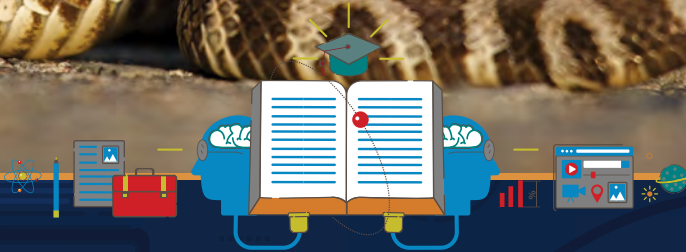


# RATTLESNAKES

A SCIENCE 3D ADVENTURE

GRADE 3



By MIKE HEITHAUS Ph.D

symbioeducation™



# KEY WORDS

Look for these words and try figure out their meaning.

ADAPTATION

ATMOSPHERE

CAMOUFLAGE

CLIMATE

DISPERSAL

FOOD WEB

HABITAT

HIBERNATE

LIFE CYCLE

POLLINATOR

PREDATOR

PREY

RAIN GAUGE

SPECIES

THERMOMETER

TRAIT

VENOMOUS

WEATHER

WIND VANE



# TABLE OF CONTENTS

Snakes!	2
Baby Snake	4
Grabbing a Meal	6
Don't Become a Meal	8
Rattlesnakes in Many Climates	10
How's the Weather?	11
Desert World	14
Surviving the Desert	16
Rattlesnake vs Kangaroo Rat	18
Desert Life Cycles: Plants	20
Desert Life Cycles: Animals	22
Studying Snakes	24
Responding to Change	26
Glossary	27

# SNAKES!

What do you think of when you hear the word snake? Does it make you shiver? Some snakes are dangerous. But, most are harmless to people. Some people even keep snakes as pets. Snakes are also very important animals. They help keep ecosystems healthy.

Snakes are reptiles just like lizards and turtles. Reptiles are cold-blooded. That means that the temperature of their bodies depends on the temperature of the air around them. They have dry bodies that are covered by overlapping scales.



King cobra



Eyelash viper



Green ratsnake



There are around 3,000 different **species**, or kinds, of snakes. They live in many different **habitats**, like deserts and tropical rain forests. Some snakes can survive in burrows during the winter, so they can live in cold places. A few groups have **adaptations** that enable them to live in the ocean. The smallest snake in the world is the Barbados threadsnake (*Tetracheilostoma carlae*). It is only 10 cm (4 in) long and is about the width of a spaghetti noodle. The green anaconda (*Eunectes murinus*) is the largest snake. It may weigh over 200 kg, or 400 pounds!



**Barbados threadsnake**



**Green anaconda**

# BABY SNAKE

Like other reptiles, most snakes lay eggs. For most snakes, the female lays her eggs and then leaves them. Some female snakes, like boas, will wrap their body around their eggs to protect them. When baby snakes hatch, they are able to survive on their own.



Some baby snakes grow inside their mother and are born alive. But once they are born, they are on their own. Mom doesn't protect them. Snakes that give birth to live young usually live in colder areas. Most sea snakes give birth to live young in the water!





**Garter snakes can give birth to up to 80 live babies at a time!**

Baby snakes look a lot like their parents. They can slither or swim as soon as they hatch. They also can hunt for themselves. They just have to eat smaller things than their parents. Snakes grow for their whole lives. Several times a year, they get too big for their skin! A new, bigger skin grows under the old skin. Then, the old skin breaks and the snake slithers out of it.



**Snakes shed their skin as they grow.**

Some snakes only live for a few years. Other larger snakes may live for a long time, maybe even 50 years!

# GRABBING A MEAL

All snakes eat other animals. They are **predators**. Snakes can't chew so they swallow their **prey** whole. Smaller snakes have to eat small prey like insects, lizards, frogs, fish, and eggs. Bigger snakes can eat even bigger prey. Pythons can eat prey as large as deer!

