
Directions: Carefully examine the illustration and answer the question. Write your answer on a separate sheet of paper.

A.



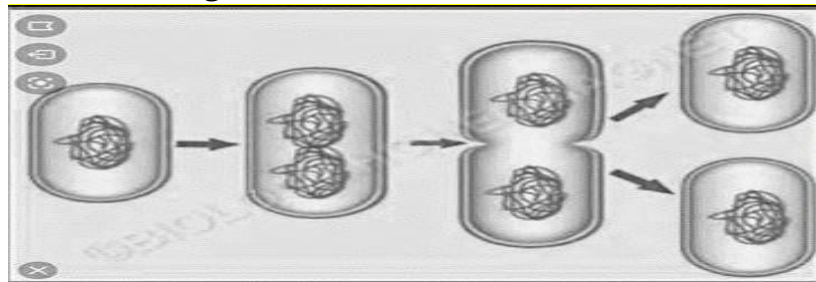
Cite Figure 1: Ontrack-media.net

B.



Cite Figure 2: The Adventure of Mrs. Ribozome

C. Binary Fission among Bacteria



Cite Figure 3: Biology for Everybody

Guide Questions:

What are the statements about cell you can derive from the images presented?
Write your answer on a separate sheet of paper



What is It

The Cell Theory

The cell theory holds some very basic and important claims that are essential to our concept of life on Earth. According to this theory, the cell serves as the structural, physiological, systemic, and organizational unit of life. The three postulates of the cell theory are:

1. All living organisms are composed of one or more cells.

The basic qualification of an organism is that it must be at least a single cell, which is a unicellular organism. Single functioning cells constitute the bacteria,

archaea and some fungi, thus these are living things. When several cells compose an organism, then it is a multicellular living organism. Plants and animals, protists and most fungi are multicellular organisms.

2. The cell is the basic unit of structure and functioning in organism.

The cell carries out the morpho- anatomy and physiology of an organism. In single- celled organisms, the cell is everything- the very structure that carries out all biochemical activities to maintain cellular life. For multi- cellular organisms, the whole organism, first begins as one cell. This first cell undergoes a series of division to increase the number of cells. These cells further specialize leading to the formation of tissues, organs, organ system and the whole organism. Thus, a bacterium is one-celled while a human being is about 10- trillion cell of different types

3. Cells come from pre-existing cells.

For the cell to reproduce, the requirement is a previously existing cell. Cells can come only from cells. Cells cannot come from anything. A non-cellular entity cannot produce a living cell. This statement has an implication for the evolution of life here on Earth. All cells on Earth- past and present- arose from a single cell, an inescapable conclusion assuming no alien intervention



What's More

Directions: Put a check on the statement that tells truth about the cell theory, and “X” if **NOT**. Write your answer on in a separate sheet of paper.

1. The cell was discovered by Robert Hooke in the year 1665 through his observation on a slice of a cork under a compound microscope. This discovery has a great impact on today's study of life.
2. The basic qualification of an organism is that it must be at least a single cell, which is a unicellular organism. When several cells compose an organism, then it is a multicellular living organism.
3. Cells can come from anything. A non-cellular entity can produce a living cell. This statement has an implication for the evolution of life here on Earth.
4. The cell theory grasps some very basic and significant claims that are important to our perception of life on Earth. According to this theory, the cell serves as the structural, physiological, systemic, and organizational unit of life.
5. Hans and Zacharias Janssen a German physiologists stated in German 'Omnis cellula e cellula' which means that new cells come from already existing cells.



What I Have Learned

Directions: Create a graphic organizer presenting all the new learnings you have acquired on this lesson. It could be in a concept map, outline, a web or a self-made graphic organizer. Be Creative in presenting your idea. Use a separate sheet of paper.

Rubrics

Category	Outstanding 4pts	Very Satisfactory 3pts	Satisfactory 2pts	Needs remediation 1pts
Quality and Quantity of Content	All the Important events are presented.	Most of the important events are presented.	Some of the important events are presented.	Many important events are excluded.
Accuracy of Content	The presented facts are accurate for all the events. (100%)	The presented facts are accurate for almost all the events. (75%)	The presented facts are accurate for most of the events. (50%)	The presented facts are often inaccurate for the events. (25%)
Sequence of Content	All of the information are placed in correct and exact order.	Almost all the information are placed in correct and exact order.	Most of the information are placed in correct and exact order.	Most of the information are incorrectly placed on the timeline.
Sentence Fluency	Information are clearly stated.	Almost all information are clearly stated.	Most of the information are clearly stated.	Most of the information are not stated clearly.



What I Can Do

Directions: Answer the following questions briefly. Write your answer on a separate sheet of paper.

1. On your own words, explain what is the three postulates about the cell.

- I. The cell is the basic structural and functional unit of all living organisms.
- II. All living organisms (plants and animals) are made up of cells.
- III. All cells arise from pre-existing cells.

