Looking at Ol' Crusty

By Linda S. Bonnette

Focus

Crawfish can readily be found throughout the world and are relatively inexpensive to purchase. They can provide students with an excellent opportunity to conduct hands-on investigations into the world of science and make connections in many other areas of the elementary curriculum. Through the investigations, research possibilities, and extensions in this folio, the students will view the crawfish in nature, literature, and as an edible delicacy. Students will create a slide show using technology, gather data, write stories and poems, and choreograph an original dance.

Background

In south Louisiana children grow up catching and eating crawfish. Many have families that make their living raising crawfish for the global market or supplementing family income by harvesting the wild swamp crawfish of the Atchafalaya Basin.

Although the crawfish and lobster look alike, they are only cousins. Crawfish need a freshwater environment, while saltwater is essential to the lobster. The crawfish is called a "decapod" because it has five pairs of legs, each with a specific purpose. Crawfish have gills like fish and yet they can spend an extended time out of water. Their gills allow the little crustaceans to extract water from the atmosphere on humid days. Some varieties construct elaborate tunnels with external "chimneys" to allow them to get to the water table and protect their cold-blooded bodies from the winter's cold and the summer's extreme heat. Crawfish are found in rivers, ponds, and swamps all over the world with the exception of Africa and Antarctica. There are about 450 species known today. The United States boasts 230 species of crawfish, 15 of which can be found in Louisiana. Crawfish vary in size and color. Their hues are white, pink, orange, brown, dark blue, and, the one that in south Louisiana is most familiar, red. Although the crawfish usually grows to a length of only six inches, there is an Australian species that measures a foot long and weighs about eight pounds. (Mmmmm! Good!)

Crawfish have two main body sections: the cephalothorax and the abdomen. A hard carapace protects the head and thorax of the cephalothorax. The legs are attached to the thorax and are used for walking, catching and cleaning prey, and reproduction. Crawfish can move forward, backward, and sideways. As adults, crawfish are not very good swimmers and depend on their tails to thrust them out of harm's way when threatened by an enemy, such as raccoons, bears, turtles, birds, fish, opossums, or people. A unique aspect of the crawfish is its ability to regenerate new parts should it lose a pincer, for example.

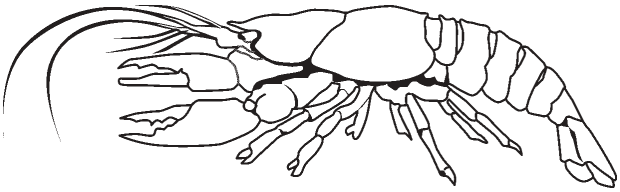
The small leg-like appendages on the underside of the abdomen are called swimmerets. Swimmerets are more pronounced on the female and are used to help her swim and to carry her eggs. Baby crawfish are born looking just like "mom" except for their coloration. They are almost transparent and nearly helpless. For two weeks they stay attached to "mom" while they double in size. The mother crawfish uses her swimmerets to provide a constant flow of fresh oxygenated water over her eggs and then her hatchlings. The young crawfish feed on tender water plants before moving on to a variety of worms, tadpoles, snails, insects, and small fish.

Grade Level	Subject Areas	Process Skills	Vocabulary
Intermediate (4-6)	Life Science	Observing, Measuring, Researching, Modeling, Predicting, Graphing	Exoskeleton, Carapace, Pincers, Regenerate, Cephalothorax, Thorax, Abdomen, Swimmerets

A cooperative project between the Undergraduate Biological Sciences Education Program Grant from the Howard Hughes Medical Institute to Louisiana State University and the Louisiana Sea Grant College Program.

A Short History of Crawfish

The crawfish has been around since 25,000 B.C. and has been found in almost all cultures. Its longevity and diversity have provided us with a rich history of folklore. Native Americans believe that the crawfish assisted in the creation of the earth. In Australia native tribes tell how a crawfish ancestor built a weir to hold back the "Great Flood" of the Bible. African-American slaves told how Noah loaded the Ark with crawfish. Farmers believe that crawfish signal rain when they close up their burrows. Crawfish appear on the coats-of-arms of European and Asian aristocracy and also on tarot cards. Many cultures believed that the crawfish served a medicinal purpose. Russian culture is filled with folktales, proverbs, and riddles surrounding the crawfish. In modern society, the crawfish appears on the computer game Dungeons and Dragons, and provided the fiendish monster in the movie *Claw Monsters*. And exactly what is meant by "crawfishing" in today's vernacular and where did this expression originate?

