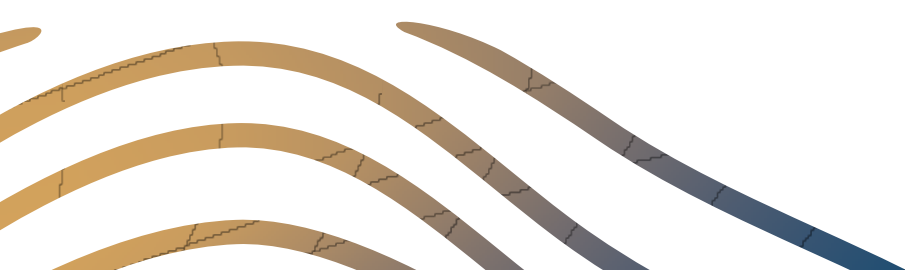




**THE OCEAN SENSES  
ACTIVITIES BOOK**



The background is a solid yellow-orange color. It features several sets of wavy, parallel lines in a lighter shade of yellow. One set of lines is in the top right corner, and another set is in the bottom left corner. The lines are curved and flow across the page.

**SIGHT**



## EXPLORING THE ARCTIC DEEP-SEA BY COLOR FILTERS

### Focus:

To get to know some of the creatures in the deep-sea that use color and the lack of light to camouflage themselves.

### Learning objectives:

With these TWO activities, we use vision to explore life forms in the deep sea which have adapted to extreme conditions. Through the activities, the pupils will also become familiar with some organisms well-hidden at the bottom of the ocean.

### Key words:

Camouflage strategies, Deep sea ocean, Physical effects of light, Characteristics of sea lifeforms

This specific lesson plan was developed in a close collaboration with: Vibeke Os, Heike Jane Zimmermann and Giuliana Panieri.

*Edited by: Giuliana Panieri and Mathew Stiller-Reeve*

*Layout and Graphics: Heike Jane Zimmermann*

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## IN SHORT (FOR THE TEACHER):

The pupils will learn how animals in the deep sea use the lack of light and colour to camouflage themselves and also learn about some of these creatures.

### Activity 1

#### DISCOVER HOW FILTRATION OF THE LIGHT AFFECTS YOUR VISION:

##### Materials:

- Each group (3-4 pupils) gets three transparent sheets in blue, green, and red, A4 size.
- A pair of scissors to cut the transparent sheets so each pupil has a piece to hold in front of their eyes.
- A4 (or A3) size print outs for each group of:
  - a) “Lifeforms of the Deep Ocean” illustration (see page 16)
  - b) “List of Different Lifeforms” (see page 17)  
(This could also be projected on a wall or screen for everyone to see)
  - c) Activity Sheet (see page 18) to record observations.

### Activity 2

#### FINDING THE FISHES:

##### Materials:

- Each pupil makes a pair of paper goggles. Please use slightly thicker white A4 paper to cut out the paper goggles. (see `Paper Goggles Template` page 20).
- Scissors to cut out the goggles.
- Blue transparent foils to be cut in small pieces and mounted over the eyeholes in the paper goggles.
- A4 (or A3) size red paper to cut out deep-sea animal shapes.  
(see “Cut-out example” page 21 or get inspired by the creatures on page 17).
- Tape to mount the pieces of transparent foil on the goggles.
- Elastic band to fit the goggles on the pupils’ heads.

#### Classroom organization (suggestion):

- a) Groups of 3-4 pupils for activity 1.
- b) For activity 2, one-half of the class will hide the creatures they have cut out. The other half will find the creatures in groups of 2 or 3.



## BACKGROUND STORY:

**These exercises explore the color filtration of light in the deep ocean, and some of the fascinating animals and lifeforms that have adapted to life at these depths. We will find many different life forms, like fish, anemones, jellyfish, shrimp, etc., in different water depths where they have evolved to deal with what we humans consider extreme conditions. These conditions include cold temperatures, intense water pressure and darkness.**



Images of life in the deep-sea (Image left to right: brittle stars, octopus and anemones by Michal Adamczyk/Mostphotos; Right: Jaap) Bleienberg/Mostphotos )

As light passes down through the ocean, the water acts as a filter and allows only specific colors to pass through while it absorbs other colors in the top few meters. Violet and the orange-red wavelengths are the first to be absorbed, with greens and blues being the last before complete darkness. In clear water the blue light can reach 100 meters. Once a color has been absorbed in the ocean, it is no longer possible to see that color. At depths of 100 meters, blue fish start to appear colorless and are more difficult to see. Some deep-sea animals have taken advantage of these optical properties of water and developed very interesting features to camouflage. This camouflage helps animals hide from their predators and sometimes also helps predators hide from their prey before they attack.

