Glossary
Bioluminescence

Name: _____

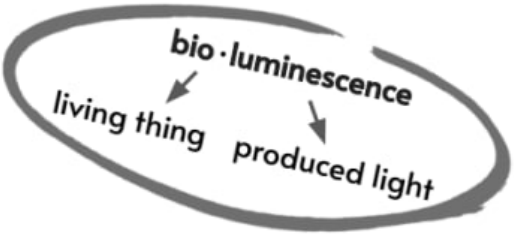
Date: _____

V.I.P.

bioluminescence

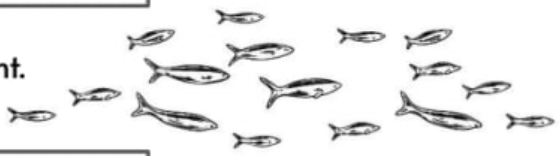
Light produced by a living thing.

The word bioluminescence is made of the prefix "bio" which means "living thing" and the word "luminescence" which means "produced light."



abundant

Present in a large amount.



migration

A movement of animals from one place to another.

attract

To cause something to come closer.

organism

A living thing.

bacteria

A small single-cell organism that can only be seen under a microscope.

predator

An animal that eats other animals to survive.

camouflage

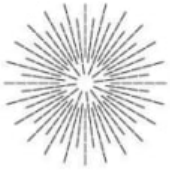
The ability to blend in with surroundings to hide from predators.

prey

An animal that can be eaten by other animals for food.

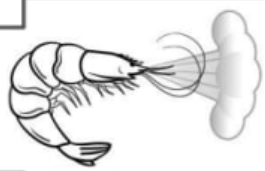
cold light

Light that is made without making heat at the same time.



produce

To make something.



communicate

To share information or ideas.

zooplankton

Small organisms that live in water. Most that live in the ocean live near the surface.

Mystery

Informative| Bioluminescence

Source 1

V.I.P.

Light in the Deep

Dr. Edie Widder, CEO and Senior Scientist of the Ocean Research and Conservation Association
Published by: NOAA (National Oceanic and Atmospheric Administration)
October 20, 2020

Hi, I'm Dr. Edie Widder, I'm a deep-sea explorer, I'm also the CEO and Senior Scientist of the Ocean Research and Conservation Association, and I am absolutely passionate about **bioluminescence** , which is what we're going to be talking about today.

Bioluminescence is **cold light** made by animals. And most people are familiar with fireflies, and there are a few other land animals that can make light. But in general it's pretty rare on land. What most people don't realize is that it's the rule rather than the exception in the ocean.

So all of the things that animals have to do on land, animals in the ocean have to do. They have to be able to find food, they have to be able to find mates, and they have to be able to defend themselves against **predators** . Well, bioluminescence plays key roles in all of those things.

So they can use the luminescence to **attract** food to them, and they do it in a bunch of really interesting ways, or they can use it to be able to see their food, so a lot of them have built-in flashlights under their eyes that they can see with. So it gets used for finding food, for finding and attracting mates, and it gets used a lot for defense. And they'll release particles or just luminescent slime into the face of a predator. There's some that use it as a way to **communicate** the fact that they taste bad, "I'm poisonous, don't touch me or you'll be sorry."

Source 2

V.I.P.

Bioluminescence

By Tasha Rose, published by Discovery Education, March 2025

On land, there are very few **organisms** that produce light. There are some species of mushroom, **bacteria** , and worms that produce light, but it is a very small percentage of land organisms. In the ocean, however, **bioluminescence** is very common. Scientists have found bioluminescent creatures from the ocean surface to the deep-sea floor. In fact, scientists estimate that more than 75% of the animals that live in the open ocean **produce** their own light!

Diving Deep

Most bioluminescent organisms live deep in the ocean where sunlight does not reach. They live in complete darkness deep below the surface. This makes observing these creatures very difficult for scientists. Scientists can only observe these deep sea organisms using special submarines or underwater robots that are specially designed to withstand the enormous pressure of the deep ocean. Scientists also need to use special cameras and lights to be able to see bioluminescence without disturbing or harming the animals. Some organisms in the deep have super sensitive eyes, so regular lights would blind them instantly!

