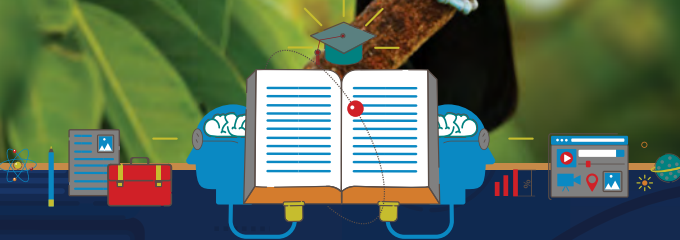


# RAINFOREST LIFE

A SCIENCE 3D ADVENTURE

GRADE 3



By MIKE HEITHAUS Ph.D

symbioeducation™



# KEY WORDS

Look for these words and try to figure out their meaning.

**BIODIVERSITY**

**CLIMATE**

**COLD-BLOODED**

**ECOSYSTEM**

**ENDOSKELETON**

**ENERGY**

**EXOSKELETON**

**FOOD WEB**

**INVERTEBRATE**

**MATTER**

**NOCTURNAL**

**ORGANISM**

**PREDATOR**

**TRAIT**

**VERTEBRATE**

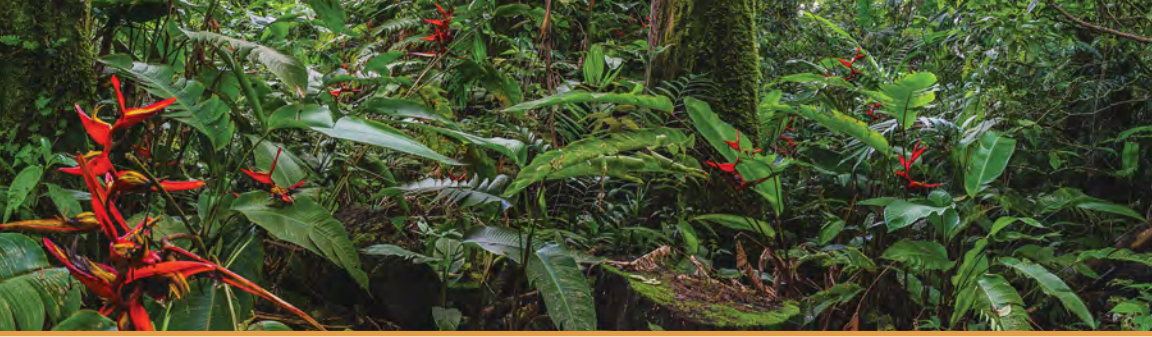
**WARM-BLOODED**

**WEATHER**



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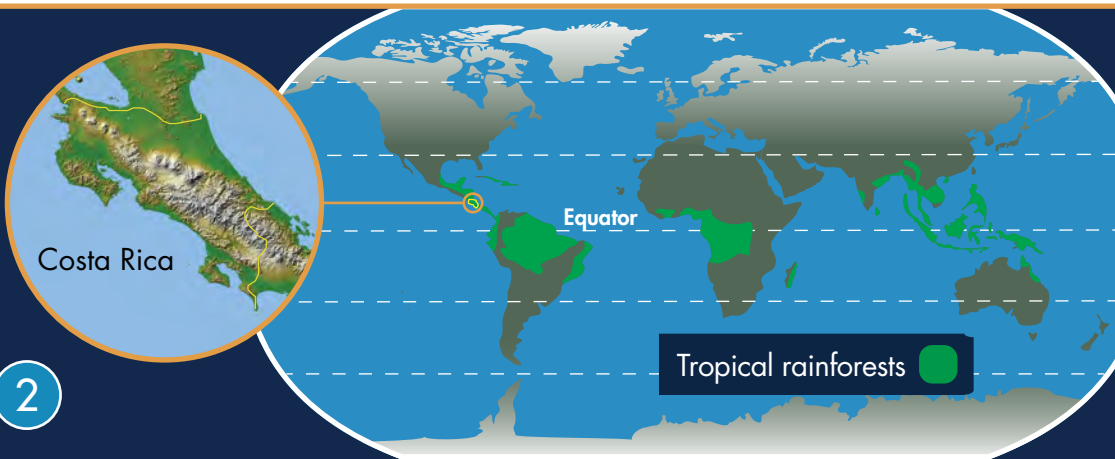
## WET AND WARM

Close your eyes and imagine a place that is hot and rainy. Picture many different animals, trees and other plants. What habitat did you imagine?



Tropical rainforests are amazing places! They are home to millions of species of plants, animals, and other organisms. The number of different species in a place is its **biodiversity**. Tropical rainforests have the highest biodiversity of any **ecosystem** on land. One reason there are so many species is the **climate**. The **weather** in tropical rainforests is the same all year. It is warm and may rain. There is plenty of water for the plants.

Tropical rainforests are found near the equator. They are found in Central America, South America, Africa, Asia, and Australia. Let's explore the tropical rainforest of Costa Rica!



# PLENTY OF PLANTS

If you walk in a rainforest, the first thing you will notice are plants. The rainforest is covered in plants! How do plants get food? They make their own! They use energy from the sun, air, and water to make food. They use this food to grow and reproduce.

The temperature, amount of water, and sunlight all affect how plants make food. If it gets too cold, plants can't make food. If there isn't enough sunlight, they can't produce enough food. They need enough water to grow and maintain their bodies. What do you think would happen in a rainforest if the rains stopped?