Many fishes and other animals have a red color on their skin, making it easier to hide from a predator's eye. However, the deep sea is dark, so some animals make their own light via a process called bioluminescence.

Today we will explore how sea animals adapt to the light filtering down in the deep ocean.

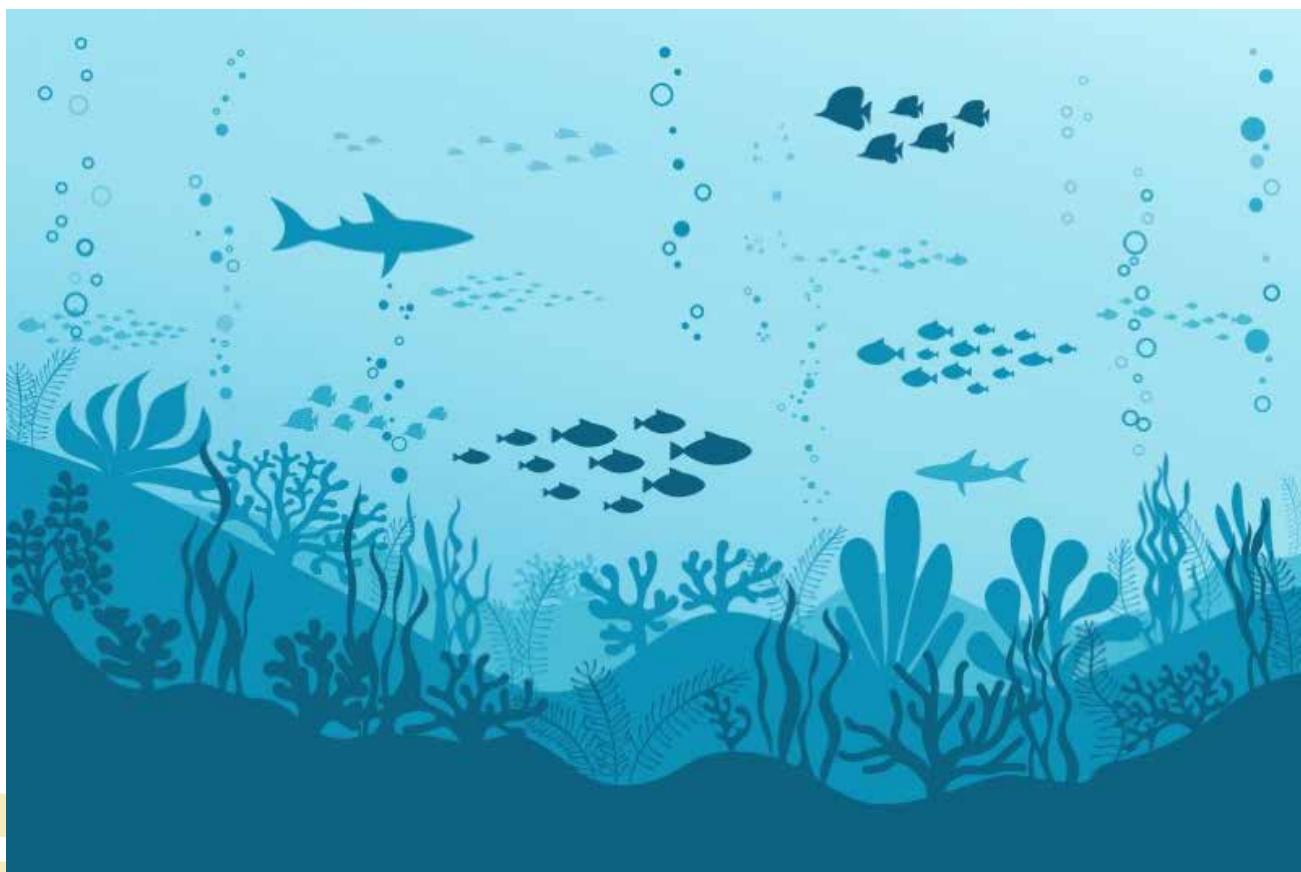


Illustration of the ocean depths (Andrii Malysh/Mostphotos)

