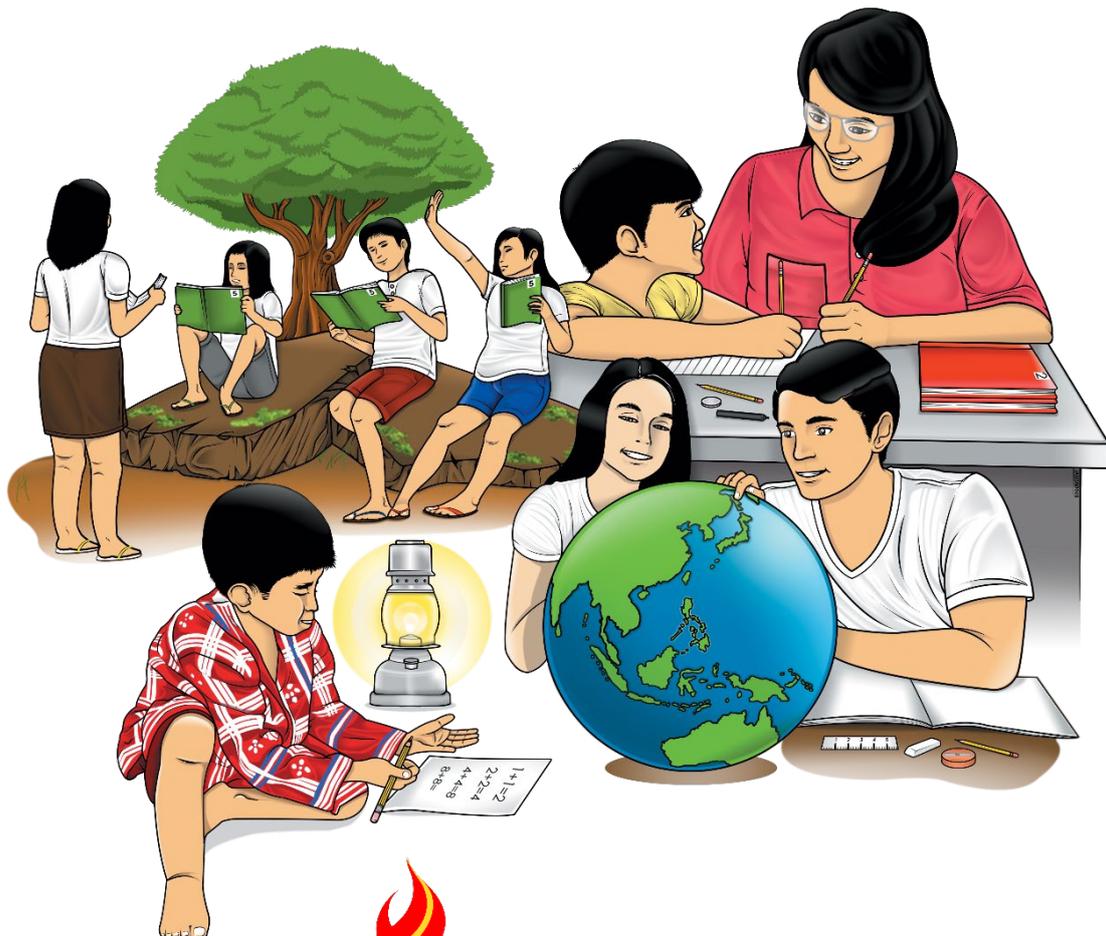


# Earth and Life Science

## Quarter 2 – Module 1:

### Evolving Concept of Life Based on Emerging Pieces of Evidence



**Earth and Life Science**  
**Alternative Delivery Mode**  
**Quarter 2 – Module 1: Evolving Concept of Life Based on Emerging Pieces of Evidence**  
**First Edition, 2021**

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**Senior High School**

**Earth and Life Science**  
**Quarter 2 – Module 1:**  
**Evolving Concept of Life Based**  
**on Emerging Pieces of Evidence**

## **Introductory Message**

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



## ***What I Need to Know***

This module was designed and written with you in mind. It is here to help you master the nature of Biology. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

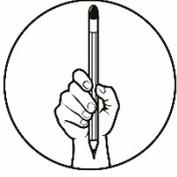
The module covers:

- Lesson 1 – Historical Development of the Concepts of Life

Learning Competency: Explain the evolving concept of life based on emerging pieces of evidence. (S11/12LT-IIa-1)

After going through this module, you are expected to:

1. identify the sequence of events of the history of life on earth;
2. name the pieces of evidence on the evolution of life on earth; and
3. recognize the importance of knowing the history of life on earth.



