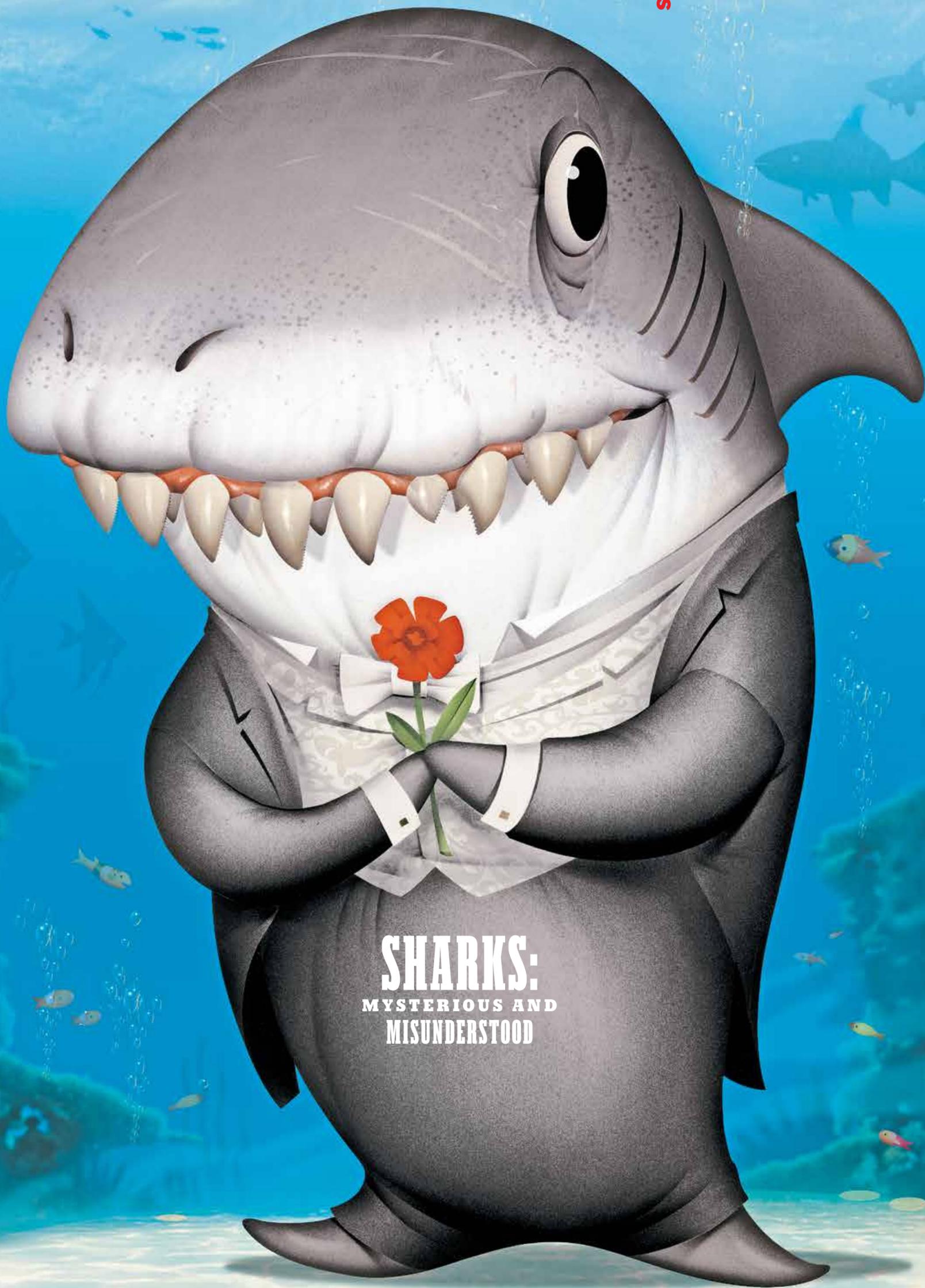


The New York Times

For Kids



SHARKS: MYSTERIOUS AND MISUNDERSTOOD

AFTER YEARS OF SEEING THEM AS SOLITARY HUMAN-KILLERS, WE ARE FINALLY LEARNING WHAT SHARKS ARE REALLY LIKE. NEW RESEARCH REVEALS THEY'RE SOCIAL, TRAVEL GREAT DISTANCES AND HAVE NO INTEREST IN ATTACKING US.

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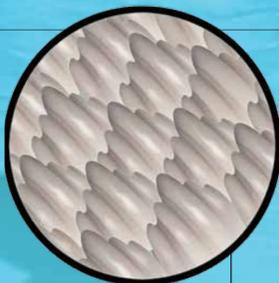
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Science

DORSAL FIN

In movies we see this infamous fin sneaking up on unsuspecting swimmers accompanied by suspenseful music. In real life, its purpose is to help stabilize the shark and prevent it from rolling upside down as it glides through the water.



SKIN

Shark skin is covered in tiny scales that make it feel smooth when rubbed in one direction and like sandpaper in the other. The edges of the scales may reduce drag from the water. In the great white's case, the skin also provides camouflage: The top of the shark is gray, and its underside is white. If you look at it from above, it blends in with the water; if you look at it from below, it blends in with the sunlight.

THRESHER SHARKS

This species has tail fins that can be as long as its body. Threshers use them like whips, swinging them at about 20 miles per hour to swat at schools of fish. One good whack can stun multiple fish at once, turning them into easy snacks.

AMPULLAE OF LORENZINI

Sharks have a supersense called electroreception. Speckled across their snouts are jelly-filled pores that can detect tiny electromagnetic signals created by muscle movements. "They can detect the electric fields given off from a beating heart of prey even when it's under the sand," says the marine biologist David Shiffman.