# WHAT KIND OF PLANT IS IT?

## FERNS

Reproduce with spores

Have flowers and fruits

Have cones; don't have flowers



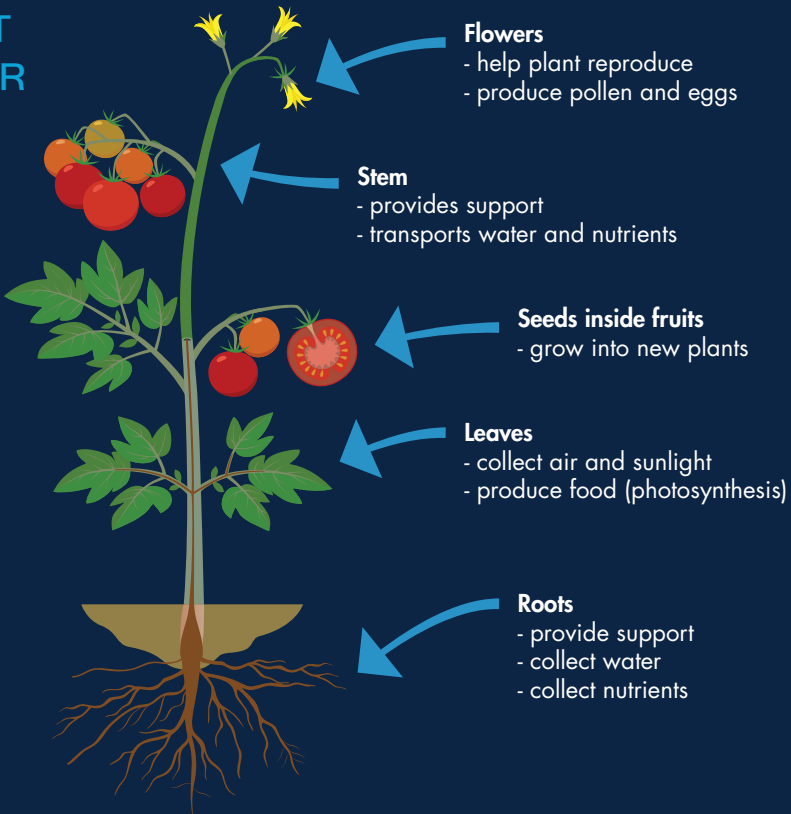
## FLOWERING PLANTS



## CONIFERS

Reproduce with seeds

### PLANT POWER BOX



Large amounts of water and sunlight in the rainforest means there are many kinds of plants. Each plant is built for its environment. Some are tall trees with small leaves. Since they are tall, they don't need big leaves to get a lot of sun. Some are short plants with huge leaves. Since tall trees block the light, there is not much light on the forest floor. Plants growing near the ground need to have big leaves to get enough sunlight!



Not much sunlight hits the forest floor. Big leaves help catch more sun in the shade. Tall trees don't need big leaves. There is plenty of light high in the canopy.

Plants look a lot like their parents. They get most of their characteristics from them. If the parent plants have bark or a stem, the offspring will have bark or a stem. They also inherit the shape of their leaves. The color of flowers passes from parents to offspring too.

But not all plants look the same. Even plants of the same type may look different. This could be because they have different parents. Other differences are caused by their environments. A plant that grows in the shade may not grow as tall as a plant that gets a lot of light. Can you think of other things that might influence how plants look?

Most people think plants just sit there doing nothing. But plants can respond to the environment! Their stems can bend to follow the sun as it moves across the sky. Flowers open and close. And, roots grow down in response to gravity. What do you think would happen if plants grew in a space station with no gravity? How would their roots grow?



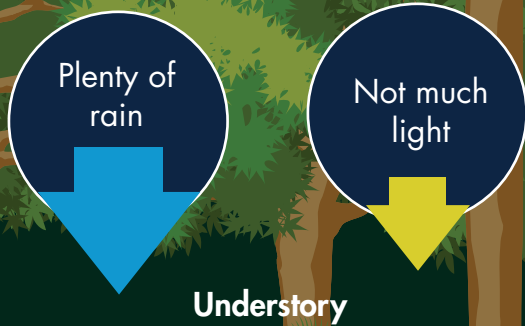
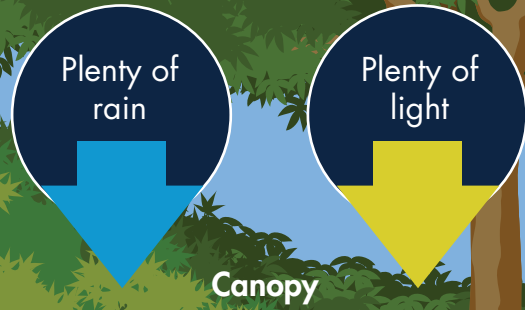
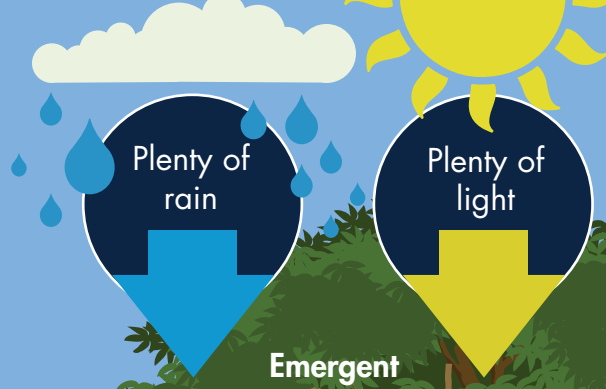




Red-eyed tree frog

# RAINFOREST HIGHRISE

The rainforest is kind of like a building. It has different floors or levels. Each floor has different types of plants and animals. Why are they different? Because each level has a different environment. Check it out!





