



Rourke's World of Science **ENCYCLOPEDIA**



Volume 2 - Animal Life



Rourke's World of Science
ENCYCLOPEDIA

Volume 2

ANIMAL LIFE

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What Is an Animal?

Animals are living creatures. They include very small creatures such as dust mites and very large creatures such as whales. Animals are multi-cellular organisms that eat food to survive. They cannot get energy from the sun like plants do. Most animals can move on their own.



Animals: Super-sized and microscopic.

How do animals eat?

We have all seen a tiger chasing a deer on TV or a cow eating grass. We have seen a kitten sucking its mother's milk. After a few years, a kitten becomes a cat and in a few months, a puppy becomes a dog. Animals like horses, elephants and camels carry loads and work for us. They need energy to work. This energy comes from the food they eat. Animals need food to grow, stay healthy and to get energy for doing work.

Plants, unlike animals are able to make their own food. Different animals have different eating habits. They eat either plants or the flesh of other animals. Some animals eat plants. Other animals eat the plant-eating animals. Some others eat both plants and animals. Hence, all animals depend on plants for food.

Find out more

Herbivores: Some animals feed on grass, plants, fruits and roots. Some feed on grains and nuts. These are plant-eating animals. They are called herbivores. They do not eat the flesh of other animals. Some examples of plant-eating animals are cows, horses, goats, and elephants.

Carnivores: Some animals eat other animals. These are flesh-eating animals. They are called carnivores. They do not eat plants. Some examples of flesh-eating animals are lions, tigers, snakes, and wolves.

Omnivores: Some animals eat both plants as well as the flesh of other animals. These animals are called omnivores. Some examples of animals that eat both are bears, jackals, cats, and dogs. Humans also eat meat, fish, eggs as well as vegetables, fruits and nuts. So, they are also omnivores.

ANIMAL LIFE

How do animals move?

Animals move in many different ways. Some animals use their legs to move. A clam uses one leg to dig into the mud or sand. A penguin waddles on two legs and swims with its wings. A coyote walks or runs on four legs. Ants walk on six legs while a spider crawls around using eight legs.

A snake is an animal with no legs. It must use the muscles and scales in its body to slither across the ground. Birds, bats, and insects use wings to fly in the air. Fish swim in the water. The crocodile can swim in the water, but it can also walk on land using its legs.



A penguin waddles on two legs.



Ants walk on six legs.



A coyote walks or runs on four legs.



Spiders crawl on eight legs.

ANIMAL LIFE

Where do animals live?

Animals live in every environment on Earth from mountain tops to ocean floors. Animals survive in environments which support their habitat. An animal's habitat supplies all the things it needs to survive such as food, water, oxygen, shelter, and temperature.

Some animals live in many different environments that support their habitat. Bald eagles live all over North America in environments that have lakes, marshes, seacoasts, or rivers for catching fish and tall trees for nesting and roosting. Other animals live in one environment. Polar bears live only in Arctic environments.

PROJECTS



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**Words to know**

○ **cellular** (sel-yuh-lur): made of or to do with cells

energy (EN-ur-jee): the strength to do active things

environment (en-VYE-ruhn-muhnt): the natural world of the land, sea, and air

ANIMAL LIFE

How are animals classified?

Animals can be grouped in many different ways. One way scientist's group animals and plants is by scientific classification. Classification starts with the kingdom and then divides them into groups called phyla. The next division is the class. Classes are divided into orders and then

families. Families are divided into genus. Finally, genus are divided to identify a specific species. An animal's two-part scientific name comes from the animal's genus and species.

Class		Animals in the Class
Insecta		Insects like ants, butterflies, dragonflies, katydids, and ladybugs.
Arachnida		Spiders and scorpions.
Malacostraca		Crabs, lobsters, shrimp, crayfish, and pill bugs.
Osteichthyes		Fish with bony skeletons like tuna, bass, salmon, and trout.
Aves		Birds like robins, ducks, penguins, and ostriches.
Mammalia		Mammals like cats, dogs, rodents, bears, whales, apes, and humans.

Do animals change?

The need for animals to adapt to the changes in their environments depends on many factors. This is because some changes can threaten the chances of an animal's survival. In general terms the three main threats to survival are temperature, lack of water and lack of food. Outside of environmental threats, many animals also need to be able to defend themselves from predators in order to survive.

Many animals have adapted over time, allowing them to better cope with the threats they face as a regular part of their lives. Some types of adaptation may change the physical characteristics of an animal; other adaptations may be a change in behavior.

Find out more

Other adaptations may include:

Hibernation - some animals will hibernate or 'sleep' through the coldest part of the year. Bears are one of the best-known examples of this.

Migration - some animals will move from one area to another as the weather becomes too hot or cold. Sometimes they will travel in order to find new sources of food.

Moulting and shedding - some animals grow thick coats of fur in order to keep warm through winter. Often they will shed this coat when the weather starts to warm up again.

Changing color - some animals will change their color or markings in order to blend into their surroundings.

Charles Darwin (1809-1882)



Getting to know...

Charles Darwin was a scientist who studied plants and animals. Darwin began to study evolution after a voyage on a ship called the HMS *Beagle* in 1832.

The *Beagle* went to the Galápagos Islands, near the west coast of South America. Darwin studied the birds that lived on the island. He found that the 13 different species of finches there had all descended from the same species of finch from the mainland of South America. The finches had evolved different beaks to eat the different types of foods available to them. Darwin published his book, *On the Origin of Species* in 1859. The book described the theory of natural selection..

ANIMAL LIFE



Charles Darwin conducted his study on birds on the Galápagos Islands.

Humans have affected how animals evolve using artificial selection. For example, people have bred sheep over thousands of years to produce wool for clothing. Those sheep with nice wool were allowed to reproduce. Those with bad wool were not allowed

to have offspring.

Sometimes, an entire species is unable to survive. This is called extinction. Most of the fossils scientists find are of animals that are now extinct.

Find out more

Natural Selection Can Occur Overnight.

In 19th century England, the white trunks of many trees turned black from pollution. Suddenly, people noticed there were more black moths than white moths. It was easier for birds to see the white moths on the trees and eat them! The black moths were safe.

Words to know

- adaptation** (ad-ap-TAY-shuhn): a change that a living thing goes through so it fits better with its environment
- evolution** (ev-uh-LOO-shuhn): the gradual change of living things over thousands of years
- extinction** (ex-STINGKT-shuhn): when a type of plant or animal has died out
- generation** (jun-uh-RAY-shuhn): the time between the birth of parents and the birth of their offspring

Types of Animals

There are many different animals in the world. Animals may eat plants or meat to live. They live in different types of environments all around the world. Their bodies help them to survive in their habitat.

Predators and Prey

Predators are animals that hunt and eat other animals for food. Prey are the animals that predators hunt. A lion is a predator that hunts for prey such as the wildebeest or a zebra. The killer whale will eat sea animals such as sea lions or seals.



Lions are fierce predators who hunt in packs.

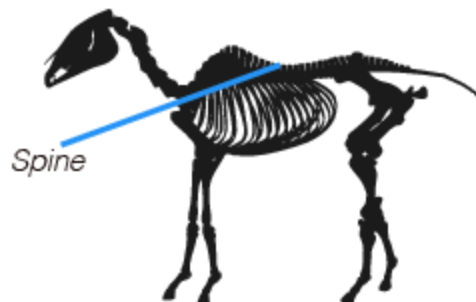
Warm-Blooded and Cold-Blooded

Some animals are cold-blooded. These animals depend on heat from outside their bodies to keep warm. Snakes and lizards are cold-blooded

animals that bask in the sun on rocks to warm their bodies. The bodies of warm-blooded animals stay at about the same temperature all the time. Humans and other mammals are warm-blooded animals.

Invertebrates and Vertebrates

Most animals are invertebrates. These animals do not have a backbone, or spine. Some examples of invertebrates are insects, snails, octopi, worms, and jellyfish. Vertebrates have a spine inside their bodies. Mammals, birds, reptiles, amphibians, and fish are all vertebrates.



Horses are vertebrates because they have a spine inside their bodies.

ANIMAL LIFE

Single-Celled Organisms

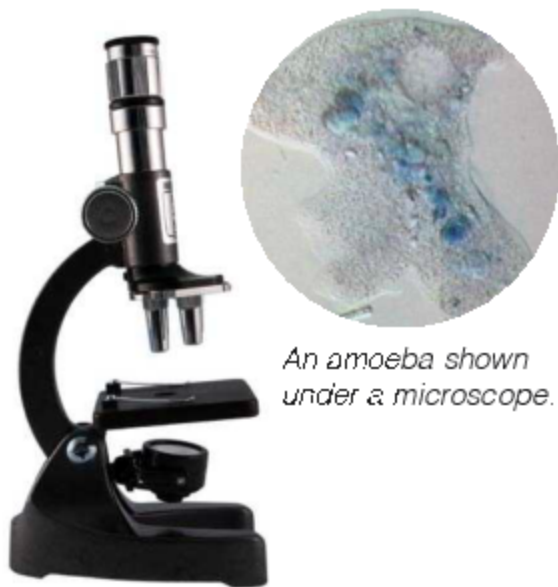
Some organisms are really small, or microscopic. They can be seen only with a powerful microscope. Living things that have only one cell are called single-celled organisms.

Many single-celled organisms used to be placed in the animal kingdom. Today they are part of the Protista kingdom and are called protozoans. Some protozoa eat other organisms. Other protozoa make their own food using sunlight like plants.

Amoebas are one type of protozoa. They live in water and other moist places. Many single-celled organisms live in large groups called colonies. Some types live inside tiny shells. When they die, their shells eventually become chalk.

Bacteria are also single-celled microscopic organisms. They used to be considered animals but because bacteria don't have a nucleus, scientists now put bacteria in the kingdoms Eubacteria and Archaeobacteria. Bacteria are the most widespread form of life on the planet. They are found in the air, soil, and water, and in plants and animals. They live in colonies. Bacteria are either round, spiral, or rod-shaped.

Bacteria have different roles in the environment. Some bacteria help digest food in plants and animals. Other bacteria break down dead plants and animals. Harmful bacteria in food and water can make you sick. Bacterial infections inside the body of an animal can be dangerous.



An amoeba shown under a microscope.

