

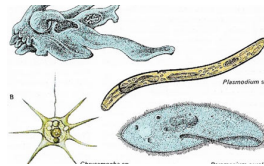
New Segment!

ZOOLOGY DESTINATIONS:

Discovering Our
Local Species!



**ENDANGERED
ANIMAL OF THE ISSUE**
ELEPHANTS AND
IVORY HUNTING



PROTOZOANS
HALF PLANT, HALF
ANIMAL, ALL
AWESOME!



**PREHISTORIC ANIMAL
OF THE ISSUE**
THE COELACANTH:
1ST ANIMAL ON LAND

NEWS FOR THE DEDICATED ZOOLOGIST

End Coral Bleaching Now

You jump off the back of a boat wearing scuba diving gear off the East coast of Australia. Immediately, you have immersed yourself in the all famous Great Barrier Reef, home to more than 2,075 species of fish, reptiles, and mammals alike. Consisting of about 2,900 individual reefs, the Great Barrier Reef is one of the 7 natural wonders of the world. The Great Barrier Reef is also the largest living structure on Earth, it is even visible from Outer Space!

You begin to look around. A dugong, a close relative of the manatee, nudges you in the arm and you cannot believe what you are seeing. Colonies of stag horn coral, fan coral, and vibrantly colored acropora corals dot the area. Colors of purple, blue, red, pink, yellow, and orange are making your eyes pop!

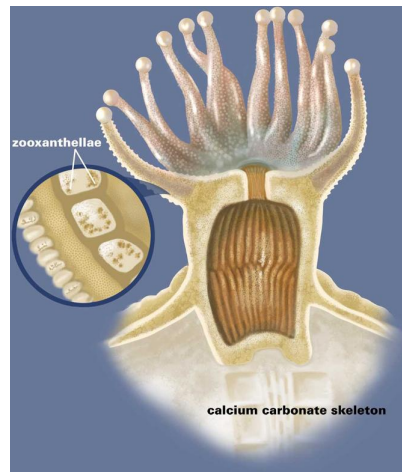




You are beginning to think that the Great Barrier Reef is the most beautiful place on Earth, with so many colors, fish, and coral! Until you look to your left and notice an area with no life at all. The coral is far from vibrant and has now been

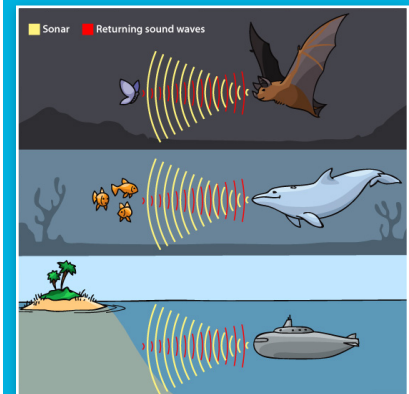
turned a milky white. No wildlife swim in this area. Barren places like these are called “dead zones” because no life lives here. Many reefs in the world have become lifeless dead zones. For example, in 2005, the United States lost 50% of its reefs in the Caribbean Sea in one year alone according to NOAA (National Oceanic and Atmospheric Administration). In 2010, the Florida Keys faced a large coral bleaching as well.

How do coral bleaching events like these occur? It all starts at the mutualistic symbiotic relationship between coral polyps and a special type of algae called zooxanthellae (say: zoo- ah- zan- thel-ah). The coral polyps receive food and color from the algae, while the algae receive shelter. Zooxanthellae live in the tissues of the coral until they are disturbed by a stress factor. A stress factor may be a dramatic change in temperature, pollution, and overexposure to sunlight caused by low tides. The coral then expels the zooxanthellae and is left “bleached” white. The bleached coral is now prone to various diseases. Slowly, the bleached coral starves and dies.



The some 4,000 species that coral reefs support can be direly damaged when the seemingly insignificant zooxanthellae leave the coral. Coral reefs are some of the most biodiverse ecosystems on Earth and it is devastating to loose any. As global climate change continues to alter the temperature of our planet, coral bleaching becomes increasingly more common. By conserving water, practicing safe boating, preventing urban runoff, not taking coral as souvenirs, and volunteering your time in ocean clean- ups you can help put coral bleaching to an end!