## Activity 1:

### DISCOVER HOW FILTRATION OF THE LIGHT AFFECTS YOUR VISION

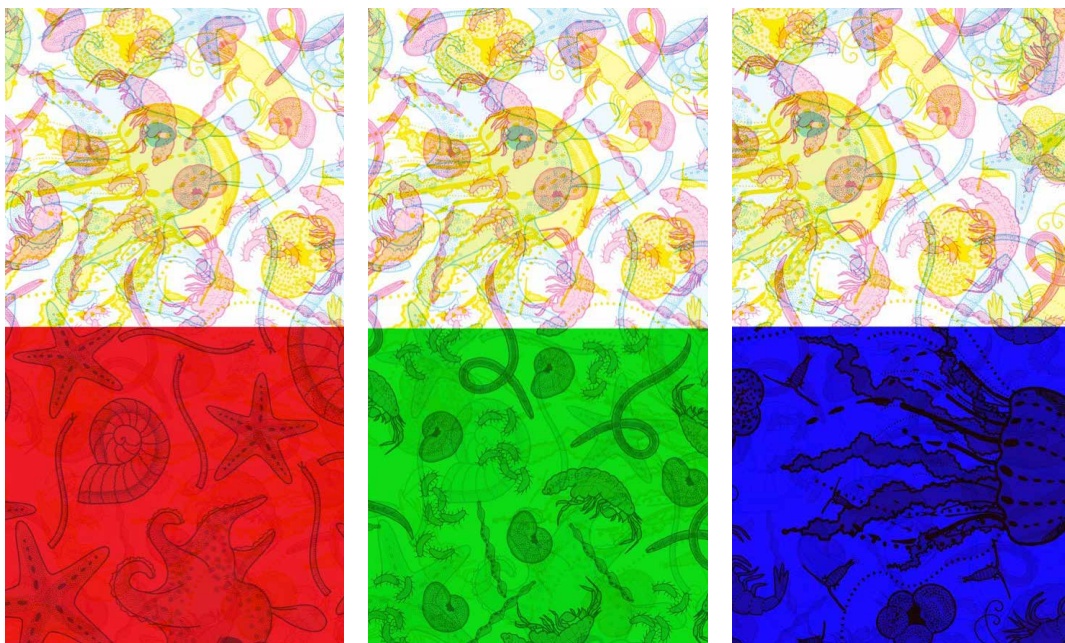
Print the illustration “Lifeforms of the Deep Ocean” (see page 7) in color. The illustration shows different deep sea lifeforms in three colors (yellow, cyan and magenta) printed on top of each other. The drawings represent diverse lifeforms from the arctic ocean described on page 8.

1. Place the print in front of the pupils (as print out) and let them describe what they see.
2. Then let them see through the different colored transparent foils and let them describe the differences they see.

By looking through the colored transparent foils (blue, red, and green), the color will filter out some of the printed figures, so some sea animals almost disappear while others will appear more clearly. (Example of Filter Effect` see page 6)

The pupils can use the “List of Different Lifeforms” (see page 8) to describe which ones appear using the different color filters and fill in the activity sheet on page 9.

Effect using the a) **red** transparent foil, b) **green** transparent foil c) **blue** transparent foil





