

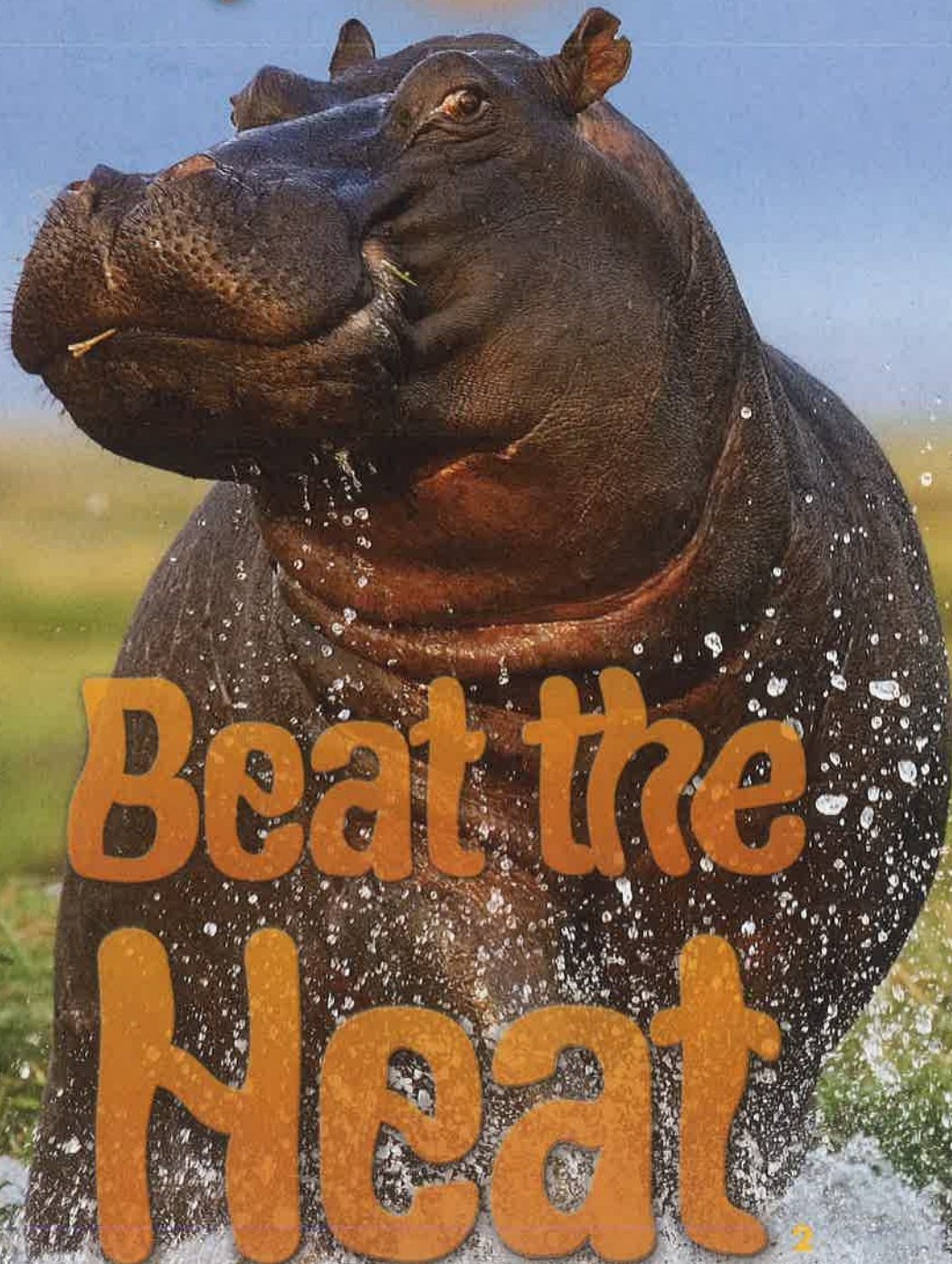
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# Explorer