The Power Of Echolocation



Echolocation is an animal superpower! It is the process in which an animal emits a sounds of different frequencies that bounce off objects in its surroundings in the form of waves. The frequency of the sound has to do with the spacing in between wavelengths. Low frequency sounds have more spacing in between than high frequency sounds. An animal, such as a bat, whale, or platypus can use echolocation to detect prey, predators, and obstacles in their surroundings. For example, bats first emit a low frequency sound which allows them to narrow down the location of their prey. The bat’s chirps will become gradually more high pitched until it has pinpointed its prey. The chirp will bounce off the prey and the bat can create a visual map of its surroundings, eventually catching its next meal.

Upcoming Events

Mark these events on your calendar and spread awareness to celebrate them!

August 6- National Badger Day

August 8- World Vulture Awareness Day and World Cat Day

August 12- World Elephant Day

August 14- World Lizard Day

August 17- National Honey Bee Day

August 19- World Orangutan Day

August 20- World Mosquito Day

August 30- International Whale Shark Day

September- Save the Koala Month

September 1- National Hummingbird Day

September 4- National Wildlife Day

September 8- National Iguana Awareness Day

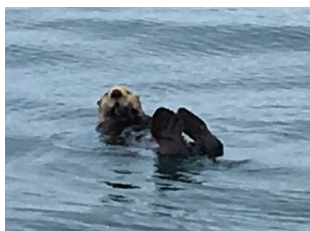
September 15- International Red Panda Day

September 22- Elephant Appreciation Day

September 22- World Rhinoceros Day

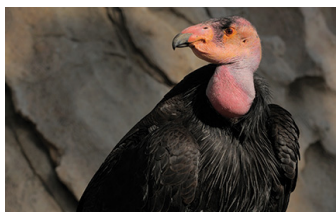
September 27- October 2- Sea Otter Awareness Week

September 28- International Rabbit Day and Save the Koala Day



Sea otters were an endangered species due to the fur trade in the early 20th century. Now, they are quite numerous, with a global population of over 106,000. California alone is home to over 3,000 sea otters.

In the 1980s California condors, a species of vulture, numbered at less than 30 individuals. Thanks to enormous conservation efforts, there are now over 400 California condors in the world!



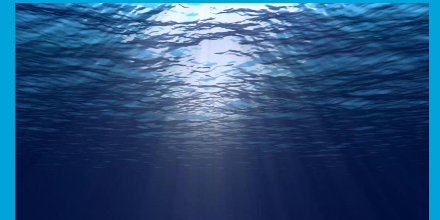
Nature Poll
Would you rather view wildlife in a forest or in the ocean?



Forest

OR

Ocean



Your Questions, Answered!

Remy Gaskell, age 10 asks: "Can you please tell me some facts about sculpins?"

Sculpins are fish part of the superfamily *Cottoidea*. They use their large, spiny pectoral fins as a form of locomotion as they navigate their habitat. Sculpins live in both marine and freshwater habitats. Marine species tend to live in either tide pools or shallow to deep waters. Freshwater species live in rivers, lakes, and streams.

Because they are bottom-dwelling fish, sculpins have evolved eyes on the top of their head rather than on the sides. Having eyes on top of their heads

allow sculpins to see predators that may looking down at them. Sculpin predators include many species of bird such as herons, terns, and kingfishers, river otters, and even other fish. However, predators must be careful for the spines adorning the dorsal and pectoral fins, as they contain an unpleasant poison.



Got a burning wildlife question?
Flip to the very last page!

Endangered Species Spotlight

Elephants

Elephants are truly magnificent animals. They use their large fan- like ears to cool off, boast incredibly impressive tusks, and have a trunk is unbelievably complex! They show emotion towards other members of their herd and use elaborate sounds for communication. Even with all their amazing qualities, elephants are certainly under respected animals.

There are four species of elephant and five subspecies that make up the *Elephantidae* family. The major species include the African elephant, Asian elephant, African forest elephant, and the African bush elephant. The Bornean elephant, Sumatran elephant, Indian elephant, Savannah elephant, and Sri Lankan elephant make up the five subspecies. Elephants are the largest land mammal and are best known for their incredible intelligence. Elephants are one of the very few animals that have passed the self recognition test involving a mirror. Elephants are also able to problem solve, just like humans and other apes.