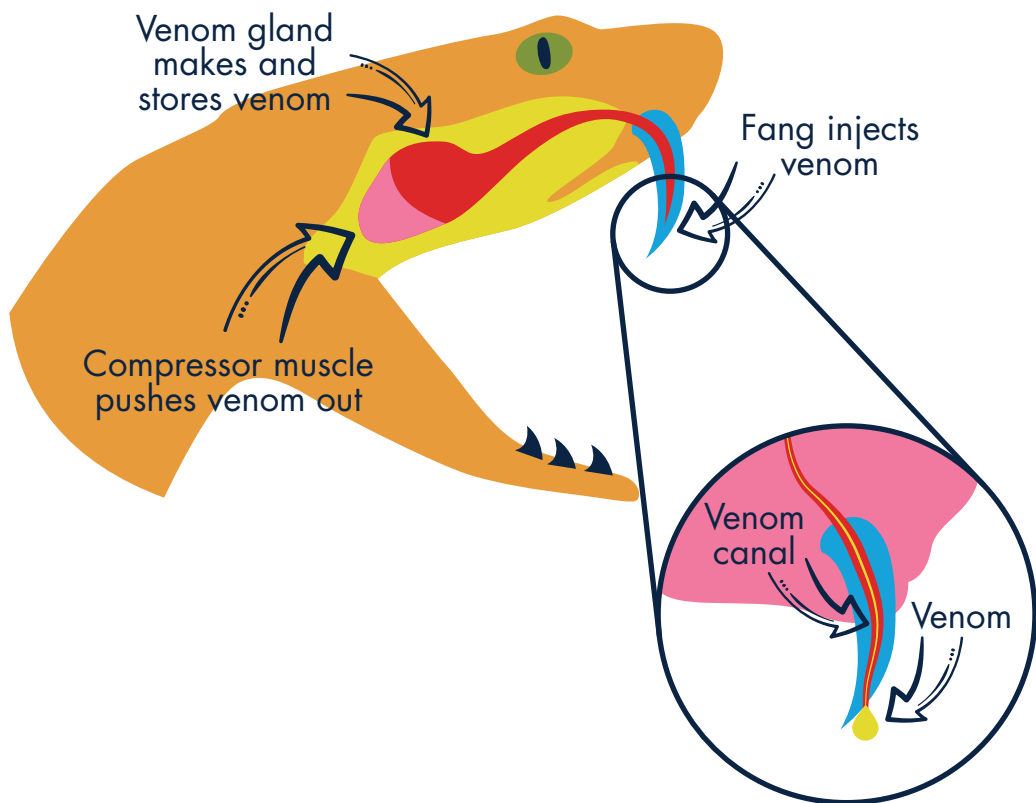


Some snakes just bite and swallow their prey whole. Other snakes, like boas and pythons, wrap their bodies around their prey and squeeze it. When the prey is dead, they eat it. These snakes are called constrictors.





A few types of snakes, like rattlesnakes, are **venomous**. They inject venom into their prey to kill it. Venomous snakes are dangerous and people need to be very careful around them.



Snakes are important. They keep populations of rats and mice from getting too big. This helps people!





# DON'T BECOME A MEAL

All snakes, even ones with venom, have predators! Hawks, eagles, and other birds hunt snakes. Mongooses are known to attack very dangerous snakes. Big snakes will even eat smaller snakes. In the oceans, tiger sharks eat venomous sea snakes! Small snakes face greater dangers than big snakes. How do snakes stay safe? There are more ways to stay safe than trying to attack!



A mongoose hunts a venomous boomslang snake.



A serpent eagle with prey.



A larger snake eats a smaller snake.

# SNAKE DEFENSES



This hognose snake is playing dead! Maybe a predator won't want a dead meal.



Can you find the Pacific Gopher Snake? **Camouflage** helps snakes hide from predators. Bonus: your prey can't see you easily either!



Spitting venom is a great defense for this Mozambique spitting cobra!



Bright colors warn predators not to attack! This coral snake has deadly venom.

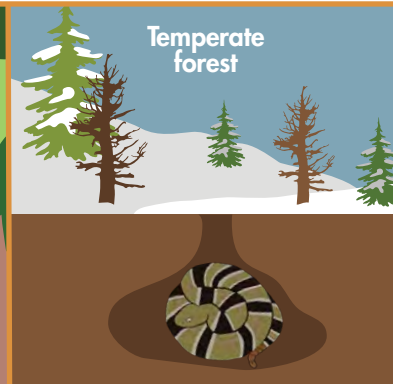


# RATTLESNAKES IN MANY CLIMATES

When people think of deserts in America, they usually think of rattlesnakes. In the Sonoran Desert of Arizona there are actually 13 different species of rattlesnakes! Rattlesnakes are important predators in the desert. They are also found in many other habitats.



Rattlesnakes are found in different **climates**. The climate is the temperature and amount of rain or snow in a location over a long period of time. Rattlesnakes live in desert climates in which it is hot and dry. They also live in temperate climates in which it is warm in the summer and cold in the winter. They are even found in tropical climates in which it is warm all year with heavy rains. They do not live in polar climates in which it is cold all year round and the precipitation is mostly snow. Why don't they live in the snow? Since snakes are cold-blooded, they can't survive in cold climates.



# HOW'S THE WEATHER?

**Weather** is different from climate. Climate tells long-term conditions. The weather is the current state of the **atmosphere**. The atmosphere is the air around earth. Is it hot or cold? Is it cloudy or sunny? Is it raining or clear? Is it snowing? Is it windy or foggy? These questions all refer to weather.

People can measure the weather using instruments.

**Thermometers** measure the temperature. A **rain gauge** measures rainfall. A **wind vane** measures the direction the wind blows. Instruments that work like small wind mills measure the speed of the wind. Satellites in space also measure weather.