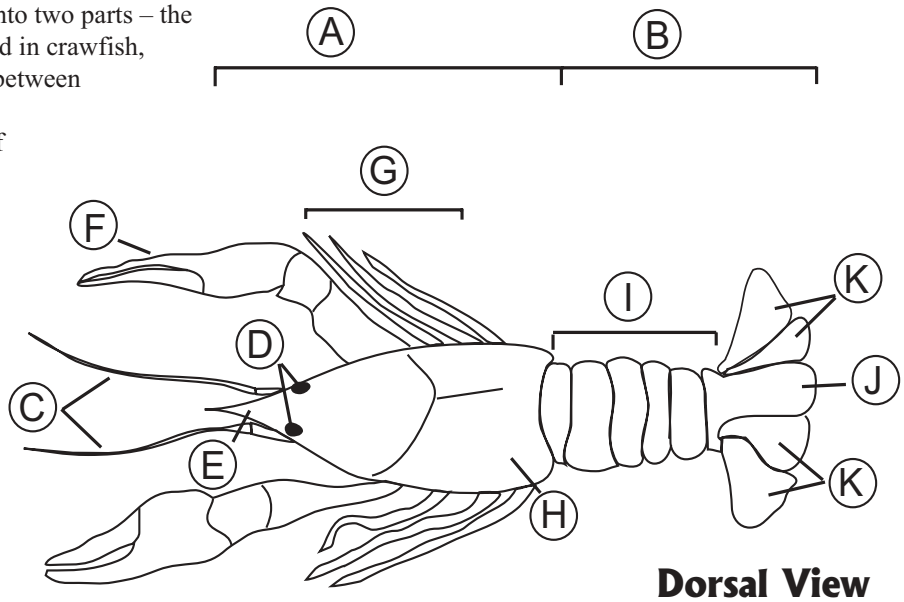


Students will discover many interesting cultural connections as they investigate the little crustacean that many have come to love as a part of dining "Cajun-style".

Imagination and creativity are the only limitations to extending the study of the critter known by many names: crayfish, crawfish, crawdad, crawdaddy, mudbug, yabby, and ecrevisse.

External Crawfish Anatomy 101

The crawfish's body can be divided into two parts – the **head and thorax (A)**, which are fused in crawfish, and the **abdomen (B)**. The division between these two parts is easily identified on specimens. A crawfish has two sets of antennae: the **first antennae** (not shown in diagram) and the **second antennae (C)**. The second antennae are the large segmented pair of antennae located near the **eyes (D)**. The eyes are set atop movable stalks. The first antennae are four whisker-like projections just below the second antennae. The **carapace (H)**, or the hard shell that protects the internal organs of the crawfish, comes to a sharp point called the **rostrum (E)**. Finally, there is the **mouth** (not shown in diagram). The mouth consists of several parts. First, there are the **mandibles** that cover the actual mouth. The mandibles act somewhat like jaws, except they move side to side.

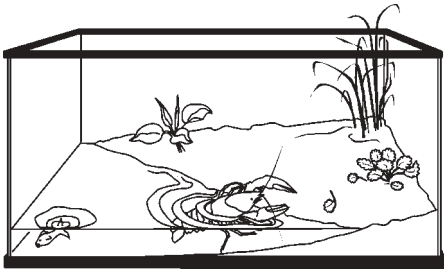


Dorsal View

Crawfish have five pairs of legs. Large claws called the **chelipeds (F)** form the first pair. These strong pinchers are specialized for cutting, capturing food, attack, and defence. A pinch can hurt! The other four pairs are much smaller and are called the **periopods (G)**. The periopods are used in walking and also to probe cracks and crevices between rocks looking for food. The first two periopods have movable fingers, like miniature claws, which are used to thrust food into the mouth. The **tail (I)** ends in a large fan-like thing called the tailfan, which consists of the **telsons (K)** and **uropod (J)**. The tailfan is used in rapid, backward motion when the crawfish must escape immediate danger. On the bottom (ventral side) of the abdomen are five pairs of **swimmerets** (not shown in diagram). The swimmerets are what the crawfish uses to swim when it is not in a hurry. All of these "legs" can be regenerated if broken off.

