



> Deep sea science

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> Life in the depths

Strange life inhabits the peculiar environments of the ocean depths. As you descend, you'd find flattened fish with bulging eyes, luminescent lures and extensional jaws that allow some fish to swallow prey larger than themselves. Chains of pulsating, transparent colonial animals called salps float in the water column along with millions of plankton, fragile, shelled microscopic organisms called radiolaria and an abundance of varied-shaped jellyfish.



Light refracting off a ctenophore in the Arctic ocean
Credit: Arctic Exploration 2002, Kevin Raskoff, MBARI, NOAA/OER.

The sea floor - an average of 5 km down, and as much as 11 km deep in the Marianas Trench off the coast of Japan - is a sparsely populated desert, with islands of activity where sea floor mountains - seamounts - sharply interrupt the gently undulating sea bed. Other biological 'islands' in the deep sea are found around hot water vents where heated seawater allows bacteria to feed off chemical energy, and cold water seeps where natural gas flows into the water from the sea bed where it may have been trapped for millions of years. Whale carcasses are another source of much-needed nutrients in the deep ocean.

Despite this myriad of fascinating ecosystems, the deep ocean is cold, dark and characterised by extreme pressure from the overlying water layers. You can explore the best images of creatures from the depths from the National Ocean and Atmospheric Administration on [Flickr](#). In the meantime, here are a few experiments that look at water, pressure, and the dependence of life on nutrients.

> Experiment 1: Bottled pressure



Credit H.Catchpole

- You will need**
- empty milk carton
 - water
 - implement for making small holes

Poke three holes at the top, middle and bottom in one side of your empty

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[Cosmetic Science Parties!](#)



Developed in conjunction with [Realize Beauty](#) a specialist in cosmetic science communication, this party is designed so that tweens and teens can make their own cosmetic products whilst learning about the science of how cosmetic products work. And yes, they get to keep their

carton. Fill the bottle to the top with water and hold over the sink or the garden.

What happens? As in the ocean, the weight of the overlying water creates more pressure at the bottom of the bottle, forcing the water out at a greater rate of flow from the bottom hole. This is a good (if messy) one for schools, try measuring the distance the water travels from each hole before it splashes onto the ground - you could try it with three identical containers, one with a hole at the top, one with a hole in the middle, and one with the hole at the bottom.

> Experiment 2: Growth spurts

You will need

Several plant cuttings
Plant nutrient mix*
Water
Small pots or containers

Grab a few cuttings from a suitable plant or your nursery and pot them into identical pots - old yoghurt or margarine containers with holes punched in the bottom work well. Use the same soil mix for each pot (why, I hear you ask - well it's all about controlling the number of differences in the experiment. We want to test the effect of adding nutrients to the soil. Mix up a bottle of plant nutrient mix (*plant food - available from nurseries). If you have several plant cuttings you could test different levels of nutrients - make one batch very weak, one as per instructions, and one strong. Over a couple of weeks, water one of your plants with straight water, and the others with your nutrient mixes. Measure the change in growth. You can also test different environments (sunny, dark) or different substrates (soil, gravel, Lego blocks etc, the choice is yours).

What happens? I'll leave it to you to find out! Nutrients are substances that life needs to grow and use energy. Plants will get nutrients from the soil, but adding some extra should give your plants a growth spurt. Life is remarkable in its ability to obtain the nutrients it needs wherever this may be, whether from the soil, air or other organisms, such as algae and bacteria.

> Experiment 3: Diving submarine



Credit H.Catchpole

You will need

pen lid
small PET bottle with lid
plasticine or blue tak
water

This one is a classic experiment done around the world for many years. Take your pen lid and add plasticine or blue tak along one side to add weight. Here's where you need to experiment: you need to add enough so that the pen lid floats just underneath the surface of the water, not floating on the top and not sinking to the bottom. Once you have weighted your diver, fill a small PET bottle to the top with water, place the diver inside and tightly screw on the lid. Squeeze the bottle and watch what happens to the diver.

What happens: This experiment classically illustrates buoyancy. The air bubble inside the pen lid allows it to float. When you squeeze the bottle you increase the pressure on the contents inside - both the water and the air inside the pen lid, but the air squashes more easily. As you increase the pressure, the air becomes more dense - the molecules that make up the air move closer together. Because you had a nice equilibrium with the diver floating just under the surface, that change in density sends it straight to the bottom of the bottle. As you release the pressure, the air spreads out again, and the diver floats back to its original position.

Many fish use a similar technique to rise and sink in the water column. To do this they alter their overall density by filling an organ called the swim bladder with oxygen drawn from their blood. This changes their volume without significantly changing their mass. And since density = mass per unit volume, this change in volume also changes their density, allowing them to float (or, when they release oxygen from the swim bladder, to sink).

> More experiments

Try these ocean experiments from [Fizzics Education!](#)

- | [Why does ice float?](#)
- | [Why do temperature layers form in the ocean](#)
- | [What drives our ocean currents?](#)
- | [Making layered liquids](#)

goodies...

Great science quotes:

"As we descended deeper and deeper the light began to fade until it was gone all together, at this point all that was visible out of the windows was the occasional glint of bioluminescence from some jellyfish or ctenophore that drifted by the sub. Finally after what felt like an hour we were on the bottom. Bob turned on the external light and all of a sudden I was introduced to an environment more foreign to us than the surface of our moon."

Brian Wrightsman, 26-year-old science teacher who dove to the bottom of the sea floor off Costa Rica in the sub Alvin

Another quote

"A lot of people attack the sea, I make love to it."

Jacques Cousteau, French explorer, filmmaker and oceanographer, 1910-1997

Yet another quote

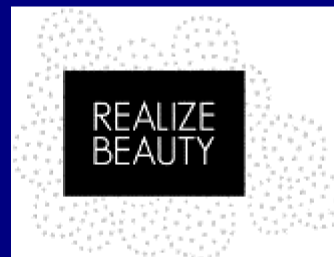
"Sponges grow in the ocean. That just kills me. I wonder how much deeper the ocean would be if that didn't happen."

Stephen Wright, American actor and writer, b.1955

Cosmetic Science

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