

## Teacher Background

### Crayfish Life Cycle and Behaviors

Crayfish have adaptations that help them survive at each stage of their life cycle. They start out as one of 50–500 or more eggs that their mothers typically carry in their swimmerets, small appendages on the ventral side (underside) of their abdomen.



Photo: Rick Reynolds

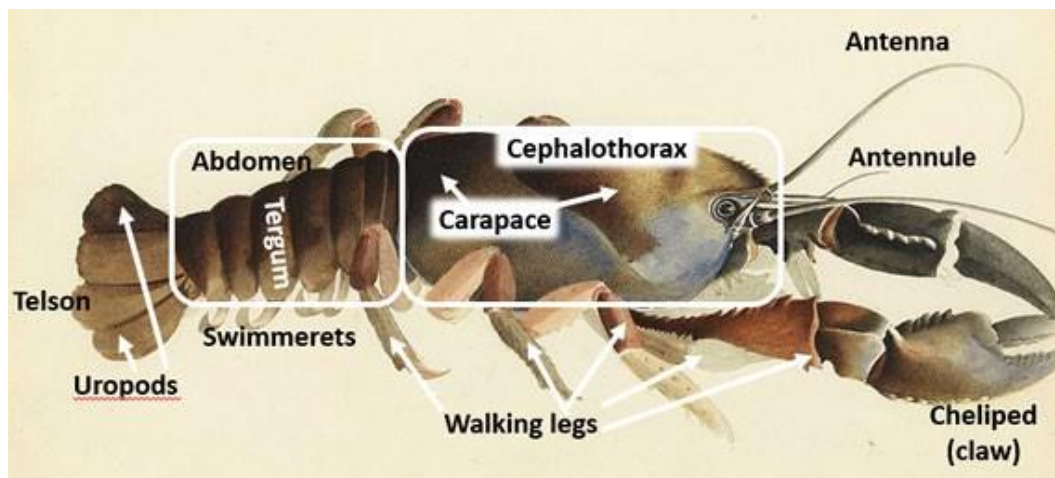
Crayfish go through incomplete metamorphosis during their life cycle. Unlike many other invertebrates, such as butterflies, which go through complete metamorphosis with distinct larval and pupal stages, they hatch from eggs directly into tiny crayfish and go through roughly 11 molts, in which they shed their exoskeleton and then replace it with a new one, growing into adults.

Crayfish are generally nocturnal. Being most active at night helps them to stay hidden from predators and stay sheltered from the hot sun. When they do venture out from shelter beneath rocks or burrows during the day, it is in well-shaded areas.

### Crayfish Anatomy/Structures

The body of a crayfish is divided into three segments: head, thorax, and abdomen. The head and thorax are fused together to form the cephalothorax.

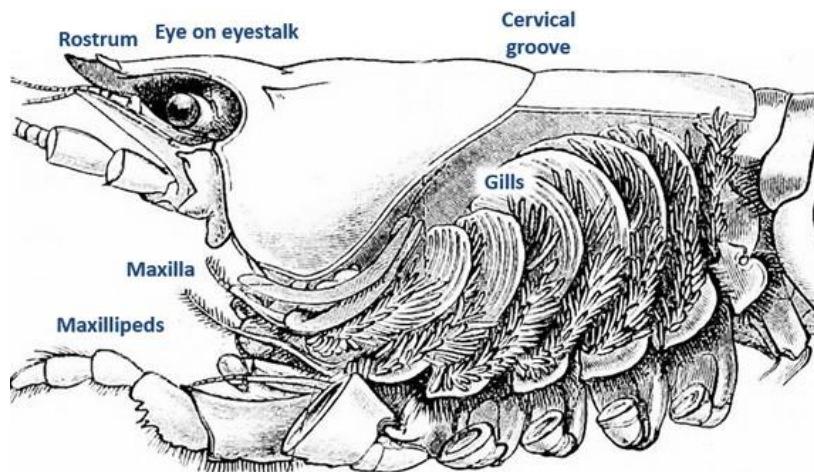
- **Thorax:** the crustacean equivalent to a chest; fused with the crayfish head to form the cephalothorax
- **Cephalothorax:** joined thorax and head of crayfish and other arthropods



