



EDUCATOR GUIDE

Exhibit Exploration



Exhibit: African Savanna and Aviary



From the savanna to the rainforest to the desert, the African Region showcases the animals that live on Africa's incredibly diverse continent. Due to the number of species and eye-level viewing areas, the likelihood that students will see a variety of animals is high. The African Aviary— adjacent to the savanna— houses several critically endangered birds like the carnivorous hamerkop and the desert-residing waldrapp ibis. See if you can spot the Kirk's dik dik, one of the world's smallest antelopes!



Habitat: Warm temperatures year round with high seasonal rainfall in summer followed by long droughts. The savannas of Africa have the largest diversity of hoofed animals in the world. Trees like acacia, jackalberry, and baobab trees are sparse; little to no canopy allows grasses and shrubs lots of access to sunlight. Just before you walk through the first tunnel to the savanna, keep an eye out for African plants like beach salvia and lily of the Nile thriving in our climate!



Adaptations: Given the diversity of hoofstock and large carnivores, adaptations for both predators and prey abound. Long, strong legs for fast running and faster escaping, precocial young that are born ready to run, and disruptive coloration are all important adaptations for prey-animal life on the savanna. Giraffes— the tallest land animal ranging from 12 to 18 feet tall— are advantageous acacia munchers. Their tongue, an impressive 16-18 inches long, is bluish-purple to prevent sunburn and especially strong to strip leaves from branches. Scimitar-horned oryx are incredibly well adapted to hot, dry environments: their splayed hooves make them excellent sand navigators, they can raise their body temperature from 97 to 116 degrees to avoid sweating, and they can forgo drinking for weeks due to specialized kidneys that prevent excess urination. Ostriches are very fast runners, while kudus are accomplished jumpers.



Ecology: On the savanna, many herbivores have similar diets. In the wild, specialized diets and feeding times allow them to thrive separately of each other's needs while filling different niches. Zebras prefer tall, coarse grasses, leaving behind shorter, succulent blades preferred by gnus and gazelle. *Food Web:* The savanna hosts an impressive array of food web



possibilities. Some producers: grasses, baobab trees, and acacia trees. Primary consumers and herbivores range from impalas, warthogs, zebras, oryx, giraffes, elephants, and antelope. Secondary consumers and carnivores like lions, cheetahs, hyenas, and marabou storks are formidable. Ostriches, duikers and patas monkeys are omnivores, while vultures and hyenas scavenge. To complete the circle, bacteria, fungi, and termites decompose the leftovers and waste.

TEACHER TIP!

An adorable clip of our adorable baby giraffe! <http://www.youtube.com/watch?v=xNsALiHirGk>
An inside look at the Giraffe Lodge! <http://www.youtube.com/watch?v=GWD2gti1tPE>



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Exhibit: Lemur Forest



This multi-species habitat houses seven types of lemurs: ring-tailed, black, blue-eyed black, red bellied, black and white ruffed, red ruffed, and red-fronted brown. See if you can spot them all!



Animal behavior: Due to the number of individuals in the Lemur Forest, this is a great spot to observe behavior. Notice where the animals congregate, how they communicate with each other, and how they get around. The ring-tailed lemurs spend a lot of time on the ground, whereas other species spend more time in the trees. You can often find the lemurs moving through the trees, leaping from branch to branch, or eating while hanging upside-down on the nets.



Adaptations: Lemurs are prosimian primates endemic to Madagascar. They have small bodies, a long nose, and large eyes. They have an excellent sense of smell and use scent as a way to communicate with other lemurs. Using the scent glands on their wrists and posteriors, they leave scent trails to mark their territories and identify individuals. They also rely greatly on their keen sense of smell to help them decide what is acceptable to eat. Their long tails are helpful for extra balance in the trees, and ruffed lemurs are quadrupedal. The ruffed lemurs (red and black-and-white) use a specialized claw on the second toes of their hind feet to brush their coats. Lemurs also use their six bottom teeth to form a 'toothcomb'—a tool to help groom themselves and other members of their social group. Ring-tailed lemurs are the most terrestrial, spending a great deal of time huddled together on the ground for warmth. The intense-sounding vocalizations of ruffed lemurs are mostly for territory announcement and general communication. Surviving in a dense forest requires loud, impressive noise-making skills. Their grasping, semi-opposable, large thumbs and toes are also incredible tree-life adaptations.



