# INTRODUCTION

We humans have had a long association with wild animals. For all but the last few thousand years of our two million years, we have depended on them for our very existence. We were hunters in our early days, drifting along with the game herds, dipping into that seemingly inexhaustible river of life for our food and clothing. When the herds prospered, we are well; when hard times came on them, our bellies shrank. So close was our relationship with wild animals, we called them our brothers.

The Chinese and Egyptians were the first to establish collections of wild animals. About five thousand years ago, Chinese emperors maintained animal parks for their private use, usually hunting. The Pharaohs of Egypt sent expeditions into the interior of Africa to collect animals for royal menageries. Later, Roman legions sent back wild animals, along with human slaves, from their conquests. Often these two – animals and humans – ended up pitted against each other in gladiatorial battles for their captors’ entertainment.

The first true zoo was built in France by Louis XIV, but it was modern only in comparison with what had existed before. Louis’ wild animals were housed in champed, dirty cages, often by themselves, and fed food which rarely approximated their natural diet. Mortality rates were high, but little attention was given to this; dead animals could be replaced easily from the rivers of wildlife still flowing in the wilderness.

At the turn of the 20th century the first modern zoo was designed and built at Stellingen, near Hamburg, Germany. It had a minimum of cages and barred enclosures; animals were exhibited in large, “natural” surroundings of artificial mountains, plains and caves, usually with others of their species.

# THE HISTORY

And now I want to tell you about the most famous zoo in the world – The San-Diego Zoo.

## In Began with a Roar

The San Diego Zoo, established in 1916, was far differ­ent from today's grand; exotic, zoological garden. For the most part, it grew from a small collection of animals held in traditional circus like cages that formed a por­tion of the city's 1915-1916 Panama-California Inter­national Exposition held in Balboa Park. After the close of the Exposition, a San Diego physician, Dr. Harry Wegeforth, rescued these animals and started the pres­ent Zoo. He would later recall how it all began:

*On September 16, 1916, as I was returning to my office after performing an operation at St. Joseph Hospital, I drove down Sixth Avenue and heard the roaring of the lions in the cages at the Exposition then being held in Balboa Park.*

*I turned to my brother, Paul, who was riding with me, and half jokingly, half wishfully, said, "Wouldn't it be splendid if San Diego had a zoo! You know ...I think I'll start one."*

Wegeforth's idea, with the help of other interested San Diegans, would take shape and prosper over the years. Even as a child, growing up in Baltimore, Mary­land, he was fascinated by animals. He regularly staged "circuses" in his backyard, using toy animals and stitched-together flour sacks for a "big top" tent. This interest went far beyond normal childish play, because young Harry had done extensive research on the real-life behavior and characteristics of his animal me­nagerie and enthusiastically explained all of this to visitors at his "performances."

Later on, as an adult, Wegeforth obtained a medical degree and moved to San Diego in 1908 to set up his practice. The work of building the Zoo, however, was soon to consume almost all of his time. It was a gamble and a dream that he lived daily, but a task he relished.

Together with four other men—Dr. Paul Wegeforth, Dr. Fred Baker, Dr. Joseph H. Thompson, and Frank Stephens—Wegeforth founded the Zoological Society of San Diego on October 2,1916. In 1921, the City of San Diego granted the Society its present home in Balboa Park, and, by 1922, Wegeforth, a few staff members, and a small collection of animals had begun moving in.

Even at this early date, Wegeforth was promoting a zoo that was different from most in existence at that time, including demerits that would, as years passed, result in its being called the "world's greatest zoo." For example, he envisioned a zoological garden where animals could be integrated with plants in pleasing settings with no bars or traditional cages to obstruct a visitor's view. He promoted the idea of grotto and moat enclosures—something just being tried in European zoos and almost unknown in America.

While riding around the Zoo grounds on his Arabian stallion, Wegeforth would map out in his mind the location of exhibits. Mesas would hold hoofed mam­mals, reptiles, and birds; the canyons would be re­served for bears and cats. In Johnny Appleseed fashion, he scattered and planted seeds for the new plants he desired. Roads that were laid out for the first bus tours are still used today.

To supplement the initial group of animals gathered from the Balboa Park Exposition, Wegeforth made col­lecting trips to other countries and other zoos, both here and abroad. His aggressive style of exchanging local animals, such as rattlesnakes and California sea lions, for more exotic species soon earned him the title of "Trader Wegeforth." Other animals were donated to the Zoo from private individuals or Navy ships that docked in San Diego and brought "gifts" to Dr. Harry's Zoo.

