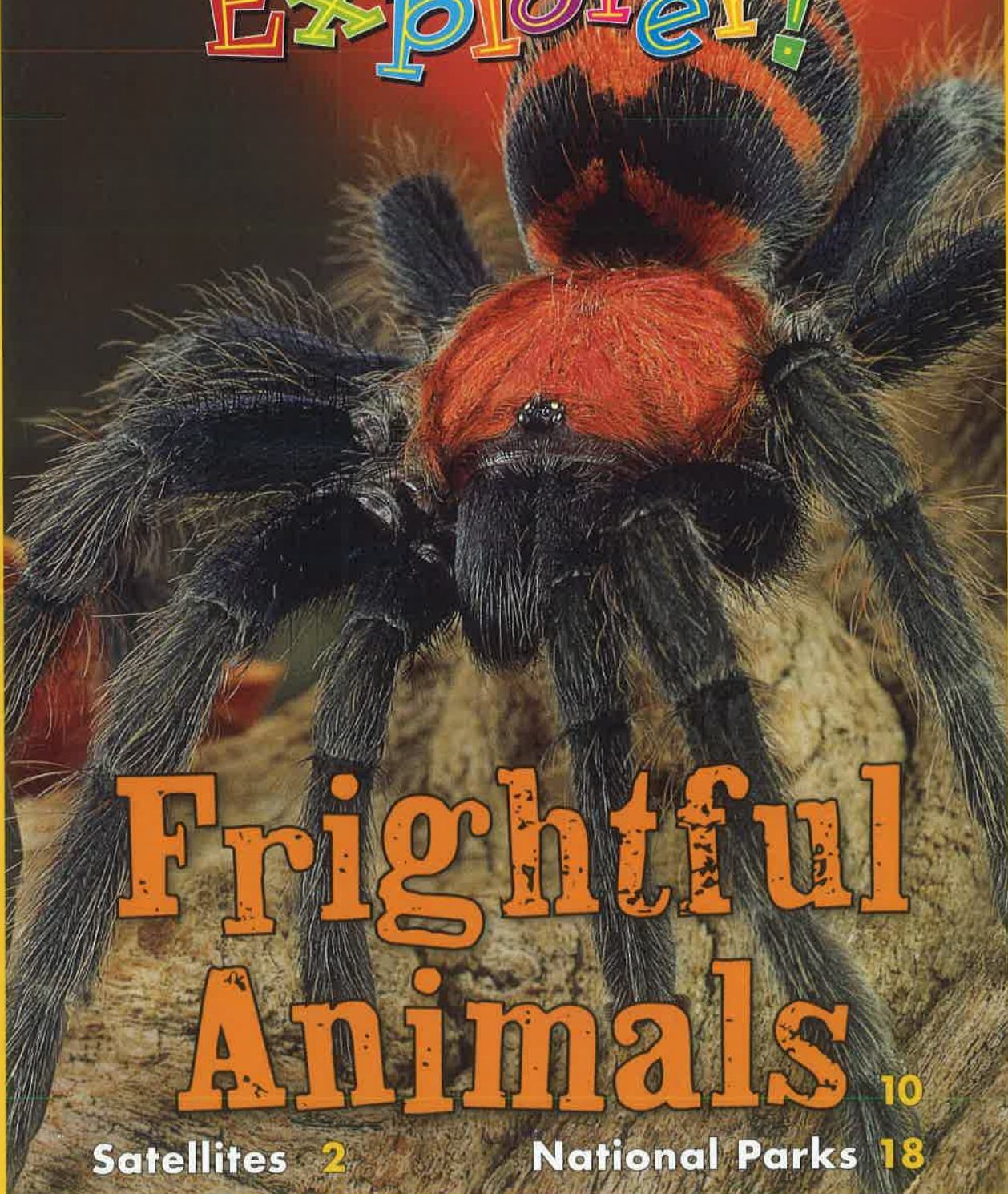


PIONEER EDITION

NGPIONEER.ORG

OCTOBER 2009

NATIONAL GEOGRAPHIC *Explorer!*



Frightful Animals

Satellites 2

National Parks 18

A satellite is shown in the upper right corner of the page, set against a dark space background with streaks of purple and blue light. The satellite has a large parabolic dish and various instruments. The main title 'EYE IN THE SKY' is written in large, bold, white, sans-serif capital letters on the left side of the page.