All of these challenges in research means that scientists still have many unanswered questions about bioluminescence. Scientists can only estimate how many organisms create bioluminescence, since more are being discovered all the time. While scientists have learned some reasons why organisms glow, such as to help them survive or **communicate** , there may be more reasons for bioluminescence that have not been discovered yet.

This deep sea robot named *Little Hercules* can explore up to 4,000 meters below the surface of the ocean. This picture shows the robot being lowered into the ocean for a test drive near Hawaii.

Why research bioluminescence?

Scientists continue to research bioluminescent creatures to learn more about the amazing life on planet Earth. However, research on bioluminescence has also led to some discoveries that can help humans too.

Bioluminescent bacteria may be only visible under a microscope, but it can be really helpful for scientists. One way it can be used is for testing water. Some bioluminescent bacteria glows when it is in clean water. If the water is polluted, the bacteria can't produce the light as well and will glow less. Scientists can quickly test to see if a body of water is polluted by adding some of the water to the bacteria. If it glows less, it means the water is toxic and may be harming other plants and animals.

Another way scientists use bioluminescence is to help find germs that could spread disease. Some bioluminescent bacteria glows when it comes in contact with germs. In a hospital, scientists can test to see how clean something is. They swab a surface and put the swab into a tube with the bacteria. If the bacteria glows, it means that surface has germs on it and needs to be cleaned again. Testing methods like this can help hospitals prevent the spread of disease.

Bioluminescence has also been used to help screen and detect cancer, test how effective medications are, and create electricity-free lamps. Who knows what inventions bioluminescence will lead to next!

Source 3

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Ocean Surface

Sunlight Zone
0–200m below surface

There are not many bioluminescent organisms in the sunlight zone because the sun lights this part of the ocean. Most are so tiny you need a microscope to see them!

Glowing algae such as dinoflagellates can make waves look like they are glowing.

Ostracods are tiny shrimp. They are so small, some people call them sea fireflies!

Twilight Zone
200–1,000m below surface

Only 1% of the sunlight reaches the twilight zone. It would look completely dark to the human eye. Over 75% of sea organisms at this depth produce their own light as bioluminescence.

A vampire squid can make a cloud of glowing liquid to escape predators.

The lantern shark uses light to attract prey.

Lanternfish use light to communicate with other fish.

This Atolla jellyfish flashes blue light to confuse predators.

Midnight Zone
1,000–4,000m below surface

No sunlight reaches this zone of the ocean at all. All creatures live in this zone in complete darkness. An estimated 75% of organisms at this depth produce their own light as bioluminescence.

The giant squid uses flashes of light to confuse its prey.

The deep sea shrimp can blast predators with a cloud of glowing liquid to escape.

This comb jelly uses light to communicate or to scare away predators.

An anglerfish uses a dangling light right in front of its mouth to attract prey.

Source 4

V.I.P.

Deep-Sea Dialogues: Bioluminescence

Dr. Rene P. Martin, Ph.D Ecology and Evolutionary Biology, Interviewer: Alexandria Puritz, NOAA.
Published October 25, 2021 by NOAA

Alexandra Puritz: **So where in the oceans do we most frequently see bioluminescence occurring?**

Rene Martin: The majority of bioluminescence and where it occurs in the ocean, actually happens a lot in what we consider the open ocean mid-water zone. These zones, specifically, are called the Mesopelagic or the twilight zone, and the Bathypelagic called the midnight zone. And I actually looked this up recently, and 4000m is basically the entire length of Central Park in New York City. And so if you just, like, stood Central Park on its head and then went all the way down, that's approximately 4000m.

It's kind of crazy to think about how much open space there is down there and how much water there is down there. And it's also important to note that many of these organisms aren't restricted to just one depth in the ocean. This is a three dimensional world. And so many of them perform something called a daily vertical migration, where they swim up into the surface at night to feed on a bunch of the **zooplankton** and other organisms that then are very **abundant** up there. And then they swim back down into the deep sea during the day, and that's usually to hide from predators. And this mass migration is thought to be the largest migration on Earth because it is constantly happening around the globe as we're rotating.

