

NEW SPECIAL EDITIONS COMING SOON!
BORED OF QUARANTINING?
ENJOY NEWS FOR THE DEDICATED ZOOLOGIST MINI ISSUES EVERY MONTH!



ANTLERS VERSUS HORNS



FROM THE FIELD:
KINGS CANYON NATIONAL PARK, CA



WEIRD AND INTERESTING ADAPTATIONS:
NUDIBRANCHS

NEWS FOR THE DEDICATED ZOOLOGIST

Protect The Pollinators

Did you know that one out of every three bites of food you take can be credited to the work of pollinators? Not only do pollinators spread pollen from flower to flower, they also fuel food chains, provide jobs, and more! They pollinate over 180,000 different plant species, as well as over 1,200 different crops. If you haven't done so already, thank a pollinator, because you need them, and they need you!



Pollinators are animals (and in fact some plants too) that spread pollen from one individual flower to another. The main food source for most pollinators is flower nectar. During feeding, a pollinator will collect and carry pollen from one flower to another. This transfer is crucial because pollen contains male sex cells that must unite with the

female sex cells. The only situation is (and this is where pollinators come in) the pollen is located in a completely different location of the flower than the receptive female parts. So, pollinators are essentially moving that pollen from a location called the anther, to the stigma, the female part of the flower.

Common pollinators include bees, wasps, butterflies, hummingbirds, bats, and moths. In some parts of the world, kinkajous, bushbabies, lemurs, blue-tailed day geckos, sugar gliders, and honey possums play the role of pollinator too! Each plays the important role of spreading genetic diversity in the form of pollen.

As you can see, pollinators play a pivotal role in Earth's ecosystems. But as deforestation increases, vital feeding habitat is lost and pollinators lose their major food source. This reduces biodiversity and causes havoc in food webs, as plants and pollinators both provide food for other animals.

Insecticides, pesticides, and herbicides are harming pollinator populations too. After being added to crops or gardens, they begin to accumulate in the pollen and nectar of plants. Pollinators ultimately fall into these death traps. Carbonate insecticides for example, are commonly used for agricultural purposes and attack the nervous system of its subjects. Neonicotinoid, organophosphates, pyrethrin, and pyrethroid insecticides are all similar in that they attack the nervous system of insects. They have also been linked to a rise in death among bees and other pollinators.

So how can *you* help? Native plants are a great way to attract pollinators and other animals to your area. Did you know that 1/3 of California's native plants can't be found anywhere else? Or that California has the most native plants than any other states in the U.S.? Native plants provide an eco-friendly alternative to non-native plants because they are less likely to become invasive. Native organisms can greatly benefit from native plants because they are part of their natural ecology. You can learn more about native plants at <https://www.cnps.org> or get a list of ideal plants for your area at <https://www.audubon.org//native-plants>.



Of course, spreading awareness is the best thing you can do to take action for issues our environment faces. In the words of Dr. Jane Goodall, "It takes a village."



Iconic Wildlife of the 50 States



Hawai'i: The 'iwi

The 'iwi (*Vestiaria coccinea*), also known as the scarlet honeycreeper, is an endemic species to the Hawaiian islands. In fact, it is one of the species that makes up the 37-40% of endemic Hawaiian species. What's up with that long curved bill? The 'iwi uses it to drink nectar from the flowers of plants such as the 'Ohi'a lehua, a tree that is linked to a Hawaiian legend. Unfortunately though, the 'iwi's population is decreasing and they are now listed as vulnerable on the IUCN Red list. Threats such as avian malaria, habitat loss, and a fungal disease known as "Rapid 'Ohi'a Death" or ROD are decreasing 'iwi populations. As mentioned before, the 'Ohi'a tree is a vital food source in the 'iwi's diet, and for other rainforest animals too. This relatively new fungal disease is causing devastation on the Hawaiian islands, from the people it impacts, to the animals that depend on the survival.

