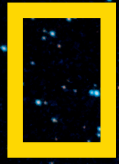


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NATIONAL
GEOGRAPHIC



Explorer

PATHFINDER

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What the



Will the Tasmanian devil win its fight against a mysterious disease?

By Brenna Maloney

Devil!

Wildlife and Wild Places

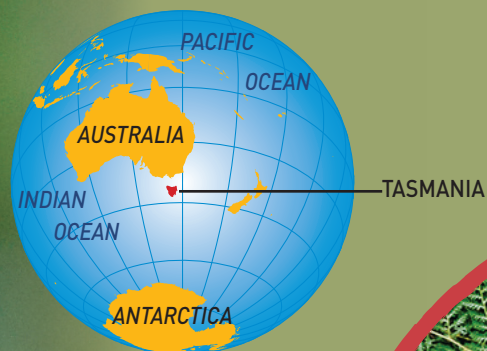
LIFE SCIENCE

As you read, think about how the body parts of a Tasmanian devil help it survive.

The sound is hard to describe.

It can be like a harsh cough. Or an angry hiccup. Or a sharp, shrill shriek. It all depends on what is being said and who is doing the talking. When a Tasmanian devil “speaks,” it’s best just to listen.

You’d have to go a long way to hear a Tasmanian devil. They are found in only one part of the world, on the island of Tasmania. It’s off Australia’s southeastern coast. You can find them in the wild there now. But their fate was uncertain 25 years ago. Tasmanian devils were victims of a mysterious cancer. In fact, they were on their way to extinction.




To start, Tasmanian devils are **marsupials**. That's a kind of mammal in which the young finish developing in their mother's pouch. The kangaroo is another type of marsupial. A mother devil's pouch helps her feed and protect her newborns, or imps. A mother can give birth to as many as 40 imps. Yet, there is only space for four in her pouch, so only four can survive.

Newborn imps are the size of a raisin. They stay in their mother's pouch for four months. After six months, they are ready to eat solid foods.

Tasmanian devils are **scavengers**. They eat **carrion**, or dead animals. Scavengers act as nature's cleanup crew. They eat the dead animals before they pollute waterways.


Tasmanian devils are the largest meat-eating marsupials in the world. They will eat dead opossums and wombats.



Tasmanian devils eat dead animals.

Tasmanian devils are not picky eaters. They also will eat birds, lizards, frogs, and even dead farm animals. Strong necks hold up their skulls. Their skulls are unusually large in order to support their strong jaws.

Devils eat their prey completely—bones, fur, and all. Look inside a devil's mouth. You'll see teeth for biting, teeth for tearing flesh, and teeth for crushing bone. Devils can bite down with the force of a tiger.



actual size
at birth



From Imp to Devil

At birth: Each imp is the size of a raisin. Four imps crawl to their mother's pouch.

4 months: The imps are old enough to leave their mother's pouch. They often ride on her back.

6 months: The imps stop drinking milk and begin eating solid food.

8 months: The young devils leave their mother. They live on their own.

2 years: The devils are old enough to have their own young.

Adult life: Devils in the wild usually live five to eight years.

All About Tasmanian Devils

ears: nearly hairless ears amplify sound; thin skin on the ears causes them to appear red when devils are excited or stressed



eyes: see in black and white, which is useful for detecting movement of prey

whiskers: appear in clumps on top of the eyes and mouth; help devils feel for food in the dark

teeth: 42 large, sharp teeth; molars can crush bone and tear skin; canines often stick out of the mouth when it is closed

claws: used for digging dens and climbing trees

pouch: backward-facing pouch is a safe space for newborns to grow



skull: large skull supports dense jaws



front legs: longer than back legs, which causes a loping gait

fur: dark brown or black, often with a white stripe across the chest; lighter markings on the shoulders and rump



tail: long and thick at the base; stores fat for times when food is scarce

During a night of hunting, a Tasmanian devil might travel 16 kilometers (10 miles).



In the Wild

Devils are **nocturnal** and usually solitary. But that changes when food is involved. Devils have an excellent sense of smell. They can detect carrion from 0.8 kilometers (about half a mile) away. Once they smell it, they can track it fast.