Graphic: Rick Reynolds from public domain illustration

- **Abdomen:** section behind the thorax covered in six plates

- **Tergum:** name for the thickened plates on each segment of the body of crayfish and other arthropods; helps to protect soft interior
- **Carapace:** hard upper shell of crayfish and other arthropods that extends from the tip of the rostrum to the start of the abdomen; protects the crayfish
- **Rostrum:** beak-like projection; ask students what function might be; protects eyes, antennae, and antennules
- **Antenna** (plural antennae): long organs used for touch, taste, and smell; helps to sense prey and predators in murky water
- **Antennules:** shorter organs also used for touch and taste, as well as balance
- Five pairs of legs to move along river or pond bottom (locomotion)
- **Chelipeds:** Pair of legs nearest to the head, enlarged with claws (chela) to hold food, provide protection, and use in combat
- **Chela:** claw located at the end of each cheliped (plural chelae)
- **Uropods:** Last pair of abdominal appendages of crayfish and related crustaceans; found on sides of the telson, completing the tail fan used for swimming
- **Telson:** An extension of the last abdominal segment; triangular-shaped structure found in between the uropods, completing the tail fan used for swimming
- Eyes on **eyestalks:** can be rotated for very large field of vision



Graphic: Rick Reynolds from public domain illustration

- **Cervical groove:** indentation that separates head and thorax, which are connected in crayfish
- **Gills:** extract oxygen from water; used to breathe
- **Maxilla:** help draw water over gills
- **Maxillipeds:** hold food; can touch and taste
- **Mandible:** crushes food to be swallowed by mouth

- **Green glands:** help to filter waste products and balance salt levels in blood; similar to kidneys in humans
- **Genital pores:** used in reproduction
- **Swimmerets:** small appendages on the ventral side (underside) of their abdomen; in males, they are used in mating; in females, they are used to hold eggs and baby crayfish

Crayfish body structures and other adaptations are presented with larger images and labels in the slides and notes of the Crayfish Adaptations PowerPoint presentation.

Additional sources for teachers and/or students are listed in the “Extend/Enrich” and “Expand Knowledge + Skills” sections at the end of the lesson.

## Materials

- “Crayfish Adaptations” PowerPoint presentation available on the Invasive Crayfish Collaborative website: [invasivecrayfish.org/products](http://invasivecrayfish.org/products)
- Computer access, data projector, display screen, and Microsoft PowerPoint (or other software capable of displaying a .ppt file)
- *Optional:*
  - “Crayfish Adaptations” reading and questions, “Crayfish External Anatomy” diagram activity, “Crayfish External Anatomy” descriptions, and “Comparing Adaptations” handout at the end of the lesson
  - Modeling clay or Play-Doh and natural materials like dried vegetation, twigs, pine needles, and pinecones for students to share
  - Human-made materials for students to share, such as used paper towel tubes and/or toilet paper tubes, popsicle sticks, elastic bands, paper, cardboard, tape, and non-toxic glue
  - Paper plates on which to construct creatures
  - Colored pencils, markers and/or crayons for students to share
  - Live native crayfish and/or preserved crayfish specimens
  - Microscope(s) and/or hand lens(es)
  - Enlarged photographs of crayfish
  - “Curious Crayfish + Freshwater Ecosystems” activity, which can be found before this lesson in the crayfish curriculum.

## Preparation

1. If possible, identify an expert partner to work with your class about crayfish and their adaptations. Contact us here for possible recommendations: [invasivecrayfish.org/contact-us](http://invasivecrayfish.org/contact-us).
2. Write the word “Adaptations” on the board to refer to during the lesson.
3. Ensure all materials above are ready for student use.