Words to know

- cell** (SEL): a basic, microscopic part of an animal or a plant
- infection** (in-FEK-shuhn): an illness caused by bacteria or viruses
- microscopic** (mye-kruh-SKOP-ik): too small to be seen without a microscope
- nucleus** (NOO-klee-uhss): the central part of a cell, containing the chromosomes
- organism** (OR-guh-niz-uhm): a living plant or animal
-

Mollusks, Sponges, Starfish, and Worms

Mollusks

Mollusks are invertebrates with soft bodies. Most mollusks live underwater. They include limpets, clams, oysters, mussels, squids, octopuses, and some snails. Some types of mollusks live on land. They include land snails and slugs. Some mollusks protect themselves by making hard shells around their bodies. Squids and octopuses are the most complex mollusks.



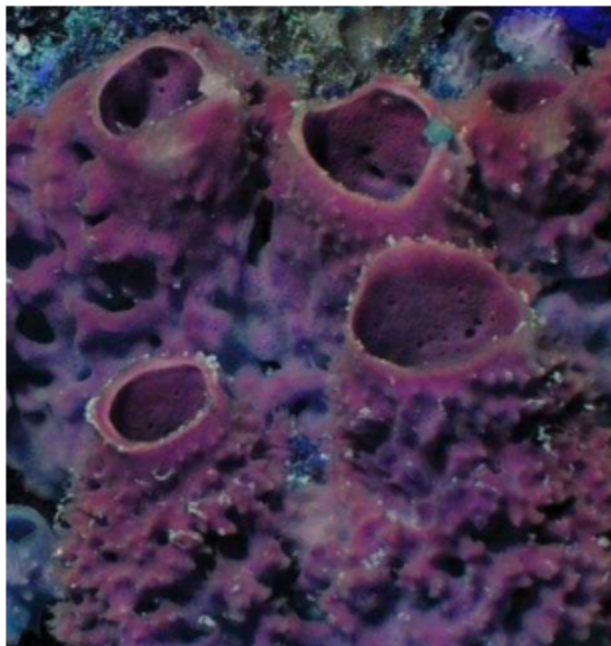
Clams protect themselves with a hard shell.



A garden snail is a type of mollusk that lives on land.

Sponges

Sponges are the simplest form of multi-cellular animals, or animals that are made of more than one cell. Most sponges live in shallow water, but some live deep in the ocean. If a piece breaks off of a sponge it will grow into a new sponge. Sponges eat small pieces of food by pulling them through tiny holes in their bodies. The skeletons of some sponges can absorb water when they die. People sometimes use these skeletons for bath sponges.



Purple Tube Sponges.

Starfish

Starfish, also known as sea stars, are star-shaped organisms that have five arms. The skin on their bodies has many spines. This helps protect them from predators. Starfish move using tube-like feet that are found under each arm. Each tubed foot has a sucker at the end. The suckers allow starfish to stick to rocks and to hold onto prey. They eat live coral, crabs, and mussels.



Starfish can cling to rocks using their suckers.

Worms

Worms come in many sizes and shapes. Some are flat, and some are round. Tapeworms and flukes have flat bodies. Tapeworms live inside the intestines of vertebrates. One type of fluke lives inside the liver of mammals. Animals that live inside other animals and cause harm to their hosts are called parasites. Roundworms have bodies shaped like a tube. Some are parasites, and some live in the ground or in water.

Segmented worms include earthworms and leeches. These types of worms have long bodies with many sections, or segments. They live in the ground and eat dead leaves. They have no eyes and five blood vessels with valves that work like hearts. Leeches

live in water and on land. They have suckers at both ends of their bodies. Some leeches suck blood for food.



Tapeworms have flat bodies.

Roundworm bodies are tube-shaped.

Earthworm bodies have segments.

Arachnids, Crustaceans, and Insects

Arachnids, crustaceans, and insects are the largest group of invertebrates. All these animals have bodies with several segments. They have hard shells called exoskeletons. They leave their shells, or molt, as they grow bigger. Then they make new shells.



A cicada emerging from its shell.

Arachnids

Arachnids include spiders, scorpions, mites, and ticks. They all have eight legs. Spiders live anywhere that there are insects to eat. Some spiders spin webs to catch their prey. The trapdoor spider makes a tunnel in the ground and lines it with silk. The spider waits for an insect and opens its door to catch the prey. They use long teeth, called fangs to kill or stun their prey.

Scorpions have claws to hold their food. Sometimes, they use stingers at the end of their abdomens for defense. Mites are tiny parasites that live on animals, plants, and food. Ticks suck the blood of warm-blooded vertebrates. Both mites and ticks can spread disease.

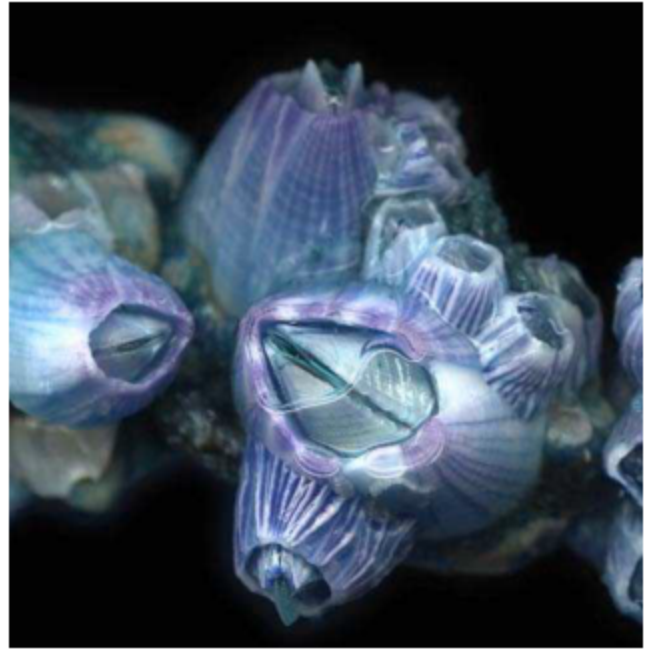


Magnified view of a tick on human skin.

ANIMAL LIFE

Crustaceans

Most crustaceans live underwater. Their bodies have many segments that bend when they swim or crawl. Attached to each segment are pairs of legs, claws, or antennas. They have two sets of antennas on their heads. Crustaceans include barnacles, crabs, lobsters, and shrimp. Barnacles cling to rocks, shells, and other animals in the sea. Crabs and lobsters have big claws for holding and eating food. Shrimp breathe and eat with their feet. The only crustaceans that live on land are some crabs and pill bugs, or wood lice.



Barnacles clinging to a rock.

A horseshoe crab's body parts.



Hard shell,
shaped like a
horse's hoof.

ANIMAL LIFE

Insects

Insects live almost everywhere. Some insects crawl along the ground. Many fly in the air. All insect bodies have three parts. The head has eyes and antennae. The middle part, or thorax, has legs for walking. Most insects have six legs. Some have wings. The back end is called the abdomen.

There are many different types of insects. Ants crawl around in search of food and bring it back to their colony. Dragonflies and beetles fly through the air. Dragonfly wings stick out away from their bodies. Beetle wings fold up across their bodies.

**Words to know**

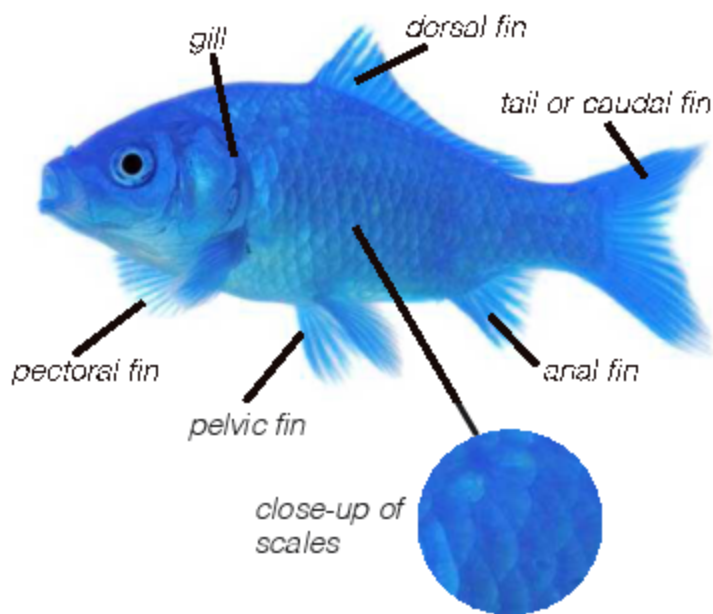
- **abdomen** (AB-duh-muhn): the back section of an insect's body
- **antennae** (an-TEN-uh): a feeler on the head of an insect
- **thorax** (THOR-aks): the part of an insect's body between its head and its abdomen

The eyes of flies are very complex. They are called compound eyes because they have thousands of parts. Bees and wasps have stingers to defend themselves. They can sting people or animals if they are attacked or threatened. Mosquitoes are small. They suck the blood of mammals through a long mouth part called a proboscis.

ANIMAL LIFE

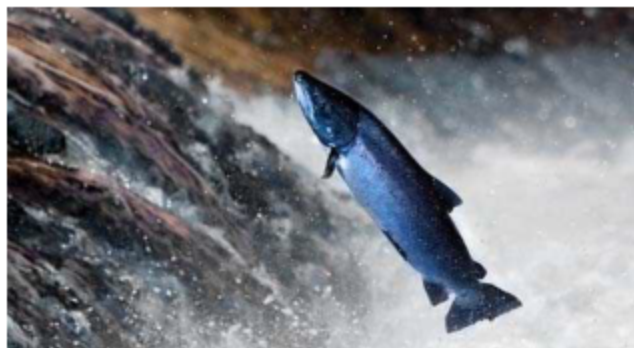
Fish

Fish are cold-blooded vertebrates that live in water. Most fish are covered in scales and have fins to help them move. Gills let them breathe underwater. Many fish live in the ocean. The ocean water has salt in it. Other fish live in freshwater, or water that is not salty. Lakes, marshes, ponds, rivers, and streams all contain freshwater. Some people keep fish as pets. The fish live in glass containers called aquariums.



Most fish lay many soft eggs in the water. This is called spawning. The eggs are fertilized by the male fish in the water and are left to hatch on their own. Grunion are silver-colored fish that live in California waters. They wriggle onto the beach under

a full moon to spawn. Salmon live in the ocean but return to freshwater to spawn. They swim upstream against the current.