Upcoming Events

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

- March: Dolphin Awareness Month
- March 3: World Wildlife Day
- March 9-13: National Wildlife Week
- March 14: Learn about Butterflies Day
- March 15: Buzzard Day
- March 16: National Panda Day
- March 20: World Sparrow Day and World Frog Day
- March 22: International Day of the Seal
- March 25: Manatee Appreciation Day
- April: National Frog Month and Prevention of Cruelty to Animals Month
- April 5-11: Bat Appreciation Week
- April 2: National Ferret Day
- April 3: Jane Goodall's birthday
- April 4: World Rat Day
- April 7: International Beaver Day
- April 6: National Birding Day
- April 16: Save the Elephant Day
- April 17: International Bat Appreciation Day
- April 25: World Penguin Day



Bats play a pivotal role in the ecosystem. Some are pollinators, others control insect populations and disperse seeds in their guano.

This year's theme for World Wildlife Day is "Sustaining Life on Earth. What can you do to help?"



Your Questions, Answered!

Claire Brandon asks: "Why do bees die after stinging you?"

First, it's important to understand that only female honey bees (excluding the queen) will sting you and then die afterwards. Male honey bees lack stingers and all other bee/wasp species can pull their stingers out.

Female honeybees have barbed stingers which will inject venom into the subject's skin, causing irritation. After the bee stings you, it will attempt to fly away, but it can't because of the barbed stinger. Through this process, the bee will leave behind its muscles, glands, venom sack, as well as bits of its digestive track. Without these organs, the honeybee cannot survive and will die. Interestingly, the honeybee may live, depending on the animal. Humans have relatively thick skin, making it harder for the bee to safely escape. But bears for example have thin skin, so after a sting, the bee can live another day.

The process in which an animal will detached part of itself out of self defense is called atomization. Not only do female honeybees do this, but so do lizards, sea stars, etc.

Nature Poll

Will you look into growing native plants?



Definitely!!!

Eventually.

Last Issue:
Pinnacles National Park won 2-1.
Check out <https://www.nps.gov> for information on both parks!



Endangered Species Spotlight

Persian Sturgeon

The Persian sturgeon (*Acipenser persicus*) is one of the 27 species of fish belonging to the sturgeon family *Acipenseridae*. Evolving some 3.5 million years before the dinosaurs, sturgeons have been around since the Triassic time period, about 208 to 245 million years ago. Sturgeon anatomy is relatively the same as it was those many millions of years ago.

Sturgeons, along with lampreys, hagfish, arowana, arapaima, and gars, are known as primitive fish. This is because they lack many distinctive features of modern day fishes. Sturgeons, along with gars, are an example of bony fish, a relatively prehistoric branch of fishes. Their ray-like fins make them similar to ray-finned fish, but their skeletons are mostly cartilage, a characteristic of cartilaginous fish, a branch of fish that evolved 24 million years after the bony fish.

The Persian sturgeon is a species of sturgeon that live in both shallow marine (neritic) and inland wetland environments of Eastern Europe, specifically of the Caspian Sea and, less commonly, the Black Sea. After spawning season, which only occurs when temperature conditions are above 61°F, Persian sturgeons will migrate upriver from April to May to lay their eggs. A second run from September to October may also occur. The following summer, juvenile sturgeons will migrate to the Caspian Sea and feed on benthic animals such as mollusks, crustaceans, and small fish.

Sturgeons in general are considered to be “more critically endangered than any other group of species” according to the IUCN Red List. In fact, as of late October of 2009, the Persian sturgeon was labeled as critically endangered. Why? Threats such as overfishing, water pollution, and habitat loss that affects feeding, migration, and breeding patterns are all main causes for the loss of sturgeon populations.

However, the main threat all sturgeons face is the legal and illegal caviar trade. Caviar, which is the unfertilized eggs of sturgeons, is highly prized in the culinary industry. Fetching anywhere from \$4 to \$125 an ounce, the harvest of caviar is very controversial. Harvesting involves killing the sturgeon in order to obtain the eggs. However, there are also no-kill methods involving “massaging” the fish and making an incision in the right location. Russian, beluga, and stellate sturgeons are at the center of attention. Persian sturgeon caviar makes up about 29% of the caviar being exported out of Russia and Iran, the world’s main exporters.

Despite worldwide love of sturgeon caviar, the methods for harvesting it are not always legal. Many species of sturgeon living in the Caspian Sea are overfished for caviar alone. In 1998, sturgeons were listed on the Appendix II of the United Nation's Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES). Because of this, the trade of sturgeons and their caviar has been limited. But the bigger question is if sturgeon populations will successfully recover. With long lifespans and slow maturity, this fact indicates that it will take a while before sturgeons recover from this crisis. Will our archaic sturgeon friends be able to thrive as they did those many millions of years ago, only time and conservation efforts will tell.