Orphans No More 10    Micro World 18

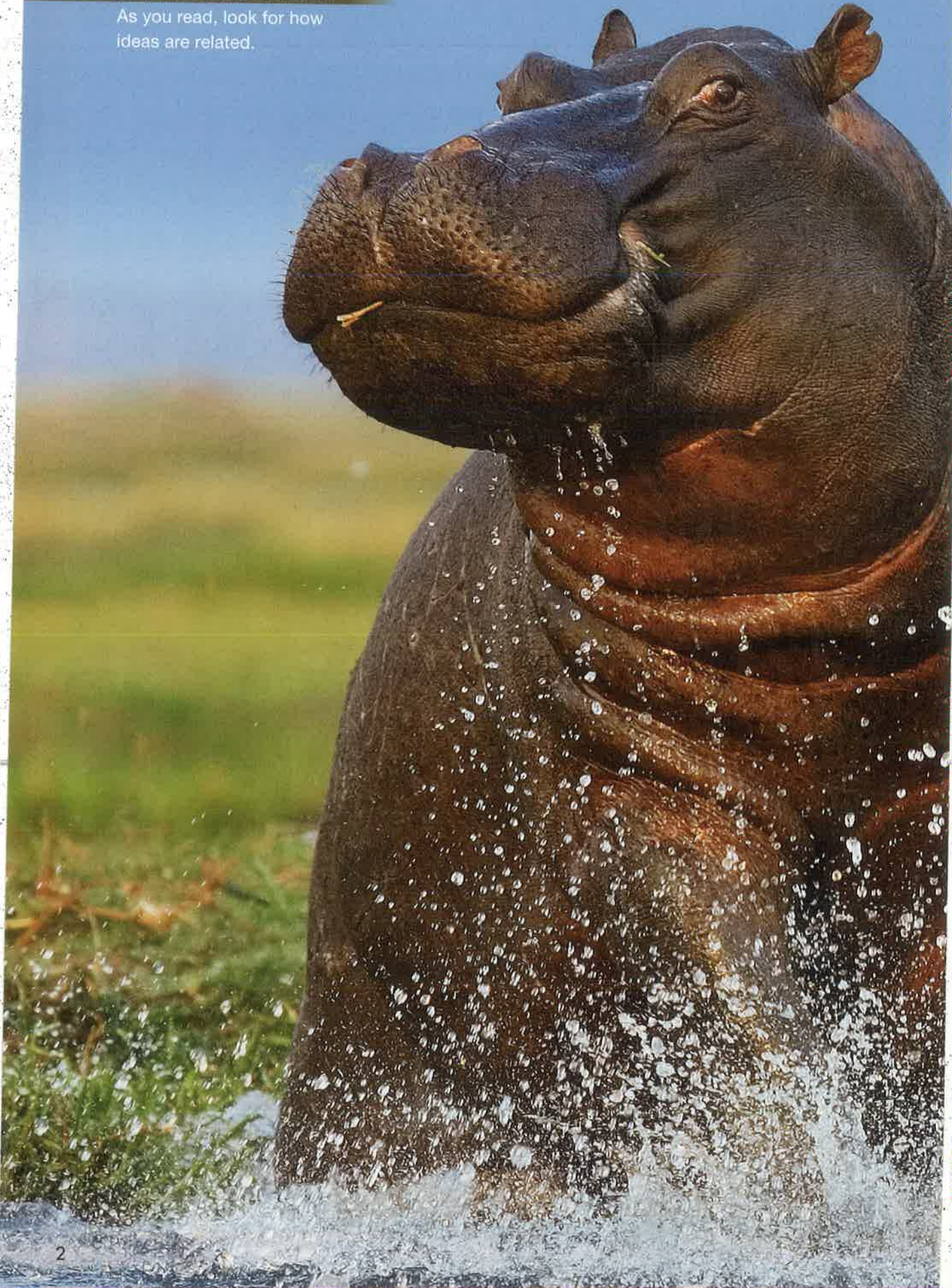




## Life Science

### COMPREHENSION STRATEGY:

As you read, look for how ideas are related.





As temperatures rise, see how  
some really cool animals

# Beat the Heat

By Rene Ebersole



**A** lizard skitters across hot desert sand. It stops and swings its head. It sticks out its chin. It twitches its tail.

Suddenly, the lizard lifts up its right front foot and its left back foot. It holds them above the sand for a few seconds. Then it quickly switches feet.

The lizard looks like it's dancing. It's not. It's trying to stay cool. Heat moves from the hot sand into the lizard's feet. That heats the lizard's whole body. Each time the lizard lifts its feet, they cool down. Its body does, too.

Soon, the desert gets even hotter. Now even the lizard's fancy footwork doesn't help. So it dives headfirst into a sand dune. It digs with its shovel-shape nose. It paddles with its legs, pulling its way to deeper sand.

The sun's heat doesn't reach this deep, so this sand isn't as hot. It's as much as 28° Celsius (50° Fahrenheit) cooler than the sand on the surface. The lizard rests and cools down.

## Heat Danger

Keeping cool is important. When an animal gets too hot, its **body temperature** rises. Bad things can happen then.

Too much heat can cause the brain and other internal organs to swell. When that happens, these body parts can stop working. So if the animal can't lower its temperature, it will die.

For a **cold-blooded** animal like the lizard, survival means finding the right place. It uses its environment to control its body temperature. Here's how it works.

If the lizard is cold, it slowly crawls to a sunny spot. It soaks in the heat. Its body warms up. Now that its muscles are warm, it can zip quickly over the sand. It can pounce on insects. Then, when the lizard gets too hot, it gets out of the sun. Its body cools down.

In a day, the lizard's temperature rises and falls. It can survive as long as it doesn't get too hot or too cold.

## Self Control

Like the lizard, amphibians, fish, insects, and reptiles are all cold-blooded animals. Mammals and birds are **warm-blooded** animals.

A warm-blooded animal doesn't use the sun or shade to stay the right temperature. It uses food. Energy from food helps keep the temperature inside its body just right. It always stays about the same, even if it's really hot or cold out.

Warm-blooded and cold-blooded animals have something in common, though. When it's hot out, they all need ways to beat the heat.

