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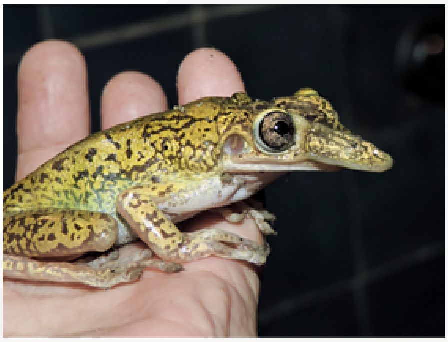
WHAT'S INSIDE?

BEST FROG FRIEND FOREVER

BY BROOKE DUGAN

I recently stumbled across a new species of frog that I need everyone to also appreciate. The shovelhead treefrog (Triprion spatulatus) goes by several equally perfect names -- the Mexican shovel-headed tree frog, shovel-nosed tree frog, and occasionally and lovingly, the duck-billed tree frog. Its species name literally translates to “spoon,” which is absolutely perfect. While there are 3 species in the Triprion genus, the Yucatán shovel-headed tree frog (T. petasatus) and Spiny-headed tree frog (T. spinosus) are going to have to step aside while I babble about this ultimate shovel face of a frog.

The shovelhead tree frog is native to the Pacific Coast of Mexico. It was first described in 1882 as part of the genus *Diaglena*, but in 2018, it was reclassified as genus *Triprion*. As of 2019, researchers suspect that the southernmost population may belong to its own subspecies or even its own species. They’re a relatively large species, averaging about 3.5-4 inches in length, and their most defining and amazing feature is their long, bill-shaped head.



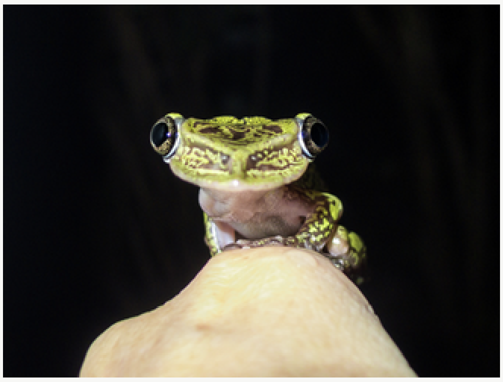
iNaturalist | Cheryl Harleston López Espino

These lowland frogs inhabit thorn-scrub and tropical deciduous forests. They breed in temporary streams and ponds created during the rainy season. Because of their specific breeding season needs, decreased rainfall patterns may negatively impact their reproduction. Wildfires in their native range pose a huge risk to their normal breeding season, making them especially sensitive to climate change.

Despite their seasonal needs, shovelhead tree frogs are classified as Least Concern by the International Union for Conservation of Nature (IUCN). They have a widespread distribution along the coast of Mexico, and presumably, the species has a large and stable population.

I couldn’t find much information about the species other than what the IUCN had listed, but let’s face it. I’m just here for this frog’s face. From head-on, they have unnecessarily wide-set eyes, ending in a little triangle of a nose. Their side profile is even worse. Their eyes are massive. Their head is narrow, and their nose looks like they're trying to draw a platypus from memory and gave it a major overbite. In short, I love this frog, and you should too.

