Marine Life Facts

Young readers will love digging into these great passages on the fascinating creatures living under the sea, and they'll get a nice reading comprehension workout in the process. What do they remember from the reading? In what paragraph did that information show up? Answering these questions challenges young readers to read actively and create a mental map of the passage as they go.

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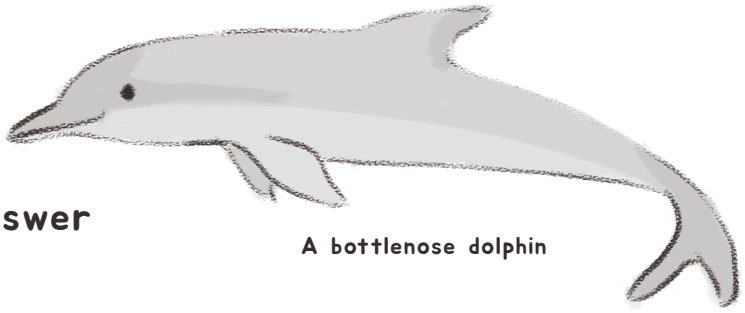
Reading Comprehension:

Dolphin Facts



A bottlenose dolphin

Read the paragraphs below, then answer the questions that follow.

Dolphins are in the same scientific order as whales, *cetacea*. Both types of mammals evolved from a land- and sea-dwelling creature called the *Indohyus*, which lived 54 million years ago. Cetaceans stayed in the oceans 49 to 44 million years ago and became adapted to living in **marine** environments. The *orca* (or killer) whale is actually in the dolphin family and is the largest at 30 feet long and 10 metric tons (22,064.2 pounds).The smallest are the *Maui dolphins* at four feet long and 90 pounds.

Dolphins are thought to be some of the smartest animals. Their mouths seem to be smiling, which fits their friendly and playful personalities. Dolphins like to jump out of the water, sometimes performing flips and spins. They are known to play with seaweed, tease birds and turtles, and swim alongside boats and with people. They also create "bubble rings" that they examine visually and with sonar, bite at to produce smaller bubbles, and use to help catch food. They live in groups called **pods** and even show signs of passing cultural habits to their young, such as using sponges to protect their noses while foraging for food.

Like whales, dolphins breathe through their *blowhole* by spouting out water and then inhaling into their lungs. Dolphins are in the group of whales that have teeth. They hunt fish in groups to corral the fish in a tight area, so they are easier to catch. Dolphins have even been known to work with humans in catching fish. In Laguna, Santa Catarina, Brazil dolphins chase fish toward fishermen and signal when to cast the fishing nets. The dolphins then catch the fish that manage to get out of the nets.

Dolphins have a sense of taste and like certain fish. Dolphins have very good eyesight, hearing, and touch, but no sense of smell. They emit sounds into their environment and listen to the echoes that come back from objects around them. This process is called **ecolocation**.

The dolphin's teeth act like antennae conducting the sound waves into a cavity in the jaw bone that leads to their middle ear. Dolphins also make whistling noises to communicate. Their noises can travel miles and are among the loudest sounds made by ocean animals.

1. How are the following words used in the text? Write the definition next to each.

marine: _____

pod: _____

ecolocation: _____

What land- and sea-dwelling creature did dolphins evolve from? _____

2. True or False? Circle the correct answer:

Dolphins are very playful. True False

Dolphins have a great sense of smell. True False

Crab

Can you walk **crabwise**? This is a term that means "sideways" or "in the manner of a crab." It was created after watching crabs walk sideways, which is easier for their legs than walking forward or backward. Most crabs walk crabwise, although some walk forward or backward, and only some can swim. Crabs also have pinchers on their front two legs that they use for communication by drumming or waving them in the air. They also use them for protection and the males use them to fight with each other. Fiddler crabs use them to dig burrows in the sand or mud to hide in or rest in. Hermit crabs, king crabs, porcelain crabs, and horseshoe crabs are not "true crabs."

Crabs are a type of **crustacean**. These kinds of animals have three body parts, the head, thorax (chest), and abdomen (belly). Crustaceans also have a thick shell, which is actually an exoskeleton or a skeleton that is on the outer part of the body instead of the inside like humans. This outer shell has to be regrown in larger sizes as the crustacean grows. The old shell is shed and left behind. This process is called molting. Most crabs like water and crabs can be found in all of the world's oceans as well as in fresh water on land. Some crabs are terrestrial or land animals and don't need to stay by the water. Most of the freshwater crabs are found in tropical or semi-tropical climates. The largest crabs are the Japanese spider crabs. Their leg span can be up to 13 feet across! The smallest pea crabs are only a few millimeters wide.

Crabs are **omnivores**, meaning they will eat both plants and meat. Their main diet is algae, but they also like mollusks, worms, other crustaceans, fungi, and bacteria. Some also eat plankton and even fish. People like to eat crabs and they are farmed and caught in the oceans worldwide. The most eaten parts of crabs are the legs and claws, but the rest of the crab meat is also eaten. The soft-shell crab can be eaten whole, shell and all! Crabs are used in popular culture as well. The term "crabby" means grumpy or mean. The constellation of Cancer and the astrological sign for Cancer are named after the crab.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

crabwise

crustacean

omnivore

2. What are the pinchers on crabs front legs used for? _____

_____

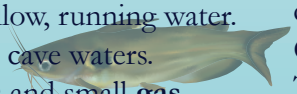
3. All crabs can swim. **True or False?**

4. The Japanese spider crab is the largest species of crab and can have a leg span up to 13 feet across.

True or False?

Catfish

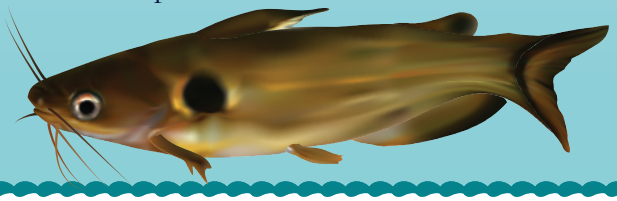
Catfish are unique looking fish in that they seem to have whiskers coming off their faces. The "whiskers" on catfish that give them their name are actually called barbels. They can have up to four total pairs of barbels: one on either side of their nose, one on each side of their mouth, and two pairs on their chins. Not all fish in the catfish family have them, however. Some have armor plates on their bodies, but none have scales. Catfish are farmed for food and also kept as pets. Catfish live around every continent except Antarctica. They swim in inland water as well as coastal areas of the oceans. Inland they prefer shallow, running water. Some even live in underground or cave waters.



Catfish have heavy, bony heads and small **gas bladders**, or swim bladders, which are the air-filled organ that lets fish control their buoyancy. **Buoyancy** is the way something sinks or floats. This organ allows fish to stay in one place under water without using too much swimming energy. Because of their heavy heads and small swim bladders, catfish are usually bottom feeders. To help with digging on the waters floor, catfish also have flattened heads. They eat by sucking in their food rather than biting. Instead of taste buds only in their mouths, catfish have **chemoreceptors**, or specialized nerve cells that detect chemicals, on their whole body! This lets them taste and smell everything they touch. Some even breathe through their skin. Catfish also use their barbels to feel out food.

All catfish except electric catfish have spine-like bones on their dorsal (back) and pectoral (side) fins. Some can sting with a protein-based venom and lock these bones into place sticking outwards for protection. The venom is strong enough to put a human in the hospital and in one species it can kill a human if stung. While there are a few reports of some aggressive species of catfish, there are no actual documented deaths from catfish stings, and most are not venomous. Catfish can be from 1 centimeter long to 8½ feet long. The largest caught catfish was a giant Mekong catfish caught in Thailand on May 1, 2005. It weighed 650 pounds.

Catfish are farmed for food in Africa, Asia, Europe, and North America, and have been caught and eaten for hundreds of years. They are a white fish and high in vitamin D as well as omega-3 and omega-6 fatty acids, nutrients important to brain and skin health.



1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

gas bladder

buoyancy

chemoreceptors

2. What are two parts of the catfish's body that help it stay on the water floor? _____

_____

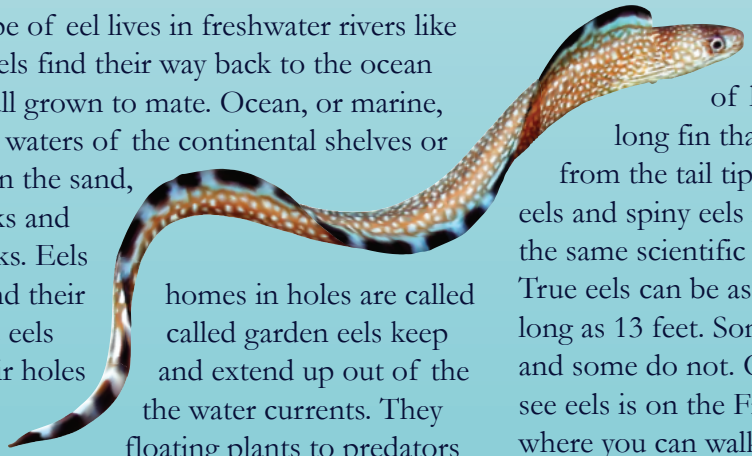
3. All catfish have barbels, or "whiskers." **True or False?**

4. Catfish have huge tastebuds on their tongues. **True or False?**

Eel

Baby eels are flat, transparent larvae that float in the ocean and eat **marine snow**, or tiny particles that also float in the water. Eels then go through metamorphosis, or change, into glass eels, then into elvers, and finally adult eels. The term elvers may have come from the springtime "eelfare," which was a term for the travel elvers took by swimming upstream in the River Thames in England. Elvers will climb up dams and waterfalls to swim upstream. Gertrude Elizabeth Blood, who worked at the fishery in Ballisodare, Ireland, started the custom of helping elvers climb up waterfalls and barriers by supplying grass ladders.

Only one type of eel lives in freshwater rivers like this. The river eels find their way back to the ocean once they are full grown to mate. Ocean, or marine, eels live in deep waters of the continental shelves or shallow waters in the sand, mud, or in cracks and caves in the rocks. Eels are nocturnal and their homes in holes are called "eel pits." Some eels called garden eels keep their tails in their holes and extend up out of the holes to float in the water currents. They look like floating plants to predators and possible prey that swims by.