Thermometer

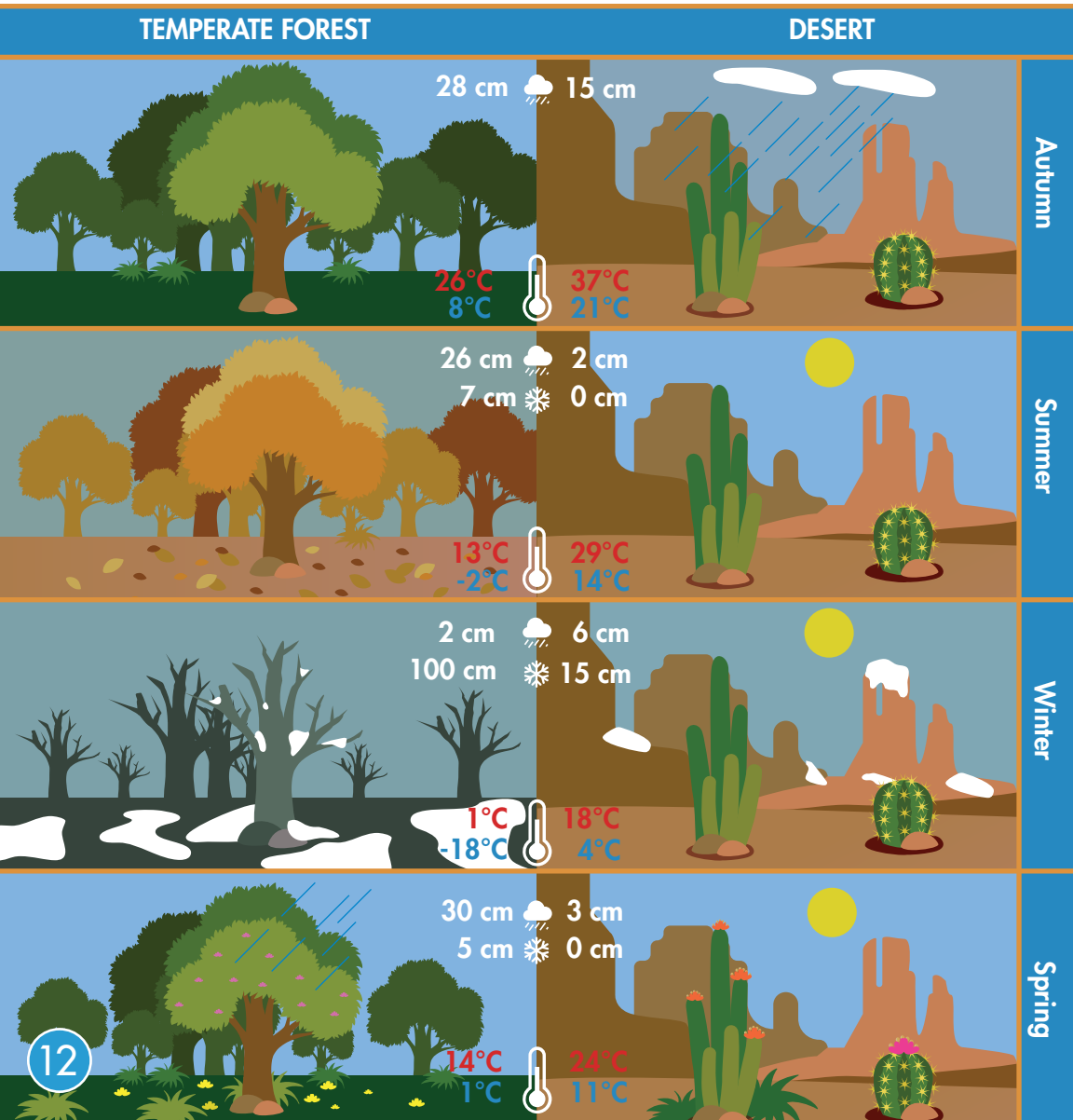


Rain gauge



Wind vane

Rattlesnakes and people need to respond to the weather. The weather can change from one day to the next. It can also change from one month to the next. Observations over many years help predict what the weather is likely to be during a particular month. Animals and plants respond to these seasonal changes in weather. Animals have babies during months when the weather will be good. They may **hibernate**, or sleep for weeks at a time, when the weather is bad. Plants produce seeds when there will be enough rain for them to grow. They may drop their leaves when it is too cold or too dry.





People need to know about the weather on a particular day to make sure they wear the right clothes or take an umbrella to stay dry. Scientists called meteorologists can predict what the weather will be for the next few days. They do this by using observations from instruments, including satellites in space. Computers use data to make predictions. These predictions can be shown on weather maps.



People and animals also need to know if there will be **severe weather**. Tornadoes, thunderstorms, blizzards, and hurricanes are severe weather that can knock down trees, power lines and buildings, start fires, and destroy property. People can predict severe weather using technology and computer models. Some animals are able to sense severe weather too. For example, young sharks can detect hurricanes before they arrive. They swim to deeper waters to stay safe. Birds seem to sense storms coming and find cover.

