LIGHT

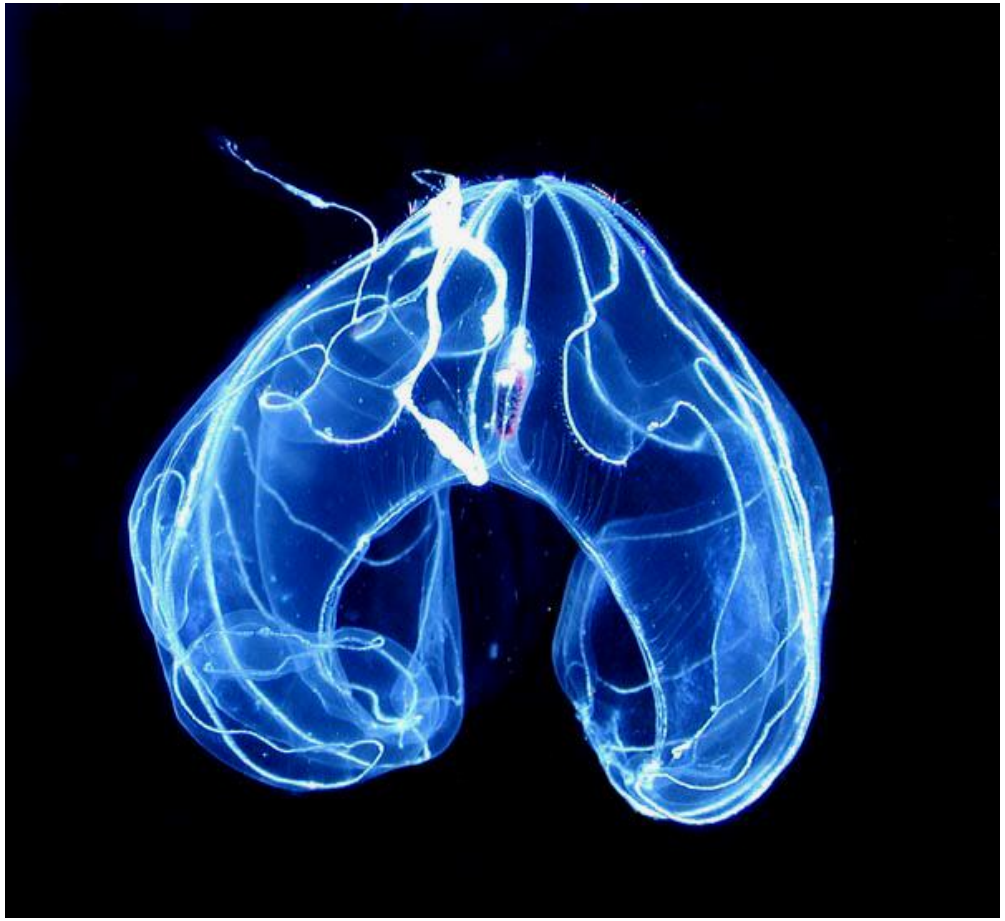
ESSENTIAL FOR THE EXISTENCE OF ADVANCED LIFE.

