

Did you
know that
sharks can
glow?

Glow-in-the-Dark Sharks

Activity for K-2



Many sharks and other marine animals that live in the deep sea have special adaptations that make them glow!



Bioluminescence is the production of visible light by a chemical reaction. Scientists call the process bioluminescence when the reaction occurs in living organisms and the animal produces and emits its own light.

Biofluorescence is not a chemical reaction. It is a phenomenon by which an organism absorbs blue light and emits it as a different color.

It is estimated that more than 75% of animals living in the open ocean water column are bioluminescent.

Swell sharks can glow, but only other swell sharks or a special camera can see the glow.

They have a special protein that glows green when activated by blue light. They are biofluorescent.

Velvet belly lantern sharks can also glow using **photophores**, which are light-producing cells on their underbelly. They are bioluminescent.

In the deep dark ocean, this light can help attract **prey**.



Teacher guide

Standards

- **Ocean Literacy Principles:** Principle 5, FC d; Principle 7, FC d
- **NGSS:** K-LS1-1, K-ESS3-1, 1-LS1-1, 2-LS4-1

Vocabulary:

- **Bioluminescence**- the light emitted by organisms such as fireflies and deep-sea fishes.
- **Biofluorescence**- when higher energy wavelengths of light (e.g., ultra-violet or blue light) are absorbed and subsequently reemitted at lower energy wavelengths in living organisms.
- **Deep sea**- the deeper parts of the ocean, especially those beyond the edge of the continental shelf.
- **Prey**- an animal that is caught and killed by another for food.
- **Predator**- an animal that naturally preys on others.
- **Adaptation**- a change or the process of change by which an organism or species becomes better suited to its environment.
- **Photophores**- a light-producing organ in certain fishes and other animals.

Materials:

- Cardstock or construction paper
- Printout
- Scissors
- Glow-in--the-dark paint (or see instructions below to make your own)
- Paint brushes
- Water cups
- Popsicle sticks
- Tape
- Glue
- Black light (optional)



HOW TO MAKE GLOW-IN-THE-DARK PAINT



To use with a black light:

1. Open a highlighter and remove the felt. Using a pair of pliers, break open the end of a non-toxic highlighter. Remove the felt strip from the center and discard the plastic highlighter casing.
2. Run water through the felt. Place a cup or jar in your sink. Slowly run water through the felt strip so the yellow highlighter liquid runs into your cup. Turn off the water and stop when the felt is white.
3. Place cornstarch in a bowl. Use 1/2 cup of white cornstarch. This will be the basis for your homemade glow-in-the-dark paint.
4. Add highlighter water. Carefully pour in 1/2 cup of highlighter water and stir until the cornstarch completely dissolves.
5. Add food coloring. If you want to change the color of your paint, add a few drops of food coloring and stir. Add more food coloring till you achieve the desired color.
6. Use your paint and let dry. This paint is pretty runny, so you may want to let it dry and paint on several layers. Extra layers will make the paint glow seem brighter and last longer.
7. Turn off all the lights and make sure to close any blinds or shades. Turn on your UV-A blacklight to see your paint glow.

Without black light:

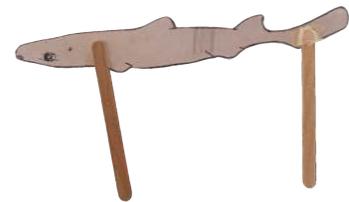
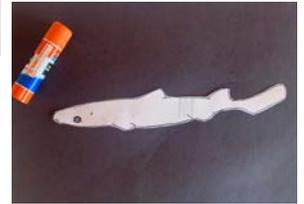
1. Choose a glow-in-the-dark powder. You can find glow-in-the-dark, or phosphorescent, powders online or at some craft and art supply stores.
2. Choose a paint medium. This will be the actual paint that you mix into the phosphorescent powder. If you want your paint to be invisible in light, choose a clear paint, such as an acrylic gel.
3. Place your phosphorescent powder in a bowl. You'll want to place 1 part powder to 5 parts paint (or 20% by volume of glow powder to paint medium).
4. Pour paint into the bowl. Gradually pour your paint medium over the powder in your bowl. Carefully stir the mixture. You can add more paint to achieve a thinner consistency.
5. Use your paint. Most glow in the dark paints should be used immediately. Depending on your powder/medium combination, your new mix may or may not have shelf life. Therefore only mix what you can use within an hour.