Through personal vision, determination, his own financial contributions, and those of others, Harry Wegeforth created the San Diego Zoo. To the unin­formed observer of the time, it might have seemed that he realized his dream from almost nothing. Indeed, some of the early exhibits were built from castoffs and discards from other construction projects — things that he could acquire for free4 much as he had built his play menageries as a child. He cajoled local wealthy citizens to help him by arousing their' concern for the animals and their city pride. One of his greatest benefactors was newspaper heiress Ellen Browning Scripps, who, by the time of her death, had donated some quarter of a million dollars to the project.

Wegeforth's concern about animal nutrition and health is additionally noteworthy. While not trained as a veterinarian, he nonetheless applied his medical knowledge to the care of Zoo animals and brought in others trained to assist him in this work. This care was reflected in the Zoo's low animal mortality figures.

One day a tiger, writhing in pain with what his keepers suspected to be intestinal problems, needed immediate treatment. As a result of his condition, they considered him too dangerous to rope and tie down for examination (this was an era before the tranquilizer dan gun). Wegeforth sized up the situation and entered the animal's enclosure with a handful of beneficial tablets. The animal crouched, made ready to leap, and opened his gaping jaws to unleash a ferocious roar. At that instant Wegeforth tossed several of the pills into his mouth. Surprised at this action, the tiger backed off momentarily, swallowing the medicine. Not one to back down, the tiger again gathered himself in a crouch, opened his cavernous mouth, and prepared to pounce. Once more Wegeforth administered the medi­cine, and this time the animal retired to his water basin to wash down the irritating pills. Such examples of Wegeforth's "make do" philosophy of animal medicine made for popular conversation among early Zoo employees.

In April of 1927, just over ten years after the Zoo's founding, he succeeded in opening the Zoological Hospital and Biological Research Institute, a major con­tribution to the further achievements of the San Diego Zoo. This facility was yet another gift from Miss Scripps.

## The Zoo Lady

Also in 1927, the Zoological Society hired its first execu­tive secretary, Mrs. Belle Benchley, an individual who would share Wegeforth's dream and assist him with his goals and plans. She had come to the organization as a bookkeeper in 1925, but soon proved so adept that Wegeforth began using her as his primary assistant. Among other things, he encouraged her to be the Zoo's public relations spokesperson, speaking at civic lun­cheons—a job she did reluctantly at first but soon mastered. Her work earned her high praise over the years, and following Wegeforth's death in 1941, she took over management of the Zoo.

It was in large part due to Mrs. Benchley that the San Diego Zoo began to achieve a national, even world­wide, prominence. Her books about life at the Zoo, published during the 1940s, made many new friends for the organization. They included *My Life in a Man-made Jungle* (1940), *My Friends the Apes* (1942), *My Animal Babies* (1945), and *Shirley Visits the Zoo* (1946). Mrs. Benchley's continued care and concern for the Zoo animals' welfare prompted one zoo expert to re­mark that the San Diego Zoo was "the only zoo in the world that is run for the animals."

Among Mrs. Benchley's more famous accomplish­ments was the arrival at the Zoo in 1949 of Albert, Bata, and Bouba, a male and two female western lowland gorillas from French West Africa. All less than a year old, these gorilla babies captured the hearts of San Diegans, who lined up by the hundreds to see them. Their first day on exhibit a crowd of some 10,000 arrived, setting a new Zoo attendance record.

## The Schroeder Years

Following the retirement of Mrs. Benchley in 1953, Dr. Charles Schroeder became director of the Zoological Society in January of 1954. He was the Zoo's first lead­er with a scientific background in animal care. Dr. Schroeder received his doctor of veterinary medicine degree from Washington State University in 1929 and had initially been hired at the Zoo as a veterinarian/ pathologist in 1932. But, as he often recalled, he per­formed many other duties as well, such as taking photo­graphs to sell to visitors as postcards.

It was through Dr. Schroeder's vision and per­sistence that the San Diego Zoo's sister facility, the San Diego Wild Animal Park, came into existence and later opened to the public in 1972. As director of the Zoo until 1972, he was also responsible for many other now well-known Zoo attractions, including the Skyfari aerial tramway, the Children's Zoo, and the moving sidewalk or escalator. He further increased the Zoo's commit­ment to research and remodeled its hospital.

It was also during this period that the local television show "Zoorama" was created, with its first airing in January 1955. Later syndicated nationally, the program brought the San Diego Zoo into the homes of millions of viewers across the nation.