## ***What I Know***

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

1. Dinosaurs are reptiles that existed for a very long time. Which era did these organisms evolve?
  - a. Cenozoic Era
  - b. Mesozoic Era
  - c. Paleozoic Era
  - d. Proterozoic Era
  
2. What are the first photosynthetic organisms that grew well on earth?
  - a. bryophyllum
  - b. cyanobacteria
  - c. stromatolites
  - d. zircon crystal
  
3. The oxygen revolution changed Earth's environment dramatically. Which of the following adaptations took advantage of the presence of free oxygen in the oceans and atmosphere?
  - a. The evolution of cellular respiration, which used oxygen to help harvest energy from organic molecules.
  - b. The evolution of chloroplasts after early protists incorporated photosynthetic cyanobacteria
  - c. The evolution of multicellular eukaryotic colonies from communities of prokaryotes.
  - d. The evolution of photosynthetic pigments that protected early algae from the corrosive effects of oxygen.
  
4. Why did it take millions of years for life to appear on Earth after the planet had formed?
  - a. It took millions of years for RNA to replace DNA.
  - b. The planet had warmed up enough to sustain life.
  - c. The planet had cooled down enough to sustain life.
  - d. Life on Earth could begin only when seedlings arrived on our planet from other worlds.
  
5. Which types of organisms developed first due to the early environmental conditions on Earth?
  - a. eukaryotic and aerobic
  - b. eukaryotic and anaerobic
  - c. prokaryotic and aerobic
  - d. prokaryotic and anaerobic

6. What are called the remains of living organism used in understanding the history of life on earth?
  - a. bone
  - b. fossils
  - c. seeds
  - d. shells
  
7. Which statement is NOT true of fossils?
  - a. Plants can form fossils.
  - b. Some bacteria can form fossils.
  - c. Most extinct organisms have been preserved.
  - d. A small percent of extinct organisms is preserved.
  
8. Which of the following can be considered as a fossil?
  - a. a billion-year old rock
  - b. a billion-year old piece of amber
  - c. a billion-year old amber with a primitive insect inside
  - d. the choices are all correct
  
9. What unique substance do researchers look after in their study of eukaryotes?
  - a. biomarkers
  - b. fossils
  - c. mitochondria
  - d. stromatolites
  
10. What is the evidence for a last universal common ancestor among life on earth?
  - a. They are all aerobic.
  - b. They all look the same.
  - c. They all have the same synthesis pattern.
  - d. They share the same underlying molecular biology.
  
11. Which statement best shows the main significance of studying the past?
  - a. The past is attractive to look back.
  - b. It will give jobs for many scientists and paleontologists.
  - c. It will allow them to think what they need to study.
  - d. Understanding the past allows us to predict the future and help in creating it.
  
12. One significance of knowing the history of life is to determine the origin of one living organism. According to researchers, which of the following are the only surviving species of the genus Homo and one of the living evidences that life has existed on Earth?
  - a. birds
  - b. dinosaurs
  - c. human beings
  - d. sponges

13. Over the past decades, there are challenges that the environment has faced. Pandemics affected the lives of various living organisms. What is the significance of knowing this history?
- It will give them an income.
  - They will just be informed about it.
  - It will lead them to know the history of life.
  - It will give an idea on how medical world will seek for the treatment.
14. The following statements are challenges for the researchers in finding and identifying signs of early cells. Which is not part of the group?
- Materials and testing laboratories are not available.
  - Cells are microscopic and most have no parts to fossilize
  - Slightly younger rocks have been heated up and undergone other processes
  - Tectonic plate movements have destroyed nearly all rocks older than about 4 billion years
15. The study of history of life is significant in many aspects. The stromatolites played a significant role as a source of evidence. What is stromatolite?
- It is found in animals.
  - It is produced by endosymbiosis.
  - It formed during volcanic eruptions.
  - It consists of layered bacteria and sediment.

**Lesson****1****Evolving Concept of Life  
Based on Emerging Pieces of  
Evidence**

Have you been curious of when and where did life possibly start on Earth? During the 1800s, geologists and the naturalists found several forms of physical evidence that confirmed that Earth is very old. The evidence includes: fossils of ancient sea life on dry land far from oceans, this supported the idea that the Earth changed over time and some dry land today was once covered by oceans; the many layers of rock allowed the people to realize that rock layers represent the order in which rocks and fossils appeared, thus they were able to trace the history of Earth and life on Earth; lastly, the indications that volcanic eruptions, earthquakes and erosion that happened long ago shaped much of the Earth's surface and supported the idea of an older Earth. This module will help you understand the historical development of the concept of life based on emerging pieces of evidence. This will trace back the events, processes, and living organisms existed on earth from the earliest time to present.