EYE IN THE SKY

High above Earth, machines called satellites circle the planet. Without them, you could not watch TV or use a cell phone. Read on to find out how you depend on satellites.

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By Jonathan McDowell
Astrophysicist, Harvard-Smithsonian
Center for Astrophysics



Reading Strategy: Read this story to learn about satellites. Think about what the author most wants you to know.

Thwap! A dart hits the elephant. The large animal falls to her knees. She is asleep. National Geographic explorer Michael Fay and his team are nearby. Carefully, they put a collar on her. They name her Annie.

Fay is at a national park in Africa. Sometimes the elephants go outside the park. Fay wants to protect them from hunters. That's why he put the collar on Annie. When Annie wakes up, the collar will send a message to a satellite. It tells where Annie is.

The satellite then sends the information to Fay's computer. So Fay will always know where to find Annie. Guards will know where to go to protect her from illegal hunters. That's how satellites help Annie. They help you, too. Let's learn how.

MICHAEL NICHOLS



Satellite Basics

A satellite is an object in space. It goes around another object. The moon is one type of satellite. It **orbits**, or goes around, Earth.

People build satellites, too. Rockets carry them into space. Each satellite has a special job. Some help scientists study the world. They send pictures and other information back to Earth. Today, about 1,000 working satellites are in orbit.

Each one has all it needs to do its job. Solar panels collect the sun's energy. This gives it power. It has computers to receive messages from Earth. It has radios to send signals back to Earth.

Space Issues

Sometimes satellites stop working. They may run out of energy. Or their computers may break down. The sun can even burn them up. That's not all.

Some satellites fly close to Earth. Air slows them down. Sometimes one falls through Earth's **atmosphere**. There, gases rub against the satellite. This can burn it up! This doesn't happen often, though.

Jumbo Job. *Satellites will track where this elephant goes.*



© SHUTTERSTOCK/STOCK

In Control. People send radio signals to computers on a satellite. The signals tell it what to do.

Sky Talk

Most satellites are relay stations. They help people communicate. Let's say you call a friend on a cell phone. First, the phone relays, or sends, a signal to a tower. The tower then sends the signal to a satellite. The satellite sends it to a tower near your friend. Your friend's phone starts to ring!

Satellite televisions work the same way. Television stations send programs to a satellite. The satellite relays the program to your home TV.

These satellites are always moving. Yet they need to be in just the right spot for TV or cell phone calls. Their secret is that they move at the same speed as Earth spins. So they are always above the same point on Earth.

© REUTERS/CORBIS



Earth Watchers

Some satellites are like eyes in the sky. They take pictures of Earth. You may have seen some on the news. They show where big storms are forming. This warns people and saves lives.

Weather satellites follow lines of **longitude**. Those are lines on a map that go north to south. The Earth spins east to west. So the satellite "sees" almost all of Earth.

Satellite images show changes on Earth, too. They show where people have cut down forests. They also help people study global warming. As Earth heats up, ice melts at the Poles. Over time, satellite pictures show how much the ice is melting.

Movers and Shakers

One day, satellites may even predict earthquakes. Here's how. Moving pieces of Earth make radio waves. What if satellites picked up these waves in space? They could warn people about an earthquake!

Satellites can be spies in the sky, too. They can see if other countries are hiding weapons. They can even pick up secret messages!