## Into the Present

The history of the San Diego Zoo in recent years has been one of a new awareness of the role of zoos in our world. Under the able leadership of new directors and members of the board of trustees, the Zoo has become increasingly concerned with captive breeding and the conservation of wildlife. Consequently, a number of conservation projects have been established, both at the Zoo and Wild Animal Park as well as elsewhere around the world. The first international conference on the role of zoos in conservation was hosted by the San Diego Zoo in 1966, during the celebration of the Zoo's 50th birthday. In addition, the Zoological Society presented its first conservation awards that year.

Perhaps the most outstanding of the Zoo's conserva­tion projects has been the Center for Reproduction of Endangered Species (CRES). Launched in 1975 as an intensive research effort to improve the health and breeding success of exotic animals, CRES is dedicated to its primary goal of helping endangered species of animals reproduce and survive, both in captivity and in the wild.

Some of the achievements CRES is most proud of have included gratifying reproductive successes with cheetahs, Indian and southern white rhinoceroses, and Przewalski's wild horses.

# THE ANIMALS OF EURASIA

Eurasia is the largest land mass on earth, stretching halfway around the globe from the British Isles to the Pacific Ocean, and from the Bering Sea south to the tip of Malaysia, an area of 54 million sq km (21 million:sq -л»ХА few of its animal species, especially those in the north, are closely related to, and in some instances are the same as, those of North America.

Relatively recently, as earth time is measured, Eurasia was linked to America by a land bridge which spanned what is now the Bering Straits. This causeway existed for thousands of years during the Ice Ages, when much of the earth's water was locked up in glaciers, thus lowering sea level. Animals crossed back and forth between the two continents on the land bridge, and the first human settlers in America prob­ably arrived via this route.

About ten thousand years ago, the latest in a series of ice ages came to an end. The ice melted; the seas rose, and the Bering land bridge was submerged. An­imal species which had wandered west into Eurasia or east to America were isolated from their native home­lands. But because ten thousand years is a mere eye wink in evolutionary timekeeping, very few changes have had time to take place in these exiles. For exam­ple, the largest member of the deer family lives in the taiga of both Eurasia and America. In Eurasia it is called an elk, in America, a moose. But it is one and the same animal. This is also true of another deer, the caribou, or reindeer. The former is a wild animal of America; the latter has been domesticated for cen­turies by the Lapps of northern Europe.

The Bering land bridge was probably responsible for the survival of at least one species — the horse. This animal originated in the western hemisphere, where it developed from a tiny, three-toed creature, to the form very much like the one we know today. During the Ice Ages, it migrated across the land bridge into Asia, where it thrived. In America the horse be­came extinct and didn't reappear here until the Spaniards brought it back as a domesticated animal in the 16th century.

The Spanish horses, as are all domestic breeds, were descendants of the wild horses which migrated from America. That original breed still exists. It is called Przewalski's horse, named for the naturalist who first brought specimens to Europe from the grasslands of Mongolia. This is the only true wild horse left in the world. All other so-called "wild" horses are feral ani­mals, that is, horses descended from domestic animals which escaped from or were released by their owners. Przewalski's horses once existed in large herds, but human intrusion into their habitat pushed them farther and farther back into a harsh environment where even these tough animals could not survive.

They were last seen in the wilderness in 1967. Fortu­nately breeding groups existed in zoos and reserves. Captive propagation brought the population up to about 700 by 1985, and four dozen Przewalski's horses have been born at the San Diego Zoo and the San Diego Wild Animal Park. Several of the Zoological So­ciety's Przewalski's horses are on breeding loans to other zoos.

The Eurasian bison, called a wisent, is closely related to the American bison. Although never so numerous as the American member of the species, wisent used to roam the forests which covered western Europe. Cen­turies of cutting destroyed all but a small remnant of these forests and came within 17 animals of exter­minating the wisent. A captive breeding program saved them and today a few hundred live in the Bialowieza Forest in eastern Poland. The San Diego Zoo has produced 25 calves.

If the felling of Europe's forests meant the destruc­tion of many wild animal species, it worked to the advantage of others. Deer, for instance, have thrived and live from the British Isles eastward. Red, roe and fallow deer live in western Europe, sika deer in Japan. Pere David's deer, formerly a native of marshy areas in central China, is extinct in the wild. It exists only in zoos and reserves.