Salmon fight strong currents to spawn upstream.

Fish have many ways to protect themselves from predators. A puffer, or blowfish, inflates like a balloon. Enemies are frightened away or are not able to bite the fish. Puffers are also poisonous, and some have spines.



A porcupine pufferfish camouflages himself on the ocean floor.

The lungfish has both gills and lungs. The lungfish can live in water with little oxygen. It can even breathe air when the water dries up.



Lungfish.

Many people think sharks are dangerous. They are good predators, but most are harmless to humans. Shark's skeletons are made of a softer material called cartilage, instead of bone. Sharks have many rows of teeth. Some types of sharks give birth to live offspring. This means that the babies grow inside the mother's body until they are born. The hammerhead shark and tiger shark both give birth to babies this way.

Words to know

- **cartilage** (KAR-tuh-lij): a strong, elastic, fibrous tissue
- gill** (GIL): the organ on a fish's side through which it breathes
- lungs** (LUHNGSS): a pair of bag-like organs inside many animals chests that they use to breathe

○



Jaws from a shark showing the rows of teeth.

Some sharks, like the grey nurse shark, have eggs that hatch inside the mother. The babies that hatch first sometimes eat the other eggs. Other sharks lay eggs that hatch outside the mother's body. A horn shark egg is covered in a leather-like case to protect the egg while it is waiting to hatch.



A hammerhead shark.

ANIMAL LIFE

Amphibians

Amphibians are cold-blooded vertebrates. They have a lot in common with both fish and reptiles. Amphibians include frogs, toads, salamanders, newts and caecilians. Frogs have smooth, wet skin. Toads have dry, warty skin and spend more time on land. Salamanders and newts are like lizards, but they do not have scales.



A frog has smooth, wet skin.



A toad has dry, warty skin.

Most amphibians lay eggs in the water, like fish. The eggs hatch into larvae that have gills and live underwater. The larvae of frogs and toads have tails but no legs. They are called tadpoles. Tadpoles develop back legs and then front legs before their tails disappear.

The larvae of salamanders and newts look more like adults. As an amphibian larva grows, its gills disappear and lungs develop.

Amphibians eat insects and other small invertebrates such as turtles and snakes. Frogs and toads have long tongues to catch their prey. They have long back legs for jumping. Most frogs and toads make loud sounds with their throats.

Life Cycle Of A Frog and Toad

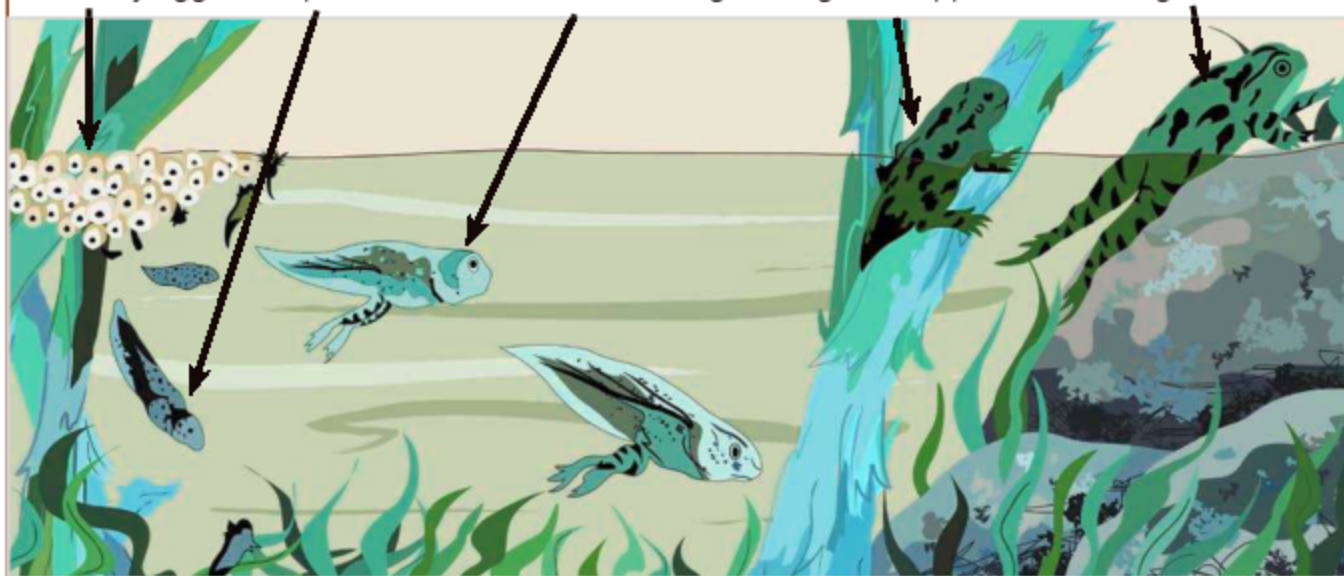
Frogs and toads lay eggs

Eggs become tadpoles.

Tadpoles develop back and front legs.

Then their tail and gills disappear.

Fully developed frog or toad.



Reptiles

Reptiles are vertebrates that have dry skin covered with scales or bony plates. They do not have feathers or fur. Most reptiles lay eggs with tough shells. Many reptiles have short legs while some have no legs at all. They are cold-blooded and breathe air.

Reptiles include alligators, crocodiles, lizards, snakes, terrapins, tortoises, and turtles.

Alligators and Crocodiles

Alligators and crocodiles look very similar. They both have long bodies and tails. Some are very large. Their skin is thick and scaly. Crocodiles have thin noses, and alligators have broader noses.



Crocodiles have thin noses.



Alligators have broad noses.

They have many sharp teeth. Alligators and crocodiles live near water and swim well. They eat fish and often attack animals that come to drink. They lay eggs on land.

Lizards

Lizards are the largest group of reptiles. They have a small head, short neck, and a long body and tail. Lizards can be small like a gecko or quite large like the Komodo dragon.



Geckos can be a 1/2 inch to about 14 inches (1.5 to 35 cm) long.



A Komodo dragon can reach up to 10 feet (3 m) long.

ANIMAL LIFE

Most lizards have four legs but some lizards have no legs. They look like snakes except they have eyelids and ears. Other types of lizards can run fast. One type of lizard, the basilisks, can run across the surface of water. Some lizards swim well, and others are good climbers.



A basilisk lizard.

Most lizards eat insects but some eat birds or other reptiles and some eat mostly plants. Nearly all lizards lay eggs, but a few types give birth to live offspring. Many lizards can lose their tails to escape when they are attacked. A new tail will grow back in its place. Two types of lizards, the Gila Monster and Beaded lizard are poisonous.



A beaded lizard.

Find out more

Some Lizards Can Change Colors

The chameleon is a lizard that can become the color of whatever it is sitting on! Well, at least the colors of trees and rocks. The chameleon also has strange eyes. They can spin, or rotate, in different directions at the same time.



Snakes

Snakes have long, narrow bodies covered in a scaly skin. A snake's skin can be one solid color or it can be multi-colored with different markings or patterns. Snakes do not have eyelids, external ear openings, arms, or legs.



Snake skin comes in many colors and patterns.

Some snakes slither quickly along the ground. Others climb trees. And still others swim in the water. Different kinds of snakes live in different habitats. Different types of rattlesnakes are found all over North America. Rainforests are home to boa constrictors. Sea snakes, like the turtle-headed sea snake live in the water.



A sea snake poking out of the sand.

Snakes eat other animals. They do not chew their food. They have flexible jaws that open wide to swallow their prey whole. Many snakes eat their prey while it is still alive. Others kill their prey first.



Snakes' jaws can open wide to swallow prey.

Boa constrictors and pythons squeeze their prey to death. A poisonous snake injects its prey with venom. Cobras, mambas, and copperheads are all snakes with poisonous venom. A rattlesnake has a special part on its tail that it shakes to warn enemies. Some snakes have special holes, or pits, that sense differences in heat. These snakes can find their prey in the dark.



A boa constrictor winds itself around a tree limb.

ANIMAL LIFE

Terrapin, Tortoises, and Turtles

Most terrapins, tortoises, and turtles are very similar. They have large, bony shells covered with big scales. They can pull their heads, arms, and legs inside the shell when they are threatened.

So, why do we have three different names for this group of reptiles? The names are based on the three types of habitats these reptiles live in.

Terrapins spend time both on land and in the water. They always live near freshwater areas like marshes, ponds, and streams. Many have adapted to life in brackish, swampy areas. Some terrapins hibernate during the winter months. The box turtle is actually a terrapin.



A box turtle is a type of terrapin.

Tortoises are turtles that live on land. They have high shells that protect them. Their strong, stumpy legs help them walk on land and dig burrows. Many tortoises have adapted to life in hot, dry areas.

They go into underground burrows when the sun gets too hot. Giant tortoises live a long time. Tortoises can live to be over 100 years old.



A giant tortoise has a life span longer than a human.

Turtles spend most of their lives in the water and lay their eggs on the land. Turtles usually have webbed feet for swimming. Sea turtles live in saltwater. Their webbed feet are like paddles. The biggest reptile is a kind of sea turtle called a leatherback. Other turtles live in freshwater like marshes, ponds, streams, and lakes. They swim but also can be seen basking in the sun on logs, rocks, or the banks of the water.



Sea turtles are an endangered species.


Find out more

Dinosaurs

Dinosaurs were a group of reptiles that lived in the Mesozoic era millions of years ago. The Mesozoic era is divided into the Triassic, Jurassic, and Cretaceous periods. All the dinosaurs died at the end of the Cretaceous period. They became extinct.

