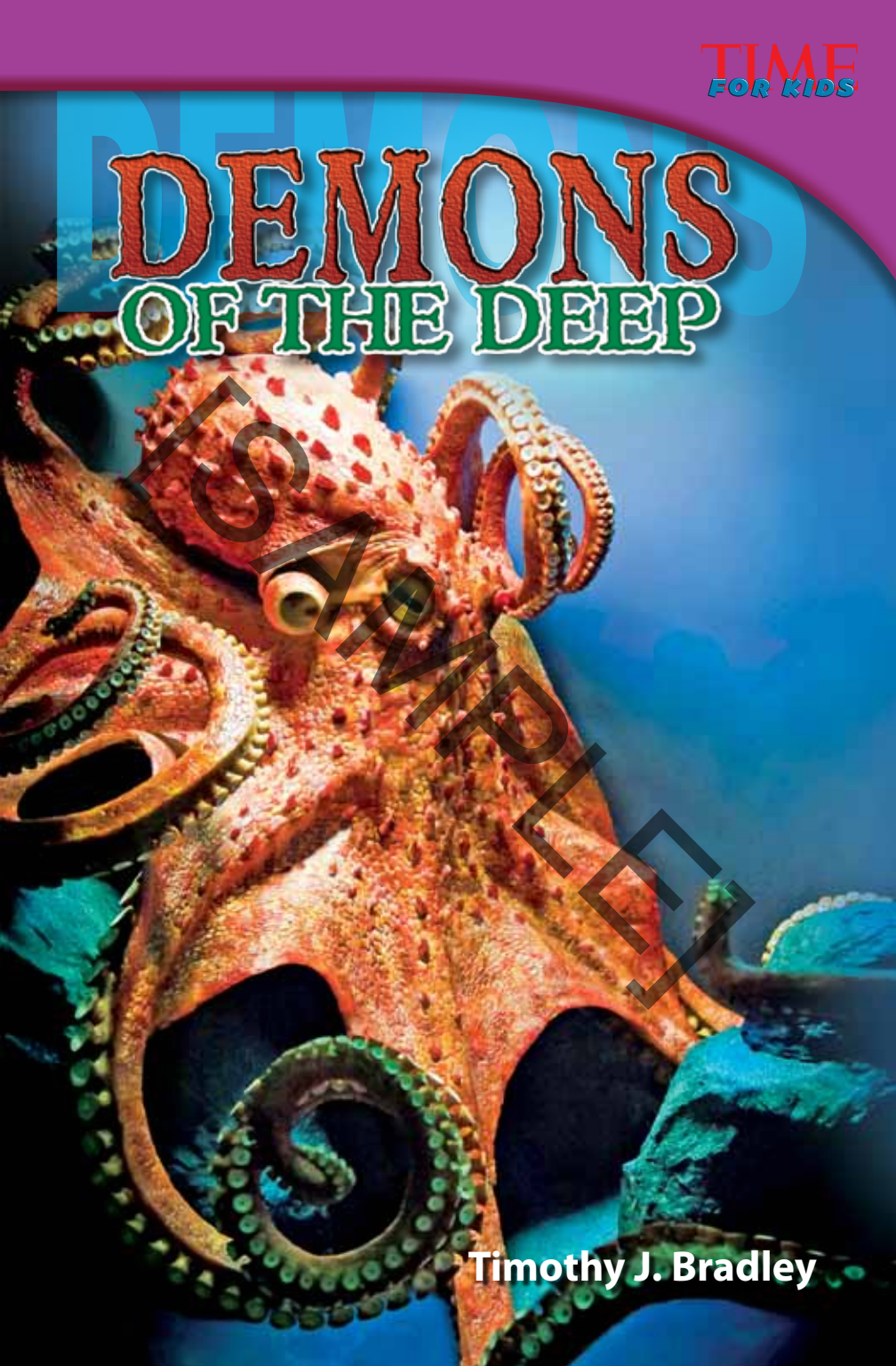
TIME FOR KIDS

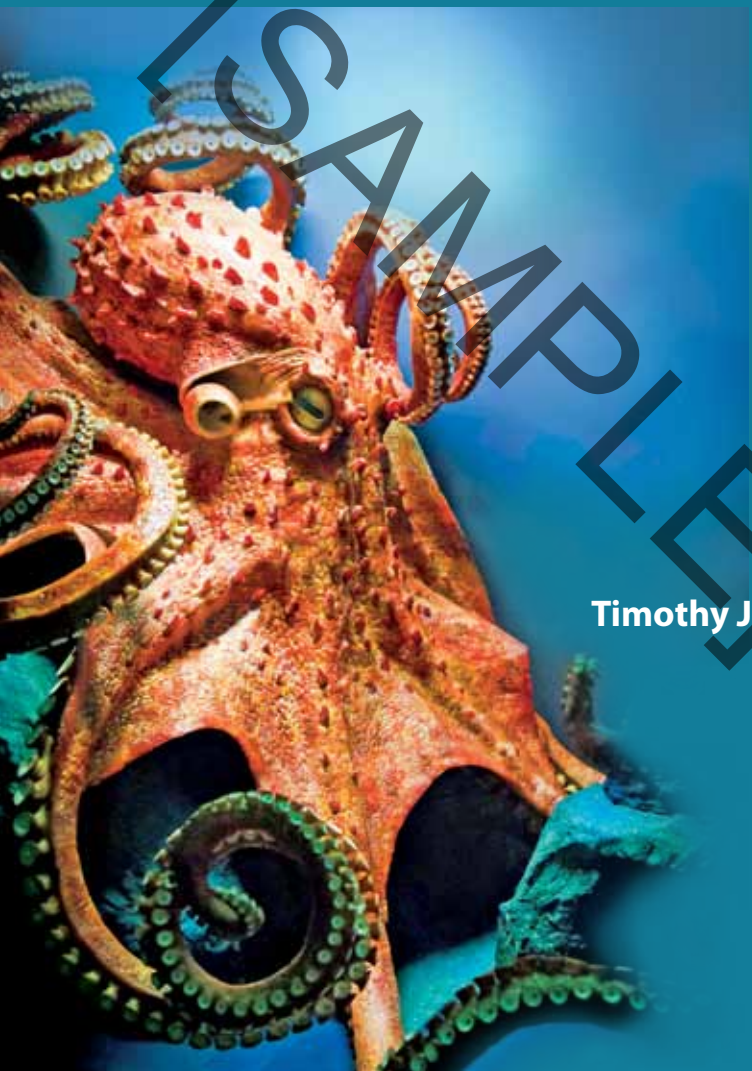
DEMONS OF THE DEEP



Timothy J. Bradley

TIME FOR KIDS

DEMONS OF THE DEEP



[SAMPLE]

Timothy J. Bradley

Consultants

Timothy Rasinski, Ph.D.
Kent State University

Lori Oczkus
Literacy Consultant

William B. Rice
Natural Science Author
and Consultant

Publishing Credits

Dona Herweck Rice, *Editor-in-Chief*
Lee Aucoin, *Creative Director*
Jamey Acosta, *Senior Editor*
Lexa Hoang, *Designer*
Stephanie Reid, *Photo Editor*
Rane Anderson, *Contributing Author*
Rachelle Cracchiolo, *M.S.Ed., Publisher*

Image Credits: pp.40, 41 (middle) Alamy; p.41 (top) The Bridgeman Art Library; pp.11 (bottom), 21 Corbis; p.39 Deep Sea Photography; pp.19 (top), 31 Getty Images; p.41 LOC [LC-USZ62-65466]; p.14 The Monterey Bay Aquarium Research Institute (MBARI); p.16 AFP/Getty Images/Newscom; p.27 Newscom; p.32 dpa/picture-alliance/Newscom; p.51 (top) KRT/Newscom; pp.24, 37, 38 Reuters/Newscom; p.53 (bottom) ZUMA Press/Newscom; pp.30, 43, 51 Norbert Wu/Minden Pictures/National Geographic Stock; pp.6–7, 18–19, 28–29, 33, 42, 44–45, 48–49, 52–53 NOAA; pp.8–9 Bruce Rasner/Rotman/Nature Photo Library; p.12 David Shale/Nature Photo Library; pp.11 (top), 19 (bottom), 26 (bottom), 28–29, 52–53(middle), 56 Photo Researchers Inc.; pp.36 (illustration), 47(bottom) ThinkStock; p.48 Kmusser/Wikimedia; p.10 (bottom) Carl Chun/Wikipedia; pp.22–23, 34–35, 39 (illustration), 46–47 (illustrations), 55, 55 (illustrations) Timothy J. Bradley; All other images from Shutterstock.

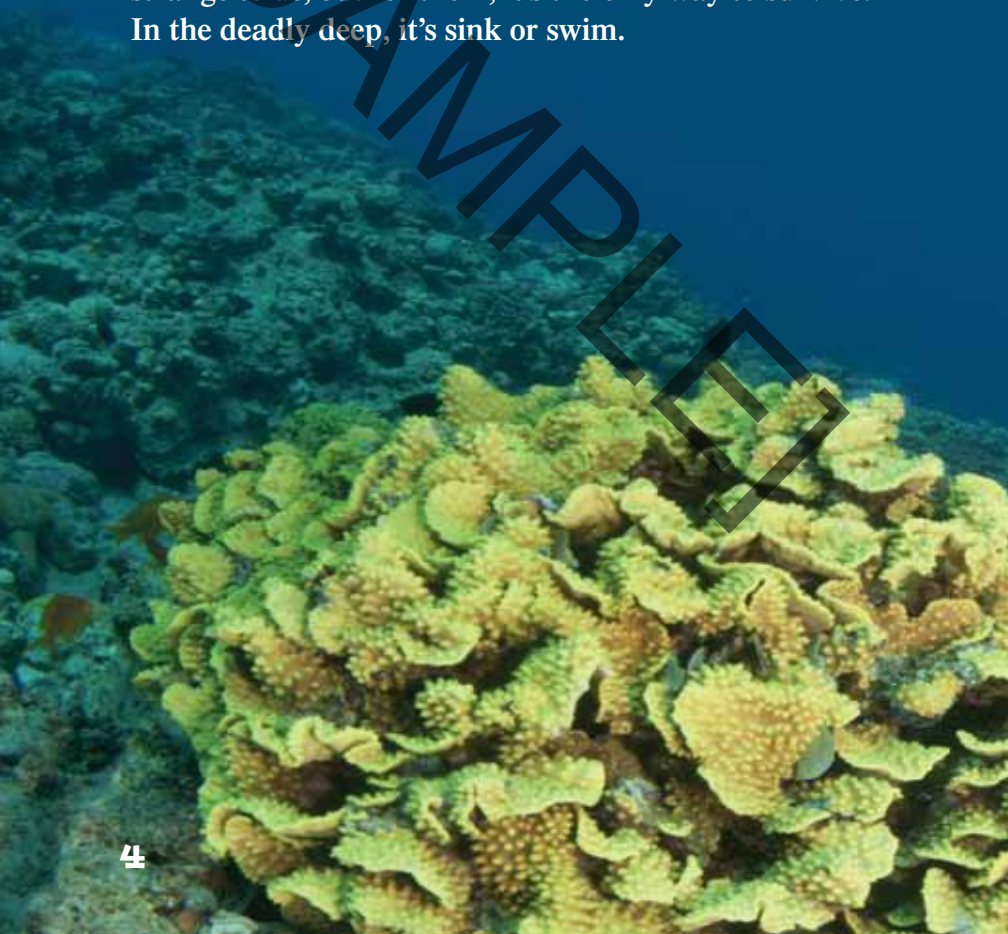
Teacher Created Materials
5301 Oceanus Drive
Huntington Beach, CA 92649-1030
http://www.tcmpub.com

