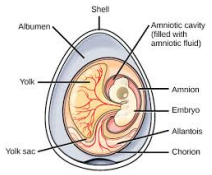
Upcoming Events

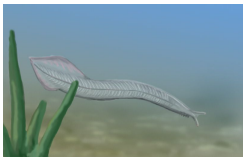
Earth Day

April 22, 2019 will be the 49th annual Earth Day!

ENDANGERED SPECIES SPOTLIGHT
THE VAQUITA PORPOISE



THE AMNIOTIC EGG
AN EVOLUTIONARY BREAKTHROUGH!



THE PIKAIA
EARLY CHORDATE OR JUST A CONTRIBUTOR?

NEWS FOR THE DEDICATED ZOOLOGIST

The Threats of Deforestation

In the modern world, deforestation has become one of the leading five environmental concerns. According to the World Wildlife Fund (WWF), 18.7 million acres of land are cleared annually due to deforestation. All forests, particularly tropical rainforests in South America and Asia, are at risk of deforestation. With less and less rainforests, Earth's inhabitants are at an even greater risk of extinction.

Rainforests are vital to the survival of all organisms. They cover an estimated 2% of the total surface area of Earth and around 50% of Earth's plants and animals call rainforests home. Rainforests are characterized based on how much rainfall the area receives. On average, tropical rainforests receive 75- 100 inches of rain each year. Other than providing organisms with water, rainforests also provide us with rich oxygen, 25% of known natural medicines, regulated temperatures, and more! Rainforests are also rich in biodiversity, housing nearly 5 million species.

Such species include the largest, heaviest, and critically endangered eagle species, the Philippine eagle, the ocelot, the critically endangered orangutan, the world's largest and heaviest snake the anaconda, the 5 inch long Atlas beetle, the elusive hornbill, the endangered golden- capped fruit bat, the well camouflaged Altas moth, the heliconia flower, Pará rubber tree, cacao trees, orchids, to name a very small handful. All these plants and animals are at great risk of extinction due to deforestation and other human posed threats.

Deforestation is the unsustainable practice of cutting down forests. Forests in South America and Indonesia are at the greatest risk of deforestation. Within the past 50 years, Indonesia has lost more than 182 acres of rainforest due to deforestation methods including logging and burning according to GreenPeace. In South America, nearly 20% of the Amazon Rainforest's land has been lost over the past 40 years. Methods of deforestation include setting fires in forests, clearing for agriculture and residence, logging for wood, etc.

Deforestation practices also release a lot of carbon dioxide, contributing to about 15% of global warming. Deforestation also pushes Indigenous peoples out of their villages and steals their human rights, customs, land, and overall way of life. With less trees in the rainforest, oxygen levels can decrease as well, interfering with the carbon- oxygen cycle between all organisms. Deforestation can even affect the water cycle, trees being the balancer of water in the atmosphere and on land. Soil erosion is also affected by deforestation and can become very dangerous in elevated circumstances. Since 50% of the world's plant and animal species live in tropical rainforests, they are at risk too! Deforestation reduces biodiversity in an ecosystem and affects 100% of all species through diminishing oxygen levels and increased carbon dioxide levels.

While 5- 10 rainforest species are predicted to go extinct every decade, all hope is not lost yet. Various conservation efforts and organizations are stepping onto the scene to end deforestation. Such organizations include the Rainforest Alliance, World Wildlife Fund (WWF), the Rainforest Action Network, Mongabay, and more. You can help save the rainforests too, spread awareness wherever you can!

Symmetry In Animals

Like you learned in math class, one side of a square is symmetrical to the other, a triangle is asymmetrical when cut horizontally, and a circle's circumference is radiated from the radius. This is the same case with animals! There are three forms of symmetry: bilateral, radial, and asymmetrical. In bilateral symmetry, you can cut an organism in half and both sides will look the same. A butterfly uses bilateral symmetry. Other animals use radial symmetry. In this case, you start from the center and can move a line around the entire organism. Starfish and sand dollars use radial symmetry. The last form is asymmetry. Try and divide an organism like this, and you will have no luck. Sponges and corals are both asymmetrical animals.

Upcoming Events!