**Emergent**



**Canopy**



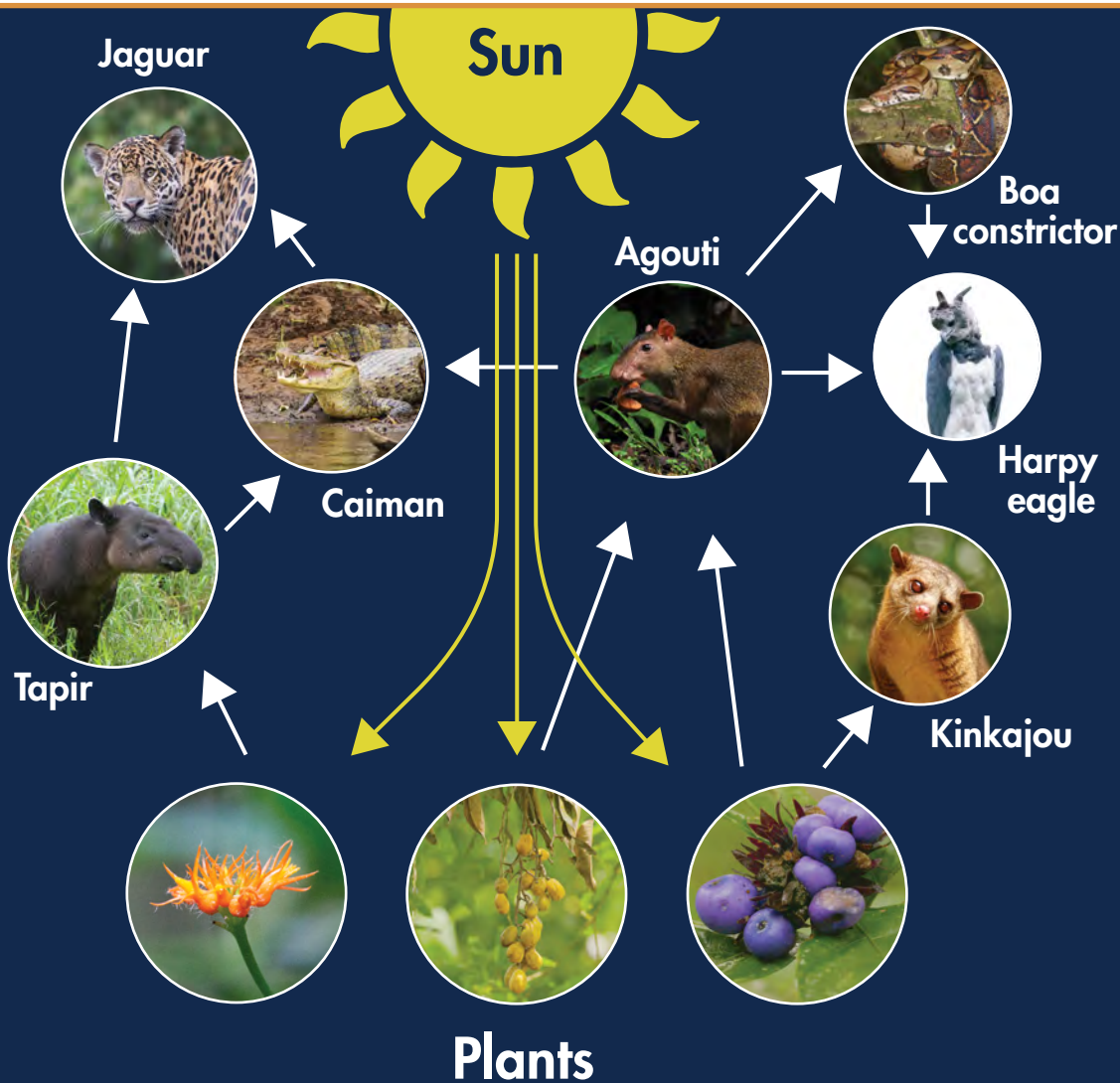
**Understory**



**Forest floor**

# TONS OF ANIMALS

Animals can't make their own food. They need to eat food to get **energy** and **matter**. Where do they get food? From plants or other animals! A **food chain** shows how energy from the sun flows to plants and other **organisms** in an ecosystem.



A food chain shows the flow of energy. A **food web** shows more species. Where did the energy come from that ended up in the harpy eagle? Trace the flow of energy with your finger. If you said the sun, you are right!

Millions of animal species live in rainforests. Here are some of the major groups of these animals.

**Invertebrates** are animals with no backbones. Some rainforest invertebrates include arthropods, worms, and snails.



Arthropods, like this cicada, are invertebrates that have their skeleton on the outside. This is called an **exoskeleton**. As they grow, they shed their exoskeleton in a process called molting.