iNaturalist | Cheryl Harleston López Espino



iNaturalist | Cheryl Harleston López Espino

iNaturalist | victor_jimenez_arcos

THE USE OF GOOGLE SCHOLAR AND WEATHER APPS IN REPTILE CARE

BY EMILY GRZEDA

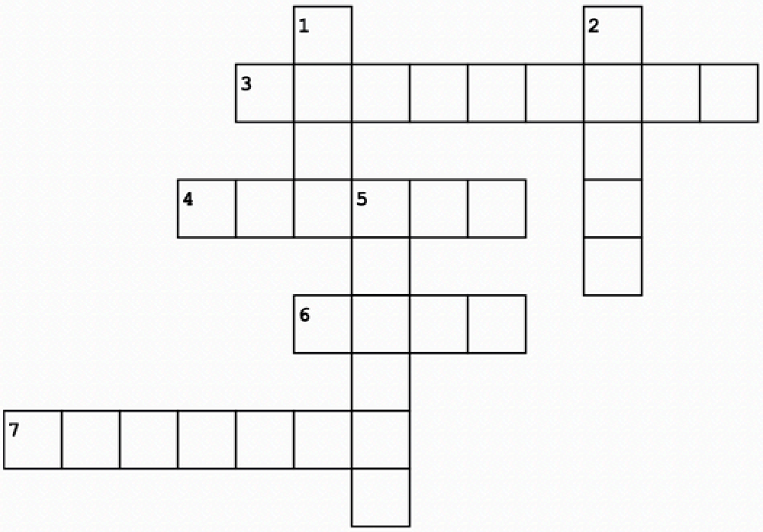
While most popular pets have well-documented parameters for which they should be kept in terms of humidity, temperatures, and lighting, less common species often do not. Learning more about the true natural history and habitat of exotic, as well as more “basic," pets can always lead to better husbandry. Using Google Scholar (or Pubmed, or any other literature search) is a great way to learn how these species live in the wild, and therefore can help build a better picture of how an animal might need its environment to be set up.

After examining the literature, you can often find major discrepancies in how we commonly keep some animals and how they really live. For example, leopard geckos in captivity are considered desert species that in captivity live on sand, have a water bowl, a small hide, and heat. However, in the wild, while they do live in that type of macroenvironment, the microenvironment that they inhabit is among shale rocks, and they only leave at dawn or dusk to hunt for food. So, why is most of their enclosure commonly a big open space? The use of these resources to research the natural history of these animals is a helpful way to compare your care to their lifestyle.

There are obvious differences between captivity and the wild that we do not want to emulate – we are not looking for them to struggle to find food or feel threats of predation. However, in many cases such as with leopard geckos, it’s not unreasonable to consider some changes, such as a much larger area of their enclosure to be covered in places to hide. Additionally, there are many parameters in the wild that naturally change with the seasons, which are important for physiological cycling. These changes primarily have to do with light, temperature, rainfall, and pressure – all of which are accessible on weather applications. Look back at the past year or two and look at those parameters of their home region and consider changing seasonal parameters based on their environments. If your species has a rainy season, mist more frequently during those months. If there are fewer hours of light, adjust automatic lights to be on for fewer hours of the day. These are small changes, but they allow for more regular biology and enrichment for the animal.

NOVEMBER ANIMAL HOLIDAYS

BY GABRIELLE DONNELLY



Across

3. November 3rd celebrates this "immortal" sea creature.

4. You can observe this November 27th holiday by adopting one of these hard-shelled reptiles.

6. America has set aside a special day for these metamorphic amphibians on November 10th.

7. The entire month of November is dedicated to awareness of these Floridian aquatic mammals.

Down

1. National Hug a ____ day is November 7th, but you might be safer hugging a stuffed version.

2. The first Saturday in November celebrates this undulate, commonly misidentified as a buffalo.

5. This galliform might be more likely to end up on your plate this month, but November promotes their adoption.

Test Your Trivia Knowledge!

BY DREW CADWELL

How long can snails sleep for?

a. 6 months
b. 1 year
c. 3 years
d. 5 years

A mandrill is what kind of creature?

a. Insect
b. Fish
c. Bat
d. Monkey

How many legs does a lobster have?

a. 6
b. 8
c. 10
d. 12

How long does it take a sloth to digest food?

a. 5 days
b. 2 weeks
c. 4 weeks
d. 2 months

What is a female wolverine called?