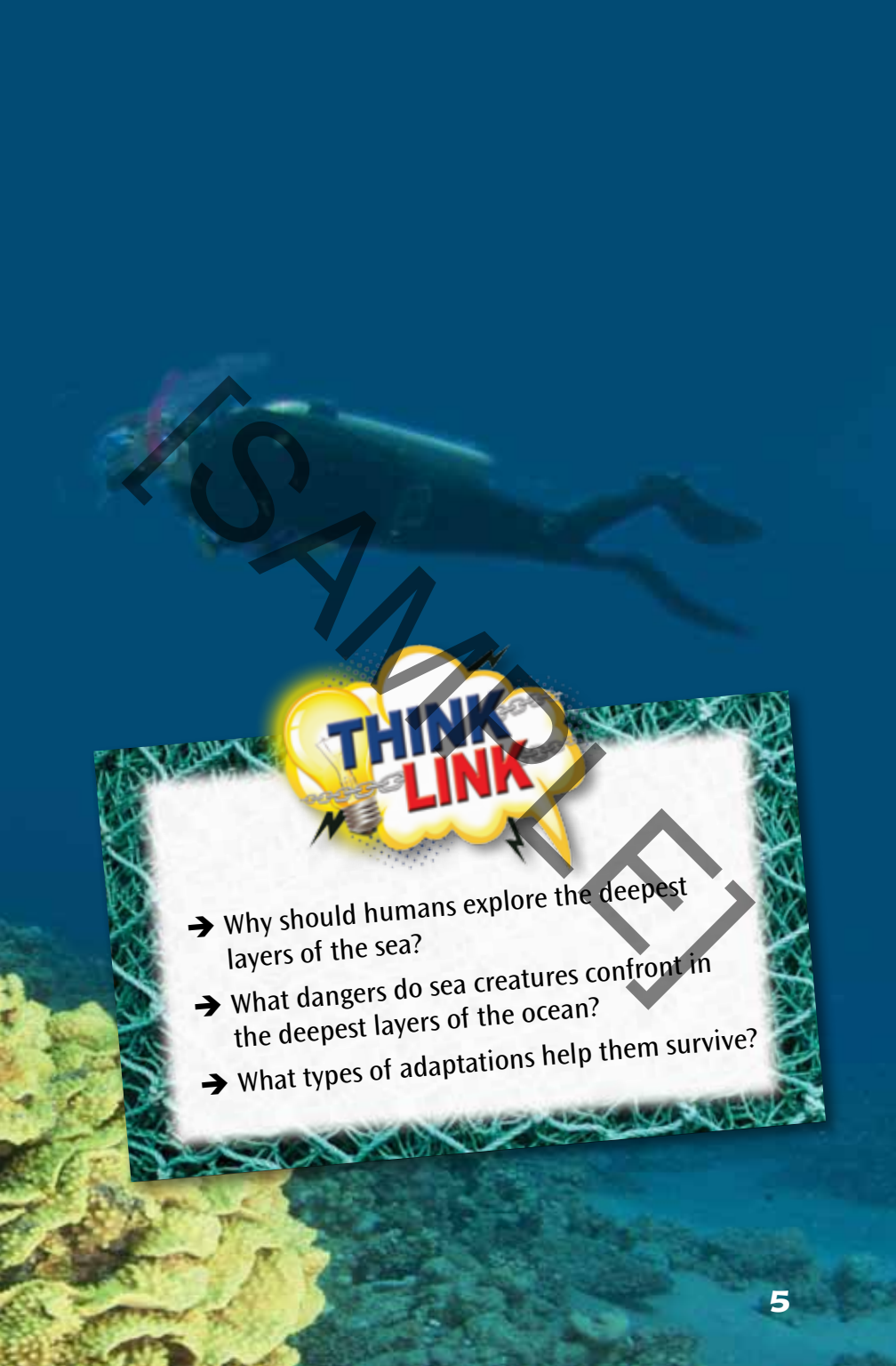
ISBN 978-1-4333-4890-9

Table of Contents

The Deadly Deep

Suit up and jump in, but be warned—danger awaits! **Predators** lurk in these icy, dark waters, waiting to catch a tasty morsel. And the deeper down you go, the harder it is to see them. Sunlight can't reach these chilly depths. No sunlight means there is no plant life. These sea creatures must find other things to eat. **Adaptations** help these demons of the deep thrive in harsh conditions. They may look strange to us, but for them, it's the only way to survive. In the deadly deep, it's sink or swim.




THINK LINK
Why should humans explore the deepest layers of the sea?
What dangers do sea creatures confront in the deepest layers of the ocean?
What types of adaptations help them survive?

The Twilight Zone

Earth's oceans cover 71 percent of the planet, but only a small portion of these waters has been explored. Most of what we know about the oceans comes from studying areas closer to the surface. That includes parts of the **twilight zone**. It begins 660 feet below the surface. The water is as dim as the evening sky when the sun sets. At this depth, there is not enough light for **photosynthesis**, making plants scarce. Food is difficult to find. Special adaptations help fish hunt at this level. Some animals swim up to the surface to feed at night. Others wait for food to fall down from above. And some eat each other.

Life in the Dark

The deep sea is one of the most hostile places to live on Earth. But it is home to an amazing array of life. Scientists have found more than 16,000 species that live in the depths of the ocean. These creatures live their entire lives without seeing light from the sun.

Megamouth Shark

At nearly 1,500 pounds, megamouths are some of the largest sharks in the ocean, but they eat some of the smallest **organisms**. They take in large gulps of water and push them through their gill slits. Tiny organisms such as **plankton** are caught by **gill rakers**. They filter the food so it can be swallowed. That is why they are known as **filter feeders**.

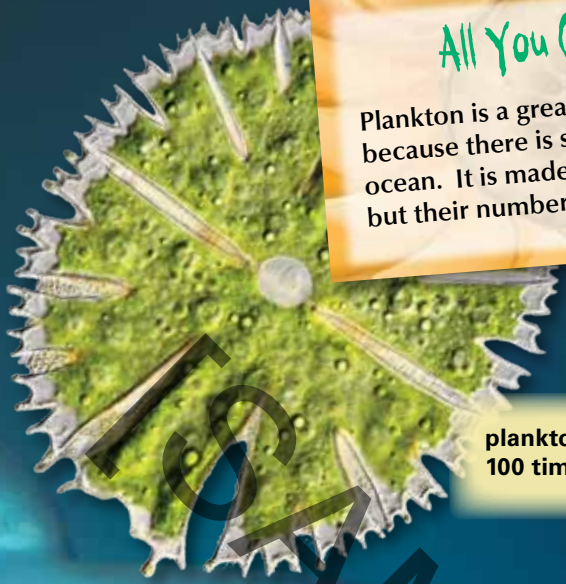
The four-foot-wide mouth is surrounded by light-producing **photophores**. This light attracts plankton. Scientists think megamouth sharks spend their days in deep water, from 400 to 660 feet deep. At night, they migrate closer to the surface to eat plankton.

Filter Feeders

Many creatures survive by filter feeding. Several types of whales are filter feeders. Manta rays are filter feeders, too. Not all filter feeders live in water, though. The flamingo, a large bird, is also a filter feeder.

All You Can Eat

Plankton is a great food source because there is so much of it in the ocean. It is made up of tiny creatures, but their numbers are huge.



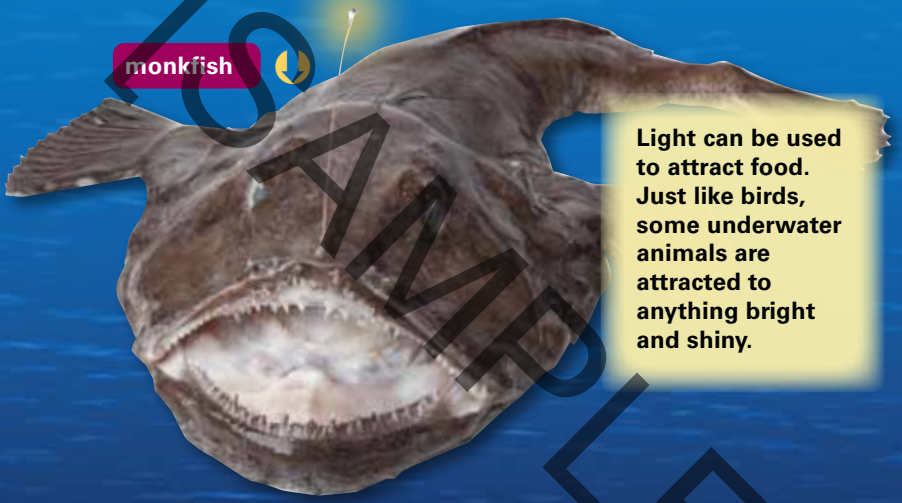
plankton magnified nearly 100 times its natural size

megamouth shark

The megamouth is very rare. Fewer than 50 have been found.

Ocean Colors

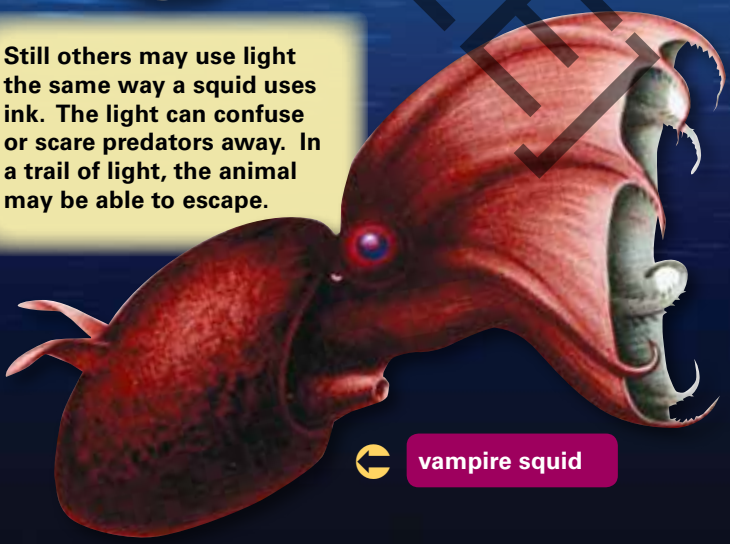
It's dark in the deep blue sea. Nearly 90 percent of deep-sea creatures are **bioluminescent**. They make their own light. Green and blue lights are the most common colors produced because these colors are seen easily in seawater. Bioluminescence serves different purposes for different sea creatures.



monkfish

Light can be used to attract food. Just like birds, some underwater animals are attracted to anything bright and shiny.

