

Raising and Caring for *Daphnia*

Daphnia, a small crustacean of the phylum Arthropoda, is commonly called the water flea. They may be small, but they play an enormous role in the food chain, serving as a basic food source for marine and freshwater fish. One reason for their importance is their sheer abundance. *Daphnia* proliferate at an enormous rate—a single organism produces a brood of eggs every two or three days and can have 13 billion descendants within 60 days. *Daphnia* are active consumers in marine or freshwater environments, feeding on various forms of algae, bacteria, and protozoa.



Physiology and Structure

Daphnia have transparent, oval bodies enclosed in a bivalve carapace. They move spasmodically, beating their antennae to move from one location to another. *Daphnia* have an intricate internal anatomy that can be easily observed with a microscope. In particular, students should be able to locate *Daphnia*'s heart and observe it beating under a microscope. Most *Daphnia* raised in cultures are female; hence, students should be able to see the eggs stored in brood pouches just above the rear of the abdomen.

Daphnia lay two types of eggs. Thin-shelled eggs, produced when conditions are warm, develop parthenogenetically (without fertilization). Thick-shelled “winter eggs” require fertilization to remain viable when the ambient temperature drops. Male *Daphnia* are typically produced as the temperature drops, to ensure that the eggs will survive the winter.

Sources and Culturing

Daphnia can be collected year-round, though late spring and early fall usually yield the best populations. *Daphnia* live in shallow ponds, lakes, and streams, and usually gather around plants away from strong currents. Capture *Daphnia* using jars or cheesecloth nets, and isolate them later in the laboratory. You can also order pure *Daphnia* cultures from biological supply houses, fish hatcheries, or aquarium supply stores.

Daphnia populations can be maintained through a number of culturing techniques, though for the purposes of these laboratories, the best set-up may be a simple plant/*Daphnia* aquarium. Uncontaminated pond water containing *Daphnia* can be added to an aquarium, along with about 200 mL of *Chilomonas* or *Euglena* culture per gallon of water. Add a few sprigs of *Elodea* or another water plant, and keep the containers at room temperature in a well-lighted area. Add yeast suspension, rice grains, or egg yolk sparingly to promote bacteria growth for the *Daphnia* to eat. Healthy cultures with sufficient food will appear slightly green; if *Daphnia* turn reddish, or male *Daphnia* appear, reduce the population size and check that the conditions have not become anaerobic.

Adapted from:

Orlans, F. Barbara, *Animal Care from Protozoa to Small Mammals*. Menlo Park, Calif.: Addison-Wesley Publishing Co., 1977. Permission pending.