

DATA *Nugget*

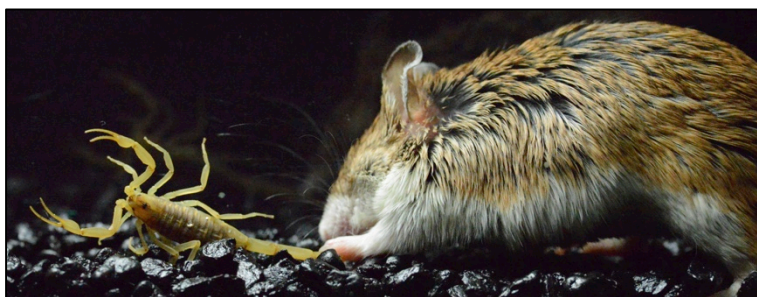
A tail of two scorpions

Featured scientists: Ashlee Rowe and Matt Rowe from University of Oklahoma

Animals have evolved many ways to defend themselves against predators. Many species use camouflage to avoid being seen. Others rely on speed to escape. Some species avoid capture by hiding in a safe place. Other animals use painful and venomous bites or stings to try to prevent attacks or to make being captured more difficult. Anyone who has been stung by a bee or wasp understands how stinging could be a great way to keep predators away! However, there is little research that documents if painful stings or bites deter predators.

The grasshopper mouse lives at the base of the Santa Rita Mountains in Arizona. Scientists Ashlee and Matt have been studying populations of this mouse for many years and wanted to know what the mouse ate. In the mountains, there are two scorpions that make a great food source for the mice. One of the scorpion species has a painful sting. The other species is slightly larger, but its sting is not painful. Ashlee and Matt thought that the use of a painful, venomous sting helped the smaller species avoid most predator attacks.

The scientists collected six grasshopper mice from the wild. Back in the lab, they trained the mice to expect a food reward when they tipped over a small cup containing live prey. Once trained, the mice were used in an experiment. The mice were presented with two cups to choose from. One contained the small scorpion species that has a painful sting. The other cup contained the larger scorpion species that has a painless



A southern grasshopper mouse (*Onychomys torridus*) capturing and eating the painful species of scorpion (*Centruroides sculpturatus*).

sting. Ashlee and Matt collected data on which cup the mice chose to approach, inspect, or pursue (by tipping over the cup). They also recorded if the mice attacked or consumed the painless or painful species of scorpion. Each trial ended when the mouse finished consuming one of the scorpions. If painful stings prevent a predator from attacking, they predicted the mice would choose to eat the scorpion species with the painless sting more often.

Scientific Question: Do painful scorpion stings affect the behavioral choices of the grasshopper mouse?

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.



Matt and Ashlee Rowe in Arizona



The painful and painless species of scorpion used in the experiment. Note that the painless species tends to be slightly larger.

Scientific Data:

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

Number of times, out of 6 trials, each mouse chose to approach, inspect, pursue (by tipping the cup), attack, and consume the **PAINFUL** species of scorpion first.

Mouse	Approach	Inspect	Tip	Attack	Consume
1	5/6	5/6	2/6	0/6	0/6
2	5/6	5/6	1/6	0/6	0/6
3	2/6	2/6	0/6	0/6	0/6
4	4/6	4/6	1/6	0/6	0/6
5*	4/5	3/5	0/5	0/5	0/5
6	2/6	2/6	0/6	0/6	0/6
Sum					
Proportion					

Number of times, out of 6 trials, each mouse chose to approach, inspect, pursue (by tipping the cup), attack, and consume the **PAINLESS** species of scorpion first.

Mouse	Approach	Inspect	Tip	Attack	Consume
1		1/6	4/6	6/6	6/6
2		1/6	5/6	6/6	6/6
3		4/6	6/6	6/6	6/6
4		2/6	5/6	6/6	6/6
5*		2/5	5/5	5/5	5/5
6		4/6	6/6	6/6	6/6
Sum					
Proportion					

**One of the trials for mouse #5 was terminated early because it inadvertently tipped both cups simultaneously, while jumping, releasing the scorpions and thus preventing any meaningful "choice."*

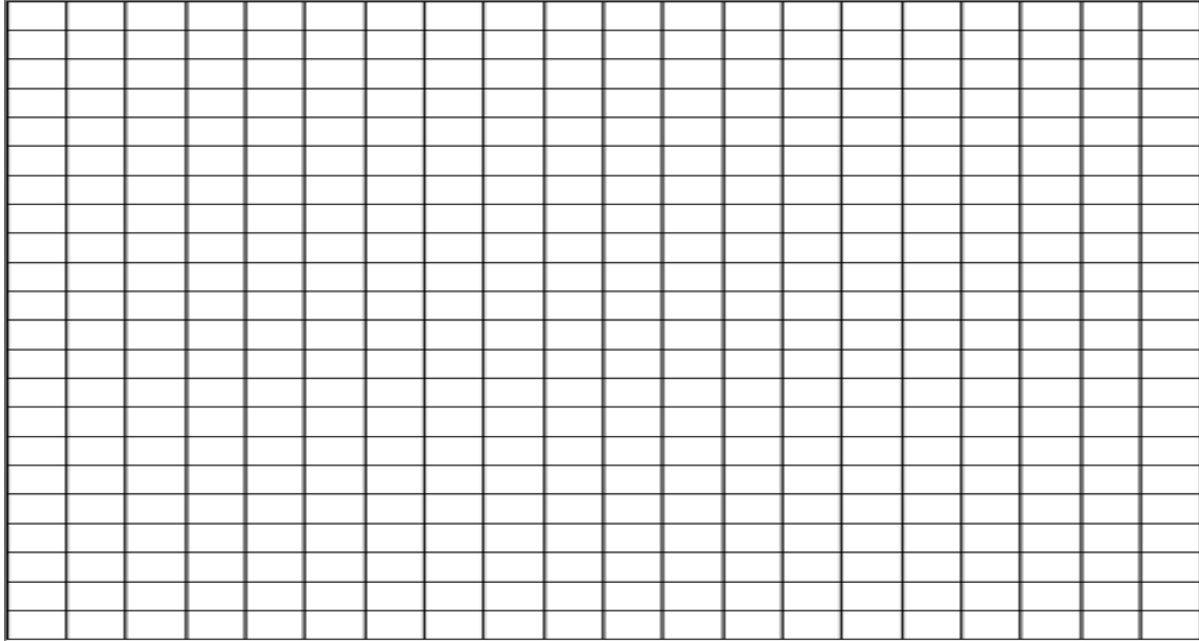
What data will you graph to answer the question?

Independent variable(s): _____

Dependent variable(s): _____

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 tables or graph.

Name_____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about how prey use defenses to deter predators.

Did the data support Ashlee and Matt's hypothesis? Use evidence to explain why or why not. If you feel the data was inconclusive, explain why.

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