Subtopic: Light produced by life

"My Fanciful Muse" by EKDuncan 2013

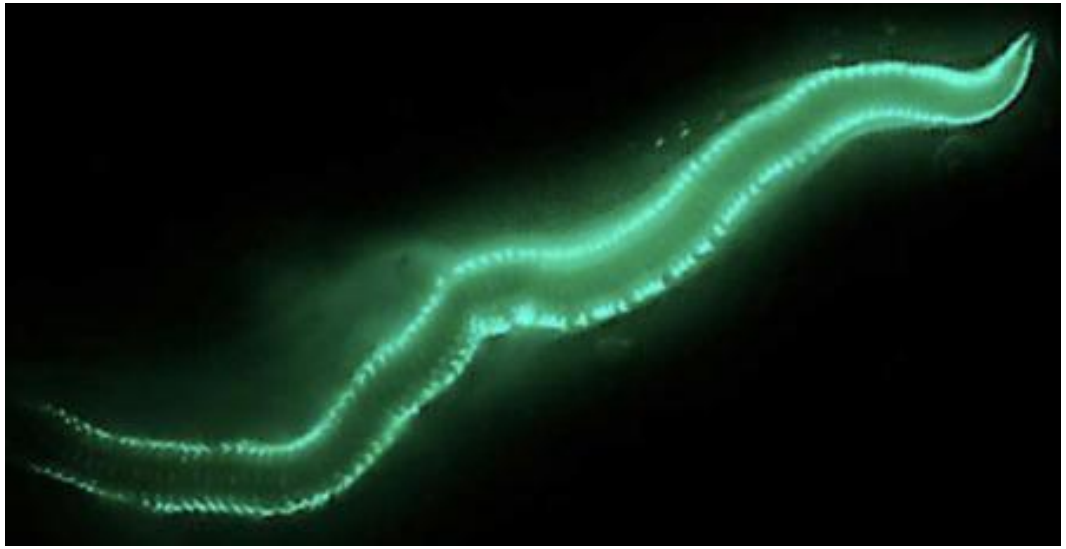
Bioluminescence. 1

- For some forms of bioluminescent life, it is not known why light is emitted.
- One example is bathocyroe fosteri, that is found at intermediate depths in all the world's oceans.
- (It is 5cm in height and aka comb jelly)



Bioluminescence. 2

- Other examples are several earthworm species which create a luminescent secretion that doesn't have an obvious purpose.



Bioluminescence. 3

- Also the reason for some fungi glow is unclear, although some scientists theorise that it attracts insects that spread the fungi's spores.

Bioluminescence. 4

- Some of the known functions are as follows.
- As **headlights** in lantern fish.

Bioluminescence.5

- **Communication:** Fireflies flash at one another in a species-specific pattern, often in order to find a mate.

Bioluminescence.6

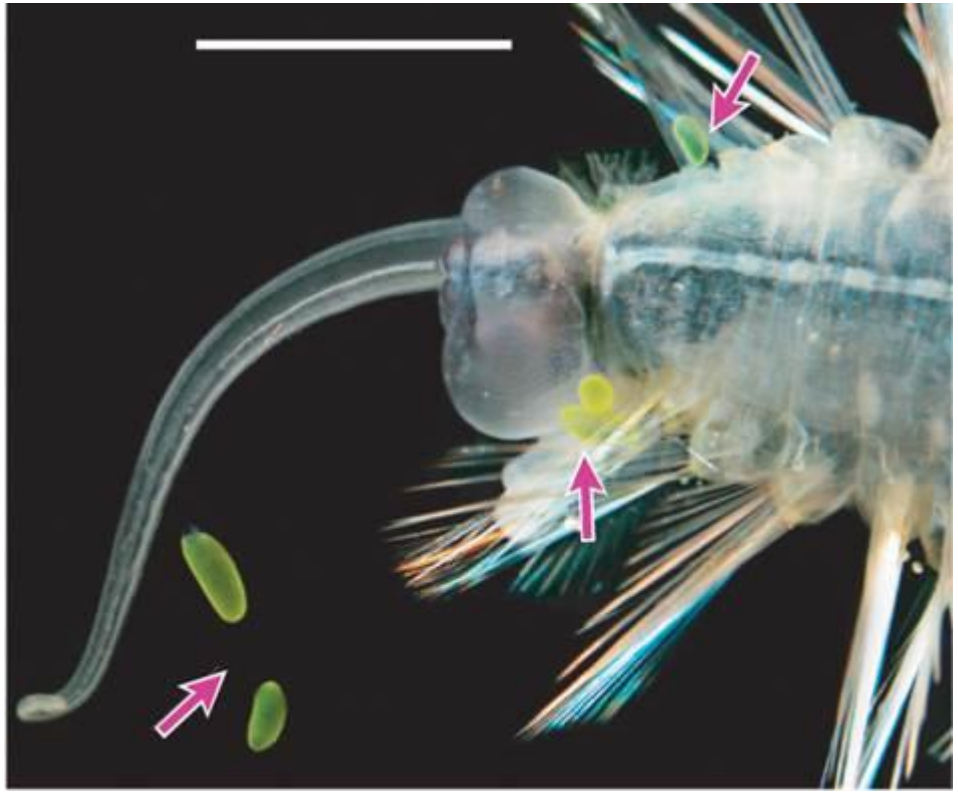
As lures to attract prey e.g. angler fish.