***What's In*****Activity 1: My Life in Timeline**

**Directions:** Picture out a history of your life. Create a timeline that will reflect the events that happened to you in the past.

My Life in Timeline

Guide Questions:

1. What is a timeline?

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2. Why is creating a timeline significant?

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***Notes to the Teacher***

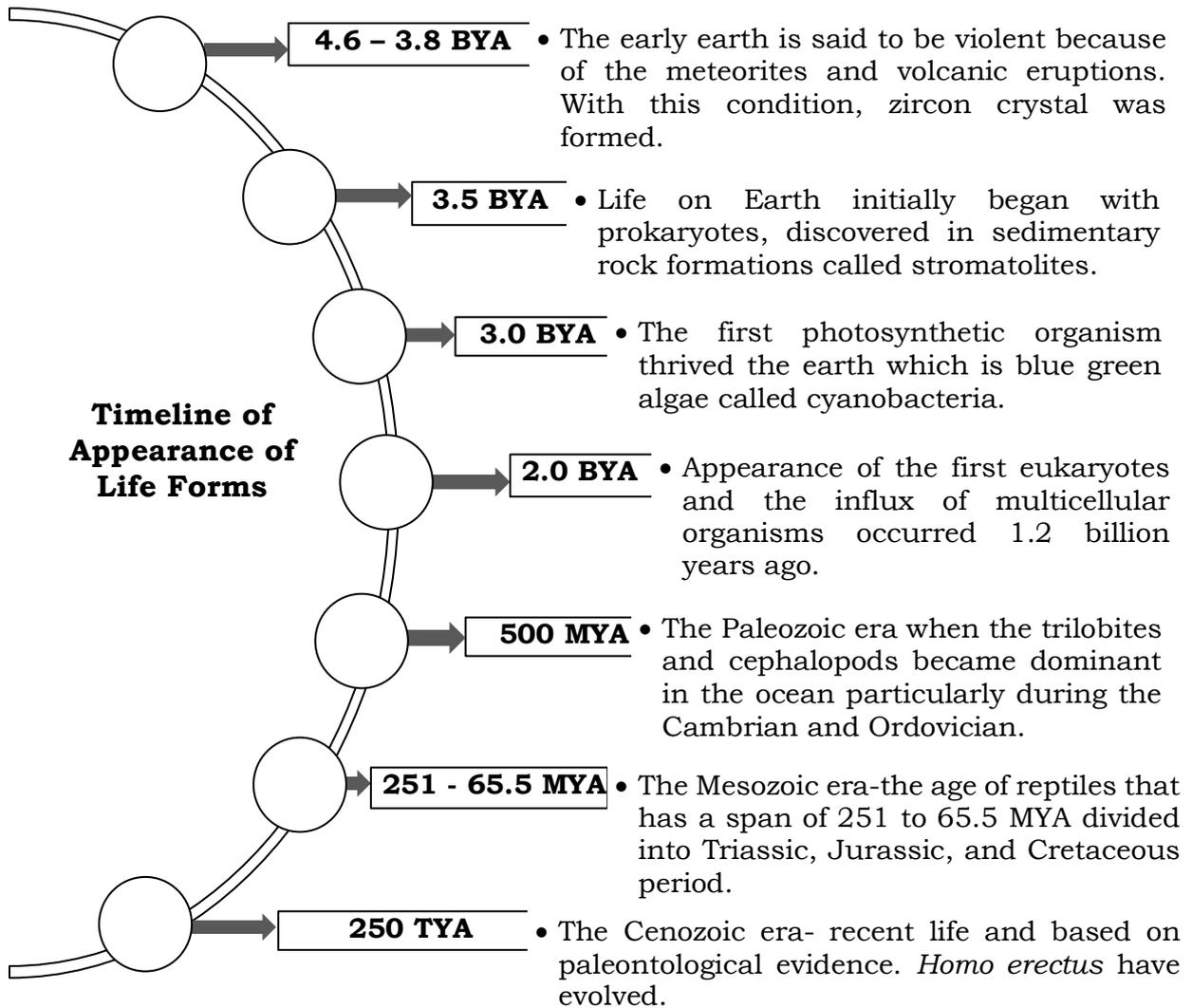
This module will help you understand the concepts about historical development of life. Guide the students by elaborating the simple and complex concepts included on each activity presented. Expectedly you will meet the target at the end of the module.

