

It Takes All Kinds to Make a World

by American Museum of Natural History

This text is provided courtesy of OLogy, the American Museum of Natural History's website for kids.

To introduce you to the biodiversity in the ocean and to get you started on your investigations, I've picked just a few examples of marine life to show you at least one from each of the major groups that scientists use to classify life on Earth: true bacteria, archaea, protists, animals, plants and fungi.

Want to learn more about this amazing watery world? Dive in and start exploring!



Image credits: courtesy of AMNH, Denis Finnin; Melanie Stiassny: courtesy of AMNH, Denis Finnin; Melanie Stiassny: courtesy of AMNH, Denis Finnin.

Melanie Stiassny has been fascinated by fish from the time she was a little girl living in London. Today, Melanie is an ichthyologist, a scientist who studies fish. At the American Museum of Natural History, she oversees everything that has to do with fish, from research and exhibits to scientific expeditions. Melanie travels to tropical areas around the world to collect and study fish.



Image credits: courtesy of NASA; Rosamond Kinzler: AMNH.

The Earth is our home. So far, it's the only place that we know of that has life. Everywhere you look on Earth there is life. This is possible because Earth has lots of water. It's also just the right distance from the Sun. Some people call Earth the "Goldilocks planet." It's not too hot (like Venus), and not too cold (like Mars), it's just right!



Image credits: AMNH, spectrum of life in Hall of Biodiversity; Eleanor Sterling: courtesy of AMNH.

Scientists have identified over 1.75 million species on Earth -- over one million of them are insects and spiders. There are many more yet to be identified! All living things are dependent upon one another for survival. This variety of life on Earth -- and its interdependence -- is called biodiversity.

Diversity of Life on Earth

True Bacteria: 10,000 known species, but there may be as many as 4 million!

Archaea: Unknown number of species. These bacteria-like organisms were once thought to be rare. They are now estimated to be 50% of the species found in the open ocean - both the largest part of the ocean and the area that is still mostly unexplored.

Protists: At least 60,000 known species. Though not a "true" group, these organisms are found in all habitats on Earth. Protists are the reason the ocean looks green near the shore.

Fungi: Of the estimated 1,500,000 species of fungi, scientists have described just 60,000. Only 500 species live in the oceans, where they prefer coastal environments.

Animals: About 1,000,000 described species. Animals are unique life forms because they have nervous systems (except for sponges), which enable them to feel and touch.

Plants: Over 250,000 described species. There are three kinds of plants: red, green, and brown. These three groups, although all plants, are not closely related. Green plants are common on land, and mostly red and brown plants live in the oceans.



Image credits: Laura Friedman.

Animals and plants are usually adapted to survive best in particular environments, known as their habitats. For example, an Amazon river fish couldn't survive in the freezing waters of the Arctic Ocean. A habitat is a place where an animal or plant lives and grows. Over time, animals and plants develop features to help them meet the challenges of their environments.



It All Began in the Oceans

Hello. My name is Mark Siddall and I'm an Invertebrate Zoologist - I study animals without backbones.



Image credits: courtesy of AMNH, Mark Siddall; Mark Siddall: courtesy of AMNH.

It's no wonder that most people aren't crazy about leeches. These dark, slimy worms survive by sucking blood from other animals, or "hosts" -- including humans. But Dr. Mark Siddall thinks leeches are the most beautiful creatures on the planet. He studies how leeches live, move from host to host, how they affect biodiversity -- the variety of Earth's life -- and he works to protect them from extinction.

Did you know that most animals (more than 99%!) are invertebrates? And that many of these live in the oceans? The other 1% of animals is called vertebrates, animals with backbones, like you and me. Most vertebrates live in water as well. In fact, much of life lives in the oceans!



Image credits: scorpion, courtesy of California Academy of Sciences, Arie van der Meijden, garden slug, courtesy of California Academy of Sciences, William Leonard, jellyfish, courtesy of NOAA, Kip Evans.

Some people may call invertebrates spineless because they lack a backbone or spine! But these amazing creatures are the most abundant animals on Earth. Some invertebrates, like squid and leeches, have soft bodies, while others, like crabs, have a hard outer shell called an exoskeleton. Invertebrates are found in every ecosystem. Some, such as sponges, jellyfish, starfish, and crabs, live in the ocean.

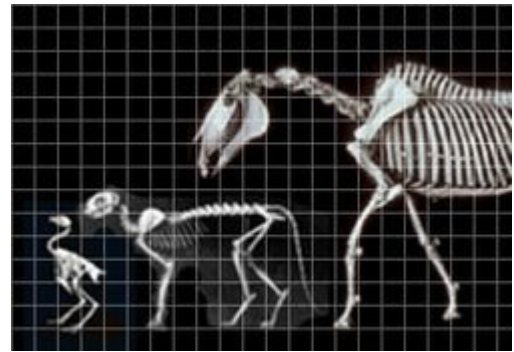


Image credits: cat skeleton, horse skeleton, courtesy of AMNH Department of Library Services, chicken skeleton, courtesy of AMNH, Roderick Mickens.