Tornado



Blizzard



Hurricane



# DESERT WORLD

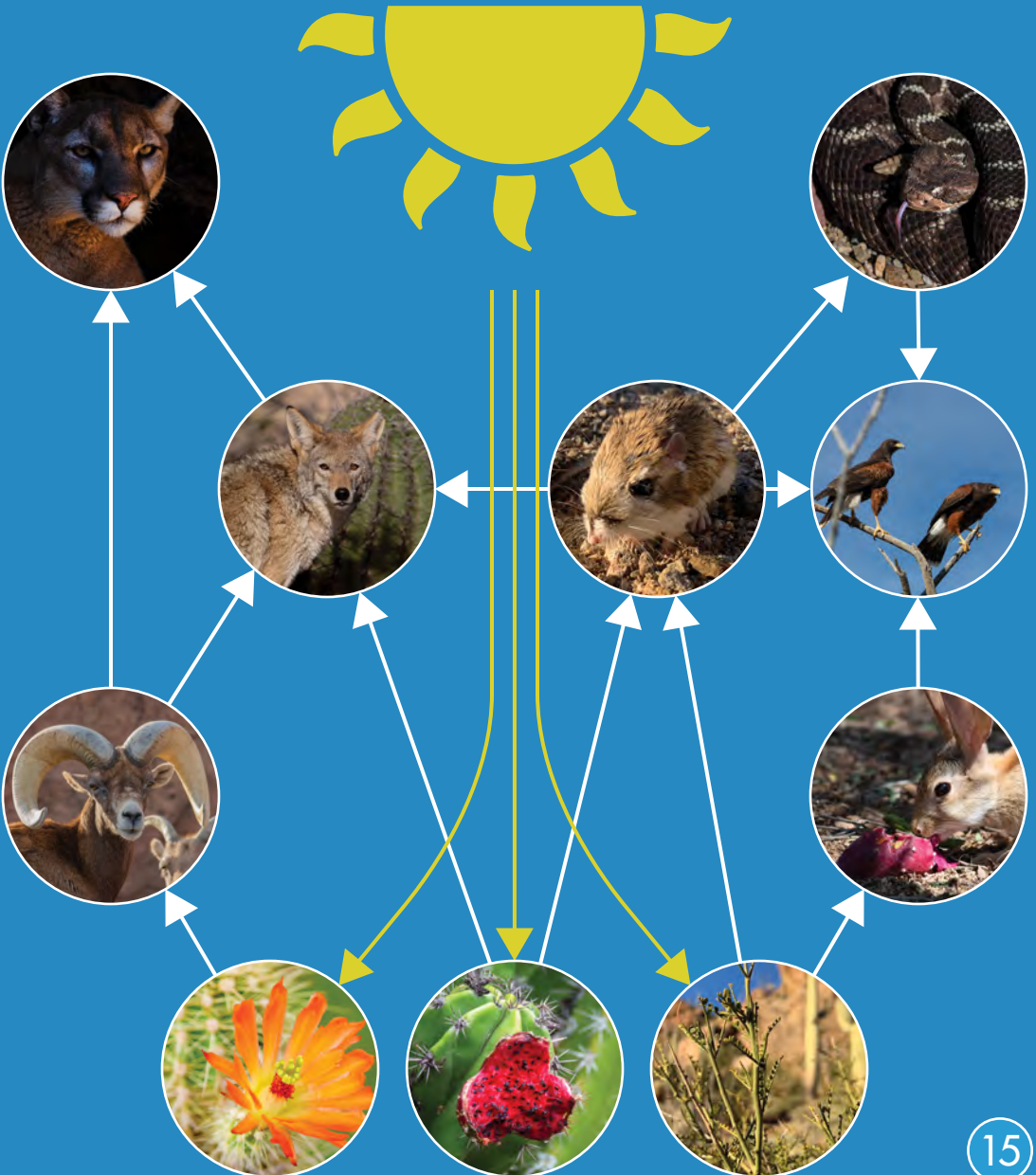
It can be difficult to survive in tropical desert climates. There is very little rain, so not many plants can survive and animals have trouble finding enough water. It is very hot during the day, so most animals need to find shelter. Animals must find ways to get enough food. They must avoid being eaten by predators.





# DESERT FOOD WEB

Plants are at the base of the **food web**. Insects, mice, and bighorn sheep may eat plant leaves, seeds, or fruits. Birds sip nectar from flowers. Some animals will even eat a cactus! Predators like scorpions, coyotes, Harris's hawks and rattlesnakes eat these animals.



# SURVIVING THE DESERT

Animals and plants that live in the desert have **traits** that help them survive and reproduce, called adaptations. Some adaptations are physical traits, like the fangs of a rattlesnake. Other adaptations are behaviors, like a group of Harris's hawks working together to catch a rabbit.