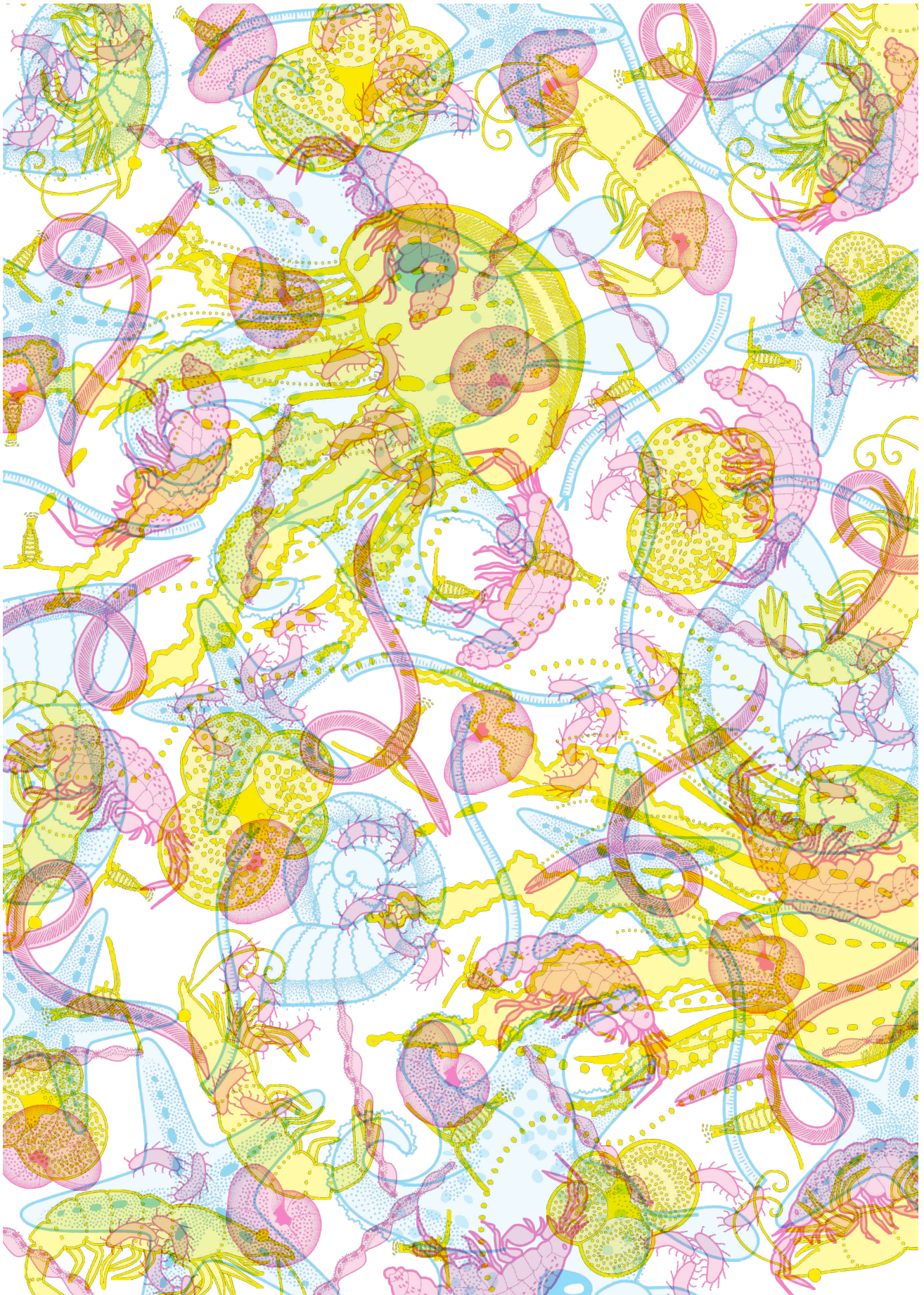
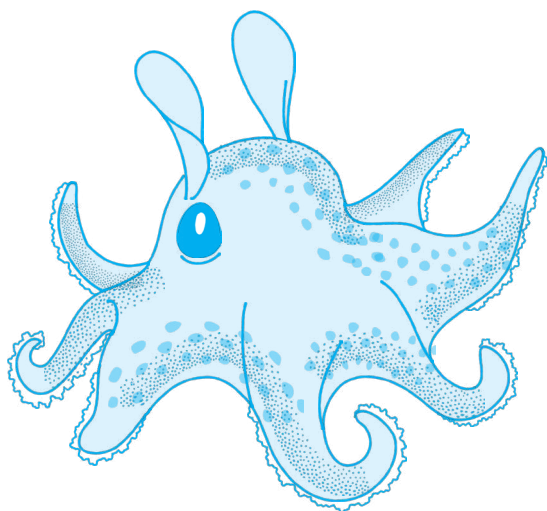


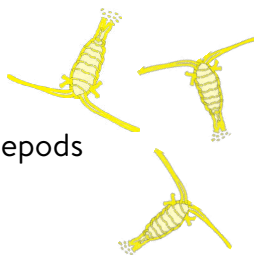
Illustration of marine organisms as explained in the text of this activity. By Heike Jane Zimmermann [www.miucreative.com](http://www.miucreative.com)