a. Angeline
b. Empress
c. She-Wolverine
d. Dam

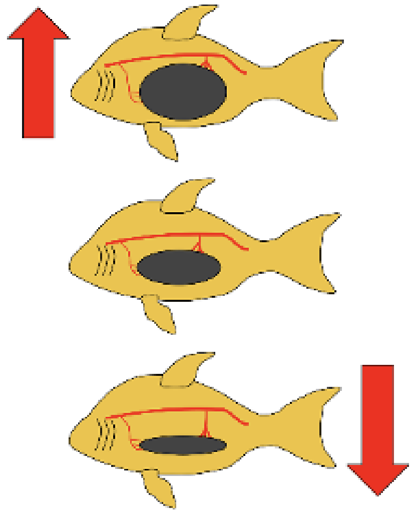
Answers: c, d, c, b, a

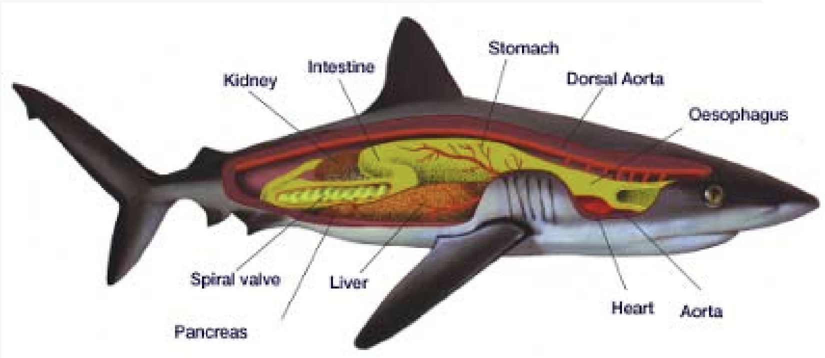
BUOYANCY OF AQUATIC SPECIES

BY RACHEL ANGLES

Most aquatic organisms have a level of natural buoyancy, a depth in the water at which they float without the input of additional energy. Many marine organisms have buoyancy mechanisms to help them vary the depth at which they can swim so that they are not having to constantly put in energy to dwell at depths above or below that of their natural buoyancy. Different organisms have adapted different methods of remaining buoyant in order to give them the greatest survival advantage.

One of the most common buoyancy mechanisms used by marine life is the use of a swim bladder. The swim bladder is an expandable sac that reduces the overall density of a fish by increasing the volume, filling the bladder with oxygen gas collected from the surrounding water by the gills. While the volume of the fish is increased, the weight is not, so buoyant force overcomes gravitational force. When the bladder is expanded, a greater volume of water is displaced and so the fish experiences a greater buoyant force. When the swim bladder is deflated, the volume of the fish is decreased and the fish experiences a less buoyant force, resulting in sinking. This mechanism is beneficial because it allows the fish to change buoyancy to evade predators or catch food.





Sharks achieve neutral buoyancy using a large fatty liver, consisting of almost 25% of the total weight of the animal. The liver is composed of the hydrocarbon squalene, the content of which remains constant. The specific gravity of squalene results in a buoyant force that overcomes gravity.

To respond to changes in weight, less abundant lipid constituents of the liver oil are varied, changing the density and overall buoyancy of the shark. Sharks are also able to vary their neutral buoyancy based on environmental factors, such as the water level or osmolarity of the sea.

The squid is one of the few animals to utilize ammonium storage in the coelomic cavity to regulate buoyancy. The coelomic cavity is isosmotic with seawater. The fluid within is primarily ammonium chloride, a relatively large volume of which is required for the squid to achieve neutral buoyancy, taking up almost 67% of the total weight of the squid. This can make them very slow, but speed is not necessary as they can use their long tentacles to catch meals and squirt ink to confuse predators.

Another mechanism of buoyancy that is common among externally shelled cephalopods such as the Nautilus is the use of a gas and liquid-filled portion of the shell. This lowers the specific gravity of the shell and tissue enclosed within to roughly the same value as that of seawater. The fluid initially filling the chambers is removed by osmosis through the siphuncle, a thin tissue that extends from the Nautilus through each chamber of the shell. The space is filled passively with gas by diffusion, and internal pressures are below atmospheric pressure. As the animal grows, it produces new tissue and shell material, increasing the density. Removal of small amounts of liquid every day serves to counteract density increases. This has adaptive significance for the animal if there is a change in the weight of the animal, for example after the ingestion of food. The Nautilus can adjust its density by emptying or refilling chambers in the shell until neutral buoyancy is achieved.