Alexandra Puritz: **Can you tell us what are some of the reasons why these animals actually bioluminesce?**

Rene Martin: If you're an organism that lives in the deep sea, one of the major benefits of evolving bioluminescence is to use it for a type of **camouflage** . Many of the organisms that live in this area have something called photophores, or light organs, on their stomachs. And much of the light that's produced by these stomach light organs specifically matches both the color and the intensity of light that's coming from the surface of the ocean. This type of camouflage that they're doing is called counterillumination.

Some of the other cool behaviors - if you think of an anglerfish, so the one from Finding Nemo that has the esca on its head, they use those to attract prey. It's also known to be used for defense mechanisms. So some species and some organisms will actually shoot out bioluminescent goo. Or make bright flashes to distract or stun different types of predators. And also living in the deep sea, it means you got to get creative in order to communicate. And so many of the organisms that use bioluminescence and use it to communicate with each other.

Bibliography

Name: _____

Date: _____

V.I.P.

Author(s) (Date)

Title Publisher

URL: Web address

1

Dr. Edie Widder ( )

URL: https://oceantoday.noaa.gov/fullmoon-lightinthedeepsea/welcome.html

2

( )

Discovery Education

URL: None - *not an internet source*

3

( )

URL: None - *not an internet source*

4

( )

URL: https://oceanexplorer.noaa.gov/edu/multimedia-resources/dsd/dsd.html

Notes

Name: _____

Date: _____

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My Questions

My Notes

Mystery

Informative| Bioluminescence

If you need more space, write on the back of this page.

Outline

Name: _____

Date: _____

V.I.P.

Introduction

Mystery Informative| Bioluminescence

- Hook:
- Background information:
- Preview:

Heading #1:

Heading #2:

Outline Cont.

Name: _____

Date: _____

V.I.P.

Heading #3:

Conclusion

- Summary:

- Suggest:

Extra Information

Transition Phrases

- First, next, last
- Additionally
- Furthermore
- Most importantly
- Not only .... but also
- Similarly
- In contrast
- For instance

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Writing Checklist

Name: _____

Date: _____

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Introduction:

- ☐ Hook
- ☐ Background information
- ☐ Preview of what the body paragraphs are about

Body Paragraph 1:

- ☐ Topic sentence
- ☐ 3 or more facts
- ☐ Numbers, definitions, and/or an expert quote
- ☐ 2 or more transition phrases

Body Paragraph 2:

- ☐ Topic sentence
- ☐ 3 or more facts
- ☐ Numbers, definitions, and/or an expert quote
- ☐ 2 or more transition phrases

Body Paragraph 3:

- ☐ Topic sentence
- ☐ 3 or more facts
- ☐ Numbers, definitions, and/or an expert quote
- ☐ 2 or more transition phrases

Conclusion:

- ☐ Summary of most important facts from body paragraphs
- ☐ A call to action or suggestion for the reader

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Revision Ideas:

Word choice - revise words by making them more interesting, exciting, or specific.	Original: deep ocean Revised: midnight zone
Add descriptions - help readers picture what you are writing about.	Original: Lantern fish are small. Revised: Lantern fish are small slender fish with large eyes.
Figurative language - add comparisons (simile or metaphor), personification, or onomatopoeia.	Original: The atolla jellyfish can flash a bright light. Revised: The flash of an atolla jellyfish bursts like a firework.
Sentence variation - combine or split apart sentences so your writing has a combination of short and long sentences.	Original: The deep ocean has high water pressure. It is hard for scientists to research. Revised: The deep ocean has high water pressure which makes it hard for scientists to research.

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Source 1

Name: _____

Date: _____

Do any Plants Eat Animals ?

Esther Ikoro - Published by Mystery Science - Sept 6, 2022

mystery
Informative
Bioluminescence

You might have seen animal-eating, monster-looking plants on TV, like Carnivine in Pokemon, or in video games like this one. But are there plants like this in real life? This is a plant called a Venus flytrap. It's what artists use to create some of the plant monsters we see in movies. Watch what happens when a bug touches one of its leaves. Whoa!