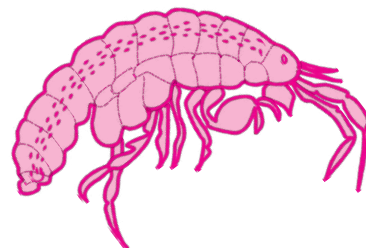
Dumbo Octopus



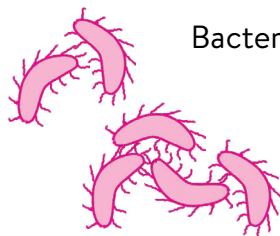
Copepods



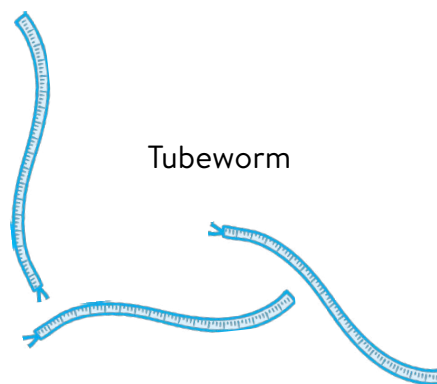
Nematodes



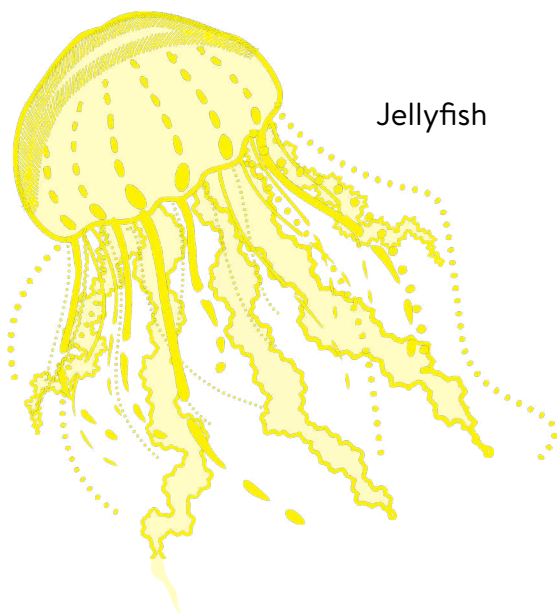
Bacteria



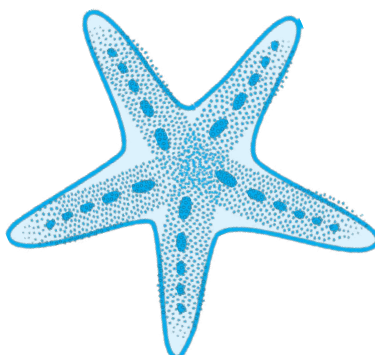
Tubeworm



Jellyfish



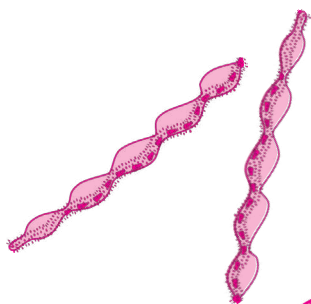
Seastar



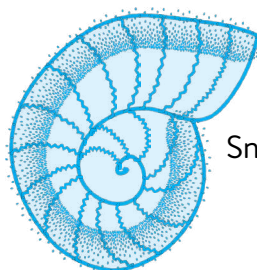
Worms



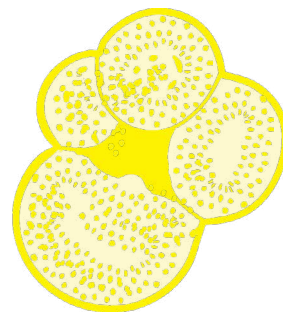
Foraminifera benthic



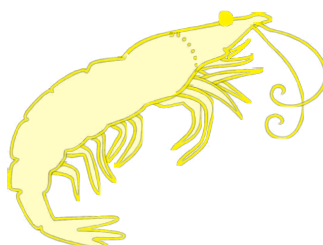
Snail



Foraminifera planktonic



Krill



### Activity Sheet

List the names of the lifeforms you see when you hold the different colored transparent foils in front of your eyes.

Use the “List of different lifeforms” (on page 8) to help.

Using red filter	Using green filter	Using blue filter



## Activity 2:

### FINDING THE FISHES

The pupils start by making goggles using the blue transparent foil. Then they can draw (on red paper) their own deep-sea animal shapes, for instance, fish, crabs, octopus, or shrimp. Simple animal shapes are likely best since you want as many as possible. Once the shapes are cut out, then you can place them all over the classroom including on the walls and the floor. **You might divide the class into two groups**, where one group places their animals around while the other group waits outside. Turn off the light and close any curtains, so the room is dimly lit (not completely dark, leave enough light to walk around safely). The effect of color filtration works best if the figures are posted on dark/non-white areas within the room.