Eels have been eaten by humans in many cultures. They are now considered a **delicacy**, a rare and special food, and can be very expensive. Some eel farms are not farming the eels responsibly. Greenpeace International, an organization that works for endangered animals, has added eels to the "red list" of fish. The red list helps fish consumers know which fish might become extinct if we eat too much of it. Eels cannot be eaten raw, as cooking helps destroys the toxic protein in their blood. Charles Richet won a Nobel Prize for discovering **anaphylaxis**, a very strong allergic reaction that can cause death, in his research using the toxic protein in eel blood on dogs.

Eels are long fish that look kind of like a snake. They have only one long fin that runs along the top of their bodies from the tail tip to the back of their heads. Electric eels and spiny eels look like eels but are not actually in the same scientific order Anguilliformes as true eels. True eels can be as small as 2 inches in length and as long as 13 feet. Some have spots all over their bodies and some do not. One of the most famous places to see eels is on the French Polynesian island of Huahine, where you can walk across a bridge over a stream with three- to six-foot-long eels swimming in it.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

marine snow

delicacy

anaphylaxis

2. What is the term for the devices used to help elvers climb? _____

3. Garden eels live in gardens on land. **True or False?**

4. What scientist won a Nobel Prize for discovering anaphylaxis allergic reactions from eel blood toxins?

_____

Lobster

Lobsters are a type of crustacean. They have a hard exoskeleton, a skeleton that is on the outside of a creature's body instead of inside like a human, that covers their whole body in sections. Lobsters are also **invertebrates**, which means they have no vertebral column, or spine. Lobsters shed, or moult, their old exoskeleton as they get bigger and grow a new one. Lobsters have 10 legs. They are well known for their large claws on the front pair of legs, but actually have smaller claws on the next two sets behind the front as well.

Lobsters are **bilaterally symmetrical**, which means if you split them down the middle, each side would be a mirror image of the other. The antennae on their heads help lobsters feel their way around the murky bottom of the ocean. They can also smell their prey with sensing hairs on the front of their heads. Lobsters live in every ocean of the world. Lobsters are omnivores (meaning they will eat any kind of food) and bottom feeders. They eat mainly fish, molluscs, other crustaceans, worms, and some plants.

Lobsters usually walk slowly on the ocean floor, but if they are startled they can swim backwards by curling and uncurling their muscular tails and abdomens. The top speed recorded for a lobster swimming is 11 miles per hour! To catch lobsters, people use traps that only open one way.

Lobster was once used only as low-quality food for poor people and servants, or as fertilizer. People now pay high prices for a meal of lobster tail and claws.

Lobsters have an enzyme called **telomerase** that repairs their DNA. Biologists say it keeps lobsters from weakening with age. If they do not get sick, eaten, or injured, lobsters might be able to just keep living! They can even regrow legs if they lose them. Lobsters keep growing the longer they are alive.

Guinness World Records states that the largest caught lobster was 44.4 pounds and was thought to be 50 years old. As recent as 2012, researchers found a way to measure lobsters' age by counting rings on the lobster's eyestalks and a stomach part. They are also studying telomerase in lobsters for anti-aging and cancer treatments, as this enzyme not only decreases in most animals, but can become cancerous if activated beyond its normal life span.

Professor Jelle Atema of Boston University has a 15-pound lobster in captivity that he is studying to see just how long it will live. Who knows how long it can live and how big it will get?

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

invertebrate

bilaterally symmetrical

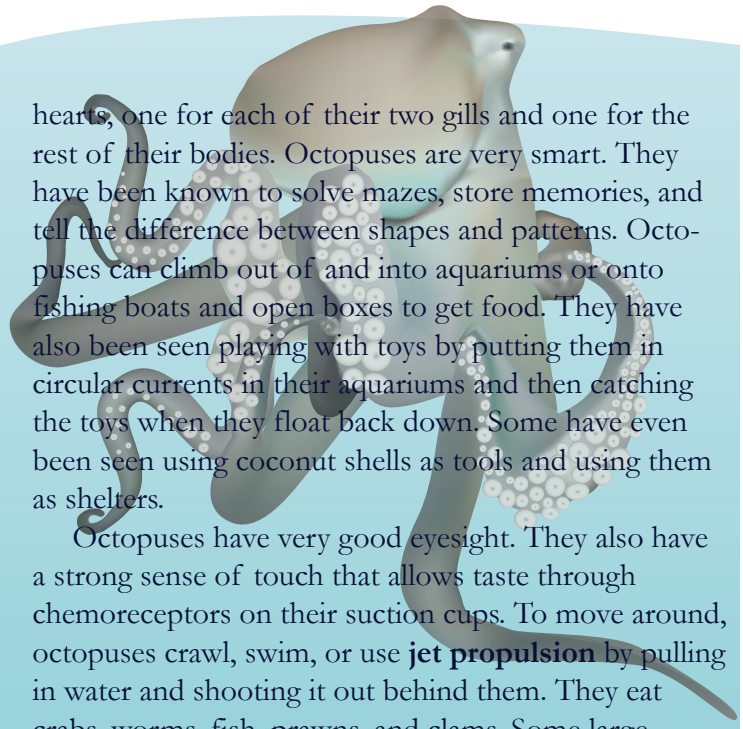
telomerase

2. How big is the largest recorded lobster? How old was it? _____

3. Lobsters get weak as they get older. **True or False?**

4. Lobsters cannot swim. **True or False?**

Octopus



Octopuses, or octopi, have eight arms with suction cups on them. They have no skeleton or outer shells, so they can fit through very narrow openings to escape predators. The only hard part of their bodies is their beak.

Octopuses can squirt out an inky substance that blocks the predator's sense of smell and may make it attack the ink instead of the octopus. Octopuses can also hide through camouflage, swim very quickly, and perform **deimatic behavior**. This means they act in sudden or threatening ways to startle or scare off predators. One example is O. macropus, which turns bright brownish red with white spots in order to look threatening. Some other octopuses spread their arms out wide and get dark rings around their eyes while making their skin pale. These changes are a surprise to the predators, and can either scare them away or give the octopus time to get away. All octopuses are also venomous, though not harmful enough to hurt humans. Some octopuses can also take off an arm, called **arm autotomy**, just like some lizards will do with their tails. The nerves in their arms can jump around without a brain, which distracts the predator.

Octopuses have very short life spans. Some only live six months, some up to five years. They have three hearts, one for each of their two gills and one for the rest of their bodies. Octopuses are very smart. They have been known to solve mazes, store memories, and tell the difference between shapes and patterns. Octopuses can climb out of and into aquariums or onto fishing boats and open boxes to get food. They have also been seen playing with toys by putting them in circular currents in their aquariums and then catching the toys when they float back down. Some have even been seen using coconut shells as tools and using them as shelters.

Octopuses have very good eyesight. They also have a strong sense of touch that allows taste through chemoreceptors on their suction cups. To move around, octopuses crawl, swim, or use **jet propulsion** by pulling in water and shooting it out behind them. They eat crabs, worms, fish, prawns, and clams. Some large octopuses even catch and eat sharks. The largest known octopus was a giant Pacific octopus that weighed 156.5 pounds. There are some records not widely accepted of another species of octopus that weighed 600 pounds.

People eat octopus. It is used often in Hawaii and in Mediterranean and Portuguese dishes. Some people keep them as pets, but they are able to escape tanks and don't live very long.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

deimatic behavior

arm autotomy

jet propulsion

2. Name three things octopuses do for protection. _____

_____

3. Octopuses live to be about 100 years old. **True or False?**

4. Octopuses can taste through their suction cups. **True or False?**

Piranha

Piranhas are mostly freshwater fish that live in rivers, lakes, and some coastal areas of the Amazon Basin in South America. Some have been seen in the United States in the Potomac River and the Lake of the Ozarks in Missouri, and one was caught near Staten Island in New York City. Piranhas have also been seen in Kaptai Lake in Bangladesh and Lijiang River in China. How these piranhas got so far from their native Amazon rivers is still being questioned.

Piranhas are usually 5½ to 10¼ inches long, but have been seen as large as 17 inches. They are best known for their sharp, triangular teeth. People used to think they grouped in schools to hunt and were **vicious** predators. After observation, scientists have found piranhas swim in schools more for protection from predators such as dolphins just like any other fish.

Piranhas are omnivores, which means they eat both plants and meat. Only some species such as the red-bellied piranha are strictly **carnivores**, or meat eaters. Piranhas, like sharks, get more aggressive when blood is in the water. They have been known to attack humans and a school of them can eat a whole cow. President Theodore Roosevelt made a trip to Brazil in 1913 and wrote in his book "Through the Brazilian Wilderness" about seeing a cow pushed into a group of starved piranhas. He spoke of seeing the piranhas fished up on deck and how they squealed and continued to try to bite anything they could. Roosevelt described them as "a short, deep-bodied fish, with a blunt face and a…projecting lower jaw which gapes widely. The razor-edged teeth are wedge-shaped like a shark's, and the jaw muscles possess great power. … Furious snaps drive the teeth through flesh and bone."

It is no wonder biologists and experts warn people to be careful in any rivers, lakes, or coastal areas where piranhas may live. Still, many people **indigenous** to South America have used piranha teeth to make tools and weapons. Fishermen catch piranhas and sell them for food, but are also bothered by them stealing bait, harming other fish they are trying to catch, and damaging and fishing gear, such as nets. Fishing for piranhas or around where they live is not for the faint of heart!

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

vicious

carnivores

indigenous

2. Where are piranhas indigenous? _____

3. Which U.S. president wrote about piranhas in a book? _____

4. It is safe to swim with piranhas. **True or False?**

Seal

The true scientific name for seal is "**pinniped**," which is Latin for "fin-footed mammals." Seals have sleek, barrel-shaped bodies that help them slip along ice or smooth rocks and swim quickly. They spend time both on the land and in the sea, but stay very close to the water's edge while on land.

Seals without external ears are called true seals, or phocids. They prefer the water and cannot move very well on land. Phocids have more tail-like back flippers and more streamlined snouts, which help them swim in waving body motions. They also use their tails to communicate by slapping the water with their back flippers.

Eared seals (also called walking seals or otariids) have back flippers that can turn upside down and are shaped more like feet. They can get around better on land than earless seals, but are still faster in the water than they are walking. They swim with their front fllippers. Sea lions and fur seals are two species of eared seals. They have snouts more like dogs and communicate in vocal "barks." The California sea lion is usually the species used in circus tricks.

