Khaled bin Sultan Living Oceans Foundation

STANDARDS

- **CCSS**: RST.9-10.1, 2, 3, 4, 5, 7, 8, 9, 10; RST.11-12.1, 2, 3, 4, 7, 8, 9, 10; W.9-10.2, 4, 7, 8, 9; W.11-12.2, 4, 7, 8, 9; SL.9-10.4, 6; SL.11-12.4, 6
- **NGSS**: HS-LS4-1
- **OLP**: 4.B.1, 4.B.2, 5.C.22

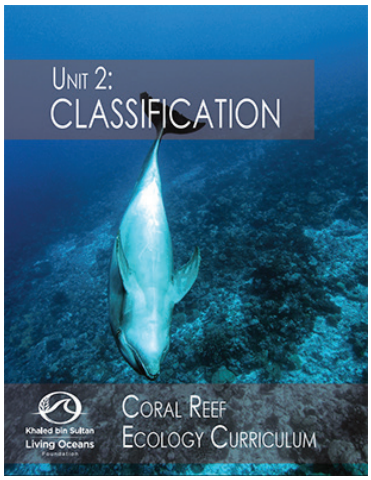
ONLINE CONTENTS

- Classification Quiz
- *What Clade R U?* Interactive (at bottom of *How To Build A Cladogram* section) Use the interactive program to learn and explore more about the anatomy of a stony coral polyp.
- *What Are Corals?* Video Classification helps scientists tell species apart. This educational video explains modern biological classification categories from the most general (domain) to the most specific (species).

CLASSIFICATION

This lesson is part of the *Classification* unit, which explains how to organize the millions of organisms on Earth. Below is a summary of what is included in the entire unit.

UNIT CONTENTS



A. Background Information
   - How Do We Classify Organisms?
   - Linnaean Naming System
   - Coral Classification
   - Modern Classification
   - Understanding Cladograms
   - How to Build a Cladogram

B. Lessons

Watch It! Naming Nature
- A worksheet to accompany the *Naming Nature* video

Classify This!
- A worksheet to classify an organism and identify its characteristics

Rules, Rules, Rules
- A worksheet about scientific names

"Taxing" Corals
- An activity to classify corals based on their characteristics

In Light of New Evidence
- A writing assignment on an organism that has been reclassified

The Key to ID
- An activity using a dichotomous key for sea stars

And Then There Was One
- An activity to create a dichotomous key for corals

Cladograms 1
- A lesson on creating and interpreting a cladogram

Cladograms 2
- A lesson on creating and interpreting a cladogram (with traits already included)

Read It! Troubling Taxonomy
- A worksheet to accompany the *Troubling Taxonomy* field blog

Read It! Blue, You Say?
- A worksheet to accompany the *Blue, You Say?* field blog

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LESSON 4A The Key To ID

ADDITIONAL BACKGROUND INFORMATION:

What is a dichotomous key? A **dichotomous key** is a tool used to help identify unknown organisms based on a key. The key has a series of choices that leads the user to correctly identify organism(s). Dichotomous means to *cut into two*. Each series of statements consists of two choices. These statements describe different characteristics that the unknown organism may have. The person using the key must decide which statement best describes the unknown organism. Once the user chooses the statement, then they follow the directions, which will lead them to the next set of two statements. Again, the user chooses the best statement and again follows the directions leading them to another set of two statements. This process will continue until the user is left with the name that identifies the organism.

Why do scientists use dichotomous keys? Dichotomous keys help scientists to classify organisms into different taxonomic levels (kingdom, phylum, family, etc.) based off of their similar characteristics. You will now learn how to use a dichotomous key.

INSTRUCTIONS:

Scientists just got back from surveying a coral reef. They need help identifying these sea stars. Use the *Sea Star Dichotomous Key* to identify these unknown species. Write your answers in the table below. The number in the table corresponds to the number on the sea star photos.

Photo #	Sea Star Common and Scientific Name
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

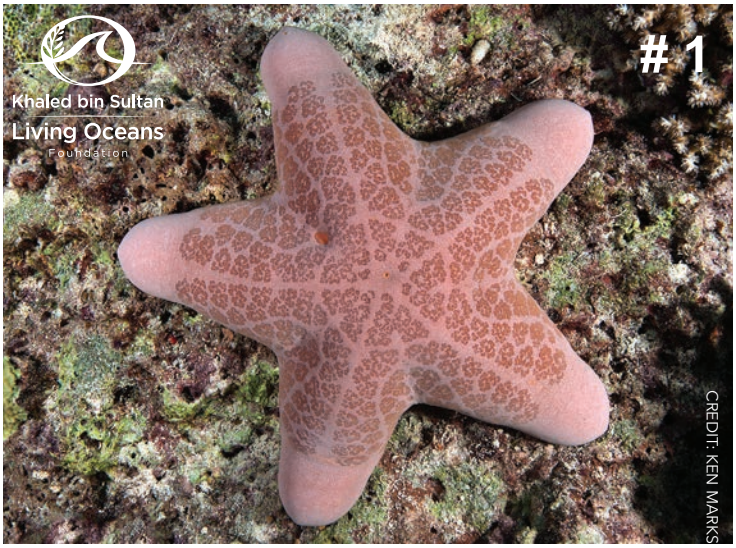
INSTRUCTIONS: Answer the following questions.