# Arthropods



Jointed legs

Leaf cutter ants

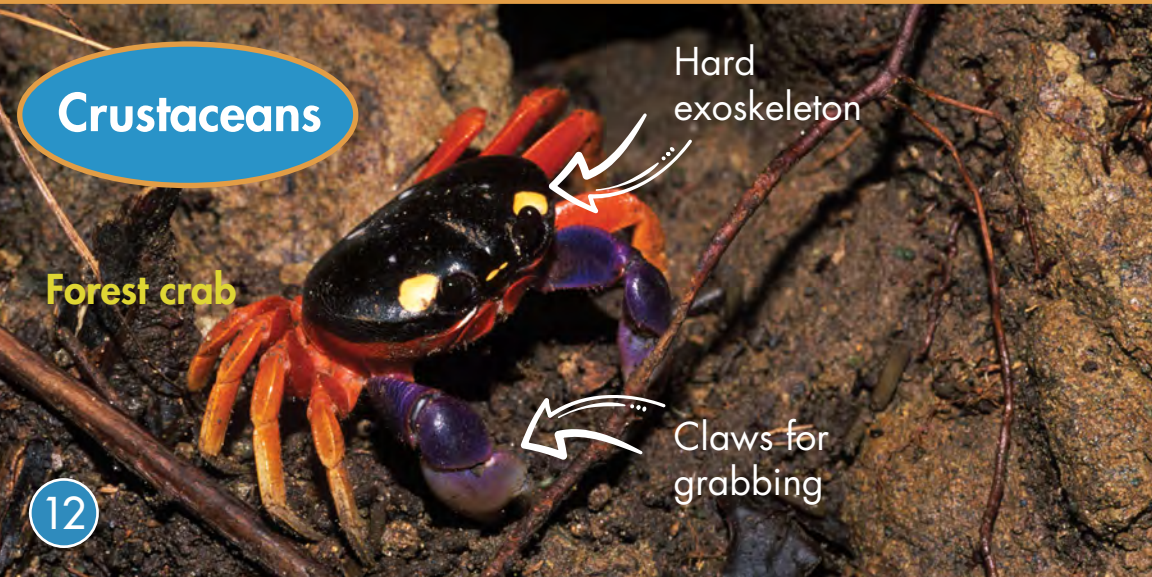
## Insects



Cicada

Wings

## Crustaceans



Forest crab

Hard exoskeleton

Claws for grabbing

# Scorpion

Stinger

Pincers

## Arachnids

Many eyes

Eight legs

Spider

Antennae for sensing environment

Millipede

Many legs

## Myriapods

# VERTEBRATES! LIFE WITH A BACKBONE

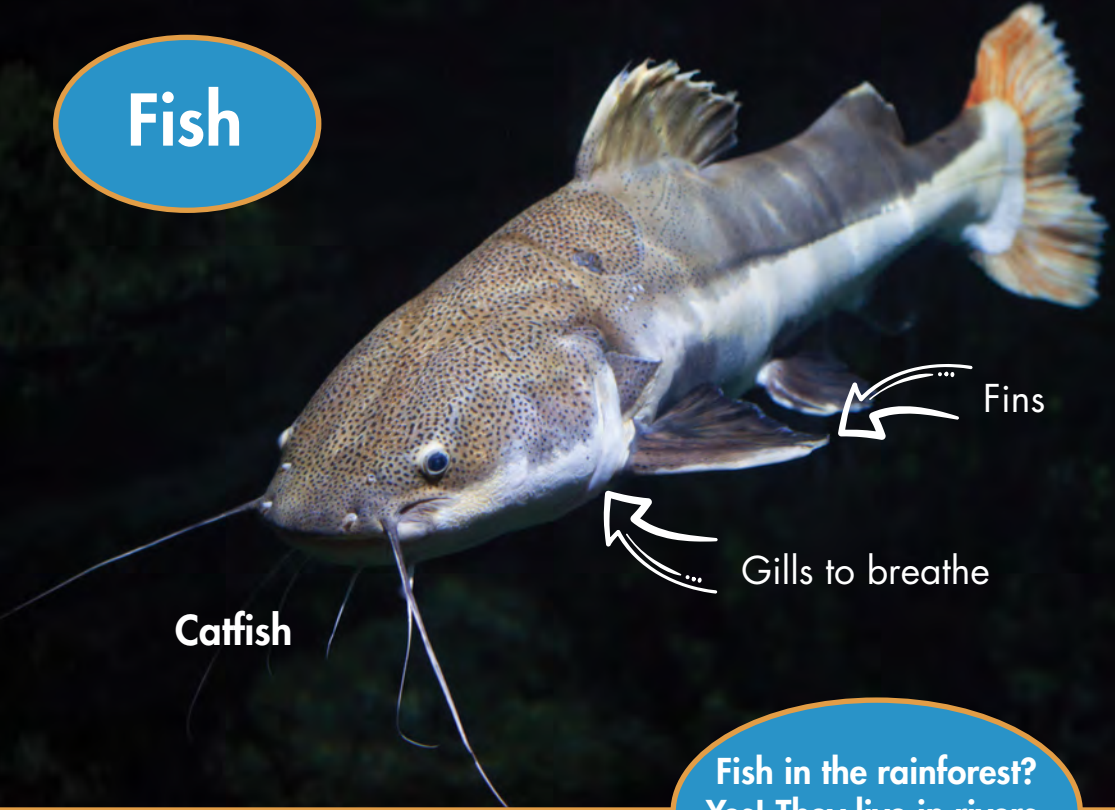


## Pygmy marmoset

**Vertebrates** have skeletons on the inside called **endoskeletons**. They have backbones. All the major groups of vertebrates are found in the rainforest. The different groups have different characteristics.