The Venus flytrap snapped shut, and the bug can't get out. It's trapped. Eventually, the bug dies, and the plant begins to soak up the nutrients from the bug's body, kind of like how a sponge soaks up water. But trapping a bug isn't as easy as it looks. Since carnivorous plants, like the Venus flytrap, don't have legs to chase after prey like an animal would, they have to find ways to get the bugs to come to them.

Now, if you were a bug near this Venus flytrap, you would be able to smell it, and it would smell like something pretty sweet. And that's one way the Venus flytrap can attract bugs: it smells good to them! But that's not the only way to attract bugs.

This is an Australian sundew plant. See the raindrops on the stem? The drops attract thirsty bugs who wanna drink, but here's the thing. those drops aren't for drinking, they're for sticking, kind of like glue. See, attracting a bug isn't the only problem a carnivorous plant has. They have to keep it trapped long enough to eat it, which is hard to do without any arms or paws. So once a bug lands on the sundew's sticky leaves, it gets stuck and trapped by the plant's long tentacles. Sticky glue is one way bug eating plants keep their preys stuck long enough to eat, but it's not the only way.

Here's another one. Doesn't it look like a cobra? The cobra lily attracts bugs in the same way a Venus flytrap does, with a sweet smell, but they don't have sticky stems like the Australian sundew does. So how do they keep the bugs trapped? By confusing them. Once a bug climbs into the tube-like top,the light shining through the tiny windows in the leaves makes the bug think that the exit is at the bottom. So it starts to climb down and down, looking for a way out, and slippery walls make it really hard to crawl out. Eventually, the bug gets super tired and falls into a pool of liquid at the bottom of the tube where it drowns and gets eaten.

Okay. So we've talked about some plants that eat bugs, but are there any carnivorous plants that actually eat bigger animals, not just insects? Amazingly, there are. Take a look at this one. Isn't it huge? The giant montane pitcher plant is the largest carnivorous plant in the world. It's called a pitcher because it's big bowl-shaped flower fills up with water, like a water or lemonade pitcher. The montane attracts bugs and animals with a sweet smell, like the Venus flytrap. But when the animals try to eat some, they slip on the slippery leaves and fall into the water. And when they do, they can't escape and get eaten by the plant. Usually the montane only eats ants, but every once in a while, it eats bigger animals, like lizards, birds, and even mice.

5th Grade Informative Writing Rubric

Bioluminescence

Name: _____

Date: _____

Standard	1	2	3	4	Feedback
W.5.2, W.5.7, W.5.8 Take notes from sources to determine key ideas. Paraphrase in notes and make a plan.					
W.5.2.a Write an introduction in 3 parts: a hook, background information, and a preview.					
W.5.2.b Write body paragraphs that include topic sentence and details.					
W.5.2.b Include direct quotes.					
W.5.2.e Write a conclusion that summarizes the information and makes a suggestion.					
W.5.2.c Include words that link ideas using transition words and phrases					
W.5.8 Cite sources in a bibliography					
W.5.5 Review work to revise and edit. Make changes and check and fix capitalization, spelling and punctuation.					

1 = standard not met; **2** = standard partially met; **3** = standard met; **4** = exceeds expectations

My Informative Writing Checklist

Bioluminescence

Name: _____

Date: _____

Writing Process	Learning Goals	Not yet 	Starting to... 	Yes! 
Find information	I can use two sources of information and take notes in my own words.			
Sort	I can sort my notes into subtopics and make a plan.			
Write a beginning	I can write a beginning that includes a hook, background information, and a preview of my writing.			
Draft paragraphs	I can write 3 body paragraphs that use lots of details and expert quotes.			
Write an ending	I can write an ending that includes a summary and makes a suggestion.			
Cite sources	I can provide sources for my research by creating a bibliography.			
Read and check again	I can re-read and revise my writing and fix any confusing parts.			
Revise and edit my writing	I can review my writing to edit and fix capitalization, spelling, and punctuation.			