Zoology Destinations

Discovering Our *Very* Local Species

Because of the effects of coronavirus, otherwise known as COVID 19, hiking trails and other wildlife viewing areas are temporarily off limits. But this should not discourage wildlife viewers, as places such as backyards and neighborhoods also provide areas where wildlife can thrive. You may be surprised to know what species are able to live in your backyard environment! Instead of sulking about the fact that the *greater* outdoors is currently unattainable, take the time to discover the species that inhabit your vicinity. You never know what species you may find!

For instance....

Being able to spend more time in my backyard has allowed me to observe many species, even ones I didn't know existed! Sightings of animals I was not yet familiar with such as black-headed grosbeaks, western leaf-footed bugs, yucca weevils, and lesser goldfinches were certainly very exiting. As were those of uncommon animals such as southern alligator lizards, hooded orioles, and even a pygmy rabbit. I was also able to become more familiar with common animals of my backyard, such as northern mockingbirds, acorn woodpeckers, and California scrub jays. I was even lucky enough to discover a mourning dove nest up in the hills of my backyard! My sister and I observed the chicks for their entire nest life and even witnessed them fledging one night. We continue to monitor their progress when we see them in our backyard. What will *you* find?

So how can I Start?

Whether you are a budding naturalist, artist, writer, or photographer, there is something for everyone when it comes to backyard wildlife!

Naturalist

Identify away! Field guides are always critical when identifying species. Going on an epic adventure and can't carry the books? Mobile apps such as iNaturalist, Audubon, and eBird, are all great for identifying wildlife!

Artist

Be inspired! Notice the key features of species- from spots and colors to wildlife behavior and fur, scale, or feather textures. Explore the usage of natural components such as leaves or flowers to make a "paint" or use as decorative items in an organic collage.

Writer

Listen to the sounds of nature! How does it make you feel? Perhaps a poem or narrative, maybe even a screen play, will arise when you let nature take over your senses!

Photographer

Observe nature and wait for the perfect moment to snap a picture! Maybe a California towhee scratching at the ground or a western fence lizard basking in the sun. With a combination of sunlight and shadows you will have a stunning picture for sure!

Antlers Versus Horns

One is made of keratin and one is made bone. One detaches after a couple of months, while the other is permanent. Can you figure out which is which? It's time for yet another zoology debunker!

Antlers, a large branching structure of bone that shed annually. They are possessed by male cervids (animals belonging to the deer family *Cervidae*), such as moose, elk, and of course, the various species of deer. Female caribou, also known as reindeer, are the only exception to this fact, as they can grow antlers as well. Antlers are covered in a material known as velvet, essentially a soft blanket of blood vessels and nerves. The velvet protects the spongy bone (the growing part) of antlers that will eventually become the next later of bone and cartilage. When the time comes, either due to hormone or environment related causes, the growing of the antlers come to a stop and begins to harden into strong, solid lamellar bone. After the hardening, the velvet falls of, revealing a rather impressive structure. Males will then go into combat with each other during the mating season and will also use their rack to impress females. After that, the male will shed its antlers so that he can grow a new rack for the following mating season.

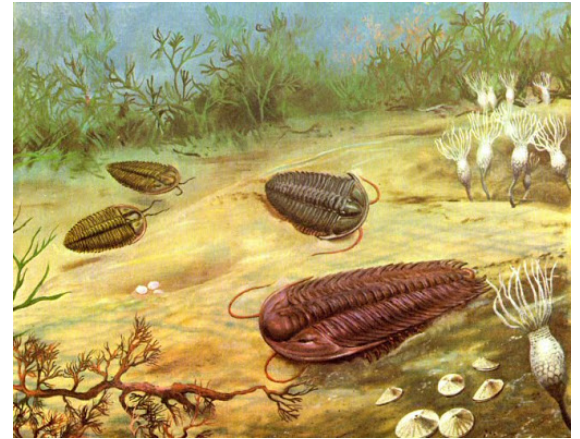


Horns can certainly be impressive too! Unlike antlers, they are made out of keratin, a protein that has strong, flexible qualities and makes up claws, hooves, skin, hair, etc. Horns are permanent, they stay with the animal all season. Horns also never stop growing, becoming gradually more impressive as years pass. In some species, both males and females possess horns, as they serve purposes beyond mating and rivalry. Their main functions encompass establishing social dominance, defending territory, and also as a weapon against predators. Horns can come in all sorts of shapes and sizes, as oppose to antlers which are pretty anchored to the branching style. Bighorn sheep for example, have horns that spiral behind the ears and then outward. Ibex have horns that reach massive lengths, have a wavy texture, and will curve far behind the ears in some species. Kudu have corkscrew-like horns that will spiral inwards. Musk oxen have horns that start at the forehead and curve outward. Bison have comparatively small and stubby horns that curve at the top. The list goes on and on.