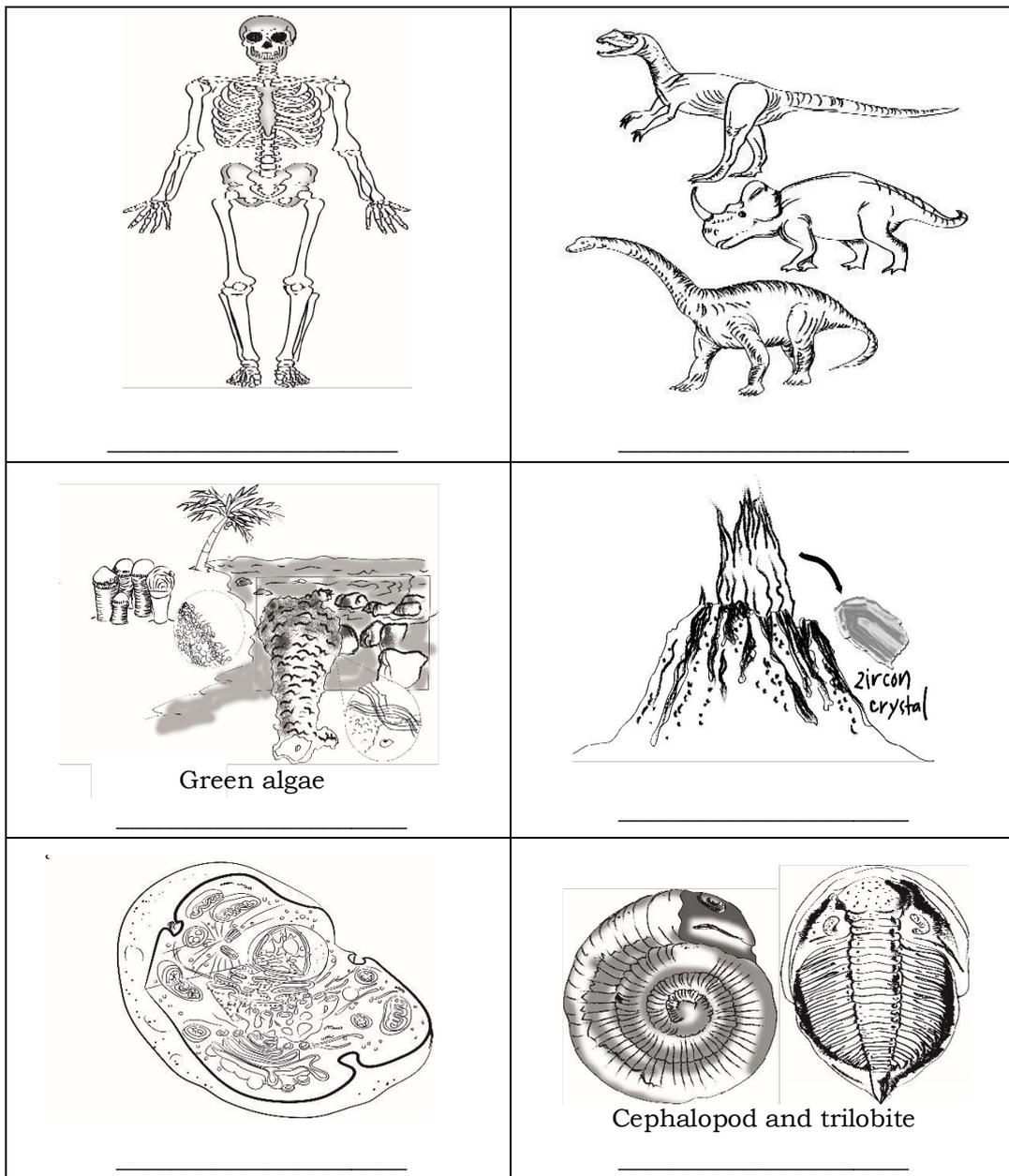


## What's New

### Activity 2: Timeline of Events

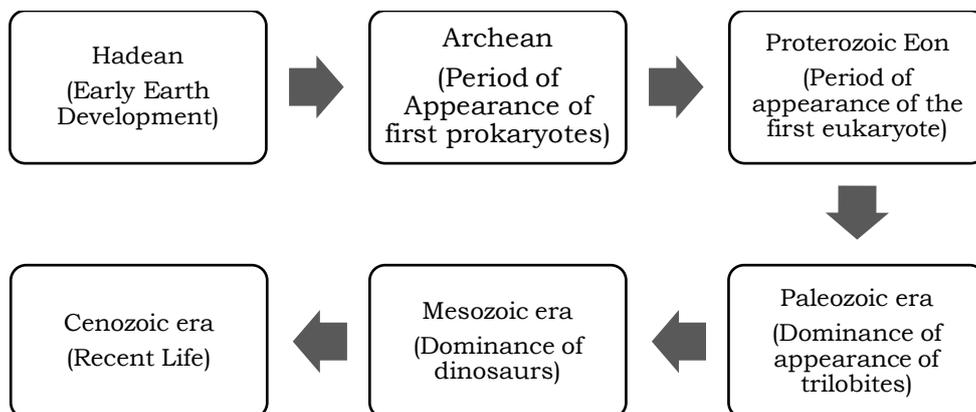
**Directions:** Read and analyze the timeline. Arrange the images below the timeline to show the order of the appearance of life forms on earth.