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

April- National Frog Month and Prevention of Cruelty to Animals Month

April 2- National Ferret Day

April 3- Jane Goodall's Birthday

April 4- World Rat Day

April 7- World Beaver Day

April 8- Zoo Lover's Day

April 14- National Dolphin Day

April 16- Save The Elephant Day

April 17- International Bat Appreciation Day

April 22- Earth Day

April 24- World Day for Animals in Laboratories

April 25- World Penguin Day

April 26- Audubon Day

May- World Migratory Bird Week (May 12- 13)

May 1- Save The Rhino Day

May 2- World Tuna Day

May 3- International Koala Day

May 4- Bird Day

May 15- Dinosaur Day

May 17- Endangered Species Day

May 23- International (Sea) Turtle Day

May 28- Whooping Crane Day

May 29- National Snail Day and Flamingo Day

May 17

Endangered Species Day started in 2006 and has been promoting the protection of countless species around the world.

May 12-13

Migratory birds are at a great risk of extinction as they travel from destination to destination. More than 1/3 of migratory birds are at risk of extinction because of poor conservation.

Cool Crafts that are Eco- Friendly

Endangered Species Tote Bag

Materials:
- A blank tote bag
- Fabric markers

Instructions:
1. Choose a favorite endangered animal.
2. Draw the animal on the tote bag using the fabric markers.
3. Use the tote bag a lot, this is a good way to spread awareness of the species.
4. If somebody asks you about the endangered species, blow them away with facts about the species and how to protect them!

Your Questions, Answered!

Claire Brandon asks: "What is the largest animal on Earth?"

Answer:

The largest animal on Earth ever to live during the corse of Earth's history is the blue whale. Weighing 200 tons and up to 105 feet long, the blue whale tops any other organism to ever survive in length and weight. A blue whale's tongue alone can weigh as much as an elephant and their heart can weigh as much as an automobile. Blue whales are part of the suborder Mysticeti, a suborder that includes baleen whales such as humpback whales and grey whales. Blue whale gestation periods last 12 months. The calves are born weighing around 3 tons and 25 feet long. Blue whales not only reach a great size, they also reach a great age. On average, blue whales live for 80 to 90 years. Amazingly, an adult blue whale can consume 8,000 pounds of krill a day. The harmony of the blue whale is extremely loud, as much as a jet engine. They use their booming sound to communicate with one another and for echolocation. Unfortunately though, with low birthrates and many threats, blue whales are at a great risk of extinction. They still have not seemed to recover the great whale slaughter of the 1900s. In 1966, the International Whaling Commission began protecting these magnificent animals.

Got a burning wildlife question? Flip to the back page!

Endangered Species Spotlight

Vaquita Porpoise

Throughout the years, countless numbers of species have been wiped out. As many as 500 species have gone extinct in the last century. As of May 2016, 2,389 species were listed as endangered by the IUCN Red list. This new segment of *News For The Dedicated Zoologist* will teach you about species that desperately need our help in not becoming extinct.

The vaquita porpoise (*Phocoena sinus)* is the most endangered marine mammal as well as one of the top ten most endangered animals in the world according to *OneKind Planet*. Recently, the population was estimated to be less than 10, making the vaquita a critically endangered species.

The vaquita is a particularly special animal because they are endemic to the Gulf of California in the Sea of Cortez, this means the vaquita only live there. The vaquita are very shy and elusive animals, making them very hard to study and monitor by scientists. Information known about the vaquita is very limited because they were only discovered 61 years ago in 1958 when one was found washed up on a beach. Since their discovery, we have learned that vaquita are on the brink of extinction due to the threats posed by gill nets and the fishing of another critically endangered fish known as the totoaba (*Totoaba macdonaldi).*

The totoaba, also endemic to the Gulf of California, is threatened with illegal Chinese trade markets. Along with rhinos, elephants, bears, tigers, and more, Chinese black markets pose huge threats to the totoaba and the vaquita. The totoaba is illegally poached by Chinese fishermen seeking their swim bladders, an organ in the fish's body which controls buoyancy while swimming. The swim bladders are dried and sold for a very large sum of money, as much as $10,000 a piece. The swim bladders are said to be used for relieving aches and pains, but no medicinal evidence has been proven. The totoaba is poached with the use of large gill nets. These nets snare and suffocate many endangered and non- endangered species such as sharks, rays, fish, dolphins, sea turtles, and the vaquita.

Vaquita were predicted to go extinct between 2018 and 2020. Many methods for saving the vaquita have been proposed. However, strategies that have saved other species form extinction have not been proving as effective with the vaquita. Conservationists have attempted bringing the vaquita into captivity, similar to the California condor. After two failed attempts resulting in the death of two vaquita however, scientists realized how delicate the vaquita were to environment and temperature changes. With such low numbers, extreme caution is being taken in saving the vaquita from extinction. While the Mexican government has been on top of protecting their endemic species, low birth rates and constant threat of gill nets have not at all benefited this situation. In addition, many people do not know of this critically endangered species. Now that you know about the vaquita, spread awareness and donate to conservation efforts. You can also adopt a vaquita on the *Porpoise Conservation Society* website at https://porpoise.org/gift/adopt-a-vaquita/. The protection of the vaquita is crucial in saving the species from extinction.