Pinnipeds live in both warm and cold climates near and in the ocean. In cold climates, a thick layer of blubber, or fat, under their skin helps keep them warm. The more fat an animal has, the easier it is for it to float, so the blubber helps seals surface after diving in the water. Some seals also have fur to keep warm. When blood moves toward the outer part of an animal's body, it lets heat off. Seals in cold climates have **circulatory systems** (the part of animals that blood flows through) that keep their blood more internal to avoid heat loss. Seals that live in warm climates do the opposite. They wave their flippers and go in the cooler water, which also helps bring their blood to the surface to release extra heat in their bodies.

Seals also have **adaptations**, specialized ways to live in their environment, that help them see well both on land and underwater. A clear membrane covers and protects their eyes while open underwater. Their nostrils also close on their own and they can hold their breath for almost two hours while diving underwater. Seals' blood flow only goes to their sense organs and nervous system while they are underwater. This lets them feel less pain and fatigue than other animals while swimming. Once they resurface, seals need time to normalize their body functions. Seals hunt underwater for fish, shellfish, squid, penguins, and other small marine creatures. Orcas and sharks hunt seals as do polar bears in the arctic.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

pinniped

circulatory system

adaptations

2. How do phocids communicate? What about otariids? _____

_____

3. Seals can run very fast. **True or False?**

4. Seals have a membrane that covers their eyes when underwater. **True or False?**

Sea Turtle

Sea turtles are a group of turtles that are adapted to living in the ocean. They live in every ocean except the Arctic Ocean. There are only seven living species of sea turtles and all of them are endangered species. The seven species are: flatback sea turtles, green sea turtles, hawksbill sea turtles, Kemp's ridley sea turtles, leatherback sea turtles, loggerhead sea turtles, and olive ridley sea turtles. The leatherback sea turtles are the only species that has bony plates under its leathery skin instead of a shell. Leatherback sea turtles are the largest and can be six to seven feet long, three to five feet wide, and up to 1,300 pounds. Other species of sea turtles are only two to four feet in length.

Sea turtle shells and necks are often homes for barnacles. The sea turtle is always swimming, which provides a constant flow of water and food source for the barnacles. Turtles also live very long lives, 80 years is the average life expectancy, and some leatherbacks live to be 100. Barnacles usually only live five to ten years, so they can be sure their sea turtle **host** will be there.

Female sea turtles lay their eggs in holes they dig in the sand at night. They do not stay with their eggs, and the babies have to find their way back to the ocean when they hatch. The gender of sea turtles depends on the temperature of the sand where they **incubate**. Warmer sand causes faster incubation times, causing more females to hatch. Male sea turtles do not return to the land once they have gone back into the ocean.

Sea turtles spend most of their time underwater. They breathe air, but can use anaerobic metabolism if they need to stay underwater longer. Sea turtles can take one huge, fast breath to fill their lungs. When they need to come up for air, they can do so quickly and stay away from danger.

Sea turtles eat both animals and plants. They are important to the sea environment because some eat jellyfish and help control the jellyfish population. Green sea turtles also are some of the only animals to eat sea grass, which needs to constantly be cut to help it grow. Many other sea creatures depend on the sea grass as a place to live. If sea turtles went extinct, they would not be the only creatures affected.

Fisherman's nets are one of the biggest threats to sea turtles. Some shrimp nets now include **TEDs** or "Turtle Excluder Devices." These are metal bars that keep larger animals from being able to go into the back of the nets. There are then holes for the turtles to escape to the front of the net. It is one way humans are working to save the sea turtles from extinction.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

host

incubate

TEDs

2. How big can leatherback sea turtles get? _____

_____

3. Sea turtles lay their eggs in sea grass. **True or False?**

4. All sea turtles are endangered. **True or False?**

Shrimp

Not all scientists agree on which species are included in the term "shrimp." The wider definition covers the same as "prawns." These are defined as stalk-eyed swimming crustaceans with long muscular tails, long whiskers (antennae), and thin legs. Shrimp have short legs called **swimmerets** that they use to paddle while swimming. Their longer legs are not strong enough for walking and are mainly for perching when they are not swimming. Shrimp, like crabs and lobsters, have a **cephalothorax**, which means their heads and thorax are fused together. Their abdomens and tails are very strong. Shrimp can swim backwards fast by "lobstering" or quickly flexing and unflexing their tail up toward their bellies. Shrimp have eye stalks that can see very far to either side. They have two pairs of antennae, one pair being twice as long as their bodies. The long antennae can feel as well as smell and taste because they have chemoreceptors that can detect chemicals in the water. The short antennae are mainly for testing food. Shrimp have a segmented shell that is often transparent, or see-through.

Shrimp can be found feeding on the seafloor and in rivers and lakes almost everywhere. Some species can do a flip and dive into the sand to escape predators. Shrimp are eaten by many larger animals and are thus important to the food chain. People eat the muscular tails of shrimp as well. Larger shrimp over 9 inches are usually called prawns. The nets used to catch shrimp have recently been equipped with TEDs, or "Turtle Excluding Devices." These metal bars keep larger animals like sea turtles from getting swept into the back of the nets where they get trapped and often die as they cannot come up for air. The TEDs also have larger holes toward the front of the trawling nets so the turtles can escape. Shrimp trawling has made catching shrimp in large quantities much easier. The nets are hooked to large boats that pull them along under the water. Many wild shrimp are endangered such as the giant tiger prawn.

Shrimp is also farmed. The giant tiger prawn used to be the most farmed species, but now the whiteleg shrimp is. The main producer of farmed shrimp is China, followed by Thailand and the Philippines. Greenpeace is challenging some shrimp farms as they took over and destroyed mangroves and over-fish young shrimp in the ocean to replenish farmed fish populations.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

swimmerets

cephalothorax

lobstering

2. Why are shrimp important to the food chain? _____

_____

3. Shrimp are only found in the ocean. **True or False?**

4. The United States is the main producer of farmed shrimp. **True or False?**

Starfish

Starfish are also called sea stars. Most have only five arms and are in the shape of a five-pointed star, but some species have more than five arms. If they lose an arm, they can **regenerate**, or regrow it. Starfish are **radially symmetrical**, meaning all their arms are the same size and shape. They have skeletons that extend into their arms but are invertebrates, meaning they have no spines. Their tops can be smooth, granular, or spiny and are covered with overlapping plates. Starfish can be red, orange, blue, gray, or brown. Depending on the species, starfish can live from 10 to 34 years. Starfish can change gender to help in breeding. Starfish grow from eggs and some species brood, or hold their eggs in a pouch. Some species can be both the mother and the father.

Starfish are found in every ocean around the world. Starfish cannot regulate the salt content in their bodies. This function is known as **osmoregulation**. This is why they are only found in salt water environments. They can live in water as deep as 20,000 feet. Starfish move around very slowly on short, tube-like feet. They do this by a water vascular system, which pulls water into it to expand the starfish's "feet" so they can touch the surface. The feet, or podium, then use an adhesive chemical to stick to the surface. The water is then squeezed out of the podium as it contracts, using other chemicals to release the adhesive and let go of the surface. This happens in a wave-like motion with several feet releasing and others attaching at the same time to move the starfish forward slowly. In fact, the fastest starfish can only travel nine feet and two inches per minute. Starfish also breathe and get rid of wastes through this flow of water through their podium feet. Some intake of oxygen and excretion of waste also happens through the papulae, or skin gills, on the starfish's surface. Starfish's mouths are on the underside of them and they eat benthic (bottom of the water) invertebrates as they move over them.

Starfish are a keystone species. The starfish is the only natural predator of some kinds of sea urchins, mussels, and shellfish. In turn, the relatively small population of starfish keeps its prey from overpopulating. Too many mussels would drive out other species from the sea floor, and too many urchins would eat up the coral reefs faster than they can grow. Starfish thus act like a keystone in an arch. The keystone itself does not hold much weight, but without it, the arch would collapse.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

regenerate

radially symmetrical

osmoregulation

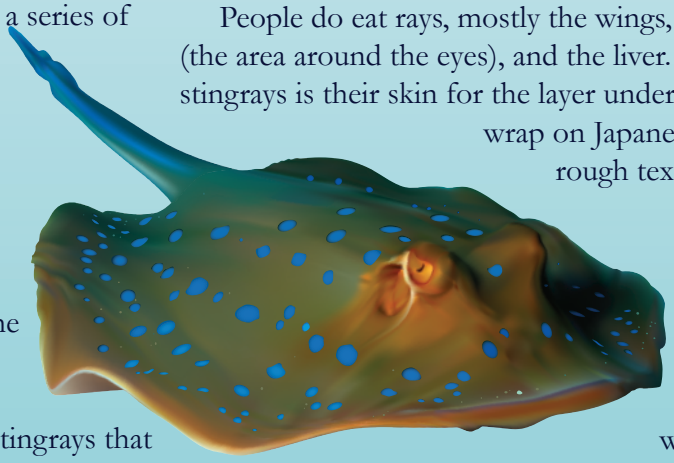
2. Starfish help the environment by eating urchins and mussels that would otherwise overpopulate and upset the balance of the ocean ecosystem. What is the term for a species like this? _____

3. All starfish have five arms. **True or False?**

4. Starfish can't move once they are stuck to something. **True or False?**

Stingray

Did you know stingrays are related to sharks? Stingrays are a group of ray fish that are **cartilaginous**, just like sharks. This means they have skeletons made of cartilage instead of bones. They also have jaws, paired fins, paired nostrils, and a heart with a series of chambers. Stingrays get their name from the barbed stingers on their tails that they use for self-defense. Only a few members of the ray family don't have stingers. They are manta rays and, surprisingly, porcupine rays.



Stingrays live in tropical and subtropical water near the coast all over the world. Some can live in deeper parts of the ocean if it is warm enough. There are also stingrays that live in freshwater rivers like the Niger and stingrays that live in Nigeria and Cameroon. Because of their flat bodies, stingrays can **agitate** (move back and forth) the sand until they are covered by it to hide. With eyes that poke up above their body, they can peek up to see if the coast, quite literally, is clear. The only problem with eyes on the top of their bodies is that their mouth is on the bottom, so they cannot see what they are trying to eat!

Stingrays have a strong **olfactory perception**, or sense of smell, like sharks. They smell for their prey of mollusks, crustaceans, and small fish. Once they have a bite, it is back into the sand with only tail and eyes peeking out to make sure no predator is looking to in turn eat them!