Habitat: Endemic to the island of Madagascar. Lemurs are important seed dispersers through their droppings. Since most Madagascar birds and bats—primary seed spreaders in other parts of the world—are insectivores, lemurs are instrumental in dispersing seeds. The 40-foot-high tree known as the traveler's palm probably owes its existence to the black-and-white ruffed lemur, thought to be the plant's main pollinator. Currently, all lemurs are endangered, due mainly to habitat destruction and hunting. Their dense forest habitat niches vary from canopy levels in coastal rain forests to primary and secondary tropical forests, to coffee plantations, to dry lowland forests.



TEACHER TIP!

Check out a short clip of a feast from a lemur's point-of-view!
<http://www.youtube.com/watch?v=epWFr-uWWqw>

Exhibit: Meerkats and Prairie Dogs



Get ready for adventure— this exhibit is immersive! There are meerkat foraging sandboxes, buddy-necessary drinking fountains, and cutaway models of prairie dog dens to better view the “rooms” in their burrows. These two species— an omnivore from Africa and a herbivorous rodent from North America— demonstrate how animals from very different parts of the world can have similar traits, especially the social behavior and cooperation that allows them to survive.



Animal behavior: Meerkats and prairie dogs are social, diurnal animals that live in large groups. While individuals may fill specific roles like teacher, babysitter, or hunter, both prairie dogs and meerkats are family oriented with each family contributing to community life. They share the responsibility of looking out for predators; listen for yips or barks that alert others of an overhead threat. Prairie dogs also communicate via smell, touch, and grooming. In the wild, they “kiss” when encountering another individual to ensure they are familiar.

TEACHER TIP!

Recommended reading: *Prairie Dogs* by Dorothy Hinshaw Patent



Habitats: Meerkats live in southern Africa in dry, arid country with red soil, rocks, and termite mounds. They are predated mostly by jackals, eagles, and falcons. A meerkat mob will sometimes use the dust to their advantage and create a cloud for cover from predators. Their home territory can extend up to four square miles! Prairie dogs reside in burrowed “towns” in the Great Plains— dry, open grasslands with low, moderately sparse vegetation. By colonizing spaces with low-statured grasses, they often select areas with past human and animal disturbance. As of 2004, their wild range had decreased by 98%¹, mostly due to cropland development. The burrows of both species help to regulate temperature and keep humidity levels high, ensuring the animals stay hydrated, cool in the summer, and warm in the winter.



Adaptations: Meerkats have immunity to natural poisons and venoms, enabling them to eat scorpions and venomous snakes. Their tail and feet form a “tripod” for better balance when

standing. Their coat is expertly camouflaged: dark skinned bellies and light fur act as a solar panel while dark marks around their eyes serve as sunglasses. Their claws are perfect for digging and their wet nose is great at sniffing out prey. Similarly, prairie dogs are also excellent diggers, energetic and efficient in creating burrow towns for their colony.



Slender-tailed meerkat
Suricata suricatta



Black-tailed prairie dog
Cynomys ludovicianus



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Exhibit: Penguin Island



Quite the sight, penguin feedings occur twice daily. Each penguin is hand fed herring and capelin by a penguin keeper and recording assistant. This helps the Zoo keep an accurate tally of how much each penguin is being fed, and is a great way to administer individualized vitamins or medicines when necessary.



 **Habitats:** Contrary to popular belief, not all penguin species live in the Antarctic! Magellanic penguins are one of 17 penguin species, all of which reside in the Southern Hemisphere At the southern tip of South America— where the climate is not much different than San Francisco’s— you will find Magellanic penguins. They inhabit rocky, coastal terrain with some grasses and low shrubs. They eat squid, cuttlefish, and sardines in the wild.

 **Adaptations:** Penguins are highly specialized, flightless sea birds. With more than 70 feathers per square inch, their dense, oil-covered coat keeps their torpedo-like bodies insulated and waterproof. They work very hard to keep their coat oily by preening often from their uropygial gland at the base of their tail. A layer of fat below their feathers also improves insulation, and a salt excreting gland near their eye helps rid their bodies of excess salt. A nictitating membrane— similar to a third eyelid— enables penguins to keep their eyes open and protected underwater. They have solid, dense bones and strong chest muscles to aid their paddle-like wings in underwater propulsion. Penguins are extremely fast swimmers, reaching up to 15 miles an hour! From below, Magellanic penguins’ white bellies blend in with the sky; from above, their dark backs blend well with the water. They have a sharp, hooked beak that expertly snatches prey. Backward-facing spines line their mouths to help them swallow prey whole— impressive!