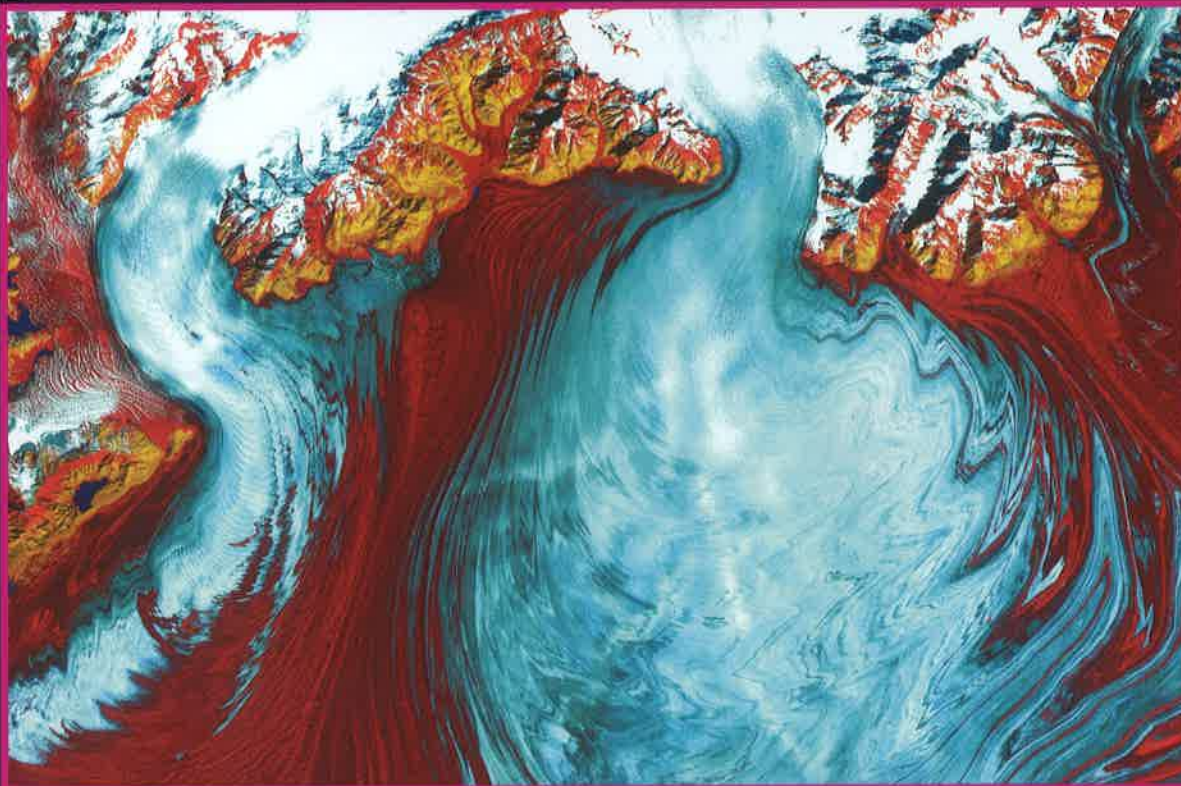
Strong Storm. A satellite took this picture of a hurricane in 1999.

© CORBIS



Live Lava. A satellite took this picture of a volcano erupting. It helped scientists see how its shape changed.

USGS



River of Ice. The largest glacier in Alaska looked like this in 2000. Scientists compared it to older satellite pictures. It had shrunk 20 meters (60 feet).

Space Patrol

Some satellites teach us about Earth. Others teach us about space. The Hubble Space Telescope is one of these. This satellite looks far into space. It takes pictures of what it sees. It sends the pictures back to Earth.

The pictures tell scientists about the stars and planets. They help us better understand the universe. Using Hubble, scientists learned the universe is 13.7 billion years old! As you can see below, the pictures are also very beautiful.

Getting Around

Here on Earth, people use a group of 20 satellites to find their way around. The satellites are called the Global Positioning System, or GPS. It figures out where someone, or something, is. Drivers use GPS in cars. Pilots use GPS in airplanes.

Even ships at sea use GPS. A lost ship can send out a signal. A GPS picks up the signal. Then it works out the ship's location. It sends this information to a rescue team. Help is on the way!

NASA/ESA/HOWARD BOND, STSCI



Space Scenes. Satellites let us look far into space.



Finding the Way. This woman uses GPS to explore a park in Alaska.

From Today to Tomorrow

Satellites already do many things. They explore the universe. They watch over Earth. They help Mike Fay save elephants. They make your life safer, too! What more will satellites be able to do tomorrow? Just imagine!

