Name: _____ Block: _____ Due Date: _____

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, like sharks, are predators that 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, like **urchins**, that eat plants and algae on the reef. All of these species, and many more, need the coral reef to survive.

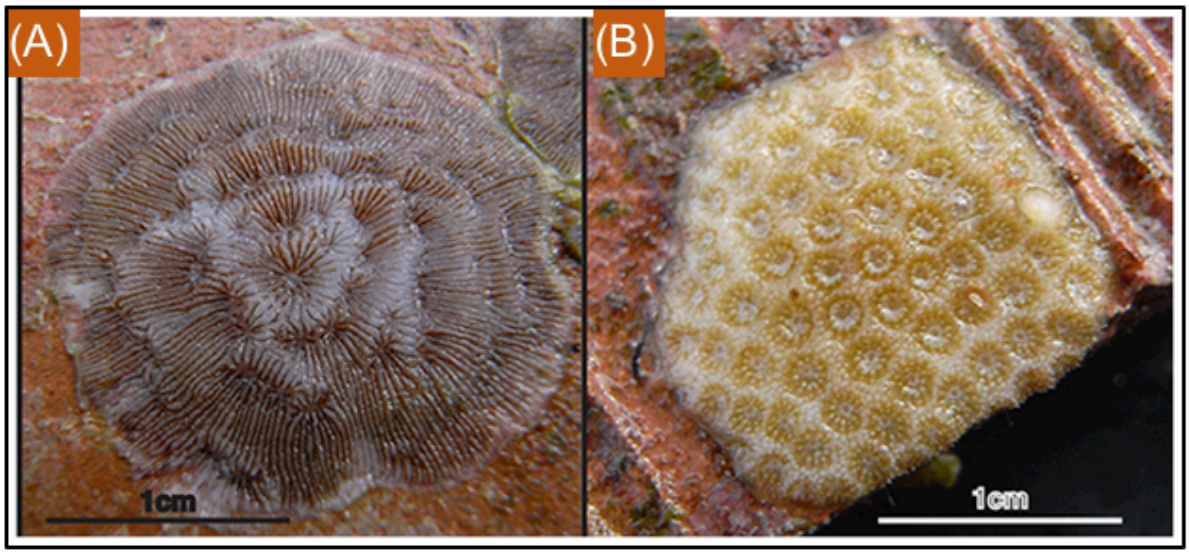
Corals are the animals that build coral reefs. They are very sensitive and can be hurt by human activity, like boating and pollution. Corals reef ecosystems are also in danger from warming waters due to climate change. Sadly, today many coral reefs around the world are dying because the places they grow are changing. Sarah is a marine biologist who is determined to figure out ways to save coral reefs. Sarah wants to understand how to help the dying corals so they can keep building the important and diverse coral reef habitats.

Corals compete with large types of **algae**, like seaweed, for space to grow on the reef. Corals are picky and only like to live in certain places. If there is too much algae, corals will have no place to attach and grow. Sea urchins are important herbivores and one of the species that like to eat algae. Sarah thought that when urchins are present on the reef, corals will have less competition from algae for space, and thus more room to grow. Maybe adding urchins to a coral reef is a way to help corals!

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.