Devils quickly establish an order about who eats what and when. They “growl-whine,” “screech,” “sneeze,” and “shriek.” Each sound means a different thing. A “discussion” about a dead wombat might start out with snorts and growls. But, it can quickly become full-on shrieking.

At a carcass, a number of devils all want to eat. These sounds establish an order to the chaos. Devils combine their sounds with biting. They use their jaws to snap at each other. And this is where their trouble as a species began.

These Tasmanian devils have a “discussion” over dinner.

Trouble in Tasmania

In 1996, a photographer took a picture of some devils on the island. Their faces were distorted by large tumors. He’d never seen anything like it and shared it with some scientists he knew.

By 2002, scientists learned it was a type of cancer. Typically, cancer cannot be “caught.” The cells from one individual are different from another’s. Yet, what was attacking devils was one of very few cancers that can spread from one animal to another. It is called devil facial tumor disease. And it is fatal. Say, one devil has it and bites another. Both devils will die. Since devils often bite each other during their fights over food, the disease spread quickly.

Captive breeding programs ensured a population of disease-free devils.



This devil is released from a trap that helps scientists monitor devil health.

Why didn't the devil's body fight the cancer cells? It turns out that this type of cancer can "hide" from a devil's defense system. The devil's body thinks the cancer is part of its body. So, its body doesn't fight back. The cancer continues to grow. For an infected devil, this can lead to starvation. The cancer grows so large on the devil's face, the devil can no longer eat.

Devils were dying. Many scientists feared the devil would become extinct. But, that's not what happened.

Progress With Protection

Almost immediately, wildlife officers removed healthy devils from the wild. A captive breeding program began. This ensured that a healthy population of Tasmanian devils would thrive. Wildlife officers also set up safe traps for catch and release to record devils' health.

In the lab, they studied the disease itself. Could they create a vaccine to protect devils? Scientists are hopeful that they will. At the same time, they are seeing some cases of previously infected devils that are regaining their health. How? Perhaps, their bodies are beginning to adapt to fight the disease.

This is promising news. Tasmanian devils play a huge role as scavengers in their ecosystem. They are loved around the world. Their recovery is important!

WORDWISE

carrion: a dead animal that a scavenger eats

marsupial: a mammal (an animal that has fur or hair and feeds its babies milk) whose young finish developing in a pouch on their mother's abdomen

nocturnal: active at night

scavenger: an animal that feeds on dead animals

Make the World a Better Place



World Face!

The Human Journey

INFORMATIONAL TEXT

As you read, identify the main idea and explain how the author supports it with key details.

Creating positive change in our world comes in all shapes and sizes. Wherever and whoever you are, the world needs you. We are all here to help—but you must lead!

By Lisa M. Gerry





what's
your
story ?

Think Globally

It's important to know about places in the world to make the world a better place. Geography plays a big role in that. Do you know where different cities, countries, and continents are? This will help you make sense of stories you read and news you hear.

When you learn about a new place, find it on a map. See where it is, what big cities are nearby, and if it's close to a body of water. What language or languages are spoken there? Look up the most popular foods eaten there. Getting a sense of the people who live there will make that place more than a dot on a map!

Listen

Every person has a story. It might be about their past. It could be about their hopes for their future. It could be about their fears or what makes them sad. When people share their story, they are telling you who they are.

Being a good listener means being curious about other people and caring about their thoughts and feelings. It can make the world better by helping you have more compassion.

L I S T E N



HERE ARE FIVE WAYS TO BOOST YOUR LISTENING SKILLS:

- 1. TRY TO UNDERSTAND.** Don't worry too much about having a response ready. Instead, try to figure out what a person is trying to say.
- 2. FOCUS.** That means putting away all distractions and giving whoever's talking your full attention.
- 3. DON'T INTERRUPT.** Give the speaker the space and time to express themselves the way they want to.
- 4. BE OPEN-MINDED.** When someone is telling you something personal, they're trusting you with their truth. They're giving you a little peek into their heart and their mind. Be respectful of that and try not to rush to judgment.
- 5. LET THEM KNOW THAT YOU UNDERSTAND.** (Or that maybe you don't.) When you want to let someone know they are being heard, you can say something like, "It sounds like what you are saying is...." Or, "Do you mean...?" If you don't understand, try, "Could you say that in another way?"



