

Lesson 18: Origin of Life

Summary

This module explores various hypotheses concerning the origins of life on planet Earth and their plausibility when applied to Mars.

Learning Goals

Students will be able to:

- Explain the conditions of the Miller-Urey Experiment.
- Define “life” and the requirements for life.
- Determine if the Miller-Urey Experiment has applicability on Mars.

Context for Use

This module is meant for adaptation in an Earth science course, particularly a segment discussing Pre-Cambrian/Hadean environmental conditions on Earth. Biology instructors are also encouraged to adapt this material.

Description and Teaching Materials

In-Class Activity 1: Miller-Urey Experiment

In-Class Activity 2: Mars Life through the Lens of MSL Curiosity

Teaching Notes and Tips

1. Encourage a discussion about the requirements for life and what “life” means in the In-Class Activity
2. Have students determine the viability of the Miller-Urey Experiment as a theory for the origin of life.

Assessment

Methods of assessment are within each individual *In-Class Activity* and *Homework*.

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References and Resources

Miller-Urey Experiment YouTube Video: <http://www.youtube.com/watch?v=iahBQolXQH8>



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In-Class Activity 2

Origin of Life?

Mars life: through the lens of Curiosity

Purpose: Students will become familiar with the mission of Curiosity as it pertains to finding life on other planets.

Preparation:

- Internet access in the classroom
- Students need to be somewhat familiar with the mineralogy of Mars to be successful in this activity (olivine, phyllosilicates, sulfates etc.).

Resources:

- Mars Curiosity Habitability Mission video:
<http://www.youtube.com/watch?v=oHLbXTOaw7w&feature=relmfu>

Engage

Have students view the following video from NASA regarding the mission of MSL Curiosity:
<http://www.youtube.com/watch?v=oHLbXTOaw7w&feature=relmfu>

Explore

As students watch the video have them be ready to answer and discuss the following questions:

1. What type of “life” are scientists looking for?
2. Can instruments on the MSL Rover Curiosity detect life?
3. What compound is associated with all life?
4. What element is necessary for life?
5. Why would the layering of rocks at Gale Crater be of interest? What might that layering imply?

Explain

Students should define habitability, extinct life, and extant life. They should understand that the “life” on Mars may be very small and primitive if scientists are lucky enough to find and detect it.

Here is a short recommended reading on habitability of Mars:

<http://www.space.com/19928-mars-habitable-life-possible.html>



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Elaborate

Detecting Life: Ask the students the following question.

1. Does Curiosity have any instruments that can directly test for life?

Evaluate

Promote discussions about the challenges NASA faces now and in the future as they continue the search for life. To spark discussion use the following question:

1. What are some of the challenges related to directly testing for life?