All species and subspecies of elephant are threatened with illegal wildlife poaching and trade. Elephant tusks, also known as ivory are of high demand throughout Asia and Africa. The tusks are essentially protruding, overgrown teeth made up of three components. These include enamel, the hard, protective outside of the tooth that prevents infection, dentine, a strong, dense, material that gives the tooth structure and protection. As well as cementum, which connects the tooth to the mandible of the elephant. Ivory, the elephant tooth, is used for jewelry, ivory carvings, various forms of art, and other decorative objects. Poaching is diminishing the

elephant population rapidly. Various conservation efforts are in place, but it will take many years for the populations to become healthy again. To help contribute to elephant conservation, do not purchase ivory, look into switching to elephant habitat- friendly products, make a donation to elephant conservation groups, and please, advocate for the elephants!

What Can You Do To Help Endangered Species?

Many conservation efforts are in place to protect the biodiversity of Earth. But did you know you can start conservation efforts too! That is exactly why Jane Goodall, renowned primatologist and conservationist, began *Roots and Shoots* in 1991, a program that promotes global conservation efforts specifically in kids. Roots and Shoots is a free program that inspires people to make a positive difference in the world. With projects focusing on wildlife, plants, water, recycling, community beautification, air, landscaping, pets and other domesticated animals, human communities, and peace, Roots and Shoots will surely bring out your inner change maker.



Jane Goodall's
roots & shoots
Needs You!

Visit <https://rootsandshoots.org>
to start making a difference
today!

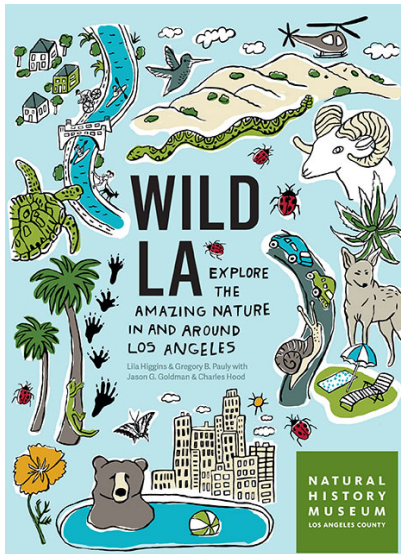
"EVERY INDIVIDUAL
MAKES A DIFFERENCE."
- Dr. Jane Goodall



Zoology Destinations

Discovering Our Local Species

While Los Angeles seems like a metropolis where minimal species would be able to survive, LA is actually teeming with wildlife. From black bears to common garden snails, and towering Mexican palm trees to California poppies, Los Angeles is full of plants and animals big and small, you just need to know where to look!



This segment works great with the book *Wild LA* by Natural History Museum scientists!

How To Observe Wildlife

Materials

1. Binoculars: Helps you see wildlife at great distances
2. Field guides: Helps you identify the species you find
3. Notebook and pencil or camera: Document your discoveries

There is no *one* way to observe wildlife, but please follow these guidelines.

1. Respect wildlife and their habitat
2. Have fun

Arlington Gardens, Pasadena

Location: 275 Arlington Drive, Pasadena, CA 91105

Parking: Street

Cost: Free parking and admission

Facility: Benches and tables, plenty of shade, no restrooms

This quiet spot located in Pasadena is a wonderful example of how all of us can contribute to our community and help conserve water in our own gardens! Adorned with various wildflowers, succulents, and trees, Arlington Gardens is a wonderful place to escape the busy life and just explore LA nature. Western fence lizards, California towhees, butterflies, honey bees, red-whiskered bulbuls, and many other species call this garden home.



California towhee



Common poppy

Arlington Gardens is a beautiful example of xeriscaping, a method of landscaping using drought-tolerant plants. Learn about the drought-tolerant plants that grow at Arlington Gardens and how they can benefit your garden. Arlington Gardens also supports many local species. Butterfly bush provides food for monarch and swallowtail butterflies, agave, poppies, cactuses, and other flowering plants support local pollinators such as bees, hummingbirds, and butterflies.