People do eat rays, mostly the wings, or flaps, cheeks (the area around the eyes), and the liver. Another use of stingrays is their skin for the layer under the leather wrap on Japanese swords. The rough texture of the ray's skin keeps the leather from sliding on the handle of the sword. Stingrays won't usually attack people and many people like to swim with the curious creatures. If you are swimming in coastal waters where rays live, it is a good idea to watch where you step or to use something to scare them away before you walk on the ocean floor. A stepped-on ray will use its stinger to say, "Excuse me, but please get off!" The venom is not deadly, but hurts more than getting stepped on!

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

cartilaginous

agitate

olfactory perception

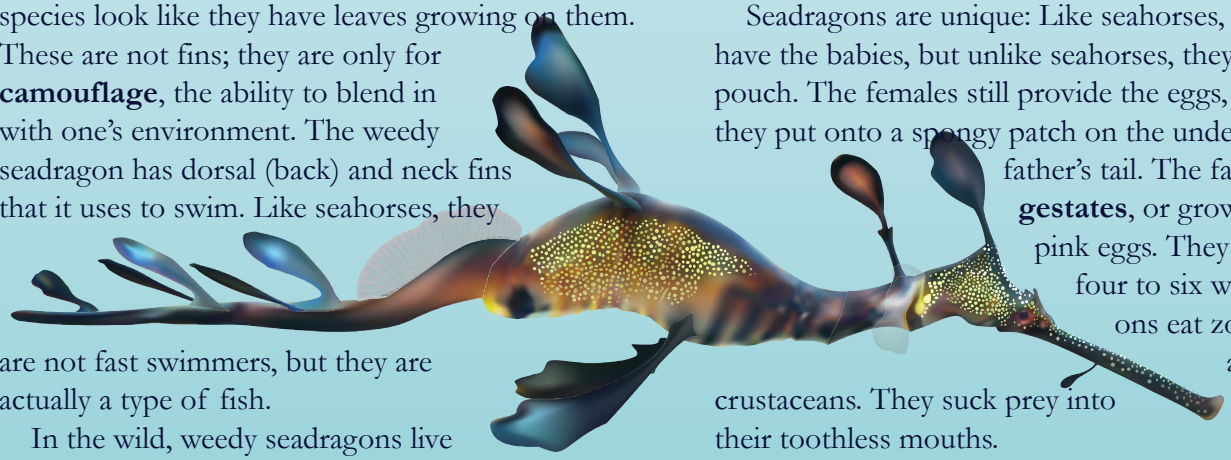
2. Where do stingrays live? _____

3. Stingrays are related to sharks. **True or False?**

4. Stingray's mouths are on top of their bodies. **True or False?**

Weedy Seadragon

In the genus Phyllopteryx all by itself, the weedy seadragon is a close relative of the seahorse. It is also closely related to the leafy seadragon. Both species look like they have leaves growing on them. These are not fins; they are only for **camouflage**, the ability to blend in with one's environment. The weedy seadragon has dorsal (back) and neck fins that it uses to swim. Like seahorses, they are not fast swimmers, but they are actually a type of fish.



In the wild, weedy seadragons live exclusively around Australia in the Indian Ocean. Because of this, it is the marine emblem of the State of Victoria in Australia. When they are full grown, weedy seadragons are a rusty red color with yellow and purple markings. Like their cousin, the seahorse, weedy and leafy seadragons have long, thin snouts that make their heads look like a horse. Their bodies are made up of bony rings and they have thin tails. Unlike seahorses, weedy seadragons don't have **prehensile** tails that can grip things. Instead, they drift and go with the flow of the sea current, looking like a loose piece of seaweed. Leafy seadragons can be up to 14 inches long, while weedy seadragons can be up to 18 inches long.

Seadragons are unique: Like seahorses, the males have the babies, but unlike seahorses, they have no pouch. The females still provide the eggs, which they put onto a spongy patch on the underside of the father's tail. The father then **gestates**, or grows, the bright pink eggs. They hatch after four to six weeks. Seadragons eat zooplankton and tiny crustaceans. They suck prey into their toothless mouths.

Seadragons are classified as "near threatened" on the International Union for Conservation of Nature's red list. They were taken for pets too often and are now under the Australian government's protection as well. It is difficult to breed weedy seadragons in captivity, but many aquariums are trying. The Aquarium of the Pacific in Long Beach, California, the Tennessee Aquarium in Chattanooga, Tennessee, and the Melbourne Aquarium in Melbourne, Australia, are a few that have been successful.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

camouflage

prehensile

gestate

2. What do seadragons use their leafy looking appendages for? _____

3. The male seadragons, like seahorses, gestate the babies. **True or False?**

4. Seadragons are like mythical dragons: They have big, sharp teeth. **True or False?**

Whale

One strange fact about whales is that they are the closest living relatives of the hippopotamus. Both animals are now in the super-order Cetartiodactyla. Scientists use DNA and physical characteristics to figure out **ancestory**, or past family relatives, of animals alive today.

In scientific classifications, whales and dolphins are both in the order cetacea. Cetaceans evolved from a land- and water-loving, deer-like animal called the Indohyus, which lived 54 million years ago. Cetaceans stayed in the oceans 49 to 44 million years ago and became adapted to living in marine environments. They became more streamlined to glide through the water, their nose holes moved to the top of their heads, they lost their back legs, their front legs became flippers, and they grew flukes on their tails.

There are two different kinds of whales, those with teeth, and those that filter plankton through a part in their upper jaw called **baleen**. It is made of keratin, like our fingernails. Dolphins, porpoises, sperm whale, killer whale, pilot whale, and beluga whales are all toothed whales in the suborder odontoceti. The term "whale" usually refers to cetacean animals with baleen feeding filters.

The largest whales are the blue whales, which grow up to 98 feet in length and 180 tonnes (roughly 396,832 pounds) in weight. They are the largest animal known to ever have existed, even larger than dinosaurs! The largest known dinosaur was only 23 to 37 tonnes.

Whales are mammals, so they breathe air, are warm-blooded, nurse their young, and have body hair. They have a layer of fat under their skin called blubber that helps keep them warm in the cold ocean water.

They breathe through their blowholes by shooting air out of the blowholes and then inhaling into their lungs. Most dives underwater are only five to eight minutes long, but the blue whale can hold its breathe for up to 40 minutes, and deep divers like bottlenose dolphins and sperm whales can stay under for 90 to 120 minutes. Whales are **conscious breathers**, meaning they have to think about breathing, so they don't ever sleep. If they did, they would drown. Whales talk to each other in what we call whale song. Some captive whales have even tried to mimic human speech.

Whales are estimated to live up to 77 years old, but one whale was found with a fragment of a harpoon from the 19th century in it which might make it 115 to 130 years old. Some dating techniques say another was 211 years old, but the science of the technique is not widely accepted. What do you think?

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

ancestory

baleen

conscious breather

2. What present-day animal is the whale related to? _____

3. Blue whales are bigger than any dinosaur was. **True or False?**

4. Whale breathe through their blowholes. **True or False?**

Jellyfish

What "blooms" but is not a flower, is an animal but has no brains, and has tentacles that Medusa's hair was named after? A jellyfish! Jellyfish larva join together, land on the ocean floor, boat hulls, or sometimes even on floating plankton or fish and latch on with tiny "fingers" called cilia. They turn into a polyp, or a plant-like stalk with a mouth at the top. Polyps look much like anemones which are their cousins. It can take years for the polyp to split and turn into free-floating jellyfish. Each new top layer of the polyp that splits off is said to be budding. The next stage is called the medusa stage, where the jellyfish continues to grow tentacles. It is no wonder Greek mythology used this term to describe the long snake hair coming off the mythical Medusa as the tentacles can move around to grab prey and sting. Jellyfish don't "bloom" at this stage necessarily. A large group of jellyfish swimming together in a small area is called a "**bloom**." It sometimes also depends on how quickly they gather together and if it is a bigger group than scientists expected to see in that area.

As for the lack of brains, jellyfish truly don't have one! They instead have a complex **nerve net**, a group of nerves that functions without the central unit of a brain to guide it. The nerve net is located in their skin and transmits impulse signals through a circular nerve ring that runs along the rim of the jellyfish's bell body. Jellyfish are not "mindless" however. They can detect the tide's movement and use it to move around while they pull in water and squirt it out behind them. Jellyfish can also detect if the water has the correct amount of salt in it for them to live, and will seek out water with the right concentration. Some jellyfish live in fresh water, but for those that don't, the **saline**, or salt-to-water concentration, is important to their survival.

Jellyfish are not actually fish. Many aquariums simply call them "jellies." They are made of 95 percent water! They do have mouths for feeding but only some have an organ that is like eyes. Jellyfish eyes can't see images; they only record light. This helps these jellyfish know up from down by detecting the sun shining on the water's surface. Box jellyfish are unique in that they have 24 eyes that can actually see things all the way around their bodies. Box jellyfish have four brains. Box jellyfish are, however, not "true jellyfish" and are classified as relatives to the brainless type. Jellyfish have been around for at least 500 million years! This makes them the oldest living multi-organ animal. How did they survive so long without a brain? Whatever the reasons, they are truly fascinating creatures.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

jellyfish bloom

nerve net

saline

2. What part of the jellyfish was the Greek mythical creature Medusa named for? _____

3. All jellyfish have four brains. **True or False?**

4. Jellyfish have great eyesight. **True or False?**

Answer Sheets

Marine Life Facts

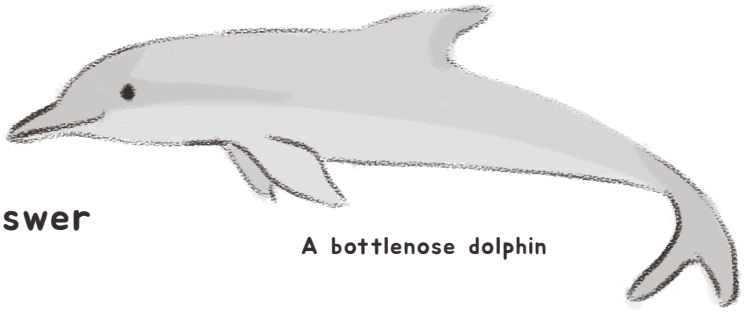
Dolphin Facts
Crab Facts
Catfish Facts
Eel Facts
Lobster Facts
Octopus Facts
Piranha Facts
Seal Facts
Sea Turtle Facts
Shrimp Facts
Starfish Facts
Stingray Facts
Weedy Sea Dragon Facts
Whale Facts
Jellyfish Facts

Name _____ Date _____

Answers

Reading Comprehension:

Dolphin Facts



A bottlenose dolphin

Read the paragraphs below, then answer the questions that follow.

