

SCIENCE

Student Book

▶ **5th Grade** | Unit 3

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SCIENCE 503

ANIMALS: LIFE CYCLES

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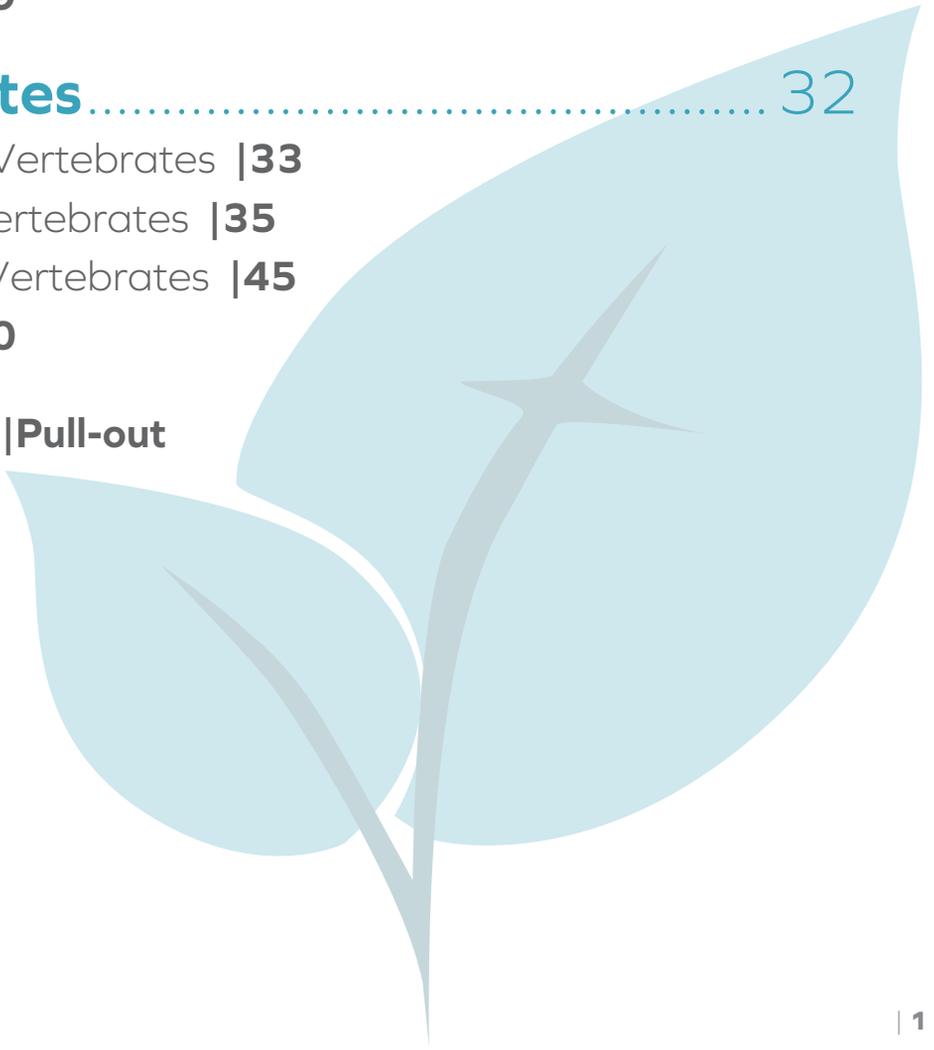
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ANIMALS: LIFE CYCLES

God has created a rich variety of animals. In the Book of Genesis, we read: "And God said, Let the waters bring forth abundantly the moving creature that hath life, and fowl that may fly above the earth in the open firmament of heaven. And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that it was good. And God blessed them, saying, be fruitful, and multiply, and fill the waters in the seas, and let fowl multiply in the earth. And the evening and the morning were the fifth day. And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so. And God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind: and God saw that it was good." (Genesis 1:20-25)

Fish, birds, insects, lizards, cattle, and bears are all examples of the animals that God has created. In this LIFEPAC®, you will explore the rich variety of animals found in the waters and on the earth. You will also learn about some one-celled, animal-like protists such as amoeba and paramecium. You will examine aspects of the life cycles of these living things. You will learn about some similarities and differences among various animals and protists. You will also learn about their common structures and the ways they reproduce. Finally, you will have an opportunity to observe some of these living things close-up during experiments!