 **Life cycles:** Magellanic penguins are the only penguins that breed on the mainland of Patagonia. Breeding season lasts from September through February. In the wild, the penguin couples dig burrows for their nests and pad the burrows with vegetation. A pair may use the same burrow for years. Females usually lay two eggs, but usually only raising one chick into adulthood. Both parents care for the young, alternating sitting the eggs and hunting for the chicks. After a few months, the juvenile Magellanic penguins have their waterproof feathers and are ready to swim. On average, they live around 20 years in the wild and up to 30 in captivity.

TEACHER TIP!

Scan the QR code on the Lion House side of Penguin Island to watch a video of a newly hatched penguin chick, or watch it here!

<http://www.youtube.com/watch?v=SgvD6y54-sY>

Can't get enough? Here's a video of our penguin colony getting check-ups!

<http://www.youtube.com/watch?v=hNAMrFrJq2Q>

Exhibit: Cat Corner



Animal classification: There are 36 species of felids ranging from 5-pound house cats to 500-pound Siberian tigers. Felids are usually divided into two subfamilies: large cats (Pantherinae) and small cats (Felinae). Generally, small cats are those with a hardened hyoid bone and cannot roar. Some similarities between all felids: agile, soft-furred body; acute vision and hearing; well-padded paws; retractable claws (with the exception of cheetahs);

carnivorous; hunt in dim light by stalking and waiting; and cats—except for lions—are solitary and monogamous. Felids have five toes on their forefeet and four toes on their hind feet. Felid cubs are altricial at birth—often blind and deaf—and require extensive maternal care.



Habitats: Habitats can vary, but a large majority of felid species are associated with forests and woodlands. Separated from the Asian mainland, Sumatran tigers reside on the Indonesian island of Sumatra. Snow leopards are found in high altitudes of central Asia whereas African lions reside on the grassy plains of Africa. Fishing cats, found throughout Southeast Asia, prefer marshy thickets, mangrove swamps, and dense cover along streams.



Adaptations: Felids may be the most morphologically specialized hunters of all carnivores—their prey is often the same size as, and sometimes larger than, they are. They have sandpapery tongues to aid in scraping meat and tissue off of bones. Sumatran tigers' smaller size makes it easier for them to make their way through the jungle while stalking and ambushing prey. They have webbing between their toes making them excellent swimmers; they will chase fast-moving hoofstock into the water where they become slow, easy prey. Well suited for a rugged, mountainous environment, snow leopards have long hind limbs and paw cushions that provide traction and aid snow leopards in scaling rough, uneven rocks. Their long tail is good for balance and extra warmth in extreme conditions. In contrast, both bobcats and fishing cats are known for their short tails. Unlike most other cats, fishing cats prey on fish as opposed to small mammals. They lightly tap their paw against the surface of the water to mimic insect movements and either scoops out its prey or dives in to retrieve it—yum!



TEACHER TIP!

Our cats have access to indoor and outdoor yards, so they may not always be visible. If you can, check the daily schedule to swing by the Lion House and witness a keeper talk about Felids!



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Exhibit: Puente al Sur



Puente al Sur is a multi-species exhibit with capybara, rhea, anteaters, and black swans. There is even a viewing window to see the anteater's indoor quarters!



Habitats: Anteaters are native to swamps, grasslands, and forests ranging from southern Belize to northern Argentina. Evolutionarily, they are thought to be members of the last living group of animals to have evolved in South America when it was an island continent. Capybaras are found only where there is water nearby; from open plains to tropical forests, they thrive in swampy, marshy, grassy areas. Ecologically similar to African hippos, capybaras are considered habitat specialists and are mostly preyed upon by jaguars and anacondas. Black swans can be found in large Australian lakes and lagoons— they are also present in New Zealand and Sweden— feeding on aquatic plants and grasses. Rheas roam the open pampas and sparse woodlands of Argentina and Brazil.