Activity 1: Looking at Ol' Crusty

Pre-lab preparation



Prepare a holding tank for the crawfish. This can be a small plastic wading pool or an aquarium. Use pond water if possible or use a dechlorinator to condition the water for the crawfish. Add pond plants to create an authentic habitat for your students to observe.

Collect crawfish after the pond has been set up for a day or two and add them to the habitat a day or so before the lab.

SOAR set-up (see *SOAR How-To Book*)

Use STAND AND VIEW Set-up #3 for the initial observation.

Procedure

(1) Begin by developing the concept of **physical characteristics**.
- What is a physical characteristic?
- What are some of the physical characteristics you can observe about crawfish? List the students' suggestions on a class chart to help guide them to the following characteristics: color, size, shape, texture, and patterning.
- Discuss why and how scientists use observation techniques to answer their research questions.

(2) The basis of this activity is for students to choose a research question about crawfish and to make observations of live crawfish in order to answer their chosen question. On DAY 1 begin by brainstorming what students know about crawfish and what they would like to know about this particular crustacean. General answers to the questions are found in the background section of this folio. Students may come up with questions that must be researched. For example:
- Can crawfish be found around the world?
- Why do crawfish build "chimneys"?
- What is an exoskeleton and how does it grow?

Other questions students offer can be answered by observing live crawfish. These are the types of questions students should focus on for this activity. For example:
- What environments do crawfish like best?
- What do crawfish eat?
- What legs does a crawfish use to eat? swim? escape?
- Under what circumstances does a crawfish choose to move backwards?
- Is there a relationship between length of body and length of legs?

(3) By DAY 2, students should have decided on a question for their research. Remind each student/group that once they've collected data, they must then develop a HyperStudio slide show to share information with the rest of the class. Allow students time on DAYS 2-4 to work on their slide shows, as it will serve as a final assessment of the activity. DAY 5, students share their slide shows with the class.

Assessment

Students share their HyperStudio slide shows. Prepare a self-assessment and a peer assessment instrument to go along with viewing the slide presentations. Students should be reminded of the need for honesty, sincerity, and respect for others before completing both peer and self-assessments.

Grade Level:
Intermediate

Group Size:
Small groups in centers

Summary:
Patterning, structure, and movement unique to the crawfish are essential to its survival. Students will use hands-on activities to develop an understanding of these concepts and to connect science with math.

Objectives:
- To observe the physical characteristics of a crawfish specimen.
- To observe the movements of a crawfish.
- To research questions about crawfish.

Materials:
- The Scope-On-A-Rope
- Crawfish, both live and dead
- Holding tank (aquarium, wading pool)
- Water and dirt
- Fish food or worms
- Video tape, rulers, chart paper
- HyperStudio

Duration:
Five one-hour periods or more depending on the depth of the observations and research

Extensions:
Language Arts, Art, Geography, Math and Home Economics, Physical Education, Music

National Science Standards:
Unifying Concepts (K-12)
- Form and function

Science as Inquiry (K-4)
- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Life Science (K-4)
- Characteristics of organisms

Science and Technology (K-4)
- Understanding about science and technology

Activity 2 - Observing the Physical Characteristics of Ol' Crusty

Pre-lab preparation

For the observations required for this activity you will need a deceased crawfish for each student/group.

SOAR set-up (see *SOAR How-To Book*)

TOUCH and VIEW with 1X and 30X lens.

Procedure

(1) **Have each student/group choose a crawfish specimen and observe the physical characteristics.** The worksheet entitled *Observing Physical Features* is provided to help guide students' observations. **Note:** Be sure to have students record the magnification of the lens they used in their observation.

(2) **Have students first estimate the length of each body part, then construct a monitor ruler to measure length.** Instructions for making this ruler are provided in the *Scope-On-A-Rope How-To Book*. Have students use metric measurements.

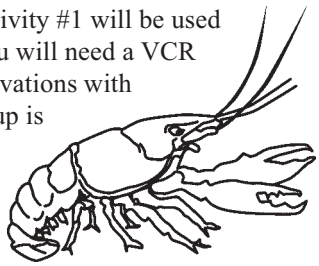
- Using the 30X lens, have students measure
  (a) the diameter of each of the **crawfish's eyes**
  (b) the length of the **first right swimmeret**
- Using a metric ruler have students measure and record the following lengths on their worksheet:
  (a) length of each of the **large claws**
  (b) length of the **body** from tip of rostrum to end of telson
  (c) length of the **first right walking leg**

(3) **Using the measurement data collected by your students have them judge whether the following statements are TRUE or FALSE.** If the statement is false, have the students rewrite the statement so that it is true.