Some animals use a special body part. This **physical adaptation** lets heat escape from their bodies. So they cool down.

Other animals act in ways that help keep them cool. **Behavioral adaptations** can be as odd as the lizard lifting its feet. They also can be as simple as finding shade or a cool pool.

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**Fast Fact: An animal can cool down 25 times faster in water than in air.**

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## Splash, Splash

A flamingo spends a lot of time in the water. You can often find it standing on one leg in shallow water. Usually, that's enough to keep this pink bird from getting too hot. Sometimes, though, it's not. Then the bird puts its second leg in the water.

Now more of the bird's bare skin is under the water. The liquid gently laps against both legs. As it does, heat inside the flamingo's body escapes into the water. That's because heat naturally moves from warmer places to cooler places. The bird cools down.

A hippopotamus takes its splash time to extremes. It lives in Africa where temperatures can soar up to 40°C (104°F). A hippo may spend up to 16 hours a day in the water to beat the heat.





This lizard lifts its feet to stay cool.



A flamingo puts both legs in the water to stay cool.



A hot hippo splashes in cool water.



## Drips and Drops

An animal doesn't always need a lot of water to cool down. That's a good thing for a wallaby. It lives in Australia's outback. Sometimes, it doesn't rain there for weeks. The sun beats down. The heat rises.

The wallaby stands on its hind legs. It looks for shade or water. It doesn't see either. Yet it isn't in trouble.

The wallaby licks its paws and its arms. In the hot air, its saliva quickly evaporates. As it changes from a liquid to a gas, the spit absorbs some of the wallaby's body heat. That cools the wallaby down.

## Sweet Sweat

Something similar happens when you sweat. Think about running a race. You start to get really hot. Before you overheat, your body's cooling system kicks in.

First, your brain sends a message to your sweat glands. You have 2.6 million of these glands tucked under your skin. They make a solution of water, salts, and other chemicals.

Soon, millions of drops of sweat squeeze through pores, or tiny holes, in your skin. Sweat coats your skin. When it touches the air, it quickly evaporates. As it does, it takes extra heat from your body with it. You may feel sticky and sweaty, but you also feel cooler.

Dogs have sweat glands, too, but only in their paws and noses. If a dog gets really hot, it can't sweat enough to make a difference. It's got another way to keep cool, though.

The dog opens its mouth and lets its tongue hang out. Saliva drips from the dog's tongue. As it pants, air rushes over its tongue and into its mouth. Some of the dog's saliva evaporates, cooling the dog down. Birds and many other animals pant, too.

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**Fast Fact: A dragonfly stays cool by standing on its head.**

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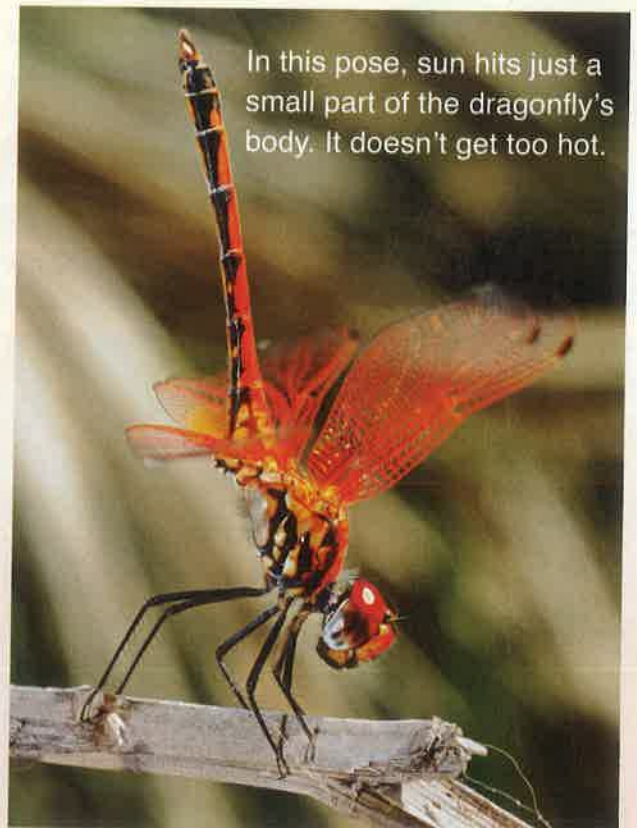
## Busy Bees

Insects can't sweat. Yet a honeybee still uses evaporation to keep cool. Imagine a hot summer day. Inside the hive, thousands of worm-like bee larvae lie helpless in the heat. If it gets any hotter, they could bake.

The adult bees rush outside. They take their body heat with them. The temperature in the hive drops a little. It's not enough, though.

A few bees buzz off to find water. When they find it, they return and do a waggle dance. They tell the other bees where to go. More bees race off to gulp drops of water. The drops slide into the bees' honey sacs. This body part is like a second stomach. The bees use it to carry the water back to their hive.

The bees line up around the hive. They all face the same direction. Each bee burps up a drop of water, opens its mouth, and holds the drop on its tongue. The water evaporates, cooling the nearby air. Wings vibrate, pushing this air toward the hive. Thanks to this bee breeze, the temperature inside the hive drops and the larvae are safe.