2. How is the Cell Theory important in our study of Biology?

Rubrics

Categories	Excellent 5pts	Good 4 pts	Fair 3pts	Needs remediation 2pts
Correctness	All needed info is provided with no misconception	All needed info is provided with some misconception	Most information given is faulty	Information is not related to the topic asked
Technicalities (Grammar, spelling, neatness)	Grammars and spellings are correct with no erasures	Most of the grammars and spellings are correct and with some erasures	Grammars and spellings are somehow correct with erasure	Grammars and spellings are mostly incorrect and many erasures



Assessment

Directions: Choose the letter of the best answer on the given choices. Write your answer on a separate sheet of paper.

- There are three postulates on the cell theory. Which is **NOT** one of those postulates?

I. All cells come from pre-existing cells.
 II. All organisms are composed of one or more cells.
 III. The cell is the basic unit of structure and organization in organisms
 IV. Cells spontaneously arise from carbon and nutrients carried in the bloodstream.

- A. I and II only
 B. III and IV only
 C. III only
 D. IV only
- The theory explains that a basic qualification of an organism is that it must be at least a single cell, which is a unicellular organism?
 - All cells come from pre-existing cells.
 - All organisms are composed of one or more cells.
 - The cell is the basic unit of structure and organization in organisms
 - Cells spontaneously arise from carbon and nutrients carried in the bloodstream.
 - What theory states that the cell carries out the morpho- anatomy and physiology of an organism?
 - All cells come from pre-existing cells.
 - All organisms are composed of one or more cells.
 - The cell is the basic unit of structure and organization in organisms.
 - Cells spontaneously arise from carbon and nutrients carried in the bloodstream.

4. What theory states that cells cannot come from anything, a non-cellular entity cannot produce a living cell?
- All cells come from pre-existing cells.
 - All organisms are composed of one or more cells.
 - The cell is the basic unit of structure and organization in organisms
 - Cells spontaneously arise from carbon and nutrients carried in the bloodstream.
5. What is the average number of human cells?
- About 10- thousand
 - About 10- million
 - About 10- billion
 - About 10- trillion
6. All cells come from pre-existing cells. Which among the choices theory proves this discovery?
- cell theory
 - cell division
 - cell diffusion
 - cell explosion
7. Which of the following does **NOT** explain how the discovery of cell theory affect our lives?
- Helps us develop new medicines.
 - Gives information how living things develop.
 - Helps us understand how cancer cells spreads.
 - Guide us how to construct an environment friendly technique.
8. How does the discovery of the cell theory affect our lives?
- | |
|--|
| <ol style="list-style-type: none"> It explains how technology works. Informs us how our body are having its shape. Explains why rubber bounce back after hitting the floor. Helps us understand how malignant cells spread to other parts of the body. |
|--|
- I only
 - II only
 - III and IV only
 - I and II only
9. Cell > Tissue > Organ > System > Organism. These sample explains the the theory that all organism are compose of cell. Is this science concept correct?
- Yes. Because all organism develop from a single cell.
 - No, because all organism produce and created by themselves.
 - No, because based on the discovery of the cell, all organism are formed from a simple tissue.
 - Yes, because based on the discovery of the cell, all Organism are coming from pre existing cell.

10. What is the cell theory that explains this illustration of the levels of organization of an organism?. Organism > System > Organ > Tissue > Cell.
- All cells come from pre-existing cells.
 - All organisms are composed of one or more cells.
 - The cell is the basic unit of structure and organization in organisms.
 - All different types of cells are all compose of the same subcellular organelles.
11. What did Anton van Leeuwenhoek contributed on the discovery of the cell theory?
- He discovered that the cells comes from a pre-existing cells.
 - He observed living cells and discovered that all living organism is made up of cells.
 - He disproved the discovery of Rudolf Virchow and stated his own theory about the cell.
 - He invented the microscope which has an improved lens that could magnify objects from 270 to 300-fold.
12. What did Hans and Zacharias Janssen contributed on the discovery of the cell theory?
- They discovered that the cells comes from a pre-existing cells.
 - They disproved the discovery of Rudolf Virchow about the cells.
 - They invented the coumpound microscope used by Robert Hooke in his discovery of the cells.
 - They invented the microscope which has an improved lens that could magnify objects from 270 to 500 fold.
13. Matthias Jakob Schleiden has been recognized in the discovery of cell theory. Is the statement correct?
- Yes, because he discovered that cells are the fundamental units of plants.
 - Yes because he discovered that cells are the fundamental units of animals.
 - Yes, because he invented the microscope that was used by Robert Hooke in his discovery about cells.
 - Yes, because he invented the microscope that was used by Anton van Leeuwenhoek in his discovery about cells.
14. Theodor Schwann contribution on cell theory was_____.
- | |
|--|
| <ol style="list-style-type: none"> his discovery that cells are the fundamental units of plants. his discovery that cells are the fundamental units of animals. his invention of the microscope that was used by Robert Hooke in his discovery about cells. his invention of the microscope that was used by Anton van Leeuwenhoek in his discovery about cells. |
|--|
- I and II only
 - III and IV only
 - III only
 - IV only

15. Which of the following was **NOT** a major event in the history of the development of cell theory?
- Virchow determining that all cells are produced by pre-existing cells.
 - Hooke viewing the remains of cells in a slice of cork under a microscope.
 - Schwann identifying that bacteria and viruses were single-celled organisms.
 - Van Leeuwenhoek viewing living cells from algae and protists under his microscope.