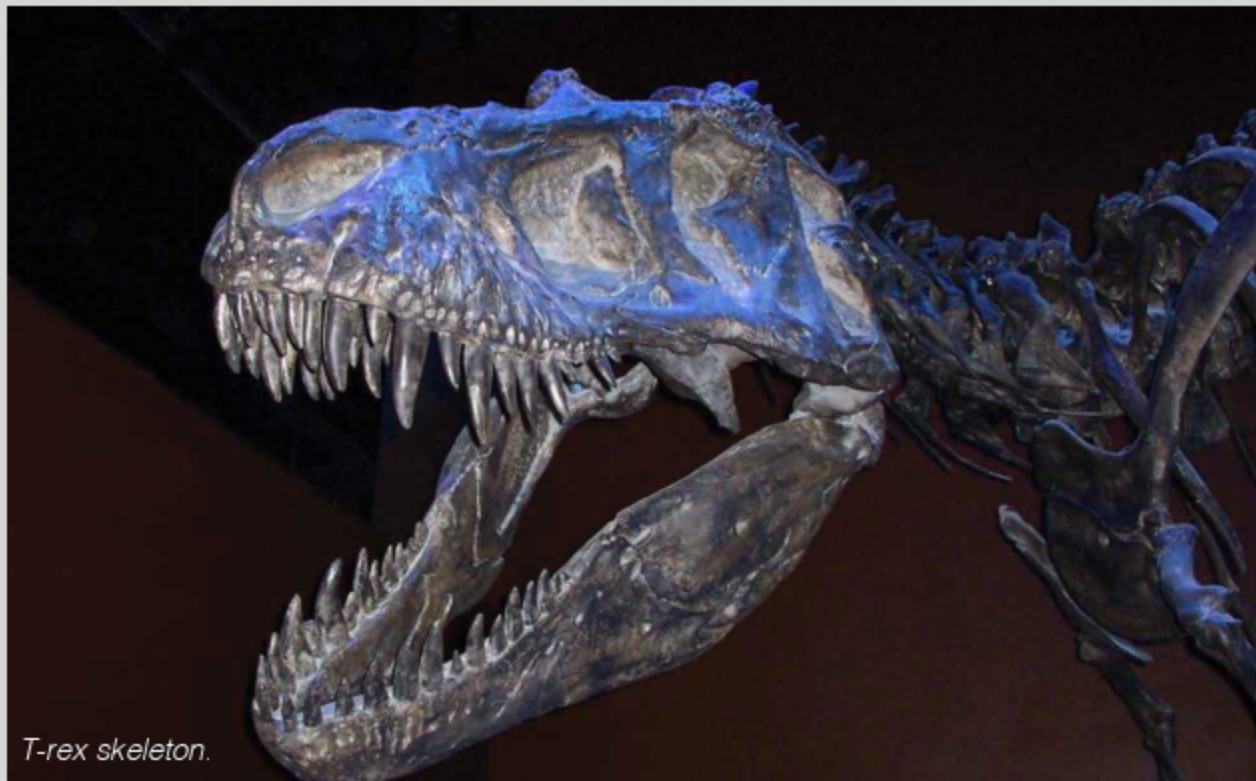
Because there were no people during that time, we only know about them from fossils and from related animals that are still alive today. The word "dinosaur" is often used for any large reptile that is now extinct.

Dinosaurs lived mostly on land. Many were very large, like the Brachiosaurus. The smallest dinosaur was the size of a chicken. Some

dinosaurs ate plants. Triceratops was a group of plant-eating dinosaurs with three horns and large, bony plates on their necks. They walked on all four legs.

Some dinosaurs hunted other animals. Tyrannosaurus rex is the species name of a large dinosaur that ate other animals. It had a big head and sharp teeth. It walked on its back legs and had small front legs.

Other reptiles related to dinosaurs lived at the same time as dinosaurs. Plesiosaurs were marine reptiles with flat bodies, long necks, and flipper-like feet. The pterodactyl was a reptile that could fly. It had wings and a beak, like birds. But it did not have feathers.



T-rex skeleton.

ANIMAL LIFE

Birds

Birds are warm-blooded vertebrates. They are the only animals with feathers. Their two front legs are wings. Most birds use their wings to fly. Birds use their hind legs and feet for walking, swimming, or holding onto branches. Most birds have tails.

All birds lay eggs with hard shells. Most birds build nests to keep their eggs safe and warm. They may use leaves, twigs, grass, feathers, or paper.



A robin lays bright, blue eggs.

Birds have sharp beaks for eating. They may eat insects, seeds, nectar, or other animals. A woodpecker has a very hard beak for making holes in tree trunks. Some woodpeckers eat insects found in the holes. Others drink the sap that oozes from the holes.



Woodpecker

A pelican is a large bird that eats fish. It can carry a whole fish in the large sac in its throat. A hummingbird is a tiny bird with a thin beak. It uses its long tongue to drink nectar from flowers. Hawks and other birds of prey have a hooked beak for ripping and tearing apart prey.



Pelican



Hummingbird

ANIMAL LIFE

Birds of prey hunt animals, including other birds. They have long, sharp claws called talons. These birds include owls, hawks, and eagles. Owls can turn their heads to look behind them for prey.



Bird Feet

Birds of prey like hawks, eagles and owls have talons for hunting.



Smaller birds use their feet for perching. Their toes can hold onto branches.



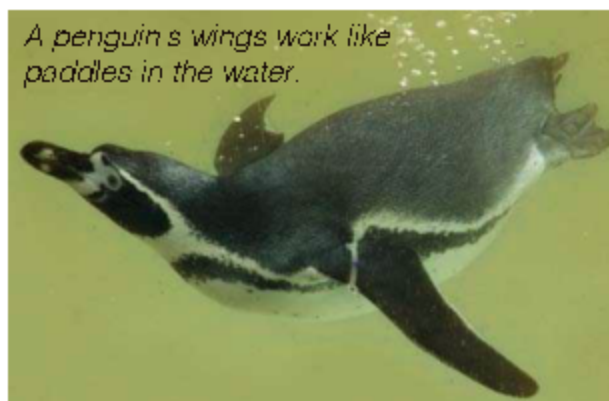
Birds like ducks, swans and penguins have webbed feet for swimming.



Some birds have beautiful feathers. They use them to attract mates. A male peacock has long, colorful feathers in its tail. It spreads its tail like a fan. A parrot has many bright colors. It can repeat, or mimic, sounds that it hears. You can teach a parrot to repeat words.



Penguins are birds that cannot fly. They use their wings to swim. Penguin's wings work like paddles under the water. The Galápagos penguin lives near the equator, the hottest part of the world. The emperor penguin lives in Antarctica, the coldest part of the world.



ANIMAL LIFE

Ducks, geese, and swans float on water. They have broad, flat feet with pieces of tissue, or webs, between their toes. These webbed feet are like paddles that help the birds swim on top of the water.

Ostriches are one of a few types of birds that cannot swim or fly. The ostrich is a large bird that lives in Africa. The body of the ostrich is too large for its wings to lift it off the ground. It has big, powerful legs and can run very fast. The rhea in South America and the emu in Australia are like the ostrich.



An ostrich can reach speeds of up to 31 miles per hour (49.90 kph).



John James Audubon (1785-1851)

Getting to know...

John James Audubon grew up in France. His family sent him to live in the United States when he was eighteen. He lived on a farm in Pennsylvania. Audubon loved nature and art. He decided to draw every type of bird in North America. He drew male and female birds. He drew illustrations showing birds caring for their young and their feeding habits.

Audubon could not find people who were interested in his paintings. So, he took his pictures to England and Scotland. He earned enough money to begin publishing *The Birds of America*. The book had very large pages. It showed a thousand different birds from five hundred species. Audubon also wrote about the behavior of birds.

The Audubon Society was named to honor John James Audubon and works to protect birds, other wildlife, and their habitats.

Mammals

Mammals are probably the animals you know best. Humans are mammals. So are dogs and cats. Mammals share some similar traits. They are all warm-blooded vertebrates. They have at least some hair or fur on their bodies. Female mammals have special body parts called mammary glands. These glands make milk that baby mammals drink. Almost every mammal gives birth to live offspring. A few types of mammals such as kangaroos have a pouch where the baby continues to grow after it is born. A couple of mammals even lay eggs.



Newborn piglets feed on their mother.

Land mammals

Bears are one type of large mammal. All bears have long fur and strong claws. Bears may eat fruit, insects, fish, and other animals. Sometimes, they stand on their back legs to eat or to scare their enemies. Some bears hibernate. That means that they sleep through the winter when food is hard to find.

Polar bears are the biggest bear. They live in Arctic areas and have white fur. Polar bears have two types of fur. Thick, woolly fur keeps them warm while guard hairs keep them dry. Polar bears catch fish and hunt seals.

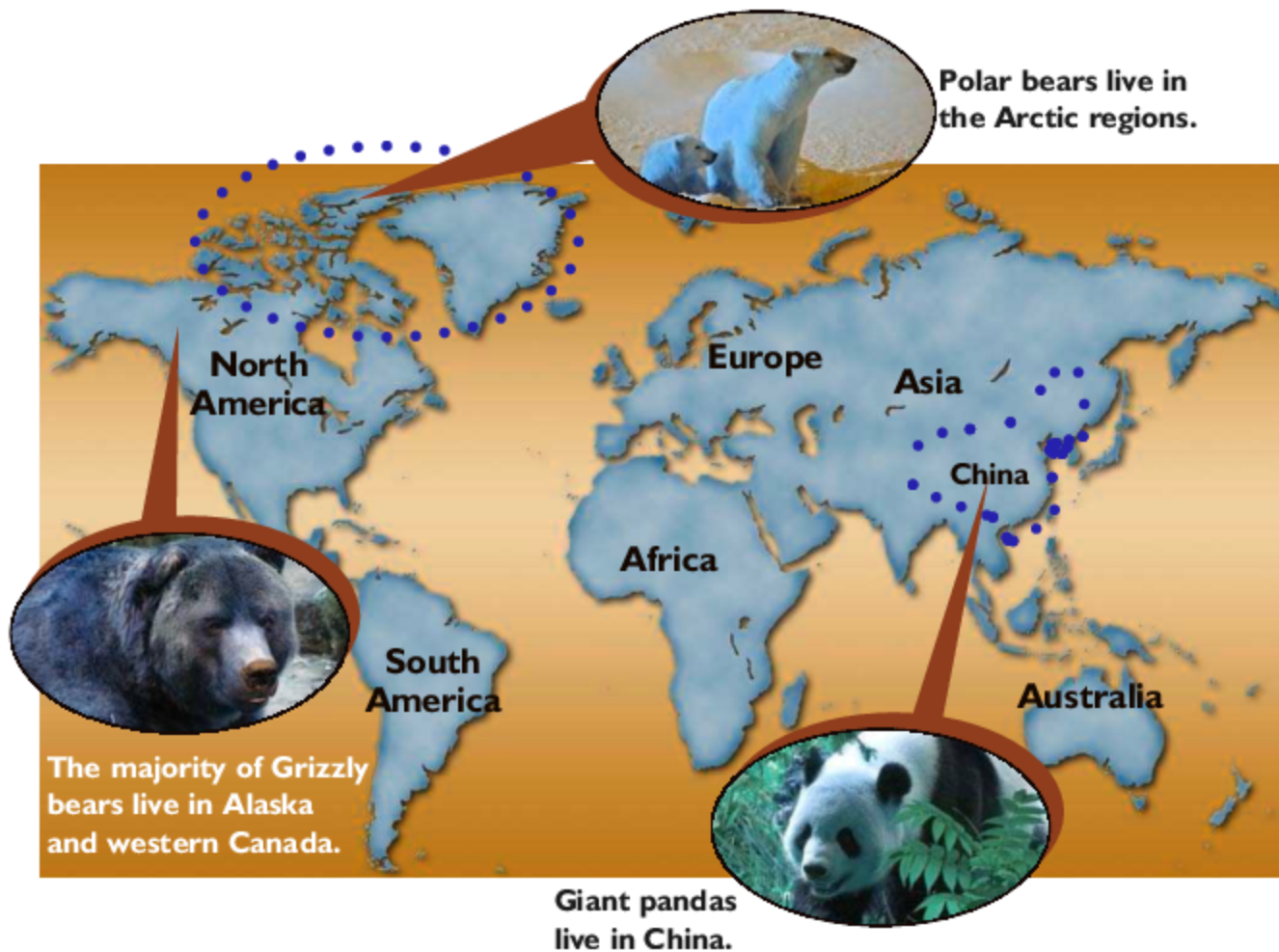


Polar bears have thick, woolly fur to keep them warm.