Whether an animal wields an impressive rack of antlers, or intimidates with a pair of awe-inspiring horns, one thing is for sure, nature sure knows how to defend itself while looking totally awesome!

Prehistoric Animal of the Issue: Trilobites

One of the most iconic animals of prehistory is the trilobite, a marine animal considered to be one of the earliest arthropods, that is animals with an exoskeleton, segmented bodies, and pairs of jointed legs. Trilobites belong to the family *Trilobita*. Trilobites evolved during the Pre-Cambrian time period some 542 million years ago. Though trilobites were very well suited to their environment, previously surviving two mass extinctions, trilobites went extinct during the Permian time period's mass extinction event some 251 million years ago. If you do the math, that's some 291 million years that the trilobites lived on Earth!



The name “trilobite” means “three lobes”, it refers to the trilobite’s three lobes that make up its body. Those three lobes are the left pleural lobe, right pleural lobe, and the axial lobe. The three segments that make up the trilobite are the cephalon, or the head region, the thorax that makes up the body, and finally the pygidium which encompasses the end/tail.

Trilobites are considered to be the most diverse class of animals, containing over 20,000 individual species! Some well known trilobite genera include *Elrathia* of the Cambrian era, *Cryptothithus*, *Isotelus*, and *Calymene* of the Ordovician era, and *Eldredgeops* and *Huntonia* of the Devonian era. Some trilobites were relatively large, up to 2 feet in length, while others were shrimps, growing to be only a couple millimeters. However, there are outliers. The largest trilobite fossils are that of a species called *Isotelus rex*. The largest recorded specimen was over 2.3 feet in length!

While the last of the trilobites went extinct during the Permian mass extinction 251 million years ago, their relatives, such as the horseshoe crab, live on.

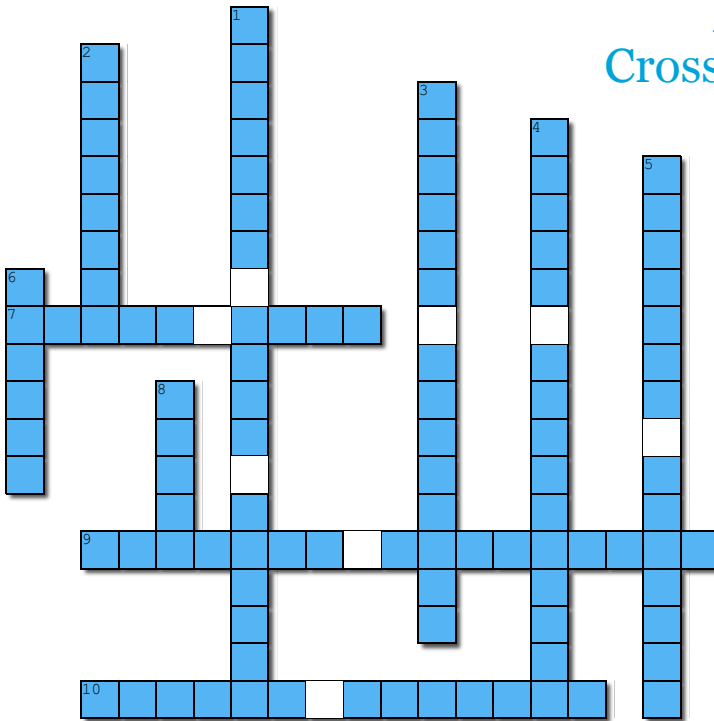
The Great Dying

Mass extinctions occur about every 26-30 million years, enough time for new species to evolve and others to meet their end. Mass extinctions are what conclude geologic time periods, when there is a big gap in the fossil record. There have been five mass extinctions so far and some say we are currently experiencing the sixth. As brutal as some of these mass extinctions have been, none measure up to that of the Permian mass extinction, also called the *Great Dying*. It is thought that during this abrupt mass extinction 96% of marine species, 70% of terrestrial vertebrate species, and some 57% of insect families perished.

