



Lighting Up Nature's Secrets

Subject: Biomimicry

Grade Level: 6-10

Topic: Bioluminescence

Time: 60-90 minutes

Learning Objectives

Students will:

- understand what bioluminescence is and identify organisms that use it.
- explore how living organisms use light for survival.
- explain how humans are mimicking bioluminescence in science, technology, and design.
- Students will brainstorm and design their own bioluminescence-inspired invention.

Materials

Glow stick, computer, *Bioluminescence Worksheet*, flipchart paper, sticky notes, pencils/markers, computers/tablets for students, *Bioluminescence Example Sheet* if student computers are not available

Procedure

Engage: To promote student curiosity, activate a glow stick and ask students why they think the stick glows. This could provide an opportunity to talk about chemical reactions. Depending on the grade level, this could be a simple or in-depth discussion. Next, show a video about bioluminescence.

🌐 [The brilliance of bioluminescence - Leslie Kenna](#)

Explore: Help students build understanding by having students conduct some research about bioluminescent organisms. If computers/tablets are available have students complete the “Bioluminescence Exploration Worksheet” by doing internet searches. If you do not have access to computers, use the “Bioluminescence Examples” to assist with completing the exploration worksheet.

Explain: Have students begin to show what they have learned. Break students into groups of 4. Give each group a sheet of flipchart paper, have students make a chart that is divided up into 6 sections just like the “Bioluminescence Exploration Worksheet”. Have them put in the labels, “What”, “How”, “Which”, “Where”, “Why” and “Interesting Facts”. Have each student contribute one sticky note or write directly on the chart. Have a class discussion about what they learned from this exploration.

Elaborate: Have students use what they have learned by working in their groups to design a bioluminescence-inspired invention. They should create a simple sketch and description on paper. They should answer the following questions:

- What problem does it solve?
- What organism inspired their idea?
- How will it use bioluminescence?

Assessment

Evaluate: Evaluate student learning by having each group share their design with the class. Next facilitate a discussion asking:

- Which ideas are the most practical?
- What are the most creative?
- How might these ideas improve sustainability or safety?
- How do these inventions fit the definition of biomimicry?

Extension Activities

- Research the bioluminescent proteins used in modern medical imaging (e.g., GFP—Green Fluorescent Protein).
- Create a digital or physical model of a bioluminescent creature.
- Investigate other nature-inspired technologies (camouflage, self-cleaning surfaces, etc.)

NGSS Alignment

Middle School

MS-ETS1-1 - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution.

MS-ETS1-2 - Evaluate competing design solutions using a systematic process.

MS-LS1-4 - Use argument based on evidence to support how the structure of organisms affects function.

High School

HS-ETS1-1 - Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions.

HS-ETS1-2 - Design a solution to a complex real-world problem by breaking it down into manageable components.

HS-LS1-2 - Develop and use models to illustrate structure–function relationships.



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