

Cockroach Dissection

Scientific Background

One way to study an organism is to conduct a dissection. A *dissection* is a detailed investigation of that organism's organs and tissues. Using a virtual dissection allows us to take a closer look at body systems using technology such as computer software.

In this lesson, students will investigate a cockroach's body systems:

Circulatory System	Responsible for the flow of nutrients, oxygen, carbon dioxide, and wastes
Digestive and Excretory Systems	Takes nutrients from food, absorbs nutrients, and eliminates wastes
Nervous System	Receives sensory input from both internal and external sources, responds to stimuli
Reproductive System	Produce and transport egg and sperm cells
Respiratory System	Deliver oxygen to all parts of body and remove carbon dioxide

The cockroach dissection activity can be found by navigating to the Cockroach screen, then clicking the microscope icon at the bottom of the screen.

Vocabulary

- Blattidae
- chewing
- colon
- dorsal
- fat body
- gizzard
- Malpighian tubules
- nerve strand
- rectum
- trachea
- cerci
- cockroach
- crop
- esophagus
- ganglia
- gland
- mandibles
- ovary
- spiracle
- tracheole

*Vocabulary definitions can be found in the **Backyard Bugs** Glossary.*

Thinking Question

How are the body systems of a cockroach similar to the body systems of a human?
How are they different?

Name: _____

Exploratory and Extension Activities

Additional Exploratory and Extension activities are available in the *Backyard Bugs* Teacher's Guide.

Nocturnal Bugs

Read aloud *Night Fliers: Moths in Your Backyard (Backyard Bugs)* by Nancy Loewen and Brandon Reibeling (Picture Window Books, 2003, ISBN: 1404801448). Discuss other creatures that are active at night. Make a list of the nocturnal bugs featured in ***Backyard Bugs***.

Cockroach Conga

Obtain the CD *Spinning Tails* by Steve Pullara and His Cool Beans Band (Released 2001, ASIN B00005Q6ZT). Teach the song *Cockroach Conga*. Students can also put this song into a Conga dance.

The Circulatory System of the Cockroach

Use the word bank to label the picture.

Dorsal Vessel

Fat Body

Trachea



Describe the cockroach's circulatory system.

The Digestive and Excretory System of the Cockroach

Use the word bank to label the picture.

Gastric Sacs

Foregut
(Esophagus)

Crop

Gizzard

Midgut (Ileum)

Malpighian
Tubules

Hindgut
(Colon)

To the Rectum



Describe the cockroach's digestive and excretory system.

The Nervous System of the Cockroach

Use the word bank to label the picture.

Ganglion
(plural:
Ganglia)

Nerve Cord

Nerve Strands

Nerves



Describe the cockroach's nervous system.

The Reproductive System of the Cockroach

Use the word bank to label the pictures.

Female

Cerci



Male

Cerci

Styli



Describe the cockroach's reproductive system.

The Respiratory System of the Cockroach

Use the word bank to label the picture.

Part of
Hindgut
(Colon)

Tracheole

Trachea



Describe the cockroach's respiratory system.

Answer Key

The Circulatory System of the Cockroach

Use the word bank to label the picture.

Dorsal Vessel

Fat Body

Trachea



Describe the cockroach's circulatory system.

Insects store fat, protein, and excretory products in their **fat bodies**.

Insects have an open circulatory system. The **dorsal vessel** is a thin, segmented tube that is part of the circulatory system. It is closed at the hind end of the insect. At the front end of the cockroach, the dorsal vessel opens into the body cavity that surrounds all the organs.