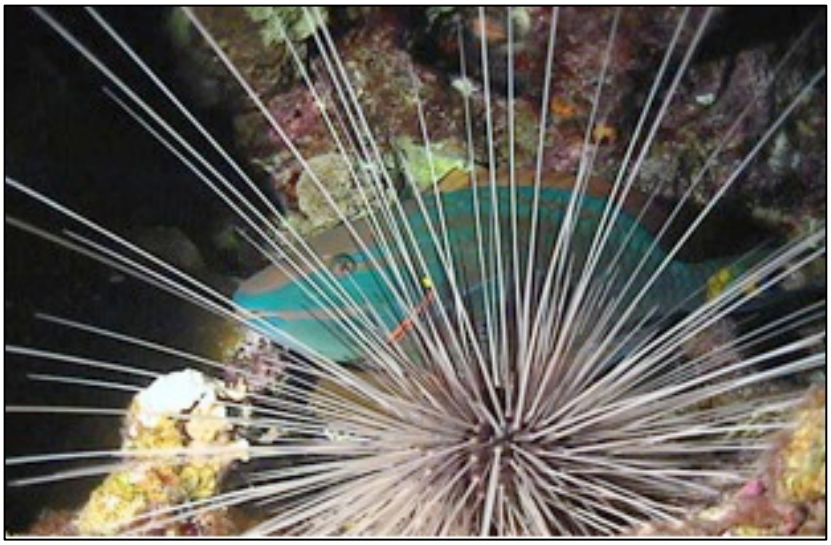
To test her idea Sarah set up an experiment. She set 8 bins out on the reef. Into half of the bins, Sarah added urchins. Into the other half she left without urchins as a control. Sarah put tiles into all of the bins. Tiles gave an empty space for coral and algae to compete and grow. After a few months, Sarah looked at the tiles. She counted how many corals were growing on each tile. Sarah predicted that more corals would grow on the tiles in bins with sea urchins compared to the control bins with no sea urchins.



(A) Coral species *Agaricia* juvenile on experimental tile.
(B) Coral species *Porites* juvenile on experimental tile.

Scientific Question: How does the presence of urchins affect corals?

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.



The vegetarian sea urchin *Diadema antillarum.*

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 it.
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 relationships.
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.

Scientific Data:

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

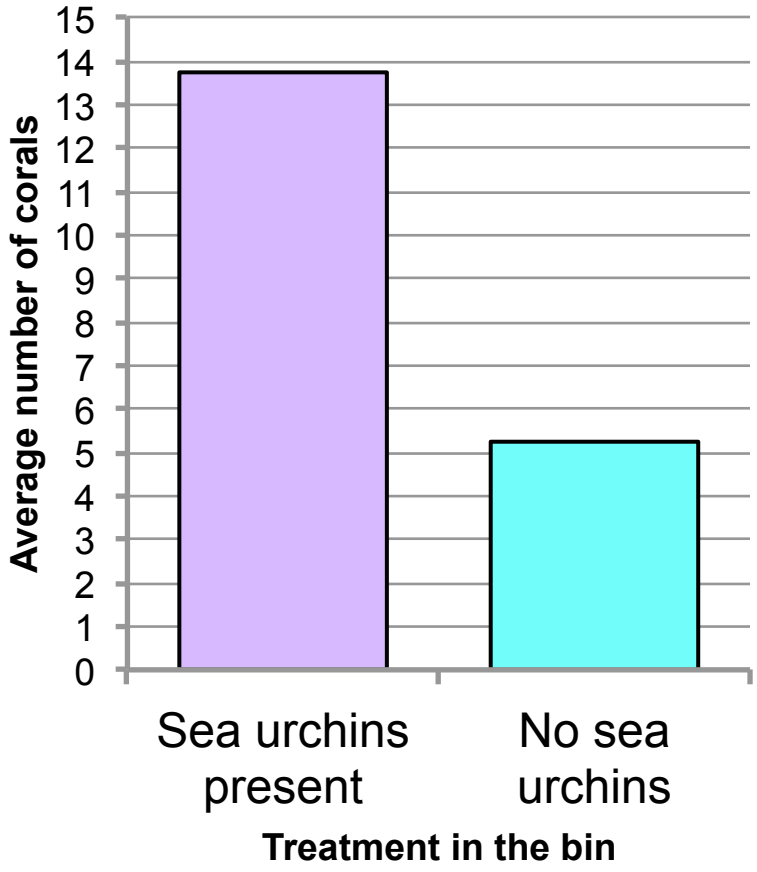
Treatment in the bin	Bin #	Number of corals on tile
Sea urchins present	1	8
Sea urchins present	2	12
Sea urchins present	3	10
Sea urchins present	4	25
No sea urchins	5	1
No sea urchins	6	3
No sea urchins	7	6
No sea urchins	8	11
Average number of corals on tile when urchins present		
Average number of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

What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

Below is a graph of the data: 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.

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?