The hedgerows of western Europe house many small animal species. There are foxes, rabbits, hares, badgers, ferrets, squirrels and birds. These and other animals have adapted to life in a human-dominated environment. Starlings and sparrows, for example, do so well that they are considered "pest" birds. Until recently, one of Europe's largest birds, the white stork, even nested in the smaller towns and villages. The bird was considered a symbol of good luck, and home-owners built platforms on rooftops for its nests. This practice is no longer common and the stork avoids the towns.

The most regal of Eurasia's raptors is the golden eagle, and the bird has figured in history for centuries. Its image was carried by Roman legions as they con­quered much of the continent. During the Middle Ages, lesser members of royalty were free to use other raptors for falconry, but the eagle was reserved for the king. Today, in more remote parts of Asia, the golden eagle is used to hunt wild goats, gazelles, foxes, and wolves. The bird occurs in the United States, where it is under federal protection. It can be seen in San Diego's back country and often is observed soaring over the San Diego Wild Animal Park.

Several other northern Eurasia predators are found in North America — falcons, hawks and owls; mam­mals including wolves, wolverines and foxes. a However, two mammalian predators are unique to I the Old World — leopards and tigers. Leopards range i from northern Asia into Africa; tigers live only in Asia I from Manchuria southward into India and Malaysia. There are five races of this great cat; all of them are endangered. The Zoo enjoys considerable success breeding and raising Siberian tigers, of which the total world population is only about 750 individuals. More than two dozen cubs have been born and raised at the Zoo.

South of the taiga, Eurasian biomes become less clearly defined. Much of the area is flat and treeless. In the west, where rainfall is adequate, grass grows thickly. But deep in the continent's interior, the land becomes a desert. Here, thousands of miles from the moderating effects of the ocean, temperatures can climb well above 38°C (100°F) in summer, and plum­met far below freezing in winter.

Animals must make drastic adjustments to these climatic extremes. One of the most common is migra­tion. Herders move their domestic herds and flocks, following the seasons, and many of the wild grazers also make similar journeys, with predators following along.

The animals which are permanent residents have adapted to the heat, cold and aridity of this area. The saiga, an antelope-like animal, has nostrils pointing downward to help keep out dust. Inside each of its nostrils the saiga has a sac which is believed to warm and moisten the air.

The Bactrian camel of Mongolia and China has adapted to its environment by growing a thick, shaggy, winter coat; broad, split hooves to keep from sinking into the sand; and two humps for storing fat when foraging is poor.

Several species of wild asses are native to the inte­rior of central Asia. Among these are the Mongolian kulan and Iranian onager. Asses are smaller than true horses and characterized by long ears, deep-set eyes coarse, wiry manes, small feet and tails tipped with long hairs. They can survive longer without water than other members of the horse family and are able to get along on a small amount of food. Because of their sure-footedness and endurance they are valuable beasts of burden and have been domesticated for centuries.

The Eurasian grassland is home to the heaviest of all flying birds, the 20 kg (45 lb) great bustard. And the world's smallest crane, the demoiselle which stands just 1 m (39 in) tall, breeds on grasslands from south­eastern Europe into central Asia.

Several species of wild sheep and goats live on the grasslands and adjacent mountains. Markhors and turs, both goats, range from Spain to India and northward into Mongolia and Siberia. The tahr, a goatlike animal, is found in the high Himalayas. Goats differ from sheep in that they have beards, feet with scent glands, convex foreheads, and a definite odor among the males.

Some of the world's most unusual mammals live in the mountains which separate central Asia from India. One of the best known is the giant panda, once considered a member of the raccoon family and now thought to be related to bears. This animal lives on a diet consisting mainly of bamboo shoots. For un­known reasons the bamboo is dying, which threatens the pandas' future. The Chinese government has commissioned a team of biologists to study the situa­tion. Although giant pandas have rarely reproduced in western zoos, a number of babies have been born in the Beijing zoo through natural conception, and artifi­cial insemination has recently been successful.

The giant panda shares its bamboo forest with the lesser panda. This animal looks like a raccoon but is related to the giant panda.

Central Asia is isolated from India and Burma by the Himalaya mountain range, the highest mountains on earth. The area is so remote that little is known about the behavior of many of its animals. It is the home of a collie-sized gazelle, several species of wild sheep, and a member of the cow family, the yak. The yak is also domesticated and has been a beast of burden and supplier of milk, wool and fuel for many centuries.

One of the most beautiful of all Himalayan animals is the snow leopard, or ounce. Its fur is in great demand and poaching has placed it in grave danger of extinction.

The snow leopard's main prey is the bharal, or blue sheep, which lives in the Himalayas and other high mountains in eastern Asia.