What do we have in common with sharks, bluebirds, lizards, and toads? We are all vertebrates, or animals with backbones. Vertebrates use their backbones for movement and support. Vertebrates share other traits as well: an internal skeleton, muscles, a protective skin, blood that circulates through vessels, and an advanced nervous system, including a head with a brain.

Life actually began in the oceans - and for most of Earth history, has thrived in the oceans. First came true bacteria and probably archaea, followed by the protists. Plants, animals and fungi didn't appear until much later, and it is only in the last 360 million years that the first vertebrates, for example, moved onto land.



The 94-foot long blue whale is one of the Museum's star attractions. It's a replica of a whale captured in 1925 off South Georgia Island at the southern tip of South America. The whale

has been in the Hall of Ocean Life since 1969. Suspended from the ceiling of the Hall, the whale swims in a "virtual ocean." Above your head, blue light shimmers as if it's filtering down through water. Lights, video, and the sound of whales singing make you feel like you are right there, submerged in the middle of the ocean with the whale.

During the late 19th and early 20th centuries, hunters looking for whale blubber almost sent the blue whale (*Balaenoptera musculus*) into extinction. But thanks to a worldwide ban on whale hunting in the 1960s, blue whale populations have started to grow again.



Image credits: courtesy of Mike Johnson.

The blue whale is the largest animal ever to have lived on Earth. It's even bigger than the enormous dinosaurs that lived over 65 million years ago! Blue whales migrate long distances, traveling alone or in small groups called pods. These colossal creatures breed in warm southern waters during the winter and feed in polar seas during the spring and summer.

classify clas · si · fy

Definition

verb

1. to put in groups according to things that are similar.

People classify trees by the kind of leaves they have.

Advanced Definition

transitive verb

1. to arrange or order with respect to type or class.

The museum's paintings are classified according to art movement and genre.

These rocks are typical of certain types, so they are quite easy to classify.

2. to assign to a particular category or group.

He had been classified as a gifted student in elementary school.

3. to specify (documents or other information) as being highly restricted in availability.

These documents have been classified and cannot be accessed without special clearance.

Spanish cognate

clasificar: The Spanish word *clasificar* means classify.

These are some examples of how the word or forms of the word are used:

1. Scientists **classify** minerals based on their shape, color, and hardness.
2. Specialists called taxonomists are working to **classify** and name the creatures.
3. Faced with that discovery and the possibility of discovering more large objects, astronomers began to talk about **reclassifying** the objects in our solar system.

diversity

di · ver · si · ty

Advanced Definition

noun

1. the state or condition of being unlike; dissimilarity.
2. a variety.

people from a diversity of backgrounds

3. an instance or point of difference.

Spanish cognate

diversidad: The Spanish word *diversidad* means diversity.

These are some examples of how the word or forms of the word are used:

1. The prefix "bio" means living, while "**diversity**" refers to different types of things.
2. The region has more than a dozen countries and is rich in cultural **diversity**.
3. Did you know that bees are basically responsible for much of the flower **diversity** you see in the wild?

estimate es · ti · mate

Definition

verb

1. to make a guess about the amount, size, or worth of something.

We estimated the taxes we would have to pay.

noun

1. a guess about the amount, size, or value of something.

The mechanic gave me an estimate for the car repair.

Advanced Definition

transitive verb

1. to calculate the approximate amount, size, or value of.

I estimated the length of the room to be close to thirty feet.

We asked the carpenter to estimate how much the new garage would cost.

We estimated our bill to be approximately three hundred dollars.

2. to judge or appraise.

He looked closely at the ring and estimated its value at around five thousand dollars.

They estimated that their drinking water would last for just two more days.

intransitive verb

1. to make an estimate.

We estimate using these charts.

noun

1. a rough calculation or educated guess as to the amount, size, or value of something.

By my estimate, we hiked about fifteen miles today.

2. a judgment or appraisal.

We took the diamond to a jeweler for an estimate of its worth.

3. a preliminary calculation, as by a building contractor, of the cost of proposed work.

The second contractor's estimate was higher than the first, but it might be more realistic.

Spanish cognate

estimado: The Spanish word *estimado* means estimate.

These are some examples of how the word or forms of the word are used:

1. Archaeologists **estimate** that over 20,000 men worked on the Great Pyramid.
2. Some experts **estimate** that 100,000 sharks are caught for their fins each year.
3. Scientists **estimate** that they have identified only a small number of all species that live in the rain forest.
4. Experts **estimate** that nearly one-third of the food that humans eat - from apples to zucchini - is pollinated by bees.
5. If you count the seconds between a flash of lightning and a roll of thunder, you can **estimate** how many miles away a storm is.
6. The exact number of slaves that Tubman led to freedom is unknown; a 19th-century biography stated that she rescued 300 slaves, while modern historians **estimate** the total was closer to 70.

Name: _____ **Date:** _____

1. According to the text, where do many invertebrates and most vertebrates live?

2. A great variety of living things live in the oceans. Use evidence from the text to support this statement.

3. What is the main idea of this text?