The group of pupils outside can put on the blue filter goggles, and then they enter the room to search for the fishes and creatures in an orderly manner (for example, all walk in a circle around the room).

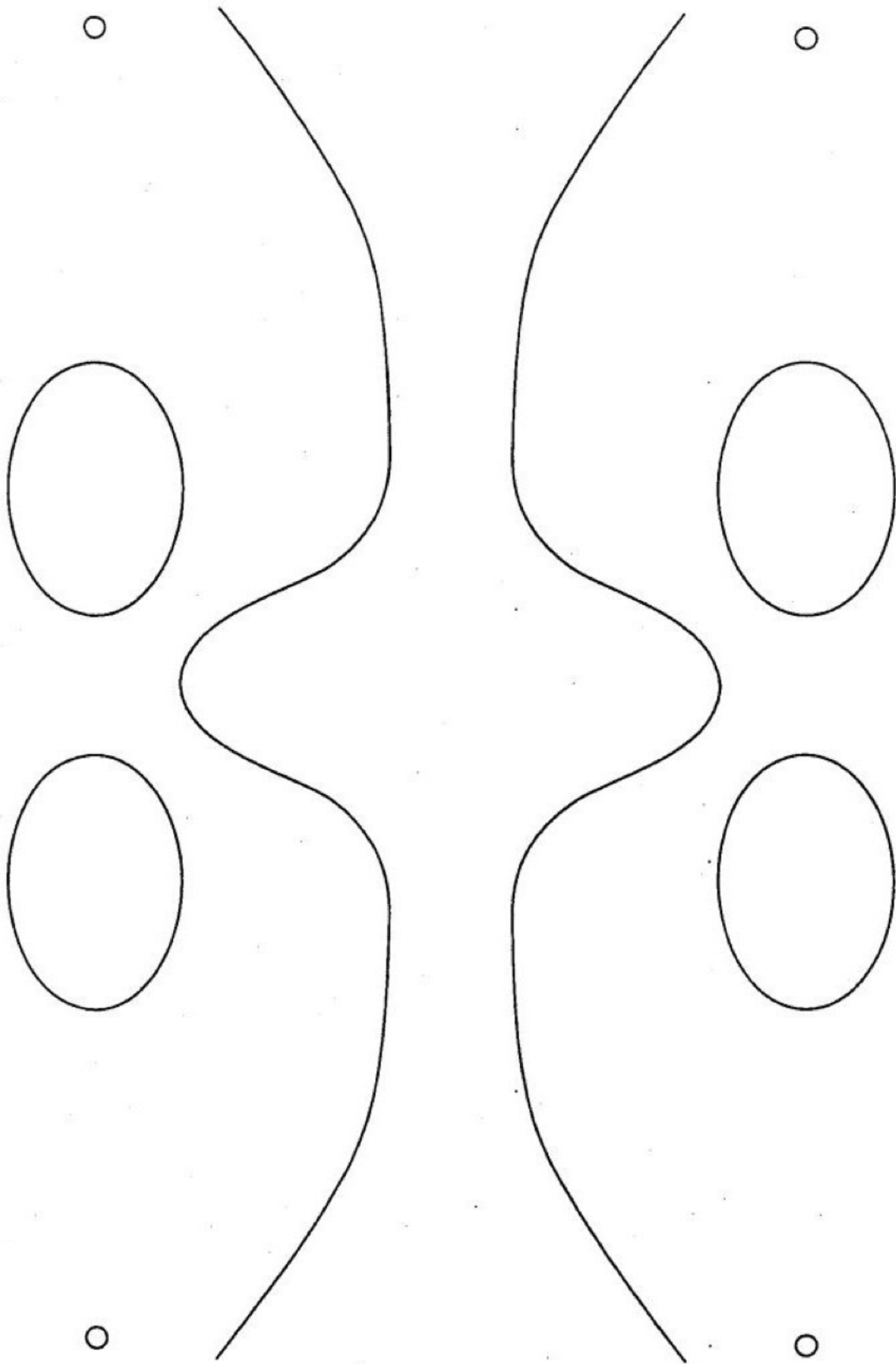
As the classroom now simulates the ocean floor, it must be QUIET. The pupils can for instance get points based on the number of fish/shellfish they find. If pupils are wearing goggles, we could say they are scuba divers. Scuba divers work in pairs, so pupils work with their “dive buddies” to spot animals. Also, scuba divers cannot speak to each other since they are underwater. [EXTRA: you might consider extending this activity to learn the different hand signals that scuba divers use to communicate:

<https://blog.padi.com/marine-life-hand-signals-for-underwater-communication/>

After the “dive”, let the pupils count their findings and write them down. They can discuss which of the animals were the easiest and hardest to find and have fun identifying what type of animals the different cut-outs represent.