Western fence lizard

Arlington Gardens is a great place to wander and discover LA wildlife!

Protozoans:

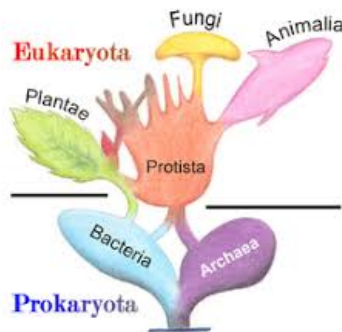
Half Plant, Half Animal, All Awesome

Have you ever heard of an amoeba? Or perhaps a paramecium, euglena, or sporozoan? These microscopic organisms are not plants, animals, fungus, or bacteria. These mysterious creatures are in their own kingdom, *Protista*, the kingdom that houses all the protozoans known to scientists.



What is a protozoan? 1.7 billion years ago, after the evolution of bacteria, a crucial moment in prehistory occurred. According to the theory of symbiogenesis, scientists think that eukaryotes such as protozoans, evolved through an association with prokaryotes. Through a process known as endosymbiosis, bacteria engulfed other bacteria to form more complex organisms with organelles, the individual parts in a cell that carry out specific

functions. Those more complex organisms became the first protozoans! This evolution was groundbreaking because protists acted as the bridge between primitive unicellular bacteria and more complex multicellular plants, animals, and fungi.



Because of they acted as the bridge in evolution, protists are not really a defined bacteria, plant or animal, but a combination of the three. Some protists, such as euglena are more plant- like, having chlorophyll in their cells and attaining energy through photosynthesis. Others, such as the amoeba and paramecium, are more animal like because they must consume other organisms for energy.

There are four distinct types of protozoans, ciliates, amoebas, flagellates, and sporozoans. Each are characterized by their form of locomotion. Ciliates, such as the paramecium shown on the right, use special hair- like organelles called cilia to move around. The cilia also help push food into the gullet (“stomach”) of the paramecium. Flagellates, such as the euglena shown on the left,

use a different form of locomotion. Instead, they have one long whip- like tail called a flagella that they spin around in circles to move around. Amoebas, such as the *Amoeba proteus* shown on the right, use pseudopods, arm- like structures, for locomotion. They stretch out their body to form a pseudopod that the rest of their body follows. Amoebas also use their pseudopods to perform phagocytosis, a process for capturing food by shaping their pseudopods around their prey to engulf it for

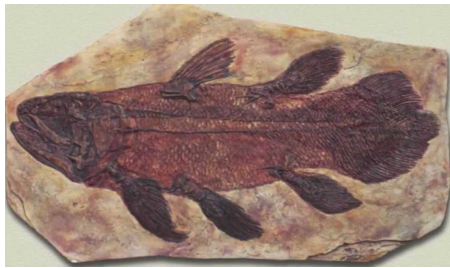
consumption. The last type of protozoan are the sporozoans, shown on the left. These protists can not move on their own and instead rely on wind or other organisms to get around. Sporozoans are all parasites and must live on a host for survival. Plasmodium is notoriously known for living in mosquitos and causing malaria, a deadly disease, in humans.



Protists are amazing microorganisms that played a tremendous role in evolution. From the transition of primitive prokaryotes to complex eukaryotes, without protozoans, we may still be bacteria!

Prehistoric Animal of the Issue: Coelacanth

Coelacanths (pronounced seel- uh- canth) are a member of the lobe- finned fish class *Sarcopterygii*, a class of fish who are credited with evolving into the first tetrapods, or land animals. Many believe that the coelacanth was a direct ancestor of the first fish to make its way onto land 395 million years ago during the Devonian period. With this crucial transition from fish to amphibians, animals were no longer concentrated in marine habitats.