Objectives

Read these objectives. These objectives tell what you should be able to do when you have completed this LIFE PAC. Each section will list according to the numbers below what objectives will be met in that section. When you have finished this LIFE PAC, you should be able to:

1. Describe the life cycles of invertebrates.
2. Explain the differences between the life cycles of invertebrates.
3. Describe the life cycles of vertebrates.
4. Explain the differences between the life cycles of vertebrates.
5. Name the groups to which the animals belong.
6. Show the relationship of the structures of animals to their reproduction in a life cycle.



1. INVERTEBRATES

In the previous LIFEPAC, Science 502, you learned that God has created a great **variety** of living things. You learned that scientists classify all living things into 5 kingdoms: animals, plants, fungi, protists, and monerans. In the previous LIFEPAC, you studied the life cycles of plants, fungi, protists, and monerans. In this LIFEPAC, you will learn about the life cycles, structures, and reproduction of animals. We will also cover a couple of examples of one-celled, animal-like protists in this LIFEPAC. We will cover these protists because, like almost all animals, they are able to move about in their environments.

God has created such a rich variety of animals that no one knows for sure how many kinds of animals there are! Scientists have classified and named over one and a half million different kinds of animals. However, many scientists believe that there may be from two million to as many as fifty million different kinds of animals. Many new kinds of animals are discovered, named, and classified each year. The world of animals is exciting! The study of animals is called **zoology**, and scientists who study animals are called *zoologists*.

Objectives

Review these objectives. When you have completed this section, you should be able to:

1. Describe the life cycles of invertebrates.
2. Explain the differences between the life cycles of invertebrates.
5. Name the groups to which the animals belong.
6. Show the relationship of the structures of animals to their reproduction in a life cycle.

Vocabulary

Study these new words. Learning the meanings of these words is a good study habit and will improve your understanding of this LIFE PAC.

amoeba (ə mē' bə). A microscopic, one-celled protist.

carnivores (kär' nə vorz). Animals that eat only other animals. They are also called meat-eaters.

extends (ek stendz'). Stretches out or reaches out.

flukes (flüks). Flatworms of a certain type.

fragmentation (frag' mən tā' shən). A method of asexual reproduction in animals by the division of the body into two or more pieces.

gills (gilz). The parts of a fish body that take oxygen from the water.

herbivores (her' bə vorz). Animals that eat only plants.

host (hōst). An animal that has another animal living in or on it.

invertebrates (in ver' tə brəts). Animals that do not have backbones. Insects, jellyfish, snails, spiders, and worms are examples of invertebrates.

larva (lär' və). The worm-like form of an early stage in the life cycle of some insects.

larvae (lär' vē). Plural form of larva.

maggot (mag' ət). The larva of a fly.

mollusks (mol' əskz). Animals with soft bodies. Adults often grow hard shells. A snail is an example of a mollusk.

nymph (nimf). The part of certain insect life cycles where the young animal has no wings or reproductive organs.

octopus (ok' tə pəs). A mollusk with a soft body and eight long arms.

omnivores (om' nə vorz). Animals that eat both plants and animals.

paramecium (par' ə mē' see um). A one-celled, animal-like protist that has a special shape.

parasites (par' ē sīts). Animals that live on or in other animals. They get their food from the hosts.

protozoans (prō' tə zō ənz). A large group of one-celled protists.

pupa (pyü' pə). The form of certain insects between the time they are larvae and adults.

pupae (pyü' pē). Plural for pupa.

squid (skwid). A mollusk that lives in the sea.

testes (tes' tēz). The body parts of male animals where sperm is formed.

variety (və rī' ə tē). Different kinds or types.

vertebrates (vēr' tə brits). Animals that have backbones. Birds, fish, reptiles, and mammals are examples of vertebrates.

zoology (zō ol' ə gē). The science of the study of animals.

