



Science Unit: *Marine Critters & Communities*

Lesson 5: *Marine Animal & Plant Adaptations*

School Year: 2007/2008
Developed for: L'École Bilingue, Vancouver School District
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Grade level: Presented to grades 2 - 3; appropriate for grades 1 – 6 with age appropriate modifications; Présenté au niveau de la 2e et 3e année; appropriée aux niveaux de la 1re à la 6e année en y apportant les modifications nécessaires.
Duration of lesson: 1 hour and 20 minutes
Notes: This lesson was taught in a French immersion school.

Objectives

1. Explore the concept of animal and plant adaptations.
2. Learn about specific adaptations of marine rocky shore species the students are already familiar with from the mural (Lessons #2&3) and the field trip (Lesson #4).

Background Information

The main concept of this lesson is adaptations; the idea that animals and plants have developed physical, behavioral, and physiological features to help them survive in their environments (e.g. successful ways to feed, defend themselves, breathe etc.). Those individuals with characteristics that allow them to survive better than others reproduce successfully and their traits are passed on to their offspring. The goal of the lesson is to expand students' knowledge of animal features and behaviors that can help or hinder their survival in a particular habitat. Students will explore adaptations of a selection of marine animals and plants living in the BC Rocky Shore environment. Six organisms are presented in this lesson, but the specific species chosen can reflect which species the students express most interest in, and which species they may have had the opportunity to explore (touch, see, feel) in real life during a field trip.

Vocabulary

<u>Word</u>	Brief definition.
Adaptation	The physical, behavioral and physiological features that organisms have developed to help them survive in their environments
Sea anemone	Carnivorous marine invertebrate that looks like a flower. Sea anemones are benthic and are closely related to corals and jellyfish (cnidarians).
Jellyfish	Carnivorous marine invertebrate that has a body shaped like a bell surrounded by tentacles. Jellyfish are pelagic and are closely related to corals and anemones (cnidarians).
Sea star	Carnivorous marine invertebrate that looks like a star (most species have 5 arms). Sea stars are benthic and closely related to sea cucumbers and sea urchins (echinoderms).
Sea cucumber	Omnivorous marine invertebrate with an elongated body and leathery skin (cucumber-shaped). Sea cucumbers are usually benthic and closely related to sea stars and sea urchins (echinoderms).



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Crab	Omnivorous marine invertebrate with a hard exoskeleton and 10 legs (decapod crustaceans). Crabs are benthic and closely related to lobsters, prawns and shrimp.
Kelp	Large seaweed that belongs to the brown algae group.
Stinging cells	A type of poisonous cell unique to the Phylum Cnidaria. When triggered, these cells eject a structure like a harpoon. They are used for feeding and protection.
Gills	The respiratory organ of many marine animals. There are many variations, such as the skin gills of sea stars and the respiratory trees of sea cucumbers.
Tube feet	The small tubular projections on the surfaces of echinoderms (sea stars, sea urchins and sea cucumbers). Used for locomotion, feeding and respiration.
Exoskeleton	External skeleton that supports and protects an animal's body, like the carapace of a crab.

Materials

* note: all lessons in this unit require a scrap book that each student keeps for the duration of the 6-week curriculum (for pasting in their activity sheets, drawings etc.)

For Activity 1

- Thick cardboard, cut in squares (one per student) to build their animals on
- Play-doh or Colored Clay, in 6 colours
- Fishing line to cut the clay
- Buttons, pipe cleaners, pom poms, straws, colored yarn, Popsicle sticks etc.
 - o Anything that the students can use to create a sculpture!

In the Classroom

Introductory Discussion

1. HOOK: Start with a few obvious examples of adaptations (e.g. giraffes have long necks to reach leaves high up on trees, polar bears are white so they can sneak up on their prey). Then ask students what animals and plants need to survive. Write the list on a flip chart. From the list choose the following survival requirements: (1) food, (2) protection (shelter and protection from being eaten), (3) a way to breathe, and (4) a way not to dry out (if applicable).
2. OTHER ITEMS TO REVIEW: Ask students if they can think of adaptations that marine rocky shore animals and plants exhibit. Using the 4 categories listed above, review how the sea anemone, jellyfish, star fish, sea cucumber, crab and kelp have adapted to successfully eat (1), defend itself (2), breathe (3), and not dry out (4).



	Sea Anemone Jellyfish	Sea Star Sea Cucumber	Crab	Kelp
How does it eat?	Carnivores Stinging cells (nematocysts), tentacles for capturing prey	SS – carnivore SC – filter feeds with tentacles or eats 'mud' like an earth worm and extracts organic matter	Omnivore or carnivore – depends on the species. Uses claws for tearing, then grinding mouth parts	Primary producer (plant) – uses sunlight to make it's own food (thus it needs to access sunlight – float)
How does it protect itself?	AN – stinging cells JF – stinging cells & can move	SS – spines, hard internal skeleton, regeneration of 'arms' SC – evisceration of guts, internal spines, toxins in skin, cryptic	Hard exoskeleton. Decorator crab camouflages itself	Thick and tough blades and stipe. Many seaweed have anti-herbivore toxins
How does it breathe?	AN - through its skin JF – through its skin	SS – skin gills, tube feet SC – respiratory trees (breathes out of its behind!)	Gills at the base of the legs	photosynthesis
How does it keep from drying out when it's out of the water?	AN – retracts tentacles to keep body moist (reduces surface area) JF – must live underwater the whole time (pelagic)	SS – behavior, must stay under water most of the time, can move to appropriate place SC – live underwater most of the time	Gills need to stay moist, so crabs that spend a lot of time on land have modified gills hanging in a protective chamber	It does dry out when out of water, thus has a strong holdfast to keep it attached to the seafloor and submerged

3. BRIEF DESCRIPTION OF SCIENCE ACTIVITIES: (1) create a marine animal or plant that has adaptations to meet the 4 survival needs listed above.

Science Activity/Experiment

Activity 1: Design your own marine animal or plant!

- Students choose where their organism lives, i.e. a "habitat" (one of the 4 mural zones)
- Students choose what type of organism it is: primary producer (plant), herbivore, omnivore, or carnivore
- Students design their organism, making sure that it has a way to eat, breathe, protect itself from predators, and protect itself from drying out.



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Closure Discussion

Each student takes a turn briefly describing their organism to the class, and the adaptations they created for it to be able to survive in its particular habitat.

References

1. Niesen, T.M. 1982. The Marine Biology Coloring Book. Coloring Concepts, Inc. Oakville, CA, USA.
2. Wikipedia sites for the vocabulary terms.