- **All crawfish used in this study have eyes with the same diameter.**
- **The majority of students in the class had crawfish specimens with right and left claws of the same length.**
- **Crawfish with the longest rostrum-telson measurement had the widest eyes.**
- **The length of the first right walking leg was exactly three times longer than the first right swimmeret.**

Activity 3 - Observing a Crawfish Walk

Pre-lab preparation



The mini-ecosystems set-up for Activity #1 will be used to observe how crawfish move. You will need a VCR hooked up to record students' observations with SOAR. If the sound recording set-up is available, students may record their observations as they video the live specimens. You will also need a small aquarium or transparent container filled with water for students to observe how crawfish swim.

SOAR set-up (see *SOAR How-To Book*)

SOAR Set-up #3 with 1X lens.

Procedure

(1) **Students will observe and describe how crawfish use each of their legs to move about.** Using the 1X lens, have students make a 15-minute videotape of one of the live crawfish in the mini-ecosystem set-up. Students should videotape three movements:

(a) crawfish movement that is undisturbed.
(b) crawfish movement that is disturbed

NOTE: In this instance, have the students place a 12-inch ruler in the water about 10 inches in front of a crawfish. Slowly moving the ruler closer to the crawfish, observe and video what the crawfish does to escape the ruler. Students are not to touch the crawfish with the ruler.

(c) crawfish movement while swimming

NOTE: The teacher should designate one student to carefully pick up a crawfish and let it go in an aquarium. The 1X lens should be placed against the aquarium so that students can video how the crawfish uses its appendages to swim. A fish net can be used to retrieve the crawfish.

(2) **Students should be able to answer the following questions about the function of crawfish legs**.

- **What legs do crawfish use to calmly move from one spot to another?**
- **What legs do crawfish use to escape from a threatening ruler?**
- **How does a crawfish use its large claws when it is moving?**
- **What legs does a crawfish use to swim?**

If a sound recording set-up is used, this can serve as an assessment, but if it is not, you may wish to have students write a one- or two-paragraph observation.

LOOKING AT OL' CRUSTY - Activity One Name:_____
RESEARCHING A QUESTION ON CRAWFISH Date:_____

SOAR Lens(es) Used:_____

The question on crawfish I have chosen to research is: _____
_____?

What characteristics of your crawfish should you observe in order to answer this question?

_____

_____

VISUAL OBSERVATION Record your observations. Be specific. Use words that relate to your sense of sight.	**ILLUSTRATING YOUR OBSERVATIONS** Draw what you see. Use as much detail as possible. Look for structure and/or patterning.

Record how long you observed your crawfish specimen today: _____

COMMENTS AND CONCLUSIONS:

LOOKING AT OL' CRUSTY - Activity Two
OBSERVING PHYSICAL FEATURES

Name:_____

Date:_____

SOAR Lens(es) Used:_____

1. Describe the physical characteristics of your specimen. Be specific.

2. Predict uses for each pair of legs.

3. Begin by estimating in millimeters the length of body parts listed below. Then, using a monitor ruler or regular metric ruler, measure each of the body parts.

Body Part	Estimate of Length	Measurement of Length
left eye		
right eye		
first right swimmeret		
left large claw		
body length (rostrum to telson)		
first right walking leg		

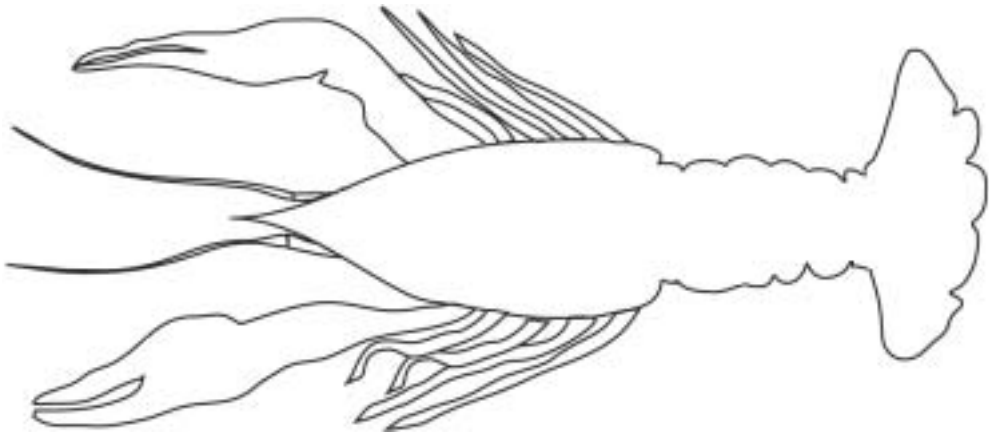
4. Using the measurement data you collected above, decide whether the following statements are true for your crawfish. Circle TRUE or FALSE. If the statement is false for your crawfish, rewrite it so that it is true.

