

Crayfish

- 3rd grade - Structures of Life

Red swamp crayfish - *Procambarus clarkii*



Preparing for crayfish arrival. A day or two before you expect the crayfish to arrive, prepare their habitat. Fill two bus trays about one-third full of cold tap water (3–4 cm deep). Keep the trays out of sight in a cool, dark place. Let the water sit for a day or more to release chlorine from the water.

What to do when they arrive. The crayfish will arrive in a cardboard box packed with damp paper or moss. Alert the school secretary to notify you as soon as they come. Immediately upon arrival, cut open plastic bag to provide air. Keeping bag upright, float entire contents in prepared bus tray for 15 to 30 minutes to equalize water temperatures. Carefully remove crayfish from the bag, grasping each from behind to avoid the strong pincers. Aquatic plants shipped with the crayfish can be rinsed in clean dechlorinated or spring water and used as both food and "hiding" places for the crayfish. Maintain at cool room temperatures, out of direct sunlight.

Background. Crayfish are marvelous classroom organisms. They are exciting and easy to care for. Through close observation, students can learn interesting details about animal structures while developing sensitivity to the needs of living organisms. Crayfish can act like living magnets, keeping students in at recess and drawing students into your classroom from all over school. In short, crayfish can bring new life to your classroom.

Crayfish are crustaceans. Their appearance is bizarre—they are festooned with a bewildering array of walking legs, pincers, and other appendages for eating, feeling, and attending to other crayfish business. Equipped with thousands of sensory bristles, some sensitive to chemicals and the others to touch, crayfish can smell, feel, and hear acutely, even though they are completely covered in a hard shell. They are aquatic, but can survive fairly extended sojourns on dry land as long as their gills remain moist. In order to meet the crayfish up close and personal, let's review some of this animal's natural history.

Crayfish like it dark and cool, and during much of the daylight they will be found alone, withdrawn under a rock or a clump of vegetation, waiting for dark, at which time they come out to forage for food. Crayfish are omnivorous, eating just about anything they can find or catch, dead or alive. Large food is held and torn to pieces in the large pincers and conveyed to the mouth by the smaller specialized legs near the head. That's what crayfish mostly do: loaf all day and look for food all night.

Crayfish are terrific animals for your students to study. They walk, swim, eat, hide, breathe, mate, molt, and die right in the classroom. Your crayfish container is a microcosm of life on Earth, and students will learn a lot by sharing time with crayfish.

The red swamp crayfish (*Procambarus clarkii*), native to the southern United States, is the species most commonly provided by biological supply companies. This species and others are restricted in some states because they can be invasive and cause harm to the local environment.

Currently, **Alaska, Arizona, California, Maryland, Minnesota, Missouri, Montana, Oklahoma, Oregon, Texas, Utah, Vermont, Washington, and Wisconsin** have some restrictions on the transport of specific crayfish species. Contact your school district or local fish and game office for details.

Handling the crayfish. Practice picking up the crayfish so that you can demonstrate the proper technique for your students. Approach the crayfish from behind. Grasp it firmly on the carapace (body shell) behind the pincers. Pick it up. It may try to reach back, but don't worry—it will not be able to reach you. Crayfish pose no health hazard for students. They do not carry diseases. Occasionally you will see white wormlike animals attached to the crayfish carapaces and pincers. They are harmless to both humans and crayfish. They seem to be opportunists, riding along for a free meal when the crayfish eat.

Provide aquatic plants. Some small aquatic plants will be ordered along with the crayfish.

Find a place for the crayfish: Plan where the two bus trays with the crayfish will reside in your room for up to several months. They need to be cool, out of direct sunlight, and safe from being spilled.

Prepare for care and feeding. Crayfish need ample clean, cool water and sufficient food in order to be healthy in your classroom. It is virtually impossible to get the water too cold (short of freezing), but it is easy for it to get too warm. Try to keep the temperature between 5°C (41°F) and 20°C (68°F). You will feed your crayfish protein in the form of dry cat food that sinks in water. Don't worry if the crayfish don't eat for a week or two; they will eat when hungry. Always move the crayfish out of their home tray and into a basin with 3–4 cm of water to feed them the dry cat food. Put in one piece of cat food per crayfish. Leave them there for about 1/2 hour. (If they don't eat, they aren't hungry.) Then return them to their home tray, without any of the cat food. The other food source that is always available is the Elodea that stays with the crayfish in their home trays. An alternative green food source that seems to work with crayfish is Swiss chard. The leaves serve as a food source and shelter for the crayfish. Remove the chard after several days in the water. They can also be given flake fish food.

