

SECTION 10-3

SECTION SUMMARY

Sponges and Cnidarians

Guide for Reading

- ◆ How is the body of a sponge organized?
- ◆ What are the main characteristics of cnidarians?

Sponges and cnidarians are animals that live in water. Sponges stay in one place, attached to hard surfaces. **The body of a sponge is something like a bag that is pierced all over with openings called pores.** Water enters these pores and carries food and oxygen into the sponge. Water also carries the sponge's waste products away.

Sponges reproduce both asexually and sexually. Budding is one form of asexual reproduction. In budding, small new sponges grow on the sides of an adult sponge. These young sponges eventually break off to live on their own. In sexual reproduction, water currents carry sperm from one sponge into the pores of another sponge. These sperm fertilize the sponge's egg cells. After fertilization, a larva develops. A **larva** is the immature form of an animal that looks very different from the adult.

Jellyfishes, sea anemones, and corals are **cnidarians**. Cnidarians are water animals that have stinging cells and take their food into a hollow central cavity. **Members of the cnidarian phylum are carnivores that use their stinging cells to capture their prey and defend themselves.** The stinging cells are on long, wavy structures called tentacles.

There are two cnidarian body plans, **polyp** and **medusa**. A polyp, such as a hydra, sea anemone, or coral, is shaped something like a vase, with the mouth opening at the top. Most polyps are adapted for life attached to an underwater surface. In contrast, a medusa, such as a jellyfish, is shaped like a bowl, with a mouth that opens downward. Medusas are adapted for a free-swimming life. Some cnidarians are polyps at one point in their lives and medusas at another point. Other cnidarians are either a polyp or medusa for all their lives. Both body plans are shown in Figure 10.

A cnidarian captures its food by using its stinging cells to inject venom, a poisonous substance, into fish and other prey. Cnidarians reproduce both asexually and sexually. Budding is the most common form of asexual reproduction.

Corals are cnidarians. At the beginning of its life, a free-swimming coral larva attaches to a solid surface. The polyp produces a hard skeleton around its soft body. The coral polyp reproduces asexually, and its offspring reproduce too. Over time, the animals die but their hard skeletons remain. Eventually, these mounds of skeletons form a coral reef. Coral reefs are home to more species of fishes and invertebrates than any other environment on Earth.

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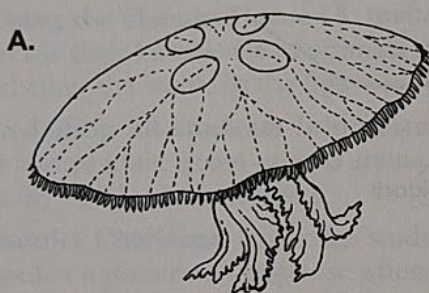
REVIEW AND REINFORCE

Sponges and Cnidarians

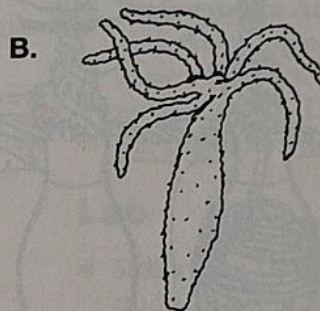
◆ Understanding Main Ideas

Answer the following questions on the back of this sheet or on a separate sheet of paper.

1. What function does water perform for sponges?
2. How does a sponge defend itself?
3. Describe two methods of sponge reproduction.
4. Describe how a coral reef is formed.
5. How do cnidarians reproduce?
6. In the diagram, identify the two different body plans of cnidarians. Label the mouth on each. Which animal is probably free swimming? Explain your answer.



Body Plan: _____



Body Plan: _____

◆ Building Vocabulary

Answer the following questions in the spaces provided.

7. Explain what cnidarians are by describing how they feed, what kind of environments they live in, and by giving three examples.

8. What is a larva?

SECTION 10-4**SECTION SUMMARY**

Worms

Guide for Reading

- ◆ What are the three main groups of worms?
- ◆ What are the characteristics of each group of worms?