Still others may use light the same way a squid uses ink. The light can confuse or scare predators away. In a trail of light, the animal may be able to escape.



vampire squid

Lighten Up!

Many forms of life in the ocean depths have photophores that produce light. They may be used to lure prey or to signal others. The light may be produced by chemicals in the creature's food or special cells that can produce light. Some organisms have bacteria living inside them that glow.

Some creatures use light as camouflage. It can protect these animals from predators.

Jewel Squid

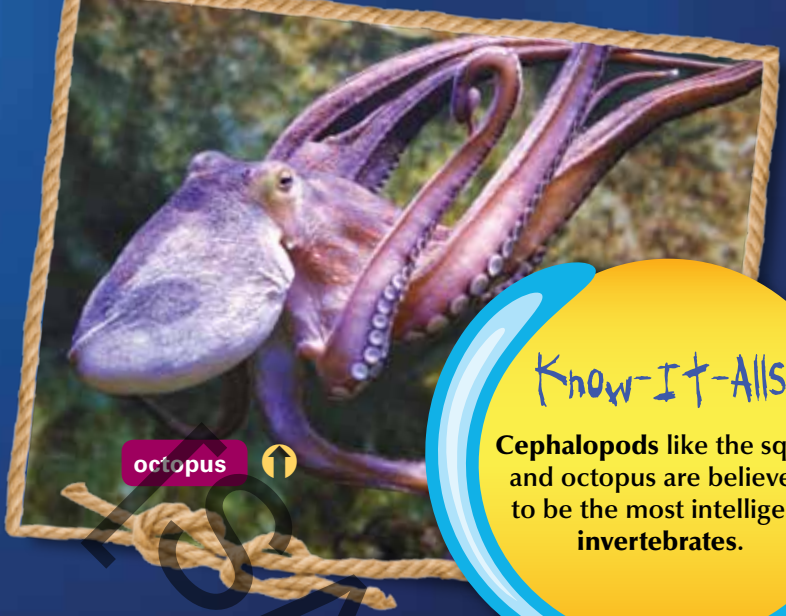
Found as deep as 1,500 feet, the jewel squid looks for prey in the dark, cold waters of the North Atlantic Ocean. It earns its name from its **translucent** skin. Inside, are hundreds of bioluminescent organs. The light helps hide the squid's shadow in the dim ocean light.

The jewel squid's eyes let it see in two ways. One eye is normal and looks down, searching for predators. The other eye is much larger and can see more details in the dark.

Escape Velocity

Some squid can launch themselves out of the water to escape from a predator by quickly pushing away water. A squid can fly over 150 feet through the air once it clears the water's surface.

jewel squid

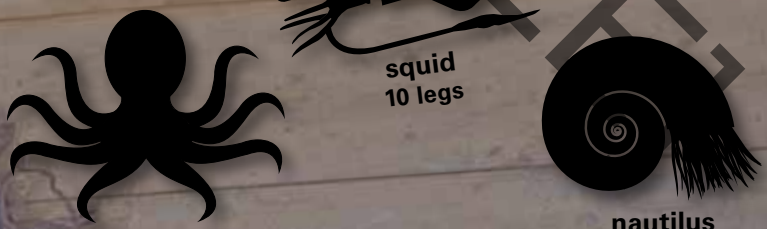


Know-It-Alls

Cephalopods like the squid and octopus are believed to be the most intelligent **invertebrates**.

A Leg Up

What's the difference between an octopus, a squid, and a nautilus? It's all in the legs!



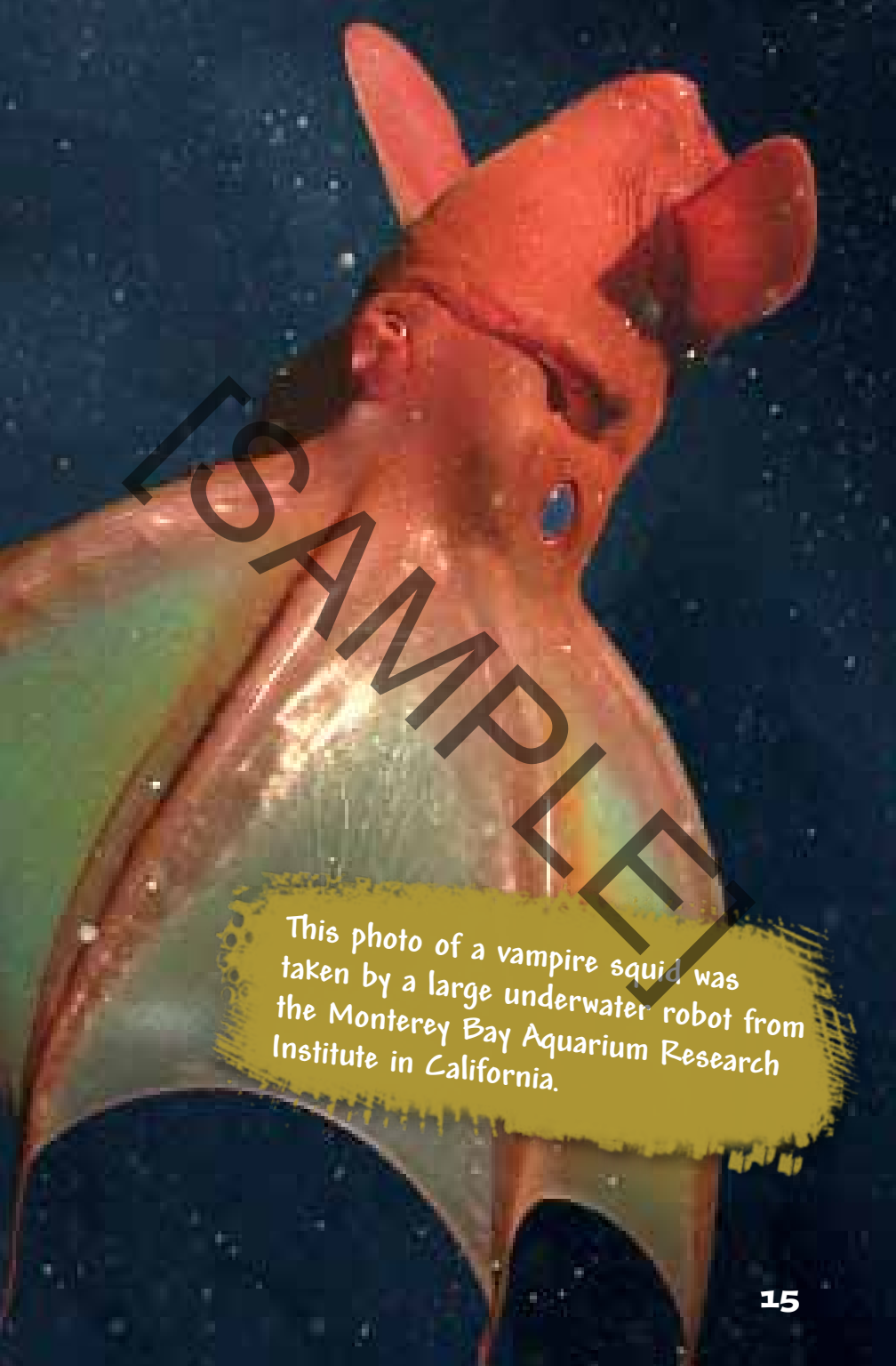
Vampire Squid

This small blood-red squid can be found at 3,000 feet below the surface. There is no light at this depth and very little oxygen. Thin skin connects the vampire squid's **tentacles**. Flexible spines line the undersides. When in danger, the squid turns inside out, covers its head, and hides, using its arms as a cloak. Unlike other squid, the vampire doesn't use ink sacs to distract predators. Instead, it shoots out a cloud of glowing mucus to escape.

Bloodbath?

Some animals earn their vampire title because they consume blood. The vampire squid doesn't drink blood. Its dark color, webbed tentacle "cloak," and creepy eyes make the name a good fit.

The vampire squid can change the size of its eye spots to confuse predators. Shrinking the spots makes it look like the squid is getting away.



This photo of a vampire squid was taken by a large underwater robot from the Monterey Bay Aquarium Research Institute in California.

A Decade of Discovery

The planet Mars has been explored more than Earth's oceans have been. It takes a lot of funding to explore **uncharted** areas like space. The Earth's ocean is also an uncharted area. Our planet's deep, dark oceans are huge. There's a lot of ocean to cover and not enough money to explore it all.

magnified crustacean

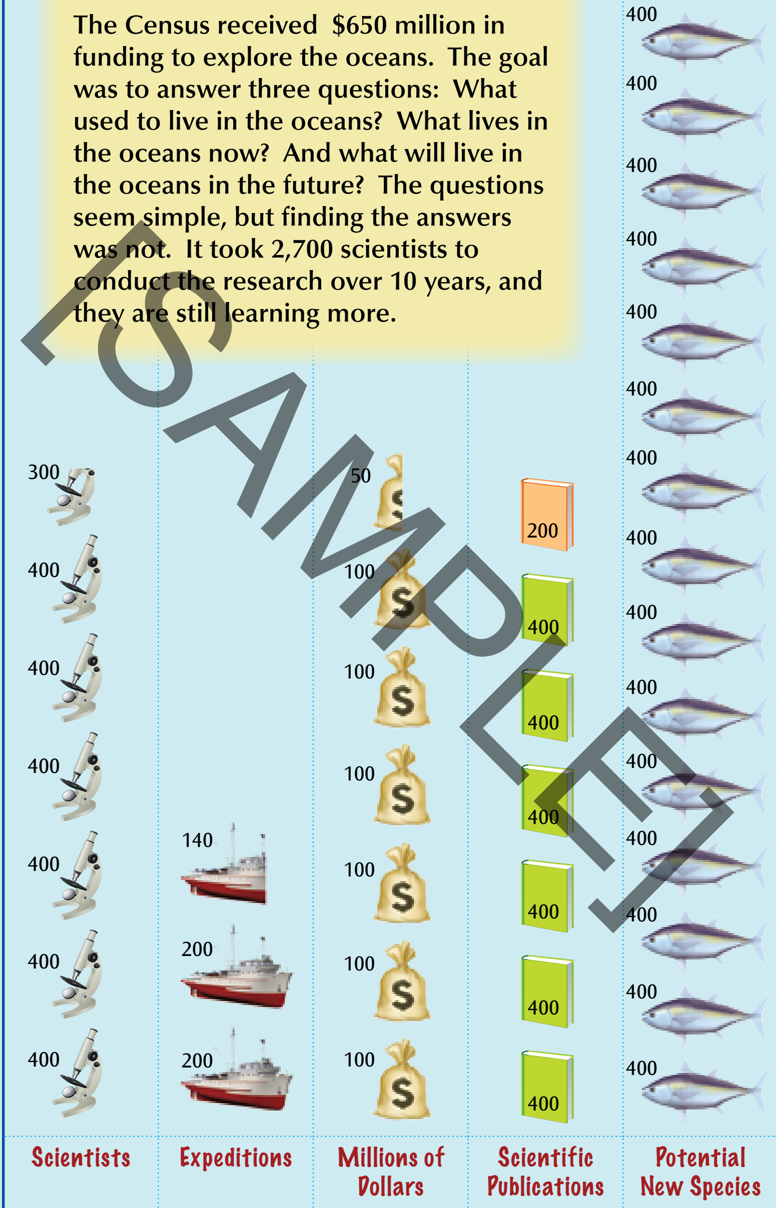
Phase 2

In the year 2000, scientists around the world joined forces. They created the Census of Marine Life. The Census helped scientists take inventory of marine creatures. In the future, they can use this information to make comparisons. If certain creatures move to cooler waters, scientists will notice and be able to conduct a study to learn why.