What was the likely cause of such a great loss of species? Scientists suspect that giant volcanic eruptions were to blame. These eruptions likely spewed immense quantities of sulphur dioxide and carbon dioxide, likely acidifying the ocean and heating the atmosphere greatly.

Games

North American Animal Crossword Puzzle



Created using the Crossword Maker on TheTeachersCorner.net

Down

1. The largest grouse species in North America
2. A crustacean with over 200 species in North America
3. A rodent native to the Sierra Nevada
4. Members of the group take care of the eggs and young of others
5. One of the largest flatfish in the world (500 lbs, 8ft.long)
6. A feline named after its short tail
8. The largest terrestrial animal in North America

Across

7. The longest living sea star in the Pacific Northwest (20 Years)
9. An insect that competes a 3,000 mile migration from northern U.S. to Mexico
10. Has the largest olfactory (smelling) system of the birds

Zoology Term of the Issue Sexual Dimorphism, noun



Sexual dimorphism describes the differences between males and females of the same species, apart from organs. This can include size, color, and the presence of additional characteristics. For example, female praying mantises are much larger than males. In elephant seals, the opposite is true. In the case of many bird species, the males are more colorful, while the females are dull colored. Male anoles have a fully developed dewlap, females usually do not. These characteristics aid in mate selection and combat.

Name the Animal!



This animal inhabits mountainous regions of Europe and western Asia.

This insect is a member of the swallowtail family.

This animal is listed as *vulnerable* on the IUCN Red List as of August 1, 1996.

The caterpillars of this species feed on the leaves of stonecrop.

There are an estimated 23 subspecies that branch from this animal.

At the peak of summer, adults of this species can be seen drinking the nectar of mountainous meadow flowers.

This species harnesses solar energy via scales on its wings. This energy allows the cold-blooded animal to keep warm in mountainous climates.

The caterpillars of this species are black and have orange or yellow spots decorating their sides.

Females of this species are larger than the males.

Still stumped?
Find the answer on page 12!

Invertebrates Of The Issue:

Classification: *Echinodermata* and *Mollusca*

Echinodermata (“spiny skin” in Greek) is a phylum of animals that is made up of sea stars, brittle stars, basket stars, sea urchins, sea cucumbers, sand dollars, and crinoids. These echinoderms all present radial symmetry. Radial symmetry can be shown when you “cut” an animal into segments and each segment radiates from a specific point, similar to the center of a circle. There are an estimated 7,000 individual species of echinoderms living on Earth today, with an estimated 13,000 extinct species. Echinoderms have been around for about 540 million years, putting their evolution during the Cambrian era. It is believed that echinoderms had evolved from prehistoric animals presenting bilateral symmetry. Evidence includes the fact that during the larval stage of their life cycle, echinoderms are bilaterally symmetric instead of being radially systemic, as seen during their adult life. Many echinoderms move via a vascular system in their bodies that allow them to take in water and expel it through feet covered with suckers.



Mollusca is a phylum containing some 50,000 species of clams, oysters, snails, slugs, squid, octopus, cuttlefish, nautilus, and more. Each of these mollusks are part of their own class. Clams, mussels, scallops, and oysters are examples of animals belonging to the class *Bivalvia*. These animals are known for their two shells connected by a hinge that can protect the soft insides. Snails, slugs, and whelks are gastropods, part of the class *Gastropoda*. These animals are characterized by their single muscular foot and a nervous tissue called ganglion. Chitons belong to the class *Polyplacophora*. The class name means “many plated”, referring to the eight plates that make up the animal’s body. Chitons

actually have primitive eyes embedded in their plates! These eyes are able to detect light. Squids, octopuses, cuttlefish, and nautilus are cephalopods, belonging to the class *Cephalopoda*. Cephalopods are considered to be very advanced for the mollusks. Cephalopods have the most well developed nervous systems and eyes of any other classes of mollusks. Many mollusks, such as gastropods and cephalopods, have venom. It’s no wonder mollusks are the second most abundant and biodiverse invertebrate phylum (after arthropods)!