There are many species of worms in the world. **Biologists classify worms into several phyla—the three major ones are flatworms, roundworms, and segmented worms.** Worms reproduce both sexually and asexually. They are also the simplest animals to have a brain. Many worms can regrow a body part such as a tail end. This ability to regrow body parts is called **regeneration**.

The bodies of flatworms are flat. Planarians, flukes, and tapeworms are flatworms. Flatworms range in size from microscopic up to 10 to 12 meters.

Most flatworms are parasites that obtain their food from their hosts. A **parasite** is an organism that cannot live on its own. It needs a host from which to get its food. A **host** is the organism in or on which the parasite lives. A tapeworm is a kind of parasitic flatworm. Its body is adapted to absorbing food from its host's digestive system. A planarian is a nonparasitic, or free-living, flatworm. Planarians are scavengers and predators.

Roundworms have a body shaped like a cylinder that is pointed at each end. They are very tiny—millions can live in a square meter of damp soil. **Unlike cnidarians or flatworms, roundworms have a digestive system like a tube that is open at both ends.** Food enters through the mouth. Wastes leave the digestive system through the **anus**, an opening at the other end of the tube.

Earthworms and other segmented worms have bodies made up of many linked sections called segments. Some organs are repeated in each section. The reproductive organs occur only once.

Segmented worms have a closed circulatory system. In a closed system, such as your own, the blood flows only through connected tubes called blood vessels. In an open system, such as that of an insect, the blood leaves the blood vessels and sloshes around inside the body. A closed system moves the blood around an animal's body more quickly.

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REVIEW AND REINFORCE

Worms

◆ Understanding Main Ideas

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

- _____ 1. Three major phyla of worms are flatworms, roundworms, and tube worms.
- _____ 2. Worms reproduce only through sexual reproduction.
- _____ 3. Worms are the simplest organism with a brain.
- _____ 4. Planarians are nonparasitic flatworms.
- _____ 5. Tapeworms are parasitic segmented worms.
- _____ 6. Planarians have one opening in their digestive system.
- _____ 7. Roundworms have a two-way digestive system.
- _____ 8. Worms are bilaterally symmetrical.
- _____ 9. Earthworms are segmented worms.
- _____ 10. Earthworms have an open circulatory system.
- _____ 11. Eyespots help an earthworm move around.

◆ Building Vocabulary

Match each term to its definition by writing the letter of the correct definition on the line beside the term.

- | | |
|------------------------|--|
| _____ 12. regeneration | a. Organism that gets its food from living in or on another organism |
| _____ 13. anus | b. Ability to regrow body parts |
| _____ 14. parasite | c. Organism which another organism lives in or on and gets its food from |
| _____ 15. segment | d. One of the linked sections that make up the bodies of earthworms |
| _____ 16. host | e. Opening through which wastes exit in a one-way digestive system |

SECTION 11-1

SECTION SUMMARY

Mollusks

Guide for Reading

- ◆ What are the main characteristics of mollusks?
- ◆ What are the major groups of mollusks?

Mollusks are invertebrates with soft, unsegmented bodies often protected by hard outer shells. **In addition to soft bodies often covered with shells, mollusks have a thin layer of tissue called a mantle that covers their internal organs.** Most mollusks move using a muscular structure called a foot. Mollusks have bilateral symmetry. They do not have repeated body parts like segmented worms do. Instead, their internal organs are located in one area. The internal organs include a pair of **kidneys**, which remove wastes produced by the animal's cells.

Most water-dwelling mollusks have **gills**, organs that remove oxygen from water. Many have an organ called a **radula** (plural *radulae*), a flexible ribbon of tiny teeth. Mollusks use radulae to scrape food from a surface, such as a leaf.

The three major groups of mollusks are gastropods, bivalves, and cephalopods. Biologists classify mollusks into groups based on physical characteristics such as the presence of a shell, the type of shell, the type of foot, and the complexity of the nervous system.

Gastropods, such as snails and slugs, have a single shell or no shell. Most snails have a single coiled shell, while many slugs have no shell. Gastropods usually creep along on a broad foot. Gastropods can live nearly everywhere on Earth. Some gastropods are herbivores. Some are scavengers that feed on decaying material. Still others are carnivores.

