

BIOLUMINESCENCE

Fireflies twinkle in a field. Mushrooms illuminate a dark forest. Colorful sea creatures light up the ocean. These natural light displays come from bioluminescent creatures.

Bioluminescent organisms can produce their own light. Bioluminescence is a chemical reaction. It takes place inside the light-producing organ of a glowing creature. Fireflies, for example, make light in their abdomens. The chemical reaction produces energy in the form of photons. The photons then create visible light.



Animals light up for a number of reasons. Here are the three main ones:

- 1. Feeding:** Anglerfish use a glowing barbel filled with bioluminescent bacteria to attract prey. When the light-struck creatures are close enough, the Anglerfish snatch them with wickedly sharp teeth. Whales and squid swim towards the glowing underside of cookie-cutter sharks. To their dismay, they often leave the area with a large circular chunk ripped out of their bodies. Many deep-sea organisms light up their environment to see their food much as others use the light to catch theirs.
- 2. Attracting Mates:** In North America, most flashing fireflies are males. The flash patterns are species specific. Females flash back a signal; thus, allowing the male to find her. Bermuda worms also use chemical light as a way to find and attract mates. Rather than using flashing, these creatures release glowing slime that attracts males.
- 3. Protection:** Many creatures use a strong flash of light to startle and distract a predator. Some squid, like the Vampire Squid, use this deep-sea tactic. The Green Bomber Worm ejects a bioluminescent "bomb" to evade predators. A unique form of protection from predators is counterillumination. It is a form of camouflage important because predators often look up when searching for prey. Consequently, some animals produce light using photophores on their underbelly. Because this light matches an illuminated background, such as the ocean surface or sky, the animals are hidden.



LEARN MORE!

Scan this QR code from your mobile device's photos app or visit the YouTube link below to check out a great video from It's Okay To Be Smart on bioluminescence!

<https://youtu.be/zZwrvxUHXC>



GLOW STICK SCIENCE

You will need:

- Glow sticks (non-toxic)
- Jars
- Scissors
- Disposable gloves (optional)

1. Crack the glowstick to activate it
2. Cut the glowstick up and let the pieces fall into the jar.
3. Close the lid onto the jar and give it a really good shake
4. Remove the pieces (this is where you may want to wear gloves, the glow sticks are non-toxic, but still made with chemicals and you may have a reaction)
5. Take the jars to a pitch-black room. And check out your glowing jar!



Try this at night for a fun glowing lantern, with multiple colors, or try adding some water to the jars for glowing water!



What other reasons besides the three on the other side might animals use the ability to light up?

HOW DOES IT WORK?

Glow sticks contain two sets of chemicals that when combined, create a chemical reaction called Chemiluminescence.

In the outer part of the glow stick, a combination of phenyl oxalate ester and fluorescent dye are used. Inside the interior glass tube, a combination of hydrogen peroxide and a phthalate ester solvent are mixed. When the two chemicals are mixed, they create a chemical reaction that causes oxygen atoms to move around quickly, which creates an unstable compound that gives off energy. The extra energy from the mixture causes the dyed molecules to move faster, creating a glowing effect.