In this pose, sun hits just a small part of the dragonfly's body. It doesn't get too hot.



This wallaby stays cool  
by licking its arm.



Many animals, including this crocodile,  
open their mouths when they get too hot.





## Color Change

A desert chameleon can't easily find water. So it has a different way to beat the heat.

Normally, this chameleon is muddy brown with pale spots on its sides. It has red ridges above its eyes and yellow stripes under its chin.

It walks stiffly across the desert. Making its legs straight and long helps it keep its belly away from the hot sand. That's one way this chameleon keeps cool. It's not the only way.

As it walks, it suddenly seems to disappear. It didn't. It changed color. Now it is mostly white, yellow, and gray. The color of its scaly skin matches the color of the sand.

Unlike many chameleons, this one doesn't change color just to show its moods. It changes color to stay cool.

The paler its skin, the more it reflects the sun. So most of the heat bounces off the chameleon's skin. Now this chameleon can wander the desert and not get too hot.

The chameleon uses unique parts in its skin to quickly change color. These parts can grow and shrink. When they shrink, the chameleon's colors fade. When they expand, the chameleon turns dark.

That's what happens when this reptile gets too cold. The darker colors absorb heat. The chameleon warms up.

## Big Bill

A toucan uses a body part to control its body temperature, too. It uses its big, colorful bill.

Its bill puzzled scientists for a long time. They thought maybe it helped the bird pick fruit. Now they have a new idea.

Using a special video camera that detects heat, they recorded the bird. When they watched the video, they got a big surprise. Almost all of the bird's body heat escapes through its bill.

The bird's blood carries its body heat. If the toucan gets too hot, it sends extra blood to its bill. As the blood circulates through the bill, heat escapes. A toucan can drop its temperature nearly 6°C (10°F) in minutes.

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## Fast Fact: Yawning may help cool your brain.

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## Super Size

An African elephant's ears work a lot like the toucan's bill. Heat escapes as blood rushes into the elephant's big, thin ears. An elephant also flaps its ears and sprays them with water. By doing this, the elephant can drop its body temperature by 5°C (9°F).

A fennec fox has a similar way to stay cool in the Sahara. This desert fox is the smallest fox in the world. Yet there's nothing small about its ears. They stick up from its head as much as 15 centimeters (6 inches).

When it gets too hot, the fox sends extra blood to its ears. It has less fur on its ears than on its body. So it's easier for heat to escape.

The fox has a second way to keep cool, too. It only goes out at night. That way, it avoids the hot sun altogether.

Many more animals have wild ways to beat the heat. A polar bear rests. A fiddler crab lets heat escape from its giant claw. Some birds fly up high where the air is chillier. For all of these animals, staying cool means staying alive. Now that's pretty cool.

## Wordwise

**behavioral adaptation:** an action that helps an animal survive

**body temperature:** the degree of coolness or heat inside an animal's body

**cold-blooded:** able to use the environment to control body temperature

**physical adaptation:** a body part that helps an animal survive

**warm-blooded:** able to make heat to control body temperature



Turning a pale color helps this chameleon beat the heat.



This toucan uses its big bill to cool down.



Heat escapes from this fennec fox's big ears.

