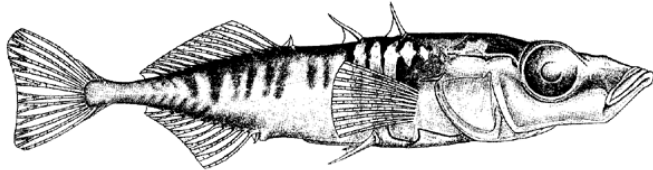


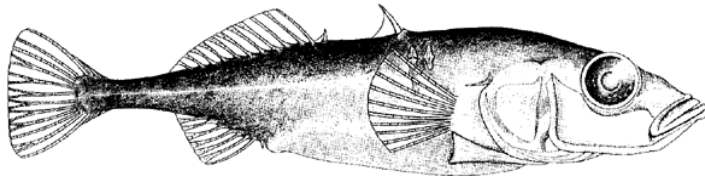
Biology 202 Case Study: Speciation in stickleback fish

Paxton Lake in British Columbia, Canada, has two different types of stickleback fishes: benthics and limnetics. Benthics are stout-bodied fish with wide mouths that feed on invertebrates in the mud in the shallow margins of the lake. Limnetics are slim-bodied fish with narrow mouths that feed on zooplankton in the center of the lake.

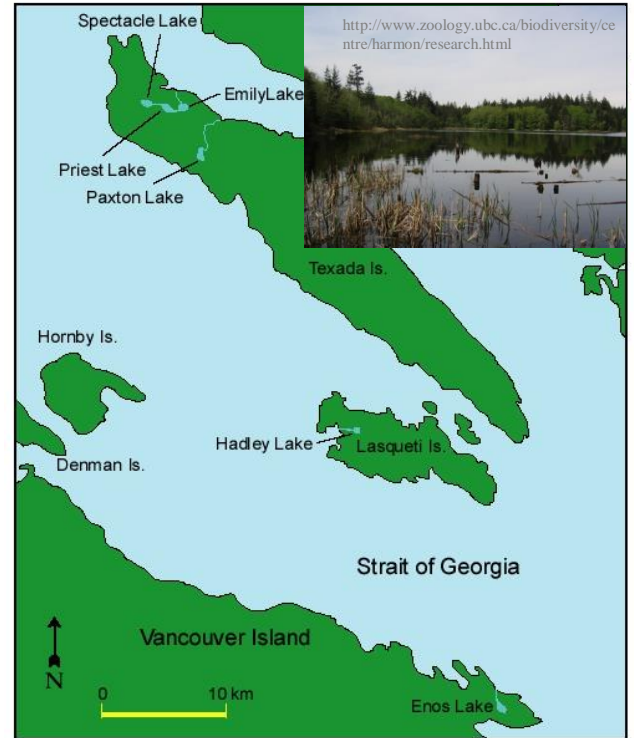


limnetic male (45.3 mm)

http://library.buffalo.edu/libraries/projects/cases/stickleback/stickleback_notes.html



benthic male (45.9 mm)



Researchers working on the sticklebacks have made the following observations.

- Limnetic and benthic sticklebacks differ in the number of dorsal (back) spines, the number of lateral (side) plates, and the presence of a pelvic girdle.
- In Paxton Lake, 1–2% of sticklebacks are hybrids.
- Limnetic and benthic sticklebacks build their nests in the same region on the benthic (i.e., bottom sediment) margin of Paxton Lake. However, benthic males select heavily vegetated areas, whereas limnetic males select bare areas of the lake bottom.
- Hybrid fish were released in a small lake that lacked a resident stickleback population. Twenty years later, there is a small, healthy population of sticklebacks in the lake.
- Limnetic and benthic males differ in courtship behaviors.
- When given a choice, male and female benthics and limnetics choose to mate with their own kind.

Consider the information provided in this case study in answering the questions below. Discuss these questions with your neighbor(s), and be prepared to share your thoughts with the group.

1. Does the case study describe sympatric or allopatric speciation? Explain your answer, including a definition of the mode of speciation that you have identified in this case.
2. Do the benthic and limnetic sticklebacks of Paxton Lake represent separate species:
 - a. According to the biological species concept?
 - b. According to the morphological species concept?
 - c. According to the ecological species concept?

For each species concept, **define** the species concept, **explain** what information you used to answer the question, and **suggest** one piece of additional information that would be relevant in helping you to decide whether the two types of sticklebacks are separate species. Use the table on the back to help organize your answer to question 2.

Species concept	Biological	Morphological	Ecological
Define species concept			
separate species?	yes no	yes no	yes no
information used to answer question			
one piece of additional information to help you decide			