### Activity 3: Evidence of Life

**Directions:** Give an evidence on the given events that occurred on geologic time scale that enables the paleontologist to sequence the history of life.



**Activity 4: It's a match!**

**Directions:** Column A are evidences while column B refers to certain timeline. Match them by writing the letter of your answer on the space before the number.

Column A	Column B
____ 1. <i>Homo erectus</i>	A. 4.3 BYA
____ 2. eukaryotes	B. 2.0 BYA
____ 3. zircon crystal	C. Mesozoic Era
____ 4. dinosaurs	D. 250 thousand years ago
____ 5. trilobite fossils	E. Cambrian Period

**Activity 5: Name It**

**Directions:** Name the pieces of evidence on the evolution of life. Write your answer on the space provided. Pick your answer from the terms inside the box.

zircon crystal	stromatolites	cyanobacteria
first eukaryotes	multicellular organisms	<i>Homo erectus</i>
trilobite fossils		first prokaryotes

<b>Period</b>	<b>Evidences/Organisms</b>
4.6 to 3.6 billion years ago	1.
3.5 billion years ago	2.
3.0 billion years ago	3.
2.0 billion years ago	4.
1.2 billion years ago	5.
500 million years ago	6.
250 thousand years ago	7.



## ***What is It***

The universe is about **4.6 billion years old**. **Life on earth**, probably began only between **3.5 and 4.0 billion years ago**. Evidences from **fossil records** show the emergence of the different life forms. The common ancestor of all life was prokaryotic. Since, oxygen was scarce on the early Earth, so the ancestral cell must also have been an anaerobic. There are some challenges encountered in searching for the evidence of early life. Cells are microscopic and most have no parts to fossilize. The tectonic plate movements have destroyed nearly all rocks older than about 4 billion years, and most of the younger rocks have been heated or undergone processes that destroy the traces of biological material. At present, the oldest cell **microfossils** (microscopic fossils) are filaments from 3.5 billion-year-old rocks in Western Australia. The filaments resemble chains of modern photosynthetic bacteria and the rocks in which they occur are the remains of ancient **stromatolites**.

The researchers look for **biomarkers** specific to eukaryotes. It is a substance that occurs only or predominantly in cells of a specific type. **Eukaryotes** are organisms having true nucleus. The DNA is enclosed within the nucleus whereas DNA of most prokaryotes lies enclosed in the cell's cytoplasm. The first eukaryotes were **protists**.

For life to evolve from simple single-celled organisms to many millions of species of prokaryotic species to simple eukaryotic species to all the protists, fungi, plants, and animals, took some time. The first life forms were very basic and this then allowed for the evolution of more complex life forms. Eukaryotic cells evolved from prokaryotic cells. The evolution of life is brought about the changes in the environment which are linked to changes in climate and geology. These Earth's environmental changes made the Earth's environment more suitable for a wider variety of life forms.

### Activity 6: Arrange Me

**Directions:** From the given statements below, arrange them to show the origin and evolution of eukaryotes. Number the boxes from 1-8, 1 as the earliest.

\_\_\_ A. The emergence of first celled organisms lacking nucleus in environment where oxygen was scarce.

\_\_\_ B. Photosynthesis and aerobic respiration evolve in some bacterial lineages.

\_\_\_ C. Fungi, animals, and algae that give rise to plants-had evolved in the seas.

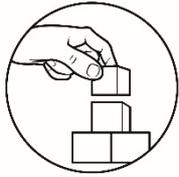
\_\_\_ D. The presence of organic compounds on early Earth.

\_\_\_ E. Oxygen-producing photosynthetic bacterial cell entered a eukaryotic cell, bacterial descendants evolved into chloroplasts

\_\_\_ F. Aerobic bacteria lived inside eukaryotic cell, then descendants of these bacteria evolved into mitochondria.

\_\_\_ G. Endomembrane system and nucleus evolve through the modification of cell membranes

\_\_\_ H. The modern life-modern organisms related by descent.



## What's More

### Activity 7: Time to Reveal

**Directions:** Arrange the jumbled word to reveal the evidence in the history of life on earth. Write the answer on the space below the grid.

R	I	O	T	L	T	I	E	B

- A marine animal first evolved at the beginning of the Cambrian period, 542 MYA, where they dominated the ocean.

