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# CRAYFISH CAPERS



## FOR THE TEACHER

### **Discipline**

Biological Science

### **Theme**

Scale and Structure

### **Key Concept**

Crayfish have special adaptations to survive in their brackish or freshwater habitat. They are similar to their marine relatives, the lobsters and crabs.

### **Synopsis**

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Students work in small groups to create a habitat for crayfish. They observe the crayfish's external anatomy and behavior to discover the ways a crayfish is adapted to live in a water home.

### **Science Process Skills**

observing, communicating, comparing, organizing

### **Social Skills**

encourage, share ideas and information, check for understanding

### **Vocabulary**

crustacean, carapace, abdomen, antenna, habitat, exoskeleton, molt

## **MATERIALS**

INTO the activities

- photos or drawings of different kinds of crustaceans (shrimp, lobster, crab, crayfish), or bring them in live or fresh from the fish market.
- two large pieces of chart paper or the chalk board

For each group

- drawing paper, pencils and crayons

THROUGH the activities

- Key Concept written in large letters on butcher or chart paper

For each group of 4 students

- one live medium-sized crayfish

Include a few extra crayfish in case some die or are reluctant to move around. Collect your own if there is an appropriate wetland or pond nearby. Crayfish can be ordered from scientific supply houses such as Carolina Biological (800) 547-1733. Most supply houses also provide several other preserved or live crustaceans for comparison, such as hermit crabs, brine shrimp, barnacles, crabs, etc. In some areas crayfish can be bought from bait shops.

When you order them we recommend you try to obtain the red eastern crayfish, which live in still water. These are the easiest to keep alive and only require being kept in water. Remember to change the water frequently.

The western brown crayfish are harder to keep alive as they live in cold flowing water. To maintain these crayfish, keep them in an aquarium with an air pump (aerator). You can keep them in the refrigerator for up to two days if you wrap them in wet newspaper or pond plants. But you must keep their gills wet, so they can breathe.

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If there is a bait shop near you, the best option is to buy the crayfish the day you plan to present the activity.

- one clear plastic shoe box or flat container filled with about 3” of water
- small container or plastic cup
- small fish net

For whole class

- rocks/gravel in tub
- broken clay flower pots—enough for 1 piece per group
- Elodea sprigs—enough for 4 or 5 per group (these plants are available from an aquarium store)
- paper towels
- large fish net (to drain water from gravel)

optional

- flake fish food, tubifex worms, fresh or frozen fish

BEYOND the activities

For each group

- chart paper and crayons or marking pens
- live goldfish (known as feeder fish at aquarium stores)

For the class

- live shrimp, crab, lobster

For each student

- drawing paper and crayons

## **INTRODUCTION**

One of the most successful groups of animals in the world are the members of the phylum Arthropoda, which means “jointed legs.” There are three times more species of arthropods than all other animal species combined. This group of invertebrates (animals without backbones) includes the insects, spiders, mites, and the crustaceans such as the crayfish, lobster, crab, barnacle, and shrimp. The crustaceans are almost entirely marine (living in salt water) and many live at the rocky seashore. One of the freshwater exceptions is the incredibly successful crayfish.

There are more than 500 species of crayfish and they are found throughout the world in swamps, marshes, ponds, streams, and even cold lakes and fast-running rivers. They are found in all coastal areas of the United States, including Hawaii, and have been introduced in Costa Rica, Spain, France, Africa and Japan. Although they live only in brackish or freshwater, crayfish are ideal to represent the crustaceans living at the rocky seashore because they

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have so much in common with their marine relatives and yet are much easier to obtain and keep alive in the classroom.

All arthropods, which includes crustaceans, have several features in common. They are all covered with a hard external skeleton (exoskeleton) that is segmented so they can move. Arthropods must shed or molt the exoskeleton in order to grow because it cannot grow as the inner body does. By the time a crustacean molts, a new, soft exoskeleton has already started to form underneath the old one. As soon as it molts, the animal inflates its new exoskeleton to a larger size by swelling itself with water. This allows for some growing room before the next molt is necessary.

Crustaceans are very successful living between the rise and fall of the tides at the rocky seashore and these same adaptations allow the crayfish to live in very diverse freshwater systems. All crustaceans have gills covered by a carapace—the shieldlike part of the exoskeleton that covers the head and most of the back, and wraps around the sides of the body above the walking legs. In shrimp, lobsters, and crayfish, the tail section, or abdomen, extends back past the carapace and ends in the telson or fanlike tail. Crustaceans can stay out of water for varying lengths of time, but must always keep their gills moist so they can breathe. Crayfish can remain out of water for about 10 minutes at a time. Crayfish, crabs, and lobsters are called decapod crustaceans because they have ten large legs. The first pair of legs are modified into pincers, which are used to defend against predators, help in competition with other crustaceans, and catch and tear food into smaller pieces. Actually, even the mouth parts of decapods are modified legs (not counted among its ten) and are used to sort and manipulate food after the pincers bring it to the mouth.