## DESERT ANIMALS



### Desert tortoise

Desert tortoises go inside underground burrows to stay cool.

### Gila monster

Gila monsters have a special bladder that can store water for months.



### Scorpion

Scorpions have venomous stingers for hunting and defending themselves from predators.



In the desert, many adaptations help plants and animals survive the harsh temperatures and lack of water.

## DESERT PLANTS



### Cactus

Cactuses have fleshy bodies to store water and spines to protect the water inside them.

### Agave

Agave has waxy leaves to prevent water from escaping.



### Ocotillo

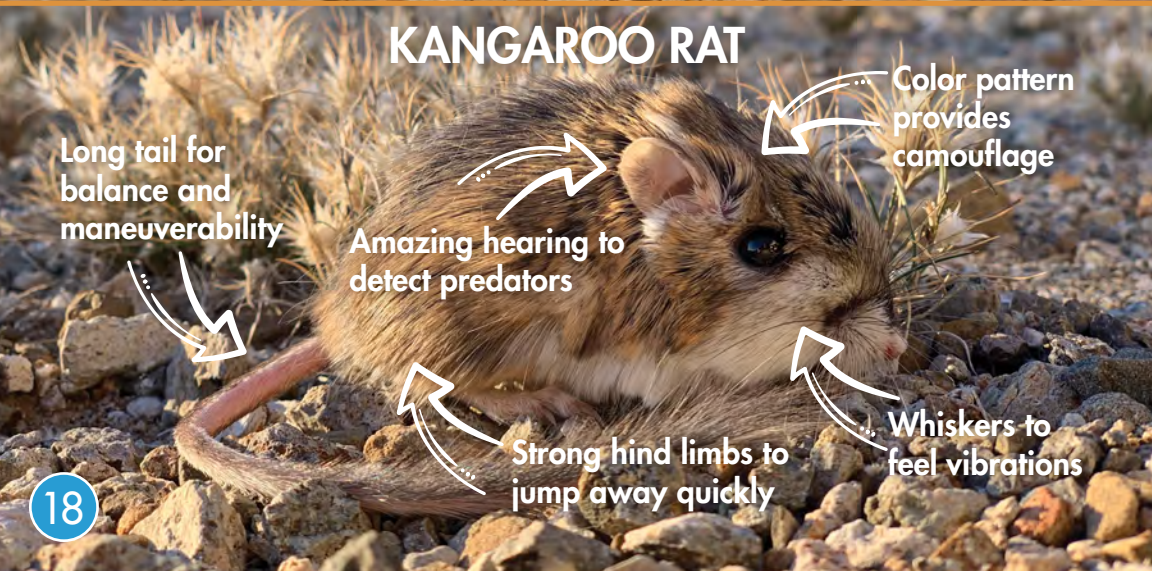
Ocotillo plants grow their leaves immediately after rain and then lose them after only a couple weeks of dry weather.





# RATTLESNAKE VS KANGAROO RAT

Not all adaptations help animals and plants survive the climate and weather. Some adaptations help them avoid getting eaten. The spines of a cactus prevent animals from eating them. Other adaptations help animals find and catch food. Let's check out the adaptations of rattlesnakes and one of their prey, kangaroo rats.



Look  
Out!

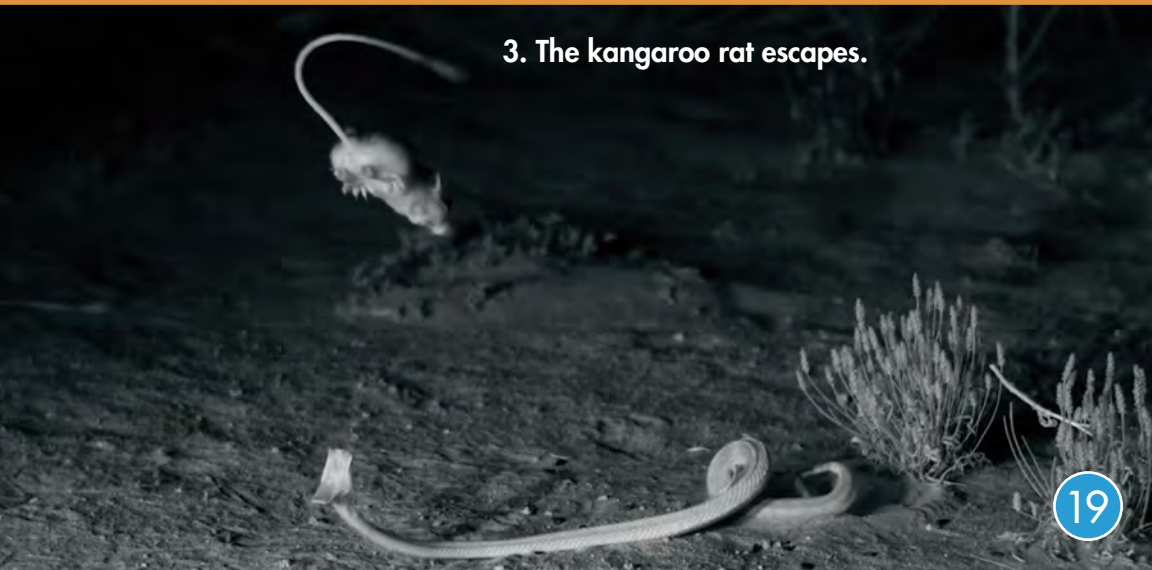
1. A rattlesnake waits for a kangaroo rat to approach.