# Fish

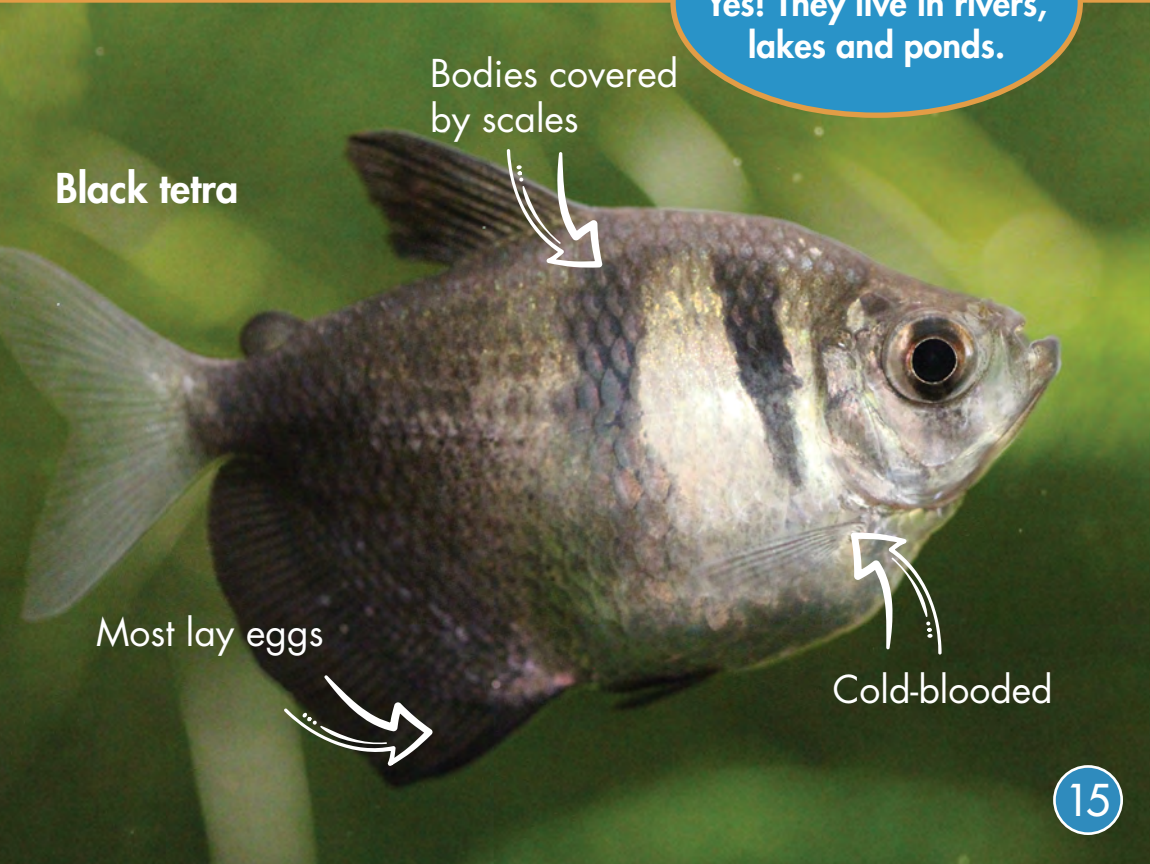


Catfish

Fins

Gills to breathe

Fish in the rainforest?  
Yes! They live in rivers,  
lakes and ponds.



Black tetra

Bodies covered  
by scales

Most lay eggs

Cold-blooded

# Amphibians

Tree frog



Most lay eggs

Lungs to breathe

Eggs have to stay wet or in the water or they will dry out



It is wet enough in the rainforest for some amphibians to lay eggs on plants. Most lay their eggs in water and don't care for their young after they hatch or are born.

Cold-blooded



Bodies covered in moist skin

Salamander

# Reptiles

Caiman

Lungs to breathe

Cold-blooded

Most reptiles live on land.  
Most lay eggs with soft, leathery shells that don't dry out. Others give birth to live young.

Strong senses for hunting or finding food

Pit viper

Bodies covered by dry skin with scales

# Birds



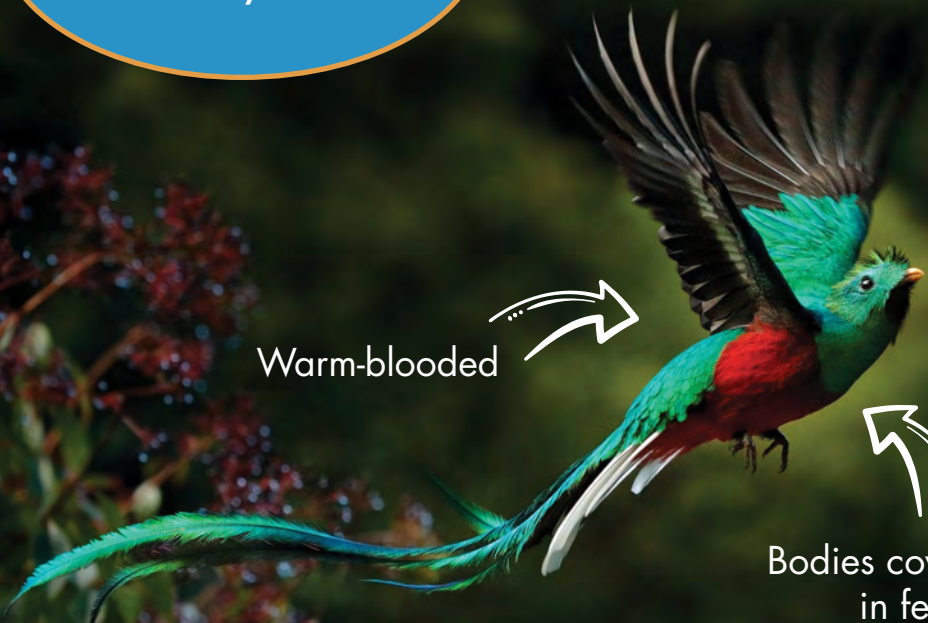
Wings

Lungs to breathe

Macaw

Birds lay eggs with hard shells that don't dry out. They care for their young after they hatch.

Warm-blooded



Bodies covered in feathers

Quetzal

## Harpy eagle

Sharp beaks for eating meat



Some birds are predators



Bill and bodies for feeding from flowers

## Hummingbirds



Some birds eat fruits, nuts, or nectar from plants

# Mammals

Jaguar



Some mammals are predators

Mammals have hair.  
They give birth to live young.  
They produce milk and care  
for their young after  
they are born.