Bioluminescence.6

- **As camouflage** e.g. emitting blue light on their undersides to appear as part of the sky.
- This could be employed by predators and prey.

Bioluminescence.7

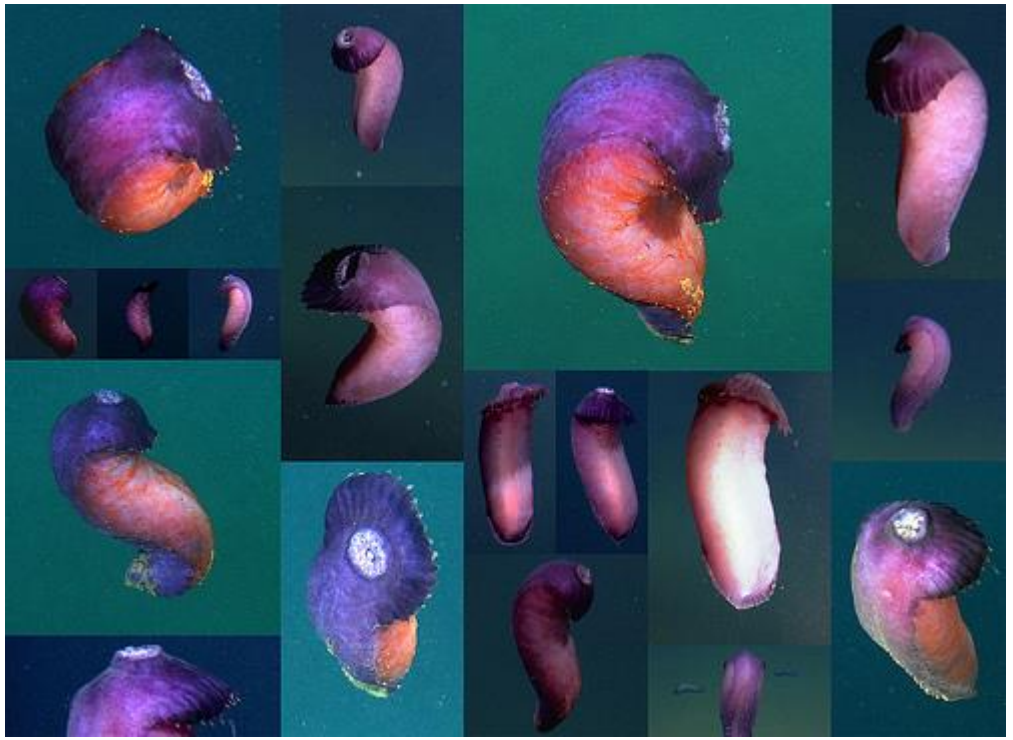
- **Scare tactics.**
- Bomber worms drop green light bombs to scare off predators



Bioluminescence.8

- **As “burglar alarms”** i.e. to attract large fish that attack the “burglar alarm” fish’s enemy.