2. The rattlesnake strikes, but the kangaroo rat hears the attack and leaps.



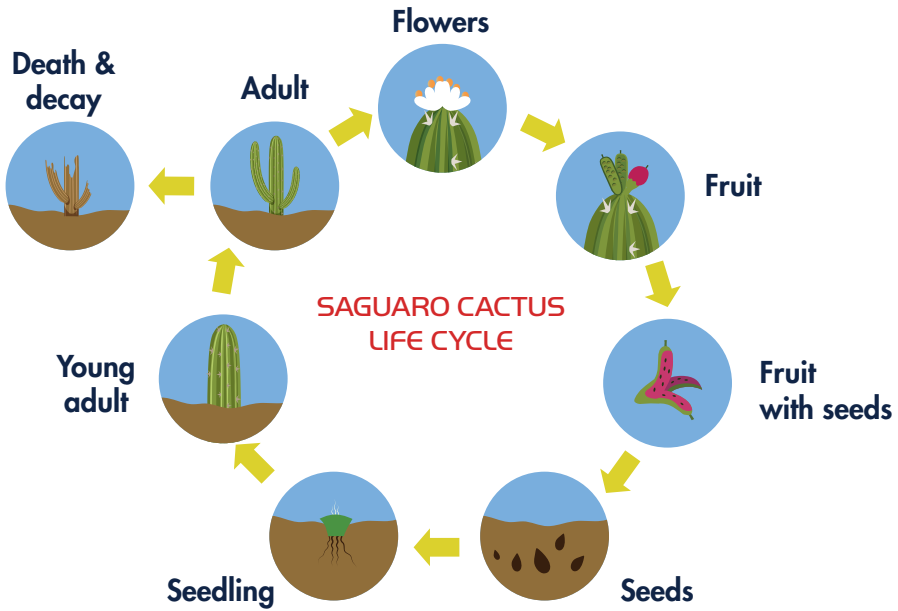
3. The kangaroo rat escapes.





# DESERT LIFE CYCLES: PLANTS

Desert plants have **life cycles** that are similar to plants in other climates. To reproduce, plants need pollen to move from one plant to another. Pollen is a yellow powder that fertilizes eggs which then grow into fruit. Most plants have pollen in flowers. Wind can blow the pollen to other plants. It can be carried by animals. When insects, like bees, or birds visit flowers for a meal they get covered in pollen. Some of the pollen shakes off at the next flower they visit. Animals that carry pollen from one plant to another are called **pollinators**. Some cacti are pollinated by bats!



Some seeds grow in fruits. Others grow in cones. Some seeds fall off the tree and grow close to their parent. Others **disperse** or move away from the parent. Some seeds, like dandelions, blow in the wind. Others are moved by animals. Some stick to animals' fur and fall off eventually. Others are in fruits that animals eat. The seed survives in the stomach of the animal. Eventually the animal poops out the seed and it grows. Other animals, like mice, collect lots of seeds. They eat some of them and bury others underground. The forgotten buried seeds grow into adult plants.

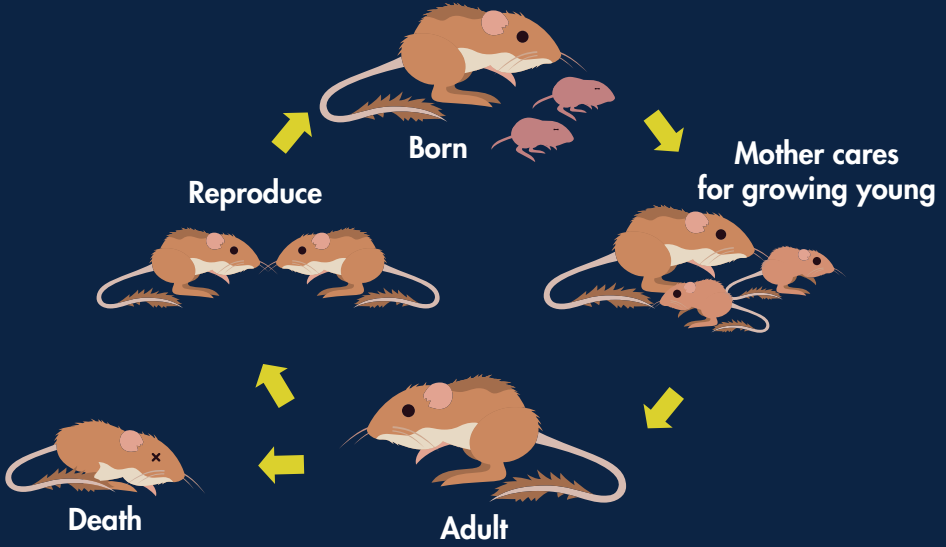


Many seeds are eaten and dispersed by animals. Some seeds are dispersed by the wind.