Much of marine life remains a mystery. Ninety percent of the information we know about the ocean is collected more than 330 feet deep. But the ocean is over two miles deep. There is still so much to discover!

Census Specs

The Census received $650 million in funding to explore the oceans. The goal was to answer three questions: What used to live in the oceans? What lives in the oceans now? And what will live in the oceans in the future? The questions seem simple, but finding the answers was not. It took 2,700 scientists to conduct the research over 10 years, and they are still learning more.



The Midnight Zone

Sunlight never reaches these waters. It is as dark as a moonless night. That is why it is called the **midnight zone**. The only light this far down comes from the creatures that live here. Many creatures that live at this depth don't have eyes. Without light, there is nothing to see. There aren't many predators in this area of the ocean, so the fish are slippery, with soft skin and weak muscles. This layer of the ocean starts at 3,300 feet and goes down to 13,000 feet. The average temperature is a frigid 39°F. With no sunlight, plant life is nearly nonexistent. These animals must **conserve** energy as they fight starvation.

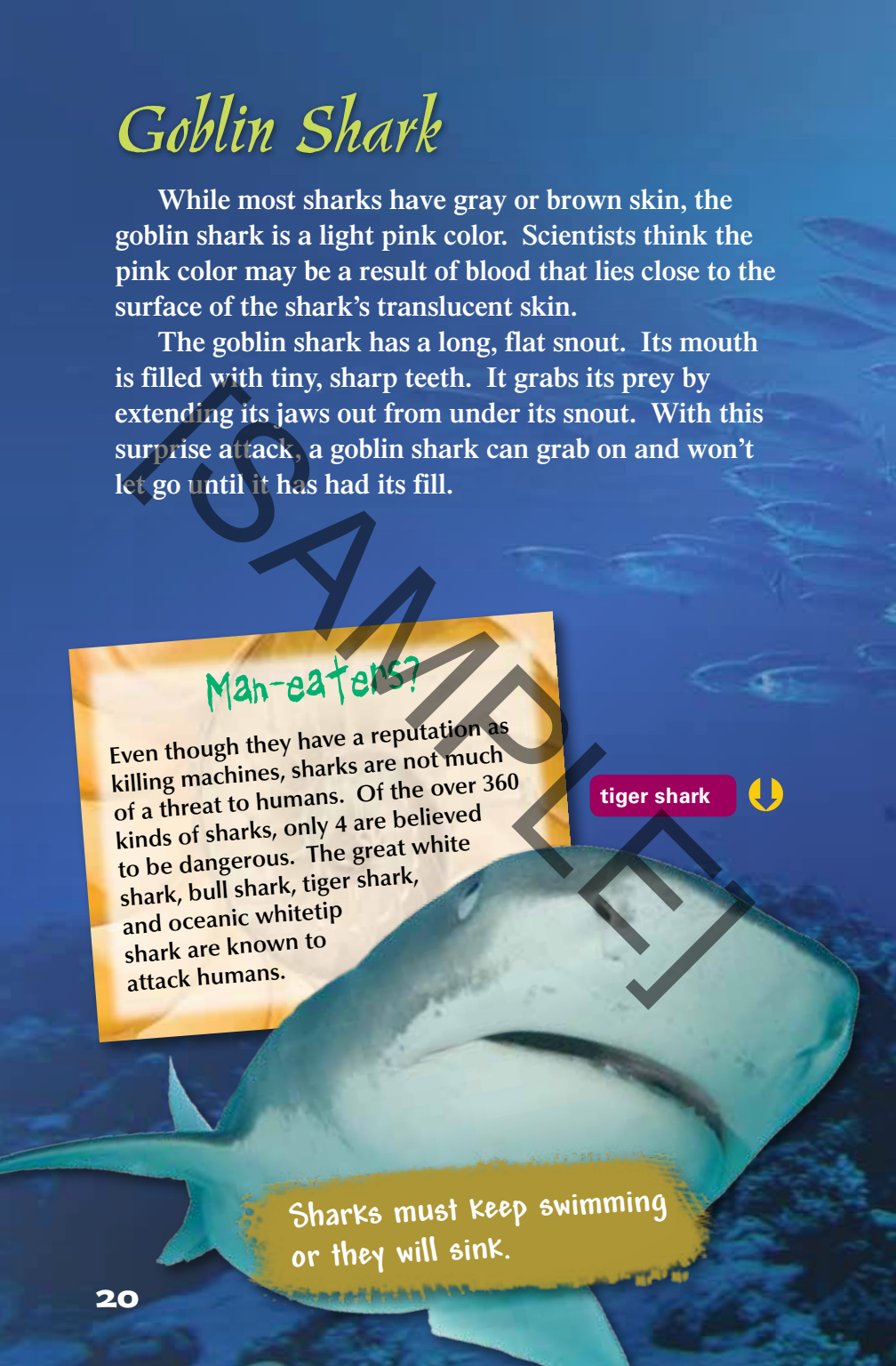
Goblin Shark

While most sharks have gray or brown skin, the goblin shark is a light pink color. Scientists think the pink color may be a result of blood that lies close to the surface of the shark's translucent skin.

The goblin shark has a long, flat snout. Its mouth is filled with tiny, sharp teeth. It grabs its prey by extending its jaws out from under its snout. With this surprise attack, a goblin shark can grab on and won't let go until it has had its fill.

Man-eaters?

Even though they have a reputation as killing machines, sharks are not much of a threat to humans. Of the over 360 kinds of sharks, only 4 are believed to be dangerous. The great white shark, bull shark, tiger shark, and oceanic whitetip shark are known to attack humans.



goblin shark

The goblin shark is thought to be very similar to the way ancient sharks looked millions of years ago.

Under Pressure

Squeeze your hands into fists. The feeling building up in the center of your palms is pressure. The pressure you feel is similar to underwater pressure. But underwater

pressure is much more intense than the feeling you created with your hands. And the farther underwater you go, the stronger the pressure gets.

- Apply the formula. What is the PSI level at a depth of 15,000 feet?
- Does the pressure increase at an even rate as creatures descend?
- What do you think are the best ways for scientists to study deep sea animals?

$$PSI = \frac{depth \times 15}{33}$$

PSI = pounds of pressure per square inch (about the size of this box)

Frilled Shark

This deep-sea shark has a long, gray body. It catches its prey with a snake-like lunge of its head. Most sharks have jaws below the snout, but the frilled shark has jaws at the front of its head. They make the head look like one giant mouth. Three hundred small, sharp teeth sit inside the jaws, perfect for gripping slippery squid. Its gill slits are uneven and fringed, which gives the frilled shark its name.

Shark Conservation

Sharks are in danger of **extinction** from human fishing practices. Without changes in fishing practices, some sharks will disappear forever.

The frilled shark's teeth each have three points on them for three times the chomping power.

frilled shark

Sharks have existed on Earth for over 400 million years.

