

# TOUR: WHAT'S FOR LUNCH?

## OBJECTIVES

Compare and contrast herbivore, carnivore and omnivore, including a discussion of eye and ear placement, differences in dentition (identify and describe the use of the canine, incisor and molar teeth); explain beak adaptations for food eaten by different birds; discuss how both prey and predators avoid detection (lack of movement, camouflage, etc.); discuss relationships within a food chain, including photosynthesis and the importance of scavengers.

## KEY TERMS

Carnivore, herbivore, omnivore, predator, prey, scavenger, Jacobson's organ, camouflage, detritus, nutrition, food chain, food web, photosynthesis, producers, consumers, trophic levels

## BEFORE YOU START

Discuss with the other docents where each of you will start. Make sure one of you has the key to the kangaroo barn. Remember that visiting a diverse selection of animals will allow you to compare and contrast their different food habits.

## GETTING STARTED

To get them thinking in terms of food procurement, ask your audience questions such as "What do most animals spend most of their time doing in the wild?" (Other than the big cats, most animals spend the bulk of their time looking for food, while trying to avoid getting eaten!) Early on quiz them about the "vores" and engage them in a discussion comparing and contrasting the "vores." Referring to their own teeth is one way of helping to illustrate differences in various types of animal dentition. If you cover eye/ear placement of prey/predators early on in your tour, you can have the audience tell you whether or not each mammal you visit is a prey animal or predator by using just that information.

Explain to your audience that we have several animal kitchens/food prep areas, each with refrigerators, freezers and sinks. (You may want to ask them why only one has a stove—animals eat their food raw in the wild and cooking it would result in the loss of some nutrients.) Remind them that animals need a variety of nutrients to meet their basic needs.

Following is a list of some of the animal exhibits along with some suggestions which point out a few of the many ways in which you can use the animals to highlight and illustrate the concepts and terms listed above. Remember, these are only a few suggestions. Be sure to consult the animal data sheets for more detailed information on their feeding habits and other pertinent information. Note: Zoo diets are also listed for most of the animals.

## ANIMALS TO HIGHLIGHT

**Arctic fox:** Carnivore; note placement of eyes and ears; seasonal variation in color of fur, cryptic camouflage. When food is really scarce in the winter, they have been known to scavenge polar bear kills. Zoo diet: dry dog food, fish, hard-boiled eggs, carnivore diet.

**North American river otter:** Carnivore; note placement of eyes and ears; webbed feet, tail used as rudder, dense under fur which traps air for insulation—these adaptations allow otters to be experts at catching fish; discuss the wide variety of prey this predator catches in addition to fish. Because they are so active (high metabolism), our otters are normally fed three times/day. Zoo diet: fish, dry dog food, carnivore diet.

**Bald eagle:** Carnivore, note placement of eyes; incredible eyesight for detecting prey at great distances (prey can be spotted from one mile in the sky); will scavenge, especially in the winter when food is scarce; will also migrate (a few miles or a thousand) in the winter to find ice-free water; will occasionally steal fish from osprey, another raptor, which is even better at catching fish than the eagle; this a great species to discuss food chains/webs—algae-insects-small fish-larger fish-bald eagle. Be sure to include photosynthesis. For upper elementary students, it's also a good time to discuss producers, consumers, and trophic levels. Zoo diet: fish, mice, bird of prey diet.

**Gray wolf:** Carnivore; note placement of eyes and ears; wolves are social (pack) and hunt their prey (which are often much larger than they are) as a well-coordinated team; like most large predators, they have "feast or famine biology"—kills may be several days apart and they can take advantage of hunting success by consuming very large amount of meat, up to 20 pounds! Wolves locate prey with their incredible sense of smell—up to a thousand times better than ours. Zoo diet: dry dog food, carnivore diet, fish (as an extra source of protein).