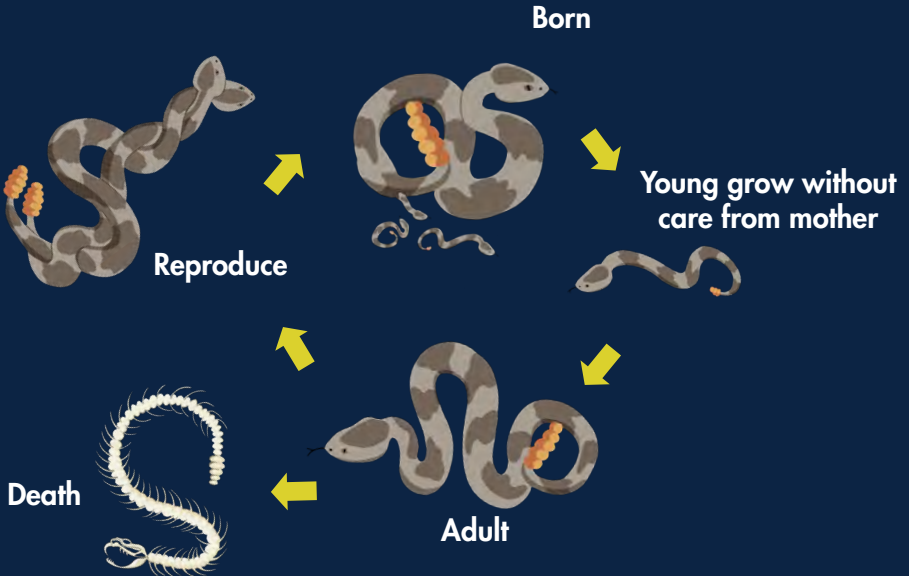


# DESERT LIFE CYCLES: ANIMALS

## KANGAROO RAT LIFE CYCLE



## RATTLESNAKE LIFE CYCLE





## Arizona black rattlesnake



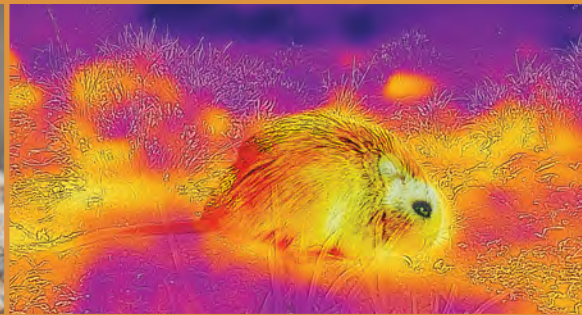
# STUDYING SNAKES

Scientists that study reptiles (like snakes) and amphibians (like frogs) are called herpetologists. To study snakes they need the right tools. Some are simple, like a snake hook. The snake hook lets scientists catch and handle snakes without being bitten. Herpetologists use scales to weigh snakes and measuring tapes to find their length.



Technology is important for studying snakes too! Special tags can be put under the skin of a snake. When scientists catch a snake, the tags help them see if they have caught it before. Small tracking devices let scientists find the snakes quickly.

To study how snakes catch their prey, scientists and engineers have designed other amazing devices. Special cameras can show how snakes see the world at night. Other cameras can slow down time. These devices capture how snakes attack kangaroo rats and how the rats respond!



Rattlesnakes have pits on their faces that sense the body heat of their prey, like kangaroo rats. This image shows how rattlesnakes may see their prey!