PROJECTS

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ANIMAL LIFE



Cats

Some wild mammals are related to domesticated cats. Cats are one type of mammal that comes in many sizes and colors. Cats hunt other animals and have sharp teeth and claws. Many are good climbers.

Tigers are the largest cats. They live in Asia. Most tigers are orange with black stripes. Unlike other cats, tigers like water. They hunt alone rather than in a group.









Tigers are an endangered species.

ANIMAL LIFE

Lions have light brown fur. They live in Africa and India. It is easy to tell if the lion is male because he has long, darker fur around his head called a mane. Lions live in a group called a pride. Usually, only one male lion will be in the pride. The female lions hunt for food for the pride and will hunt in a group.

Leopards live in Asia and Africa. They have light brown fur with black spots. A leopard hunts alone and drags its prey into a tree to hide it from other hungry animals.

Cat	Details
Cheetah 	Habitat: Africa Length: 6-7 feet (1.8-2.15 m) Weight: 100-125 pounds (45-55 kg)
Jaguar 	Habitat: South and Central America Length: 4-6 feet (1.2-1.8m) Weight 79-300 pounds (36-136 kg)
Leopard 	Habitat: Asia and Africa Length: 3.5-5.5 feet (1-1.7 m) Weight: 65-175 pounds (30-80 kg)
Lion 	Habitat: Africa and India Length: 6 feet (1.8 m) Weight: 420 pounds (190 kg)
Cougar 	Habitat: North and South America Length: 6 feet (1.8 m) Weight: 200 pounds (90 kg)
Tiger 	Habitat: Asia Length: 4.5-9 feet (1.4-2.7 m) Weight: 500 pounds (230 kg)

ANIMAL LIFE

Dogs

Some wild mammals are related to domesticated dogs. These mammals are predators that often hunt in groups, called packs.

Coyotes look like a small, light brown wolf. They live in North America and may hunt near people's homes. A coyotes howling and other sounds are one of the few wild mammal sounds commonly heard by humans.



Coyotes are often seen in well populated areas.

Foxes are smaller than coyotes and have a bushy tail and large ears. Foxes are well adapted to all habitats such as the Arctic, deserts, forests, and grasslands.

Jackals look like the coyote. They live in Africa and Asia. Jackals usually live alone or in pairs.



A Black-backed Jackal.

Wolves are larger than most domestic dogs. They may be gray or red. Wolves live in North America, Europe, and Asia.



Wolves live and hunt in packs.

There Are Different Kinds of Foxes

Arctic Fox. They live in Arctic regions of Europe, Asia, Iceland, Greenland and North America.



Desert Fox or Fennec. Can be found in the Sahara Desert of North Africa.



Red Fox. They live in parts of the United States, Canada, Europe, Asia and Australia.



Elephants and Rhinos

Elephants are the biggest land animals. Adult elephants can weigh six tons (5,443 kg) or more. There are different types of elephants in different parts of the world. The African elephant is larger than the Asian or Indian elephant and also has bigger ears.

Male elephants have long teeth called tusks made of ivory. Muscles in an elephant's trunk let it pick up objects and drink water. Elephants eat hundreds of pounds of plants every day.



African elephant.



Indian elephant.

African elephants have larger ears than Indian elephants.

Find out more

Elephants have few natural enemies except man. They are in danger of extinction because of loss of habitat and poaching. Elephants are hunted for their ivory tusks which have been used to make items such as jewelry and piano keys. They are listed as an endangered species. Conservationists are trying to protect the elephant by making laws to ban the sale of ivory.



ANIMAL LIFE

Rhinoceros, or rhinos, are another large mammal from Africa and Asia. They have thick gray skin and little hair, like the elephant. A rhino has one or two horns on its nose.

Hoofed mammals

Many mammals have a hard piece on the bottom of each foot called a hoof. They eat plants and often live in groups called herds. Many have horns or antlers on their heads. Some of these mammals are domesticated, such as horses, cows, sheep, goats, and pigs.

Other hoofed mammals live in the wild, such as antelope, bison, deer, giraffe, and zebras.

Zebras live in Africa. Zebras are like horses with black-and-white stripes.



The rhinoceros uses its horns as a weapon for fighting.

Giraffes also live in Africa. They have long legs and a very long neck. Giraffes can reach leaves at the tops of trees.

Camels live in the deserts of Africa and Asia. They are a large animal that has one or two humps on its back. Camels have one nail and a large, soft pad instead of a hoof. This helps them walk on sand.

There Are Different Kinds of Hooves

Animals like horses, donkeys, and zebras have one hoof on each foot.



Animals like goats, deer and cows have cloven hooves. They look split.



Camels do not have hooves. Instead they have a two-toed foot with toenails.



ANIMAL LIFE

Marsupials

Marsupials are mammals with a pouch. The pouch is where the developing young marsupial lives when it leaves its mother's uterus. In the pouch a baby marsupial finds a nipple where it can drink the milk from its mother. The baby will complete its development in the pouch. It will not leave the pouch until it can survive outside. Most marsupials live in Australia and South America.

Kangaroos are the largest marsupials. They have small front legs, large back legs, and a thick tail. The kangaroo uses its back legs to leap high and far. It often stands on its back legs.

Kangaroos eat plants. A baby kangaroo is called a joey. The joey may ride in its mother's pouch to feed or travel until it is a year old.



A joey feels safe in its mother's pouch.

Koalas are another marsupial from Australia. They look like a bear. Koalas live in eucalyptus trees and eat the trees leaves and young bark. A female koala carries its baby on its back until the offspring is a year old.



A koala baby holds on tight to its mother's back.

Opossums are the only marsupial native to North America. They have a long nose and a tail like a rat. Opossums can hang upside down by their tails. They often live near people and search garbage cans for food. Opossums will eat both plants and animals.



Opossums love to search garbage cans for food.

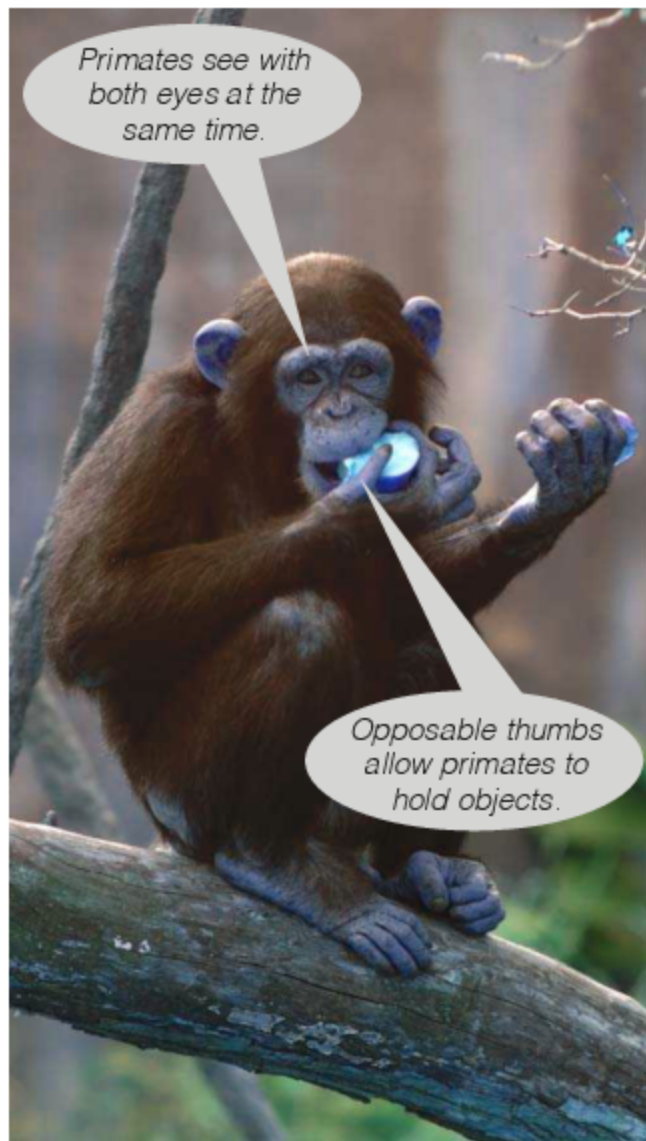
ANIMAL LIFE

Primates

Humans belong to the group of mammals called primates. The other primates are apes, monkeys, and lemurs. Primates depend on their eyesight to find food or locate a mate. Their eyes are on the front of their faces. Primates see the world with both eyes at the same time. The image seen by one eye overlaps with the image that the other eye sees. This gives primates a good sense of depth, or how far away something is. Primates can see in color, unlike most other animals.

Primates have bodies that are good for climbing trees. They have long arms and legs. Their thumbs are opposable. This means that the bone of the thumb can turn, or rotate, to touch the other fingers. The hands of primates can hold branches or food.

