

LAB ____: BEHAVIOR OF THE SIAMESE FIGHTING FISH*(Betta splendens)***Background**

Betta Splendens (family Anabantidae), otherwise known as Siamese fighting fish or Bettas, are native to fresh water areas of Malaysia and Thailand. Cultured for many years, male Bettas are often used for sport where two are placed in the same tank to fight. Wild Bettas are naturally a barrage of yellows and browns, and their fins are often shorter than the European bred Bettas. European breeding which began in the late 1890's developed the yellowish-brown, faintly banded males, into a variety of long-finned brightly colored individuals. Male Bettas are extremely territorial and aggressive towards each other. When males are placed together their colors deepen, and they spread their fins and gill covers. This behavior can be considered innate, since it is inherited, as well as agnostic, being a aggressive behavior. Besides changing appearance, they will also approach each other either in a frontal approach, a broadside display, undulating movements, and/or increased swimming speed.

Many Bettas, particularly males, are commercially sold as pets, and are often found in an array of colors of red, blue, turquoise, and even white. Female Bettas are easily identified since their fins are significantly smaller than the males, and their coloration is often less extravagant. As seen in the diagram below, Bettas have many larger fins. On either side there are pectoral fins, below are a long thin pair of pelvic fin. Behind the pelvic fins is a large anal fin, and above on its back is a slightly smaller dorsal fin. Last, its tail is labeled as a caudal fin due to the fact that it can extend and spread apart. Bettas are most distinguishable by their accessory breathing organ called a labyrinth. These are folded tissues in two chambers of the gill cavity; these labyrinths are supplied with numerous vessels and can absorb oxygen from air. Basically, Bettas need to surface in order to replenish their air supplies, if they are denied access to surface air, they will drown.

The courtship of Bettas are complex, the male begins by building a nest of bubbles near the surface. Each bubble is coated by mucus from his mouth, preventing them from bursting. He then courts a female, displaying bright colors and extending his fins as if to attack. He gathers the eggs in his mouth and places them in the nest, and guards and cares for the eggs and the newly hatched fry. They grow to about 6 cm long.

When the territory of the male's nest is threatened by another male, the male Siamese fighting fish is particularly likely to show aggressive behavior. The aggressive display is characterized by the following behaviors (see diagram below to help identify anatomical structures):

- Rapidly fluttering gill covers
- Brightened colors
- Lunging toward the threatening stimulus & attempted biting
- Raised & spread fins which increase the apparent body size of the fish
- Positioning of the fish's body perpendicular to the threatening stimulus (this behavior is called lateral display)

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(Betta diagram placed here)

The field of animal behavior attempts to understand such phenomena as aggressiveness in the Siamese fighting fish. In this laboratory, you will be the animal behaviorist and the Siamese fighting fish is your subject of study. With your teacher's guidance, you will find a research problem, develop an hypothesis, design an experiment that tests your hypothesis, observe and collect data and, finally, write a research report on your activities. This activity will allow you practice in the nature of scientific inquiry and you will be using the scientific method to gain knowledge about the Siamese fighting fish.

One final word of caution. There is a tendency for newcomers in animal behavior to give animals they are studying human traits which the animals do not possess. The error is called "anthropomorphizing" and may lead to incorrect observations and conclusions. For example, it is wrong to attribute such emotions as "joy" or "friendship" to fish, for we cannot directly observe such emotions. Instead, the behaviorist should attempt to describe observed behaviors with simpler, more objective language that doesn't anthropomorphize the subjects of study.

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Procedure

1. Obtain a male Siamese fighting fish in a tank from your teacher.
2. Observe your male Betta. Be sure you can identify the fins indicated in the diagram above. Look for a collection of bubbles floating at the surface of the tank. This is the bubble-nest that the male has created in which a female would lay her eggs. Note that the fish's mouth is directed upward. What do you think is the purpose of the upward-pointed mouth?

3. Take notes on the behavior of your Siamese fighting fish when he is alone in the tank. Consider at least the following behaviors: position of fins, gill covers, color of fins & gill covers, is he swimming around or staying in one location, where is he staying, how often does he gulp air, does he have a nest. Also make note of physical factors like water temperature.

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4. Carefully lower a mirror into the aquarium and leave it in place for 10 minutes. If there is a nest lower the mirror close to the nest. Turn the mirror so your male Betta can see himself. Briefly describe what occurs when your fish became aware of the mirror. Include a description of aggressive and submissive behaviors that you saw. (be sure you can identify aggressiveness and submissiveness).

5. Animal behaviorists are often interested in determining the variables (stimuli) that trigger certain behaviors. Use your imagination to think of three (3) stimuli that may either increase or decrease the frequency of aggressive behavior in male Siamese fighting fish. (Note: there are no wrong answers here, so be creative!). Choose one of these ideas and develop an experiment to test your ideas.
6. Complete the following form to present your proposal to your teacher. Once you receive approval, you may perform your experiments.

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**BEHAVIOR OF THE SIAMESE FIGHTING FISH
STUDY PROPOSAL FORM**

Team Members _____

Title _____

Research Question _____

Hypothesis _____

Test of Hypothesis _____

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Data Tables:

Proposed Plan to Analyze Data _____