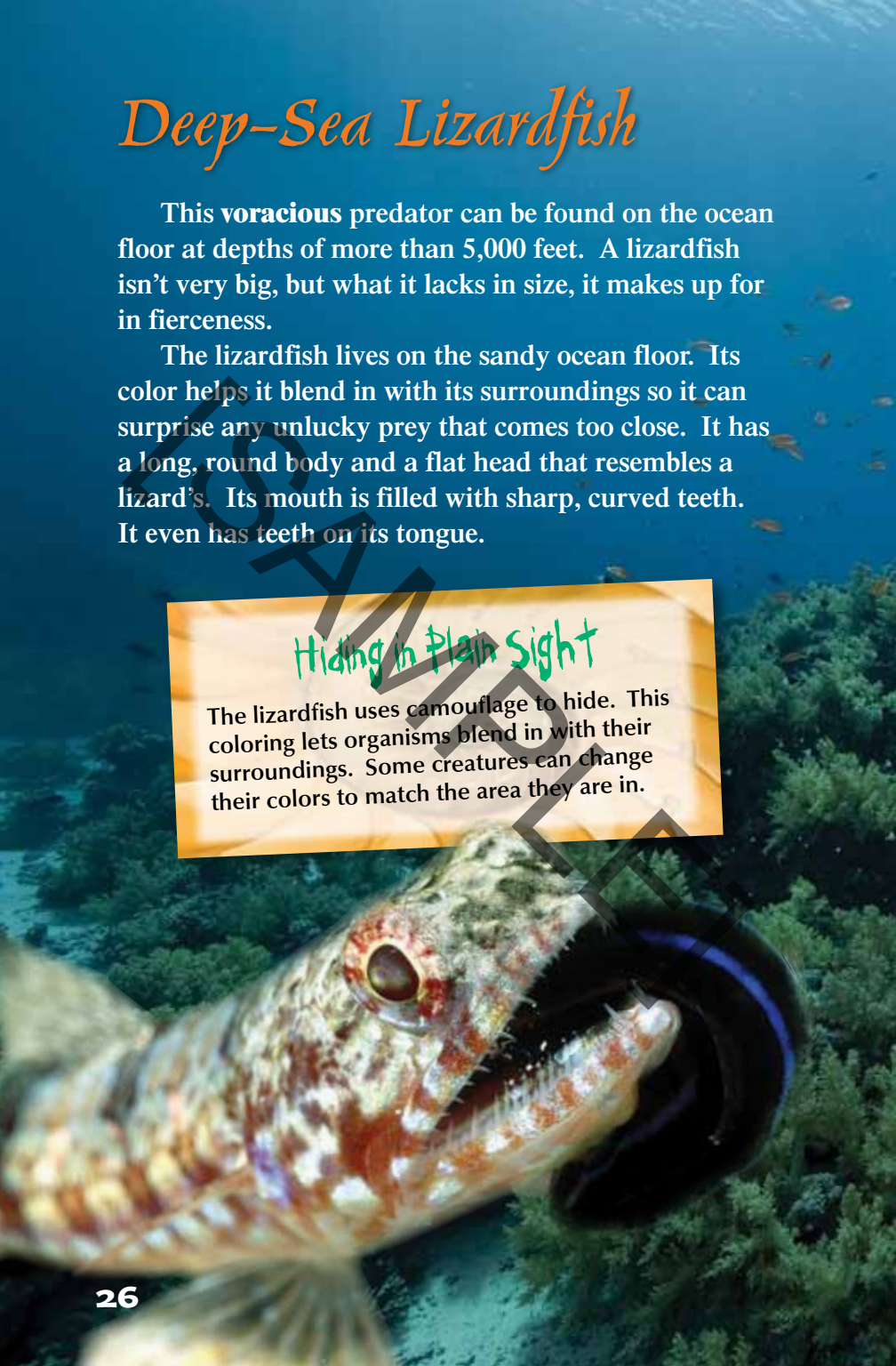
Deep-Sea Lizardfish

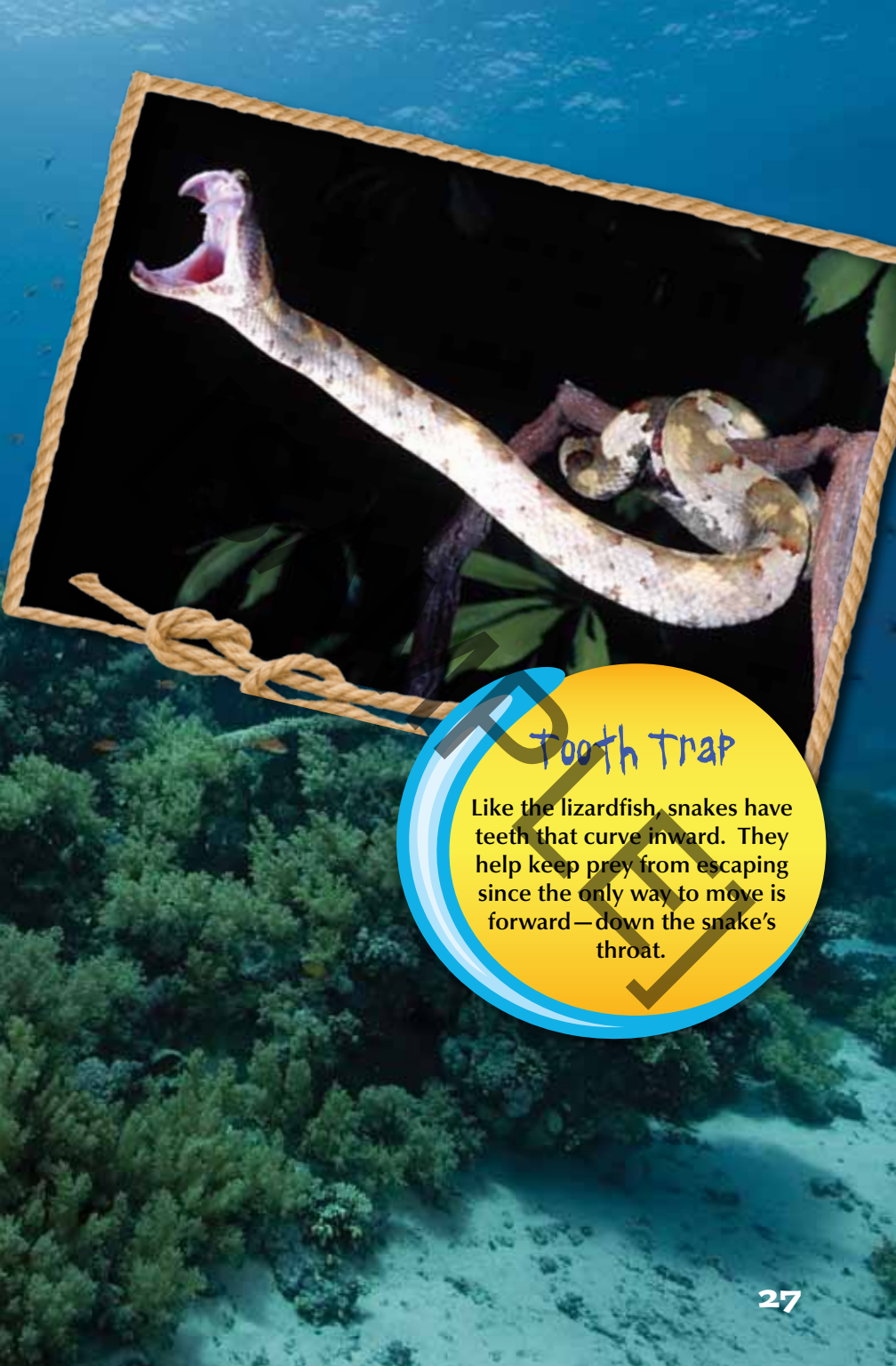
This **voracious** predator can be found on the ocean floor at depths of more than 5,000 feet. A lizardfish isn't very big, but what it lacks in size, it makes up for in fierceness.

The lizardfish lives on the sandy ocean floor. Its color helps it blend in with its surroundings so it can surprise any unlucky prey that comes too close. It has a long, round body and a flat head that resembles a lizard's. Its mouth is filled with sharp, curved teeth. It even has teeth on its tongue.

Hiding in Plain Sight

The lizardfish uses camouflage to hide. This coloring lets organisms blend in with their surroundings. Some creatures can change their colors to match the area they are in.





Tooth Trap

Like the lizardfish, snakes have teeth that curve inward. They help keep prey from escaping since the only way to move is forward—down the snake's throat.

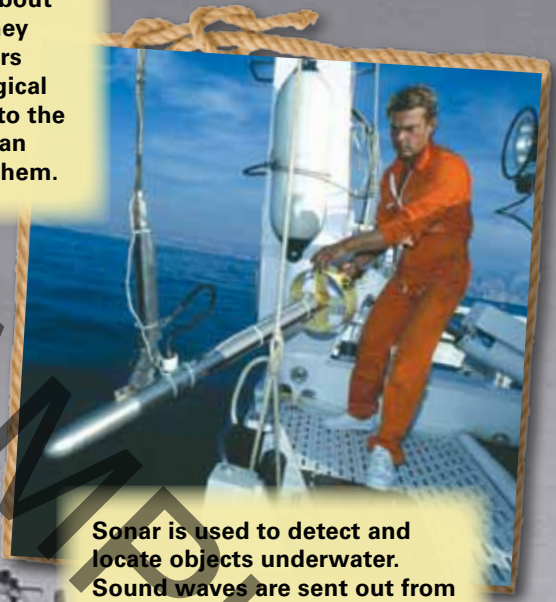
Uncharted Waters

For thousands of years, people had no way to explore the deepest parts of the ocean. Submarines and diving suits gave us our first glimpse of deep-water marine life. Today, there are a number of tools that help us learn about underwater life.

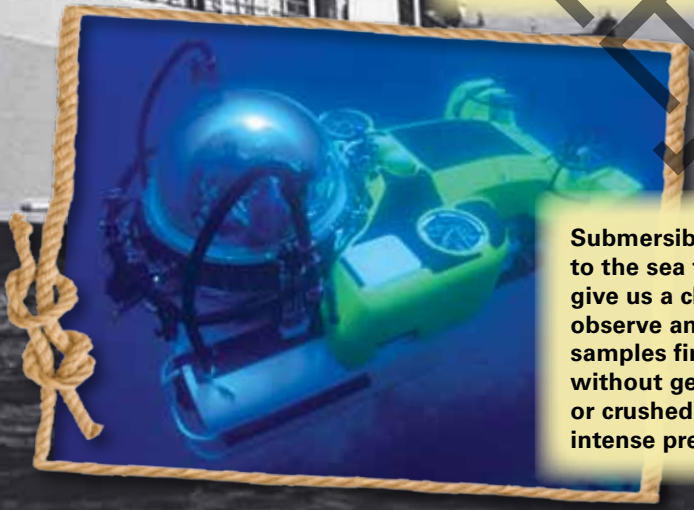
rescue diving suit

With special diving gear, we can go hundreds of feet below the surface. It can be dangerous, but it allows research to be conducted for several hours at a time.

Sea vessels are vital tools for exploration. They use sensors to get information about the ocean. They can send divers and technological equipment into the water. They can also retrieve them.



Sonar is used to detect and locate objects underwater. Sound waves are sent out from a vessel and bounce off other objects. Then the distance between the two is measured.

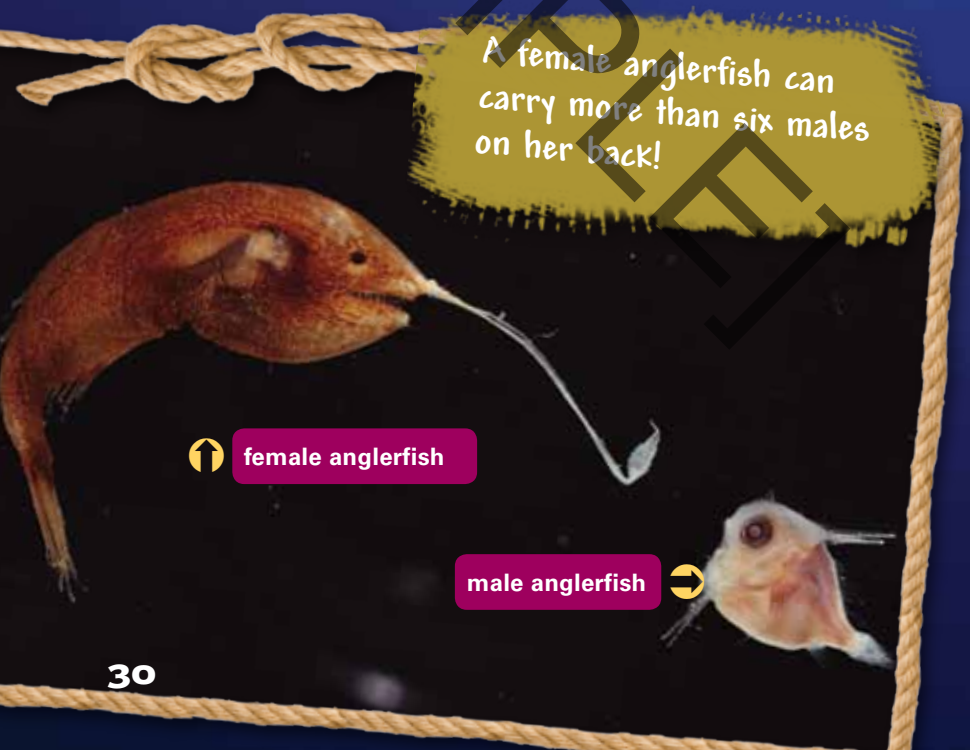


Submersibles take us to the sea floor. They give us a chance to observe and collect samples firsthand without getting wet or crushed by the intense pressure.