Think About Things Critically

Being a critical thinker means you consider the facts and evidence. For example, a lot of the information on the internet has not been fact-checked. Double-check it! Find another reliable source to verify the information.

How do you know whether or not to trust a source or the information provided? Consider these questions:

- 1. Who is the information coming from? Who is the original source?**
- 2. Is this source reliable? Why or why not?**
- 3. Does this source have an agenda or a motive for sharing this information?**
- 4. What does this source gain from my belief in this information?**
- 5. Do other reliable sources confirm or agree with this information?**



TRUTH



Join a Team

So, you want to change the world. Chances are you can't do it alone. Nor would you want to. Instead, try joining a team. You'll make new friends, feel part of the group, and have some fun. You'll learn how to share with others, handle it when you don't get your way, and be there for others when they need it. Most important, you will learn to get along with people you might not normally hang out with.

There are many sports teams you could try out. There are also dance teams, newspapers, choirs, volunteer organizations, and many other groups.

Stand Up for Justice

Have you ever gotten into trouble for something you didn't do? Then you've experienced injustice, or something that isn't fair. Injustice happens every day, in small ways and in big ways.

It takes real courage to speak up when you see injustice. If you see someone being picked on, for example, find a safe way to say or do something. That might mean speaking to a teacher, coach, parent, or school counselor. Or it might mean saying to whoever's being mistreated, "I'm sorry that happened. You didn't deserve it. I support you."

STOP



“Be the change that you wish to see in the world.”

**—Mahatma Gandhi,
social activist**



Ask Questions

Think of yourself as an investigator. You want to figure out how stuff works and why things are the way they are. Be on the lookout for new leads, explanations, and information.

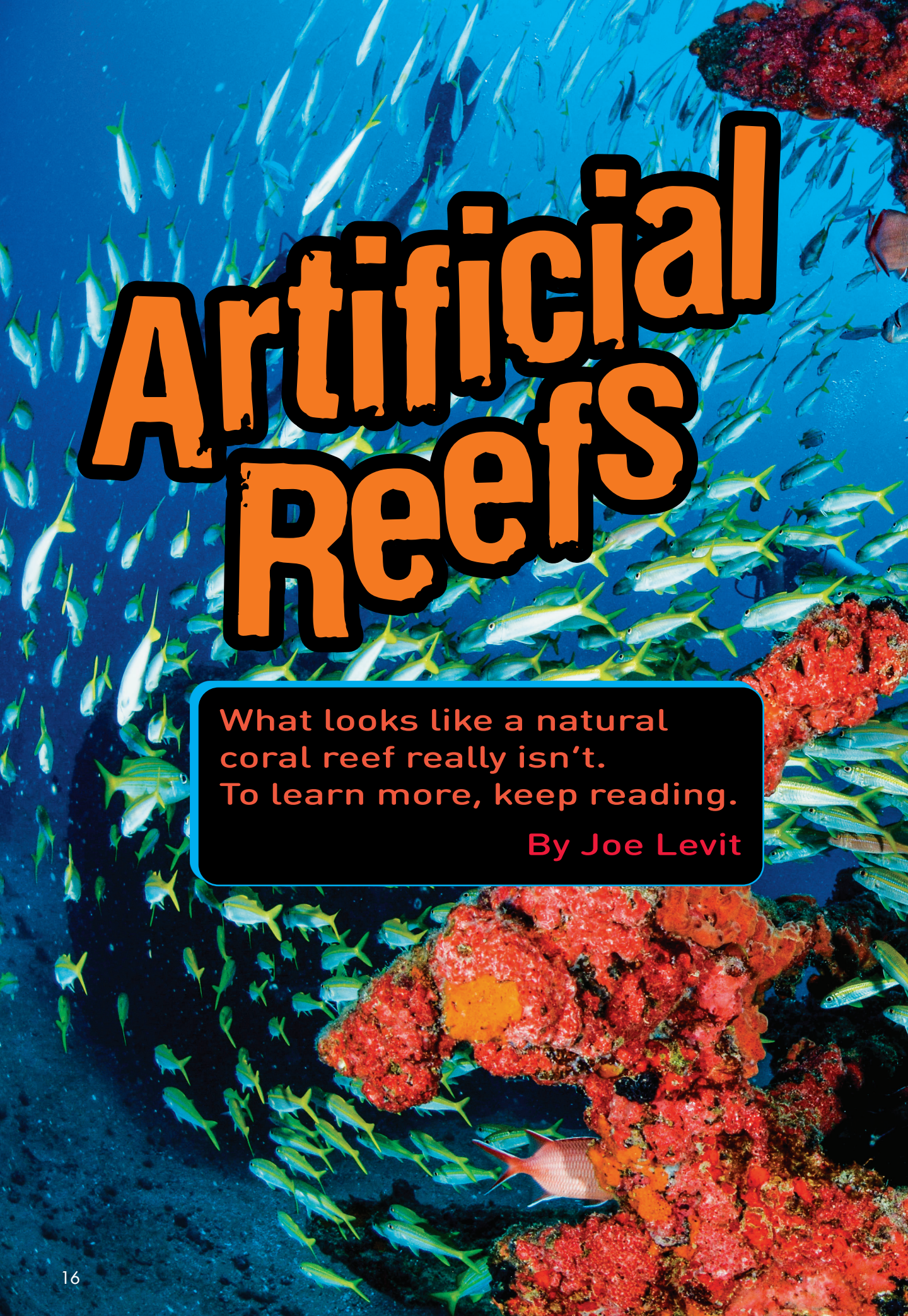
Let yourself wonder and ask all the questions you have until you find the answers you’re looking for.