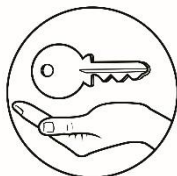
Additional Activities

Directions: Write a short essay to the questions. Write your answer on a separate sheet of paper.

- How far we have developed since the discovery of the cell?
- How far can we reach more?

Rubrics for the Essay Making.

Category	Very good (5points)	Good (5points)	Fair (3points)	Needs remediation (1points)
Focus on the Topic	The whole content is related to the topic and allows the reader to understand much more about the topic.	Almost all the content is related to the topic. The readers can still learn something about the topic.	Most of the content is related to the topic but a rather does not learn much about the topic.	Most of the content is not related to the topic. And sometime no attempt has been made to connect the content to the topic.
Creativity	The content contains many creative details that describes the topic which allows the reader to create his/her own essay.	The content contains many creative details that describes the topic, but the reader cannot create his/her own essay of it.	The content contains few creative details that describes the topic and most of them distracts the topic which creates mis-understanding to the readers.	There is little evidence of creativity in the content of the essay. many of the description used distracts the focus of the readers.
Imagery	Many vivid, descriptive words are used. The reader can picture the imagery in the essay.	Some vivid, descriptive words are used. The reader can somewhat picture the imagery in the essay.	The reader can figure out what to picture in the essay, but the author didn't supply much detail.	The reader has trouble figuring out what imagery the essay is using and what the author wants him/her to picture.



Answer Key

Lesson 1:

<p>Assessment</p> <p>1. C 2. C 3. B 4. D 5. B 6. C 7. B 8. B 9. C 10. C 11. B 12. C 13. D 14. D 15. D</p>	<p>What's More</p> <p>Across 1. Cell 2. Cellulae 3. Robert Hooke 5. Theodor Schwann 7. Cell Division 9. Scientist 10. Discovery Down 2. Cell Theory 4. Microscope 6. Leeuwenhoek 7. Cork 8. Rudolf Virchow 11. Schleiden 12. Hans 13. Janssen Hidden Word JOB WELL DONE!</p>	<p>What I Know</p> <p>1. B 2. A 3. B 4. A 5. C 6. C 7. B 8. D 9. A 10. A 11. D 12. A 13. B 14. B 15. D</p>
--	---	---

Lesson2

<p>Assessment</p> <p>1. D 2. B 3. C 4. A 5. D 6. B 7. D 8. C 9. A 10. A</p>	<p>What's More</p> <p>1. / 2. / 3. X 4. / 5. X</p>	<p>What I Know</p> <p>1. A 2. I 3. E 4. B 5. L 6. H 7. C 8. G 9. F 10. K 11. A 12. B 13. E 14. C 15. D</p>
--	---	---

References

Tamez, J., 2020. [online] Available at: <<https://youtu.be/KuJqqiATlqw>> [Accessed 15 June 2020].

Dela Pena, R., Gracilla, D., & Pangilinan, C. 2016. *General Biology Combined Book 1 & 2*. JFS Publishing Services Accessed June 15, 2020

Biology: LibreTexts libraries. 2020. *Discovery of Cells and Cell Theory*. Accessed June 15, 2020. <[https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_\(Wakim_and_Grewal\)/05%3A_Cells/5.02%3A_Discovery_of_Cells_and_Cell_Theory](https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_(Wakim_and_Grewal)/05%3A_Cells/5.02%3A_Discovery_of_Cells_and_Cell_Theory)>

Sutori. 2020. *Our Cell Theory Timeline. Facts about scientists who contributed to "The Cell Theory"*. Accessed June 15, 2020. <<https://www.sutori.com/story/our-cell-theory-timeline--ysqPf9CgJguMXPYQDfDXsv2g>>

Toppr-guides. 2020. *What Is Cell Theory?* Accessed June 16, 2020. <<https://www.toppr.com/guides/biology/cell-the-unit-of-life/introduction-to-cell-and-cell-theory/>>

Nagwa. 2020. *Worksheet Cell Theory*. Accessed June 16, 2020. <<https://www.nagwa.com/en/worksheets/359171571219/>>

Disclaimer

This Self-Learning Module (SLM) was developed by the DepEd SOCCSKSARGEN with the primary objective of preparing for and addressing the new normal. Contents of this module were based on DepEd's Most Essential Learning Competencies (MELC). This is a supplementary material used by all learners of region XII in all public schools beginning 2020-2021. This process of LR development was observed in the production of this module. This version 1.0 highly encourage feedback, comments and recommendations.

For inquiries or feedback, please write or call:

Department of Education – SOCCSKSARGEN Learning Resource
Management System (LRMS)

Regional Center, Brgy. Carpenter Hill, City of Koronadal

Telefax No. (083) 2288825/ (083) 2281893

Email Address: region12@deped.gov.ph