



Lesson Plan 65: Sea Star Animal Adaptations

Introduction Discussion: Background on Sea Stars

- Echinoderms: Although many people call them starfish, they are not actually fish! Instead, they are more closely related to sea urchins and sand dollars. To avoid this confusion, we now like to refer to them as sea stars
 - Must have radial symmetry around a central disc
 - Must be star shaped
 - Have spiny skin
 - Calcium carbonate skeleton
 - No central brain, hear or eyes!
- How they move: pump sea water through series of canals and suckers to hold on
- Sea stars can live up to 30 years and weigh up to 10 lbs, which is about the size of a small cat!
- Sea stars are usually brightly colored. Most are red/orange but they can also be blue, grey, or brown
- Sea stars also have little tube-like feet underneath them that help them walk along the ocean floor and a mouth in the middle of their bodies

Frozen Sea Star Experiment (for at home)

Materials

- Baking soda
- Water
- Food coloring
- Star-shaped ice cube trays
- Vinegar
- Dropper
- Cooler and ice (to transport the frozen sea stars)

Instructions

- (The Night Before) Mix water with baking soda (about 3:1 ratio baking soda to water for the right consistency) with yellow food coloring
- Freeze the mixture in star-shaped ice cube tray
- (During the lesson) give each student their own frozen sea star
- Allow students to use the dropper to drip a few drops of vinegar onto their sea stars
- The frozen sea stars should start to fizzle and melt

Discussion

- This is a recall to the carbon sequestration and ocean acidity lesson we did a few months ago
- Unfortunately, as people emit more CO₂, the ocean is sucking up more CO₂ and becoming more acidic (like lemon juice or the vinegar we used here)
- While this is harmful to most ocean life, it is particularly dangerous for mussels, corals, sea stars, and other animals surrounded by a shell-like material

- The hard, outside surface of sea stars that helps protect their soft insides from predators is made of a substance called calcium carbonate
- When the calcium carbonate of a sea star is exposed to an acidic substance, such as vinegar, it starts to dissolve and release bubbles of carbon dioxide, which gets released back into the ocean

Salt Dough Sea Star Craft (for at home)

Materials

- 2 cups flour
- 1 cup salt
- 1 cup water
- Baking tray
- Toothpicks
- Bowl
- Something to mix with

Instructions

- In a large bowl, mix the flour, salt, and water until it reaches a dough-like consistency
- Give each student a golf ball-sized piece of dough
- Have each student break their dough into 5 pieces and roll each piece into a log (will likely need assistance from myself or a parent)
- Stick the 5 logs together to form a sea star!
- Using a toothpick, students can draw designs in their sea star
- The salt dough will air dry and harden so students can take their craft home. They can also be painted when dry
- Using my own sea star, either break off an arm and stick it back on, or pull a new arm from the dough to demonstrate the regenerative adaptation of sea stars

Discussion

- One adaptation sea stars have is that they are able to regrow their limbs! This is called regeneration.
- This helps sea stars mainly in two different situations. One of these is if they have a disease in a certain part of their body, they can cut that part of themselves off. Another is if they get snagged by a predator! If they're caught, they can lose that part of their body and grow a new arm.
 - This is similar to how lizards can regenerate their tails
- A few species of sea stars have also adapted to reproduce this way. Some starfish will shed an arm during what is called fission. The original sea star will regrow that arm while another sea star will grow from the arm they shed!
- Can you imagine losing one of your arms and a baby growing from it?

Book to follow up:

Star of the Sea: A Day in the Life of a Starfish by Janet Halfmann