Anglerfish

This deep-sea fish takes the prize for creepiness. The anglerfish has long, curved, needle-like teeth. Females have a long spine growing out and over their heads. At the end of the spine lies a glowing ball of flesh. This strange growth acts like bait on a fishing line, attracting prey. When the prey is close enough, the anglerfish strikes. She opens her wide mouth and gulps. Her jaws and stomach are elastic, which allows the anglerfish to devour fish twice her size.

The female anglerfish is much larger than the male. Males must find a female to survive. When they do, they grab on with a bite. The male **fuses** onto the female and gains nutrients from her. Gradually, he is reduced to a fraction of his original size.



Gotcha!

The anglerfish is an **ambush predator**. It saves energy by attracting prey with its light-up lure. Then, it surprises its prey with a deadly bite. Ambushing prey is a tried-and-true method of hunting. Animals such as lions and trapdoor spiders are also ambush hunters.

female with two males on her back

Angler is a term for a person who likes to fish. An anglerfish is a fish that likes to fish for fish.

Giant Isopod

This nightmarish **crustacean** may look like a bug, but it is related to shrimp and crabs. The giant isopod can grow up to three feet long. Armored plates cover its back, and 14 legs help it move. Each leg has gills that allow it to breathe. It has two large **compound eyes** that make it look like an alien wearing sunglasses. When threatened, it curls into a ball for protection. The giant isopod is a **scavenger** that can survive long periods of time without eating. It often dines on the bodies of dead whales.

Isopod Got Your Tongue?

A relative of the giant isopod attacks fish by climbing through the fish's gills and into the mouth. It feeds on the blood vessels in the fish's tongue. When the fish's tongue rots, the isopod acts as the fish's tongue. Tasty!

The large size of the giant isopod is an example of deep sea gigantism. Many creatures grow larger when they live in deeper waters.

Scavenger Hunt

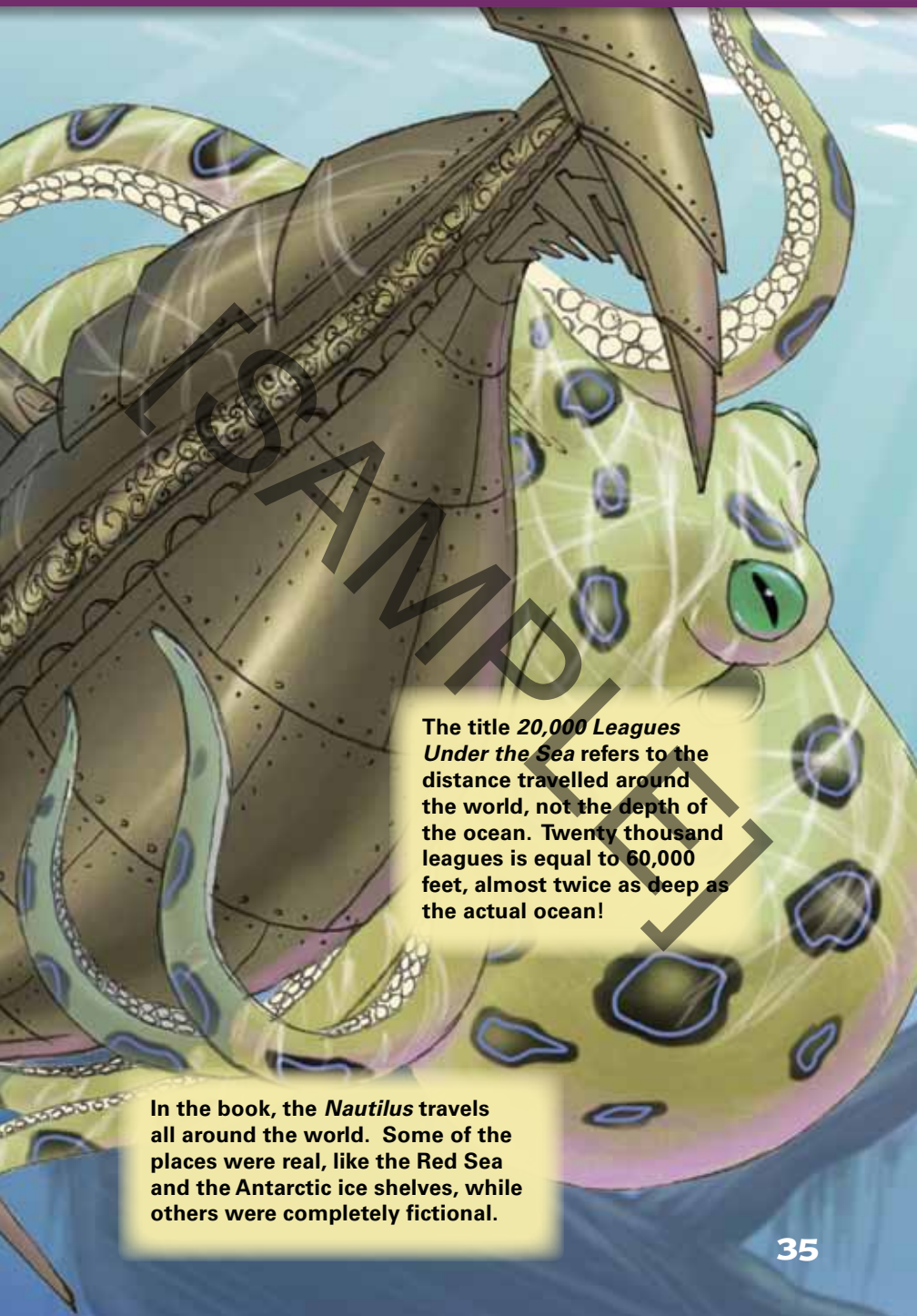
Scavengers play an important role in every ecosystem. They help break down dead plants and animals into simple matter. Some animals both hunt actively and scavenge for food.

Fantastic Voyage

People have been wondering what lies below the water for thousands of years. In 1870, when Jules Verne published *20,000 Leagues Under the Sea*, submarines were just being developed. This book marked the beginning of science fiction. Verne wrote about adventures aboard the submarine *Nautilus*. He mixed the scientific findings of his time with his own imagination to make a fantastic yet true-to-life story.

Submarines were just being developed. No one had yet used them for long voyages.

At the end of the book, Captain Nemo drives his submarine into the Maelstrom, a powerful whirlpool of water located off the coast of Norway.



The title *20,000 Leagues Under the Sea* refers to the distance travelled around the world, not the depth of the ocean. Twenty thousand leagues is equal to 60,000 feet, almost twice as deep as the actual ocean!

In the book, the *Nautilus* travels all around the world. Some of the places were real, like the Red Sea and the Antarctic ice shelves, while others were completely fictional.

Yeti Crab

The mountain yeti is a mythical creature that is covered in long fur and lives in the snowy mountains of India. The yeti crab earns its name from its light color and the long hair on its arms. But this "yeti" prefers a warmer **habitat**. It thrives in the chemical fumes coming from hot-air vents in the ocean floor. Scientists think bacteria living in the hair of the yeti crab remove toxic chemicals in the water.

Fantastic Voyage

The yeti crab was discovered by scientists in a small submersible named *Alvin* during the 2010 Marine Census. *Alvin* can carry a pilot and two passengers. It can dive as deep as 14,764 feet.

The yeti crab looks like a lobster but is more closely related to crabs.

Colossal Squid

A while back, scientists were excited about the *giant* squid, but that's old news. There's an even bigger squid cruising the deep waters of the **polar** ocean. A few specimens of the *colossal* squid have been hauled from the sea. Scientists estimate the colossal squid might reach lengths of 46 feet. That would make it the largest invertebrate on Earth.

At over 10 inches across, even its eyes are enormous. The tentacles of the colossal squid are covered with sharp hooks that help it hold on to its prey. Its strong, sharp beak slices its food. The colossal squid feeds on fish and other squid that live deep in the ocean.

One of the largest colossal squids was caught off the coast of Antarctica.

colossal squid

A Big Meal

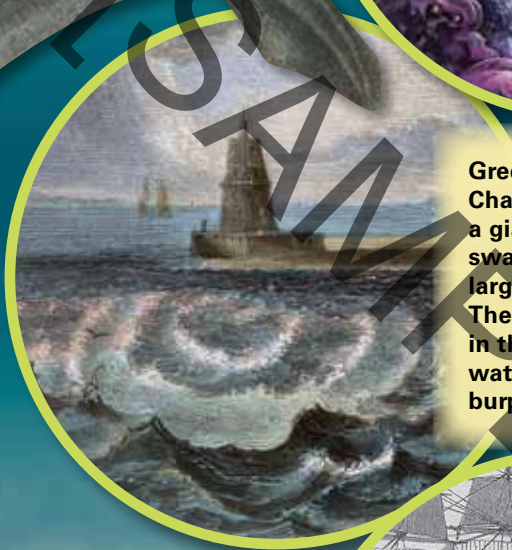
Life might sound great for the colossal squid, but it is hunted by a predator that is even bigger: the sperm whale. Colossal squid beaks have been found inside whale stomachs. Sperm whales often have tentacle scars from their battles with giant and colossal squid.

Legends of the Sea

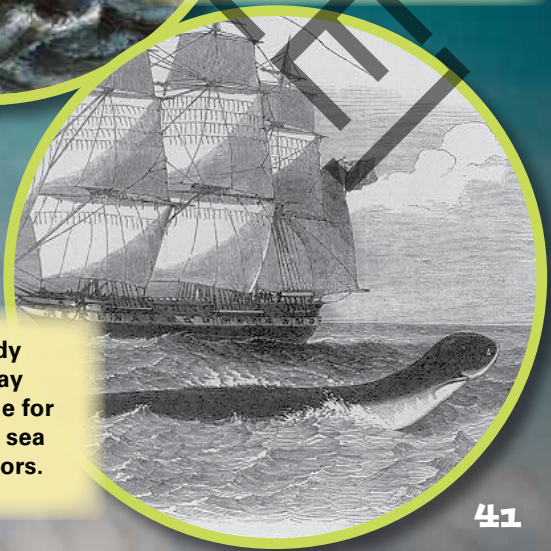
Creatures like the colossal squid seem like something out of a science-fiction novel. But they are real. What other fabled sea creatures could be real?

In 1546, a sea creature was found off the coast of Denmark. They say it resembled a human monk. Some say the creature was an angel shark. Others say it was a walrus.

The kraken is a mythical sea monster that looks a lot like a colossal squid. Could the colossal squid be the basis for this legendary creature?