Primates have nails instead of claws. They have small folds on the palms of their hands and soles of their feet to help them hold objects. In humans, these folds are fingerprints. Lemurs and many monkeys have long tails. Apes and humans do not have tails.



Words to know

- **domesticate** (duh-MESS-tuh-kate): to tame something so it can live with or be used by humans
- **native** (NAY-tiv): an animal or plant that originally lived or grew in a certain place
- **poacher** (POHCH-UR): a person who hunts or fishes illegally
- **vertebrate** (VUR-tuh-brate): any animal that has a backbone
- **wild** (WILDE): natural or not tamed by humans

ANIMAL LIFE

Apes

Apes live in Africa and Asia and on some islands in the Pacific Ocean. They have no tails. Apes include gorillas, chimpanzees, orangutans, gibbons, and siamang.

Gibbons are small apes. They have very long arms and swing from tree branches.



Chimpanzees live in Africa. They are smaller than gorillas and have dark fur and skin. Chimpanzees walk on their knuckles like the gorillas, but spend more time in trees.

Chimpanzees may use tools in the wild. They will use a stick to get ants or termites out of a hole or to scare away an unwanted intruder.



Gorillas live in Africa. They are very large and strong. Gorillas have dark fur and skin. They walk on their feet and the knuckles of their hands. They can climb trees, but do not do so very often. Gorillas eat mostly plants, but they may also eat meat.



ANIMAL LIFE

Orangutans live on the Pacific islands of Borneo and Sumatra, near Asia. They have brown skin and long red fur. Orangutans climb with their hands and feet. They live in trees and eat plants.



A pair of orangutans

Lemurs

Lemurs are small primates. They live on the island of Madagascar, near Africa. They have small heads, large eyes, soft fur, and a long bushy tail. Most lemurs eat leaves, fruit, flowers and sometimes insects or small vertebrates. Some scientists put lemurs in their own group because they have some differences from other primates.



Ruffed Lemurs are just one of many kinds of lemurs.








Monkeys

Monkeys are called either New World monkeys or Old World monkeys. New World monkeys live in Central and South America. They live in trees and have long tails. Some use their tails to hang from trees. Howler monkeys can make loud noises. Old World monkeys live in Africa and Asia. They have small tails. The baboon has a long nose, lives on the ground, and eats both plants and animals.



A Red howler monkey.

ANIMAL LIFE

Primate		Where They Live
Chimpanzees		Africa
Gibbons		Tropical rainforests in Southeast Asia
Gorillas		Africa
Orangutans		Borneo and Sumatra, near Asia
Lemurs		Madagascar, near Africa
Monkeys (Old World)		Africa and Asia
Monkeys (New World)		South and Central America

ANIMAL LIFE



Jane Goodall
(1934-)



Dian Fossey
(1932-1985)



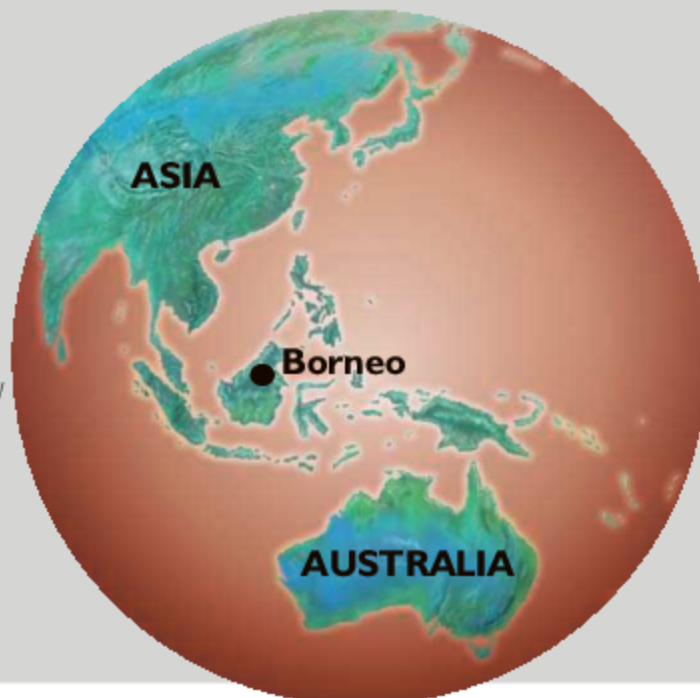
Biruté Galdikas
(1946-)

Getting to know...

Three women are famous for studying the behavior of apes. Jane Goodall was born in England in 1934. She went to Tanzania, in Africa, to study chimpanzees. Dian Fossey was born in San Francisco in 1932. She went to Zaire, in Africa, to study gorillas. Biruté Galdikas was born in 1946 and grew up in Canada. She went to the Pacific island of Borneo to study orangutans.

All three women were students of Louis Leakey (1903-1972). He was both an anthropologist, a scientist who studies humans, and a paleontologist, a scientist who studies fossils. He wanted to learn about apes so he could understand humans better.

Goodall, Fossey, and Galdikas lived with the apes and got to know them well. They studied the social system of the animals. They tried to protect the apes from human diseases, the destruction of their habitats, and poachers.



Rodents

A rodent is a small mammal. All rodents' front teeth continue to grow like your fingernails. They gnaw on food or other things to grind down their front teeth. Rodents often nibble nuts and seeds in small bites.

Rodents that live in the wild include squirrels, gophers,

porcupines, chipmunks, and prairie dogs. Many people keep rodents such as mice, rats, guinea pigs, and hamsters as pets. Rodents reproduce frequently and usually have many offspring. Some mammals that are like rodents are rabbits and shrews.



All rodents have 2 large front teeth and claws on their feet.

There Are Different Kinds of Rodents

Capybaras are the largest rodent in the world.



Some rodents, like hamsters, make good pets.



A porcupine is a rodent covered in quills.



ANIMAL LIFE

Water mammals

Some mammals spend most or all of their lives in water. For example, beavers live both on land and in the water while manatees live their whole life in the water.

Hippos, or hippopotamuses, are a large animal with thick, gray skin like an elephant. Their eyes, ears, and nostrils are located high on their heads so the hippo can stay deep in the water for long periods of time. Hippos do this to stay cool and avoid getting sunburned.

Otters are furry mammals that eat fish and mollusks in rivers and the ocean. They float on their backs and break open shells with rocks.

Beavers are furry rodents that use branches to make dams across rivers. They build homes that they enter from underwater.



Hippo



In the water, otters lie on their backs and use their stomachs as a table.



Beaver



A beaver dam.

ANIMAL LIFE

Seals, sea lions, and walrus.

Seals, sea lions, and walrus have webbed flippers to help them swim in the ocean. They can move on land, but are clumsy and slow. They spend time lying around on beaches or rocks. Seals and sea lions eat fish while walrus eat clams, snails, crabs, and worms. Walrus have long tusks.

Both male and female walrus have tusks.

**What's the Difference Between a Sea Lion and a Seal?**

Sea lions have ear flaps.

Sea lions have longer necks and sleeker bodies than seals.

Sea lions make loud "barking" noises.

Sea lions have long front flippers which they use to "walk" on land.

Seals have tiny openings for ears and no ear flaps.

Seals make quieter "grunting" noises

Seals have small front flippers. They crawl on their belly when on land.

ANIMAL LIFE

Whales and dolphins. Whales and dolphins cannot live on land. They live in the ocean and must come to the surface to breathe air. A whale

or dolphin breathes through a nostril on its back called a blowhole. The blue whale is the largest animal in the world.

There Are Different Kinds of Whales and Dolphins

Beluga Whale



Also known as White whales. The beluga is able to change the shape of its head by blowing air around its sinuses. Belugas do not have a fin on their back.

Blue Whale



A Blue whale's tongue is about the size of an elephant and 50 humans could stand in its mouth. Blue Whales eat krill. They are Baleen Whales.

Bottlenose Dolphin



Bottlenose dolphins are the most common and well-known dolphins. They have small, cone-like teeth. They mostly eat small fish.

Humpback Whales



The Humpback's head and lower jaw are covered with knobs, called tubercles. Humpbacks are baleen whales.

Orca



Also known as Killer whales, Orcas belong to the dolphin family. The Orca's intelligence and trainability have made it popular at theme parks.

Southern Right Whale



There are four right whale species: North Atlantic Right whales, North Pacific Right whales, Southern Right whales, and Bowhead whales.

Mating and Reproduction in Animals

Mating

One of the most fascinating aspects of human life is how we choose our mates. Animals also choose their mates, sometimes with a great deal of care. Mating systems are important to understand because they reflect the result of natural selection on mate choice, and ultimately on strategies for maximizing individual reproductive success. A mating system describes how males and females pair when choosing a mate. Males and females differ greatly in the investment each makes to reproduce, and therefore approach mating with differing strategies. To study these differences,



Male peacocks have magnificent feathers of many colors which they use to attract a mate.

scientists observe mating systems and describe how males and females come together. When choosing mates, animals evolve species-typical strategies for maximizing their reproductive success — this results in considerable diversity among animal species in their mating patterns.



Both the male and female Emperor Penguins care for their egg.

Reproduction

All species of animals must have offspring in order to survive. Animals give birth to their offspring through reproduction. Reproduction happens in different ways for different animals. Some make copies of themselves. Some lay eggs. Others have live births. Reproduction is the beginning of the cycle of life.

ANIMAL LIFE

Asexual reproduction is the way many single-celled organisms and other animals have offspring. This means that one organism or animal makes exact copies of itself all by itself. An amoeba splits its nucleus in half. Each half becomes a new amoeba. This is called mitosis. Some animals, like jellyfish, reproduce by breaking off a part of their bodies. This part grows into a whole new jellyfish. This is called regeneration. Many coral plants reproduce by budding. Budding happens when a new animal grows from a parent. Thousands of coral animals live together in colonies.



Find out more

Starfish Can Regenerate

When some fishermen wanted to get rid of the starfish in their nets, they cut the starfish into pieces and threw them into the sea. To their surprise they had even more starfish. A starfish can regenerate, or grow new tissue. Each piece became a new starfish!



Coral reefs are made up of thousands of coral animals.

Sexual reproduction is reproduction involving the male and female of a species. Each parent produces special cells called gametes. Female gametes are called ova or eggs. They come from the ovaries. Male gametes are called sperm. They come from the testes. Each gamete contains half the genetic material for a complete animal. Fertilization happens when the male and female gametes join together.