Note: All vocabulary words in this LIFE PAC appear in **boldface** print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.

Pronunciation Key: hat, āge, cāre, fār; let, ēqual, tērm; it, īce; hot, ōpen, ōrder; oil; out; cup, pūt, rüle; child; long; thin; /ʒh/ for then; /zh/ for measure; /u/ or /ə/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

Like plants, animals come in many shapes and sizes. Most kinds of animals are less than an inch long. Some are so tiny that they can only be seen with a microscope. Other animals are very large, like the elephant, the giraffe, and the blue whale.

As you learned in previous LIFEPACs in this series, animals and plants are dependent on one another. Plants depend on the carbon dioxide given off by animals and human beings. In turn, animals and human beings depend upon plants for oxygen and food. As you learned, this cycle of life is called the *carbon cycle*. In addition, some plants depend upon animals to reproduce. For example, bees and birds carry pollen from plant to plant so that the plants might be fertilized.

Animals differ from plants in their ability to move around in their environment. Most plants are fixed on one place by roots or root-like structures. However, almost all animals can move around from one location to another.

There are many ways to classify the different kinds of animals. For example, some animals live on the land, while others live in water. Some animals are *cold-blooded*, while others are *warm-blooded*. Cold-blooded animals are warm when their surroundings are warm or cool when their surroundings are cool. Warm-blooded animals, however, almost always have the same body temperature regardless of the temperature of their surroundings.

Animals can be classified according to what they eat. Animals that only eat plants are called **herbivores**. Cows and giraffes are examples of herbivores. Animals that eat only other animals are called **carnivores** or *meat-eaters*. Lions, sharks, and dogs are carnivores. Animals that eat both plants and animals are called **omnivores**. Bears are omnivores.

Animals can also be classified according to whether or not they have backbones. Animals that do not have backbones are called **invertebrates**. The vast majority of animals are invertebrates. Insects, jellyfish, snails, spiders, and worms are examples of invertebrates. Animals that do have a backbone are called vertebrates. Birds, fish, reptiles, and mammals are examples of **vertebrates**.

In this LIFEPAC, we will study animals by classifying them as either invertebrates or vertebrates. In this section of the LIFEPAC, you will learn about invertebrates. In the next section, you will explore vertebrates.



| Reptiles, like snakes, are cold-blooded; their body temperature is based on their surroundings. The sidewinder snake (above) moves sideways in order to move forward.

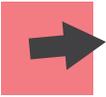


| Dolphins are warm-blooded mammals. They require air to breathe, unlike fish.



Complete these statements.

- 1.1 Scientists classify all living things into _____ kingdoms.
- 1.2 The study of animals is called _____ .
- 1.3 Scientists have named and classified over _____ different kinds of animals.
- 1.4 _____ animals are warm when their surroundings are warm and cool when their surroundings are cool.
- 1.5 Animals that eat both plants and other animals are called _____ .
- 1.6 Animals that do not have backbones are called _____ .
- 1.7 Animals differ from plants in their ability to _____ in their environments.



What is your favorite animal? Why? Look up some information on this animal in a book or encyclopedia, the library, or the Internet. Then, write a short paper (less than one page) about your favorite animal. Include some information about where the animal lives, what it eats, how it breathes, and any other things that you find interesting about your favorite animal. Let your teacher read about your favorite animal when you have finished.