- Swimming sea cucumbers:



Fireflies (lightning bugs)

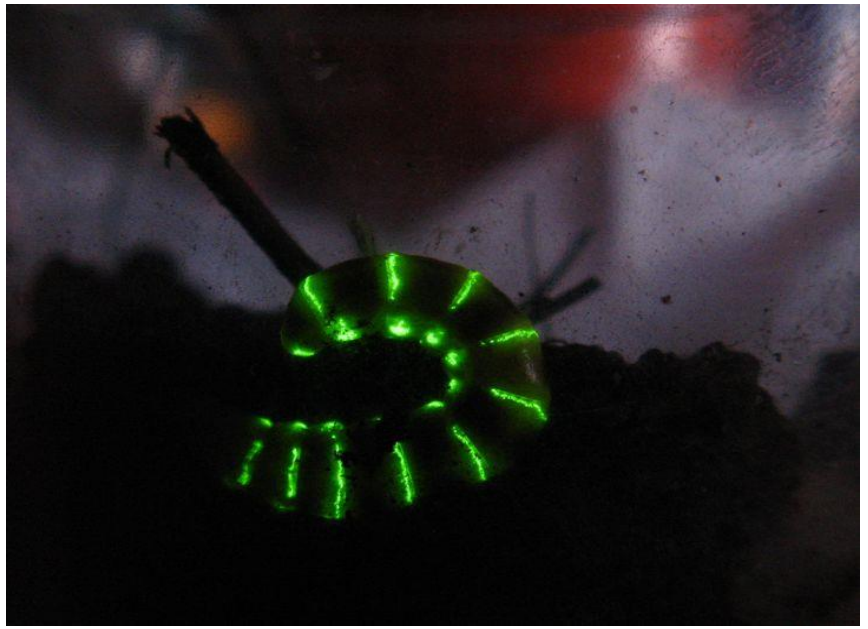
- Fireflies produce a "cold light", with no infrared or ultraviolet frequencies.
- This chemically produced light from the lower abdomen may be yellow, green, or pale red.

Alternate names

- They are winged beetles, and commonly called **fireflies** or **lightning bugs** for their conspicuous use of bioluminescence during twilight to attract mates or prey.

‘Glow Worms’

- Their larvae emit light and often are called "glow worms“.
- In most species, both male and female fireflies have the ability to fly, but in some species, the females are flightless.



An abundant group

- About 2,000 species of fireflies/glow worms are found in temperate and tropical environments.
- Glow Worm Cave, south east Queensland.

Tasmania

- Glow worms can be seen in the dense gully forest leading to Russell Falls at Mt Field National Park.
- In the north of the State, they are able to be seen in Marakoopa Cave, in the Mole Creek Karst National Park.

Melba Gully, in the rainforest of the Great Otway National Park

- During the 9-month larval stage (when?), the glow worms live in damp, dark places throughout the Otways, such as the soil banks and overhanging ledges along the walking tracks in Melba Gully.