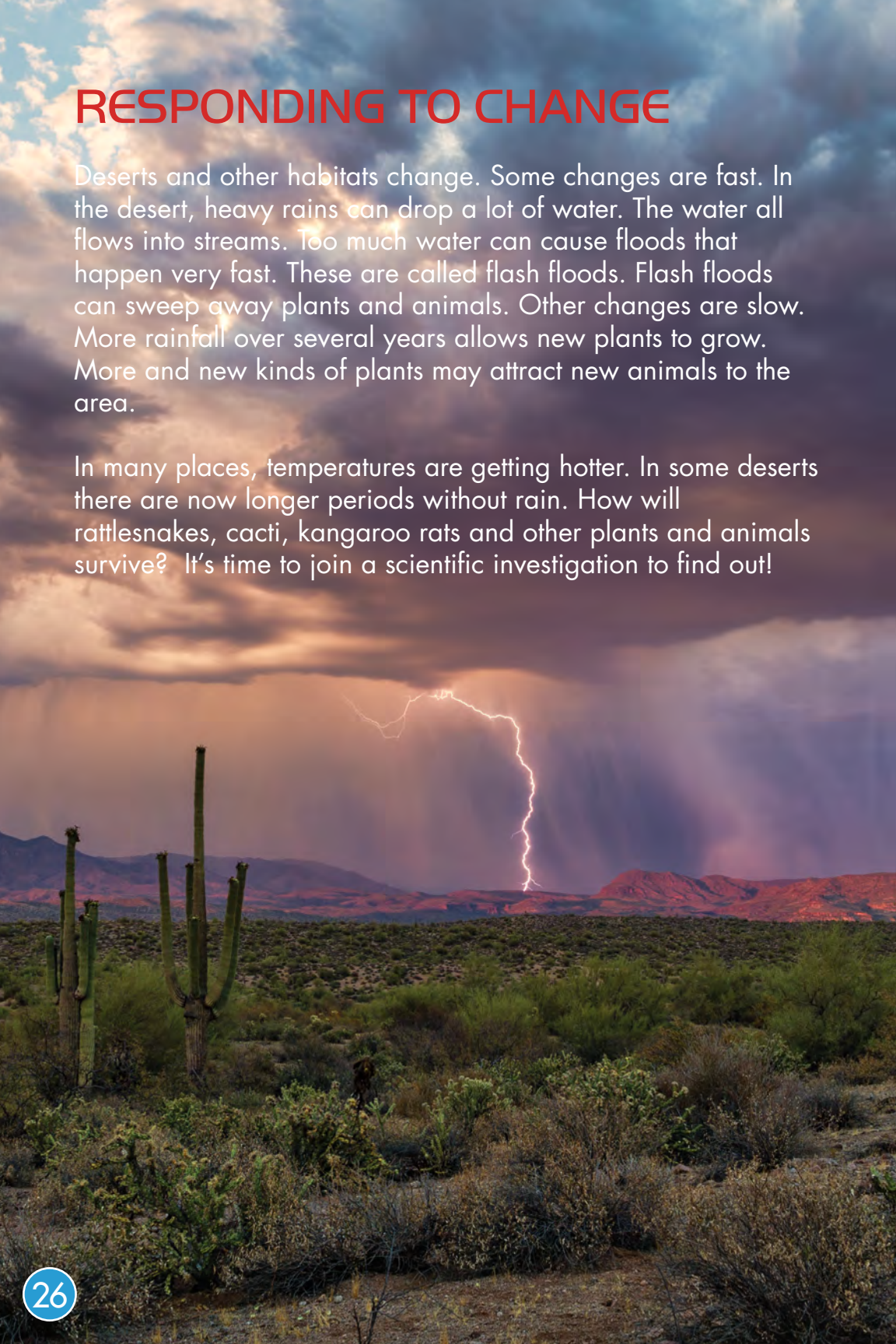




# RESPONDING TO CHANGE

Deserts and other habitats change. Some changes are fast. In the desert, heavy rains can drop a lot of water. The water all flows into streams. Too much water can cause floods that happen very fast. These are called flash floods. Flash floods can sweep away plants and animals. Other changes are slow. More rainfall over several years allows new plants to grow. More and new kinds of plants may attract new animals to the area.

In many places, temperatures are getting hotter. In some deserts there are now longer periods without rain. How will rattlesnakes, cacti, kangaroo rats and other plants and animals survive? It's time to join a scientific investigation to find out!





# GLOSSARY

## **ADAPTATION**

a trait of an organism that helps it survive in its environment

## **ATMOSPHERE**

the air surrounding the Earth

## **CAMOUFLAGE**

color that lets an animal blend in to the environment

## **CLIMATE**

weather conditions in an area over a long period of time

## **DISPERSAL**

moving away from a parent

## **FOOD WEB**

what eats what in an ecosystem

## **HABITAT**

the place an animal or plant lives

## **HIBERNATE**

to sleep through long periods of time, like the winter

## **LIFE CYCLE**

the changes that happen to an organism during its whole life

## **POLLINATOR**

an animal that spreads pollen from one plant to another

## **PREDATOR**

an animal that eats other animals

## **PREY**

an animal that is eaten by other organisms

## **RAIN GAUGE**

an instrument used to measure the amount of rainfall over a period of time

## **SPECIES**

a particular type or group of organisms

## **THERMOMETER**

an instrument used to measure the temperature

## **TRAIT**

a feature passed down from parent to offspring

## **VENOMOUS**

having venom, a substance that can harm or kill another animal when injected

## **WEATHER**

the conditions in the atmosphere at a particular time

## **WIND VANE**

a tool that tells the direction the wind is blowing



# PHOTO CREDITS

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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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