Teacher check:

Initials _____ Date _____

Life Cycles of Invertebrates

In the previous LIFEPAAC Science 502, you learned that living things go through *life cycles*. There are various *life stages* in a life cycle of living things; for example, beginning, growth, adulthood, and end. Animals go through life stages, too. They also begin, grow, and become adults. For example, consider the earthworm. The earthworm has no backbone, so it is an invertebrate. The earthworm begins life as a tiny, fertilized egg. After hatching from the egg, it grows into a mature worm. When it reaches maturity, it mates with another earthworm and lays many new eggs. Finally, the earthworm gets old and dies. The earthworm is just one of many types of worms. Worms have soft, slender bodies and no backbones or legs. Other examples of worms besides the earthworm are flatworms, roundworms, and leeches. Other worms may have life cycles like the earthworm. They may differ, however, in the number of offspring that they produce. Other worms may reproduce more times or fewer times. All worms are invertebrates. Yet, not all invertebrates have life stages like those of the earthworm. You will now learn some things about the various life stages of invertebrates.



Answer these questions.

- 1.8** What is a *life cycle* of a living thing? (You may need to refer to the Science 502 LIFEPAAC, Section I to help you answer this question.)

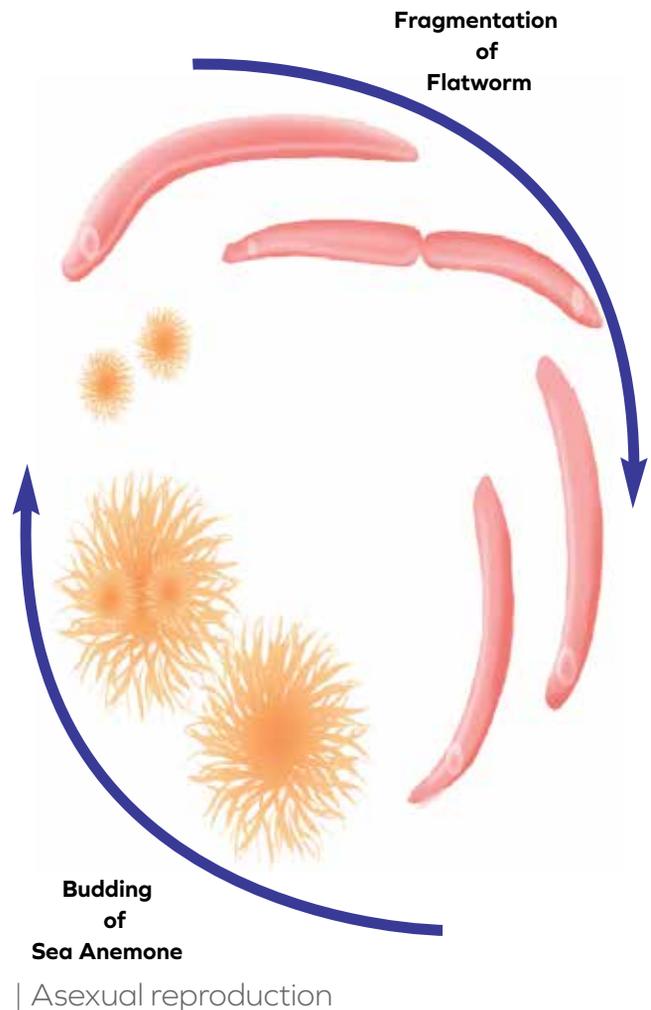
- 1.9** Why is an earthworm an invertebrate?

Beginning stage. Like almost all living things, the first stage in the life cycle of invertebrates begins with reproduction. Invertebrates can reproduce in one of two ways: (1) *asexual reproduction*, and (2) *sexual reproduction*. In asexual reproduction, only one parent is needed to produce an offspring. In sexual reproduction, two parents—one male and one female—are needed to produce offspring. Most animals and invertebrates reproduce through sexual reproduction.

Asexual reproduction only takes one parent to produce an offspring. This happens in two ways: (1) **fragmentation**, or (2) budding. Fragmentation is used by invertebrates such as planarians and some other flatworms. In this method of reproduction, a single parent usually divides into two pieces, one with the head and the other with the tail! Each section then grows the parts that are missing and becomes a completely new individual animal. Budding occurs when the animal produces small projections, called *buds*, from its side. (You learned about this process for cells and plants in the previous LIFE PACs in this series.) Invertebrates known as hydras and some sea anemones reproduce by budding. The buds develop into tiny copies of the parent. Eventually, the buds grow large enough to detach from the parent and become a new individual animal.