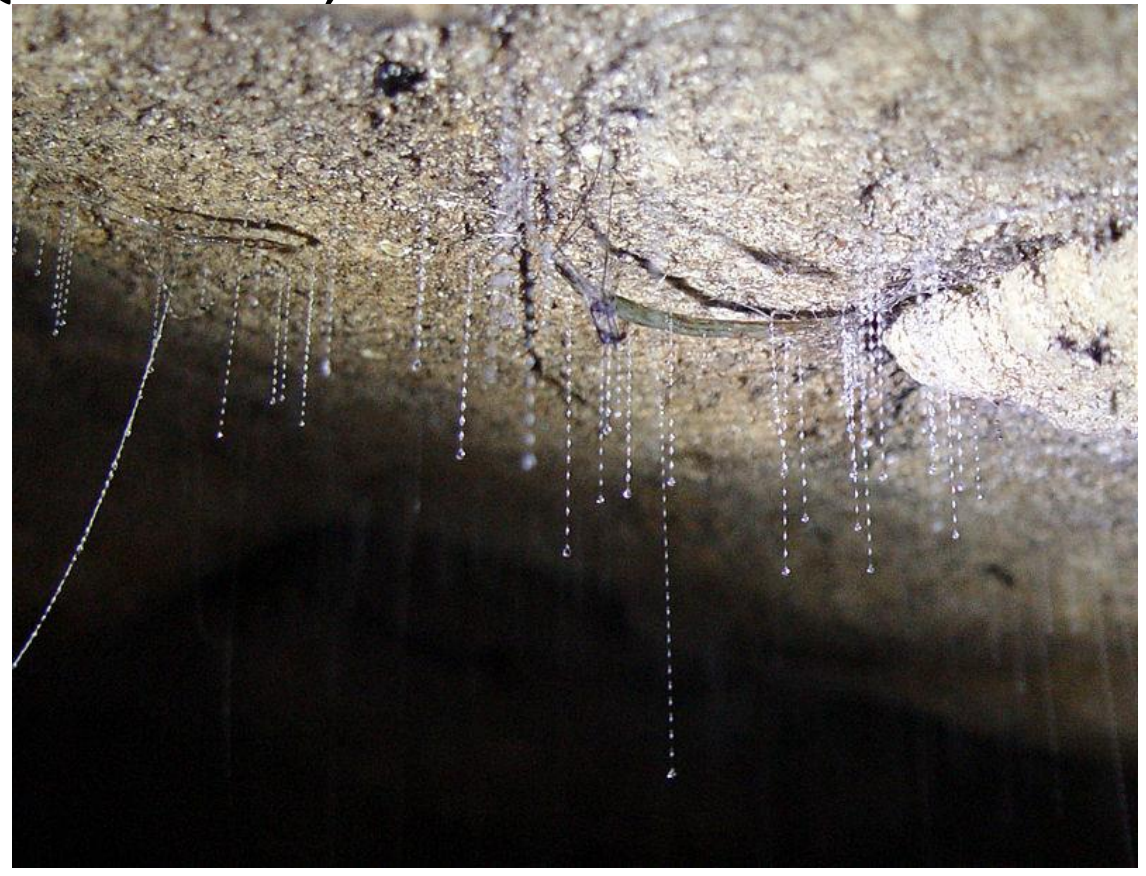
Natural indoor lighting

- Waitomo Glow Worm Caves New Zealand.

Australia

- There are, at least, 3 described species of glow worm in Australia:
- Arachnocampa flava from southeast Queensland,
- Arachnocampa richardsae from the Blue Mountains region, and
- Arachnocampa tasmaniensis from Tasmania.

Arachnocampa richardsae:



Does it seem strange that living things can emit light?

- It may seem strange at first but when we look at the science it is not so special.
- We all emit heat i.e. infra red radiation, which is a type of electromagnetic radiation, as is light.

Subtopic: Life’s requirements for light

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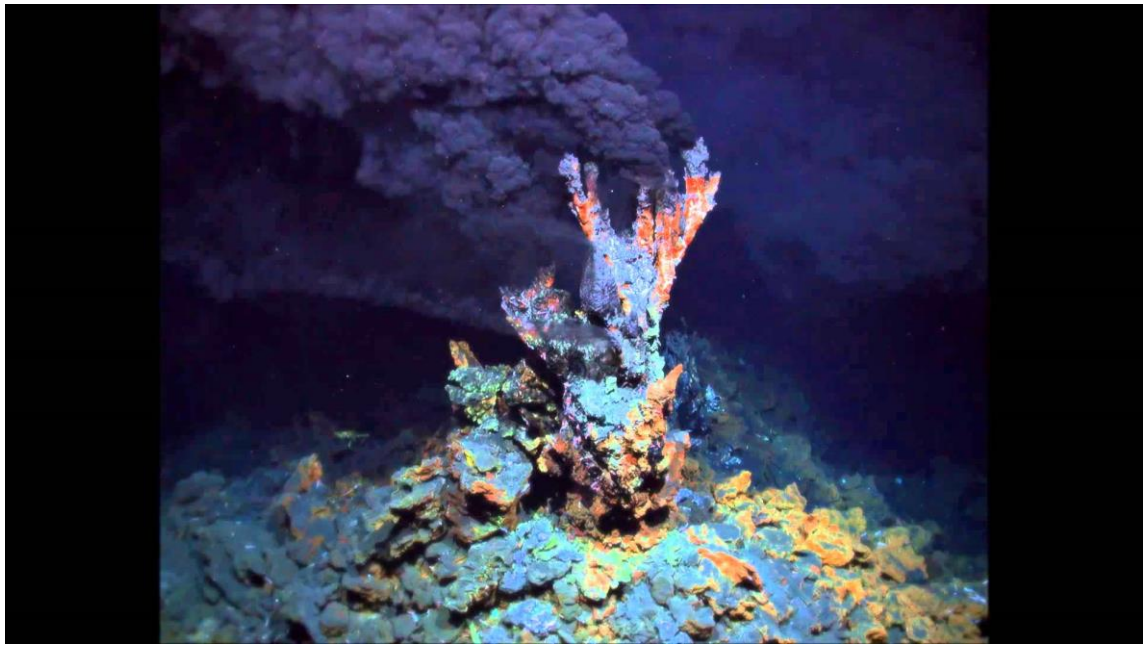
Light and life. 1