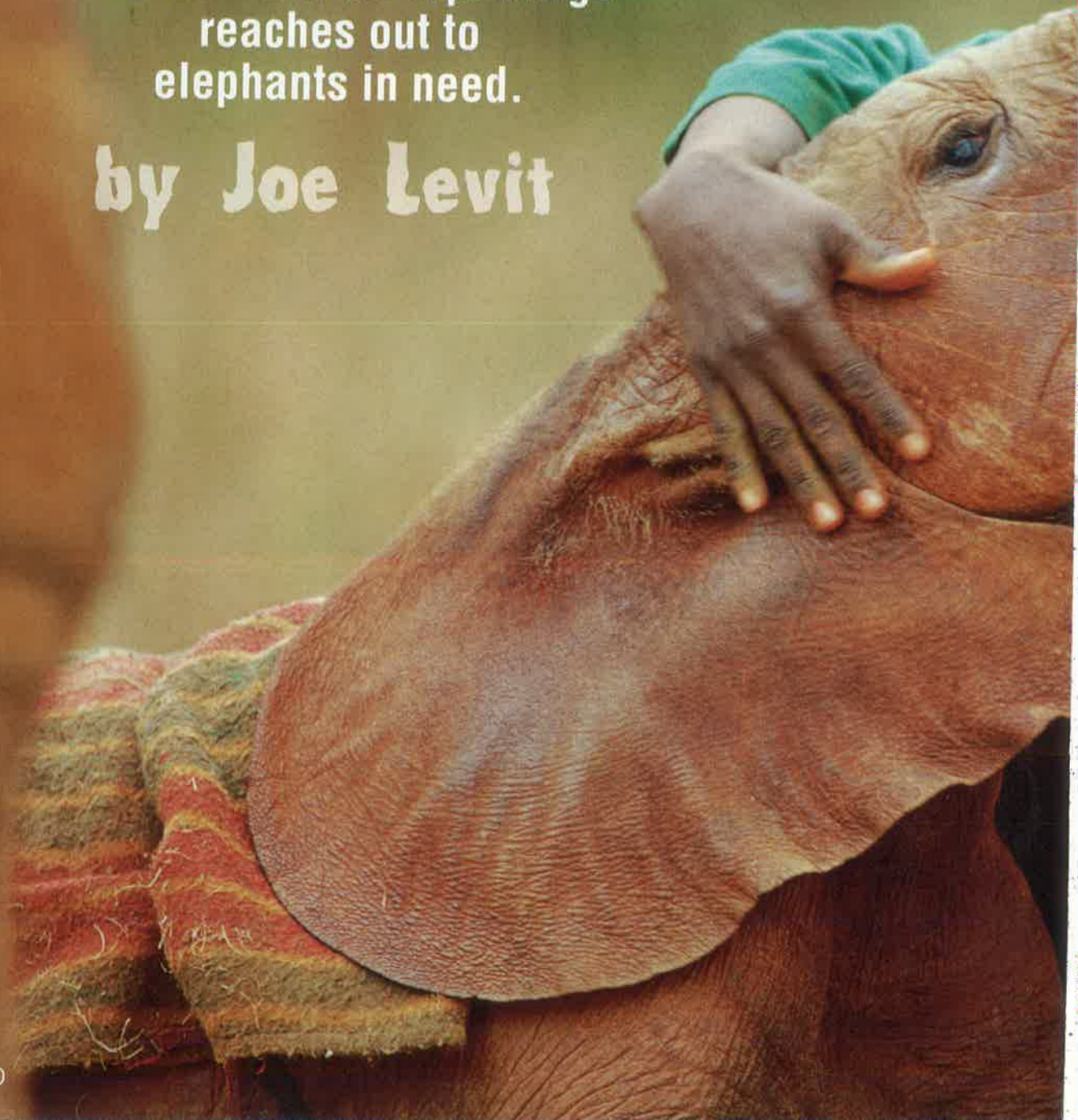




# Orphans

Discover how an orphanage  
reaches out to  
elephants in need.

by Joe Levit





## Social Studies

COMPREHENSION STRATEGY:



As you read, look for causes and their effects.

# No More





**T**he urgent voice of the park ranger calls out over the airwaves. He is speaking into his radio in short bursts. He sees a baby elephant near the river. She is alone, and she is injured. Send help quickly, the ranger says.

The **veterinarians** listening to the call know what to do. They rush to the site. When they get there, they are shocked by what they see.

The baby elephant has a wound on her head from a spear. There are also deep gashes on her back. When she sees the vets coming, the baby elephant runs to the bushes. She doesn't trust humans. Humans attacked her. They also likely killed her mother for her mother's tusks. She is an orphan now.

This is not the first orphan elephant these vets have treated here in Kenya, Africa. It will not be the last, either.

## Elephants in Trouble

At one time, more than a million elephants roamed Africa. Now fewer than 500,000 do.

The number of people living in Africa is growing. More houses and businesses are built for people to live and work in. Forests are cut down to make room. This is called **deforestation**. It means **habitat loss** for elephants. These animals must squeeze their herds into smaller and smaller patches of land.

Losing land isn't the only problem, though. **Poachers** have killed many elephants for their valuable ivory tusks. They also take elephants' meat, hide, and other parts.

Poachers are not the only danger to elephants. Local farmers sometimes shoot elephants. Sometimes, the elephants damage their property. Other times, farmers are trying to protect their crops from hungry elephants.

When a mother elephant is killed, her baby has little hope for survival. That is why the vets and other people at the David Sheldrick Wildlife Trust are so important. They help, protect, and care for orphan elephants.

## A New Home

The vets take the injured elephant to the orphanage. They name her Murka. Murka's injuries are serious, but she is strong.

The vets treat her wounds. She begins to heal. Within a few weeks, she is allowed to go to the nursery. This is where other baby orphan elephants live.

Murka seems scared at first, but the other elephants greet her gently. They touch her head with their trunks. They make low rumbling sounds to welcome her. She begins to feel safe.

By the end of the day, Murka is tired. Her body is still healing. One of the elephant keepers leads her to a quiet place to lie down for the night.

His name is Simon. He covers her with a warm blanket. Then he lies down next to her. She looks at him suspiciously. He rests his hand on her cheek. He whispers to her softly. Soon, they both fall asleep.