Sexual reproduction is used by most animals and invertebrates. In this method, a male sperm unites with a female egg cell to produce a fertilized egg. It is at this point that a new animal life begins. The means of fertilization can either occur outside the female body or within the female body.

In sexual reproduction, the beginning stage of the life cycle starts with a single cell. This cell is produced through fertilization of a female egg cell with a male sperm cell. After it is fertilized, the egg cell begins growing and reproducing. This is the next stage in the life cycle of the invertebrate: the growth stage.



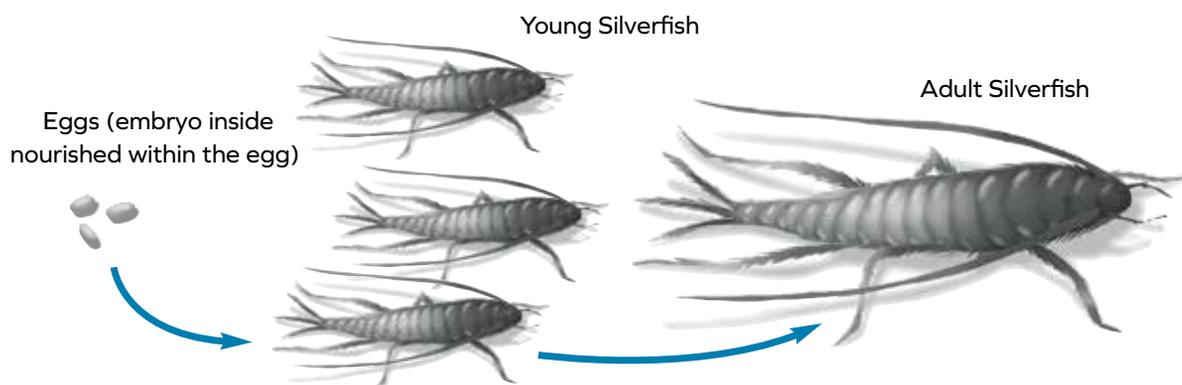


Match these items.

- | | | | |
|------|----------------------------|----|--|
| 1.10 | _____ asexual reproduction | a. | the result of a male sperm combining with a female egg |
| 1.11 | _____ sexual reproduction | b. | a single parent divides into two or more pieces |
| 1.12 | _____ fragmentation | c. | only one parent needed to produce offspring |
| 1.13 | _____ budding | d. | two parents, male and female, needed to produce offspring |
| 1.14 | _____ fertilization | e. | produces small projections from one parent which split off to form offspring |
| | | f. | the process of cell division |

Growth stage. Sexual reproduction can occur either within or without the female body; that is, the sperm may either reach the egg inside the female body or outside the female body. If fertilization of the egg occurs within the female body, the fertilized egg is then laid outside the female body. If the fertilization took place outside the body, the fertilized egg remains outside the female's body. Now an embryo begins to form within the fertilized egg. This occurs through the process of *mitosis*, the division of cells. (Recall that you learned about mitosis in previous LIFEPAcs in this series.)

Each fertilized egg contains some food for the growing embryo. Growth of the embryo inside the egg is the first part of the growth stage. As soon as the new animal can live outside the egg, it hatches from the egg.



| Growth stages of silverfish

Other invertebrates go through a different process of growth after hatching from an egg. They are hatched in **larva** form. (You will learn more about this later in this section.) **Larvae** do not look like their parents. They turn into **pupa** form before becoming adults. Larvae and some **pupae** get their own food as they grow.

Some other invertebrates have an even different process occur during their growth stage. After hatching from an egg, the new invertebrate is called a **nymph**. (You will learn more about this later in this section.) The nymph looks somewhat like the parent invertebrate, but some parts are missing. Nymphs are able to get their own food for continued growth. As they grow, they begin to form the missing parts of their bodies that will allow them to become adult invertebrates.