Dolphins are in the same scientific order as whales, *cetacea*. Both types of mammals evolved from a land- and sea-dwelling creature called the *Indohyus*, which lived 54 million years ago. Cetaceans stayed in the oceans 49 to 44 million years ago and became adapted to living in **marine** environments. The *orca* (or killer) whale is actually in the dolphin family and is the largest at 30 feet long and 10 metric tons (22,064.2 pounds).The smallest are the *Maui dolphins* at four feet long and 90 pounds.

Dolphins are thought to be some of the smartest animals. Their mouths seem to be smiling, which fits their friendly and playful personalities. Dolphins like to jump out of the water, sometimes performing flips and spins. They are known to play with seaweed, tease birds and turtles, and swim alongside boats and with people. They also create "bubble rings" that they examine visually and with sonar, bite at to produce smaller bubbles, and use to help catch food. They live in groups called **pods** and even show signs of passing cultural habits to their young, such as using sponges to protect their noses while foraging for food.

Like whales, dolphins breathe through their *blowhole* by spouting out water and then inhaling into their lungs. Dolphins are in the group of whales that have teeth. They hunt fish in groups to corral the fish in a tight area, so they are easier to catch. Dolphins have even been known to work with humans in catching fish. In Laguna, Santa Catarina, Brazil dolphins chase fish toward fishermen and signal when to cast the fishing nets. The dolphins then catch the fish that manage to get out of the nets.

Dolphins have a sense of taste and like certain fish. Dolphins have very good eyesight, hearing, and touch, but no sense of smell. They emit sounds into their environment and listen to the echoes that come back from objects around them. This process is called **ecolocation**.

The dolphin's teeth act like antennae conducting the sound waves into a cavity in the jaw bone that leads to their middle ear. Dolphins also make whistling noises to communicate. Their noises can travel miles and are among the loudest sounds made by ocean animals.

1. How are the following words used in the text? Write the definition next to each.

marine: From or found in the sea.

pod: A group of dolphins.

ecolocation: Locating objects by reflecting sound.

What land- and sea-dwelling creature did dolphins evolve from? Indohyus

2. True or False? Circle the correct answer:

Dolphins are very playful. (True) False

Dolphins have a great sense of smell. True (False)

Crab

Can you walk **crabwise**? This is a term that means "sideways" or "in the manner of a crab." It was created after watching crabs walk sideways, which is easier for their legs than walking forward or backward. Most crabs walk crabwise, although some walk forward or backward, and only some can swim. Crabs also have pinchers on their front two legs that they use for communication by drumming or waving them in the air. They also use them for protection and the males use them to fight with each other. Fiddler crabs use them to dig burrows in the sand or mud to hide in or rest in. Hermit crabs, king crabs, porcelain crabs, and horseshoe crabs are not "true crabs."

Crabs are a type of **crustacean**. These kinds of animals have three body parts, the head, thorax (chest), and abdomen (belly). Crustaceans also have a thick shell, which is actually an exoskeleton or a skeleton that is on the outer part of the body instead of the inside like humans. This outer shell has to be regrown in larger sizes as the crustacean grows. The old shell is shed and left behind. This process is called molting. Most crabs like water and crabs can be found in all of the world's oceans as well as in fresh water on land. Some crabs are terrestrial or land animals and don't need to stay by the water. Most of the freshwater crabs are found in tropical or semi-tropical climates. The largest crabs are the Japanese spider crabs. Their leg span can be up to 13 feet across! The smallest pea crabs are only a few millimeters wide.

Crabs are **omnivores**, meaning they will eat both plants and meat. Their main diet is algae, but they also like mollusks, worms, other crustaceans, fungi, and bacteria. Some also eat plankton and even fish. People like to eat crabs and they are farmed and caught in the oceans worldwide. The most eaten parts of crabs are the legs and claws, but the rest of the crab meat is also eaten. The soft-shell crab can be eaten whole, shell and all! Crabs are used in popular culture as well. The term "crabby" means grumpy or mean. The constellation of Cancer and the astrological sign for Cancer are named after the crab.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

crabwise "in the manner of a crab" or sideways

crustacean a type of animal with three body parts and a shell that molts

omnivore an animal that will eat both plants and meat

2. What are the pinchers on crabs front legs used for? communication, protection, fighting, and for some crabs digging

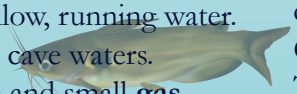
3. All crabs can swim. **True or False?**

4. The Japanese spider crab is the largest species of crab and can have a leg span up to 13 feet across.

True or False?

Catfish

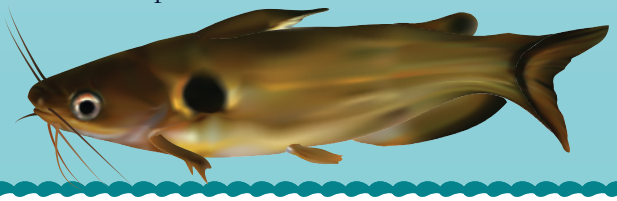
Catfish are unique looking fish in that they seem to have whiskers coming off their faces. The "whiskers" on catfish that give them their name are actually called barbels. They can have up to four total pairs of barbels: one on either side of their nose, one on each side of their mouth, and two pairs on their chins. Not all fish in the catfish family have them, however. Some have armor plates on their bodies, but none have scales. Catfish are farmed for food and also kept as pets. Catfish live around every continent except Antarctica. They swim in inland water as well as coastal areas of the oceans. Inland they prefer shallow, running water. Some even live in underground or cave waters.



Catfish have heavy, bony heads and small **gas bladders**, or swim bladders, which are the air-filled organ that lets fish control their buoyancy. **Buoyancy** is the way something sinks or floats. This organ allows fish to stay in one place under water without using too much swimming energy. Because of their heavy heads and small swim bladders, catfish are usually bottom feeders. To help with digging on the waters floor, catfish also have flattened heads. They eat by sucking in their food rather than biting. Instead of taste buds only in their mouths, catfish have **chemoreceptors**, or specialized nerve cells that detect chemicals, on their whole body! This lets them taste and smell everything they touch. Some even breathe through their skin. Catfish also use their barbels to feel out food.

All catfish except electric catfish have spine-like bones on their dorsal (back) and pectoral (side) fins. Some can sting with a protein-based venom and lock these bones into place sticking outwards for protection. The venom is strong enough to put a human in the hospital and in one species it can kill a human if stung. While there are a few reports of some aggressive species of catfish, there are no actual documented deaths from catfish stings, and most are not venomous. Catfish can be from 1 centimeter long to 8½ feet long. The largest caught catfish was a giant Mekong catfish caught in Thailand on May 1, 2005. It weighed 650 pounds.

Catfish are farmed for food in Africa, Asia, Europe, and North America, and have been caught and eaten for hundreds of years. They are a white fish and high in vitamin D as well as omega-3 and omega-6 fatty acids, nutrients important to brain and skin health.



1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

gas bladder swim bladder, or the organ that helps fish control buoyancy

buoyancy the way something sinks or floats

chemoreceptors specialized nerve cells that detect chemicals

2. What are two parts of the catfish's body that help it stay on the water floor? gas bladder and a heavy, bony head

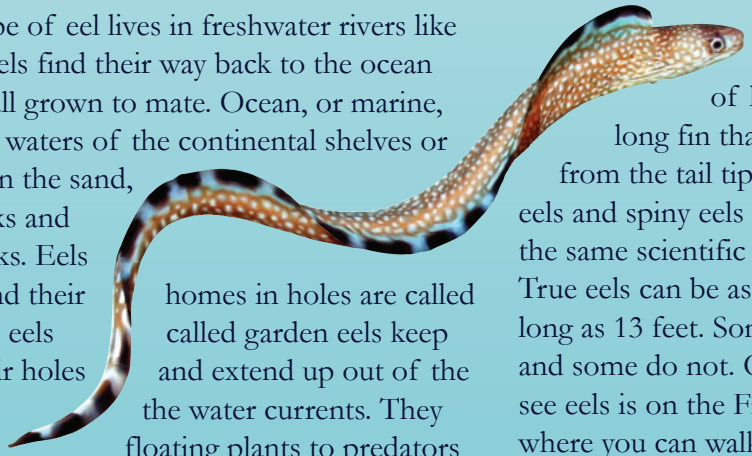
3. All catfish have barbels, or "whiskers." **True or (False?)**

4. Catfish have huge tastebuds on their tongues. **True or (False?)**

Eel

Baby eels are flat, transparent larvae that float in the ocean and eat **marine snow**, or tiny particles that also float in the water. Eels then go through metamorphosis, or change, into glass eels, then into elvers, and finally adult eels. The term elvers may have come from the springtime "eelfare," which was a term for the travel elvers took by swimming upstream in the River Thames in England. Elvers will climb up dams and waterfalls to swim upstream. Gertrude Elizabeth Blood, who worked at the fishery in Ballisodare, Ireland, started the custom of helping elvers climb up waterfalls and barriers by supplying grass ladders.

Only one type of eel lives in freshwater rivers like this. The river eels find their way back to the ocean once they are full grown to mate. Ocean, or marine, eels live in deep waters of the continental shelves or shallow waters in the sand, mud, or in cracks and caves in the rocks. Eels are nocturnal and their homes in holes are called "eel pits." Some eels called garden eels keep their tails in their holes and extend up out of the holes to float in the water currents. They look like floating plants to predators and possible prey that swims by.



Eels have been eaten by humans in many cultures. They are now considered a **delicacy**, a rare and special food, and can be very expensive. Some eel farms are not farming the eels responsibly. Greenpeace International, an organization that works for endangered animals, has added eels to the "red list" of fish. The red list helps fish consumers know which fish might become extinct if we eat too much of it. Eels cannot be eaten raw, as cooking helps destroys the toxic protein in their blood. Charles Richet won a Nobel Prize for discovering **anaphylaxis**, a very strong allergic reaction that can cause death, in his research using the toxic protein in eel blood on dogs.