As one moves south from the high country, the character of the land and its animals change. Rugged mountains give way to forested foothills. This country is the northern edge of the sloth bear's range which also includes other parts of India and Sri Lanka (Ceylon). Termites are a part of the sloth bear's diet, and it sucks them in by a "vacuuming" process. The bear rips open the termites' nest with its claws, then blows away the dirt and dust, and starts sucking. Its lips protrude; its nostrils close to keep out dirt.

Beyond the foothills, seasonal forests give way to semi-arid plains and desert in India. Axis deer, nilgai (India's largest antelope) and blackbuck live here. In the Gir Forest is the last remnant population of the lions which once roamed from the Atlantic through the Near East and into Asia. But lions have been gone from most of this range for many centuries and exist today only in a protected reserve in the tiny Gir Forest in western India, where a few hundred individuals survive.

Where one finds lions and other predators, scaven­gers will also be found. In India they include striped hyenas, foxes, dholes (wild dogs), and Indian white-backed vultures. These animals perform a vital func­tion in the balance of nature, cleaning up carrion left by the hunters, thus helping to prevent the spread of disease.

Still farther south lies India's tropical forest, actually two of them — a rain forest and a seasonally decidu­ous forest. They are home to a large variety of mon­keys, mainly of two groups — the short-tailed, stout-bodied macaques, which are primarily terrestrial, and the long-tailed, slender-bodied arboreal langurs.

The macaques include the rhesus monkey of India, sacred to the Hindus, and critical to science. The exis­tence of the Rh blood factor was first demonstrated in rhesus monkeys, and a rhesus was the first living being shot into space in the United States' space program. In Europe, the only wild monkeys are the Barbary apes, actually macaques, of Gibraltar. Legend has it that when these animals disappear — there are approximately 30 of them — Britain's reign over the Rock will come to an end.

The second large group of Asian monkeys, the lan-gurs, are also called leaf-eating monkeys. There are more than a dozen species, among which the douc langur is considered to be one of the most beautiful of all monkeys. The word "douc" means "monkey" in Vietnamese.

Three of the surviving five species of rhinoceroses live in southeastern Asia. Two, the Sumatran and Javan rhinos, could be extinct in the wild. The third, the Indian rhino, exists in small numbers in Assam. Be­cause of the heavy folds of skin and the bumps, called tubercules, on its hips and shoulders, this rhino ap­pears to be wearing a suit of armor.

The Chinese believe that rhino blood, urine, and horn (which is not a true horn at all, but is composed of hair-like material) have medicinal and aphrodisiacal powers. This superstition has resulted in heavy poach­ing of rhinos, placing them in grave danger.

Among the better-known snakes of southeastern Asia are the Indian and king cobras and the pythons. A king cobra can measure 3.5 m (12 ft) or more. It feeds mainly on other snakes. The closely related Indian, or Asian, cobra is appreciably smaller. The pythons are non-venomous constrictors. Contrary to popular be­lief they do not crush their victims to death but, through constriction, cause death through suffocation.

Southeastern Asia is the home of some of the showiest of all birds — the pheasants. Although native to Asia, they have been introduced elsewhere and now are among the most widely distributed of birds. One of the most widespread is the ringneck pheasant. An old legend claims that ringnecks were introduced into Greece by Jason, famous for his quest of the golden fleece. Ringnecks were brought to the United States in the mid-1800's and are now game birds. Several spe­cies of pheasants are exhibited at the Zoo, two of them roaming freely on the grounds.

The first is the blue peafowl. The male, called a peacock, is the traditional symbol of vanity and false pride because of its almost constant displaying and strutting. The peafowl has been semi-domesticated for ages. A Greek myth relates how the bird got the eye-like spots on its tail. The peacock was a favored pet of Juno, wife of Jupiter. She became angry at her one-hundred-eyed servant, Argus, because of a misdeed on his part. To punish him and to make sure the world remembered his offense, she snatched out his hun­dred eyes and scattered them on the tail of her pet peacock. There they remain to this day.

The other pheasant that wanders the Zoo grounds is the junglefowl. It looks much like a domestic chicken — understandably since it is the chicken's ancestor.

Anthropologists think the chicken was first domesti­cated about 4000 B.C. as a fighting bird. Evidence suggests that the first chickens in the New World came with Polynesian sailors. The most ornamental of all domestic chickens are the long-tailed birds bred by the Japanese, some having tail feathers 6 m (20 ft) long.