Walk the Talk

This is simple. Avoid saying one thing and doing another. For example, have you ever been kind to someone’s face? But then you talk about them behind their back. If you say something, make sure your actions back it up.

Want more suggestions on how to change the world? Read “100 Ways to Make the World Better!” by Lisa M. Gerry





Artificial Reefs

What looks like a natural
coral reef really isn't.
To learn more, keep reading.

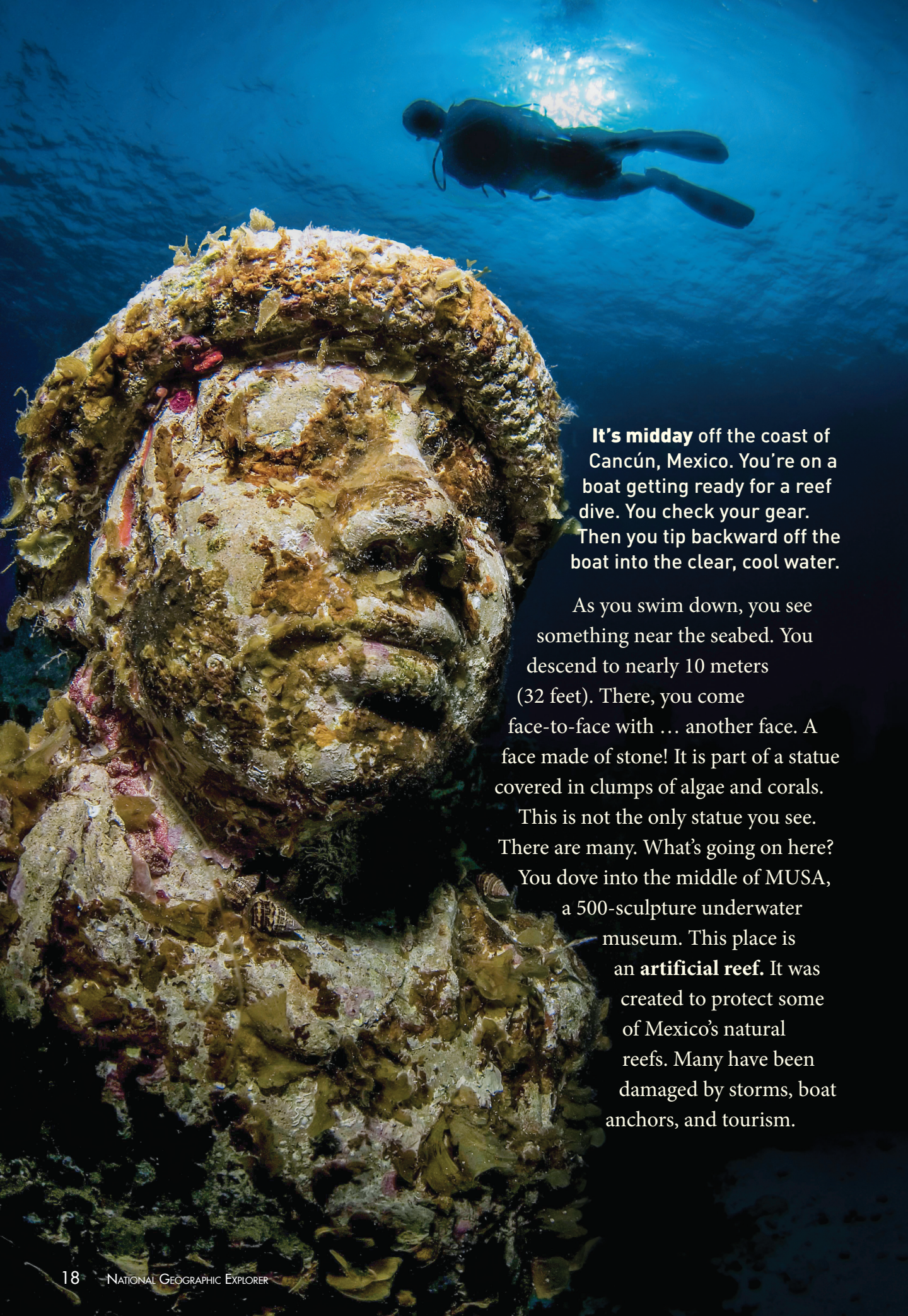
By Joe Levit

Wildlife and Wild Places

LIFE SCIENCE

As you read, think about how artificial structures and living things have created a new habitat.





It's midday off the coast of Cancún, Mexico. You're on a boat getting ready for a reef dive. You check your gear. Then you tip backward off the boat into the clear, cool water.

As you swim down, you see something near the seabed. You descend to nearly 10 meters (32 feet). There, you come face-to-face with ... another face. A face made of stone! It is part of a statue covered in clumps of algae and corals.

This is not the only statue you see. There are many. What's going on here? You dove into the middle of MUSA, a 500-sculpture underwater museum. This place is an **artificial reef**. It was created to protect some of Mexico's natural reefs. Many have been damaged by storms, boat anchors, and tourism.

The Value of Reefs

Our oceans cover 71 percent of Earth's surface. They hold 97 percent of the planet's water. We rely on our oceans for the air we breathe. Ocean plants produce half of the world's oxygen. Ocean waters absorb almost one-third of carbon dioxide emissions. The oceans also regulate the weather and play a crucial role in Earth's water cycle.