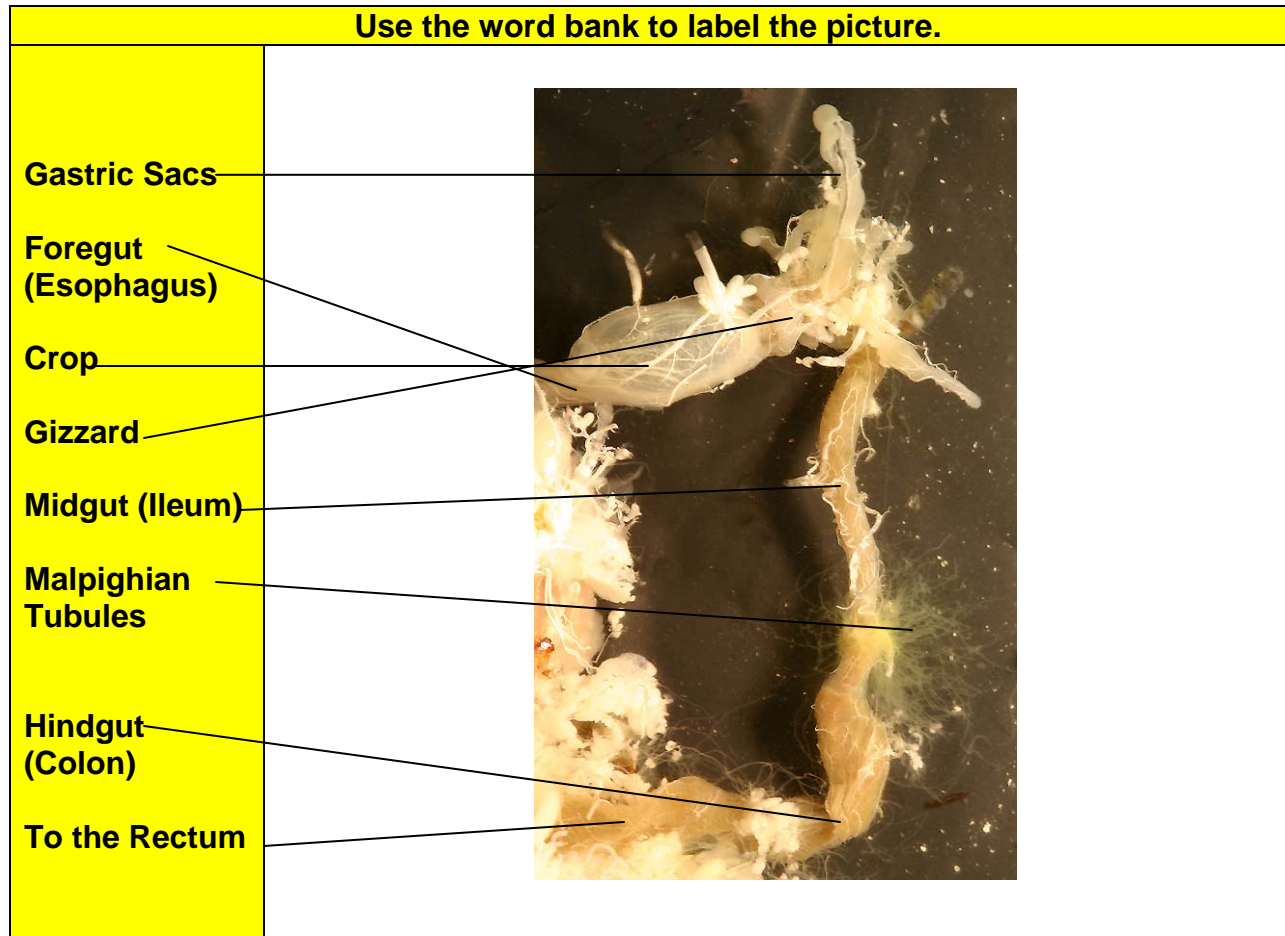
Insects have **hemolymph**, instead of blood. Each segment, or chamber, of the dorsal vessel has openings that gather **hemolymph** from the body cavity.

The dorsal vessel works like a heart and is the main vessel of the circulatory system of an insect. It pumps hemolymph towards the head and into the body cavity.

The **dorsal vessel** is flanked by two trachea. The trachea, which supply oxygen to the cockroach's tissues, are part of the **respiratory system**.

In comparison to insects, humans have a closed circulatory system. The blood flows through blood vessels to reach all parts of the body.

The Digestive and Excretory System of the Cockroach



Describe the cockroach's digestive and excretory system.

Cockroaches are omnivorous. This means that they eat many different kinds of food. Their mouth organs, the **maxilla**, **mandibles**, and **labium**, are used to taste food and handle food pieces. Cockroaches use their mandibles, or jaws, to bite and chew their food.