E	E	R	C	T	U	S	M	O	H	O

- Extinct species of the genus Homo from which the modern human has evolved from.

A	K	R	P	O	R	Y	O	T	S	E

- A basic cell type which lacks true nucleus. Bacteria, blue-green algae, archaeans and spirochetes are examples of organisms belonging to this cell type.

R	U	O	S	D	N	I	A	S

- These are giant reptiles that roamed the earth during the Mesozoic era.

A	K	R	U	E	Y	O	T	S	E

- This basic cell type possesses a true nucleus that contains DNA.

### Activity 8: Origin of Life

**Directions:** Create a concept map that will discuss how life originated and evolved based on emerging pieces of evidence using the concepts inside the box.

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• history of life</li> <li>• eukaryotic cell</li> <li>• prokaryotic cell</li> <li>• stromatolites</li> <li>• fossils</li> <li>• Variation Among Organisms</li> <li>• Molecular DNA</li> </ul> | <ul style="list-style-type: none"> <li>• adaptation</li> <li>• photosynthesis</li> <li>• scarcity of oxygen</li> <li>• biomarkers</li> <li>• organic monomers</li> </ul> |
|--|--|

**Activity 9: TMG (Transformations, Mass Extinctions and Geologic Changes)**

**Directions:** Earth’s history is marked by a series of transformations, mass extinctions and geologic changes that have taken place over the course of 4.6 billion years. Place the given events on the corresponding time it occurred.

• First evidence of life (3,850 MYA)	• Modern humans (0.1 MYA)
• Oldest fossils (3. 500 MYA)	• Formation of great oceans (4,200 MYA)
• First evidence of soft bodied animals (900 MYA)	• Continents begin shifting (3100 MYA)
• The Cambrian Explosion (530 MYA)	• Rodinia supercontinents breaks up (700 MYA)
• First land plants and fish (480 MYA)	• Pangea supercontinent breaks up (200 MYA)
• First reptiles (350 MYA)	• Inland seas dry up (200 MYA)
• First Mammals and dinosaurs (220 MYA)	• Global ice ages begin (2 MYA)
• First birds (150 MYA)	• First hominids (5.2 MYA)
• About 50%of marine invertebrate genera (Late Triassic 206 MYA)	• 25 % of Marine invertebrate families (End Ordovician 443 MYA)
• Dinosaurs and 60 to 80 percent of all species (End Cretaceous 65 MYA)	• Many wood land, plant-eating herbivores (Miocene 9 MYA)

<b>Transformation</b>	<b>Mass Extinctions</b>	<b>Geologic Changes</b>

**Activity 10: Extinct Flora & Fauna**

**Directions:** The study of the history of life revealed that there were living organisms that became extinct brought by environmental conditions. In recent times, there are news on various species that underwent this process. Enumerate flora and fauna that become extinct and the reasons for this inexistence.

## Activity 11: Sequence of Events

**Directions:** Below are some key events happened in the past. Create a timeline that will show the sequence of events of the history of life. Use the information below as your guide. You may just use the keywords as part of your timeline.

- The genus *Homo* gave rise to **modern humans**, *Homo sapiens*, us. It is estimated that they have been around for 2.3-2.4 million years, coinciding with the first evidence of stone tool usage.
- The **first mammals** are our most direct ancestors, evolved from Amniotes. One of the earliest known mammals was *Eozostrodon* lived about 210 million years ago.
- Studies of fossils from the Devonian Period 416-359 MYA indicates that **land plants** had evolved features we recognized today, such as leaves, roots and secondary wood.
- Simple **eukaryotes**, but more advanced organisms, thought to developed 1.6 – 2.1 billion years ago
- Oldest known fossilized **prokaryotes** have been dated approximately 3.5 billion years ago
- Around 1.1 billion years ago **multicellular organisms** are thought to have started to develop.
- **Animals** in the most basic sense of the word, have evolved from eukaryotes. **Fossils of early sponges** have been discovered in 665 million years old rock.
- 560 million years ago, some highly significant fossils of an organism which was named **Charnia** were discovered. These enigmatic early animals were anchored to the sea floor where they are thought to have absorbed nutrients.