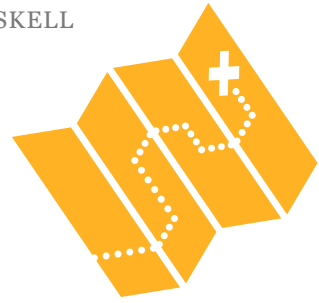
Weird & Interesting Adaptations

Name: Nudibranch (Order *Nudibranchia*)

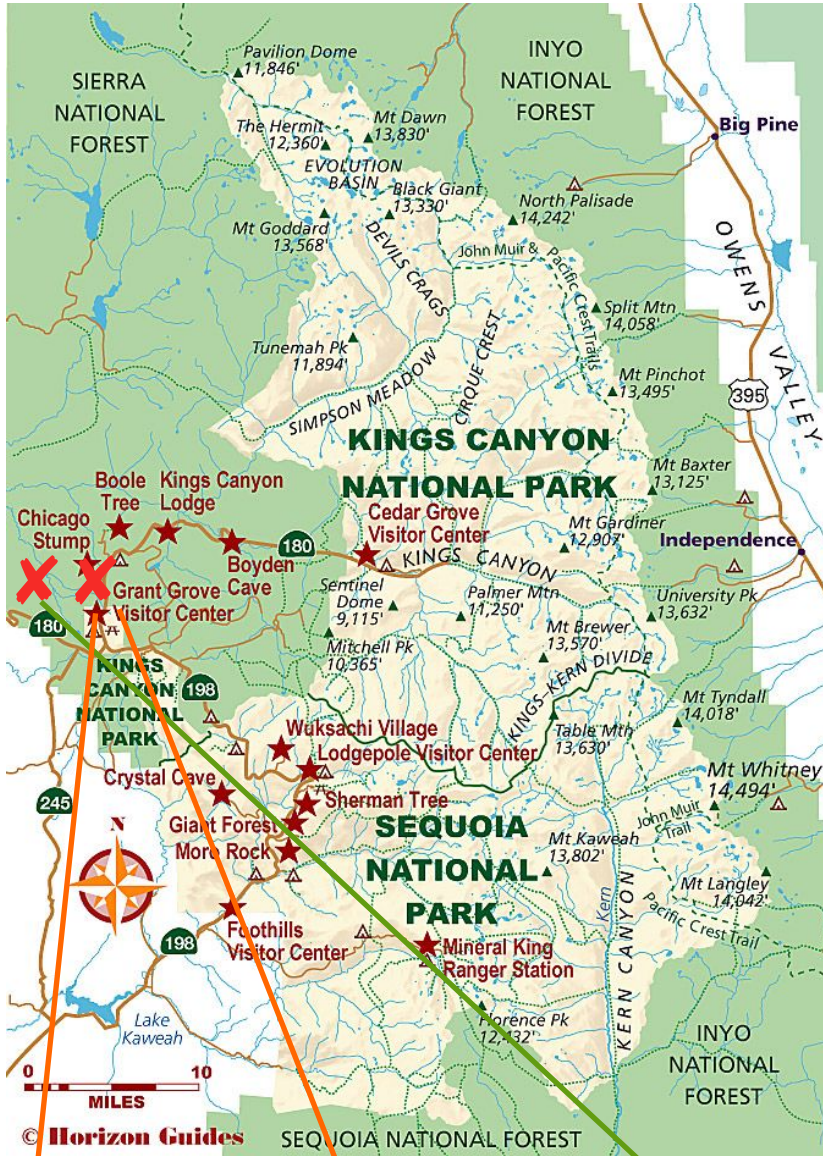
Weirdest Feature: Everything!

Purpose: Nudibranchs are an order of marine gastropod containing some 2,000 species. The name nudibranch means “naked gills”, referring to their feathery gills and horns. Some possess stinging cells and are able to secrete toxins. Nudibranchs are hermaphrodites. Who would win: nudibranch or jellyfish? Nudibranch, look it up!





From The Field: Kings Canyon National Park, California



Kings Canyon National Park, California field notes

August 31, 2019

4:41 pm

Hume, CA

- Juvenile common garter snake (*Thamnophis sirtalis*) passes by and then dashes into the brush

August 31, 2019

4:48 pm

Hume, CA

- Bicolored carpenter (*Campontus vicinus*) ant found on log, solo

August 31, 2019

5:53 pm

Hume, CA

- White-headed woodpecker (*Picoides albolarvatus*) spotted drilling holes into a pine tree

This entry is sourced from my trip to Kings Canyon NP in August, 2019.