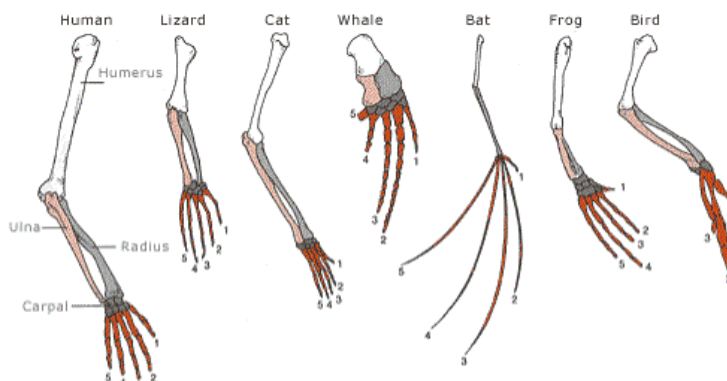
Scientists believe that an ancestor of coelacanth used its lobed fins as legs to “walk” onto land millions of years ago. Fossils confirm this theory, showing that their fins anatomically look very similar to the arm and leg structures of land animals. Coelacanth’s fin bones contain a bone connecting the fin to the body (similar to our humerus bone), two bones connecting the previous to the end (radius and ulna), and five long, finger- like bones at the end (phalanges). Furthermore, coelacanth DNA contains the mutation that promotes the development of limbs in land vertebrates.

Thought to have gone extinct with the dinosaurs 65 million years ago, recent discoveries confirm that the coelacanth is very much still living. In 1938, South African museum curator Marjorie Courtenay- Latimer discovered a prehistoric looking fish at a nearby dock, where someone must have caught it. Latimer could not identify the fish herself and reached out to Professor J.L.B. Smith, who could not believe what he was seeing after he confirmed it to be a coelacanth. Since 1938, more people have rediscovered coelacanth in different locations. In 1997 and 1998, coelacanths were discovered in Sulawesi, Indonesia. However, they were genetically different from the previously known coelacanths.

Homologous Structures

The word *homologous* is the scientific way of saying “the same or similar”. That being said, the phrase *homologous structures* refer to structures that are similar enough to theorize that two or more animals share a common ancestor. Homologous structures do not necessarily have to look the same or even share the same function.

One example of a homologous structure can be found in the limbs of animals. Using comparative anatomy, we can analyze the arm anatomy of many animals. Humans, lizards, cats, bats,

