

Glossary
COSEE-West
Bioluminescence Workshop: April 26, 2008
“A New Look at the Deep Sea”

A Absorption – (in relation to light) the process by which a photon is taken up by some substance or molecule.

Abyssal zone – ocean depths between 2,000 meters and 6,000 meters.

Aphotic zone - dark region of the ocean that lies below the surface sunlit waters.

Autogenic – intrinsic or self-produced.

B Bioluminescence – chemical production of visible light by organisms.

Buoyancy – the ability of an object to float in a fluid by displacement of a volume of fluid equal in mass to the mass of the floating object.

Burglar Alarm – a type of defensive behavior; When an animal is caught by a predator it may use its bioluminescence to attract the attention of an even bigger predator. If the bigger predator attacks the smaller predator then the prey may have a chance to escape.

C Chemiluminescence - light produced by a chemical reaction. Bioluminescence is one form of chemiluminescence.

Counterillumination – bioluminescence emitted from the belly of an animal (often from photophores) that exactly matches the background light from above, thereby serving as camouflage by eliminating the animal’s silhouette. This is a similar camouflage strategy to countershading.

D Deep scattering layer (DSL) - sound-reflecting layer filled with zooplankton and nekton that moves up at night and down each day (diurnal vertical migration) in response to changing levels of light.

Density – quantity of things per unit measure (especially area or volume) or mass per unit volume.

Dinoflagellates - single-celled algae, mainly marine, and some cause the red tides that are extremely toxic to marine life. They make up a large portion of the *phytoplankton* (phyto = plant). They come in many different shapes from simple spheres to complex forms with armor plates and horns, and in many sizes (2 μm to 2 mm). Some are phototrophs (get their energy from photosynthesis) and some are heterotrophs (get their energy from consuming plankton). Some are bioluminescent and others aren’t.

Diurnal vertical migration – ascent of some zooplankton and nekton to the surface during nighttime and descent out of the sunlit surface water during daytime.

E Epipelagic zone – ocean depths between the surface and approximately 200 meters.

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Euphotic zone - the well-lit surface layer of the ocean where plants photosynthesize; also called the *photic zone*.

F Fluorescence - phenomenon in which a photon of light (usually ultraviolet) is absorbed by a molecule and re-emitted at a different wavelength (usually visible light). Light of one color is stimulated by another color of higher energy (shorter wavelength). Emission continues only as long as the stimulus producing it is maintained. “Black light” posters are fluorescent.

I Interspecific - phenomena/interactions that occur between individuals of *different* species.

Intraspecific - phenomena/interactions that occur between individuals of the *same* species.

Invertebrate - animals that do not possess a backbone.

L Luciferase - the enzyme in an organism that catalyzes the production of light by oxidizing a specific substrate (called *luciferin*).

Luciferin - a molecule that emits light when it is oxidized by a luciferase enzyme.

Luminescence - light generation, not caused by heat.

M Mesopelagic zone - the “twilight zone” of the ocean, representing depths between 100 meters and 2,000 meters (depending on the clarity of the water); there is some light, but it is insufficient for photosynthesis.

Midwater - ocean depths between 500 meters and 2,000 meters below the sea surface.

O Ostracod - small marine or freshwater crustacean with a shrimp-like body enclosed in a bivalve shell (2 shells hinged together like a clam); also sometimes called “seed shrimp” because of its shape or “sea firefly”.

P Pelagic - referring to the water column away from the bottom, sometimes also referred to as *open ocean*.

Phosphorescence - very similar to fluorescence (in that a photon of light is absorbed at one wavelength and re-emitted at a different wavelength), but energy state transitions occur on a much slower time scale; light that persists following exposure to light, even after the light source has been removed. Glow-in-the-dark paint and toys are phosphorescent. Although bioluminescence is often called phosphorescence (even by people who should know better), phosphorescence and bioluminescence are **not** related in any way.

Photophore - light-producing or luminous organ found in certain crustaceans and fishes.

Phytoplankton - plant or algal members of the plankton community which are the primary producers of the oceans.

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Plankton - organisms that drift or have weak swimming abilities, and are carried about by currents in saltwater or freshwater.

Pyrocystis fusiformis - a photosynthetic, bioluminescent dinoflagellate. Reproduction is asexual. All living creatures are given a scientific name that consists of two words, the genus (e.g. *Pyrocystis*) and the species (e.g. *fusiformis*). *Pyrocystis fusiformis* literally means spindle-shaped (*fusiform*) fire (*Pyro*) cell (*cystis*).

R Remotely Operated Vehicle (ROV) - unmanned submersible operated remotely via a cable to a control center; usually equipped with sampling tools and cameras.

S Siphonophore - stinging invertebrates (cnidarians in the class Hydrozoa) that have highly specialized body parts and feed on crustaceans, fish, and other gelatinous organisms.

Submersible - a vessel that can submerge and operate underwater.

Symbiosis - is the interaction of two organisms living in close proximity to each other, often with one member of the association living on or inside the other. Mutualism (both organisms benefit) and parasitism (one organism benefits and one is hurt) are two examples of symbiosis.

T Thermocline - a distinct layer in a body of water, such as an ocean or lake, in which temperature changes more rapidly with depth than it does in the layers above or below. It marks a contact zone between water masses that have markedly different temperature from each other.

Z Zooplankton - animal plankton such as copepods, euphausiids, jellyfish, salps and ctenophore.