THE ECHINODERM GAME



DISCLAIMER ABOUT THE PICTURES ON THE CARDS: These photos were all borrowed from the Internet using Google image search. You can easily find these same pictures by using key words such as "sea star," "sea cucumber," "feather stars," etc. The images are provided merely as a time-saver for you. No infringement of copyright is intended, and use of these pictures is assumed to be fair use for educational purposes." These cards are not to be sold or published in any manner!

Target age group: any

Number of players: 2 to 6 (per set of cards)

Time needed: 15 minutes for first activity, 30 minutes for second, but could go longer

Materials needed: color copies of card pages printed onto heavy card stock paper, scissors

<u>Preparation</u>: Copy the 7 card pages onto card stock paper and then cut apart the cards. (Optional: Print out the "mini posters" showing the classes, but these can be on regular paper.)

Background information:

Echinoderms are a <u>phylum</u> of marine invertebrates (ocean animals who do not have bones). "Echino" means "spiny" and "derm" means "skin." The five main <u>classes</u> of Echinoderms are:

- 1) Asteroidea: sea stars ("aster" means "star")
- 2) Holothuroidea: sea cucumbers
- 3) Echnioidea: sea urchins and sand dollars (sea biscuits)
- 4) Ophiuroidea: brittle stars and basket stars ("Ophiur" means "snake," referring to their long arms.)

5) Crinoidea: feather stars and sea lilies (Many crinoids are famous for being extinct.)

<u>Recommendation</u>: If you'd like some short videos of these animals, you might want to check out the coral reef playlist on YouTube.com/TheBasementWorkshop. Ellen McHenry has previewed and posted videos that are appropriate for students. There are many videos posted, but they are arranged topically so all the echinoderm videos should be grouped together. There are quite a few fabulous videos on echinoderms. (The videos are mostly very short, just a few minutes long, so you don't have to watch any long documentaries.)

ACTIVITY 1: Sorting into classes

Lay all the cards out on the table, face up. Let the students look at them for a few minutes and make any comments they want to. (Often students are very talkative at this point and want to point out animals they may have seen on the beach or in a video, or they want to point out their favorite colors and patterns.) Then introduce the five main classes, as listed above. You can use the "mini posters" if you would find that helpful.

Have the players work as a group to sort the cards into the five classes. Don't stack the cards as you sort. Make sure all the cards are visible at all times.

Questions to ask after the cards are sorted:

1) Do all sea stars have 5 rays? ("Arms" are called "rays.")

2) Do any sea stars look like they have no rays? (the pin cushion stars)

3) Find the sunflower sea star. This is the species that can grow to be almost a meter (3 feet) in diameter. How many rays does this one have? (looks like 24)

- 4) Do all crown-of-thorns stars have the same number of rays? (no)
- 5) Some sea cucumbers have feathery gills that protrude out from their bodies. Find these cucumbers.
- 6) Find the orange basket star. Can you see that it has only five rays? These rays have lots of branches.
- 7) Does the fossilized brittle star look any different from the living ones? (no)
- 8) Does the fossilized sea urchin look different from the living pencil urchin? (no)

9) Find the sea urchin test. The test is the hard shell to which the spines are attached. So this picture of the test does not show a living urchin. A test was included in the pictures because it is good to be able to recognize a sea urchin test. Not all tests look like this one. Some are light green or white and have very large knobs instead of large dots. (Google for images.)

10) Feather stars might look like underwater ferns, but they are animals, not plants. They can swim by waving their feathery arms. They are not stuck in one place all the time like sponges or corals are. Find the feathers with "feet" visible.

11) Echinoderms that have long arms with small bristles or feathers will usually be filter feeders, using their arms to gather small particles from the water. Find all the cards that you think look like filter feeders. (Remember, the crown-of-thorns is a predator and eats corals.)

12) Now rearrange the groups, sorting by color. Animals that are more than one color can form a group. (In other words, make a pile for 2-color creatures and a pile for 3-colors.) Put the fossils into their own category.

ACTIVITY 2: Matching game

In this game, you will be observing colors, textures, and body shapes. This is a simple game as far as rules go, so that the players' mental energy can be spent on looking carefully at the cards instead of trying to remember rules.

Collect all the cards into a pile and shuffle thoroughly. Deal 3 cards to each player and then put the remaining deck face down. Draw one card from the top of the deck and put it face up on the table.

The goal of the game is to get rid of all of your cards. Players will be making a line of cards, starting with that first card. A matching card can be played on either side of the first card. A match can be by color, by body shape, or by texture. However, sometimes you won't be able to make a match. If you can't lay down a card, you must pick up a card.

By allowing the "sidewalk" of cards to be played on either end, this gives two chances for a match instead of just one. Even so, there will be times that no match can be made. Younger students will be very tempted to make matches off to the sides, creating alternate "sidewalks" going off perpendicularly to the main one. It is up to the adult in charge whether to allow this. Bearing in mind that the point of the game is to enjoy learning about echinoderms, the game format can be altered if the situation calls for it.

Games usually last no more than 10-12 minutes, so multiple games can be played during one class period.

Examples of what to look for:

Colors: (solid colors, 2 colors, 3 colors) Patterns: stripes, dots, patterned in some way Textures: thick spikes, thin spikes, rounded bumps, feathery, smooth Body shapes: star, cucumber, round, spherical, etc. (The baskets have their own unique body shape.) Number of arms ("rays") Fossilization (all fossils match each other automatically)

Keep these guidelines fairly "tight." The matches must be as exact as possible. For example, you can't match the pincushion star with a sand dollar according to shape. Nope, the pin cushion just isn't round enough. The pencil urchin really isn't the same shape as a thin-spined urchin. The spines are quite different. However, the fossilized urchin is obviously a pencil urchin with an exact shape match to a living pencil urchin. A feather star is not the same texture as a sea lily. Feather stars look feathery. Matching the texture of a crown-of-thorns star to the spiky brittle star is not ideal, but passable. Matching the highly patterned pin cushion star to the sea star that is patterned with red dots and saying both are highly patterned would be okay. Matching the orange and white sea star with the orange and yellow feather star would be okay because they both have a 2-tone color scheme. Matching a sand dollar with a sea star because they both have the number five very prominently displayed in their bodies would also be okay. Good observation!

Basically, keep the guidelines as tight as possible, but allow the group (or the adult in charge) to make on-the-spot judgment calls about dubious matches. If everyone in the group agrees that the match is legit, then go with it. Always keep in mind that **the point of the game is have the students observe the animals**, not to win or lose!

ACTIVITY 3: Echinoderm cookies

If you would like an extension activity to keep the echinoderm learning going, you might want to make edible echinoderm sculptures. Use a standard sugar cookie dough recipe but leave out the baking powder. Provide paint by mixing food coloring with a little egg white. Pretzel sticks make great urchin spines. Chocolate chips and sprinkles are fun for sea star textures. Sliced almonds are great for detailing sand dollars.

Use the cards as visual references for making the cookies. (Google for more pictures if you want more samples.) If you have dietary issues, you can adapt using gluten-free dough, sugar-free dough, and natural food colorings. If you'd rather make regular (non-edible) sculptures, you can use a craft dough and then paint them when dry.

CLASS ASTEROIDEA: SEA STARS













CLASS CRINOIDEA: SEA LILIES and FEATHER STARS







CLASS HOLOTHUROIDEA: SEA CUCUMBERS



These are "mini posters" that you might want to use when introducing the classes of Echinoderms. They can be used individually, or glued onto posterboard to make an Echinoderm poster.

These are pictures easily found using Google search. You can use Google yourself to find many more images like these.