Wordwise

atmosphere: gasses around a planet

longitude: distance east or west of Greenwich, England

orbit: to travel around an object in a circle

satellite image: picture taken by a satellite

High-Tech Hobby



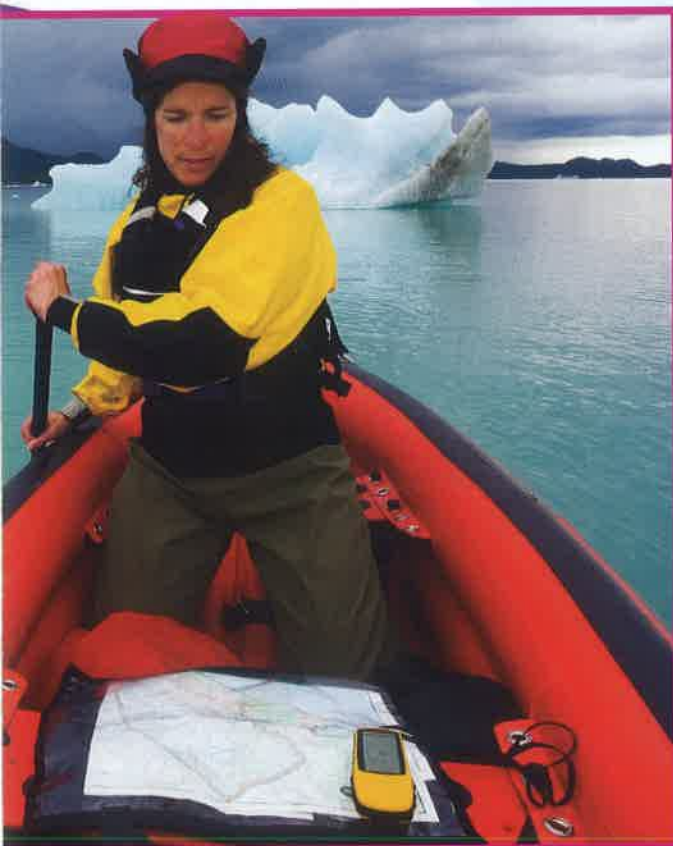
You can play a game using satellites! It's called *Geocaching*. It is like a treasure hunt. Someone hides a cache, or group of objects. A book is hidden with the cache.

The players use a GPS to find the treasure. They may have to hike over rocks or through forests. If they find the cache, they sign the book. This proves they were able to find it.

So you see, satellites also can be fun!



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© BIRBY HARDE/CORBIS IMAGES

Risky Rescue. Rescuers use satellites when they train to find people at sea.



© 2000/AMERICAN PICTURES

Gila monster

Reading Strategy: As you read this story, think about how the animals are alike and how they are different.

Frightful Animals Hall of Fame

Which creature makes you shake with fright? Take a tour to see some of the world's scariest animals. Then decide.

By Shirleyann Costigan

In the wild, animals do what they must to survive. Some animals are known for their killer **instincts**. What if you could see some of these animals close up? Which would you put in the Frightful Animals Hall of Fame? Come explore to learn about these frightful creatures.

Desert Monster



© MARIAN BACON/ANIMALS ANIMALS

Our first stop is the southwestern United States. Here we visit a hot, dry desert. This is where a large lizard called a Gila monster lives.

The Gila monster is a shy animal. It hides most of the day. Still, it knows how to defend itself. When its strong jaws crush down on something, it doesn't let go. The Gila kills its prey with **venom**. It eats small animals and some kinds of eggs.

A Gila moves slowly. But it can sprint quickly. Don't worry, though—it rarely attacks people.



Killer Teeth. A Gila monster kills prey with venom that comes out of its teeth.



© WILD NATURE PHOTOS/ANIMALS ANIMALS

Supersize Spider

Our next stop is the Amazon jungle. That's in South America. The world's largest spider lives here. It is a goliath tarantula. It can grow larger than your foot! This spider definitely belongs in our Hall of Fame.

This spider eats frogs, beetles, lizards, and bats. Many years ago, some explorers saw one eating a bird. So they named the spider the goliath bird-eating tarantula.

The tarantula doesn't make a web. It sneaks up on its prey. Then it jumps on the victim. It bites the animal with its fangs. The spider spits special juices into the animal. The juices turn the animal's body to mush. Finally, the spider slurps up its meal.

