Brilliant Beautiful Bioluminescence!

Bioluminescence Dreams
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What is Bioluminescence?

Bioluminescence is light that is produced by living things through a chemical reaction. Bioluminescence is a cold light.
Animals and organisms use bioluminescence for different reasons including:

- **Attraction**: for example, fireflies flash in different patterns to attract mates. Anglerfish use bioluminescence to attract prey.
- **Repulsion**: for example vomiting shrimp spit clouds of bioluminescent goo as a burglar alarm. This confuses the predator and makes them more visible to other predators.
- **Counterillumination:** for example, some fish camouflage by using photophores on their undersides.

The Science of Bioluminescence

Some animals produce their own bioluminescence and some need to have bacteria or algae to make light.

FIREFLIES have a chemical called luciferin and an enzyme called luciferase in their lower abdomen, it mixes with oxygen, calcium and adenosine triphosphate to make the light. They can make light in many colours like yellow, blue, green or red, **Diagram A**

ALGAE DINOFLAGELLETES have little factories called scintillons, in there they have luciferin and luciferase which mixes with oxygen. As the chemical builds up it makes a glowing blue light when the cell walls of the algae are disturbed, **Diagram B**

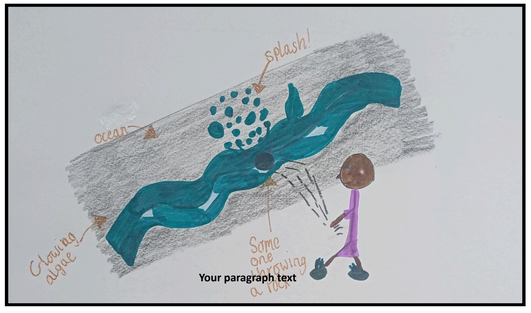
DEEP SEA VOMITING SHRIMP (Acanthephyra) when under attack vomit a luciferin compound that reacts with oxygen in the water to create a blinding blue bioluminescence, **Diagram C**

FEMALE ANGLERFISH have a long lure growing from their heads called an illicium. At the tip of the illicium is the esca. The esca has tiny glowing bacteria called Photobacterium which produce light through a chemical reaction involving luciferase and luciferin. The bacteria provides light for the anglerfish to attract prey, and the anglerfish provides a safe home for the bacteria. Only female anglerfish have illiciums and escas, **Diagram D**

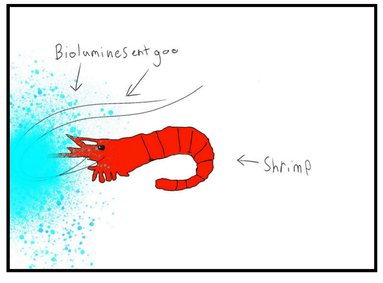
HOW THEY MAKE LIGHT
First oxygen enters the animal or bacteria, then a chemical called Luciferin with the enzyme Luciferase, which is made by the animal already they combine together with the oxygen to create the light, **Diagram E**



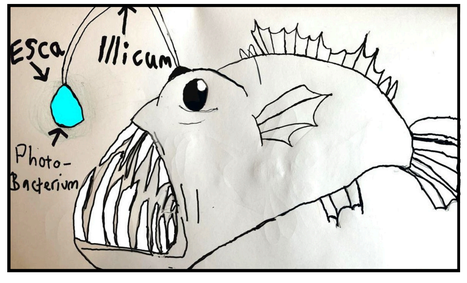
A. Firefly



B. Bioluminescent Algae

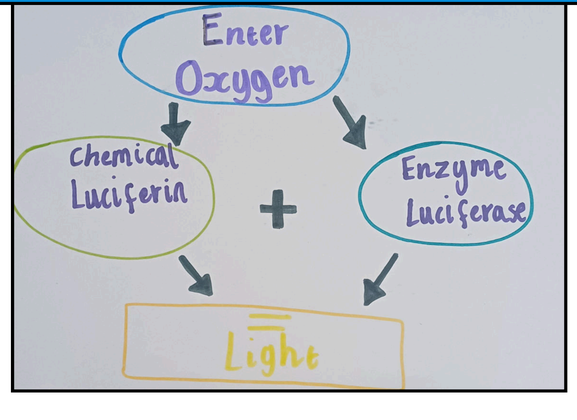


C. Vomiting Shrimp



D. Angler Fish

E. Science behind the Chemical Reaction



Significance and Impact

Scientists are learning about how to use bioluminesence in different ways to solve some of our biggest problems.

For example:

- Bioluminescent animals and organisms can make light with very little energy. Scientists are looking at how they can learn from them to create green energy. For example, they have created trees that glow by mixing bioluminescent mushroom fungi with trees to make it glow. This will help us save energy and reduce our carbon footprint.

- Bioluminescence is also used in medical research to mark cells so they are easier to see under a microscope, they have used this to study diseases and virus inside a mouse.

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