- There are forms of life on Earth that can exist without light and in extreme environments, such as deep-ocean volcanic vents, sea ice, hot springs, highly acidic pools of water and inside rocks that are 3.5 kilometre below Earth’s surface.



Light and life. 2

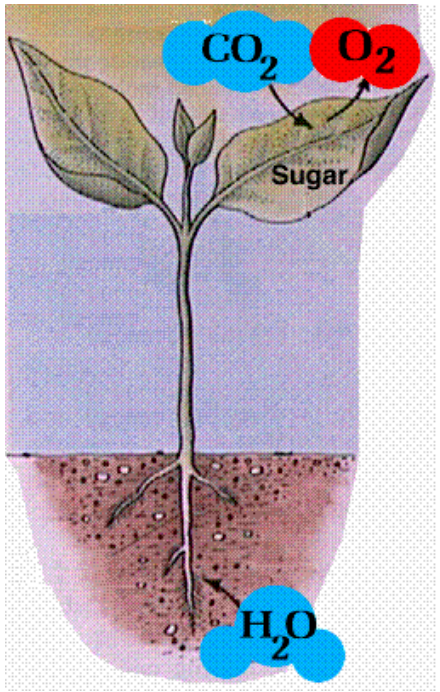
- It has also been proposed that the first life on Earth was similar to that which exists at the volcanic vents at the ocean's bottom.

Light and life. 3

- There are also sea-creatures that have adapted to living in the darkness deep beneath the oceans.
- They may not be able to do this without food materials that sink from the surface waters.