Bivalves are mollusks that have two shells held together by hinges and strong muscles. Clams, oysters, scallops, and mussels are bivalves. Bivalves do not have radulae. Most bivalves are filter feeders; they strain their food from the water. Bivalves live in all kinds of watery environments. As adults, most bivalves stay in one place or move slowly. Bivalves, such as oysters, cover sand or grit lodged in their shells with a protective coat, which eventually forms a pearl.

Octopuses, cuttlefish, nautilus, and squids are **cephalopods**. These animals have feet adapted to form tentacles around their mouths. They use their tentacles to capture food. Nautilus has an external shell. Squids and cuttlefish have a small shell within their bodies. Octopuses do not have shells. Cephalopods have large eyes and excellent vision. They have the most complex nervous system, including a large brain, of any invertebrate. All cephalopods live in the ocean and swim by jet propulsion.

SECTION 11-1**REVIEW AND REINFORCE**

Mollusks

◆ Understanding Main Ideas

Complete the table below with information about mollusks.

	Gastropods	Bivalves	Cephalopods
Common example			
How do they eat?			
How do they move?			
Do they have a shell?			
Adaptations of their feet			

◆ Building Vocabulary

From the list below, choose the term that best completes each sentence.

mantle radula cephalopod
gills bivalve kidneys
gastropod

1. A row of tiny teeth found in gastropods is called a _____.
2. The most intelligent group of mollusks is the _____ group.
3. Waste is removed from a mollusk's body by its _____.
4. The _____ produces a mollusk's shell and covers its internal organs.
5. A _____ is a two-shelled mollusk.
6. A snail is a _____.
7. Most water-dwelling mollusks have _____, organs that remove oxygen from water.

SECTION 11-2**SECTION SUMMARY**

Arthropods

Guide for Reading

- ◆ What are the major characteristics of arthropods?
- ◆ What are the main groups of arthropods?

An arthropod is an invertebrate that has an external skeleton, a segmented body, and jointed attachments called appendages. Arthropods have open circulatory systems and reproduce sexually. Male and female reproductive organs are in separate individuals.

All arthropods have a waxy **exoskeleton**, or outer skeleton, that protects the animal and helps prevent evaporation of water. Arthropod exoskeletons are made of **chitin**, a long-chain molecule. Long-chain molecules like chitin are called polymers. An exoskeleton cannot grow with the animal. Arthropods shed their outgrown exoskeletons in a process called **molting**.

Arthropods have segmented bodies and jointed appendages that give them flexibility and enable them to move. These appendages are often highly specialized tools. For example, an **antenna** (plural *antennae*) is an appendage on the head that contains sense organs. The wings that most insects have are another type of appendage.

The major groups of arthropods are crustaceans, arachnids, centipedes, millipedes, and insects. A **crustacean** is an arthropod that has two or three body regions and usually has three pairs of appendages for chewing. Crustaceans have five or more pairs of legs. Each body segment has a pair of legs or modified legs attached to it. Crustaceans are the only arthropods that have two pairs of antennae.

Most crustaceans begin their lives as microscopic, swimming larvae. Crustacean larvae develop into adults by **metamorphosis**, a process in which an animal's body undergoes dramatic changes in form during its life cycle.

An **arachnid** is an arthropod that has two body sections, eight legs, and no antennae. The first body section is a combined head and chest. The hind section, called the **abdomen**, contains the arachnid's reproductive organs and part of its digestive tract. Spiders, mites, ticks, and scorpions are all arachnids. Spiders are predators and have hollow fangs, which are structures that inject venom into prey.

Centipedes and millipedes have highly segmented bodies. Centipedes have one pair of legs attached to each segment, and some centipedes have over 100 segments. Millipedes, which may have more than 80 segments, have two pairs of legs on each segment.

SECTION 11-2**REVIEW AND REINFORCE**

Arthropods

◆ Understanding Main Ideas

Read each description. Decide which animal group from Section 2 best fits each description. Write your answers in the spaces provided.