Coral reefs are the largest living structures on Earth. They play a key role in keeping our oceans healthy. Reefs also protect shorelines from storms and high tides. Reefs provide food, shelter, and protection. They are spawning areas for fish and other marine organisms. They are study areas for scientists. And millions of people worldwide count on coral reefs every day for food or income from fishing.

Reefs in Trouble

Unfortunately, increased human activity is putting a strain on the health of our oceans and reefs. Threats include fishing methods that damage reefs. Careless tourism, pollution, and climate change threaten the reefs, too.

Here in Cancún, Mexico, more than 400,000 tourists visited the natural reefs every year. Many of them were beginning divers who caused more damage than experienced divers.

Mexico's National Marine Park created the underwater museum, MUSA, to draw people away from natural reefs and toward artificial ones instead. It's working. Forty percent of the people who would have visited natural reefs now visit MUSA.

This natural reef in the Red Sea is full of marine life.



Getting Started

To protect natural reefs, we can start building new reefs, artificial ones. Artificial reefs mimic, or copy, natural ones. But, they can be created for different purposes.

Some artificial reefs prevent coastal erosion. They force waves offshore rather than landing on the coastline. Others are meant to hold sediment on beaches. Still others are a habitat for fish and other aquatic life.

To build an artificial reef, a large object is installed in an area where the sea bottom is flat and featureless. When ocean currents meet with an object, an upswelling of plankton occurs. Small fish can now feed. This, in turn, draws larger fish to the area.