A similar mechanism is found in organisms such as the cuttlefish, where buoyancy is regulated by the movement of fluids and gases into and out of chambers in the cuttlebone. The fluid, a sodium chloride solution, has a lower osmolarity than the blood of the cuttlefish, creating an osmotic pressure to balanced by hydrostatic pressure from the flow. The membrane at the end of the cuttlebone has the capability to pump salts from this fluid and into the bloodstream, resulting in a change in osmotic pressure in response to hydrostatic pressure exerted by the external environment. This allows them to dwell at different levels in the water, so they can find food or evade predators as needed.

The sperm whale uses a different mechanism for buoyancy, due to its tendency to dive extremely deep. The mechanism involves the spermaceti organ, which makes up the majority of the head of the sperm whale and is filled with a mixture of triglyceride fats and waxes called spermaceti. It is an oil at room temperature, but if cooled spermaceti will solidify, contract, and become denser. This increase in density results in a decrease in the buoyancy of the whale. This buoyancy mechanism allows the sperm whales to dive deep in order to find food, primarily squid. They can remain at these depths for up to around 90 minutes.

PARTHENOGENESIS

BY CARLY CLARK

California condors have made their way into the news cycle recently when it was published in the Journal of Heredity that two chicks in the California Condor breeding program who were submitted for genome analysis were found to lack paternal contributions to their genetic make-up. This is evidence that the species can experience facultative parthenogenesis as a means of reproduction, an exciting prospect for an endangered species. But what is parthenogenesis anyway?

Parthenogenesis, meaning 'virgin birth', is the growth and development of an embryo without fertilization by sperm. Aside from the absence of a mate requirement, the added benefit to parthenogenesis is that unlike cloning, where offspring have identical genetics to the parent, in parthenogenesis genes separate and undergo recombination creating genetically distinct offspring.

Species can be facultative parthenogens, like the California condor, where parthenogenesis is rare and occurs due to the spontaneous and rare development of an embryo despite the lack of paternal contribution. There are also many species that are obligate parthenogens, including many species of reptiles such as the Brahminy Blind Snake (right), amphibians including many species of salamander, fish, and invertebrates that have shifted to a completely asexual mode of reproduction.

Although the exact mechanism of what causes species to shift towards asexual means of reproduction is not known, several theories suggest that parthenogenesis is more likely to evolve in species with large ecological niches and in populations with vast range distributions where physically locating mates can prove difficult.

WHAT'S ON THE MENU? – A LOOK INTO FEEDER INSECT NUTRITION

BY FAYTH KIM

Superworms or mealworms? Dubia roaches or crickets? While diversifying your pet's diet is important not only for a balanced diet but also for enrichment purposes, not all feeder insects are built equally. Identifying an appropriate feeder rotation and schedule may be dependent on your pet's size, age, and overall level of activity. Here's a look into the nutrition profiles of common feeder insects, so you too can customize your pet's balanced diet. Feeder insects often have more phosphorus than calcium which is why is recommended to dust your feeder insects with a high-quality calcium powder. Reptiles require adequate UVB exposure in order to effectively absorb dietary calcium via vitamin D3 (UVB converts inactive vitamin D to active vitamin D3). Too much phosphorus can interfere with the absorption of calcium so it is imperative to know the relative calcium to phosphorus ratio of your feeders and the supplementation with calcium when necessary. Nutritional hyperparathyroidism, commonly known as metabolic bone disease, may result as calcium stores are leached from the bone to maintain normal levels.

**Note: remember to gut-load your feeder insects at least 24 hours prior to feeding them to maximize nutritional benefits!

	Moisture (%)	Protein (%)	Fat (%)	Fiber(%)	Ash(%)	Calcium: Phosphorus
Crickets *(Acheta domesticus)*	73	18	6	2	2	1:9
Hornworms (*Manduca quinquemaculata*)	85	9	3	1	1	1:3
Mealworm larvae (*Tenebrio molitor*)	65	19	9	2	2	1:7
Superworm larvae (*Zophobas morio*)	60	19	16	4	1	1:18
Waxworms (*Galleria mellonella*)	62	14	18	1	3	1:7
Dubia roaches (*Blaptica dubia*)	66	23	7	1	3	1:3
Black soldier fly larvae (*Hermetia illucens*)	61	18	14	4	3	2.5:1

Sources and Acknowledgements

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page 4-5:

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page 6:

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