Demo uses Neon Dot Paints:



Design your own glow-in-the-dark shark!

1. Print outline out
2. Cut out the outline and glue it to construction paper or cardstock
3. Cut out from construction paper or cardstock.
4. Tape or glue popsicle sticks to print out side (can be done before or after painting)
5. Use glow-in-the-dark paints to create a pattern on the black side of the cut-out
6. Let paint dry and look at it under black light or in a dark room!

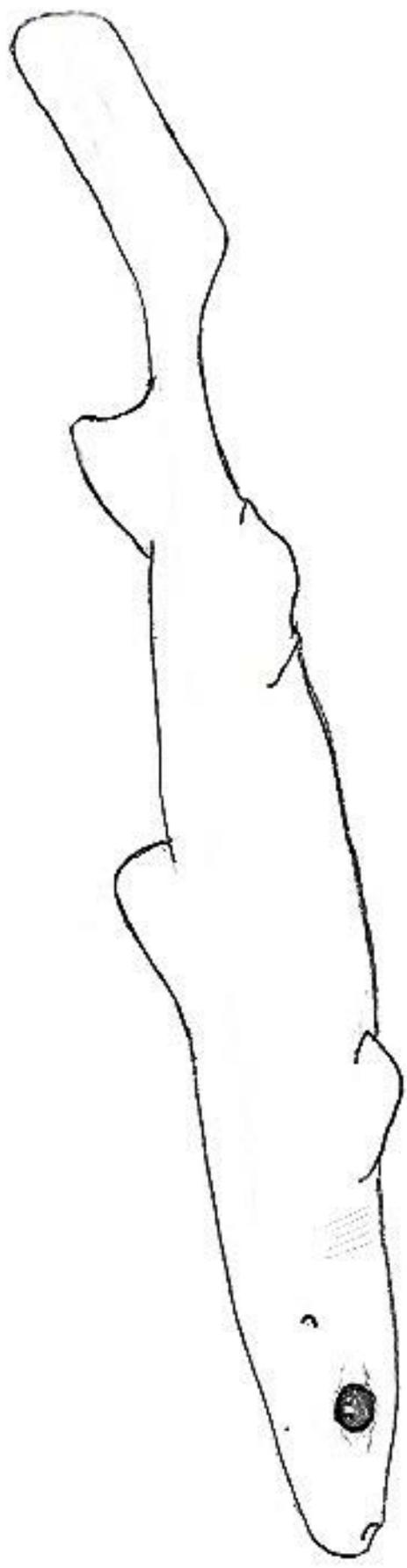


Design your own glow-in-the-dark shark!

Why does your shark species glow?

What color is the protein or photophores on your shark?

What pattern glows in the deep sea?





Like many deep-water sharks, velvet belly lanternsharks have sharp fin spines on their back. They can make them glow in the dark using photophores to warn predators that they have protective spines.

CONSERVATION STATUS
The velvet belly is accidentally caught in high numbers in many deep-sea trawl fisheries. Due to its small size it is usually just discarded, which makes it very difficult to assess the impact of the fishing industry on these shark populations.

SHARK FACTS

VELVET BELLY LANTERN SHARK

VELVET BELLY LANTERNSHARK (*Etmopterus spinax*)

- ▶ One of the most common deep-water sharks found throughout the Atlantic Ocean, this shark is typically found between 200-700m depths
- ▶ The name "velvet belly" refers to the distinctive and abrupt black pattern on its underside, which is home to thousands of special cells called "photophores" or light cells
- ▶ In the Northeast Atlantic and Mediterranean Sea, these populations separate by age. Generally younger juveniles are found at shallower depths and mature adults in deeper waters

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Image: Rudolf Svensen

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