Name_____

DATA Nugget

Won't you be my urchin?

Featured scientist: Sarah W. Davies from University of Texas at Austin

Research Background:

Imagine you are snorkeling on a coral reef where you can see many species living together. Some animals, such as sharks, are predators and eat other animals. Other species, like anemones and the fish that live in them, are mutualists and protect each other from predators. There are also **herbivores**, such as urchins, that eat plants and algae on the reef. All of these species, and many more, need the coral reef to survive.

Corals are animals that build coral reefs. When you look at a coral you may see what looks like one large rock. In fact, corals are made up of thousands of tiny animals, called polyps. Coral polyps are white but look brown and green because microscopic plant-like organisms, called zooxanthellae (a kind of algae), live inside them. Corals provide the microscopic algae a safe home, and in return the corals are able to feed on the excess sugars the algae produce from photosynthesis. But sadly, corals around the world are dying. Scientists are determined to figure out ways to save coral reef ecosystems by helping corals survive so they can continue to build important and diverse reef habitats.

Corals are habitat specialists and only like to live in certain places. However, the corals compete with other types of algae, like seaweed, for space to grow. Sarah is a marine biologist who is interested in corals because they are such important animals on the reef. She wanted to understand how to help the dying corals. She thought that when herbivores are present and are eating algae on the reef, the corals in turn have less competition for space and thus more room to grow.

Experimental setup with tiles in bins. Some bins have sea urchins and some do not.

Scientist Sarah scuba diving on the coral reef for fieldwork.

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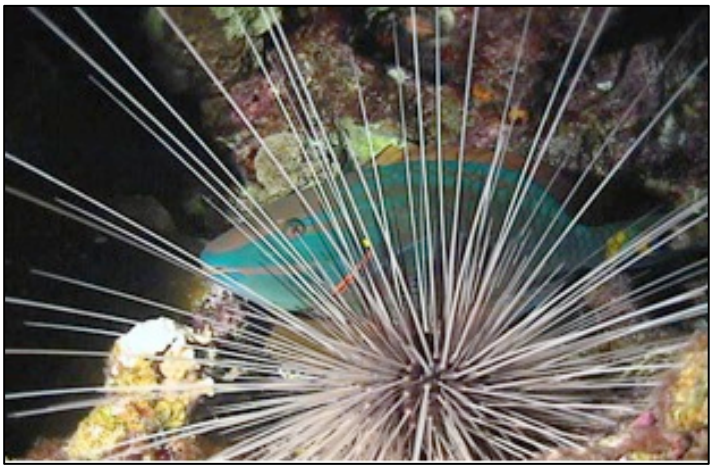

The vegetarian sea urchin *Diadema antillarum.*

Sarah set up an experiment where she put tiles in bins out on the reef. Tiles provided space for animals to grow, including corals. Sarah also put sea urchins in half of the bins. Sea urchins are important herbivores and one of the species that like to eat algae. The other half of the bins had no urchins so the algae would be free to grow there. She had 4 bins with urchins and 4 bins with no urchins. After a few months, Sarah counted how many corals were growing on the tiles. She counted corals found in the bins with and without sea urchins. Because sea urchins eat algae, they should free up space for coral to grow. Sarah expected that more corals would grow on the tiles in sea urchin bins compared to the bins with no sea urchins.

Scientific Question: How does the presence of urchins affect coral populations?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.

Draw a food web for the coral reef ecosystem:

1. Include **corals**, **urchins**, and **algae** in your food web. Write out the name of each species and put a box around each.
2. Add arrows to connect the boxes. Arrows represent the interactions between the species in the ecosystem. For example, you can use arrows to show who eats whom or to show competition between different species. Use the direction of the arrow to show the direction of energy flow or other relationship.
3. Once you have drawn your arrows, label them with the type of interaction. For example, label an arrow with the words “eaten by” if the arrow connects a species to the species that consumes it.

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Scientific Data:

Complete the table and use the data below to answer the scientific question:

Treatment in the bin	**Bin #**	**Number of corals on tile**
Sea urchins present	1	8
Sea urchins present	2	12
Sea urchins present	3	10
Sea urchins present	4	25
No sea urchins	5	1
No sea urchins	6	3
No sea urchins	7	6
No sea urchins	8	11

Average number of corals on tile when urchins present	
Average number of corals on tile when there are no sea urchins	

What data will you graph to answer the question?

Independent variable: _____

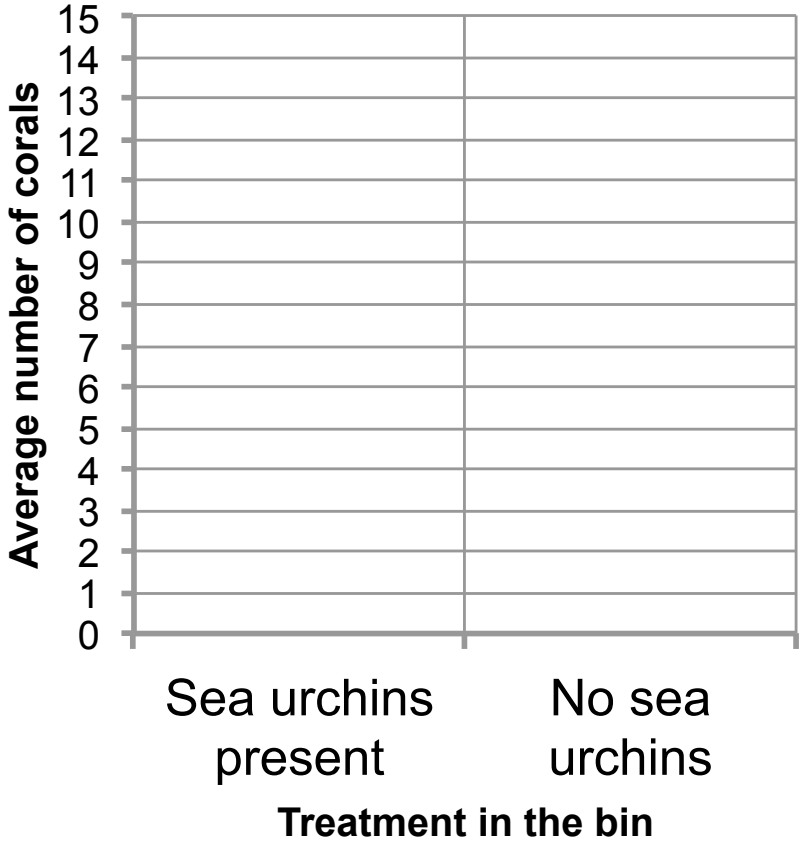
_____

Dependent variable: _____

_____

Name_____

Draw your graph below: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question.

What evidence was used to write your claim? Reference specific parts of the table or graph.

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Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the relationships between coral, algae, and urchins.

Did the data support Sarah's hypothesis? Use evidence to explain why or why not. If you feel the data were inconclusive, explain why.

Your next steps as a scientist: Science is an ongoing process. What new question(s) should be investigated to build on Sarah's research? What future data should be collected to answer your question?