Greek mythology tells of Charybdis (ka-RIB-dys), a giant sea monster that swallows ships whole. Its large mouth is legendary. The stories say that it takes in three giant gulps of ocean water every day. A single burp can form a whirlpool.



The long, slender body of the frilled shark may have been responsible for reported sightings of sea serpents by early sailors.

The Abyssal Zone

This zone is named after a Greek word that means "no bottom." The ocean is so deep it's as if it keeps going and going and going…with no end. This layer of the ocean starts at 13,100 feet and descends to 19,700 feet. Few creatures live at this depth. The water pressure is bone-crushingly intense, and the water is very cold. The animals that live in the **abyssal zone** have found a safe place to hide, but one of the biggest dangers is starving to death. Food is almost impossible to find.

sea cucumber

Legend says kissing a sea cucumber brings good luck.

Small animals like this one are an important source of food for deep-sea creatures.

Get in the Zone

Twilight

Midnight

Abyssal
13,000–19,000 feet

Hadal

The scientific name for this part of the ocean is the *abyssalpelagic* (**uh-BIS-uhl-PUH-laj-ic**) *zone*.

Tripod Fish

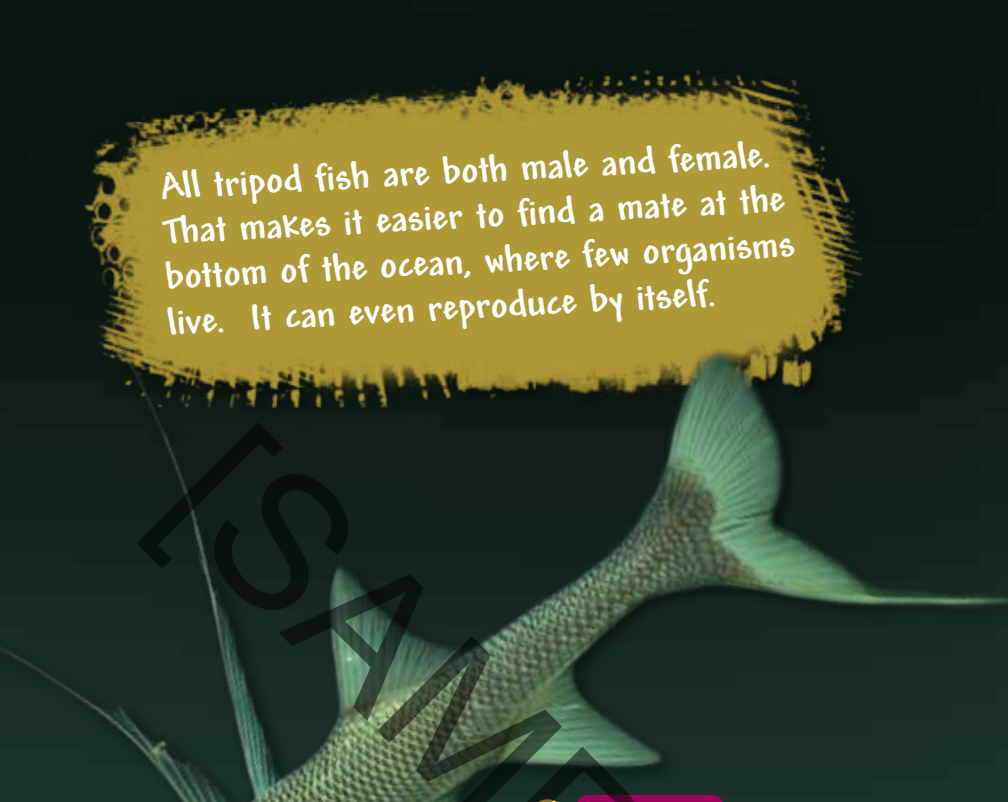
The tripod fish can hunt without using too much energy, which is important since the search for food is an endless quest. The tripod fish swims into the **current** to catch anything that swims by. Long rays that stretch out from its body are used like a ladder. They let the tripod fish prop itself up to a level where shrimp and other yummy bits drift by. It can also fold its fins forward to feel for nearby prey. The darkness of the ocean floor makes eyes useless, so hunting by touch is the only way to survive.

Venus flytrap sea anemone

Hunting By Touch

Many living things use their sense of touch to hunt. The Venus flytrap plant has tiny hairs to feel for nearby prey. Spiders know when an insect is trapped in their web by feeling the web bounce.

All tripod fish are both male and female. That makes it easier to find a mate at the bottom of the ocean, where few organisms live. It can even reproduce by itself.



tripod fish

Energy Savers

It can be hard to find food at these depths. Many creatures have lower **metabolisms**. They have adapted to use less energy, which means they need less food. They have weaker muscles and lighter bones. They breathe and digest more slowly. Some animals have special air sacs in their bodies that help them float instead of swim.

Survival Showdown!

Imagine you're a deep-sea creature. You have evolved to survive. But danger lurks in every wave. What adaptations would you choose?

Large Eyes

or

Useless Eyes

Eyes are useful to spot prey and predators.

but

You never know who might be watching you.

Eyes? Who needs 'em! Find food by touch instead.

but

You could be waiting a long time for a meal to float past you.

Big Teeth

or

Big Mouth

Big sharp teeth are great for snagging prey.

but

What if you bite off more than you can chew?

A big mouth can suck in lots of water plus whatever swims near it.

but

What if the prey is strong and slippery?

Bioluminescence or Transparency

Bioluminescence is great for attracting prey.

but

It may also attract predators.

Transparency keeps you hidden.

but

How will a mate find you?

Expandable Stomach or Low Metabolism

A stomach expands to hold more food.

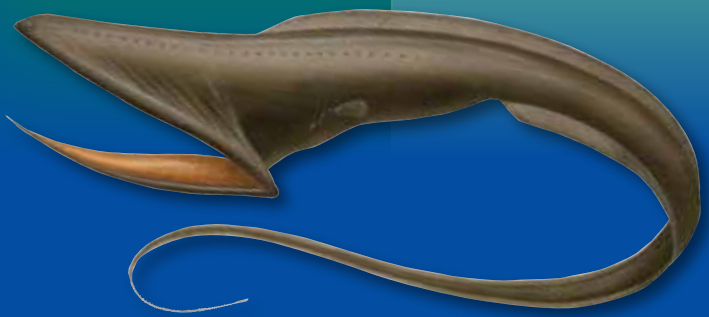
but

Digesting a big meal takes lots of energy.

A low metabolism requires less food.

but

You'll have trouble making a fast getaway when a predator comes your way.



Hadal Zone

The **hadal zone** is the deepest level of the ocean. The name is inspired by Hades, the Greek god of the underworld. The water pressure is nearly eight tons per square inch. That is enough pressure to make your eyes pop out of your head. Yet even in these **lethal** conditions, life can still be found. The hadal zone starts at 19,686 feet, or nearly 4 miles deep. The deepest point is 35,797 feet. That is close to seven miles deep!

Mariana Trench

At the bottom of the Pacific Ocean, two **tectonic plates** meet at the Mariana Trench. Nearly seven miles down, this is the deepest place on Earth. It stretches more than 1,580 miles long. Even at this deep location, small forms of life thrive.

Get in the Zone

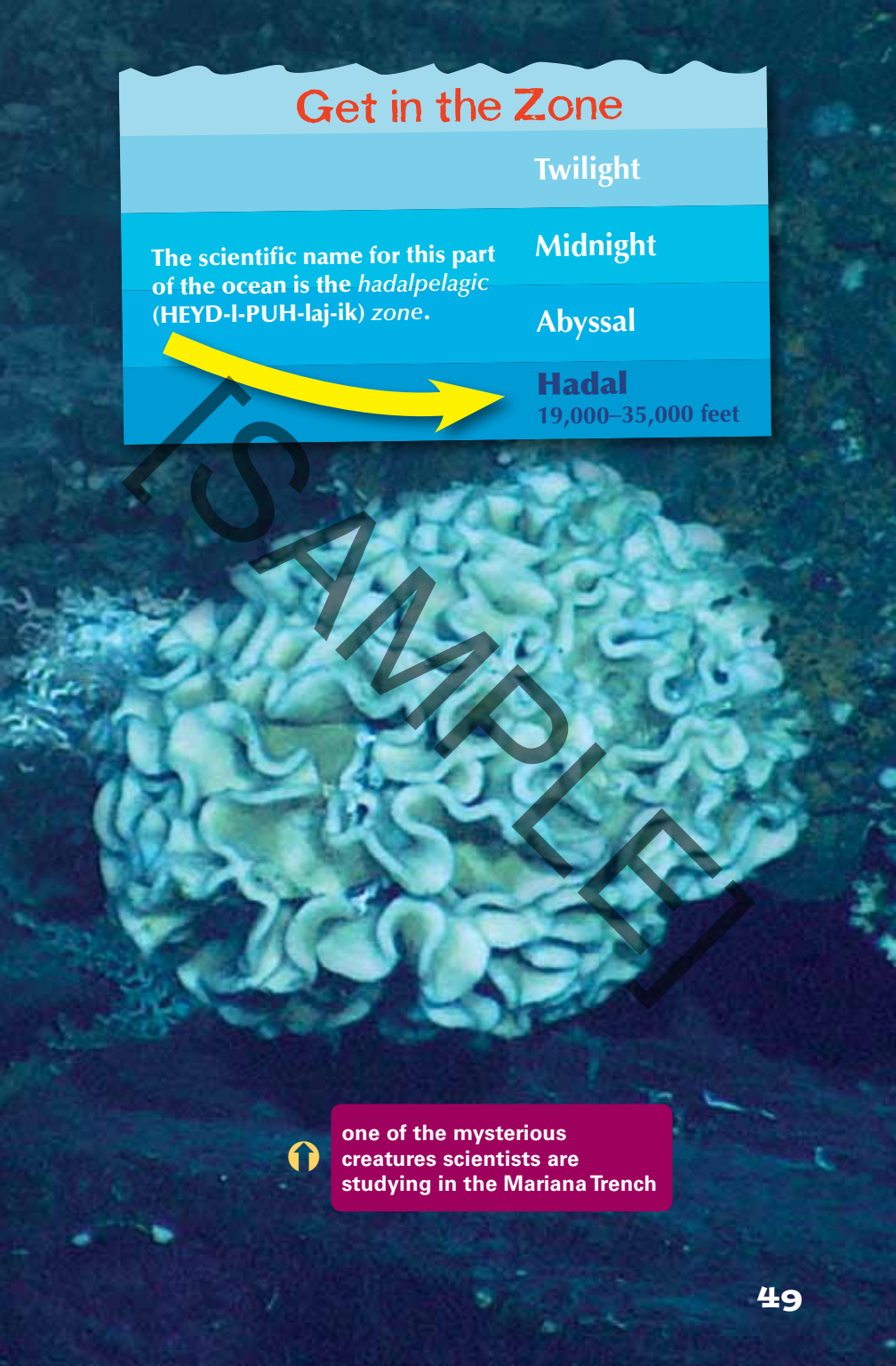
Twilight

The scientific name for this part of the ocean is the *hadalpelagic* (HEYD-l-PUH-laj-ik) *zone*.