## Activity 12: Why Should I Study History of Life?

**Directions:** Write at least fifty-word reflection paper on: “Why should I study history of life?”.



## What I Have Learned

### Activity 13: Complete me

**Directions:** Complete the paragraph by filling-up the blanks with the correct word from the box.

stromatolites	ocean
human Beings	zircon crystal
4.6 billion years ago	Mesozoic Era
Cenozoic	3.0 billion years ago
Earth	<i>Homo erectus</i>

About (1) \_\_\_\_\_, the earth was formed as the solar system came into existence with the other planets rotating around the sun. (2) \_\_\_\_\_ is said to be geologically violent because of the continuous bombardment by meteorites and volcanic eruptions. With this condition, minerals were formed from the elements and compounds contained in the molten material. The oldest material found on earth is the (3) \_\_\_\_\_ that is estimated to be 4.3 billion years old. Life on earth is believed to begin 3.5 billion years ago with single-celled prokaryotes, as discovered in sedimentary rock formations called (4) \_\_\_\_\_. As early as (5) \_\_\_\_\_, the first photosynthetic organism thrived the earth which is blue green algae called cyanobacteria. It was 2.0 billion years ago when the first eukaryotes appeared and the influx of multicellular organisms occurred 1.2 billion years ago. During the Paleozoic Era which lasted 542 to 251 MYA, the Cambrian and Ordovician Period has been known as the age of invertebrates when trilobites and cephalopods became dominant in the (6) \_\_\_\_\_. The (7) \_\_\_\_\_ is the age of reptiles that has a span of 251 to 65.5 MYA divided into Triassic, Jurassic, and Cretaceous Period. (8) \_\_\_\_\_ is the era of recent life and based on paleontological evidence (9) \_\_\_\_\_ have evolved 250 thousand years ago. (10) \_\_\_\_\_ are the only surviving species and one of the living evidences that life have existed on earth.





## Assessment

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

- Oxygen was scarce during the early development of Earth. By this situation, what kind of organism first existed?
  - aerobic organism
  - anaerobic organism
  - mammal
  - protist
- Which of the following statements is NOT true on the evolution of multicellular organisms?
  - The process of continuous specialization brought more complex organisms.
  - The prokaryotic organisms that formed multicellular aggregates were like the cells of Cyanobacteria.
  - They are believed to have evolved from single-celled prokaryotic organisms.
  - They are formed from other multicellular colonial aggregates through cells specialization.
- Why do you think the emergence of plants and animals came later than simple living organisms?
  - Their existence is not that important on Earth.
  - Their size is too big that it takes longer time for development.
  - The cell structures of these multicellular organisms are more complex.
  - These organisms are composed of many nucleus compared to unicellular.
- Which statement is incorrect about living organisms?
  - The earliest forms of life existed were the prokaryotes.
  - The eukaryotic organisms evolved from the unicellular prokaryotic.
  - Organisms did not change despite of the changes in the environment.
  - Evolution of oxygen-producing organisms allowed the increase in the atmospheric oxygen.
- Which of the following are in the correct order?
  - eukaryotic cell, photosynthesis, prokaryotic cell, organic molecules
  - eukaryotic cell, prokaryotic cell, organic molecules, photosynthesis
  - organic molecules, eukaryotic cell, photosynthesis, prokaryotic cell
  - organic molecules, prokaryotic cell, photosynthesis, eukaryotic cell

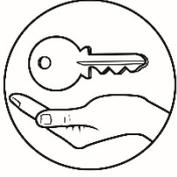
6. What is the evidence for a last universal common ancestor among life on Earth?
  - a. All look the same.
  - b. They have similar synthesis pattern.
  - c. All are classified as aerobic organisms.
  - d. They share similar molecular features.
7. What unique substance do researchers look after in their study of eukaryotes?
  - a. biomarkers
  - b. fossils
  - c. mitochondria
  - d. stromatolites
8. Which of the following can be considered as a fossil?
  - a. a billion-year old rock
  - b. a billion-year old piece of amber
  - c. a billion-year old amber with a primitive insect inside
  - d. all of the choices are correct
9. Mainly the fossils are found on sedimentary rocks. What type of rocks are stromatolites?
  - a. igneous
  - b. metamorphic
  - c. sedimentary
  - d. trilobites
10. Which of the following is NOT true about the evidence that fossils provide?
  - a. All fossils gathered contain intact DNA that can be sequenced.
  - b. Fossil ages can often be determined by testing nearby rocks.
  - c. Fossil organisms often share physical similarities with living organisms.
  - d. Some fossil organisms are transitional forms between groups of organisms.
11. It was stated that the organisms are evolving. The evolution can be due to environmental changes. More so, the conservation of their traits depends mainly on how they will survive. In this regard, humans alter the natural world bringing harmful consequences from their activity. Which among the following refers to the alteration brought by humans to the natural environment?
  - a. environmental issues
  - b. ecosystem conflict
  - c. environmental topics
  - d. human intervention