Words to know

- chrysalis** (KRIS-suh-liss): a butterfly at the stage of development between a caterpillar and an adult
- fertilize** (FER-tuh-lize): to begin reproduction in an egg by causing sperm to join with the egg
- fetus** (FEE-tuhss): a baby or an animal before it is born, at the stage when it is developing in its mother's womb
- gamete** (gam-EET): the male (sperm) or female (egg) reproductive cell of an organism
- larvae** (LAR-vee): insects at the stage of development between the egg and the pupa, when it looks like a worm
- pupa** (PYOO-puh): an insect at the stage of development between a larva and an adult

ANIMAL LIFE

Bird Reproduction

Birds reproduce by laying eggs with hard shells. The eggs are fertilized in the female's body during mating. The female then lays the eggs in a nest. The mother or father sits on the eggs to keep them warm. This is called incubation. The eggs hatch in two or three weeks. Baby birds, or chicks, are born blind and without feathers. They must be fed and kept safe until they are ready to fly.



Chicks are born blind and without feathers.

Fish Reproduction

Fish and amphibians reproduce by spawning. Spawning occurs when a female releases eggs into the water. A male fertilizes the eggs by covering them with sperm. The eggs of most reptiles are fertilized inside the mother's body. This happens during

mating, when the male puts sperm in the female's body. Most reptiles lay soft-shelled eggs on land. Some snakes and lizards have eggs that hatch inside the mother's body.



Close-up of a frog's eggs.


Find out more
Male Seahorses Give Birth

Seahorses are bony fish with heads that look like those of horses. Female seahorses lay eggs inside a pouch on the male's stomach. The male gives birth to young seahorses when the eggs hatch! The father takes care of them after they are born.



ANIMAL LIFE

Insect Reproduction

Most female insects lay eggs. Male insects fertilize the eggs. Baby insects are called larvae. Larvae from many insects look like tiny adult insects. Some flying insects larvae do not have wings. They often look like little worms. These larvae must go through metamorphosis, a change in form, before they become adults.



Caterpillars hatch from butterfly eggs. Through metamorphosis they will become butterflies.

Find out more 

Metamorphosis

Some animals have babies that look nothing like their parents. Many insects and some amphibians go through a dramatic change in form as they become adults. This change is called metamorphosis. Butterflies and bees go through a complete metamorphosis. Butterflies lay eggs that hatch into larvae called caterpillars. A caterpillar spends its time eating and growing. It enters the pupa stage by forming a chrysalis. The caterpillar develops into an adult butterfly inside the chrysalis case. The metamorphosis is complete when the butterfly comes out of the case.

The Butterfly Life Cycle

A butterfly lays eggs.

The eggs become larvae (caterpillars).

A caterpillar forms a chrysalis.

A caterpillar develops into a butterfly inside the chrysalis.

A fully developed butterfly comes out of the chrysalis.



ANIMAL LIFE

Amphibian Reproduction

Frogs go through metamorphosis. The larvae that hatch from frog eggs are called tadpoles. They look like fish because they have gills and a tail that looks like a fin. Tadpoles slowly change into frogs. They grow legs and a mouth after several weeks. Their tails are reabsorbed, or taken back into their bodies. The metamorphosis is done when the tadpole becomes a frog. (See page 19 to see how frog larvae changes into frogs).

Mammal Reproduction

Most mammals carry their offspring in the mother's body until they can live on their own.

Marsupials such as koalas have babies that are not fully developed when they are born. The young marsupial crawls up its mother's fur into a pouch. It grows in the pouch until it can live on its own.



A koala with her baby

Monotremes are mammals that lay eggs. The only monotremes are the platypus and the spiny anteater. All other mammals give birth to live young.

Placentals are mammals that carry babies in their bodies until they are fully formed. Most mammals are placentals. The developing fetus is connected to the mother through the placenta. The placenta is an organ through which the fetus gets nutrients. The time that the fetus stays inside the mother is called the gestation period. The gestation period for elephants is almost two years. It is less than a month for mice. The gestation period for primates can be as long as nine months.



A model of a human baby inside its mother.

ANIMAL LIFE

Reptile Reproduction

All reptiles hatch from eggs fertilized inside the female. Most reptiles lay their eggs in nests before the young hatch. Sea turtles lay their fertilized eggs buried in a nest in the sand and leave the eggs unprotected. The newly hatched sea turtles must find their way back to the sea on their own. Pythons lay their fertilized

eggs in a nest and protect them from predators.

Some female reptiles such as rattlesnakes carry the eggs inside their bodies. The eggs hatch inside the snake's body and then the mother gives birth to live young. Once the snakes hatch and are born, the young snakes must fend for themselves.

Different Animals Have Different Gestation Periods

Cat



7–10 week gestation period.
Cat babies are called kittens.

Dog



7–10 week gestation period.
Dog babies are called puppies.

Elephant



73–104 week gestation period.
Elephant babies are called calves.

Human



36–43 week gestation period.
Human babies are called infants.

Animal Adaptations

Animals have to adapt to the world in which they live in order to survive. Every species of animal has a different way of surviving. Species develop better ways of dealing with their environment over time. Traits that help an animal survive are passed on to the next generation. Traits that are not needed may disappear. After many generations, these changes become adaptations. Adaptations can be both behavioral and physical traits. Physical adaptations might include the shape of a bird's beak, the shape of nose or ears, or even fur color. Behavioral adaptations include special ways animals mate, defend themselves, move around, or get food.



An Arctic fox's fur is white when there is snow on the ground.

Behavior

Behavior is what animals do. Some types of behavior are called instincts. Instinct behaviors happen without the animal thinking about it. All animals are born with instincts, like knowing how to eat and sleep. Some behaviors are taught by parents. A female mountain lion may bring home a live rabbit to show her offspring how to hunt. Some behaviors are taught by experience. A dog that is stuck with quills learns not to get too close to a porcupine. Most animals use both instincts and learned behavior to adapt to their world.



When the snow melts, the Arctic fox's fur turns dark. This way it blends into its surroundings.

Defense Mechanisms

Many animals have defense mechanisms. These are adaptations that help them protect themselves, or defend themselves from predators. Porcupines and hedgehogs have sharp spines called quills on their backs and tails. The quills rattle when they are shaken. This is a warning to their enemies. The porcupine can release quills into the nose or body of a predator if attacked.



Porcupine quills.

A skunk raises its striped tail when threatened. If the attacker does not go away the skunk squirts a bad-smelling liquid to make the attacker leave. Squids and octopuses can squirt a dark ink in the water when threatened. The ink hides them so they can escape. A turtle has a hard shell that surrounds its entire body. Only the head and legs stick out. It can quickly pull them inside if attacked.



A cuttlefish.

Many animals protect themselves simply by the way they look. Some animals try to hide against a background. They hide themselves with colors or patterns that match the world around them. This is called camouflage. The stripes on zebras help them blend into one another when they stand in a herd. This makes it difficult for a predator to pick out a single zebra.



With so many stripes, it's hard to find one zebra!

ANIMAL LIFE

Some insects look like leaves and sticks. Leaf butterflies in southern Asia look exactly like tree leaves until they move. Stick insects look like twigs and branches of plants.



Stick insects look like part of the plant they hide in.

Bright colors on animals attract mates and warn predators. Many butterflies have brilliant colors. Their coloring helps males and females find each other for mating. Bright red insects often warn predators that they are poisonous. Red ladybugs taste bad.



The ladybug's color warns predators not to eat them.

Hunting

Predators are meat-eating animals that hunt for their food. Many types of animals hunt. Birds hunt for insects to feed themselves and their offspring. Birds of prey hunt small rodents, fish, and other birds.



Osprey hunt fish.



Smaller birds hunt worms and insects.

ANIMAL LIFE

Cats and dogs are the best hunters among land mammals. Cats, like tigers and leopards, usually hunt alone. A cat watches from a hiding place and sneaks up close to its prey. Sometimes, cats hide the dead body, or carcass. They can eat from it for several days. Mothers may bring the carcass back to their offspring. Lions are the only cats that hunt in a group, called a pride.



Lions hunt in groups called prides.

Many dogs, like wolves, hunt in a group called a pack. Hunting in a group is a way for predators to work together to catch their prey. The predators will watch for a young or weak animal. As a group they can easily chase an animal that is separated from its herd.



A pack of African wild dogs.

Some animals find or steal food killed by other animals. They are called scavengers. Vultures and hyenas are common scavengers in Africa. Vultures are large birds. Hyenas are like dogs. Both vultures and hyenas try to take carcasses away from other animals.



A vulture

Social Groups

Many animals live in small family groups or larger groups. Even an animal that lives alone may join other animals of its species for mating or migration.

Migration is the movement of large groups of animals from one place to another. They may be looking for food or a warmer climate during the winter. Insects called locusts fly in swarms. Many birds fly south for the winter in groups called flocks.



Birds fly in flocks when they migrate.

Other animals live in large groups for food and protection. Ants, bees, and termites are social insects. This means that they live together in colonies and depend on each other for survival. Life in the colony is controlled by the queen. The queen is larger than the other insects and is the only one in the group that lays eggs.



Some wasps live together in colonies.

Many hoofed mammals live in groups called herds. Some animals in the herd can eat while other animals watch for predators. The males often fight to choose which one is dominant. The dominant members will get to eat before the other members of the herd.



Many hoofed animals live in herds for protection.

Symbiosis

Symbiosis is when organisms of different species live together. Many times an animal's survival depends on a symbiotic relationship. Dust mites must eat dead skin that animals shed. They even eat human's dead skin!

Commensalism

When a symbiotic relationship helps one animal without affecting the other animal it is called commensalism. Remoras are a type of fish that attach themselves to sharks. The remoras get scraps of food and protection from the sharks. The sharks are not affected by this relationship.



A remora attached to a shark.

Mutualism

When a symbiotic relationship helps both animals it is called mutualism. Ants and aphids live together and benefit each other. Aphids make a sweet liquid called honeydew. The ants

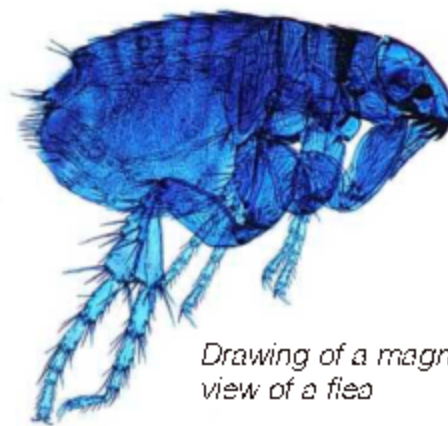
drink the honeydew and feed it to their larvae. The ants build shelters for the aphids and protect the aphid larvae.