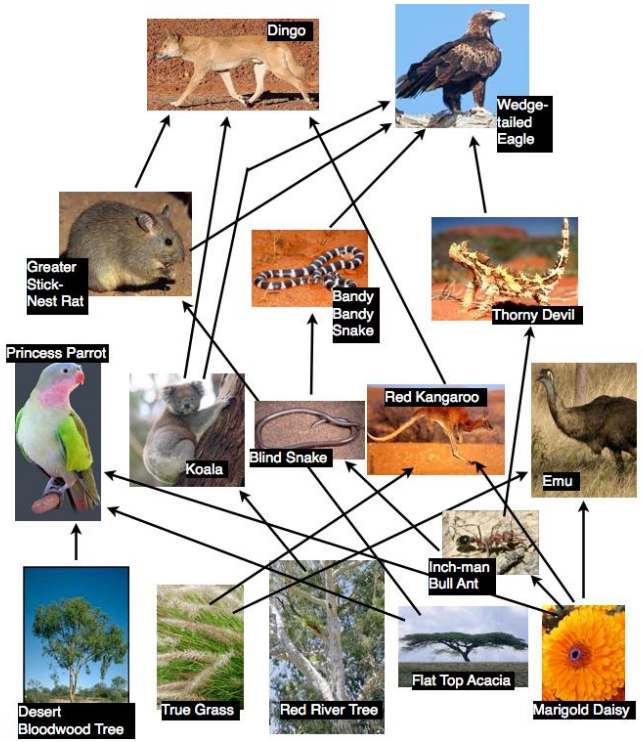
Light and life. 4

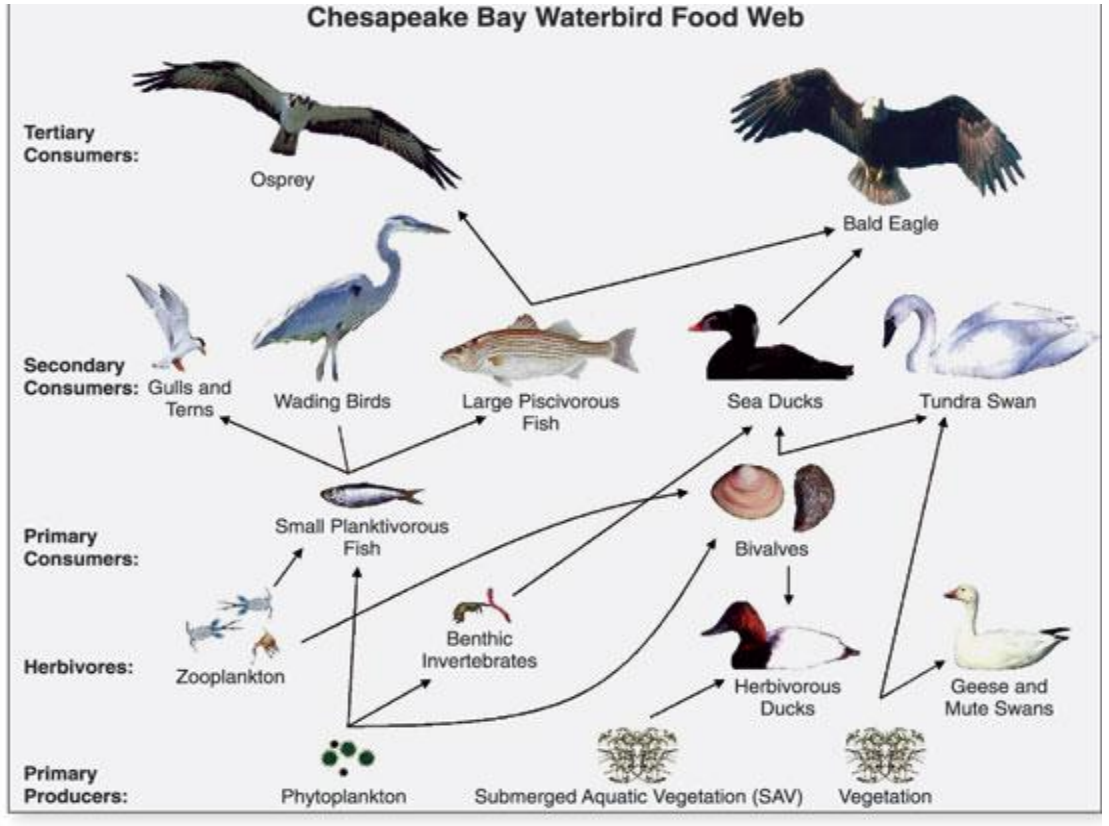
- For life, except for those above, light is essential.
- The foundation of all other life is the photosynthesis reaction that takes place between carbon dioxide and water in the presence of chlorophyll and light.



Web of life

- Food chains start with plant life, which captures energy from the sun by photosynthesis, or with organisms that use chemical energy from volcanic vents.





In plants, glucose is used to produce organic compounds

The primary product of photosynthesis is glucose which is the source of carbohydrates like cellulose, starches etc.

Plants also produce fats, proteins and water soluble sugars such as maltose and sucrose.

Sugar crystals: