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# Lesson Plan: The Unseen World - Scale, Chemistry, and Connection

## Materials Needed:

- Access to the book *Silent Spring* by Rachel Carson (specific chapters can be assigned)
- Access to the story *Micromegas* by Voltaire (available online)
- Access to the *Doctor Who* episode "Planet of Giants" (Season 2, 1964)
- MEL Chemistry Kit: "Chemistry & Electricity"
- MEL Chemistry Kit: "Corrosion"
- Notebook or digital document for journaling and project planning
- Art supplies (drawing paper, pencils, colored pencils, etc.) for the final project
- Access to the internet for researching medieval architecture and the Green Man symbol

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## Overall Learning Objectives:

By the end of this multi-day lesson, the student will be able to:

- Analyze how perspective and scale (as seen in *Micromegas* and *Doctor Who*) alter our understanding of the world and its hidden dangers.
- Apply principles of electrochemistry (corrosion and electricity generation) from the MEL kits to explain real-world phenomena.
- Synthesize the environmental warnings of *Silent Spring* with the symbolic human-nature relationship represented by the Green Man and medieval architecture.
- Create an original project that integrates concepts from literature, chemistry, history, and environmental science to solve a problem or express a unique perspective.

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## Lesson Structure (Designed as a 4-Part Exploration)

### Part 1: A Matter of Perspective

**Focus:** Understanding how a change in scale reveals a new reality.

#### 1. Activity: Read & Watch.

- Read Voltaire's *Micromegas*.
- Watch the *Doctor Who* episode "Planet of Giants."

#### 2. Discussion & Reflection:

In your journal, answer the following questions. We will discuss your answers afterward.

- Both stories involve characters experiencing a world at a different scale. What is the biggest challenge they face that isn't just about physical survival?
- In "Planet of Giants," the Doctor and his companions realize a beautiful lawn is a deadly jungle of pesticides. How does their tiny size change their perception of human impact on the environment?
- Voltaire uses scale to make philosophical points about humanity's importance (or lack thereof). What do you think his main message is?
- **Connection Question:** How might the perspective of a giant from Saturn (*Micromegas*) and the perspective of a tiny human (the Doctor) be similar when observing Earth?

## Part 2: The Invisible Chemical World

**Focus:** Connecting the conceptual idea of unseen dangers to the tangible, invisible world of chemistry.

### 1. Activity: Read & Experiment.

- Read the first chapter of *Silent Spring*, "A Fable for Tomorrow."
- Complete the experiments in the **MEL Chemistry "Corrosion" kit**. Observe the slow, deliberate process of metal changing.
- Complete the experiments in the **MEL Chemistry "Chemistry & Electricity" kit**. Pay attention to how an invisible flow of electrons creates a visible result (like lighting an LED).

### 2. Discussion & Reflection:

- Rachel Carson describes a healthy world and then a "silent" one. What was the "unseen" cause of this change? How does this connect to the pesticide danger in "Planet of Giants"?
- Corrosion is a slow, destructive process caused by an invisible chemical reaction. How is this similar to the way Carson describes the effect of DDT on the environment?
- The electricity kit shows that invisible forces can create power and light. Can you think of a way this principle could be used for something environmentally positive, as a contrast to the destructive chemistry of corrosion and pesticides?
- **Connection Question:** If Micromegas or the tiny Doctor were observing your chemistry experiments, what might they think they were seeing? A magical spell? A world being born or dying?

## Part 3: Enduring Symbols - Nature, Ruin, and Renewal

**Focus:** Exploring humanity's historical relationship with nature through art and architecture.

### 1. Activity: Research & Analyze.

- Research the "Green Man" or "foliage head" symbol. Where does it appear? What are the different interpretations of its meaning? Find at least three different examples in architecture or art.
- Research medieval Gothic cathedrals (e.g., Notre Dame, Chartres). Look specifically at their scale, the time it took to build them, and the way they incorporated natural forms (gargoyles, carvings, stained glass) into their structure.

### 2. Discussion & Reflection:

- The Green Man symbolizes the untamable, cyclical power of nature. How does this symbol contrast with the view of nature presented in *Silent Spring*, where it is something fragile that humans can easily destroy?
- Medieval cathedrals were built to last for centuries, often taking generations to complete. What does this long-term perspective say about their builders' relationship with their world, compared to the short-term thinking that led to the problems Carson describes?
- Many of these ancient stone structures are now threatened by a modern chemical process: acid rain, which is a form of corrosion. How does this fact tie together the themes of this lesson so far?
- **Connection Question:** Imagine a Green Man carving on the side of a cathedral. What would it "witness" over 800 years, from its creation to the modern age of chemistry described by Carson?

## Part 4: Creative Synthesis Project (Assessment)

**Focus:** Applying and integrating all the concepts from this lesson into a creative, tangible project. Choose **one** of the following options.

### 1. **Project Option A: The Micromegan Field Report**

Write and illustrate a short story from the perspective of a microscopic or alien explorer visiting a modern Earth environment (a garden, a kitchen sink, a rusty car). Describe the "giant" world they see. They must observe and try to explain two chemical processes they witness—one constructive (like a battery working) and one destructive (like pesticide effects or corrosion)—without having the scientific language for them. Your report should also reflect on the strange relationship the "giants" (humans) have with their natural world.

### 2. **Project Option B: The Neo-Gothic Green Machine**

Design a piece of eco-architecture. It could be a building, a bridge, or a public sculpture. Your design must be inspired by both the structure of a medieval cathedral and the symbolism of the Green Man. The key requirement is to incorporate a principle from your chemistry kits to solve an environmental problem. For example, could it use galvanic corrosion principles to sacrificially protect a riverbank? Or use electrochemical reactions to purify water that flows through it? Create a detailed drawing of your design and a one-page written explanation of how it works, what it symbolizes, and how it connects the ancient and modern worlds.

### 3. **Project Option C: A Dialogue Across Time**

Write a script for a short play or conversation between three characters: Rachel Carson, Voltaire, and a medieval stone mason who carved Green Man figures. They meet in a timeless place and are debating the relationship between humanity, nature, and scale. Each character must argue from their own perspective, using evidence from their work/life. Voltaire would speak of cosmic scale, the mason of nature's power and permanence, and Carson of the unseen chemical dangers of the modern world. The dialogue must resolve with them finding a surprising piece of common ground.

## **Assessment Rubric for Final Project:**

- **Synthesis of Concepts (40%):** How well does the project clearly and creatively connect ideas from at least three of the core topics (Scale/Perspective, Chemistry, Environmentalism, History/Symbolism)?
- **Application of Knowledge (30%):** How accurately and thoughtfully are the scientific (chemistry) and historical (architecture/symbolism) concepts applied within the project?
- **Creativity & Originality (20%):** Does the project demonstrate original thought and a unique approach to the prompt? Is it engaging and well-executed?
- **Clarity & Communication (10%):** Is the final project presented clearly, whether through writing, drawing, or a combination? Is the central idea easy to understand?

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