This feeding routine can be followed every day if the crayfish are actively eating, and less frequently if they are not. While they are in the feeding basin, the home tray can be rinsed and

filled with fresh water. This should be done about once a week-more often if the water begins to smell bad.

Molting. Another ponderable: think about the problem of living inside a suit of armor. Crayfish can't grow unless the shell (comprising the carapace, or main body shell, tail shell, and leg shells) can be removed. And this is exactly what crayfish do. Periodically (quite often early in life) the crayfish slides out of its old, hard shell in a process called molting. The "naked" crayfish that emerges is actually covered in a complete and perfect shell, but it is soft and flexible, allowing the crayfish to expand and grow. After a day or so the new shell will become hard, again affording the animal the protection of an armored exterior. In preparation for molting the crayfish withdraws most of the calcium from its shell, and stores it in two white "tablets" in the sides of its head. Calcium is a major hardener in the crayfish shell, as it is in strong human bones and teeth. With this precious supply of calcium the new shell can harden in a matter of hours instead of days or weeks.

Reproduction. Males and females, spurred on by messages communicated to each other, join periodically for mating, especially in the spring. Males can be told from females by the generally larger pincers and narrower tails, but these characteristics are not absolute. To tell for sure, you must pick them up and look underneath. Males have two pairs of modified swimmerets (the small leg-like appendages under the tail) that are white-tipped and lay between the last pair of walking legs. The females have longer, softer-looking swimmerets (for holding the eggs) and a little white pore centered between the walking legs. Some time after mating the female lays about 200 eggs, which she carries in a mass under her tail. After several weeks the eggs hatch, and a hoard of minute, perfectly formed, ravenous baby crayfish emerge. At first they continue to ride along under the female's tail, eating tiny waterborne bits of food, but soon they leave this security and head out on their own. During these early days many are eaten by fish, insects, and other crayfish, but some always survive to fulfill their destiny.

Pregnant crayfish. You think you might have a pregnant crayfish? Here are some things to consider.

- A peaceful environment with plenty of cover in or under which to hide will provide security for the mothers. You might want to go one step farther and separate the two females so each has a basin of her own. That way you will be able to tell whose offspring belong to which female.
- When the eggs hatch it will be even more important for there to be lot of structure in the habitat. Plan to put in a bunch of plants or even plastic plants in which the babies can hide. Rocks, pebbles, flower pots, and the like are good, too. The thing you want is lots of places for the babies to hide from each other. They are notorious for eating each other. As you know, crayfish are at risk just after they have molted, and the little ones love to snack on their just molted brothers and sisters. That is the way it goes in the crayfish world.

- If you have some flake fish food, a little bit crumbled up into dust will be a good food source for the babies. They will find the tiny bits that fall into the gravel on the floor of the habitat.
- One more thing...don't give up on the eggs. It might be 4-6 weeks before they hatch. You may not know when your females laid their eggs, in which case it will be a surprise when they hatch.
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Plan for a new crayfish home.

When you have completed the activities, there are several options for disposing of the crayfish. Discuss the options with students and together come up with a plan.

- Set up an aquarium and make the crayfish permanent members of your classroom community.
- Another class in the school or district might like to have them for a science resource.
- If some of the students would like to take them home, send them off, with parental permission, of course.
- **If the crayfish were not collected locally, they should not be released into the local environment.** It is important for students to understand the reasons for not releasing nonnative plants and animals into local environments. There is always a chance that an introduced species might displace a native species in the environment, so releasing such organisms is not an option. This applies to any plants such as elodea as well. *You can also return them to the district science coordinator for distribution to other schools.*

Resolving the question of what to do with the crayfish can be turned over to students. They can do research by writing or calling local experts to find out what they recommend. One expert to talk to might be the company that supplied the crayfish. Local fish and game biologists would be another resource for students to contact. In Oregon, a class studying crayfish got first-hand experience with the effects of invasive species. Their local stream became populated with a non-local crayfish, and you can [view the Oregon Public Broadcasting video](#) with the story.

As a last resort, you can put the organisms in a bag and place them in the freezer for two days. They can then be disposed of in the trash. **Crayfish should never be released into any local environment.** You can refer students to the last part of the reading in Science Resources for reasons for not releasing crayfish.