The next four pairs of legs are used primarily for walking, but also for handling food and cleaning itself. In crayfish, the legs on the abdomen or tail section are used in reproduction to hold masses of dark, spherical eggs until they hatch. They also are used as fans to keep the eggs oxygenated. These abdominal legs are called swimmerets because they help the crayfish to swim, although they are weak swimmers and cannot float. The crayfish uses its strong tail to dart backwards rapidly by flexing it towards the belly. This allows them to escape predators and to right themselves when they end up on their back. In crabs, the tail and abdomen are very much reduced and are wrapped tightly underneath the carapace. Female crabs have a wide rounded abdomen used as a shelf to hold their eggs. Males have a narrow, triangular abdomen. A crayfish habitat should include freshwater with plenty of oxygen; have an airstone, or keep the water less than an inch deep. It needs a thin layer of gravel so the crayfish can get their footing.

Crayfish can be very aggressive towards one another. It is important, if you are keeping them for any length of time, that each crayfish be given a place to hide. Crayfish will eat almost any kind of fresh or frozen fish and can actually live for

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over a month without being fed. They will also eat live food such as goldfish and water plants.

Crayfish have to contend with fast moving rivers, whereas its seashore relatives, crabs and shrimp, have the changing tides and crashing waves to deal with. Crayfish have pincers like crabs and walking legs like shrimp. Also, like crabs, they can hang onto rocks and water plants so it isn't dislodged with strong water movement. By observing crayfish that live in streams and ponds, we can begin to understand how their relatives from the rocky seashore live as well.

## **INTO THE ACTIVITIES**

### **My Buddy Says**

*See the Teaching Strategies section for how to present this activity.*

Remind the students that a habitat is a home and includes everything an animal needs to survive.

1. What are two things animals need to have in their habitat so they can survive? (*food, water, shelter, mate, plants, air*)
2. Can you think of two more things animals might need to live?
3. Imagine you are a crab living in the ocean. Describe what your home or habitat would look like.
4. As a crab, what do you use to protect yourself?

### **Animal Drawings**

Pass out drawing paper, pencils, and crayons. Use photos or drawings of different crustaceans (shrimp, lobster, crab, crayfish). Or bring in whole live, or fresh, crustaceans from the fish market or Asian food store.

Have students work together in small groups around one of the pictures and draw and label the parts of the body. The teacher or helpers can label as the students point out the parts if need be. If the students don't know the name of a part, have them make one up that is descriptive of that part. Have the students draw the animal in the habitat where they think it lives.

Display the drawings around the room and have each group present their drawing and describe the labeled parts of their animal and its habitat. As the students make their presentations, list the attributes on a large T-Chart (sample below) with one side labeled ALL CRUSTACEANS HAVE and the other side labeled ONLY SOME CRUSTACEANS HAVE.

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## **What We Want to Know**

Have each group make up two questions about their animal that they might be able to answer if the animal was alive so they could watch it. List these questions on a chart labeled WHAT WE WANT TO KNOW.

## **THROUGH THE ACTIVITIES**

### **Crustaceans: Mini-discussion**

Discuss crustaceans and how crayfish are freshwater relatives of the crustaceans living at the rocky seashore. Use the INTRODUCTION for examples.

### **Crayfish Brainstorm**

Hold up one crayfish (pick it up behind the pincers or put one in a small tray using a net) so everyone can see it. Walk with it quickly around the room. Brainstorm a list of all the external parts we could see. The list might include legs, eyes, antennae, pincers, shell, exoskeleton, hair or bristles, and mouth parts. Use this list to help the students with their powers of observation as they discover things about their live crayfish.