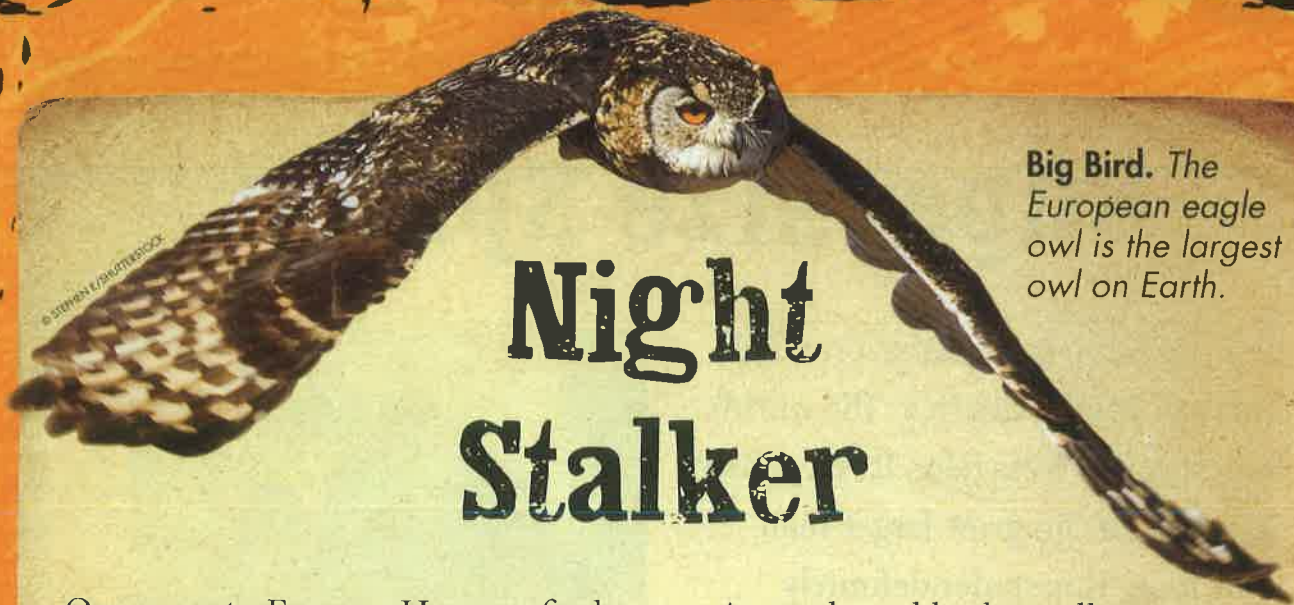
The tarantula has another weapon for defense. It can kick sharp hairs off its body. The hairs stick in an attacker's mouth and eyes. Before it kicks, the spider makes a loud hissing noise. The hiss is a warning. Watch out!



Danger Afoot. A goliath tarantula can grow larger than your foot.



Hairy Legs. This spider kicks sharp leg hairs at predators.



Big Bird. The European eagle owl is the largest owl on Earth.

Night Stalker

On we go to Europe. Here we find the European eagle owl. It also lives in Asia and parts of Africa. The eagle owl is the largest owl on Earth.

So just how big is this owl? Its body may grow 76 centimeters. That's 30 inches long. That is longer than your leg! Its huge wings may grow up to 2 meters (6 feet) from tip to tip. This is one big bird.

An eagle owl looks really scary. Feathers on its ears stick up like horns. Its orange eyes seem to look right through you. The eagle owl hunts small animals like rabbits. But sharp claws and a beak can catch deer.

Like other eagles, the call of this bird is *oo-hoo*. It can also growl or even bark. Does that seem strange? Well, our next Hall of Famer laughs!



Hyena Hunter



Pack Rat. Hyenas hunt in groups called packs.



The spotted hyena is next in the Hall of Fame. It can make a giggling noise! But this animal is not funny. It is a dangerous killer.

The spotted hyena hunts in the grasslands of Africa. It lives in a group called a clan. The animals speak to each other with wails and screams. They also giggle. You can hear their giggles 5 kilometers (3 miles) away!

Three things make the spotted hyena dangerous. First, it can run 48 kilometers (30 miles) an hour. Second, it usually hunts in a pack. And third, a hyena will eat *anything*. Even metal pots. Now, that's scary!



Fierce Fish

Our next animal is the great white shark. We'll go to the ocean off Australia to find it.

The great white shark can be 6 meters (20 feet) long. It can weigh 2,270 kilograms (5,000 pounds)! It hunts seals, sea lions, and sea turtles.

