

WORCESTER ART MUSEUM



Nature Science *Bright Lights - Bioluminescence*



The focus of this lesson is to learn about bioluminescence, how living creatures in nature create light, and compare it to how humans create light.

Fireflies and Reeds, early 1900s.
Tsukioka Kogyo, woodblock print ink and color on paper, 2008.25

Light is something that we use every day. Humans cannot see well in the dark, so we need sources of light to help us see. Humans are not able to create light from our fingertips, we need to find a lamp or a flashlight. However, some organisms in nature do have the amazing ability to create light!

There are fish, jellyfish, plants, insects, and more that can create light inside their bodies! Most often, you see this in fish in the deep dark sea, in mushrooms, and in fireflies. This **phenomena** is called **bioluminescence**. They can **luminesce**, or light up, thanks to chemicals they have inside their bodies. Why do they do this? Sometimes to help them see in the dark: a fish very deep in the sea might need a light to see their prey better. Other reasons an organism like a bug or fish might use bioluminescence is to attract prey, startle and confuse predators, as well as attract mates. Some tiny water plants called algae luminesce too, supposedly to confuse an animal that wants to eat them.



@camilla.marcon via Twenty20



@gingermanphotography via Twenty20



@alicegreenup via Twenty20

Vocabulary

Bioluminescence - When a living organism makes and gives off it's own light.

Contrast - (In art) The difference between the lightest and darkest areas of an image or artwork.

Luminesce - to give off light.

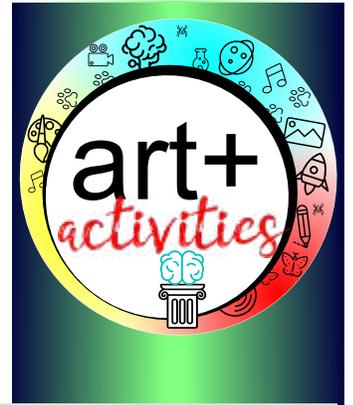
Light - A natural agent that stimulates the eye and provides the ability to see.

Phenomena - a situation or fact that happens which we might not know the explanation for.



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Light & Humans



Cut Overlay Lamp, 1860-1880,
Boston and Sandwich Glass Company, 2019.103



Humans cannot make light with our bodies, but our eyes require light to see, so how do we get light? One place we get light is from the sun; another way we get light is from fire, which includes candles and oil lamps.

We can also create light using electricity, like a light bulb. Our ability to have light even when the sun goes down means we can accomplish much more in one day! And since light is so important to us, we've come up with beautiful ways to display light. Here are some examples of oil-based lamps.



Oil Lamp, about 2nd
century BCE, Greek,
2014.1183

Design your Own Lamp

Let your imagination loose - what is the coolest lamp you can think of? Would it be candle-based, oil-based, electric, or something else? Draw and color your design here!





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Light & Art



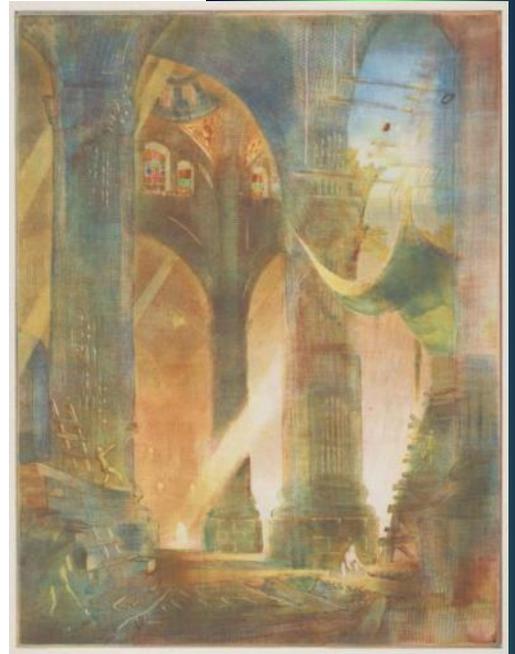
Light is also very important for artists, because it allows our eyes to see--and create with--all the beautiful colors in the world. Several art forms, such as sculpture and textural painting, can be enjoyed without light, but some art forms like watercolor painting and stained glass would be harder to experience with no or low light. Photography is an art form that would be impossible without light!



Cottage in a Landscape, 1927, Rockwell Kent, watercolor over graphite on off-white wove paper, 1927.15



Streaming Light & Traffic, Madison Avenue at 57th Street, 1968, Bruce Cratsley, gelatin silver print, 2000.40



Darkness and Light, 1952 Reynold H. Weidenaar, color mezzotint, progressive color proof (yellow, red, and blue), 1989.5.6

Contrast

In art we often speak of light in relation to contrast--the difference between the lightest and darkest areas of an artwork. Having too little contrast - or not much difference between the lightest and darkest areas can make an image harder to see more contrast makes a subject easier to see. Having too much contrast and getting rid of all the middle tones can also make the image a little harder to recognize.



image with more contrast

ORIGINAL

image with less contrast



Jo, 1993, Catherine Opie, chromogenic print, 2002.36

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Hands On Activity: Lanterns

Today we will be making lanterns inspired by the wonderful bioluminescent organisms we first looked at! CAUTION - this art activity calls for using scissors or a craft blade like an X-acto knife, please be careful and get an adult to help if needed!

Supplies

- Paper: copy paper or construction paper are best
- Pencil
- X-acto knife or scissors
- Cutting mat or cardboard
- Binder clips
- Tape

Directions



1. Read through the directions before you begin.
You will be flipping your image halfway through the project, so keep that in mind if you want to use letters.
2. Place your piece of paper landscape-style.
3. Draw a design that will be big enough to carve out easily, but small enough to leave plenty of the paper for light to filter through. Flowers, jellyfish, or lightning bugs would look great!
4. Leave some room, about half an inch, on either short end so you'll have room at the end to shape your lantern.
5. Once your design is complete in pencil, start cutting out the parts where you don't want there to be any paper, where light will shine through. Go slow and be careful with your scissors or craft knife. *If using a craft knife use a cutting mat or piece of cardboard to protect your table!*
 - You don't have to follow your pencil lines perfectly, you'll see why in the next step!
6. Once you've completed carving out all the places you want light to shine through, turn the paper over. On the other side you'll be able to see your design without the pencil lines!
7. Prepare a few pieces of tape. You may need a second person's help for the next step.
8. Roll your paper short end to short end, overlap them by at least half an inch, and use at least two pieces of tape to secure them together.
9. Now your lantern can stand up! Place an electric tea light or a bunch of string lights inside the lantern shell to create a beautiful light fixture!



Paper Lantern with cut-out designs inspired by the bioluminescent comb jelly, Breton Lorway 2020