Eels are long fish that look kind of like a snake. They have only one long fin that runs along the top of their bodies from the tail tip to the back of their heads. Electric eels and spiny eels look like eels but are not actually in the same scientific order Anguilliformes as true eels. True eels can be as small as 2 inches in length and as long as 13 feet. Some have spots all over their bodies and some do not. One of the most famous places to see eels is on the French Polynesian island of Huahine, where you can walk across a bridge over a stream with three- to six-foot-long eels swimming in it.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

marine snow tiny particles that float in the ocean

delicacy a rare and special food

anaphylaxis a very strong allergic reaction that can cause death

2. What is the term for the devices used to help elvers climb? grass ladder

3. Garden eels live in gardens on land. **True or (False?)**

4. What scientist won a Nobel Prize for discovering anaphylaxis allergic reactions from eel blood toxins?

Charles Richet

Lobster

Lobsters are a type of crustacean. They have a hard exoskeleton, a skeleton that is on the outside of a creature's body instead of inside like a human, that covers their whole body in sections. Lobsters are also **invertebrates**, which means they have no vertebral column, or spine. Lobsters shed, or moult, their old exoskeleton as they get bigger and grow a new one. Lobsters have 10 legs. They are well known for their large claws on the front pair of legs, but actually have smaller claws on the next two sets behind the front as well.

Lobsters are **bilaterally symmetrical**, which means if you split them down the middle, each side would be a mirror image of the other. The antennae on their heads help lobsters feel their way around the murky bottom of the ocean. They can also smell their prey with sensing hairs on the front of their heads. Lobsters live in every ocean of the world. Lobsters are omnivores (meaning they will eat any kind of food) and bottom feeders. They eat mainly fish, molluscs, other crustaceans, worms, and some plants.

Lobsters usually walk slowly on the ocean floor, but if they are startled they can swim backwards by curling and uncurling their muscular tails and abdomens. The top speed recorded for a lobster swimming is 11 miles per hour! To catch lobsters, people use traps that only open one way.

Lobster was once used only as low-quality food for poor people and servants, or as fertilizer. People now pay high prices for a meal of lobster tail and claws.

Lobsters have an enzyme called **telomerase** that repairs their DNA. Biologists say it keeps lobsters from weakening with age. If they do not get sick, eaten, or injured, lobsters might be able to just keep living! They can even regrow legs if they lose them. Lobsters keep growing the longer they are alive.

Guinness World Records states that the largest caught lobster was 44.4 pounds and was thought to be 50 years old. As recent as 2012, researchers found a way to measure lobsters' age by counting rings on the lobster's eyestalks and a stomach part. They are also studying telomerase in lobsters for anti-aging and cancer treatments, as this enzyme not only decreases in most animals, but can become cancerous if activated beyond its normal life span.

Professor Jelle Atema of Boston University has a 15-pound lobster in captivity that he is studying to see just how long it will live. Who knows how long it can live and how big it will get?

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

invertebrate an animal with no spine or vertebral column

bilaterally symmetrical both sides are the same, but mirrors of each other

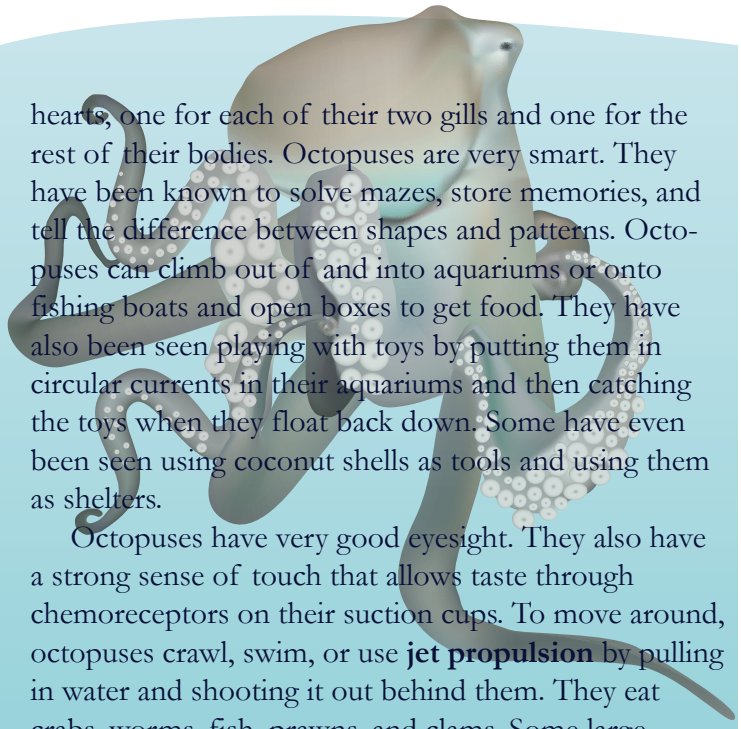
telomerase an enzyme in lobsters repairs their DNA

2. How big is the largest recorded lobster? How old was it? 44.4 pounds and 50 years old

3. Lobsters get weak as they get older. **True or (False?)**

4. Lobsters cannot swim. **True or (False?)**

Octopus



Octopuses, or octopi, have eight arms with suction cups on them. They have no skeleton or outer shells, so they can fit through very narrow openings to escape predators. The only hard part of their bodies is their beak.

Octopuses can squirt out an inky substance that blocks the predator's sense of smell and may make it attack the ink instead of the octopus. Octopuses can also hide through camouflage, swim very quickly, and perform **deimatic behavior**. This means they act in sudden or threatening ways to startle or scare off predators. One example is O. macropus, which turns bright brownish red with white spots in order to look threatening. Some other octopuses spread their arms out wide and get dark rings around their eyes while making their skin pale. These changes are a surprise to the predators, and can either scare them away or give the octopus time to get away. All octopuses are also venomous, though not harmful enough to hurt humans. Some octopuses can also take off an arm, called **arm autotomy**, just like some lizards will do with their tails. The nerves in their arms can jump around without a brain, which distracts the predator.

Octopuses have very short life spans. Some only live six months, some up to five years. They have three hearts, one for each of their two gills and one for the rest of their bodies. Octopuses are very smart. They have been known to solve mazes, store memories, and tell the difference between shapes and patterns. Octopuses can climb out of and into aquariums or onto fishing boats and open boxes to get food. They have also been seen playing with toys by putting them in circular currents in their aquariums and then catching the toys when they float back down. Some have even been seen using coconut shells as tools and using them as shelters.

Octopuses have very good eyesight. They also have a strong sense of touch that allows taste through chemoreceptors on their suction cups. To move around, octopuses crawl, swim, or use **jet propulsion** by pulling in water and shooting it out behind them. They eat crabs, worms, fish, prawns, and clams. Some large octopuses even catch and eat sharks. The largest known octopus was a giant Pacific octopus that weighed 156.5 pounds. There are some records not widely accepted of another species of octopus that weighed 600 pounds.

People eat octopus. It is used often in Hawaii and in Mediterranean and Portuguese dishes. Some people keep them as pets, but they are able to escape tanks and don't live very long.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

deimatic behavior acting in sudden or threatening ways to scare off predators

arm autotomy taking off a limb that can still move as a form of defense

jet propulsion propelling something behind you to move you forward

2. Name three things octopuses do for protection. they squirt ink, hide through camouflage or through small openings, swim quickly, and perform deimatic behavior

3. Octopuses live to be about 100 years old. **True or (False)?**

4. Octopuses can taste through their suction cups. **(True) or False?**

Piranha

Piranhas are mostly freshwater fish that live in rivers, lakes, and some coastal areas of the Amazon Basin in South America. Some have been seen in the United States in the Potomac River and the Lake of the Ozarks in Missouri, and one was caught near Staten Island in New York City. Piranhas have also been seen in Kaptai Lake in Bangladesh and Lijiang River in China. How these piranhas got so far from their native Amazon rivers is still being questioned.

Piranhas are usually 5½ to 10¼ inches long, but have been seen as large as 17 inches. They are best known for their sharp, triangular teeth. People used to think they grouped in schools to hunt and were **vicious** predators. After observation, scientists have found piranhas swim in schools more for protection from predators such as dolphins just like any other fish.

Piranhas are omnivores, which means they eat both plants and meat. Only some species such as the red-bellied piranha are strictly **carnivores**, or meat eaters. Piranhas, like sharks, get more aggressive when blood is in the water. They have been known to attack humans and a school of them can eat a whole cow. President Theodore Roosevelt made a trip to Brazil in 1913 and wrote in his book "Through the Brazilian Wilderness" about seeing a cow pushed into a group of starved piranhas. He spoke of seeing the piranhas fished up on deck and how they squealed and continued to try to bite anything they could. Roosevelt described them as "a short, deep-bodied fish, with a blunt face and a…projecting lower jaw which gapes widely. The razor-edged teeth are wedge-shaped like a shark's, and the jaw muscles possess great power. … Furious snaps drive the teeth through flesh and bone."

It is no wonder biologists and experts warn people to be careful in any rivers, lakes, or coastal areas where piranhas may live. Still, many people **indigenous** to South America have used piranha teeth to make tools and weapons. Fishermen catch piranhas and sell them for food, but are also bothered by them stealing bait, harming other fish they are trying to catch, and damaging and fishing gear, such as nets. Fishing for piranhas or around where they live is not for the faint of heart!

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

vicious cruel, wild, dangerous

carnivores animals that eat meat

indigenous native to that area, originally from that area

2. Where are piranhas indigenous? the Amazon basin in South America

3. Which U.S. president wrote about piranhas in a book? Theodore Roosevelt

4. It is safe to swim with piranhas. **True or (False?)**

Seal

The true scientific name for seal is "**pinniped**," which is Latin for "fin-footed mammals." Seals have sleek, barrel-shaped bodies that help them slip along ice or smooth rocks and swim quickly. They spend time both on the land and in the sea, but stay very close to the water's edge while on land.

Seals without external ears are called true seals, or phocids. They prefer the water and cannot move very well on land. Phocids have more tail-like back flippers and more streamlined snouts, which help them swim in waving body motions. They also use their tails to communicate by slapping the water with their back flippers.

Eared seals (also called walking seals or otariids) have back flippers that can turn upside down and are shaped more like feet. They can get around better on land than earless seals, but are still faster in the water than they are walking. They swim with their front fllippers. Sea lions and fur seals are two species of eared seals. They have snouts more like dogs and communicate in vocal "barks." The California sea lion is usually the species used in circus tricks.