This killer fish can smell a meal 5 kilometers (3 miles) away. Then it swims quickly and quietly through the water. When it finds its prey, the shark swims up under it. Then comes the silent attack! Most victims never know the shark is coming.

The jaws of a great white are super scary. They are lined with rows of sharp teeth. The shark never runs out of teeth. New teeth keep growing all the time.



Big Mouth. A great white shark has about 300 teeth!



Strong Snake

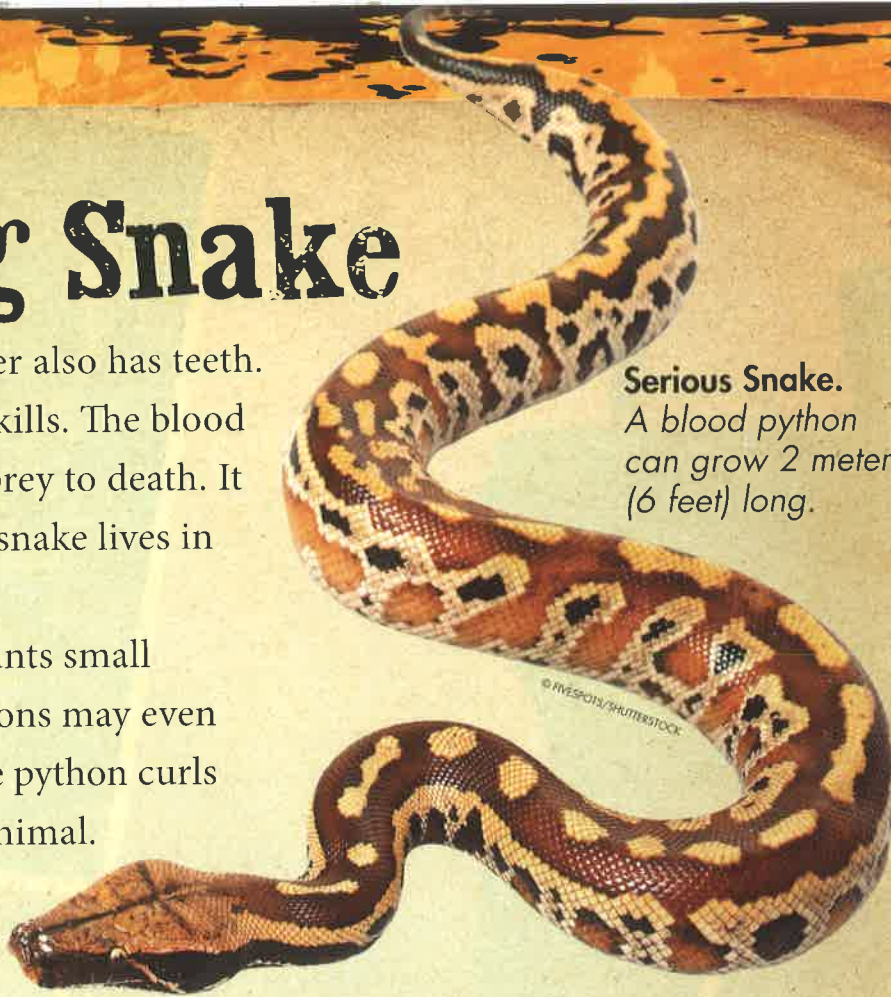
Our last Hall of Famer also has teeth. But that's not how it kills. The blood python squeezes its prey to death. It is a **constrictor**. The snake lives in Southeast Asia.

A blood python hunts small animals. Larger pythons may even eat deer or sheep. The python curls its body around an animal.

It squeezes tighter and tighter. Soon the trapped animal cannot breathe. It stops fighting. Then the hungry snake swallows the animal whole!

The blood python may seem cruel to us. But it's not. Neither is the shark, or the hyena. They are like many animals. They have to eat to stay alive. This is nature's way.

Which animals do you think should be in the Frightful Animals Hall of Fame? Look around. Explore. Learn more about nature's killers. Just keep a safe distance!



Serious Snake.

A blood python can grow 2 meters (6 feet) long.



Wordwise

constrictor: animal that squeezes its prey

instinct: natural way an animal behaves

venom: poison