Adaptations: Capybaras are incredibly well-adapted to an aquatic lifestyle. They have webbed toes for superb swimming; their eyes, ears, and nostrils are located close to the top of their heads to allow for full-body submersion. They can even mate and sleep in the water. Did you know black swans have 25 neck vertebrae? This means they don't have to dive for food and have lots of flexibility! The giant anteater is a specialist at its craft. They walk on their knuckles to keep their digging claws sharp and locate prey by scent. They work on an ant colony for about a minute, feasting on ~30,000 insects a day. Their tongues can be as long as two feet but are only ½-inch wide and can extend up to 150 times a minute. Anteaters don't chew because they don't have teeth. Instead, they crush insects against growths on the roofs of their mouths and sides of cheeks. To aid in the digestion of all of those insects, their stomachs have extra strong walls— impressive! Like their ostrich relatives, rheas have long, powerful legs that are excellent for outrunning predators. They will often squat amongst bushes, flattening their body against the ground to help go unnoticed. Their wings, while not used for flight, are used as rudders to change direction as the bird runs up to 37 miles per hour.



Animal classification: Capybaras, the world's largest rodents, are like other social rodents (chinchillas, guinea pigs, porcupines) when it comes to play time! Individuals chase each other and play-wrestle at any age. Similar to guinea pigs, their vocalizations are squeaks and grunts. Along with cassowaries, ostriches, and emus, rheas— the largest bird in the Americas— belong to a group of large, flightless birds called 'ratites'. Giant anteaters are the largest of the 4 species of anteaters and differ greatly from others. Their elongated snout and long tail are two of the biggest giveaways (smaller anteater species have short snouts and prehensile tails).

TEACHER TIP!

Looking for lots of cuteness? Check out an anteater baby!

<http://www.youtube.com/watch?v=Azt7wt7q6d8>

You can also see some behind-the-scenes capybara training:

<http://www.youtube.com/watch?v=gNJtYywn6k>



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Exhibit: Grizzly Gulch



Habitats: Grizzlies thrive in high mountain wooded areas, tundra, alpine meadows, dry steppes, and Arctic shrublands— they occupy a greater diversity of habitats than any other species of bear! Their current North American range flows through Alaska, Western Canada, Idaho, Montana, Washington, and Wyoming. They can also be found in Europe and Asia. In recent generations, the grizzly bear has been hunted for sport and threatened by people moving into their habitat and causing large scale deforestation. Despite the appearance of the grizzly on the state flag, they have been extirpated in California since 1922. Habitat use by females with young differs from that of males; females with young tend to avoid areas where male bears hunt or fish to avoid infanticide.



Animal behavior: Grizzly bears tend to live solitary lives and usually only come together during breeding season or when females are raising their cubs. Varying greatly in size, adult females can weigh anywhere from 200-450 pounds, while males can range from 300-850 pounds. Despite this dimorphism, females with cubs will still challenge alpha males if necessary. The guard hairs on their backs are tipped in white thus giving them a ‘grizzled’ appearance. The large shoulder hump provides muscle to the forelimbs to dig winter dens, dig up roots, strike down a prey animal, or compete with rival males. They have excellent hearing and sense of smell that compensates for their less than stellar eyesight. Dens are used for protection and security in winter. Remaining dormant in winter months, their breathing rates, metabolism, and body temperature lower greatly.¹ Grizzlies do not seem to defend territory, but rather “personal space”. Bears of all ages have been seen playing, while young bears wrestle and tumble together. Grizzlies have several different vocalizations depending on purpose: growls and roars when threatened, snorting and barking during an attack, and when content, a popping noise is made with their lips and cheeks.



Ecology/food webs: The feeding behavior of North American grizzlies often depends on the availability of food sources— they love salmon-filled rivers! Due to plentiful food sources, coastal grizzlies are usually slightly larger than non-coastal bears. While grizzlies are capable of hunting large prey like moose or caribou, they often eat various plants and berries, insects, fish, and small mammals. They may scavenge garbage or pet food thereby bringing them into contact with humans.

TEACHER TIP!

The daily feeding tends to get crowded, but is totally worth it— get there early for a spot near the viewing window!

Meet our grizzly sisters, Kachina and Kiona:
<http://www.youtube.com/watch?v=VuB-GqGiRi4>