Answer true or false.

- 1.15** _____ An embryo forms inside a fertilized female egg of invertebrates.
- 1.16** _____ Embryos must search for their own food outside the egg.
- 1.17** _____ After hatching, the “baby” of some invertebrates looks like a miniature adult.
- 1.18** _____ Some invertebrates hatch in larva form and become a pupa before becoming an adult.
- 1.19** _____ A nymph looks somewhat like a parent invertebrate, but some body parts are missing.

Adult stage. The adult stage of an invertebrate is reached when it grows to full size and is able to reproduce. It looks very much like its parents. Its form will change very little during the adult stage. It can begin to reproduce. Some invertebrates will reproduce many times during their adult stage.

The egg-laying female invertebrate may produce many eggs at one time. Most of these eggs may be fertilized by sperm from the male invertebrate. The new fertilized eggs are then deposited outside the body of the female if they were not already outside the body. New animals are formed just like the parent began. These hatch into babies. The babies grow. Life for that species continues.

SELF TEST 1

Match these items (each answer, 3 points).

- | | | | |
|-------|-------|--|---------------|
| 1.01 | _____ | The body has no regular shape. | a. mollusk |
| 1.02 | _____ | Adult grows a hard shell. | b. worm |
| 1.03 | _____ | Adult is long, thin, and soft. | c. insect |
| 1.04 | _____ | Adult has six legs. | d. amoeba |
| 1.05 | _____ | Some have a pupa form. | e. paramecium |
| 1.06 | _____ | One cell. Adult has a regular shape. | |
| 1.07 | _____ | Many are parasites during growth and adult stages. | |
| 1.08 | _____ | Adult has gills. | |
| 1.09 | _____ | A nymph grows wings. | |
| 1.010 | _____ | About one million different kinds. | |

Write true or false (each answer, 3 points).

- | | | |
|-------|-------|--|
| 1.011 | _____ | Amoebas grow from eggs. |
| 1.012 | _____ | Embryos must search for their own food outside the egg. |
| 1.013 | _____ | A tapeworm is a parasite. |
| 1.014 | _____ | Some worms grow from larvae. |
| 1.015 | _____ | Some insects do not go through the pupa and larva forms. |
| 1.016 | _____ | Sperm is produced in the testes of an animal. |
| 1.017 | _____ | Eggs must be fertilized inside the female's body. |
| 1.018 | _____ | A paramecium grows from a nymph. |
| 1.019 | _____ | A spider is an insect. |
| 1.020 | _____ | A larva sheds its skin as it grows. |

Write the correct letter in each blank (each answer, 2 points).

- 1.021** The study of animals is called _____ .
a. botany b. zoology c. microbiology
- 1.022** Animals that eat only plants are called _____ .
a. carnivores b. herbivores c. omnivores
- 1.023** A life cycle can be completed in less than a day by _____ .
a. worms b. mollusks c. parameciums
- 1.024** A _____ looks like the parent, but doesn't have wings or reproductive organs.
a. nymph b. larva c. pupa
- 1.025** A parasite _____ .
a. lives alone
b. eats mostly blood
c. lives in or on other animals
- 1.026** An animal without a backbone is called _____ .
a. a weak animal b. a vertebrate c. an invertebrate
- 1.027** An egg cell is made fertile by _____ .
a. mitosis b. a sperm cell c. an amoeba
- 1.028** Maggot is another name for _____ .
a. a fly larva b. nymph c. pupa
- 1.029** An invertebrate that has both male and female parts is the _____ .
a. larva b. paramecium c. earthworm
- 1.030** Animals that have six legs are _____ .
a. spiders b. vertebrates c. insects

Put these events of a life cycle in proper order (each event, 3 points).

wings grow
adulthood

egg is laid
nymph is hatched from egg

an egg cell is fertilized

1.031

1.032

1.033

1.034

1.035

Complete this activity (this answer, 5 points).

1.036 Describe the life cycle of a mollusk.



Teacher check:

Score _____

Initials _____

Date _____





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