



## Something's Fishy in Paxton Lake: Speciation in Sticklebacks

by

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Don chuckled to himself as he drove out of the university parking lot, thinking of that morning's General Biology class. He had just finished a spellbinding lecture on the mechanisms of speciation and had asked for questions from the class. One student had raised her hand. "Why, when so many species are going extinct, are no new species arising?" There had been a murmur of approval from the class. "Yes!" another student had said. "We've all heard of *Archaeopteryx* and *Australopithecus*, but those have been extinct for millions of years. Why aren't any new species evolving today? The only ones I know of are Pokémons!" That got a big laugh just as the bell rang to end the class.

Don drove towards the ferry terminal. Teaching was always stimulating, and his students had raised a good point.

Field research was a great way to relax and think about the questions that fascinated him. A researcher in animal ecology at the University of British Columbia, Don was heading to Texada Island, one of the Gulf Islands between the British Columbia mainland and Vancouver Island. Yesterday, he had answered a call from a buddy of his on Texada, a fisherman who had been fishing at tiny Paxton Lake on the island. The fisherman had noticed an unusual type of stickleback in the lake and thought that his friend might be interested. Don's wife was disappointed that he was off for another weekend of fieldwork, but Don was eager to get out to Paxton Lake and investigate the mysterious fish.

When Don got to the lake, he spotted the odd sticklebacks right away, feeding in the shallow water along the shoreline. They were stocky little fish, with deep bodies and wide mouths. The usual stickleback protection is a protective armor of lateral plates, with sharp dorsal and pelvic spines and a pelvic girdle to lock the spines erect. A prickly mouthful for a trout! Most of the new fish weren't so well protected. They had only two dorsal spines instead of the usual three. They didn't have a pelvic girdle or pelvic spines, and they had very few lateral plates. When Don examined the mouths of the sticklebacks, he found they had a relatively small number of short gill rakers. He dissected the guts of several fish and found they were full of bottom dwelling organisms such as crustaceans and insect larvae. Don called these fish benthics, since they fed in bottom sediments, or benthic zone, on the margins of the lake.

Don walked along the boardwalk out into the middle of the lake, where he saw a school of more familiar looking sticklebacks. These offshore fish were slim with narrow mouths. They had the usual protective armor of dorsal spines, pelvic girdle, and lateral plates. Their mouths contained large numbers of long gill rakers, which are used by sticklebacks to filter plankton out of the water. He dissected a few of the fish and, sure enough, their guts were full of plankton. These fish were called limnetics, since they fed in the open water, or limnetic zone, of the lake.

Don was puzzled. What was going on in Paxton Lake? Were these two groups of sticklebacks separate species? Were they two different forms within a single species, specialized to feed in different areas of the lake?

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Don has hired you as a summer student to investigate the sticklebacks of Paxton Lake.

1. You decide to carry out some field research. What data will you collect from Paxton Lake about these two groups of sticklebacks to help you decide if they are indeed separate species?
2. You know that sticklebacks are easy to keep and rear in the lab. Design a lab experiment to investigate these two groups of sticklebacks.

**After a group discussion of data from 1 & 2, go to question 3**

3. Design another lab or a field experiment that might help you explain why these two groups of sticklebacks do not interbreed in Paxton Lake since they are capable of interbreeding with each other.

**Image Credit:** “Paxton Lake Sticklebacks” by Elizabeth Carefoot, Learning and Instructional Development Centre, Simon Fraser University. Used with permission.

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