**Barred owl:** Small animals, including squirrels, chipmunks, mice, voles, rabbits, birds (up to the size of grouse), amphibians, reptiles, and invertebrates. They hunt by sitting and waiting on an elevated perch, while scanning all around for prey with their sharp eyes and ears. They may perch over water and drop down to catch fish, or even wade in shallow water in pursuit of fish and crayfish. Zoo diet: Bird of prey diet, mice.

**Farm yard:** All of these animals are herbivores, with the exception of two species (have your audience guess which two are not) which are omnivores (chickens and Guinea hogs); note placement of eyes and ears on all the herbivores; goats are ruminants. Zoo diets: varies somewhat depending on animal, but for most it's hay, grain/pelletized food.

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**Kangaroo barn/freezer:** Discuss the feeds that are visible: hay (we use both alfalfa hay, which is high in protein, and grass hay which is lower in protein because some of our herbivores need food which compares to that which they would eat in the wild.) Show them the walk-in freezer and the fish and carnivore diets housed there.

**Camels:** Herbivores; note placement of eyes and ears; discuss the camel's hump (if you ask what is in the hump, most people will say "water") and fat storage—humps are much larger in the fall and winter; camels are ruminants; camel bodies are very efficient in their use and conservation of water; camels can drink up to 30 gallons of water once they do come across some in the desert. Camels can defend themselves from predators by biting and kicking—unlike horses and donkeys, they can kick in all four directions. Zoo diet: hay and pelletized food (they chew any wood they can reach!)

**Patagonian mara:** Herbivore; note placement of eyes and ears; like rabbits, these animals, which are actually rodents, produce two types of fecal pellets—soft ones which are re-ingested (to get more nutrition from their poorly digested food—eating of feces is called coprophagy), and firm pellets which are not re-ingested; cryptic camouflage. Note: You can talk about predators of the maras (jaguars, eagles) and lead into a discussion of: predator/prey, food chains, food webs, etc. Zoo diet: hay, pelletized food.

**Spider monkeys:** Omnivores; using their prehensile tail allows their hands to be free to pick fruit and grab insects. Being social gives them multiple eyes and noses to find food and to detect predators. Zoo diet: primate biscuits, produce on M-W-F.

**Magellanic penguins:** Carnivore; exhibit counter-shading; discuss why they are the only animals we hand feed (for both nutrition and disease prevention); talk about the parents taking turns with incubation and feeding of the young.

## FELINE & PRIMATE BUILDING:

**Primates:** All our species are omnivores; being social provides multiple eyes, ears and noses to detect predators and food. Tamarins are strictly arboreal (tree-dwelling), lemurs spend a little time on the ground, but are mostly arboreal, and mandrills spend most of their time on the ground and use trees primarily to escape danger and to roost at night. Zoo diets: primate biscuits, produce on M-W-F.

**Big cats:** All are carnivores; note placement of eyes and ears; extremely powerful jaws and legs; sprinters, not endurance; retractable claws; spend most of their day resting, conserving energy; have very elastic stomachs and can consume large amounts of meat when they make a kill.

**Lions:** The only social large cats (pride), often hunt extremely large prey; utilize cryptic camouflage contrast this with the disruptive coloration of zebras, one of their prey.

**Amur tigers and snow leopards:** Have fur with color patterns than can function as either cryptic or disruptive depending on the color of the habitat; both are solitary. Zoo diet (all): carnivore diet, large bones; the big cats are fasted one day/week.

## BIRD & REPTILE HOUSE:

There are examples of herbivores, omnivores and carnivores;

**Birds:** Discuss differences in bills, gizzards and use of grit, crops and food storage. Zoo diets: varies with species, but may include bird of prey diet, meal worms, wax worms, crickets, seeds, produce.

**Snakes:** All are carnivores; have loosely hinged jaws for swallowing large prey; either constrictors, swallow prey while still alive (garter snakes), or are venomous; Jacobson's organ; cryptic camouflage. Zoo diet: rodents offered weekly. Digestion is slow and temperature-dependent.

