Teaching Activity: Gaia and Life

Introduction: Explaining to someone what makes a living organisms is not an easy thing to do. Obviously, dogs, cats, trees, bacteria, algae and mushrooms are alive; rocks, metals and plastics are obviously not living. What about the entire Earth/atmosphere system?

Scientists generally agree that the following are characteristics of all living things: 1) defined outer limits or boundaries (cell walls, membranes, skin, etc.); 2) take in energy either as sunlight or chemical energy stored in food; 3) direct and maintain internal chemical functions; 4) excrete waste products; 5) grow; 6) restore damaged tissue, bones, etc; 7) reproduce and 8) evolve.

Objective:

- To define a living thing;
- To provide evidence for a thing being living or nonliving;
- To evaluate whether and ecosystem is alive, specifically if Gaia can be considered alive;

Materials: Duco cement, Petrie dish, water, burning candle, rocks with fossils, fish eggs, yeast, shells, dried algae, fruit, seeds, potted plant, cut flower, wasp nest or bee hive, any other items for consideration, Overhead projector;

Procedure:

1. With the class, brainstorm a list of things that are alive and things that are not alive.
    - Discuss characteristics of living things.

2. Light the candle.
    - Ask the class if the candle is alive, and why or why not.

3. Make the "BLOB".
    - Fill a Petrie dish with water; add a drop of Duco cement to the water.
    - Shape the cement.
    - Discuss if the "BLOB" is alive or not and why.

4. Pass out the blank table: **LIVING or NONLIVING?**
    - Have students fill in the list of items and classify them as either living or nonliving as well as provide evidence for or against.

5. Create a table of life forms.
    - Instruct students to compare the characteristics of a variety of living things, a small ecosystem and GAIA.
    - Students should put a (+) if the items exhibits certain characteristics and a (-) if it does not.

6. Students should then answer the questions in the **Analysis and Comprehension** section.

Student Activity Sheet: Gaia and Life

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Objective:

- To define a living thing;
- To provide evidence for a thing being living or nonliving;
- To evaluate whether and ecosystem is alive, specifically if Gaia can be considered alive;

Procedure:

1. Brainstorm a list of living and nonliving things with your class.
    - Discuss the characteristics of living things.

2. Fill in the list of items in the table "**LIVING** or NONLIVING".
    - Classify them as either living or nonliving and give evidence for or against your choice.

3. On the table of life form characteristics, put a (+) if the items exhibit a specific characteristic and (-) if it does not.

4. Answer the questions in the **Analysis and Comprehension** section.

Student Activity Sheet #1

PART I: TABLE: LIVING or NONLIVING?

ITEM	Is it alive now?	Was it ever alive?	Evidence for living/nonliving

Student Activity Sheet #2

PART II: TABLE: CHARACTERISTICS OF LIFE FORMS

CHARACTERISTICS	VIRUS	BACTERIA	APHID	TULIP	LION	OAK TREE	BEEHIVE	GAIA
Boundary								
Uses energy								
Metabolism								
Excretes waste								
Grows								
Self-healing								
Reproduces								
Evolves								

PART III: ANALYSIS AND COMPREHENSION

1. What are the criteria necessary for something to be considered living?_____
_____
_____

2. Should the definition of living include larger life forms such as a beehive, an ecosystem or GAIA? Why or why not? _____
_____
_____

3. Are viruses alive? Why or why not? Answer this question in paragraph form answering either yes or no and defending your answer. _____
_____
_____
_____
_____
_____
_____
_____
_____

4. Is GAIA alive? Why or why not? _____
_____
_____