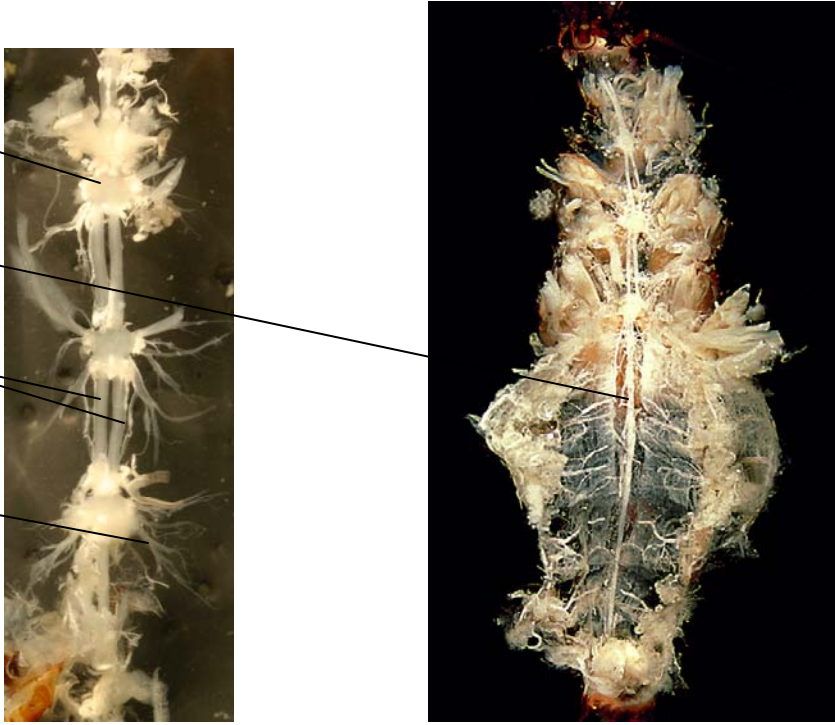
From the mouth organs, the food passes into the **foregut, or esophagus**. The foregut opens into a **crop**, where undigested food is temporarily stored. The gizzard is a muscular stomach with sharp teeth-like structures that grinds the food into smaller pieces. The **gastric sacks** contain bacteria that the cockroach uses to digest its food.

The **Malpighian tubules** remove wastes from the hemolymph, in the body cavity surrounding the cockroach's organs and tissues. These organs also regulate the balance of water and salts in the cockroach's body. The contents of the Malpighian tubules are emptied into the **midgut**, which is also called the ileum. Most of the absorption of the food's nutrients takes place in the midgut, or ileum.

In the **hindgut, or colon**, water, salts, and nutrients are reabsorbed from the feces and urine. The remaining wastes leave the body through the **rectum**, which is also part of the excretory system.

The Nervous System of the Cockroach

Use the word bank to label the picture.

<p>Ganglion (plural: Ganglia)</p> <p>Nerve Cord</p> <p>Nerve Strands</p> <p>Nerves</p>	
---	---



Describe the cockroach's nervous system.

The cockroach's nerve cord is part of its nervous system. The **nerve cord** is shiny and white, and consists of two parallel strands, running close together along the length of the ventral, or under side of the cockroach.

The nerve strands join together at each body segment to form lumps called **ganglia**. **Nerves** radiate out from each ganglion into the muscles and the sense organs.

The Reproductive System of the Cockroach

Use the word bank to label the pictures.

<p>Female</p>	
<p>Cerci</p>	
<p>Male</p>	
<p>Cerci</p>	
<p>Styli</p>	

Describe the cockroach's reproductive system.

You can tell female and male cockroaches from one another by the differences in their abdominal tips. Females and males both have a pair of **cerci**. Male cockroaches also have a pair of **styli**. Cerci and styli are sense organs.


The female cockroach's internal reproductive organs consist of a pair of **ovaries** in which its eggs are formed, and a duct that leads from the ovaries to the outside of the insect. Next to the duct is a pouch in which the male's sperms are stored. The sperms fertilize the eggs.

A **gland** that encloses fertilized eggs in a leathery case is also part of the reproductive organs. This egg case is called an **ootheca**. It protects the developing fertilized eggs. The ootheca can be seen protruding from a female's rear end before it is deposited on the ground outside the female's body.

The male cockroach's internal reproductive organs include a pair of testes. Sperm is produced in each testis. Ducts lead from the testes out of the male cockroach's body to deliver sperm to the female cockroach. There are a number of **glands** along the duct that secrete substances that help sperm fertilize the eggs.

The Respiratory System of the Cockroach

Use the word bank to label the picture.

Part of Hindgut (Colon)	
Tracheole	
Trachea	

Describe the cockroach's respiratory system.

The respiratory system of insects is made up of many branching tubes. The tubes start at openings, called **spiracles**, found on the surface of the cockroach. Air enters the cockroach's body through the spiracles. The spiracles are found in each of the cockroach's segments.

The larger tubes are called **trachea**. Trachea are found close to the cockroach's dorsal vessel, or heart. The trachea branch into smaller tubes, called **tracheoles**. The tracheoles surround all of the insect's organs and tissues. Air passes into the trachea and moves on into the tracheoles and finally into the body tissues.

The oxygen in the air diffuses, or spreads into, the cells that form the tissues. Carbon dioxide leaves the cells and moves back through the tracheal system consisting of the tracheoles and the trachea and leaves the insect's body through the spiracles.

In comparison, in humans oxygen and carbon dioxide is carried from and to the lungs by the blood in the blood vessels of the circulatory system. Humans do not have a tracheal system.