Resources

- <https://dickinsoncountyconservationboard.com/2019/03/27/11-pollinators-from-around-the-world/>
- https://www.fs.fed.us/wildflowers/pollinators/What_is_Pollination/
- <https://www.pollinator.org/pollinators>
- <https://www.epa.gov/ingredients-used-pesticide-products/chemically-related-groups-active-ingredients>
- <https://www.lovebigisland.com/quick-and-remarkable-facts-about-hawaii/endemic-species-hawaii/>
- <https://www.iucnredlist.org/species/22720844/94686315>
- <https://savingohia.com/full-documentary/>
- <https://cms.ctahr.hawaii.edu/rod/>
- <https://whatismyspiritanimal.com/animal-holidays-celebrations/>
- <https://www.nps.gov/subjects/bats/benefits-of-bats.htm>
- https://wwf.panda.org/knowledge_hub/endangered_species/sturgeon/
- <https://www.iucnredlist.org/species/235/13043839#geographic-range>
- <https://www.ifis.org/blog/sustainable-caviar-production>
- <https://www.discoverwildlife.com/animal-facts/mammals/whats-the-difference-between-horns-and-antlers/>
- <https://www.fossilguy.com/gallery/invert/arthropod/trilobite/index.htm>
- <https://phys.org/news/2018-09-end-permian-extinction-earth-species-instantaneous.html>
- <https://www.butterflyidentification.com/apollo.htm>
- <http://web.missouri.edu/~flinnm/courses/mah/lectures/sexdim.htm>
- <https://www.youtube.com/watch?v=jhOWRzJloZ8>
- http://www.fossilmuseum.net/Tree_of_Life/Phylum-Echinodermata.htm
- <http://www.oceanicresearch.org/education/wonders/mollusk.html>
- <https://www.nationalgeographic.com/animals/invertebrates/group/nudibranchs/>

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



Wait just a minute, 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 Information

Name: _____

Question: _____

Email (also optional): _____

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

Answers- Name the Animal!

The animal on page 8 is an Apollo butterfly (*Parnassius apollo*).

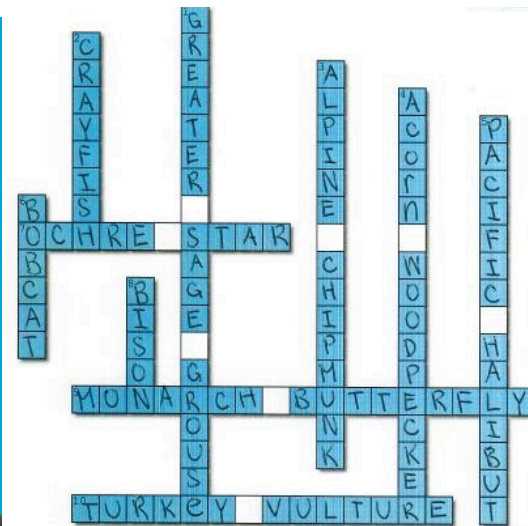
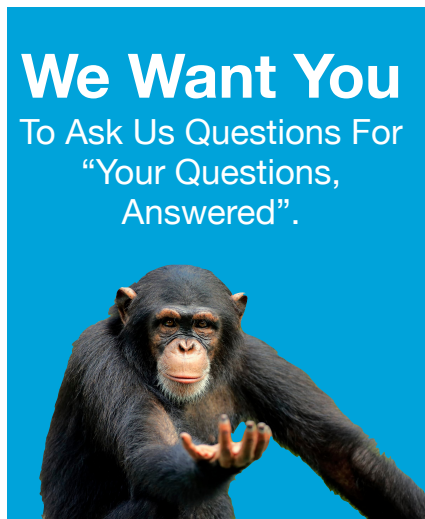
Crossword Answers



NEWS FOR THE DEDICATED ZOOLOGIST

"Those who dwell among the beauties and mysteries of the Earth are never alone or weary of life."

-Rachel Carson
Marine biologist and conservationist



Printed by Office Printers LTD.

Get Ready For The First Quarantine Issue Of News For The Dedicated Zoologist!