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## THE FEEDING BEHAVIOR OF THE GIANT WATERBUG

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Ethology, the study of animal behavior, is a branch of biology too often overlooked in beginning biology courses. This is unfortunate since studying the behavior of living animals not only captures the interest and imagination of students more easily than other kinds of laboratory exercises but can also help to develop the skills of observation and description so fundamental to the art of science.

An ideal subject for behavioral study is the giant waterbug, *Lethoceras americanus*. The giant waterbug is a member of the family Belostomatidae, a group of fiercely predatory, aquatic insects. Members of the family easily can be identified and collected from eutrophic ponds and drainage ditches throughout the United States. They are particularly abundant in waters with emergent vegetation such as cattails or those covered by floating vegetation and debris.

*L. americanus* is the largest species in the family and reaches sizes up to 10 cm. It feeds on a wide variety of prey such as tadpoles, frogs, fish, insects, crayfish and snails. One author once discovered the bug feeding on a 28 cm. long banded water snake.

The giant waterbug is easily maintained in an aquarium for study, and its impressive size and quick responses easily capture and retain the students' interests. A typical feeding sequence of the giant waterbug on crayfish prey (4-7 cm. long) proceeds as follows:

- 0 - 2 sec: The bug attacks swiftly, largely in response to movements of its prey. It grabs the crayfish with its forelegs and inserts its beak either dorsally between the junction of the cephalothorax and abdomen or at the base of a walking leg.
- 10 sec: The toxic saliva secreted by the waterbug completely immobilizes the crayfish.
- 3 - 4 min: The waterbug moves to the surface carrying its prey with its forelegs and extends its anal respiratory tube above the surface to replenish its air supply.
- 3 - 15 min: The bug probes the original puncture wound with its prehensile beak. The beak extends into the wound 3 - 5 mm. During this time the prey is sometimes rotated using the forelegs as levers and midlegs as braces.
- 15 min: The waterbug makes a second return to the surface for more air.

16 - 18 min: Once the abdomen of the crayfish has been liquified and partially or completely emptied, the waterbug withdraws its beak. If the bug originally began feeding in the abdomen, it will then probe and feed in the head area, and then at the bases of the legs. Finally, the cheliped and various leg segments will be probed.

80 min: The waterbug releases its prey.

Many different kinds of behavioral experiments might be performed with the giant waterbug or other species of Belostomatidae:

1. The students could work together or independently to try to describe a general sequence of feeding activity and compare it to the description presented above.
2. They could try to determine the role played by visual and chemical cues in the location of its prey.
3. They could offer a variety of potential prey to the waterbug to determine which species are selected most frequently and what factors influence this choice.
4. Students could provide prey of the same species but of different sizes to find if specific size classes are more suitable than others.
5. They might explore various forms of interactions with other individuals of the same or different species of predators.

Such studies emphasize the process of science, helping students make unbiased scientific observations and test hypotheses in order to arrive at logical scientific explanations for their observations. In addition, valuable insights into insect behavior, ecology, community interactions and physiological principles are demonstrated and can be understood in the context of the *living organism* rather than the preserved animal.