The hot, humid rain forests of southeastern Asia hold a profusion of wildlife, much of it arboreal. Among these tree dwellers, primates reign, and within this group, the anthropoid — manlike — apes are royalty. Two of earth's four kinds of manlike apes live in southeastern Asia.

The smallest and most agile of these are the gibbons and siamangs. These apes are light-bodied, long-armed and have long, slender hands. Their generic name, *Hylobates,* means "tree dweller." They are truly champion acrobats, swinging hand over hand and leaping more than 9 m (30 ft) from one branch to the next. On large branches they usually walk upright, holding their arms aloft for balance. Gibbons live in family groups of two to six animals within well defined territories. Their morning whooping, often heard at the Zoo, is a territorial call to warn off other gibbons. The second anthropoid of southeastern Asia is the slow, retiring orangutan. Its name means "old man of the forest," and the orang does seem the most human of the apes. Unlike the gibbon, it is a loner. The species used to be widespread throughout the islands of southeastern Asia but extinction came early on all but Borneo and Sumatra. If we read the evidence cor­rectly, prehistoric man hunted orangutans for food and could have been partly responsible for their dis­appearance from most of the range. Today fewer than 5,000 individuals remain, and despite strenuous efforts to save them, their numbers continue to drop. The forests they need are falling to the ax, so if the species survives, it will be in zoos and wildlife reserves.

Among the rain forest's arboreal creatures, there are a number of interesting "flying" animals — snakes, frogs and lizards. None of these animals actually flies. They glide with varying degrees of aerodynamic facil­ity. The snake spreads its ribs and arches its body to produce a crude airfoil that allows it to glide at a steep angle. The other animals have folds and strips of skin which, when stretched, produce taut membranes that slow descent.

The second largest of all land animals, the Asian elephant, lives in the tropical forest. A bull can weigh 5,000 kg (11,000 Ib) and stand 2.5 to 3 m (8 to 10 ft) tall at the shoulders. Asian elephants have been domesti­cated for centuries — for riding, war, and as beasts of burden.

The Asian elephant's only natural enemy is the tiger. Although this cat attacks elephants, especially calves, it also preys on just about anything it can catch, includ­ing the crocodiles that live in the forest's sluggish rivers. One of its chief prey is the Malay tapir.

Tapirs originated in the New World, crossed on the land bridge into Asia and now exist on both conti­nents. The obvious difference between Old World and New World tapirs is the large, white saddle-shaped patch of hair on the Malay tapir's body. American tapirs are a solid brown color.

Of the many species of birds in the tropical forest, among the most bizarre are the hornbills. There are 45 species, distributed throughout tropical and subtropi­cal Africa and Asia. One of the bird's more fascinating behavioral habits is the manner of nesting. In most species of hornbills, when the female is pregnant and ready to lay, she enters a natural cavity in a tree. She and the male plaster over the cavity's opening with a mixture of droppings, mud and regurgitated food. They leave a narrow opening just wide enough for the female to poke her beak through, but too small for predators to enter. The plastered wall hardens, and the female, her eggs, and later the chicks, are safe. The male spends the time feeding his mate. When the nestlings are half-grown, both parents chip away the wall and the female emerges. She then helps her mate feed the baby birds, which remain in the nest until they are fledged. During the time the nest is occupied, it is kept clean and disease-free by insects and micro­scopic scavengers.

# THE ANIMALS OF THE AMERICAS

North and South America comprise the only continu­ous land mass that reaches from the north to south polar regions, a distance of more than 14,500 km (9,000 mi). The combined area of the two continents is 41.4 million sq km (16 million sq mi), in which are found all terrestrial biomes.

The two continents have been joined for the past two or three million years. Earlier South America was an island, set apart from the northern land mass for at least 60 million years. This gave time for animal spe­cies unique to the continent to evolve. After the Isth­mus of Panama emerged, there was an interchange of animals between North and South America, much as that experienced by Eurasia and America during the Ice Ages. One of the animals found in both Eurasia and America is the polar bear. Its habitat is along the entire Arctic coast. It has even been sighted hunting seals on ice floes hundreds of miles at sea. The polar bear's heavy coat insulates it from the icy water and air. Thick hair growing between its toes keep it from slipping on the ice. The thick, white pelt made the animal a prized trophy and reduced its population. The bear is now protected throughout its range.

The musk ox, resident of the far north, also has had to be protected from excessive hunting. At one time it came very close to extinction. A member of the cow family, the musk ox has adapted to the bitter cold by developing a heavy, shaggy coat consisting of two parts — a coarse outer covering of long guard hairs and a soft inner coat so dense that neither cold nor moisture can penetrate.

