

# The Classroom Animal

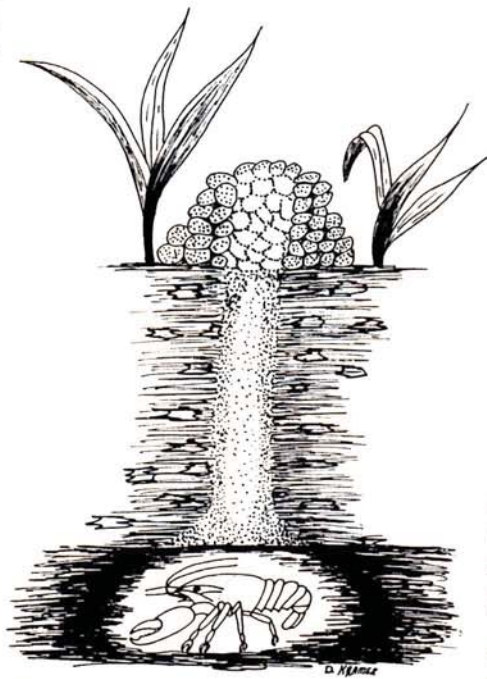
## Crayfish

Over three hundred kinds of crayfish occur in North America. Each has specific habitat requirements and is thus limited in its range. However, since there are so many species, crayfish can be found in almost every imaginable aquatic or semiaquatic environment throughout southern Canada and the U.S.

Crayfish—sometimes called *crawfish*, *crowdads*, *mudbugs*, or *crabs*—are freshwater organisms related to marine shrimp and crabs, and, of course, to lobsters, which they closely resemble. All are members of a group (or class) called Crustacea, characterized by a hard exoskeleton, numerous legs, and the presence of gills. These, in turn, are members of a larger group, the phylum Arthropoda, which includes insects and spiders and is the largest group of animals on Earth.

### Characteristics

Although they vary in length from 5 to 12 cm or more, most species of crayfish are so similar in appearance that it is difficult to distinguish between them. Usually reddish to brown or grey-brown in color, their bodies are divided into two parts: a rigid *cephalothorax* and a flexible, segmented *abdomen*. Two pairs of *antennae*, a pair of eyes on stalks, and the mouth are located near the front of the cephalothorax, and five pairs of legs are attached to the midline along the bottom. The first pair of legs terminates in large pincers—the most obvious and characteristic feature of the crayfish. These are used in eating, jousting with other crayfish over territorial matters, defense, and burrowing. The four smaller pairs of legs are used primarily for walking but are also tipped with small claws that help them cling to the substrate as a crayfish climbs. Most of the internal organs, including the brain, heart, lungs, and stomach, are in the



Some crayfish burrow to the water table where they create underwater chambers.

cephalothorax. The abdomen looks and functions like a tail, but it too has small leglike appendages called *swimmerets* and a broad, flat, fanlike projection called the *telson*.

Walking is the chief method of locomotion for crayfish. Considering their cumbersome appearance, crayfish are surprisingly agile and can move forward, backward, or sideways in water or even on land, where they sometimes wander. They can also swim short distances, but they are awkward swimmers and adopt this way of getting around mostly as a means of escape. They swim by making a series of downward and forward movements of the abdomen, which propels them backward in a jerky fashion.

Most crayfish live among rocks and litter on the bottom of streams, rivers, swamps, marshes, ponds, lakes, and muddy backwaters, and in these habi-

tats they often reach high population levels. Other, solitary, species burrow in fields and meadows, sometimes as deep as a meter, to create underground chambers just below the water table. The entrances to these burrows are often “chimneys” of mud balls, the remains of the process of excavation. (See figure.) A few species called *cave crayfish*, unique because they are colorless and eyeless, inhabit underground streams sometimes hundreds of meters below the surface of the Earth.

### Diet

Omnivorous and opportunistic in their feeding habits, crayfish play an important role in many aquatic ecosystems. First, as scavengers, they consume a great deal of dead plant and animal material that would otherwise decay. They also consume living plant material and, as predators, they eat insects and their larvae, worms, snails, fish, frog eggs, and tadpoles. When they eat, crayfish hold food against their mouths using one or both pincers, rasp away tiny bits, and then swallow.

In turn, crayfish are preyed on by many other animals including various fish, turtles, snakes, mink, raccoons, and a number of birds such as kingfishers.

### Reproduction

Reproduction in most species takes place in late summer or fall. A few weeks after mating, females produce an average of 100 to 200 (but up to 400) dark-colored eggs. Once laid, the eggs are attached to the swimmerets and carried about by the female. When carrying the eggs, the female is said to be in the “berry stage.”

After hatching, the young, which resemble miniature adults, remain attached to the swimmerets for a week or two. Then, when they are about 1 cm in length, they leave the female and lead an independent existence.

## Molting

The young grow rapidly and molt several times before they reach maturity in as little as three to four months. Thereafter, both males and females molt two times each year—once to produce the breeding stage and once to produce the nonbreeding stage—during their 2–4 year lives. Crayfish can regenerate an appendage that has been severely injured or broken off. The process begins with the next molt, and eventually a new leg or pincer appears.

For a few days following each molt, the new exoskeleton, including the greatest defense of the crayfish, the pincers, is soft and flexible. At this time, crayfish are especially vulnerable to predation, so they tend to be reclusive until the exoskeleton hardens. They are sometimes collected during this “soft-craw” stage for use as fish bait.

## A Delicacy

Considering their kinship to lobsters, shrimp, and crabs, it is not surprising that crayfish are edible. They are not widely exploited for food except in certain southern and West Coast states and a few other areas, where they are commercially harvested and consumed in great numbers. Peeled tails (abdomens) fried in butter and whole crayfish boiled like lobster are reputed to be excellent.