## A New Day

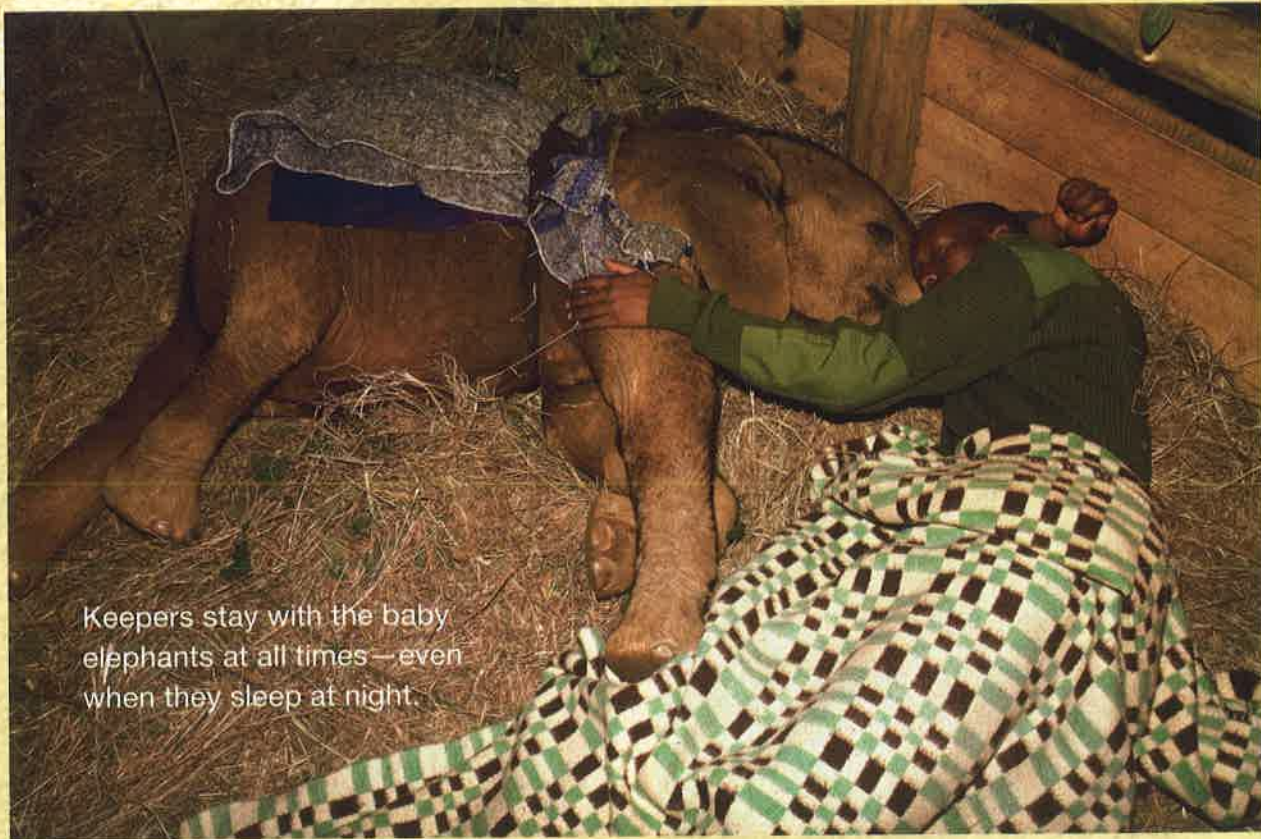
The day begins in the nursery at 5:30 a.m. Murka is hungry. So are all the other baby elephants. The keepers feed the babies milk from large bottles. A man holds a bottle to Murka's mouth, but she does not trust him.

He is Mishak Nzimbi. He has worked as an elephant keeper in the nursery longer than anyone else. He seems to have a special way with the orphans. He knows that Murka is missing her mother.

To get Murka to drink milk, he hangs up a wool blanket between two shrubs. Murka is curious. The blanket is warm, like her mother. She leans against it. Mishak stands on the other side. He pulls the corner of the blanket up just a little to offer her the bottle.

The milk does not taste like her mother's milk. Yet Murka drinks. Baby elephants need milk the same way human babies do. The elephants need milk every three hours. Each baby drinks 24 liters (6 gallons) a day.





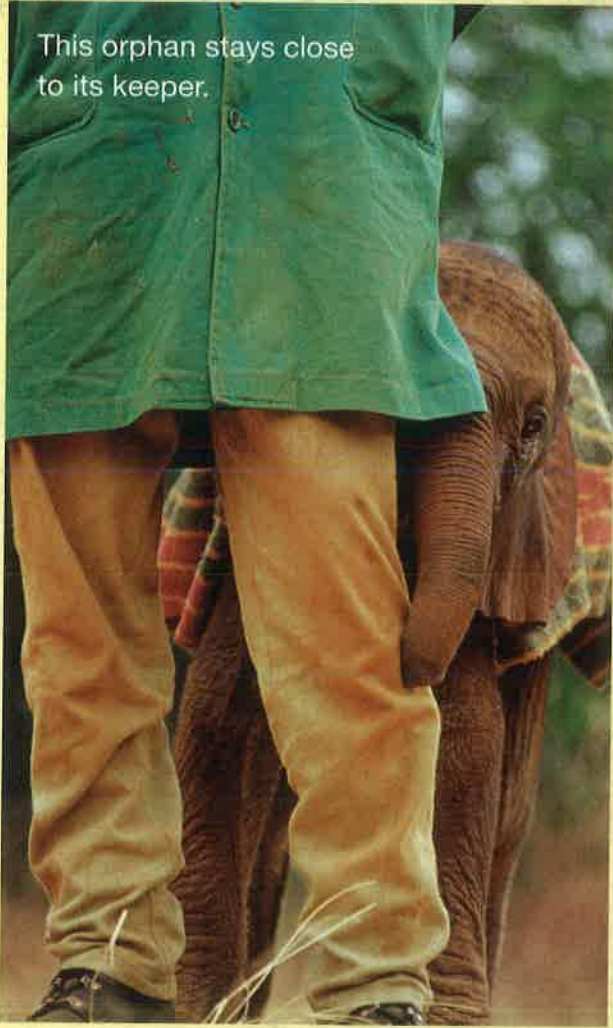
Keepers stay with the baby elephants at all times—even when they sleep at night.