### **Designing the Crayfish Habitat**

Arrange students into cooperative groups of about four. Have each group design a habitat for their live crayfish. Pass out the small container, fish net, and plastic shoe box with about three inches of water to each of the groups. Lay out the gravel, plants and flower pot pieces on a table. Assign one student to be in charge of getting the gravel, another the plants, one the crayfish, and one to get the piece of a broken clay flower pot, which will become a “home” for the group’s crayfish. Have the students come and get one material at a time so that the entire class adds their gravel to their habitat before adding the plants. Tell the students the crayfish might crawl out if the gravel is piled too high on the sides. After the gravel and plants have been added to the group’s satisfaction, have the student getting the crayfish bring the small container and fish net to the teacher to receive their crayfish. The teacher can put the crayfish in the fish net and the student can hold the plastic cup under the net to catch drips. Add the flower pot piece for the crayfish after the initial observations have been made, otherwise the crayfish may hide out.

### **Live Crayfish Discoveries**

Give the groups about 5-10 minutes to discover things about their crayfish on their own. Remind them to look, listen, and smell, but not to touch. Have each group decide on one observation about their crayfish they will present to the class. Write or draw these observations on the board.

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After this initial observation period, refer the students to the lists of “Animal Parts” and “What We Want to Know.” Can they find all the parts listed on their crayfish? Can they answer any questions? Have the students brainstorm additional parts and questions they would like to add to their lists. Possible questions include:

- how many legs does it have
- how does it protect itself
- what do they use all the different legs for
- what does it do when you touch its head
- does it blink its eyes
- does it prefer land or water
- what does it like to eat
- how does it find food
- how does it eat
- how hard can it pinch
- can you sneak up behind it
- what do they use their antennae for

Have the entire class try to answer some of these questions.

*Each group may give a different answer about how many legs the crayfish have. Some might count the pincers, some might not and some may count all the abdominal legs and others won't. In addition, some may have lost a leg during capture or confinement; if so, it will eventually grow back after several molts.*

Elicit how the students might try to answer the remaining questions. Give the groups time to make further observations and try some of their experiments. Have some food available if the students would like to try to feed the crayfish, although they may not be comfortable enough yet in their new home to start to eat. You might want to leave the crayfish undisturbed for a while so they can check out their new habitat.

### **Mind Photographs**

Have the students take a picture in their mind of their crayfish by looking at the crayfish and then closing their eyes and picturing what it looks like. Have them do this two more times so they have a very clear picture of their crayfish. Then have each group move or rotate to another crayfish and compare that crayfish with their own by closing their eyes and visualizing their crayfish. Have each group say one way the crayfish are different and one way they are the same. Make a large T-Chart on the board with one side labeled ALL CRAYFISH HAVE and the other side labeled ONLY SOME CRAYFISH HAVE. (Students will notice differences in size, color, and number of pincers, legs, and antennae.)

### **Categorizing and Sequencing**

Have the students agree on and arrange the trays of crayfish in a sequence from largest to smallest. They might also sequence or categorize them based on color, markings, or size of pincers.

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### **“Homes”**

Add the clay pot pieces to the habitat. The crayfish will probably need some uninterrupted time to locate the home and go underneath it. Most will go in within a few minutes if they are left undisturbed. Have the students predict which way they will go into the home—backing in or walking forward.

### **Debriefing**

What did they learn by using a live crayfish they probably couldn't have learned if they had just used pictures or a model of a crayfish?

What was their favorite part of the activity? What was their least favorite?

### **Key Concept**

Hold up the key concept and have one or two students read it aloud. Post it near other work from this activity.

## **BEYOND THE ACTIVITIES**

### **What's in a Name**

Of course the crayfish is not a fish at all. In some areas they are called crawfish or crawdads. Have the students participate in a contest to give the crayfish a more appropriate name. The students can make posters and slogans in support of their choice and then vote on the winning name. You might want to extend this to include new names for other rocky seashore creatures such as starfish, barnacle, mussel, and sea anemone.

### **Field Trip**

Take a field trip to a pond or marsh to observe crayfish in their natural habitat. Use a baited minnow trap to capture some crayfish and compare them to the ones you had in your classroom. Remember there are over 500 species of crayfish! You can also take a field trip to a seafood market where many different species of crustaceans can be observed.

### **Live Animal Comparison**

Bring live shrimp, crabs, or lobsters into the classroom to observe their behavior and compare to the crayfish. Compare crustaceans to a live goldfish. List all of the ways that fish and crustaceans are different.

### **What If**

Write a story about a crayfish that somehow ended up at the rocky seashore. Remind the students that it really can't live in saltwater. What sort of adventures might it encounter? What strange rocky seashore creatures might

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it encounter? What would it think of the crashing waves and changing tides? Would it get along with the crabs?

**Library Research**

Visit the library and learn about the freshwater habitat of the crayfish. Learn who its enemies are and about other animals living with the crayfish. Have the students draw a picture of the crayfish in its natural habitat.