   Both my crawfish's eyes have the same diameter. TRUE FALSE

   My crawfish specimen had right and left claws of the same length. TRUE FALSE

   The first right walking leg was exactly three times longer than the first right swimmeret.
   TRUE FALSE

5. On the drawing below, fill in the drawing with as much detail as possible. (You may use pencil colors only to add coloration. Remember to use a *light hand*.)



Extensions

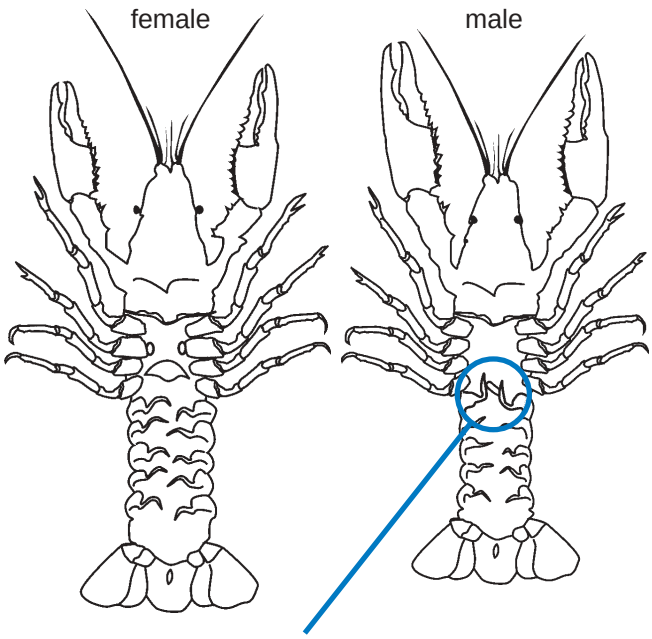
LANGUAGE ARTS: Folktales, Fantasy, and Poetry

Set up a reading center in which several books and magazines are available to students. (Check the reference section for suggestions.) After the students have completed the reading assignments, you may have them write an original folktale or other fantasy based upon their reading, observations, and research. Possible story themes: How crawfish tricked raccoon, Francois the crawfish moves north, A day in the life…, The mystery of the chimney, etc.

Poems based on knowledge gained from observations, investigations, and readings may be in free verse, meter, or in the pattern of a cinquain, diamante, or haiku.

Students may solve a wordsearch puzzle using vocabulary from the folio.

Is it a female or a male crawfish?



Specialized swimmerets of a male crawfish

The way to distinguish the sex of crawfish is to place your specimen on its back. The male crawfish will have a specialized pair of first swimmerets.

ART

Students may carve potato prints of crawfish to embellish their creative writing.

Students may cooperatively create a wall mural of a wetland environment featuring the crawfish. Bulletin board paper can be used as background and the swamp's plant and animal life can be created using construction paper and the "torn paper" method to create a collage.

Students who are ambitious may wish to fold the lobster presented in many origami books. (No one will know the difference, except your students.)

GEOGRAPHY

As students research the crawfish they may place map pins in a world map mounted on a bulletin board.

MATH & HOME ECONOMICS

Provide several cookbooks featuring recipes for crawfish or allow students to search the Internet for an interesting one they wish to prepare. Remember the limitations of cooking in your particular classroom/school. Have students compile a list of things needed from home and from the grocery. Use the newpaper to help estimate the cost for the dish plus tax and additional math skills to figure out the per-student cost. Have students shop for items needed. Use math skills once again while assembling the recipe. Cook and enjoy!

PHYSICAL EDUCATION

Students may use any piece of music they wish or choose a "Cajun" or "Zydeco" piece to create an original dance. This should be done after observations have been completed and research data have been compiled. Use of a rubric to assess this activity is recommended.

MUSIC

Teach the "Crawdad Song" found in ***The Crawfish Book*** by Glen Pitre.