12. What is the significance of studying the molecular evidence present among living organisms?
- It will benefit the economy of the world.
  - It will give idea for the scientist which to clone.
  - It will then serve as the basis of what to study.
  - It will allow the classification of living organisms.
13. Over the past several decades, natural selection has caused populations of *Staphylococcus aureus* to evolve resistance to most antibiotics. What do you think would be the significance of being knowledgeable about the history of this organism towards antibiotics?
- It will just give them background about the microorganism.
  - It will just give them idea of increasing the frequency of the organisms.
  - It will give an idea of continuing the use of antibiotic against *Staphylococcus aureus*.
  - It will give an idea for the medical team to discontinue the use of particular antibiotic resistant to that microorganism.
14. The study of history of life is indeed significant. As part of searching for the fossils of previous organisms, stromatolite played a significant role. What is true about stromatolite?
- It is found on eukaryotes.
  - It is produced by endosymbiosis.
  - It is formed during volcanic eruptions.
  - It consists of layered bacteria and sediment.
15. The following statements are challenges for the researchers in finding and identifying signs of early cells. Which is NOT part of the group?
- Cells are microscopic and most have no parts to fossilize
  - Materials and testing laboratories are not available.
  - Slightly younger rocks have been heated up and undergone other processes
  - Tectonic plate movements have destroyed nearly all rocks older than about 4 billion years.



## ***Additional Activities***

- It was stated that researchers faced challenges looking for fossils of the earliest-life forms. These fossils served as evidence of the origin of life. Based on your knowledge of tectonic plates, why few samples of early rocks remain?
- Create an interactive infographic that will show the history of earth.



# Answer Key

**Activity 10: Extinct Flora & Fauna**  
 Students' answer may vary

**Activity 11: Sequence of Events**  
 1. Prokaryotes-3.5 billion  
 2. Simple eukaryotes- 1.6-2.1 BY  
 3. Animals-sponges - 665 MY  
 4. Charnia- 560 MY  
 5. Land plants- 416-359 MY  
 6. First mammals- Eozostrodon- 210 MY  
 7. Homo sapiens- 2.3-2.4 MY  
**Activity 12: Why Should I study History of Life**  
 Students' answer may vary

**Activity 13: Complete Me**  
 1. 4.6 billion years ago  
 2. Earth  
 3. zircon crystal  
 4. stromatolites  
 5. 3.0 billion years ago  
 6. ocean  
 7. Mesozoic era  
 8. Cenozoic  
 9. Homo erectus  
 10. human beings

**What I Have Learned**  
 Students' answer may vary

**What I Can Do**  
 Students' answer may vary

**Assessment**  
 1. B  
 2. D  
 3. C  
 4. C  
 5. D  
 6. D  
 7. A  
 8. D  
 9. C  
 10. A

**What is It**  
 Activity 6: Arrange Me  
 A. 2  
 B. 3  
 C. 7  
 D. 1  
 E. 6

**What's More**  
 Activity 7: Time to Reveal  
 1. trilobite  
 2. *Homo erectus*  
 3. prokaryotes  
 4. dinosaurs  
 5. eukaryotes

**Activity 8: Origin of Life**  
 Students' answer may vary

**Activity 9: TMG**  
**Transitions**  
 1. First evidence of life  
 2. Oldest fossils  
 3. First evidence of soft bodied animals  
 4. The Cambrian Explosion  
 5. First land plants and fish  
 6. First mammals and dinosaurs  
 7. First birds  
 8. First hominids  
 9. Modern humans  
**Geologic Changes**  
 1. Formation of great oceans  
 2. Continents begin shifting  
 3. Rodinia  
 4. Pangaea  
 5. Inland seas dry up  
 6. Global ice ages  
**Mass Extinctions**  
 1. 50% invertebrate genera  
 2. Dinosaurs and 60 to 80% of all species  
 3. 25% of marine invertebrate families  
 4. many wood land, plant-eating herbivores

**What I Know**  
 1. B  
 2. B  
 3. A  
 4. C  
 5. D  
 6. B  
 7. C  
 8. D  
 9. A  
 10. D  
 11. D  
 12. C  
 13. D  
 14. B  
 15. D

**What's In**  
 Activity 1: My Life in Timeline  
 Students' answer may vary

**What's New**  
 Activity 2: Timeline of Events  
 1. 7  
 2. 6  
 3. 3  
 4. 2  
 5. 1  
 6. 4  
 7. 5  
**Activity 3: Evidence of Life**  
 1. zircon crystal  
 2. stromatolites  
 3. biomarkers  
 4. trilobite fossils  
 5. dinosaur fossils  
 7. *Homo erectus*

**Activity 4: It's a Match**  
 1. D  
 2. B  
 3. A  
 4. C  
 5. E

**Activity 5: Name It**  
 1. zircon crystals  
 2. stromatolites  
 3. cyanobacteria  
 4. first eukaryotic organisms  
 5. multicellular  
 6. trilobite fossil  
 7. *Homo erectus*

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