Pinnipeds live in both warm and cold climates near and in the ocean. In cold climates, a thick layer of blubber, or fat, under their skin helps keep them warm. The more fat an animal has, the easier it is for it to float, so the blubber helps seals surface after diving in the water. Some seals also have fur to keep warm. When blood moves toward the outer part of an animal's body, it lets heat off. Seals in cold climates have **circulatory systems** (the part of animals that blood flows through) that keep their blood more internal to avoid heat loss. Seals that live in warm climates do the opposite. They wave their flippers and go in the cooler water, which also helps bring their blood to the surface to release extra heat in their bodies.

Seals also have **adaptations**, specialized ways to live in their environment, that help them see well both on land and underwater. A clear membrane covers and protects their eyes while open underwater. Their nostrils also close on their own and they can hold their breath for almost two hours while diving underwater. Seals' blood flow only goes to their sense organs and nervous system while they are underwater. This lets them feel less pain and fatigue than other animals while swimming. Once they resurface, seals need time to normalize their body functions. Seals hunt underwater for fish, shellfish, squid, penguins, and other small marine creatures. Orcas and sharks hunt seals as do polar bears in the arctic.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

pinniped the scientific term for seal

circulatory system the part of an animal that blood flows through

adaptations specialized ways something works to live in an environment

2. How do phocids communicate? What about otariids? phocids slap the water with their back flippers, otariids use vocal "barks"

3. Seals can run very fast. **True or (False?)**

4. Seals have a membrane that covers their eyes when underwater. **(True) or False?**

Sea Turtle

Sea turtles are a group of turtles that are adapted to living in the ocean. They live in every ocean except the Arctic Ocean. There are only seven living species of sea turtles and all of them are endangered species. The seven species are: flatback sea turtles, green sea turtles, hawksbill sea turtles, Kemp's ridley sea turtles, leatherback sea turtles, loggerhead sea turtles, and olive ridley sea turtles. The leatherback sea turtles are the only species that has bony plates under its leathery skin instead of a shell. Leatherback sea turtles are the largest and can be six to seven feet long, three to five feet wide, and up to 1,300 pounds. Other species of sea turtles are only two to four feet in length.

Sea turtle shells and necks are often homes for barnacles. The sea turtle is always swimming, which provides a constant flow of water and food source for the barnacles. Turtles also live very long lives, 80 years is the average life expectancy, and some leatherbacks live to be 100. Barnacles usually only live five to ten years, so they can be sure their sea turtle **host** will be there.

Female sea turtles lay their eggs in holes they dig in the sand at night. They do not stay with their eggs, and the babies have to find their way back to the ocean when they hatch. The gender of sea turtles depends on the temperature of the sand where they **incubate**. Warmer sand causes faster incubation times, causing more females to hatch. Male sea turtles do not return to the land once they have gone back into the ocean.

Sea turtles spend most of their time underwater. They breathe air, but can use anaerobic metabolism if they need to stay underwater longer. Sea turtles can take one huge, fast breath to fill their lungs. When they need to come up for air, they can do so quickly and stay away from danger.

Sea turtles eat both animals and plants. They are important to the sea environment because some eat jellyfish and help control the jellyfish population. Green sea turtles also are some of the only animals to eat sea grass, which needs to constantly be cut to help it grow. Many other sea creatures depend on the sea grass as a place to live. If sea turtles went extinct, they would not be the only creatures affected.

Fisherman's nets are one of the biggest threats to sea turtles. Some shrimp nets now include **TEDs** or "Turtle Excluder Devices." These are metal bars that keep larger animals from being able to go into the back of the nets. There are then holes for the turtles to escape to the front of the net. It is one way humans are working to save the sea turtles from extinction.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

host a living animal that is home to parasites or other animals

incubate the way eggs mature and grow

TEDs "Turtle Excluding Devices" or metal bars that keep larger animals from getting caught in fishing trawls

2. How big can leatherback sea turtles get? six to seven feet long, three to five feet wide, and up to 1,300 pounds

3. Sea turtles lay their eggs in sea grass. **True or (False)?**

4. All sea turtles are endangered. **(True) or False?**

Shrimp

Not all scientists agree on which species are included in the term "shrimp." The wider definition covers the same as "prawns." These are defined as stalk-eyed swimming crustaceans with long muscular tails, long whiskers (antennae), and thin legs. Shrimp have short legs called **swimmerets** that they use to paddle while swimming. Their longer legs are not strong enough for walking and are mainly for perching when they are not swimming. Shrimp, like crabs and lobsters, have a **cephalothorax**, which means their heads and thorax are fused together. Their abdomens and tails are very strong. Shrimp can swim backwards fast by "lobstering" or quickly flexing and unflexing their tail up toward their bellies. Shrimp have eye stalks that can see very far to either side. They have two pairs of antennae, one pair being twice as long as their bodies. The long antennae can feel as well as smell and taste because they have chemoreceptors that can detect chemicals in the water. The short antennae are mainly for testing food. Shrimp have a segmented shell that is often transparent, or see-through.

Shrimp can be found feeding on the seafloor and in rivers and lakes almost everywhere. Some species can do a flip and dive into the sand to escape predators. Shrimp are eaten by many larger animals and are thus important to the food chain. People eat the muscular tails of shrimp as well. Larger shrimp over 9 inches are usually called prawns. The nets used to catch shrimp have recently been equipped with TEDs, or "Turtle Excluding Devices." These metal bars keep larger animals like sea turtles from getting swept into the back of the nets where they get trapped and often die as they cannot come up for air. The TEDs also have larger holes toward the front of the trawling nets so the turtles can escape. Shrimp trawling has made catching shrimp in large quantities much easier. The nets are hooked to large boats that pull them along under the water. Many wild shrimp are endangered such as the giant tiger prawn.

Shrimp is also farmed. The giant tiger prawn used to be the most farmed species, but now the whiteleg shrimp is. The main producer of farmed shrimp is China, followed by Thailand and the Philippines. Greenpeace is challenging some shrimp farms as they took over and destroyed mangroves and over-fish young shrimp in the ocean to replenish farmed fish populations.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

swimmerets small legs shrimp use for swimming

cephalothorax a fused head and thorax

lobstering the way a shrimp or lobster swims byquickly flexing and un-flexing their tails

2. Why are shrimp important to the food chain? shrimp are a food source for many other larger animals

3. Shrimp are only found in the ocean. **True or (False?)**

4. The United States is the main producer of farmed shrimp. **True or (False?)**

Starfish

Starfish are also called sea stars. Most have only five arms and are in the shape of a five-pointed star, but some species have more than five arms. If they lose an arm, they can **regenerate**, or regrow it. Starfish are **radially symmetrical**, meaning all their arms are the same size and shape. They have skeletons that extend into their arms but are invertebrates, meaning they have no spines. Their tops can be smooth, granular, or spiny and are covered with overlapping plates. Starfish can be red, orange, blue, gray, or brown. Depending on the species, starfish can live from 10 to 34 years. Starfish can change gender to help in breeding. Starfish grow from eggs and some species brood, or hold their eggs in a pouch. Some species can be both the mother and the father.

Starfish are found in every ocean around the world. Starfish cannot regulate the salt content in their bodies. This function is known as **osmoregulation**. This is why they are only found in salt water environments. They can live in water as deep as 20,000 feet. Starfish move around very slowly on short, tube-like feet. They do this by a water vascular system, which pulls water into it to expand the starfish's "feet" so they can touch the surface. The feet, or podium, then use an adhesive chemical to stick to the surface. The water is then squeezed out of the podium as it contracts, using other chemicals to release the adhesive and let go of the surface. This happens in a wave-like motion with several feet releasing and others attaching at the same time to move the starfish forward slowly. In fact, the fastest starfish can only travel nine feet and two inches per minute. Starfish also breathe and get rid of wastes through this flow of water through their podium feet. Some intake of oxygen and excretion of waste also happens through the papulae, or skin gills, on the starfish's surface. Starfish's mouths are on the underside of them and they eat benthic (bottom of the water) invertebrates as they move over them.

Starfish are a keystone species. The starfish is the only natural predator of some kinds of sea urchins, mussels, and shellfish. In turn, the relatively small population of starfish keeps its prey from overpopulating. Too many mussels would drive out other species from the sea floor, and too many urchins would eat up the coral reefs faster than they can grow. Starfish thus act like a keystone in an arch. The keystone itself does not hold much weight, but without it, the arch would collapse.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

regenerate to regrow

radially symmetrical the same all the way around

osmoregulation regulating salt concentration in an animal

2. Starfish help the environment by eating urchins and mussels that would otherwise overpopulate and upset the balance of the ocean ecosystem. What is the term for a species like this? keystone species

3. All starfish have five arms. **True or (False?)**

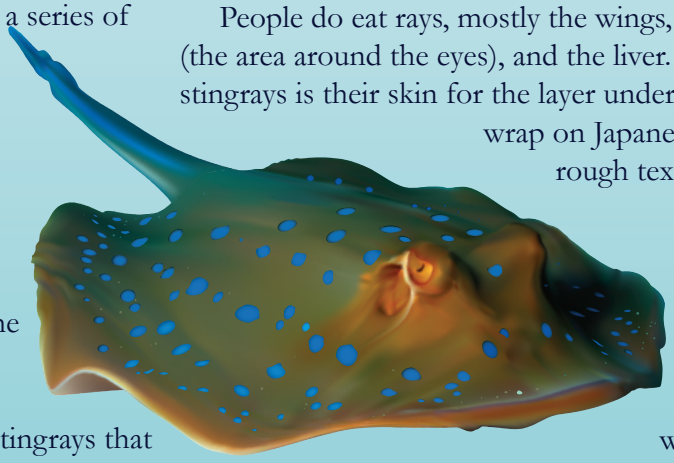
4. Starfish can't move once they are stuck to something. **True or (False?)**

Stingray

Did you know stingrays are related to sharks? Stingrays are a group of ray fish that are **cartilaginous**, just like sharks. This means they have skeletons made of cartilage instead of bones. They also have jaws, paired fins, paired nostrils, and a heart with a series of chambers. Stingrays get their name from the barbed stingers on their tails that they use for self-defense. Only a few members of the ray family don't have stingers. They are manta rays and, surprisingly, porcupine rays.