HAMMERHEAD SHARKS

Their unique heads make them the easiest sharks to identify. The strange T shape of their noggins grants them a 360-degree field of vision, wider than any other shark's.

LATERAL LINE

Along with the ampullae of Lorenzini, this sensory organ helps the shark detect movements in the water. As water flows through the lateral line system, which runs from head to tail, it picks up vibrations that tell the shark when prey is nearby.

SWELL SHARKS

They glow in the dark — but only other sharks can see their dazzling disco display. This is a property called bioluminescence, and scientists studying the swell shark recently discovered that these shy predators appear to glow green in the black depths of the ocean, probably to help them find mates.

NOSE

Smell is one of a great white shark's most powerful senses: It can smell tasty seals from two miles away. Its two nostrils, or nares, are used solely to sniff out prey — not to breathe, as they are in humans.

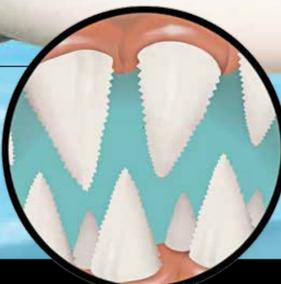
CARTILAGE

Sharks don't have bones the way we do. Instead, their skeletons are made up entirely of cartilage, like your ears and nose. It is much lighter and more flexible than bone, allowing sharks to be nimble swimmers.



TEETH

If one of the two-inch-long teeth lining a great white's jaws falls out, it's no big deal: There's a never-ending supply of razor-sharp replacements right behind it. Over a lifetime, they go through an estimated 30,000.



STOMACH

Sharks can turn their stomachs inside out. Gross! If they are really stressed out or swallow something they can't digest, they literally puke their guts out through their mouth — and then suck their stomach back in.

JAW

Sharks' jaws aren't attached to their skulls, so they can push out their mouths to take bigger bites.

GILLS

As they swim, great whites breathe through their gills, which absorb oxygen from the water. Unlike nurse sharks and bullhead sharks, great whites don't have strong muscles in their cheeks that can pump water into their bodies, so if they stop swimming, they can die from a lack of oxygen.

LIVER

Great white sharks have enormous livers that can be a quarter of their entire body weight. Their livers store large amounts of fatty oil that can act as a fuel source for long journeys. Because the fatty oil is lighter than water, the liver is the key to helping sharks float.

LISTEN, we won't disagree with you: The big, toothy grin of a shark is frightening. But there's nothing to be afraid of! For all the shark drama you see on television shows, in movies and in the local news, much of their reputation as solitary, bloodthirsty, human-hunting villains is just wrong. Because they are so elusive, it was once easy to imagine them this way, but scientists have learned more about them lately.

"Sharks are not the mindless killing machines that people used to think that they were," says David Shiffman, a marine biologist at Simon Fraser University in Vancouver. "They are capable of some really complicated activities like social interactions, problem-solving and making enormous migrations." The 1975 movie "Jaws" played an outsized role in the public's imagination. In it, there's one type of shark, a great white, and

one type of behavior: chomping people. Scientists have always known that devouring humans wasn't the defining characteristic of sharks — not to mention that there are at least 500 species, with many different types of behavior — but now, thanks to years of dedicated research and improved tracking techniques, we can see them as they really are. "Scientists are smashing the misconception that all sharks are loners," says Melissa Márquez,

a marine biologist and founder of the Fins United Initiative. "In fact, many species do like to be around others of their kind — for example, scalloped hammerheads, sand tiger sharks, leopard sharks, white-tips and whale sharks." And if you're not convinced yet, consider this statistic: Sharks kill five to 10 humans per year around the world, whereas humans kill an estimated 100 million sharks per year. So, really, we're the scary ones.

HOW TO FIND A SHARK

TRACKING TAGS:

Where do sharks hang out? High-tech tags attached to the body of great whites have started to show us. For instance, researchers tagged more than 70 great white sharks and observed them via satellite. They found that every year, the sharks would swim more than 1,000 miles to a seemingly empty spot in the Pacific Ocean

MONSTERS NO MORE

BY NICHOLAS ST. FLEUR
ILLUSTRATIONS BY BILL MAYER

halfway between Mexico and Hawaii. Now known as the White Shark Cafe, the area is about as large as Colorado. Marine biologists didn't have a clue why or how many sharks in total made the long trip, so in April they visited the cafe on a research vessel. They discovered a smorgasbord of marine life, like plankton, squid and tuna. "We thought this was a remote ocean desert," says Barbara Block, a marine biologist from Stanford University

who led the research project. "But we now know the place the sharks took us to was like an oasis in the desert." Block says her team is still not sure whether the sharks travel to the cafe so they can eat, mate or both, but it's really cool that they come together like this. "By putting tags on big animals, we are learning their secrets in the ocean," Block says. "But there are still a few mysteries we don't have figured out."

SHARK POOP:

Since sharks are so hard to find, some scientists have begun tracking them using an ever-surer sign of their whereabouts: their poop. Well, it's technically called "environmental DNA," but it's basically the body waste, mucus, saliva and shed skin cells that marine animals like sharks leave behind. "From small plankton to big whales, all of their DNA is floating around in the water," says Judith Bakker, a marine biologist

at Florida International University, who is searching the seas for these clues. This technique allows scientists to collect data on shark populations without having to catch any sharks. They drop special tubes into the water from a boat or while scuba diving. They then analyze all the DNA in the

water — first separating shark DNA from other marine-animal DNA and then identifying the species. The research has already been used to confirm the presence of whale sharks in the Persian Gulf, estimate rare Greenland shark populations in their home waters and detect great hammerhead sharks in the Caribbean and New Caledonia. A major goal of the work is to pinpoint where endangered sharks exist to better protect them. Thanks, poop! ♦