1. They are invertebrates with an exoskeleton, segmented body, and jointed appendages. They have an open circulatory system and reproduce sexually. Their name comes from the Greek for "joint-leg."

2. They have highly segmented bodies with one pair of legs attached to each segment. They are predators with venom and sharp jaws. They eat smaller animals. Some of them have over 100 segments.

3. They all have two body sections and eight legs. Some of them are predators with fangs or a stinger; others are parasites. None of them have antennae.

4. They have segmented bodies with two pairs of legs on each segment. They eat decaying leaves. They curl up into a ball when something disturbs them.

◆ Building Vocabulary

From the list below, choose the term that best completes each sentence.

abdomen antennae chitin
exoskeleton metamorphosis molting

5. An arthropod's _____ protects it and keeps it from drying out. It is made of _____ and does not grow with the animal.
6. The heads of some arthropods have _____, which contain sense organs.
7. Some animals go through a process called _____ during their life cycle in which their bodies undergo dramatic changes in form as they develop.
8. The hind body section of an arachnid is called its _____.
9. The process of shedding an outgrown exoskeleton is called _____.

SECTION 11-3**SECTION SUMMARY**

Insects

Guide for Reading

- ◆ What are the characteristics of insects?
- ◆ What is the overall impact of insects on humans?

Insects are arthropods with three body sections, six legs, one pair of antennae, and usually one or two pairs of wings. The three body regions are the head, **thorax**, and abdomen. An insect's thorax, or mid-section, is the section to which wings and legs are attached. The abdomen contains many of the insect's internal organs. Sense organs, such as the eyes and antennae, are located on an insect's head. Most insects have two large compound eyes that are especially keen at seeing movement. Most also have simple eyes, which can distinguish between light and darkness.

Insects begin life as tiny, hard-shelled, fertilized eggs. After they hatch, insects begin a process of metamorphosis that eventually produces an adult insect. There are two types of metamorphosis. The first, called **complete metamorphosis**, has four stages: egg, larva, **pupa**, and adult. Insect larvae usually look something like worms. After a period of eating and growing, the larva goes into the second stage and becomes a pupa (plural *pupae*). During the pupal stage, the insect is enclosed in a protective covering and gradually changes from a larva to an adult.

In contrast, **gradual metamorphosis** has no distinctly different larval or pupal stages. An egg hatches into a **nymph** that often resembles the adult insect. A nymph may molt several times before becoming an adult.

Insects eat a wide variety of things. If something is alive, or was once living, some kind of insect will probably eat it. Insect mouthparts are tools adapted for a highly specific way of getting food.

Insects have many defenses against predators. **Camouflage**, or protective coloration, is one type. Insects have other defenses as well, such as hard exoskeletons or the ability to run or fly quickly. Some insects smell bad or taste bad to predators.

Many insects have an impact on humans. Some damage crops and some carry diseases. **The vast majority of insects, however, are harmless or beneficial to humans.** Many insects enable food crops and other plants to reproduce by carrying pollen from one plant to another. Some insects prey on harmful insects and help to reduce those insect populations. One method of controlling harmful insects is the use of biological controls. Biological controls introduce natural predators or diseases into insect populations.

SECTION 11-3

REVIEW AND REINFORCE

Insects

◆ Understanding Main Ideas

Answer the following questions.

1. How many body sections does an insect have? _____ Sketch an insect on a separate piece of paper. Name and label the body parts on your sketch.
2. How many legs does an insect have? _____ Show them on your sketch.
3. List two other features that most insects have. Show them on your sketch, and label them.

4. Name two ways that insect mouthparts are used for feeding.

5. List at least three ways in which insects help humans.

6. What is one problem with using pesticides to kill insects?

◆ Building Vocabulary

From the list below, choose the term that best completes each sentence.

thorax	complete metamorphosis	nymph
pupa	gradual metamorphosis	camouflage

7. The wings and legs of an insect are attached to the _____.
8. The four stages of _____ in order are egg, larva, _____, and adult.
9. In the pattern of development known as _____, the young insect, called a _____, looks much like a miniature adult.
10. Some insects hide from predators by using _____ that allows them to blend into their surroundings.