Musk oxen form a defensive ring when threatened. Adults stand along the perimeter, heads and horns pointing out, and the calves cluster together inside. This defensive posture works well against the ox's chief enemy, wolves, but is of little avail when high-powered rifles are the enemy.

Wolves prey on many species in the north — musk ox, caribou, moose, deer, hares, and even rodents. These carnivores are among the most maligned of all animals, victims of false myths and legends and syste­matic programs of extermination. They are accused of attacking humans and destroying entire herds of domestic animals. But their depredations of livestock are less severe than often claimed. And unprovoked at­tacks by healthy wolves in North America on humans are unknown. Those recorded from Europe's Middle Ages are thought to have been made by rabid animals or hybrids.

The world will be a far lonelier place if the last wolf dies. As biologist Ernest P. Walker wrote in his book, *Mammals of the World,* "The howl of the wolf and coyote, which to some people is of more enduring significance than superhighways and skyscrapers, should always remain a part of our heritage."

Some Arctic wolves remain snow white year round, an adoption to their environment. Three other predators of the far north— the snowy owl, Arctic fox, and weasel— are white at least part of the year.

The life cycle of the snowy owl demonstrates the close relationship which can exist between predator and prey. This owl hunts hares and lemmings. When these mammals are plentiful, female owls lay clutches of seven to ten eggs. When the food supply drops, only one to three eggs are laid.

Lemmings are among the most plentiful animals of the far north. These tiny rodents, found throughout the Arctic, are characterized by wide fluctuations in population. When vegetation is plentiful, the lem­mings' numbers skyrocket. This population density seems to trigger a drive to migrate. Hordes of lem­mings move out. Nothing deters them — swamps, forests, lakes, rivers. Eventually some reach the sea, which seems just one more obstacle. They plunge in, swim out, and drown.

Each summer the far north comes alive with the millions of birds which have migrated from the south to mate, build nests and raise their young. Waterfowl make up the majority of these migrants. Shore birds, pelagic birds, geese and ducks abound in the short Arctic summer. Some have come thousands of miles. The champion migrant is the Arctic tern, which flies • 16,000 km (10,000 mi) from the Antarctic, and in au­tumn flies back again.

When the birds leave the Arctic at the end of sum­mer, they follow ancient flyways south. One of the flyways follows the Pacific coastline from Alaska to California. Small ponds and estuaries along the coast resound to the gabbling of hundreds of ducks.

The southern edge of North America's tundra bor­ders on the taiga. Here wildlife tends to stay on the forest's edge, in meadows, along streams, on lakes and in old burns. Grass, sedges, and willows grow most profusely in these openings.

The lakes of Wood Buffalo Park in Canada's taiga are the summer nesting sites of the whooping crane, the rarest of all cranes and the object of a decades-long conservation effort. In 1949 there were only 21 left out of a population which once ranged from the East Coast to the Rocky Mountains. With complete protection, the population rose to 109 birds by 1979. Eighty-three lived in the wilderness; the others were captives.

Twice a year the wild birds migrate a hazardous 4,000 km (2,500 mi) from their nesting grounds in Wood Buffalo Park to the Aransas Wildlife Refuge on the Texas coast. The possibility of a major storm or devas­tating disease striking this flock is a threat which makes biologists shudder. One of the basic rules in the management of an endangered species is to spread the risk. A daring experiment was undertaken with the whooping cranes. Eggs were removed from nests in Wood Buffalo Park for artificial incubation and place­ment under setting sandhill cranes, a related, more plentiful species. The artificially incubated eggs are hatching and producing birds that are raised in captiv­ity. Several whooping cranes have been hatched and are being raised by their foster parent sandhills in Idaho. If the experiment succeeds, a new flock of whooping cranes will have been produced, one which migrates a much smaller distance, over a different route, than the original group. A fringe benefit of taking eggs is that it stimulates the female bird to continue laying, thus generating more than the usual number of clutches per year. The most common grazing animal of the American coniferous and deciduous forests is the white-tailed deer. In the far West, it is replaced by the mule deer. There are actually more deer now in North America than when Europeans first arrived, because of the clearing of forest land, plus game management.

Bears once occurred throughout the forests of America north of Mexico. The world's largest is a brown bear, the Alaskan or Kodiak. The grizzly, also a brown bear, has been known to launch unprovoked attacks against humans.