Visit https://www.aljazeera.com/programmes/techknow/2017/11/late-save-mexico-vaquita-porpoise-171128091452659.html to watch an informational video about the vaquita and vaquita conservation.

Zoology Experiments

The Side of Wonder

In order to make discoveries and prove a theory, a scientist must back their claim with evidence. You know how your English teacher asks you to write your opinion about a story by making a claim and supporting it with evidence from a text. Science is similar to that. Scientists ask questions to come to a conclusion. My question might be: How do fruit flies react in high temperatures? My claim or hypothesis may be: Future generations of fruit flies may develop new mutations to cope with the heat. Lastly, I would conduct an experiment to determine if my hypothesis is correct or not. I could expose fruit flies to a high temperature and see how they react in the next few generations. The results of my experiment would be my evidence or conclusion. Using this process, scientists can find answers to many questions.

Question: How do animals float on water?

Facts: Aquatic animals live most, if not all of their lives in or around water, therefor locomotion is key. Water foul such as ducks have feathers that trap air, hollow bones, and a special gland called the uropygial gland. This gland produces an oil that is spread over the duck's body. This oil makes the duck's feathers water repellant. Hollow bones and air trapping feathers allow the the duck to be more lightweight making them more buoyant.

Experiment: To The Lab!

Materials:

- A plastic container filled 3/4 of the way with water
- Cork
- Rock
- Small piece of paper
- Oil

Instructions:

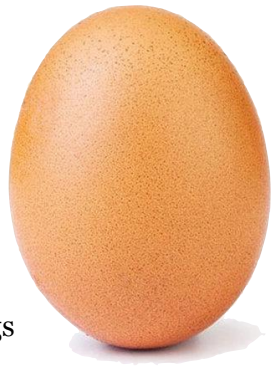
1. Fill the plastic container 3/4 of the way with tap water
2. Place the objects in the container

Questions to Consider:

1. Why do you think the cork floats?
2. Why does the rock sink?
3. Why do you think the oil does not mix with the water? Does this work the same way as the oil on a duck's feathers?
4. Why did the piece of paper first float and then sink?

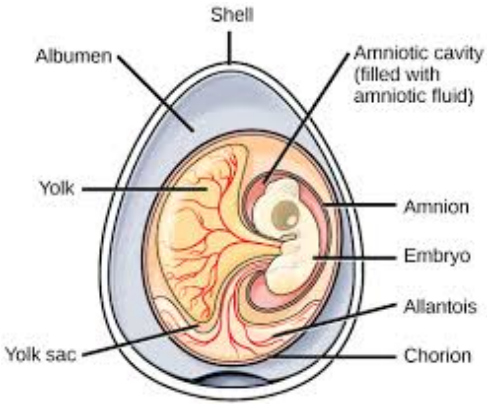
The Amniotic Egg

An Evolutionary Breakthrough!



350 million years ago, amphibians dominated Earth. They included early frogs, toads, salamanders, and newts. Amphibians are primitive animals compared to reptiles, lacking many evolutionary advantages. The most significant advantage that amphibians lack is the amniotic egg. Amphibians are almost entirely reliant on water. They live half their life in a water source and half on land, hence the name amphibian. Amphibians also need to lay their jelly- like eggs in a water source such as a lake or pond. The disadvantage here is that the eggs can dry out and space for laying the eggs are more limited.

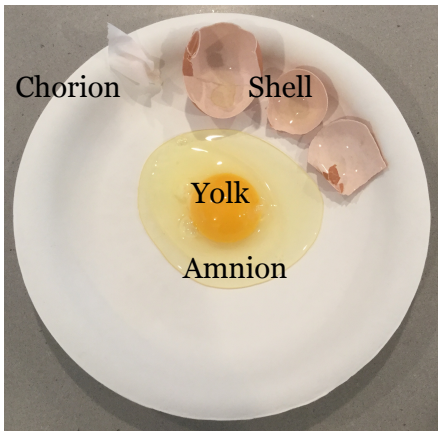
Animals were mostly reliant on water, until 340 million years ago, when the amniotes evolved. Modern day amniotes include reptiles, birds, and mammals. Amniotes all evolved from tetrapods, which were the first animals that could live their whole life on land. The eggs that the tetrapods and modern day amniotes laid were covered by a protective and flexible shell. In some cases the shell was also leathery, as seen in modern day reptiles. The shell made the egg waterproof and protected the embryo inside from predators, bacteria, and other pathogens. The shell also has tiny holes in it called pores, which allow the embryo inside to be supplied with oxygen.