**Lizards:** Carnivores or omnivores, depending on the species; Gila monster is one of only two species of venomous lizards in the world; all of our lizard species exhibit cryptic camouflage.

**Amphibians:** All of our species are carnivorous; poison dart frogs use bright colors to warn predators, frogs' tongues attach at the front of their mouths and are sticky—the tongue is flicked out to capture insects and other small prey. Zoo diet: varies with species: meal worms, crickets, wax worms, fish.

## MIDDLE/HIGH SCHOOL

In addition to more depth and detail with the above topics, you can add discussion of the following terms and concepts: carnassial teeth, apex predator, biomagnification, simultaneous calving, coprophagy, ruminants.

**Carnassial teeth:** These large, pointy teeth (premolar and first molar), found in many carnivorous mammals, are used for shearing flesh and bone in a scissor or shear-like way. Many modern carnivores, e.g., lions, eat meat from other vertebrates or invertebrates and have well-developed carnassial teeth. In others, the carnassial teeth have become adapted to an herbivorous or to an omnivorous, mixed diet of meat and vegetable. The premolars and molars of modern bears are modified to grind vegetable matter.

**Apex predator:** Also alpha predators, or top-level predators. Predators that, as adults, are not normally preyed upon in the wild. Apex predator species are often at the end of long food chains, where they have a crucial role in maintaining the health of ecosystems. One study of marine food webs defined apex predators as greater than trophic level four. Food chains are often far shorter on land, with the top of the food chain limited to the third trophic level, as where

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such predators as the big cats, crocodilians, hyenas, wolves, or giant constrictor snakes prey upon large herbivores. Also applies to such omnivores as grizzly bears and humans that eat considerable vegetable material as well as much meat but are not themselves prey in most of their range.

**Biomagnification:** This is the accumulation of a substance up the food chain by transfer of residues of the substance in smaller organisms that are food for larger organisms in the chain. It generally refers to the sequence of processes those results in higher concentrations in organisms at higher levels in the food chain (at higher trophic levels). These processes result in an organism having higher concentrations of a substance than is present in the organism's food.

**Synchronized calving:** A strategy utilized by several species of large ungulates in which most of the population gives birth within a very short period of time. In the Serengeti in Africa, 500,000 wildebeest calves are born within a 2–3 week period. In northern Canada and Alaska, 80–90 percent of all caribou calves are born within a 10-day period in early June. The synchronization serves two important functions: it reduces the chance that an individual calf will be killed by predators and calving almost always coincides with the peak abundance of nutritious plants.

**Coprophagy:** This is a behavioral digestive process seen in rabbits, hares, guinea pigs, most rodents and several other mammal species. Literally translated, coprophagy means

“feces ingestion.” However, in the species mentioned above it involves the production of special “soft pellets” in the cecum, which maintains cultures of beneficial bacteria. These soft pellets have twice the protein, and half of the fiber of the typical hard fecal pellet. They also contain high levels of vitamin K and B vitamins and are usually immediately ingested after being expelled.

**Ruminants:** Ruminants have a fore-stomach with four chambers. These are the rumen, reticulum, omasum, and abomasum. In the first two chambers, the rumen and the reticulum, the food is mixed with saliva and separates into layers of solid and liquid material. Solids clump together to form the cud (or bolus). The cud is then regurgitated, chewed slowly to completely mix it with saliva and to break down the particle size. Plant fibers, is primarily broken down in these chambers by microbes (bacteria, protozoa, and fungi). Ruminating mammals include cattle, goats, sheep, giraffes, American bison, European bison, yaks, water buffalo, deer, camels, alpacas, llamas, wildebeest, antelope, and pronghorn.

**Hindgut fermenters:** Split into two classifications according to whether they depend primarily on the cecum or colon for microbial digestion. Cecal fermenters include rabbits, guinea pigs, chinchillas, and rats. Large nonruminant herbivores, such as horses, rhinoceroses, gorillas, and elephants, depend more on the colon for microbial fermentation.