

KOMODO DRAGON CART

The following items should be on the cart, if they are not let someone in education know. If you discover a new problem with any biofact (broken pieces, loose teeth, etc.), it is your responsibility to let the staff know **and** make a notation with the date, time and your name on the sign out clipboard.

Note: Please return all items to their appropriate place on the cart, and make sure lids and bungee cords are secured. Things should be left exactly as you found them.

Note: Do not try to open the Lucite containers with the food. We are trying to prevent animals from getting into the bone room.

KOMODO DRAGON CART INVENTORY

- Komodo dragon skull (replica)
- American alligator skull
- Burmese python skull in lucite box
- Common green iguana skull in lucite box
- Komodo Dragon Resource Notebook

KOMODO DRAGON TALKING POINTS

Like other reptiles, komodo dragons continue to grow throughout their lifetime. This growth slows after 6 years when dragons reach their average adult size. Komodo dragons are both predators and scavengers. Strictly carnivorous, they consume small animals as juveniles and larger prey, even as large as water buffalo, as adults.

Generally in reptiles, teeth are simple and conical (peg-like) and they are similar shape and size throughout the jaw (homodont). Reptile teeth are continuously shed and replaced throughout their lifespan, and the upper and lower tooth rows do not contact one another. They are used for killing and holding. Reptiles swallow their food whole.



Komodo Dragon Skull



Alligator Skull



Iguana Skull



Python Skull

The teeth of the alligator are socketed with deep roots like that of humans. Iguanas have sharp, jagged teeth that are very capable of shredding leafy foods. Burmese pythons are constrictors, so they don't have fangs. They do have back curving teeth that grab prey and don't let it escape. Venomous snakes have fangs which are sharp, long, hollow or grooved teeth that are connected to a small sac in the snake's head behind its eyes. These sacs produce venom which when a snake bites is released and starts to work immediately to kill or paralyze the prey.



Komodos have about 60 serrated teeth that are about one inch long and are frequently replaced as they are lost. Further rows of replacement teeth lie behind. A dragon will go through four or five sets of teeth in a lifetime. There are no venomous sacs in a komodo but the venom resides in their mouth. They also have the rear facing teeth to help grab on to prey.

Venom vs. Bacteria:

Until 2009, it was believed that komodo dragons killed their prey with a quick bacteria-ridden bite. It was believed that the bacteria festered in the wound left by the komodo's serrated teeth resulting in sepsis. A 2009 study, by Dr Bryan Fry, confirmed that dragons are, in fact, venomous. The venom causes a decrease in blood pressure and has anti-clotting agents. Venom
San Francisco Zoo

is not delivered by “injection” like with venomous snakes, but rather oozes into the wound as the dragon bites and pulls at the prey’s flesh (inertia eating).

Jacobson’s Organ:

The **Jacobson’s organ** or **vomerinal organ (VMO)** is an organ in front of the palate of the mouth that functions as a chemical receptor. It can be found in all vertebrates but it is only enhanced in a few. It is extremely developed in the Squamata Order (snakes & lizards).

Reptiles smell using the tip of their tongue. The tongue picks up scents in the form of airborne molecules and is then withdrawn into the mouth where the scents are interpreted by the Jacobson’s organ. A forked tongue is a feature common to many species of reptiles. A forked tongue allows them to sense from which direction a smell is coming and provides more surface area for the chemicals to contact.

The tongue is flicked out of the mouth regularly to sample the chemical environment. As the tongue is brought into the mouth, it passes the two opening ducts of the Jacobson organ. These openings are separated and each half of the tongue is independent from the other, allowing one fork of the tongue for each pit. The organ identifies the chemical molecules and the information passed along to the brain where it is interpreted. If the strength of the scent is stronger on one side, the snake knows to go in that direction. The Jacobson’s organ allows the komodo to detect rotting carcasses from distances as great as 10 kilometers.

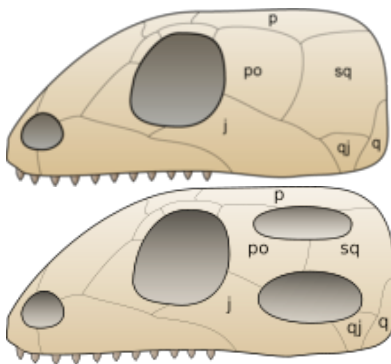
The degree of the tongue’s fork indicates the use of the organ. Those reptiles with deeply forked tongues have a more developed Jacobson’s organ than those with only slightly forked tongues. The common green iguana with a very shallow fork doesn’t use its Jacobson’s organ as much as a komodo dragon, which has a deeply forked tongue. You can see the pits on the Burmese python skull.

Parietal Eye:

The parietal eye of amphibians and reptiles appears visible as a light-sensitive spot on top of their head and is associated with the pineal gland. The parietal eye detects changes in light, and allows the animal to properly thermoregulate. It acts as a defensive measure, since an approaching predator will cause the light to change. The parietal eye is why proper UV lighting in this exhibit is important.

Modern Reptiles:

Reptiles are split into four subclasses based on the number and position of temporal fenestrae, openings in the sides of the skull behind the eyes. Modern reptiles are represented by the two below.