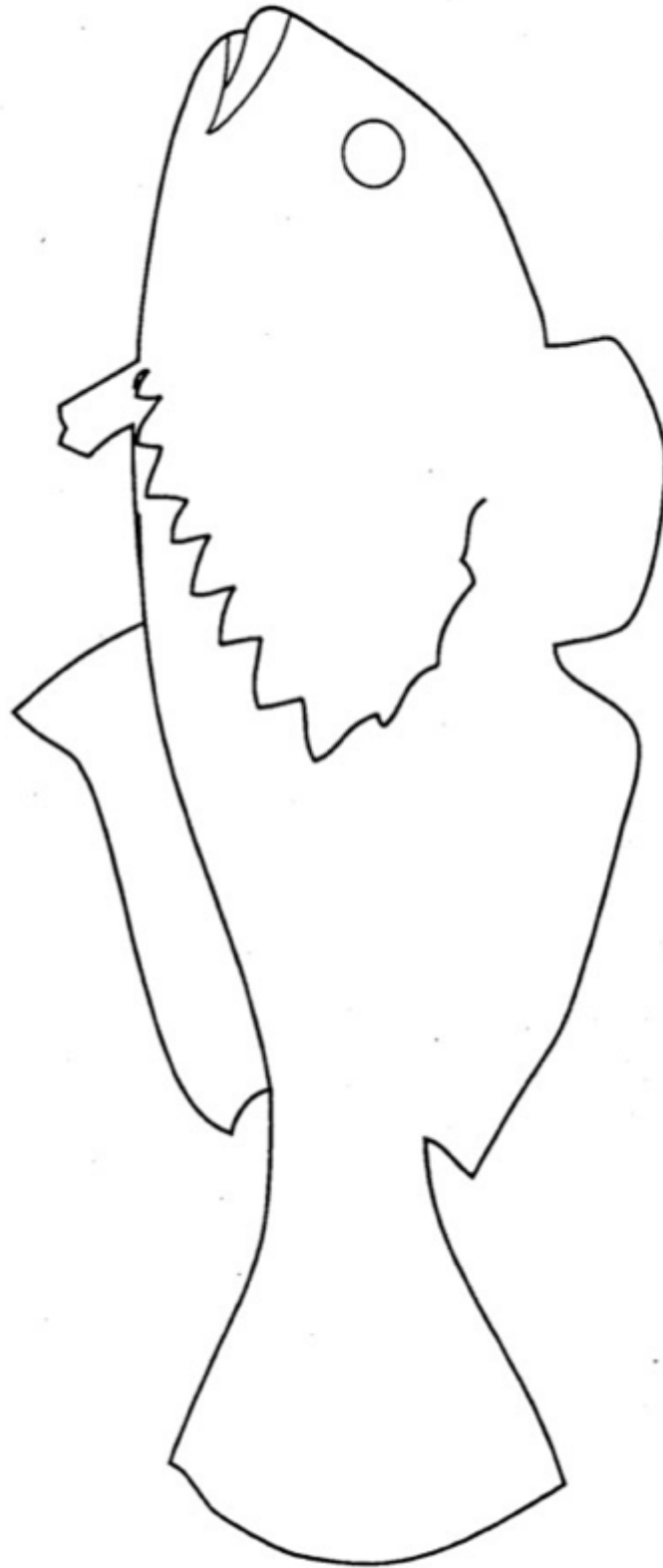
As light travels down through the ocean, the red light is filtered out first. Blue light travels deepest in the ocean. Even in the deep sea, where it is completely dark, some animals make their own light. Many deep-sea animals have red colors on their skin to be invisible to predators, or sometimes also because they are predators themselves.

This activity also simulates the darkness of the deep sea. How many animals can your pupils find?



Template for the googles to be cut





Template of a fish to be cut