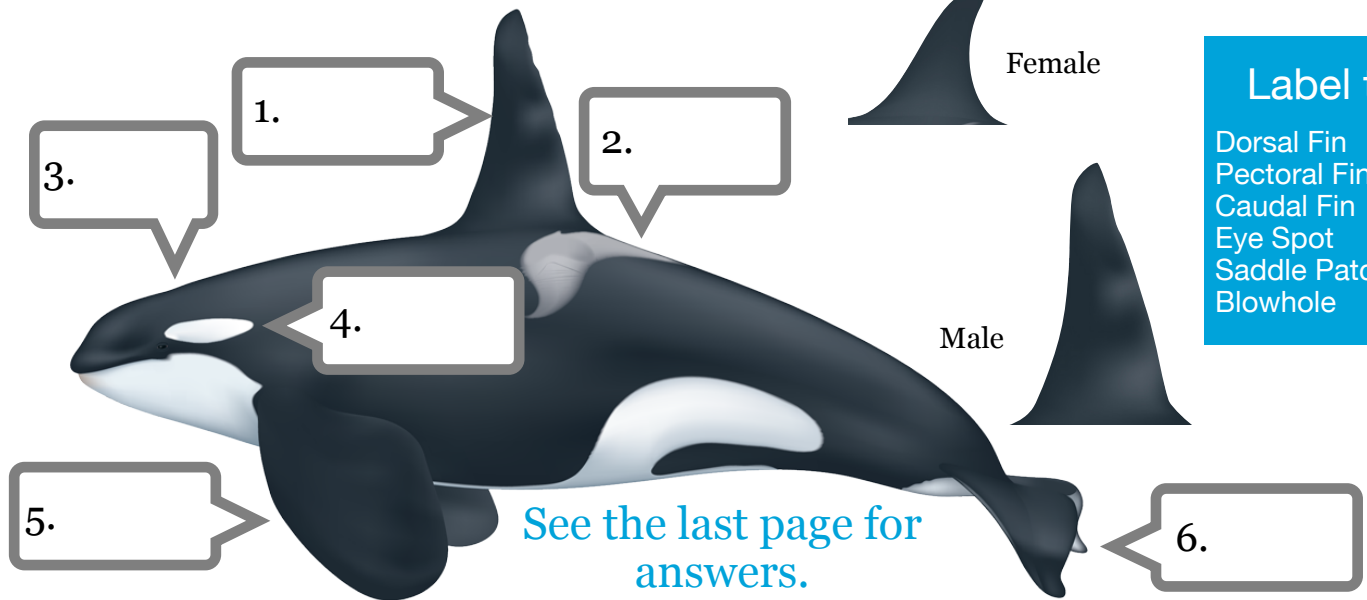


frogs, birds, and even whales (which originally lived on land), share a similar composition of bones in their arms. With the same basic structure of five phalanges (exception with birds) connecting to carpals, which connect to the radius and ulna, which is all connected to the body by the humerus. All these tetrapods share a common ancestor, the coelacanth, an evolutionary breakthrough.

Games

Labeling Orca Anatomy

Orcas or killer whales (*Orcinus orca*) are the largest species of dolphin!



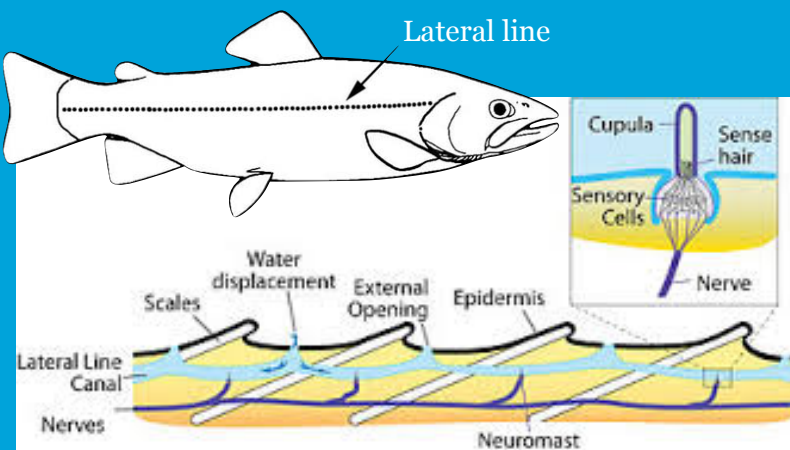
Label the:
 Dorsal Fin
 Pectoral Fin
 Caudal Fin
 Eye Spot
 Saddle Patch
 Blowhole

See the last page for answers.

Zoology Term Of The Issue

Lateral Line
 Noun

A sensory organ found in most fish that allow them to navigate better in their surroundings. The lateral line is believed to sense water currents and other vibrations in the water. The lateral line is made up of many mechanoreceptors known as neuromasts or lateral line organs. Neuromasts are organized into rows or individually along the skin or underneath lateral line canals filled with mucus. Lateral lines can also be found in amphibians during their larval stage and those who are completely water dependent.



Name the animal!



These animals propel themselves through water with the help of 8 rows of fused cilia placed along their sides.

These animals refract light as they swim, hence the rainbow light show.

These animals are ctenophores (ten- uh- fours) and are therefor not true jellyfish.

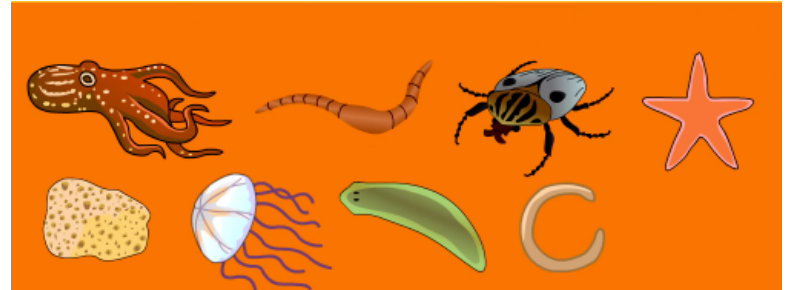
Unlike jellyfish, this animal's food is ingested and excreted in different areas.

These animals capture their prey with sticky cells known as colloblasts.

