

DATA *Nugget*

Fish fights

Featured scientist: Alycia R. Lackey from Michigan State University

Research Background:

In many animals, males fight for territories. Getting a good territory and making sure other males don't steal it is very important! Males use these territories to attract females for mating. The males that get the best territories are more likely to mate with females and have more babies. Only the males that have babies will pass on their genes to the next generation.

Stickleback fish use the shallow bottom areas of lakes to mate. Male stickleback fish fight each other to gain the best territories in this habitat. In their territories, males build a nest out of sand, aquatic plants, and glue they produce from their kidneys. The better the nest, the more females a male can attract. Males then use courtship dances to attract females to their nests. If a female likes a male, she will deposit her eggs in his nest. Then the male will care for those eggs and protect the offspring that hatch.



A male stickleback in his territory (*front*) and an intruding male (*back*)

Alycia is a scientist who is interested in understanding what makes a male stickleback a good fighter and defender of his territory. Perhaps more aggressive males are better at defending their territory and nests because they are better at fighting off other males. She used sticklebacks she collected from British Columbia to test her hypothesis.

In her experiment, 24 males were kept in 6 large tanks, with 4 males in each tank. Alycia watched each of the 24 males every day for 10 days. She recorded the behaviors of each fish when they were competing for territories, defending their territory, and building their nests. She also recorded the size of the males' territories and whether they had a nest each day.

As Alycia observed the fish, she measured three things:

1. Average Male Net Aggression: A number that indicates how many times the fish performed an aggressive behavior, like charging or nipping, minus the number of aggressive behaviors performed by another fish directed at that fish.
2. Average Territory Size: Each fish either had no territory (given the number 0), a small territory (1), or a large territory (2). Their territories changed during the experiment from one day to the next, so scientists averaged the values over the 10 days.
3. Days With Nest: The number of days over the course of the experiment that a fish had a nest.

Scientific Question: How does aggressiveness in male sticklebacks affect their ability to defend their territories?

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.

Scientific Data:

Use the data below to answer the scientific question:

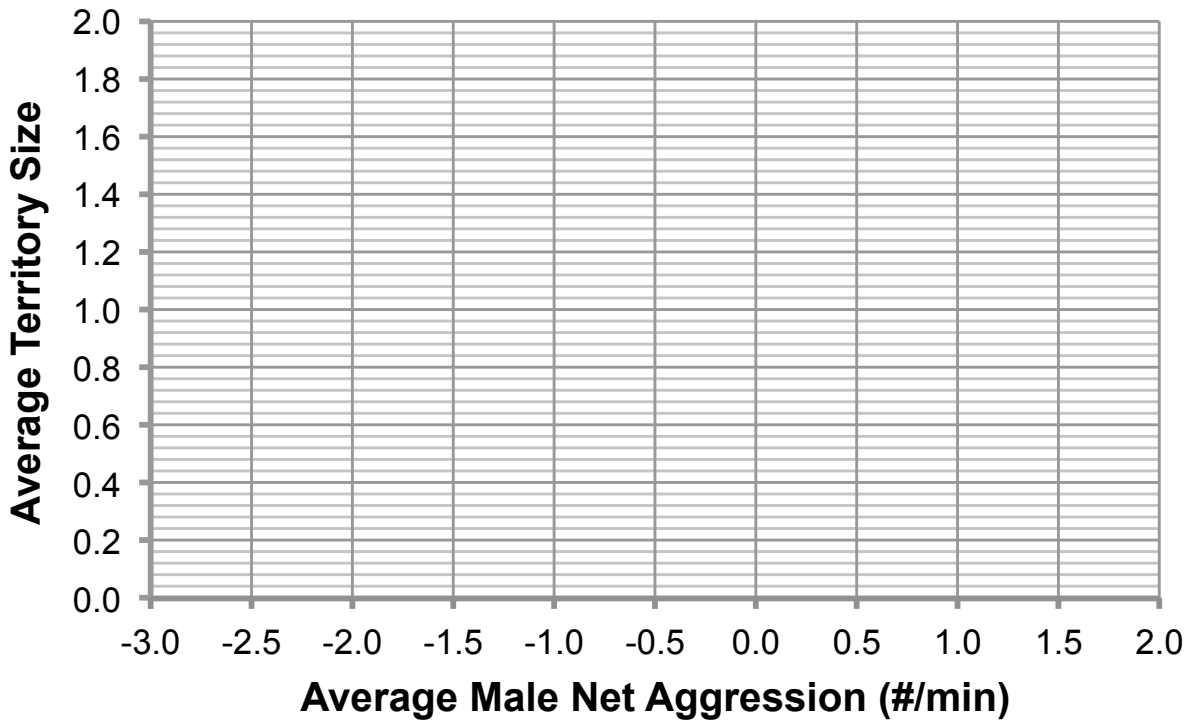
Fish #	Average Male Net Aggression <i>(aggression performed minus aggression received per minute)</i>	Average Territory Size <i>(0: none, 1: small, 2: large)</i>	Days With Nest <i>(number of days with nest)</i>
1	-1.28	0.14	0
2	0.20	0.07	0
3	-0.11	0.29	0
4	-0.47	0.50	0
5	-1.02	0.54	0
6	-1.32	0.00	0
7	0.94	1.14	0
8	-1.18	0.00	0
9	-2.18	0.00	0
10	-0.12	0.36	0
11	1.58	1.00	0
12	-0.24	1.00	0
13	-0.46	0.00	0
14	0.49	1.64	1
15	0.66	2.00	3
16	0.45	1.07	2
17	0.49	1.71	3
18	0.38	1.71	1
19	-0.77	0.44	1
20	1.18	1.93	4
21	-0.11	0.29	1
22	0.85	2.00	3
23	1.35	1.93	3
24	1.09	1.00	3

What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

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.

Name _____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the importance of territories for male sticklebacks.

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

Your next step as a scientist: Science is an ongoing process. What new questions do you think should be investigated? What future data should be collected to answer them?