Stingrays live in tropical and subtropical water near the coast all over the world. Some can live in deeper parts of the ocean if it is warm enough. There are also stingrays that live in freshwater rivers like the Niger and stingrays that live in Nigeria and Cameroon. Because of their flat bodies, stingrays can **agitate** (move back and forth) the sand until they are covered by it to hide. With eyes that poke up above their body, they can peek up to see if the coast, quite literally, is clear. The only problem with eyes on the top of their bodies is that their mouth is on the bottom, so they cannot see what they are trying to eat!

Stingrays have a strong **olfactory perception**, or sense of smell, like sharks. They smell for their prey of mollusks, crustaceans, and small fish. Once they have a bite, it is back into the sand with only tail and eyes peeking out to make sure no predator is looking to in turn eat them!



People do eat rays, mostly the wings, or flaps, cheeks (the area around the eyes), and the liver. Another use of stingrays is their skin for the layer under the leather wrap on Japanese swords. The rough texture of the ray's skin keeps the leather from sliding on the handle of the sword. Stingrays won't usually attack people and many people like to swim with the curious creatures. If you are swimming in coastal waters where rays live, it is a good idea to watch where you step or to use something to scare them away before you walk on the ocean floor. A stepped-on ray will use its stinger to say, "Excuse me, but please get off!" The venom is not deadly, but hurts more than getting stepped on!

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

cartilaginous an animal with a skeleton made of cartilage instead of bones

agitate to shake or disturb

olfactory perception sense of smell

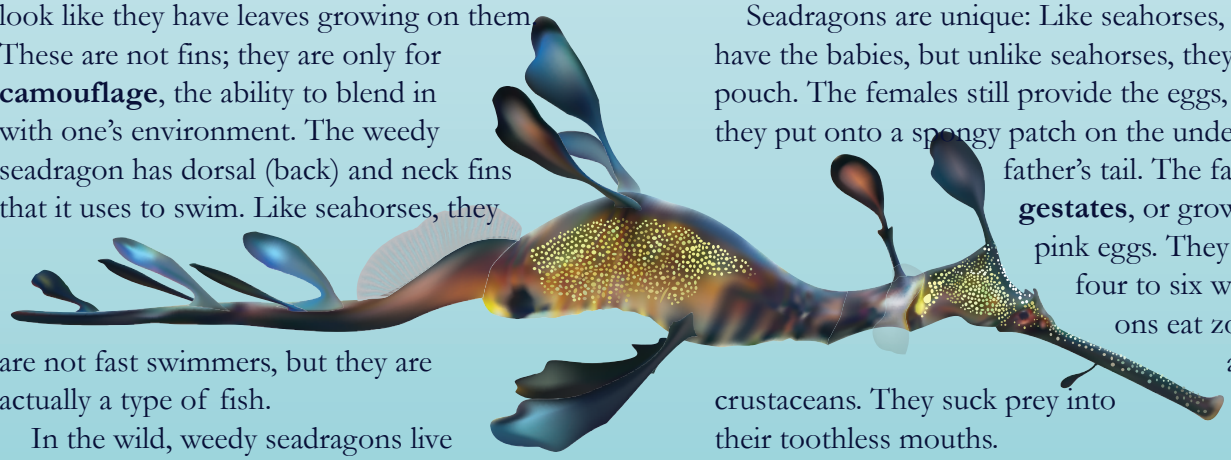
2. Where do stingrays live? in coastal tropical or subtropical water all over the world

3. Stingrays are related to sharks. **True or False?**

4. Stingray's mouths are on top of their bodies. **True or False?**

Weedy Seadragon

In the genus Phyllopteryx all by itself, the weedy seadragons is a close relative to the seahorse. They are also closely related to leafy seadragons. Both species look like they have leaves growing on them. These are not fins; they are only for **camouflage**, the ability to blend in with one's environment. The weedy seadragon has dorsal (back) and neck fins that it uses to swim. Like seahorses, they are not fast swimmers, but they are actually a type of fish.



In the wild, weedy seadragons live exclusively around Australia in the Indian Ocean. Because of this, it is the marine emblem of the State of Victoria in Australia. When they are full grown, weedy seadragons are a rusty red color with yellow and purple markings. Like their cousin, the seahorse, weedy and leafy seadragons have long, thin snouts that make their heads look like a horse. Their bodies are made up of bony rings and they have thin tails. Unlike seahorses, weedy seadragons don't have **prehensile** tails that can grip things. Instead, they drift and go with the flow of the sea current, looking like a lose piece of seaweed. Leafy seadragons can be up to 14 inches long, while weedy seadragons can be up to 18 inches long.

Seadragons are unique: Like seahorses, the males have the babies, but unlike seahorses, they have no pouch. The females still provide the eggs, which they put onto a spongy patch on the underside of the father's tail. The father then **gestates**, or grows, the bright pink eggs. They hatch after four to six weeks. Seadragons eat zooplankton and tiny crustaceans. They suck prey into their toothless mouths.

Seadragons are classified as "near threatened" on the International Union for Conservation of Nature's red list. They were taken for pets too often and are now under the Australian government's protection as well. It is difficult to breed weedy seadragons in captivity, but many aquariums are trying. The Aquarium of the Pacific in Long Beach, California, the Tennessee Aquarium in Chattanooga, Tennessee, and the Melbourne Aquarium in Melbourne, Australia, are a few that have been successful.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

camouflage the ability to blend in with one's environment

prehensile can grip things

gestate to grow babies in a womb

2. What do seadragons use their leafy looking appendages for? camouflage

3. The male seadragons, like seahorses, gestate the babies. **True** or **False?**

4. Seadragons are like mythical dragons: They have big, sharp teeth. **True** or **False?**

Whale

One strange fact about whales is that they are the closest living relatives of hippopotamus. Both animals are now in the super-order Cetartiodactyla. Scientists use DNA and physical characteristics to figure out **ancestory**, or past family relatives, of animals alive today.

In scientific classifications, whales and dolphins are both in the order cetacea. Cetaceans evolved from a land- and water-loving, deer-like animal called the Indohyus, which lived 54 million years ago. Cetaceans stayed in the oceans 49 to 44 million years ago and became adapted to living in marine environments. They became more streamlined to glide through the water, their nose holes moved to the top of their heads, they lost their back legs, their front legs became flippers, and they grew flukes on their tails.

There are two different kinds of whales, those with teeth, and those that filter plankton through a part in their upper jaw called **baleen**. It is made of keratin, like our fingernails. Dolphins, porpoises, sperm whale, killer whale, pilot whale, and beluga whales are all toothed whales in the suborder odontoceti. The term "whale" usually refers to cetacean animals with baleen feeding filters.

The largest whales are the blue whales, which grow up to 98 feet in length and 180 tonnes (roughly 396,832 pounds) in weight. They are the largest animal known to ever have existed, even larger than dinosaurs! The largest known dinosaur was only 23 to 37 tonnes.

Whales are mammals, so they breathe air, are warm-blooded, nurse their young, and have body hair. They have a layer of fat under their skin called blubber that helps keep them warm in the cold ocean water.

They breathe through their blowholes by shooting air out of the blowholes and then inhaling into their lungs. Most dives underwater are only five to eight minutes long, but the blue whale can hold its breathe for up to 40 minutes, and deep divers like bottlenose dolphins and sperm whales can stay under for 90 to 120 minutes. Whales are **conscious breathers**, meaning they have to think about breathing, so they don't ever sleep. If they did, they would drown. Whales talk to each other in what we call whale song. Some captive whales have even tried to mimic human speech.

Whales are estimated to live up to 77 years old, but one whale was found with a fragment of a harpoon from the 19th century in it which might make it 115 to 130 years old. Some dating techniques say another was 211 years old, but the science of the technique is not widely accepted. What do you think?

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

ancestory past family relatives

baleen the keratin part of a whale's jaw that filters food

conscious breather an animal that controls its breath by thinking about it

2. What present-day animal is the whale related to? the hippopotamus

3. Blue whales are bigger than any dinosaur was. **(True) or False?**

4. Whale breathe through their blowholes. **(True) or False?**

Jellyfish

What "blooms" but is not a flower, is an animal but has no brains, and has tentacles that Medusa's hair was named after? A jellyfish! Jellyfish larva join together, land on the ocean floor, boat hulls, or sometimes even on floating plankton or fish and latch on with tiny "fingers" called cilia. They turn into a polyp, or a plant-like stalk with a mouth at the top. Polyps look much like anemones which are their cousins. It can take years for the polyp to split and turn into free-floating jellyfish. Each new top layer of the polyp that splits off is said to be budding. The next stage is called the medusa stage, where the jellyfish continues to grow tentacles. It is no wonder Greek mythology used this term to describe the long snake hair coming off the mythical Medusa as the tentacles can move around to grab prey and sting. Jellyfish don't "bloom" at this stage necessarily. A large group of jellyfish swimming together in a small area is called a "**bloom**." It sometimes also depends on how quickly they gather together and if it is a bigger group than scientists expected to see in that area.

As for the lack of brains, jellyfish truly don't have one! They instead have a complex **nerve net**, a group of nerves that functions without the central unit of a brain to guide it. The nerve net is located in their skin and transmits impulse signals through a circular nerve ring that runs along the rim of the jellyfish's bell body. Jellyfish are not "mindless" however. They can detect the tide's movement and use it to move around while they pull in water and squirt it out behind them. Jellyfish can also detect if the water has the correct amount of salt in it for them to live, and will seek out water with the right concentration. Some jellyfish live in fresh water, but for those that don't, the **saline**, or salt-to-water concentration, is important to their survival.

Jellyfish are not actually fish. Many aquariums simply call them "jellies." They are_ made of 95 percent water! They do have mouths for feeding but only some have an organ that is like eyes. Jellyfish eyes can't see images; they only record light. This helps these jellyfish know up from down by detecting the sun shining on the water's surface. Box jellyfish are unique in that they have 24 eyes that can actually see things all the way around their bodies. Box jellyfish have four brains. Box jellyfish are, however, not "true jellyfish" and are classified as relatives to the brainless type. Jellyfish have been around for at least 500 million years! This makes them the oldest living multi-organ animal. How did they survive so long without a brain? Whatever the reasons, they are truly fascinating creatures.

1. **New terms:** See how these three terms are used in the text, and write a definition next to each one.

jellyfish bloom a large group of jellyfish swimming in a small area

nerve net a group of nerves that functions without the central unit of a brain

saline salt-to-water concentration

2. What part of the jellyfish was the Greek mythical creature Medusa named for? the tentacles

3. All jellyfish have four brains. **True or (False?)**

4. Jellyfish have great eyesight. **True or (False?)**