- Anapsid - lack temporal fenestrae
 - Order *Testudines* or *Chelonii* (Turtles, tortoises and terrapins)
- Diapsid - two temporal fenestrae
 - One dorsal and one ventral
 - Major reptiles
 - Order *Squamata* (lizards and snakes)
 - Order *Sphenodon* (tuatara)

- Order *Crocodylia*

Info on SF Zoo's Komodo Dragon – “Big Daddy Bahasa”

Hatch-date: October 8, 2011 at the Memphis Zoo

Length when came to SF Zoo 8/2013: 47 inches
(full grown at 6 years of age – 6 (F) – 10 (M) feet)

Weight when came to SF ZOO 8/2013: 5 lbs
(full grown at 6 years of age – from 150 (F) – 300 (M) lbs)

Zoo diet: Small dead mice. Fed approximately 20% of his body weight per week (servings vary depending on training/enrichment). Fed 3x/week until reaches 2 years, then 2x/week.

Temperature of building: Gradients above 85 degrees with hot spots of 110 - 120 degrees F

What special considerations are needed for captive komodos? Female komodos are more difficult to manage in captivity due to very specific conditions needed to prevent complications with egg production/laying. Need huge amounts of UV light and high temps. Perching needed for young dragons.

Do we think we'll be expanding the exhibit as he grows or moving him elsewhere when he outgrows it? After 1.5-2 years (when he is between 3 and 4 yrs of age) will likely need to expand the enclosure.

Anything else interesting that you'd like to share? Komodo dragon tail-to-body ratio changes as they grow. Young dragons have longer tails – about 2/3 of their body length. Adult dragons have tails that are roughly the same length as their body.

Reference Sheet

	Common Green Iguana	Burmese python	American alligator	Komodo dragon
Feeding strategy & Diet	Herbivore, feeding on leaves, flowers, and fruit	Carnivores, surviving primarily on small mammals and birds	Carnivores, feeding mainly on fish, turtles, snakes, and small mammals	Carnivores, feeding on carrion, deer, pigs, smaller dragons, and even large water buffalo
Habitat	Rain forests of northern Mexico, Central America, the Caribbean Islands, and southern Brazil. They spend most of their lives in the canopy, descending only infrequently to mate, lay eggs, or change trees	Jungles and grassy marshes in Southeast Asia. Young pythons spend times in trees, moving to the ground when body size prevents easy climbing. Excellent swimmers	Freshwater rivers, lakes, swamps, and marshes of the southeastern United States, primarily Florida and Louisiana	Primarily in the tropical savanna forests of the Lesser Sunda islands of Indonesia. Young dragons find safety in trees from cannibalistic adult dragons and other predators
Lifespan (wild)	20 years	20-25 years	35-50 years	25+ years
Size	6 feet	16-23 feet	10-15 feet	Up to 10 feet
Weight	11 lbs (5 kg)	Up to 200 lbs (90 kg)	1,000 lbs (453 kg)	150-300 lbs (150 kg)
Status (IUCN Red List)	Not listed, however, of the 63 iguana species listed on the Red List, 20 are Endangered and 1 is Extinct (Navassa rhinoceros iguana)	Vulnerable	Least concern. A conservation success story, as American alligators were once on the verge of extinction due to hunting. Regulations on hunting and movement of alligator hides allowed the species to recover	Vulnerable. Threats to komodo dragon survival are habitat destruction, loss of prey species, and hunting



Komodo Conservation

The world's largest lizard needs our help!

Komodo dragon populations are declining. There are approximately 3000 surviving individuals in the wild.



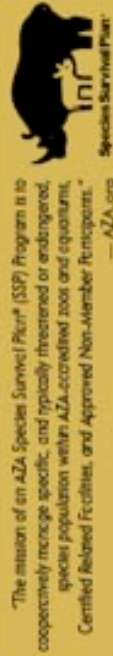
Dragon Facts

1. Males often wrestle with each other by standing on their back legs. The winner will then get access to females or a favored basking site.
2. Female dragons often use the large mound nests of the megapode bird to lay their own eggs. Komodo eggs take 7-8 months to hatch.
3. After hatching, small Komodo dragons live in trees until they are 3-4 years old. Living in trees gives them access to the right food and protects the juveniles from being eaten by the larger dragons living on the ground.
4. Komodo dragons do not swim very frequently among islands. This means that a disturbance on one island could result in a local extinction because it would take a long time for other lizards to re-establish the population.

Komodo dragons are protected within the boundaries of the Komodo National Park, which only covers a portion of their native habitat.

A main conservation effort is habitat protection within the park, however, low funding means fewer park ranger patrols. Even protected areas are at risk. Outside of the park, human population growth has led to a reduction of dragon habitat; and the poaching of rusa deer, one of the dragon's favorite prey, has led to drastic population reduction and even localized extinctions.

The San Francisco Zoo actively supports Komodo dragon conservation through the AZA Komodo Dragon Species Survival Plan (SSP). This program supports field research and conservation efforts, provides funding, staff and captive breeding at zoos around the world.



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