Resources

Educator References

Byrd, W. 1983. **Going Mudbuggin'**. Louisiana Conservationist, May/June issue, pp. 20-23.

Huner, J. V. and J. Black. 1991. **Crawfish: A Louisiana Tradition**. Louisiana Conservationist, May/June issue, pp. 20-23.

Romaire, R., 1996, **Crawfish Production Manual**. Louisiana State University Agriculture Center, Louisiana Cooperative Extension Service.

Huner, J.V. and J.E. Barr. 1991. **Red Swamp Crawfish: Biology and Exploitation**. Louisiana Sea Grant College Program, Louisiana State University, Baton Rouge. 128 pp.

Washburn, V. P. 1953. **All About Crawfish**. Louisiana Conservationist, March issue, pp. 1-6.

Tradebooks and Resources for Children

Collins, S. H. 1998. **Cendrillon: A Cajun Cinderella**. Pelican Publishing Company.

Fontenot, M. A. **Clovis Crawfish** series. Pelican Publishing Co.

Gaspard, K. 1999. **What's in the Swamp**. DeSimonin Publishing.

Hickman, P. 1993. **Wetlands**. Kids Can Press Ltd. [ISBN 1-55074-126-8]

Pitre, G. 1993. **The Crawfish Book: The Story of Man and Mudbugs Starting in 25,000 B.C. and Ending with the Batch Just Put on to Boil**. University Press of Mississippi. [ISBN 0-87805-599-1]

Pohl, K. 1992. **Crayfish.** Raintree Steck-Vaughn Library. [ISBN 0-81172-2718-0]

Reid, G. K. 1995. **Pond Life: A Guide to Common Plants and Animals of North American Ponds and Lakes**. Golden Books. [ISBN 0-307-24017-7]

Russell, S. P. 1974. **The Crusty Ones: A Girst Look at Crustaceans**. Henry Z. Walck, Inc. [ISBN 0-8098-1226-6]

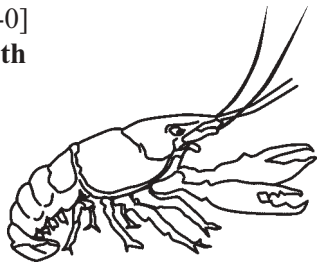
Time-Life. 1989. **Life in the Water: A Child's First Library of Learning**, Time-Life Books, Inc. [ISBN 0-8094-4853-X]

Tordjam, N. 1991. **The Living Pond**. Young Discovery Library. [ISBN 0-944589-38-3]

Tveten, J. L. 1979. **Exploring the Bayous**. David McKay Co., Inc. [ISBN 0-679-20601-9]

Vistain, J. M. 1996. **Click, Clack, Claws (Crawfish)**. Ranger Rick, v. 30, no. 6, p. 28.

Wiessinger, J. R. 1989. **Bugs, Slugs, and Crawfish – Right Before Your Eyes**. Enslow Publishers, Inc. [ISBN 0-89490-264-4]



WWW Links

Appalachian Man's Home Page! http://www.denison.edu/~stocker/crawfish.html *Great pictures and other information.*

Aqualink http://www.aqualink.com/fresh/species.html *Good pictures.*

Brigham Young University, Monte L. Bean Life Science Museum, http://bioag.byu.edu.nlbean/crawfish/crayhome.htm *Information and pictures.*

The Crayfish Corner, February 8, 2000A http://www.mackers.com/crayfish/ *A useful site with basic information about crawfish anatomy and resource links.*

Crayfish Review Cornell University, http://BioG-101-104.bio.cornell.edu

Crayfish of the Chesapeake Bay Watershed, February 8, 2000, http://members.xoom.com/peterrusso/index2.html *A complete reference site with color pictures and information about crawfish behavior.*

John G. Neihardt Internet Project: Symbolism in the Plains Region, http://www.wayne.esu1k12.ne.us/neihardt/raccoon.html *This site tells the symbolism of Plains Indians through a story about the raccoon and the crawfish.*

Pictorial Guide to Identifying Freshwater Crayfish http://www.wa.gov.au/westfish/rec/broc/idfresh/idfshc.html

Spiny Freshwater Crayfish http://www.nativefish.asn.au/spiny.html

Glen Welker's Indigenous People's Literature, http://www.indians.org/welker/racccray.htm *This site tells a trickster story about a crawfish.*