The young orphans need to drink milk every three hours.



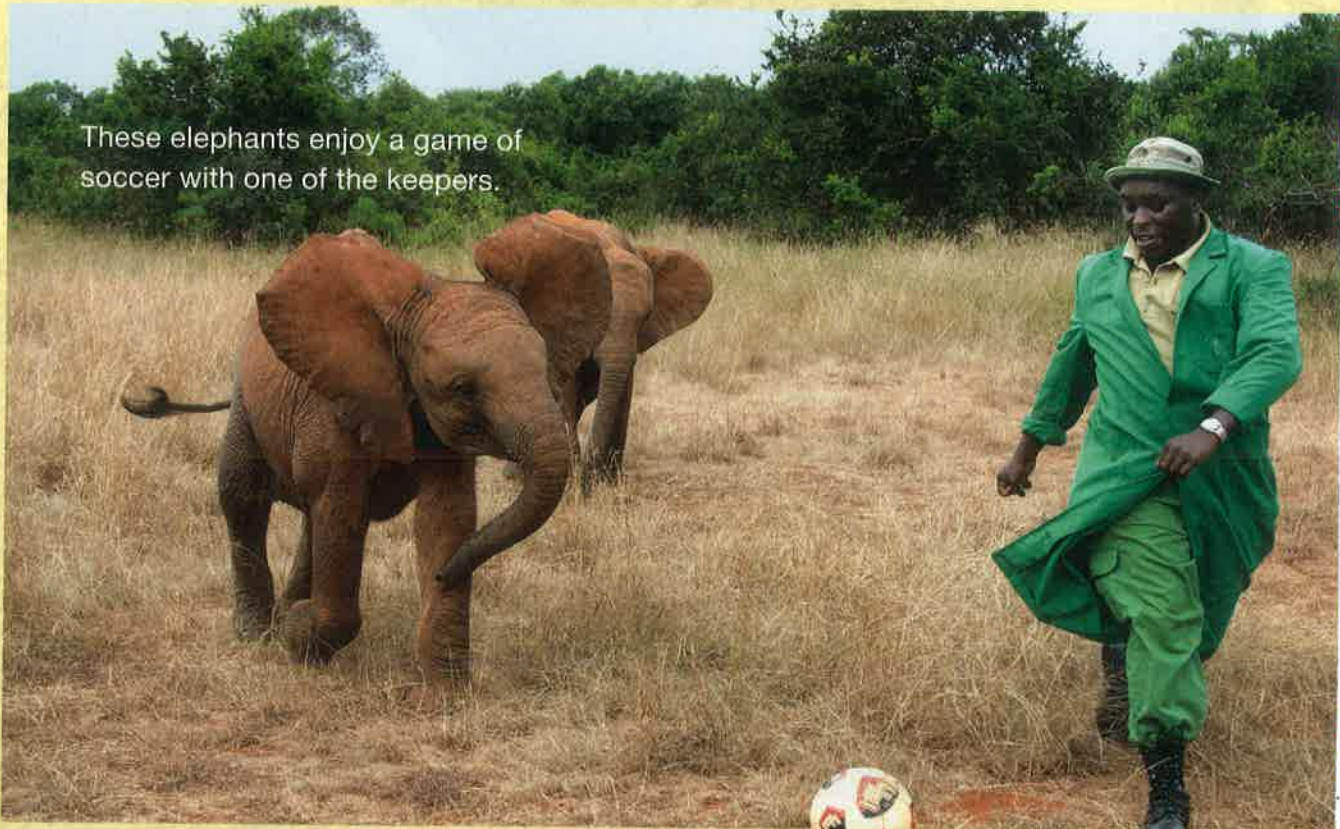
This orphan stays close to its keeper.



This baby elephant keeps cool with a mud bath.



These elephants enjoy a game of soccer with one of the keepers.





## Getting Started

After breakfast, it's time to leave the nursery. This is a cold morning. A keeper named Amos puts a wool blanket on Murka's back. She has never worn a blanket before. Amos ties an old pair of stockings over the blanket and around her middle. It makes a perfect belt. Now the blanket won't fall off when she walks.

In the wild, baby elephants rely on their herd. They live with their mothers, sisters, and aunts. The oldest female leads the herd. She is the **matriarch**, and she is in charge.

Each day, the matriarch leads the herd to search for food and water. Elephants eat up to 180 kilograms (400 pounds) of plants each day. Because they eat so much, they need room to roam to find what they need.