When you remove the shell, you see the chorion. The chorion lets oxygen pass through to the embryo while filtering out unneeded carbon dioxide. The chorion works with the allantois to direct the carbon dioxide and oxygen. The allantois also stores the waste of the embryo. After the allantois is removed, you see the amnion, the most important part of the egg. The amnion is a liquid which simulates the watery world that amphibians lay their eggs in. Without the amnion, the embryo inside would dry out, defeating the whole purpose of the amniotic egg. In addition, the amnion acts as a shock absorber, absorbing any rough movement or collisions of the egg. Lastly, the yolk, which acts as the nutrient source for the egg. Over the corse of the next million years, the amniotes divided into two groups, Sauropsida and Synapsida. Sauropsids include birds and reptiles, while synapsids include mammals.

Mini Experiment

Discovering the Amniotic Egg



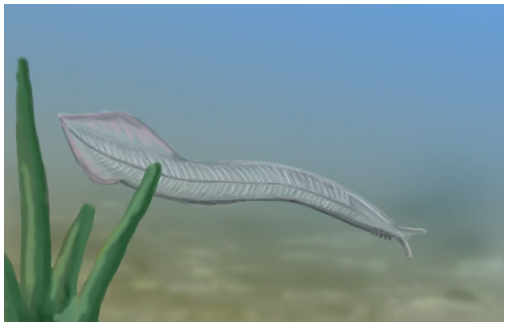
Materials

- One chicken egg
- Plate

Instructions

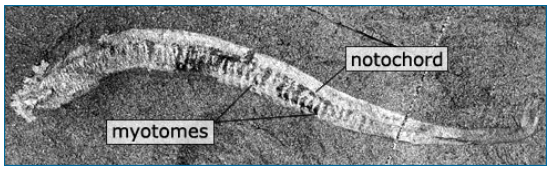
1. Crack the egg onto the plate, DO NOT throw away the shell.
2. Look at the egg and shell, do you recognize any parts of the amniotic egg?
3. Wash hands after the experiment.

Prehistoric Animal of the Issue: Pikaia



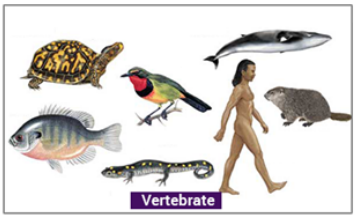
Approximately 505 million years ago during the Middle Cambrian era lived the pikaia. The pikaia was first described by paleontologist Charles Doolittle Walcott in 1911. The pikaia is a rare fossil, only 60 specimens are known. All of the known fossils were found in the Burgess Shale rock deposit of British Columbia, Canada. The Burgess Shale deposit is particularly special because it preserves soft parts of organisms exceptionally well.

Since its discovery, scientists have not been sure as to what the pikaia really was. Many believe the pikaia was a primitive chordate, an animal with a less developed backbone. This would mean that the pikaia is the ancestor of all mammals, fish, reptiles, birds, and amphibians.



However, other scientists disagree. The pikaia is also believed to be a cephalochordate, a group of animals that include lancelets. Lancelets are long marine invertebrates that have a notochord, or primitive backbone. In addition, the pikaia had myotomes, segments of muscle seen in many embryonic vertebrates such as fish and amphibians. This piece of evidence supports the theory that the pikaia may have been the ancestor of chordates. If the pikaia was a cephalochordate, they may be related to the actual ancestor of the chordates. Today, the pikaia is widely accepted as being a cephalochordate. Regardless of what the pikaia really was, most scientists can probably agree that the pikaia and other lancelets contributed to the evolution of chordates.

Vertebrates Versus Invertebrates



After the microscopic animals evolved 3.5 billion years ago, the next step was to bring structure to the kingdom *Animalia*. Thus, the first invertebrates evolved 543- 488 million years ago. These invertebrates included mollusks, trilobites, and any other soft- bodied animal with a protective outside. As all invertebrates do, these early animals lacked spinal cords, an organ in the body which sends nervous impulses to the brain for processing. Just because invertebrates lack a spinal cord, that does not mean they also lack a nervous system. Many invertebrates' nervous systems are comprised of ganglia, a group of neurons in an organism's body. For example, the earthworm's nervous system works when ganglia send messages from an individual segment of the worm's body to the brain.