## Housing, Care, and Capture

Crayfish are territorial and will fight if crowded. This characteristic can be the source of interesting behavioral studies, but it needs to be considered in maintaining captive specimens. One or two crayfish can be kept in a 40-L aquarium. If more are kept, they should either be given separate accommodations or a larger container such as a plastic wading pool. Two to five cm of coarse aquarium gravel will provide an appropriate substrate, and a few rocks,

a brick, or a clay flower pot will provide hiding and climbing places. Crayfish have a seemingly uncontrollable urge to alter their surroundings. They will continually move the substrate around, and they often burrow under objects. Then they will defend the special area they have created from other crayfish. Crayfish need a only few cm of water, but there should always be enough to completely cover the specimens.

Captive crayfish can be fed any of their natural foods. But, since these are sometimes unavailable and since crayfish are omnivores and scavengers, a variety of substitutes will also be acceptable. Small pieces of lettuce and other vegetables as well as pieces of fresh meat or fish will be an adequate diet.

Crayfish are messy eaters, and it will be easier to keep their cage clean if they are removed to another container (a bowl or pail) for feeding. Otherwise, any uneaten food should be removed

from the enclosure after half an hour or so to prevent fouling of the water.

Though crayfish can be taken out of the water for observation and study, their tolerance for dryness is limited since they breathe through gills. Consequently, they should not be kept out of the water for more than 10 to 15 minutes at a time. Crayfish adapt well to life in the classroom and can be kept successfully as long as two years.

Handle crayfish carefully. They will

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**To catch crayfish  
in shallow streams,  
place a net downstream  
from a rock, and  
gently move the rock.**

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*This crayfish, pincers at the ready, also displays the four pairs of walking legs and segmented abdomen terminated by the fan-shaped telson.*



Jeff Kortz

not bite, but they can give a painful pinch with their strong claws. To pick them up safely, grasp them on either side of the cephalothorax above the walking legs with the thumb and forefinger. This technique should be demonstrated to children if they are to be allowed to handle crayfish.

Crayfish for classroom use can often be collected from shallow streams. Place a large net downstream from a rock, and gently move the rock. This will alarm any crayfish sheltering under the rock, and as they attempt to escape, they will be swept into the net by the current. Crayfish can also be caught, with practice, by raising a rock and grabbing them.

Or try fishing for them. Tie a string to a piece of meat or fish and dangle it near a crayfish. When the crayfish grasps the bait with its pincers, gently raise it out of the water and lower it into a pail. No hook is needed as the crayfish will hold on and catch itself.

Crayfish are protected in some areas of the U.S., so the propriety of collecting them, if in question, should be determined by contacting a local conservation officer. Alternatively, they can often be purchased from fishbait shops or from biological supply companies.

#### Resources

*Crayfish: Teacher's guide.* (1976). Elementary Science Study. New York: McGraw-Hill.  
Pennak, R. W. (1978). *Freshwater invertebrates of the United States.* New York: John Wiley.

*In The Classroom Animal, a development of S&C's popular Care and Maintenance series, column writer David C. Kramer focuses on the natural history of small animals suitable for short-term classroom study and on how to care for these animals. Readers wishing to communicate with Professor Kramer should write him at the Department of Biology, St. Cloud University, St. Cloud, Minnesota 56301.*

#### Suggested Observations, Activities, and Questions

- Place two crayfish of different sizes together in an established aquarium. Observe and describe the behavior of each. Which one dominates? What does the submissive one do? Then, remove the dominant crayfish and observe the behavior of the submissive one. Add yet another crayfish. Now, which dominates?
- Save shed exoskeletons for examination with a microscope or magnifier. They will show every detail of the original crayfish—and will not bite.
- Observe and describe the use of the antennae, the pincers, and other appendages in locating and obtaining food, defense, and other activities.
- Allow younger students to go "fishing" for crayfish in the aquarium. Use a meter stick with a string attached for a pole and tie on a piece of food.

## Helpful Hints

### Shuttle Launch Beanbag Game



Every year, Hyattsville Elementary School puts on an Annual Family Fall Festival, an evening of raffles, food, and carnival games that have been created and organized by teachers, parents, and students. Last fall, my class, inspired by their favorite subject, sponsored a particularly popular game, the Shuttle Launch Beanbag Game.

For one game ticket, participants in our game had the chance to launch three beanbag shuttles. I made the shuttles from white muslin fabric, stuffed them with dried beans, and drew the details with a fine line marker designed to be used on cloth. Each shuttle represented one of the five spacecrafts in our nation's fleet—the *Enterprise*, *Columbia*, *Challenger*, *Discovery*, and *Atlantis*.

A backboard made of two wooden boards hinged together kept our shuttles from going into orbit, and three plastic buckets in three different colors (labeled 3, 2, 1) were set up to catch the

shuttles. I anchored the buckets to the floor to keep them in place for a full evening of launches.

We decorated the game backboard and the playing area with shuttle and Spacelab posters and photographs of astronauts. These helped children and parents waiting in line for blast off to learn about shuttle launching—and to get into the spirit of the festivities.

As each player came forward, we offered a choice of three shuttles and made sure he or she stayed the designated distance from the buckets. Each successful launch into a bucket won the participating astronaut a carnival prize from our space center. **Pamela Bacon**, Hyattsville (Maryland) Elementary School. Photograph by Mary Grace Nuckols.

*Do you have a tip for other classroom teachers? Send it to "Hints," S&C, NSTA headquarters.*