On this day, Mishak will act like the orphans' mother. The baby elephants line up behind him. Murka lines up, too. Then Mishak leads them into the forest. Here, the elephants play with one another and with the keepers. Murka watches as the elephants and men chase a soccer ball. Some orphans shove each other with their heads or trunks. They are trying to see who is stronger. Murka flares her ears and curls her trunk. She shows that she is not ready to play with the others yet.

## Lessons Worth Learning

The morning passes quickly. Now the sun is warm. The elephants no longer need blankets.

It's time for Murka to learn some important lessons. A mother elephant usually teaches her baby how to survive. She keeps her baby close to her for the first year. The mother will not let her baby wander beyond the reach of her trunk.

She teaches her baby what plants are safe to eat. She teaches the baby how to stay safe from predators. She also teaches a lesson about mud.

In the wild, elephants learn to coat their skin with a layer of wet mud. This keeps them cool in the heat. It also makes a thick crust on their skin when it dries. This keeps insects away.

## Mud Bath

Today, Murka will learn the mud lesson from Mishak and the other orphans. The herd of orphans finds a large, muddy puddle.

One of the orphans charges in. It slips and slides on the slick mud. Then it sucks up a trunkful of mud. It sprays it into the sky. A shower of mud rains down on the baby elephant. The keepers laugh. It's bath time!

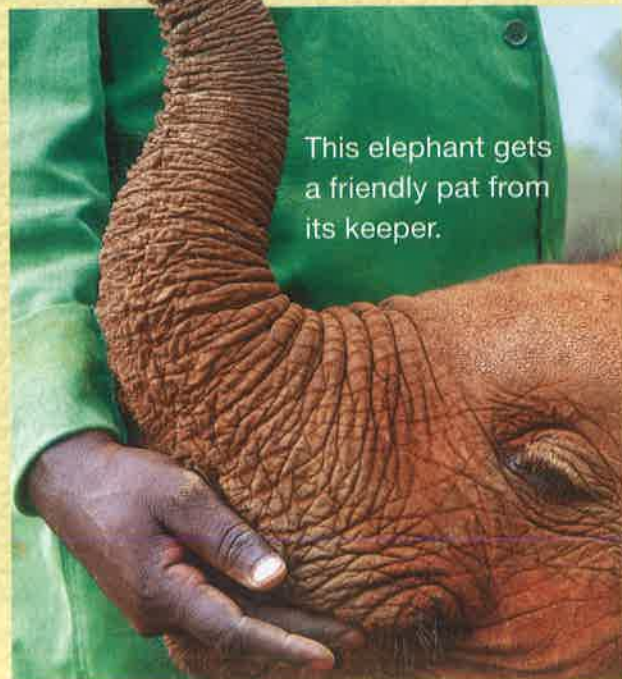
The other orphans join in. They squirt one another. They stamp their feet in the mud. That kicks up gooey clumps of mud. With loud trumpeting, they call to Murka. They are telling her to join them.

Murka stays by the edge of the mud puddle. She's not sure what to do. Mishak scoops up some of the runny mud and pours it on her head. It dribbles down her back.

The mud is cool. Suddenly, she understands. She takes a small step forward into the puddle. She sucks up some mud with her trunk and sprays it on her back.

After a long day, the orphans follow Mishak back to the nursery. Soon, it's time to go to sleep. This time, Amos comes to tuck Murka in.

She gently sweeps her trunk across his face. He knows why she is doing this. She wants to get to know him. She touches his nose, his cheeks, his eyes. He sings to her softly until she falls asleep.



This elephant gets a friendly pat from its keeper.



## On the Move

Murka doesn't stay in the nursery long. She is almost two years old now. Most of the orphans leave the nursery when they are about this age.

Then they go to live in a different part of the orphanage. This place is called Tsavo. It is a wild and rugged land. Here, Murka and the other orphans will meet wild elephants and other animals.

Simon and Amos load Murka and two other orphans into a special truck. The truck starts to move. One of the orphans cries out. She's scared.

Murka reaches her trunk through the stall that divides them. Murka pats the frightened elephant's head to comfort her.

Murka is scared, too, but she trusts these men now. She knows they will not hurt the orphans. The trip takes many hours. Twice, the truck stops. The keepers jump out and search for fresh food. They cut branches and tall grasses for the elephants to eat.

## The Ties That Bind

At last, Murka and the other orphans see their new home. Within moments, 11 more orphans join them. This may be a new place, but these elephants are old friends. Many of them had once lived in the nursery, too.

All the orphan elephants huddle together. Their heads press against one another. They touch heads and faces with their trunks. There is a low, soft rumbling of voices. They are happy to be together.

Murka soon learns that life here is different from the nursery. Several older elephants from the wild come to visit the orphans. Each day, they see, hear, and meet new animals.

The keepers no longer sleep with the elephants at night. The orphans sleep together in stalls, though. Here, they are protected from predators. The orphans are still too young and small to defend themselves against a lion or leopard attack.

Eventually, the orphans meet older elephants that live in the wild.