Tamandua



Lungs to  
breathe

Bodies covered in hair



Sloth

Some mammals are herbivores

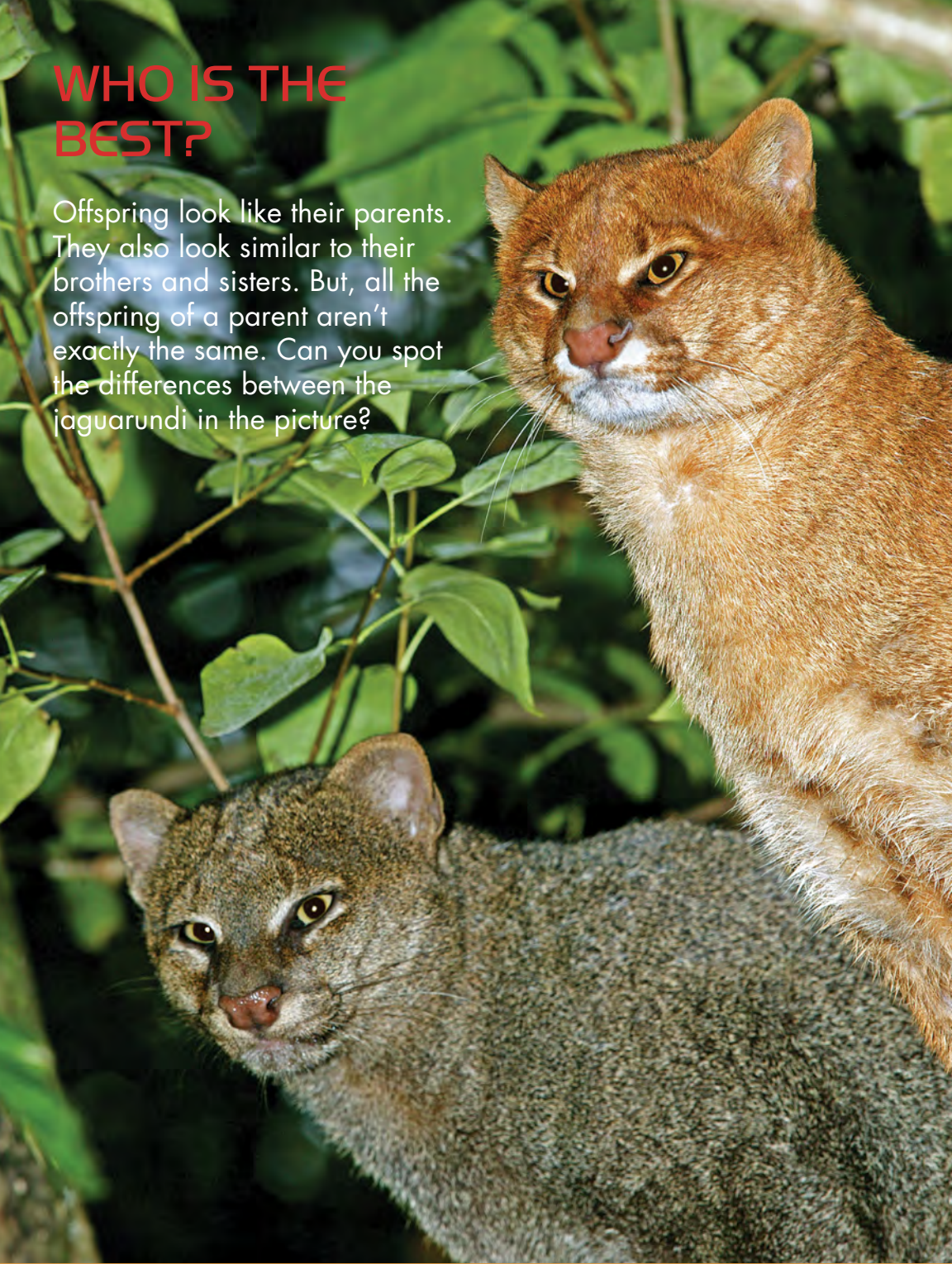
Warm-blooded



Agouti

## WHO IS THE BEST?

Offspring look like their parents. They also look similar to their brothers and sisters. But, all the offspring of a parent aren't exactly the same. Can you spot the differences between the jaguarundi in the picture?



Jaguarundi are forest cats that have two different color types, gray and red. An animal's color is a type of trait. Do differences in traits matter? They can! Individuals with some traits may survive better.



Plants and animals have structures and behaviors, called **traits**, that help them survive and reproduce. Not all individuals have the same traits. Some traits help plants and animals survive better than others.

Many male birds have bright feathers. Bright feathers attract females. Males with bright feathers have more chicks. Males with dull feathers may not have chicks.



White-collared manakin



Black-and-white owl

Owls with better vision will catch more prey. Without good vision, an owl won't get enough to eat.