Midnight

Abyssal

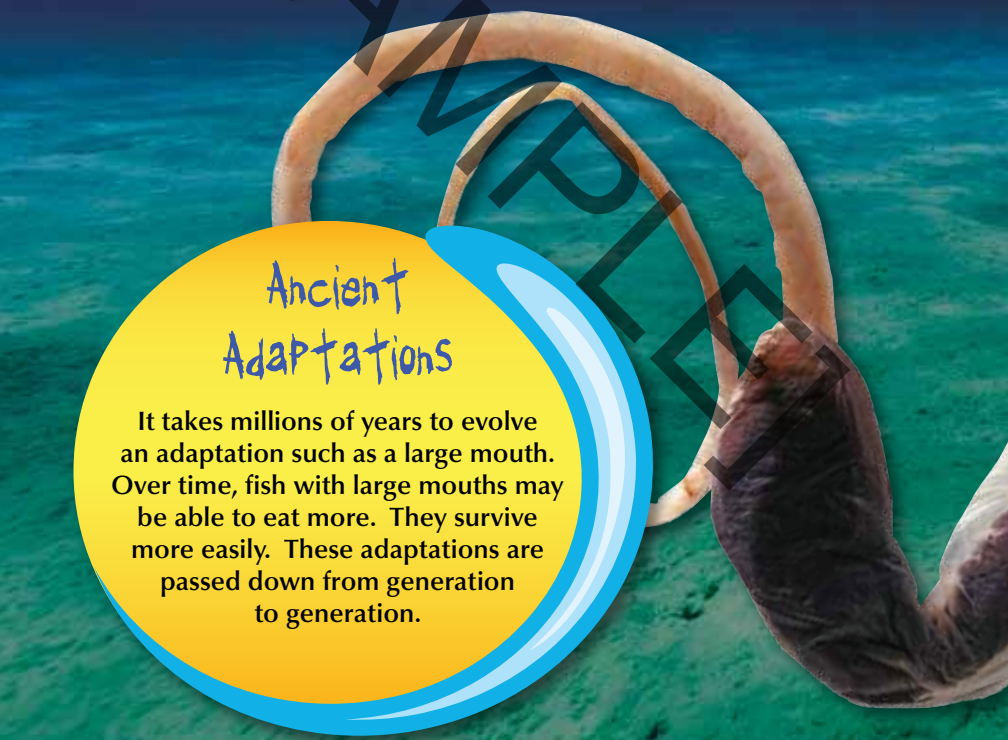
Hadal
19,000–35,000 feet



one of the mysterious creatures scientists are studying in the Mariana Trench

Gulper Eel

With its thin body and huge mouth, it looks like an eel. But scientists think it's a fish. The gulper eel swims slowly through the depths of the ocean riding the currents with its long tail. The gulper has a huge mouth that can swallow prey bigger than its own body, and its elastic stomach can stretch to hold large fish and even squid. A glowing bulb on the tail attracts prey.



Ancient Adaptations

It takes millions of years to evolve an adaptation such as a large mouth. Over time, fish with large mouths may be able to eat more. They survive more easily. These adaptations are passed down from generation to generation.

bowhead whale jawbones

Big Mouth!

The gulper eel's mouth may be large compared to its body. But compared to the mouth of the bowhead whale, it's tiny. The bowhead whale's giant mouth makes up one-third of its body length! Its mouth is 30 feet in length and 20 feet wide.

gulper eel

mesopelagic amphipod

Amphipod

This tiny creature can be found many places on Earth. Many amphipods live in the ocean. This small crustacean thrives as deep as 30,000 feet underwater. It most often acts as a scavenger, living off dead bits and pieces of other creatures. It can also feed on small living things. It is a source of food for many sea creatures. Whales and some fish are predators. Some amphipods hide in empty snail shells.

Undersea Snowstorm

Marine snow is made of dead organisms and plankton that sink slowly to the bottom of the ocean. Some amphipods survive by consuming this "snow." Marine snow is one way energy travels from the surface of the ocean to the ocean floor.

Start the Pump!

Marine snow transports carbon dioxide from the surface of the ocean to deeper areas. The carbon dioxide is used by organisms that eat the falling marine snow. This is an example of the **biological pump**.

Amphipods are so small and plentiful that there are often more than 1,000 in a square foot.

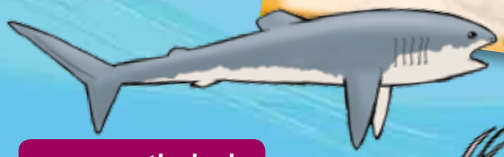
How Low Can You Go?

These sea creatures can dive deeper than any human. They search for the perfect depth—close to food and places to hide. But with intense water pressure coming at them from all directions, they each have their limit.

The deepest a human has dived outside a submersible is 1,044 feet.

Diving Deep

Who will win the award for deepest swimmer? Take a look to find out!



megamouth shark
600 feet

jewel squid
1,500 feet

goblin shark
4,265 feet

frilled shark
4,757 feet

colossal squid
6,560 feet

gulper eel
24,000 feet

amphipod
30,000 feet

Life in the Abyss

For centuries, the creatures that lived in the deepest parts of the ocean were left to our imaginations. Humans had no way to find out what lurked below the surface, so they imagined them from above. Today, scientists no longer need to wonder. Modern technology is revealing the largest habitat on Earth. Progress is slow, but as our technology improves, so will our understanding of the deep blue sea. Surely there are more demons of the deep to meet.

Glossary

abyssal zone—13,000 to 19,000 feet below the surface of the ocean, where there is no light
adaptations—changes in the structures or functions of organisms that help them survive
ambush predator—a carnivorous animal that captures its prey by surprise
biological pump—the process by which carbon dioxide is transported from the ocean surface to deeper areas
bioluminescent—able to produce light
camouflage—the hiding or disguising of something by covering it up or changing the way it looks
cephalopods—creatures such as squid and octopuses that have muscular tentacles with suctions, highly developed eyes, and often an inky fluid that is released for defense
compound eyes—eyes made up of many separate visual parts; found in arthropods
conserve—to use carefully and avoid waste
crustacean—a type of arthropod such as a crab or lobster, often aquatic
current—a continuous movement of water or air in the same direction
extinction—the state when an organism is completely gone from Earth
filter feeders—animals that feed on tiny organisms by sucking in water and straining it
fuses—becomes attached to
gill rakers—finger-like parts that filter solids from gills
habitat—the place where a plant or animal normally grows
hadal zone—the deepest part of the ocean at 19,000 to 35,000 feet

invertebrates—creatures without a backbone
lethal—causing or able to cause death
marine snow—material that slowly sinks to the bottom of the ocean, made up of dead organisms and plankton
metabolisms—chemical processes in the body, especially those that cause food to be used for energy and growth
midnight zone—a layer of the ocean where no sunlight reaches and is between 3,300 feet and 13,000 feet deep
organisms—living persons, plants, or animals
photophores—light-producing organs found in some fish
photosynthesis—the process of making energy from sunlight
plankton—tiny animal and plant organisms that live in the water
polar—of or relating to the North or South Pole or the region around it
predators—animals that live by killing and eating other animals
prey—animals that are consumed by others for energy
scavenger—an animal that feeds on dead or decaying matter
tectonic plates—large areas of land that make up the surface of Earth
tentacles—the long, flexible arms of an animal, used for grabbing things and moving
translucent—able to be seen through
twilight zone—the part of the sea that starts 660 feet below the surface where little light is found
uncharted—not explored or recorded on a map
voracious—having a huge appetite

Index

Bibliography

Hoyt, Erich. ***Creatures of the Deep: In Search of the Sea's "Monsters" and the World They Live In.*** **Firefly Books Ltd., 2001.**

Dive down through the layers of the ocean. You'll explore abyssal plains, mid-ocean ridges, and hadal trenches. You'll also meet the "monsters" that live in the darkest reaches of the sea.

Mallory, Kenneth. ***Diving to a Deep-Sea Volcano.*** **Houghton Mifflin Company, 2006.**

Discover the mysteries of underwater volcanoes and hydrothermal vents. This book follows the discoveries of marine biologist Rich Lutz as he explores the deep sea in a research submarine.

Oleksy, Walter G. ***Mapping the Seas.*** **Franklin Watts, 2002.**

Learn about the history of ocean mapping, how modern mapping of the ocean's depths helps scientists explore the deep sea, and what the future of sea mapping will look like.

Rice, William B. ***Survival! Ocean!*** **Teacher Created Materials, 2012.**

With tips on finding safe drinking water, catching a bite to eat, and calling for help, this book will give you an advantage over the creatures of the deep. Find out how to survive if you're lost at sea.

Sitarski, Anita. ***Cold Light: Creatures, Discoveries, and Inventions That Glow.*** **Boyds Mills Press, Inc., 2007.**

Meet the first inventor to make an object glow in the dark and the first explorers who saw monstrous creatures glowing deep in the sea. You'll also learn about bioluminescent animals as well as present and future technologies for making animals and things glow.

More to Explore

A Deep-Sea Bestiary

http://www.pbs.org/wgbh/nova/nature/deep-sea-bestiary.html

Meet the bizarre animals of the deep. Fascinating photographs, drawings, and facts bring these deep-sea creatures—including the vampire squid, gulper eel, and common blackdevil—frightfully to life!

Bioluminescence

http://news.nationalgeographic.com/news/2010/05/100506-bioluminescence-sea-life-embed-video

Watch a video about bioluminescent deep-sea creatures that glow, and learn why scientists think these animals give off light.

Crittercam Chronicles

http://www.nationalgeographic.com/crittercam/deepsea

Dive into an interactive virtual deep-sea world. To learn more about the critters of the deep, use your mouse to click on the animals that swim by you.

Deep Ocean: Cool Stuff

http://ocean.si.edu/ocean-science/deep-ocean-exploration

Discover cool videos, photographs, and articles about the deep sea. Meet the creatures behind mysterious tracks on the sea floor, view art made out of ocean mud, and learn about underwater mountains.

The Deep Sea Layers

http://oceanlink.info/biodiversity/deepsea/deepsea.html

Explore the mysteries of the deepest layers of the ocean. Discover the amazing animals of the mesopelagic, bathypelagic, and abyssalpelagic zones.

About the Author

Timothy Bradley grew up near Boston, Massachusetts, and spent every spare minute drawing spaceships, robots, and dinosaurs. That was so much fun that he started writing and illustrating books about natural history and science fiction. Tim also worked as a toy designer for Hasbro, Inc., and he designed life-size dinosaurs for museum exhibits. As a child, Tim dreamed of traveling to the bottom of the ocean to swim with the sea demons that lived there. Instead, he grew up to write this book. Tim lives in sunny Southern California with his wife and son.