Go to page 10 to find the answer!

Invertebrates Of The Issue: A Brief Introduction

Invertebrates are animals that lack a spinal column or backbone. Invertebrates are generally considered to be more primitive than the vertebrates- fish, amphibians, reptiles, birds, and mammals. Some invertebrates lack eyes, others reproduce asexually, some even live at the bottom of the ocean! As you can see, despite lacking a backbone, invertebrates are still *really cool*!



Though it seems that there are a lot of vertebrates (animals with backbones) inhabiting Earth, invertebrates actually make up about 95% of all animals on Earth! This makes sense because they have been around for a *lot* longer than any vertebrate. The first invertebrates evolved around 800 million years ago, while the first vertebrates evolved some 540 million years ago. We can thank invertebrates for many features that are shared among all animals- including you! Invertebrates were the first animals to be multicellular- or having more than one cell as seen in archaeobacteria, eubacteria, and some protists. Invertebrates are also responsible for the evolution of tissues, which gave rise to organs and organ systems. Symmetry is another key feature of all animals that ever lived on Earth. There are many more features that invertebrates are responsible for. Thanks invertebrates!

[Learn more about the classification of invertebrates in the next issue!](#)

Resources

- https://oceanservice.noaa.gov/facts/coral_bleach.html
- <https://whatismyspiritanimal.com/animal-holidays-celebrations/>
- <https://www.worldatlas.com/articles/how-many-types-of-elephants-are-there.html>
- “Wild LA: Explore the Amazing Nature in and Around Los Angeles” By: Lila Higgins, Dr. Gregory B. Pauly, Dr. Jason G. Goldman, and Charles Hood
- “Know It All Biology- Protists” By: Henry Gee
- <http://faculty.college-prep.org/~bernie/sciproject/project/Kingdoms/Protists%207/evolution.html>
- TED-Ed: “The Coelacanth: A living fossil of a fish” By: Erin Eastwood
- <https://ocean.si.edu/ocean-life/fish/coelacanth>
- <https://biologydictionary.net/homologous-structures/>
- https://biocyclopedia.com/index/general_zoology_lateral_line_system_of_fish_and_amphibians.php
- <https://ucmp.berkeley.edu/cnidaria/ctenophora.html>
- <https://www.brainpop.com>
- <https://www.ck12.org/biology/invertebrate-evolution/lesson/Invertebrate-Evolution-BIO/>

Thank You for reading this month’s edition of “News for the Dedicated Zoologist”! I hope you enjoyed it.



But wait, there's more!

If you would like to ask a **zoology related** question to be featured in "Your Questions, Answered", what you need to do is simple!

"News For the Dedicated Zoologist" Request Paperwork

Name: _____

Question: _____

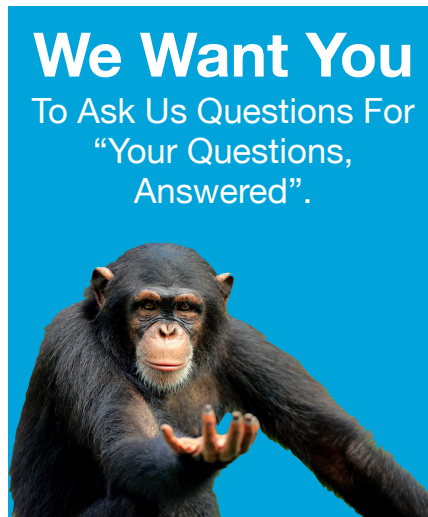

Email (also optional): _____

Please give this piece of paper to Morgan Gaskell **or** send the information to biologyislife@50-50.com.

Answers- Labeling Orca Anatomy

- 1. Dorsal Fin
- 2. Saddle Patch
- 3. Blowhole
- 4. Eye Patch
- 5. Pectoral Fin
- 6. Caudal Fin

The animal on page 8 is a comb jelly!

"News For The Dedicated Zoologist" now has a paperless option! If you would like to get the e-version (eco/electronic), please inform Morgan Gaskell via email or in person. Your next issue will be sent via email!

Get Ready For The October- November Issue Of *News For The Dedicated Zoologist!*