Ants provide protection and shelter for aphids in return for honeydew.

Parasitism

When a symbiotic relationship helps one animal and harms the other animal it is called parasitism. Fleas, ticks, and mites are all parasites that are harmful to their animal host.



Drawing of a magnified view of a flea

How We Use Animals

Humans use animals for a wide variety of purposes. Animals such as dogs, cats, and hamsters can be family pets. Horse racing and dog shows can provide entertainment for people. Scientists study animals. Some animals are eaten as food. Humans use many different products made from animals. Farmers raise many of these animals.



Some people enter their pet dogs into dog shows.

As Pets

All kinds of animals are kept in homes as pets. Mammals such as dogs and cats are the most common pets. Some people have birds. Snakes and lizards are common reptiles kept as

pets. Many people keep different kinds of fish in aquariums in their homes. Other people even keep insects as pets. Ant farms and butterfly gardens are fun to watch and see how those creatures move and change. Many people consider their pets to be an important part of their family.

Number of U.S. Households that Own a Pet (millions)

Bird	6.4
Cat	37.7
Dog	43.5
Equine	4.2
Freshwater Fish	13.9
Saltwater Fish	.8
Reptile	4.4
Small Animal	5.7

Total Number of Pets Owned in the U.S. (millions)

Bird	16.6
Cat	90.5
Dog	73.9
Freshwater Fish	139.0
Saltwater Fish	9.6
Reptile	11.0
Small Animal	18.2

In Medicine

Animals get many diseases that are similar to ones that affect people. By studying these animals, medical researchers can learn what causes diseases and how to prevent, treat, or cure them. These findings help both humans and animals. Researchers also study animals to understand how they adapt to different environments. This can help threatened or endangered species.

Based on the traditional assumption that animals respond the same way that humans do when exposed to certain products, unknown numbers of animals, mostly rabbits, mice, and rats, are subject to tests that assess the safety of cosmetic, personal care, household products, chemicals, medical devices, and their component ingredients. Reactions to the exposure of these products vary among species, making it difficult to extract data from animal tests and apply them to situations in which humans are exposed. As a result, animal-based testing methods continue to fail legitimate human needs, while new discoveries in the field of alternatives have led to new and improved techniques that do not involve live animals.



A medical researcher holds an albino rat.

In Scientific Experiments

Scientists study animals to learn about many different things. Experiments are tests to see if an idea works or not. Scientific experiments are done on animals to find out more about animal behavior. They are also done to test drugs, shampoo, and makeup as well as medical advances for humans that might help to cure a disease.

ANIMAL LIFE

For Food

Many animals are eaten as food. Meat from cows is called beef. Meat from a baby cow is called veal. Meat from birds is called poultry. Meat from pigs is called pork. People also eat seafood. Seafood includes all kinds of fish, mollusks, and crustaceans. Mollusks that people eat include squids, octopuses, clams, oysters, and snails. Crustaceans that people eat include

lobsters, crabs, shrimp, and crayfish. Some people like to eat sushi, which is usually uncooked seafood.

Other foods that we eat come from or contain animal products. Honey comes from bees. Milk comes from cows and goats. Chickens can lay unfertilized eggs that are eaten. Gelatin comes from animal tissues and is used in several food products, like some jellies and ice creams.

Bees make honey.



Chickens lay eggs.



Cows produce milk.



ANIMAL LIFE

Animal Rights

Supporters of animal rights believe that animals have an inherent worth—a value completely separate from their usefulness to humans. They believe that every creature with a will to live has a right to live free from pain and suffering. Animal rights is not just a philosophy—it is a social movement that challenges society’s traditional view that all nonhuman animals exist solely for human use. As PETA founder Ingrid Newkirk has said, “When it comes to pain, love, joy, loneliness, and fear, a rat is a pig is a dog is a boy. Each one values his or her life and fights the knife.”

In July, 2015 a lion named Cecil was baited and killed as sport in a national park in Zimbabwe. Jane Goddall said it best: “I was shocked and outraged to hear the story of Cecil, Zimbabwe’s much loved lion. Not only is it



Illegally caged monkey trying to escape.



Many animals are often killed in sport hunting.

incomprehensible to me that anyone would want to kill an endangered animal (fewer than 20,000 wild lions in Africa today) but to lure Cecil from the safety of a national park and then to shoot him with a crossbow...? I have no words to express my repugnance. He was not even killed outright, but suffered for hours before finally being shot with a bullet. And his magnificent head severed from his wounded body. And this behavior is described as a “sport.” Only one good thing comes out of this – thousands of people have read the story and have also been shocked. Their eyes opened to the dark side of human nature. Surely they will now be more prepared to fight for the protection of wild animals and the wild places where they live. Therein lies the hope.”

Endangered Species

The world is losing dozens of species every day in what experts are calling the sixth mass extinction in Earth's history. As many as 30% to 50% of all species are moving toward extinction by mid-century.

Habitat destruction, pollution or overfishing either kills off wild creatures and plants or leaves them badly weakened. The trouble is that in coming decades, the additional threat of worsening climate change will become more and more pronounced and could then kill off these survivors.

Changes to Habitats

Some animals, such as the panther, are endangered because the places they live, known as habitats, are being destroyed.

Humans destroy many animal habitats as they build more houses and cities. Wetland habitats including lakes, rivers, swamps, and marshes are often affected by development. Many birds, insects, fish, and other animals that make their homes in wetlands die when their food supply is destroyed.



Deforestation destroys habitats.

The destruction of forests, or deforestation, throughout the world has also put many animals in danger. In South America, the Amazon Forest is being cut down to make room for farms and to make grasslands for cows. The habitats for many insects, birds, and other animals are being destroyed.

People sometimes release non-native species such as Cuban tree frogs or pythons to a habitat. These new species often destroy the balance of the native animals living in the habitat.

ANIMAL LIFE

Pollution

The biggest human created danger that affects the world environment is pollution. Pollution is the poisoning of water, land, or air by chemicals or other things. The pollution of oceans, lakes, rivers, and streams has killed and endangered many animals. The Great Barrier Reef in Australia is home to thousands of animal species. Much of the coral reef has been destroyed by a combination of pollution and too many starfish.



Fish and coral of the Great Barrier Reef.

Hunting and Poaching

Hunting and poaching, or illegal hunting, are threats to many species of mammals. Whales are killed for their oil and meat. Monkeys are taken from forests in Africa and South America for medical research. Elephants and rhinos are killed by poachers for their ivory tusks and horns. Many of these animals have become endangered.



Zebras are killed for their skins.

Words to know

- **activist** (AC-tiv-ist): a person who speaks or shows support for a cause
- **endangered** (en-DAN-jered): to threaten with extinction
- **extinct** (ex-STINGKT): when a type of plant or animal has died out
- **pollution** (puh-LOO-shuhn): harmful materials that damage or contaminate the air, water, and soil, such as chemicals, gasoline exhaust, and industrial waste
- **preservation** (pres-ur-VA-shuhn): to protect something so that it stays in its original state
- **threatened** (THRET-uhnd): animals and plants likely to become endangered in the near future

People Who Study Animals

There are many things about animals that can be studied. We study their anatomy, their behavior, and how they live in the wild. We also learn more about our own bodies, behavior, and development when we look at other animals. We study how animal life can have an affect on humans and how humans can have an affect on animals lives. We study their place in the classification of living things and the history of evolution.

Zoology

Zoology is the study of all animals. It is a branch of biology. There are different fields within zoology. They

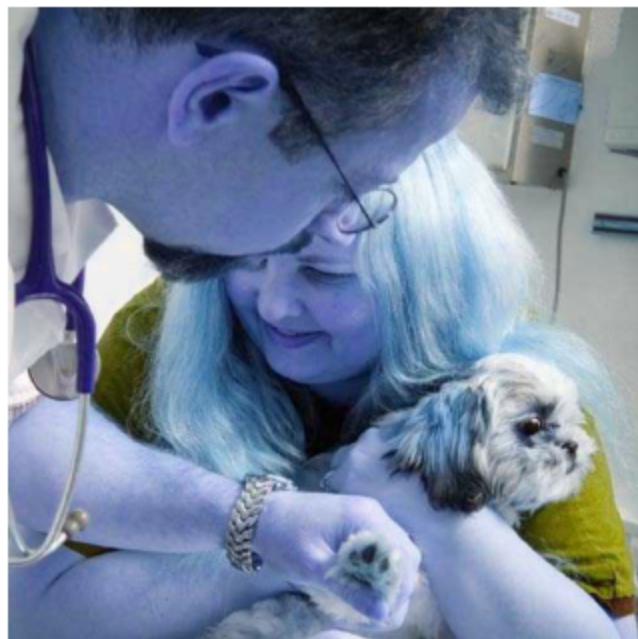


Two marine biologists draw blood from a dolphin.

are divided into types of animals that are studied. An entomologist studies insects. A herpetologist studies reptiles and amphibians. An ornithologist studies birds. A marine biologist studies animals that live in the ocean. Ethology is the study of animal behavior.

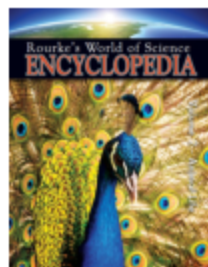
Veterinarian

A veterinarian, or vet, is a doctor who keeps animals healthy and cares for sick or injured animals. Most veterinarians treat pets. Some treat farm animals, wild animals, and animals that live in zoos.



A veterinarian examining a small dog.

Book Index



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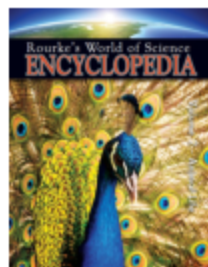
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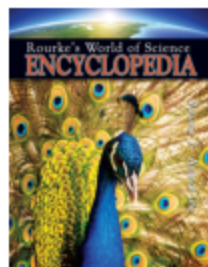
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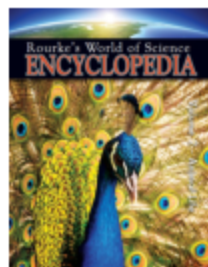
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