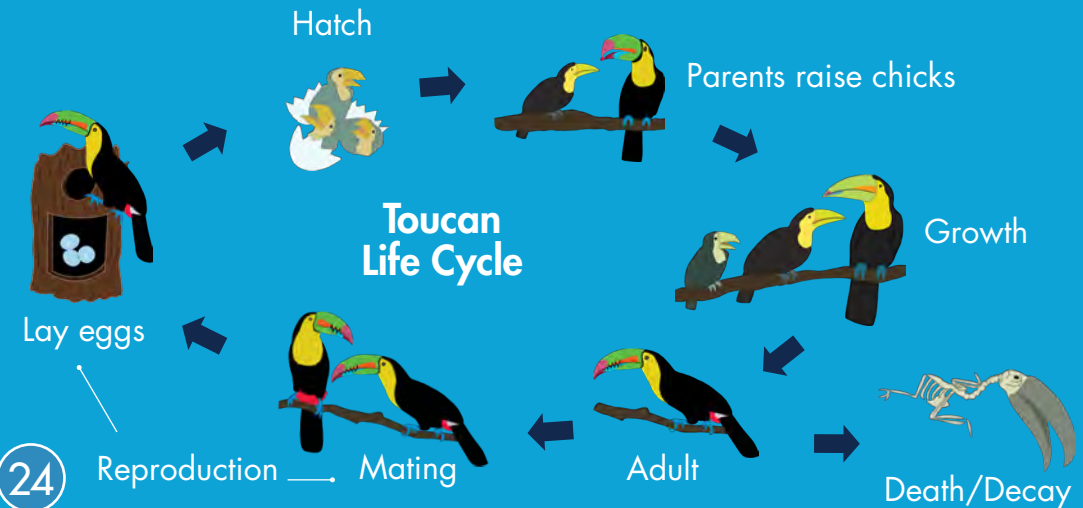
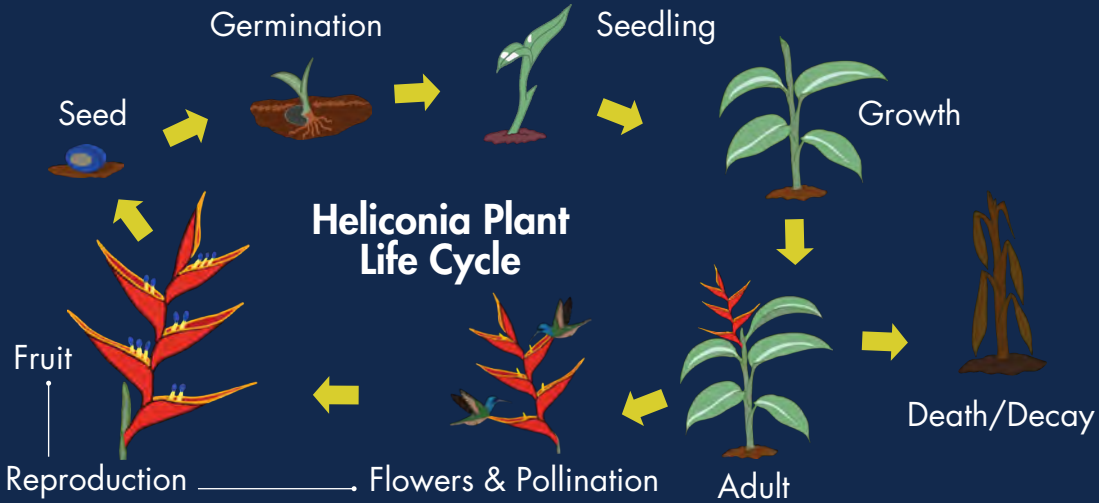


Toucan with guava fruit

Plants with sweet-tasting fruits attract hungry birds. Birds eat the fruits and help move the seeds. Plants with bad-tasting fruits won't attract birds to eat them. Their seeds won't be moved.

# GROWING UP IN THE RAINFOREST

Growing up in the rainforest is a challenge for plants and animals. Plants get plenty of water, but it can be difficult to get enough sunlight. For animals, it can be a challenge to find shelter and food. And, they need to avoid **predators!** Different plants and animals have different ways to survive and reproduce. But they all share some steps in their life cycle. All are born, grow, reproduce, and eventually die and decompose.



# STICK TOGETHER!

Some animals, like jaguars and sloths, live alone. Others form groups. Why live in a group? By sticking together, members of groups can help each other survive. Group members keep watch to help them avoid predators. Groups can spread out to find more food. In some groups, members help each other raise and protect their babies. Being in a group can help individuals stay warm. Groups can help keep other groups from taking over their space and food.

Some animals live in a group with their relatives for their whole lives. Others only stay in groups with their parents until they are old enough to go form their own family groups. Some birds may form huge groups for a while to stay safe and then all go their own ways.