488- 444 million years ago, vertebrates evolved. The first vertebrates were fish. Vertebrates are animals that include mammals, fish, reptiles, birds, fish, and amphibians. Unlike invertebrates, vertebrates have a spinal cord, which acts as a more complex form of the ganglia as seen in many invertebrates. A vertebrate's nervous system works using neurons. Neurons form an intricate network throughout the body. Nervous impulses are sent to the spinal cord, which sends the messages to the brain for processing.

Games

Is it an invertebrate or vertebrate?

1. Tiger	Vertebrate	Invertebrate
2. Human	Vertebrate	Invertebrate
3. Atlas moth	Vertebrate	Invertebrate
4. Amoeba	Vertebrate	Invertebrate
5. Wolf Spider	Vertebrate	Invertebrate
6. Desert tortoise	Vertebrate	Invertebrate
7. Blue Whale	Vertebrate	Invertebrate
8. Sponge	Vertebrate	Invertebrate
9. Earthworm	Vertebrate	Invertebrate
10. Gila monster	Vertebrate	Invertebrate
11. Euglena	Vertebrate	Invertebrate
12. Beetle	Vertebrate	Invertebrate
13. Sting ray	Vertebrate	Invertebrate
14. Coral	Vertebrate	Invertebrate

Zoology Term Of The Issue

Sequential hermaphrodite

(See- quen- shell Herm- afro- dite)
Noun
An animal that can change between genders. Sequential hermaphroditism occurs in many fish and gastropods. Clownfish are one of the most famous sequential hermaphrodites. They are born males and can switch to females at any time. Sequential hermaphroditism also occurs in many plant species where it is called dichogamy.

The jack-in-the-pulpit can switch between male and female when resources deplete.

Name the animal!

This animal is the only scaled mammal in the world!

This animal is endangered due to illegal poaching for its scales.

This animal's scales are are made of keratin, the same thing our fingernails and hair is made of.

Reptile Of The Issue: Bog Turtle

The bog turtle (*Glyptemys muhlenbergii*) are a species of turtle living in the United States. The bog turtle prefers marshy areas such as swamps, bogs, slow- moving steams, and marshy meadows. Bog turtles are relatively small, growing only 11.4 centimeters in length and 3.9 ounces. Bog turtles have a bright yellow, orange, or red blotch on each side of their head, making them easy to identify. Their shell is light brown to black in color. Similarly to how your teeth wear down with use, bog turtle young start with rough shells which gradually smoothen with age as a result of burrowing. Interestingly, a male's tail is often longer and thicker than a female's, while females have a wider and more domed shell.

Bog turtles are omnivores. They primarily eat insects such as beetles, millipedes, dragonflies, and ants, snails, slugs, earthworms, spiders, berries, seeds, other plant parts. Occasionally, bog turtles will eat frogs, nesting birds, mice, and voles. During hunting, the bog turtle will continue to bite its prey until it is fully in its mouth. Unfortunately, bog turtles are labeled as critically endangered on the IUCN Red List due to excessive habitat loss, illegal pet trade, and road kill.

Resources

- https://www.livescience.com/27692-deforestation.html
- https://www.worldwildlife.org/threats/deforestation-and-forest-degradation
- https://whatismyspiritanimal.com/animal-holidays-celebrations/
- https://www.nationalgeographic.com/animals/mammals/b/blue-whale/
- https://vaquitaaaa.tumblr.com
- https://animals.howstuffworks.com/birds/duck-float.htm
- Ted Ed: "The Game changing Amniotic Egg" By: April Tucker
- http://www.prehistoric-wildlife.com/species/p/pikaia.html
- https://faculty.washington.edu/chudler/invert.html
- https://www.arkive.org

Thank You for reading this month's edition of "News for the Dedicated Zoologist"! I hope you enjoyed it. Please do your part and spread awareness for all those endangered animals out there.

But wait, you're not done yet!

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

Fill out the information below and send it to my email or give it me in person.

"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- Is it an Invertebrate or Vertebrate?

1. Tiger- Vertebrate
2. Human- Vertebrate
3. Atlas moth- Invertebrate
4. Amoeba- Invertebrate
5. Wolf spider- Invertebrate
6. Desert tortoise- Vertebrate
7. Blue whale- Vertebrate
8. Sponge- Invertebrate
9. Earthworm- Invertebrate
10. Gila Monster- Vertebrate
11. Euglena- Invertebrate
12. Beetle- Invertebrate
13. Sting ray- Vertebrate
14. Coral- Invertebrate

The animal on page 8 is a pangolin!

Get Ready For The June- July Issue Of *News For The Dedicated Zoologist*!

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