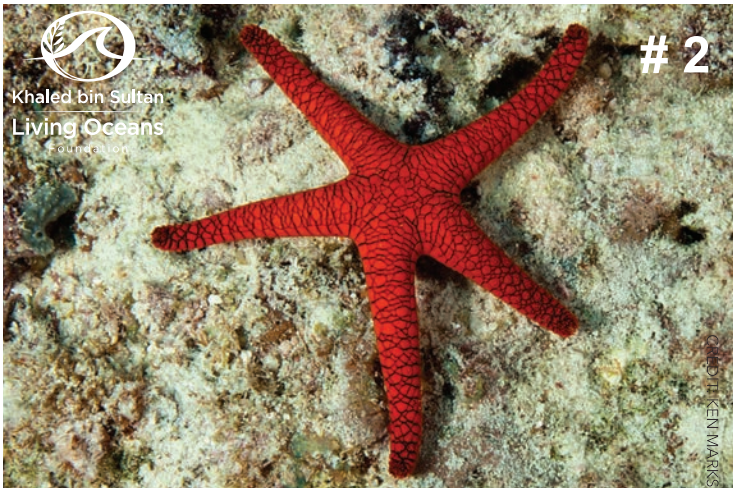
1. Which sea stars are the most closely related?

2. Do you think that there are any other ways to create this dichotomous key? Provide one example.

3. Were there any species that were more difficult to identify than others? Explain.

4. Are there any disadvantages to using a dichotomous key?



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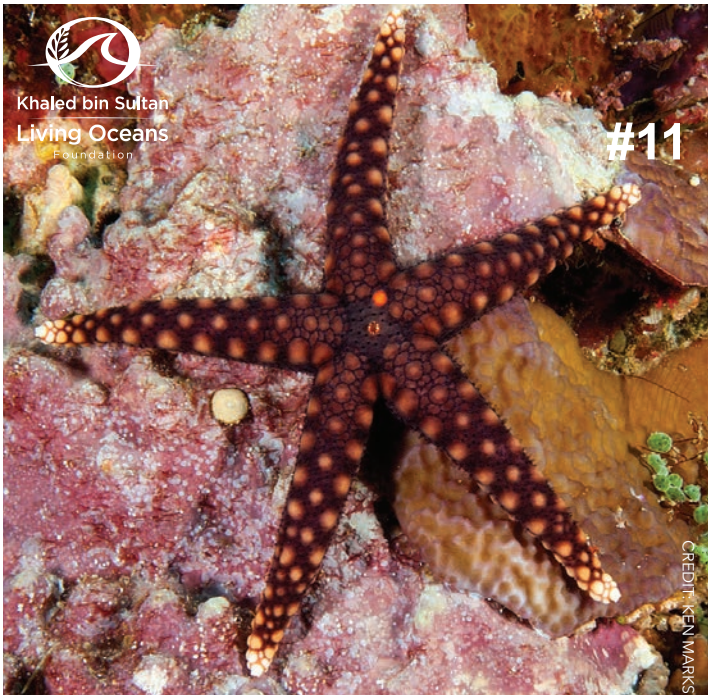
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SEA STAR DICHOTOMOUS KEY:

1a	Sea star is smooth or flat.	Go to step 2.
1b	Sea star is bumpy or spiny.	Go to step 7.
2a	Sea star has five arms.	Go to step 3.
2b	Sea star has more than five arms.	Lazon sea star (*Echinaster luzonicus*)
3a	Sea star has thin arms.	Go to step 4.
3b	Sea star has thick, short arms.	Granular sea star (*Choriaster granulatus*)
4a	Sea star has lines.	Go to step 5.
4b	Sea star does not have lines.	Go to step 6.
5a	Sea star has long blue lines down arms.	Galapagos blue sea star (*Phataria unifascialis*)
5b	Sea star has black lines in circle-like pattern.	Indian sea star (*Fromia indica*)
6a	Sea star is blue with cobblestone texture.	Blue sea star (*Linckia laevigata*) – blue
6b	Sea star is white.	Blue sea star (*Linckia laevigata*) – white
7a	Sea star has spines.	Go to step 8.
7b	Sea star does not have spines.	Go to step 9.
8a	Sea star has five arms.	Panamic sea star (*Pentaceraster cumingi*)
8b	Sea star has more than five arms.	Crown-of-thorns sea star (*Acanthaster planci*)
9a	Sea star is inflated.	Cushion star (*Culcita novaeguineae*)
9b	Sea star is not inflated.	Go to step 10.
10a	Sea star has large and pointed tubercles.	Warty sea star (*Echinaster callosus*)
10b	Sea star has small tubercles.	Go to step 11.
11a	Sea star has small blue tubercles over entire body.	Watson's sea star (*Gomophia watsoni*)
11b	Sea star does not have blue tubercles over entire body. ..	Cuming's sea star (*Neoferdina cumingi*)