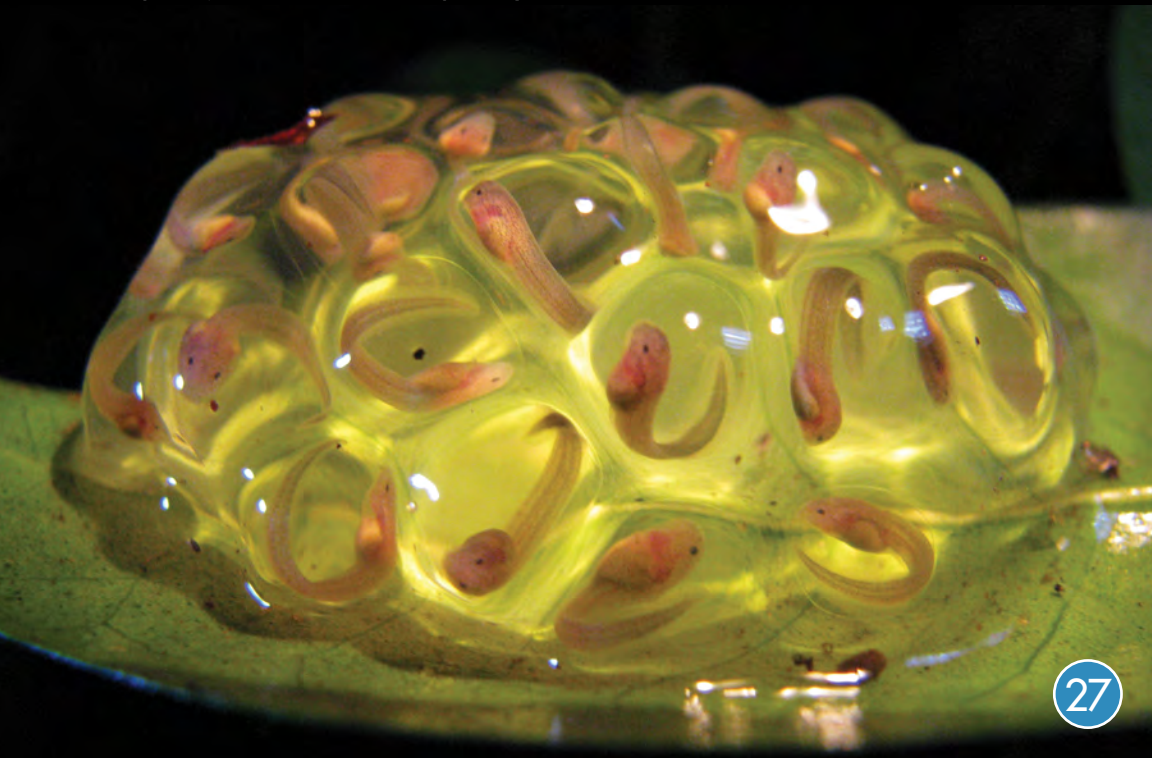
# FOREST RHYTHM

Rainforests have cycles. Day turns into night. Night turns into day. Different animals come out at different times of day. Some animals, like monkeys, are active during the day. Others, like bats, are **nocturnal**. They only come out at night. Many frogs only make noise at night. Why do you think different animals are active at different times?





Rainforests have seasons. The temperature is not very different between seasons. But, the amount of rain changes. It rains every day during the wet season but not as much during the dry season. Plants change in response to changes in seasons. Some plants drop their leaves when it is too dry. They make flowers to reproduce during certain seasons. Animals respond to seasons too. In the rainy season, birds will move to places to eat or to raise chicks. Frogs come out in the rainy season to mate and lay eggs. Many animals reproduce based on the seasons. They have offspring when there is plenty of food!



# FOREST THREATS

People use resources in rainforests. They cut down trees for timber. They clear the forests for land to farm. In some places, they hunt animals for food or other products. Mines can pollute waters and hurt the forests. If people aren't careful, many plants and animals will either have to move or die out. This makes the biodiversity go down. Scientists are trying to find ways for rainforests to survive while still getting the resources people need. One solution is making protected areas. Costa Rica has protected more than 25% of its land! But scientists still need to know more to better protect rainforests.



# STUDYING RAINFORESTS

It is important for scientists to learn more about rainforests. They need to know about the plants and animals that live there. They need to understand when certain types of animals are there and the conditions they need to survive. Scientists need to know if animal numbers are increasing, decreasing, or staying the same. This information will help them protect rainforests!

The team at Tirimbina in Costa Rica are investigating these questions. They use different methods to study different animals. Finding frogs can be tricky. But it is easy to hear them! Sound travels long distances in the rainforest. The team records animal sounds. Then, they can tell when different animals are active. Computers help them count the calls. They can figure out how many different animals are making sounds.



A three-toed sloth is shown hanging from a tree branch in a lush green forest. The sloth's long, shaggy brown fur is prominent. It has three claws on its front paws, which are gripping a thick, light-colored tree branch. The sloth's face is dark brown with a lighter patch around its eyes and nose. The background is filled with out-of-focus green foliage and tree trunks.

Now, let's join the team to help out!

**Three-toed sloth**





# GLOSSARY

## **BIODIVERSITY**

the number of species in an area

## **CLIMATE**

weather conditions in an area over a long period of time

## **COLD-BLOODED**

having a body temperature that is the same as the environment

## **ECOSYSTEM**

the organisms and environment in an area

## **ENDOSKELETON**

a skeleton on the inside of the body

## **ENERGY**

the ability to do work

## **EXOSKELETON**

a skeleton on the outside of the body

## **FOOD WEB**

what eats what in an ecosystem

## **INVERTEBRATE**

an animal without a backbone

## **MATTER**

something that takes up space and has mass

## **NOCTURNAL**

active or occurring at night

## **ORGANISM**

a living thing

## **PREDATOR**

an animal that eats other animals

## **TRAIT**

a feature passed down from parent to offspring

## **VERTEBRATE**

an animal with a backbone

## **WARM-BLOODED**

an animal that can generate its own heat and maintain a constant body temperature

## **WEATHER**

the conditions in the atmosphere at a particular time

# PHOTO CREDITS

**Abbreviation Key:** SS = Shutterstock.com; NASA = National Aeronautics and Space Administration

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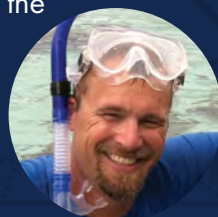


# SCIENCE 3D

Thanks for exploring with us! Our science adventures take us around the world to uncover secrets of the most amazing animals and places. Our mission and passion is to share these scientific discoveries with you. There are so many cool things to see out there, even in your own backyard, so get outside and explore!

## MIKE HEITHAUS PH.D.

Dr. Mike Heithaus is a scientist, explorer, author, educator, and television host. He is a professor of biology and Dean of the College of Arts, Sciences & Education at Florida International University. Mike and his students study sharks, whales, sea turtles, and other large marine animals around the world. They also work with people to help protect these species. Mike loves sharing his work with others. He has written text books and helped create programs for students in elementary, middle, and high school. He has been on television programs including on PBS, National Geographic, and Discovery Channel's Shark Week.



## PATRICK GREENE

As a wildlife filmmaker, Patrick has always had a passion for animals. He started to draw pictures of sharks and whales when he was just five years old. Later, he went to college to become a marine biologist and learned a lot about science. Then he got a job in television and learned how to make videos, too. Since then, he's gone all over the world studying and filming wild animals. He's made shows for National Geographic, PBS and ABC, and even won an Emmy Award. He loves making videos to teach students about science and about the many creatures that share our world.





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