Over months and years, algae, barnacles, and oysters can attach. As time passes, a complex and diverse community of sea life becomes connected to the object.



Artist Jason deCaires Taylor carefully crafts the face on one of the underwater statues.

Seeding Solutions

Creating an artificial reef takes time. MUSA president Roberto Abraham says that one of the greatest challenges in creating the underwater sculptures was using the right cement.

If the cement isn't strong enough, the statues crumble over time. If the surface is too acidic, corals and algae can't take hold and grow.

Once the MUSA staff and artists found the right mix, they were able to create the statues. Then, they hand-seeded many of the statues. They placed young staghorn coral polyps on the surface to give the growth a head start. The change is slow, but miraculous. "They evolve every day," Abraham says.


These statues have been underwater for several years. Corals and algae grow on them. Fish swim among them.



Repurposing Rigs

Art isn't the only way to make an artificial reef. Abandoned oil rigs can also double as reefs! Oil rigs are huge structures built in deep water. Usually, they are built on clay, mud, and sand. It's where people drill for oil.

When these rigs are no longer in use, the Rigs to Reefs program turns them into deep-sea artificial reefs. In the United States, many of the Gulf States participate in this program. To date, more than 500 rigs have been converted to reefs, mostly in Texas and Louisiana.



Surrounded by fish, these corals grow on an artificial reef.



This rig may one day become part of an artificial reef.

Helping Out a Giant

A typical rig can provide a habitat for as many as 14,000 fish! A rig can support more marine life than natural reefs do. The steel is a good surface for corals and sponges. Red snapper, hogfish, and barracudas make the rigs their home.

These rigs are even helping to bring back a threatened species. Goliath groupers have been protected since 1990 but are still vulnerable. These fish can weigh almost 363 kilograms (800 pounds). In recent years, they have been most abundant near deep, artificial reefs.

Accidental Reefs

Some artificial reefs are not planned. These reefs are born from objects that don't belong in the ocean at all. Planes that crash or ships that sink sometimes become reefs by accident.

There's a place in the Red Sea called Sha'ab Abu Nuhas. It is a coral reef off the coast of Egypt. Navigating this reef by ship can be dangerous. In fact, it is known as a ship graveyard.

You'll find four large shipwrecks on the north side of this reef. These ships all struck the reef. They sank and slid down a steep slope. They became partially buried in sand.

The *Giannis D* was such a ship. It was a large, Greek transport ship hauling timber. In 1983, it accidentally ran full speed into Sha'ab Abu Nuhas. The crew abandoned the sinking ship. Then a storm sent its pieces to the bottom.

To dive there now, you'd see the bones of a ship covered in corals. Hawksbill turtles, glassfish, eels, and Napoleon fish drift by. The ship might not belong there, but the sea has claimed it for its own.

Creating a Home

You'll find the S.S. *Thistlegorm* at the bottom of the Red Sea as well. It was a cargo ship of the British merchant navy. It sank during World War II.

At the time, the ship was filled with supplies for soldiers and weapons of war. It held bombs, anti-tank mines, rifles, and more than 100 motorbikes. All still lie at the bottom of the sea.



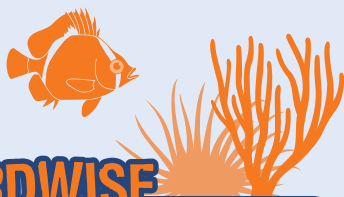
A Future Hope?

How strange these items look now, encrusted with corals. The wreck is alive with fish. This ship has become their home.

Nothing can replace a natural coral reef. Yet, artificial reefs can make up for some of the loss. In time, marine communities can thrive in these reefs.



Clockwise from left:
The wreck of the *Giannis D* lies on its side. It's now encrusted with corals and algae. A scuba diver looks at part of the S.S. *Thistlegorm*. A hawksbill turtle feeds on corals attached to the wreck of the *Giannis D*.



WORDWISE

artificial reef: an underwater structure made by people, typically built to promote marine life in an area

coral reef: an underwater ecosystem characterized by reef-building corals



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NOVEMBER–DECEMBER 2020

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