**Stickleback Evolution Lab Activity**

**Introduction:**

!. Define “model organism.”

2. How do spines protect ocean stickleback fish?

3. How did ancestral populations of ocean-dwelling fish come to live in freshwater lakes?

4. The loss of stickleback pelvic spines is similar to the loss of which body parts in some other four-legged vertebrates?

5. What is the difference between marine, sea-run, and freshwater stickleback fish populations? Be specific.

6. Explain how the stickleback armor protects the fish from some predators.

**Tutorial 1:** *(make sure you practice scoring fish until you have mastered the technique BEFORE you click on experiment 1)*

7. Describe the difference between a: complete pelvis, reduced pelvis and absent pelvis.

**Experiment 1:**

8. What is the overall objective for experiment 1?

9. In a population, what happens to organisms that are better adapted to the environment in which they live?

10. Why are random samples, rather than entire populations, used in most research studies?

11. What is one advantage of studying larger-sized samples?

12. Examine the pelvic score data you just collected. Does the pelvic phenotype differ between Bear Paw Lake and Frog Lake fish? Explain

13. After graphing, how do your data compare to those obtained by Dr. Bell and colleagues?

14. Complete the Experiment 1 Quiz. What was your score?

15. Explain why the stickleback fish in Frog Lake are more similar to ocean and sea-run stickleback than they are to the stickleback fish in Bear Paw Lake.

16. In addition to predators, what other environmental factors might be responsible for the differences

between Bear Paw Lake and Frog Lake stickleback populations?

17. Click on Experiment 1 Analysis. You are to do a Chi-Square analysis of the data.

What is your Null Hypothesis?

18. Complete the chi square analysis of the data:



19. How many degrees of freedom are there?

20. What are the “p values” for each lake?

21. Do you “reject” or “fail to reject” the null hypothesis for the data from each lake?

22. Complete the Chi-Square Quiz. What was your score?

23. Explain the difference between the results of the chi-square calculations for Bear Paw Lake and Morvoro Lake.

24. What do you think might be an explanation for why Morvoro Lake contains fish with and without pelvic spines?