American black bears are quite common in much of their range — practically all the wooded areas of North America north of central Mexico. They usually occur in their familiar black color phase, but also have been known to be a cinnamon color, brown, and even blue. The rare blue or glacier bear occurs only in southeastern Alaska, where there are about 500 left.

South of North America's taiga is the immense grass­land known as the Great Plains. This covers most of the continent's interior and stretches 3,900 km (2,400 mi) from southern Canada deep into Mexico. It is prairie country, a seemingly flat land, devoid of trees except­ing along the river courses. Almost all of the original grasses were plowed under for the raising of crops, and of the tremendous number of wild animals which once lived there, practically nothing remains. As the naturalist Peter Farb wrote, "Not even the eastern forests have suffered the almost complete destruction that European man has brought to the grassland."

The story of the American pronghorn, the only "an­telope" native to the New World, illustrates his point. When Europeans first settled in the Western Hemi­sphere, there were an estimated 50 to 100 million pronghorn on the plains. Four centuries later by the turn of the 20th century, only 20,000 were left. Today, through strenuous conservation efforts, the prong-horn is safe, although consigned to a small fraction of its former range.

Another example of what happened to the plains' wildlife concerns a "dog." Before the Europeans came, hundreds of millions of rodents, called prairie dogs because of their dog-like call, lived in underground "towns" from southern Canada to Mexico. One such system of burrows in Texas covered more than 65,000 sq km (25,000 sq mi) and contained approximately 400 million animals. With the coming of civilization, the burrows were plowed under and the animals poi­soned. Few prairie dog towns still exist.

As the prairie dogs disappear, they are taking with them at least one of their predators, the black-footed ferret. This member of the weasel family has prairie dogs as its prime food. It has become overspecialized and is caught in an evolutionary trap.

North America's arid areas occur in the southwest­ern United States and parts of Mexico. Large grazers and browsers include bighorn sheep, mule deer and javelinas, also called peccaries. Hawks, foxes, owls, coyotes, and several species of reptiles are among the carnivores. Among them, the coyote is one of the few which has thrived in the face of human intrusion into its habitat. Not only has it maintained its former range; it has expanded it.

One of the resident birds of the North American southwest is the roadrunner, a member of the cuckoo family. Primarily a ground bird, it can run at speeds of up to 24 kmph (15 mph). Its diet consists of lizards and other reptiles which it kills by repeated blows from its heavy beak. If prey proves too large to swallow, the roadrunner ingests a bit at a time. The birds can be seen dashing along the desert with snakes or lizards hanging from their mouths.

The world's smallest owl, the 14 cm (5 1/2 in) high elf owl, also is a resident of the American desert. This tiny predator uses the hollowed-out nests of wood­peckers, located in cactuses, as its home.

The desert also has its reptiles, including many spe­cies of lizards, plus two of the four poisonous snakes of North America — the rattlesnake and coral snake.

Rattlesnakes are pit vipers, a group of reptiles which also includes the fer-de-lance, bushmaster, water moc­casin, and the copperhead The pit is an opening below the snake's eyes which contains a heat-sensing organ.

Only two of North America's lizards are poisonous — the gila monster and Mexican beaded lizard. Unlike poisonous snakes which inject their venom through hollow fangs, these lizards bite their victims, hold on, and allow poison to flow into the open wound from fangs which are grooved at the rear.

The coastlands and adjacent lands of the United States are the habitat of a wide variety of reptiles, birds and mammals. Water moccasins and copperheads are found in the warmer portions, and the largest of all North American reptiles, the alligator, lives in the riv­ers and bayous of the southeast.

Alligators can be distinguished from the closely re­lated crocodiles by their broader heads and the lower teeth which are out of sight when the mouth is closed. A crocodile's teeth are visible at all times.

There are no authenticated cases of wild alligators attacking humans. Crocodiles, on the other hand, can attack people.

Many species of shorebirds live in North America. One of them, the brown pelican, came close to extinc­tion on the continent because of DOT. The pesticide was sprayed and dusted on croplands, then percolated into the ground water and was carried to sea where it entered the ocean's food chain. The pelicans, being ultimate consumers, got heavy doses. Although the chemical didn't kill them, it did weaken the shells of their eggs. The result was few pelican hatchlings. After DDT was banned the pelican population began to grow again. In 1979, 1,200 nests were counted in California, a remarkable comeback.

Marine mammals of the U.S. Pacific coast include four species of pinnipeds — members of the seal group. They are elephant seals, harbor seals, Steller sea lions and California sea lions.

South of the United States and northern Mexico, the character of the land and its wildlife changes. Desert, chaparral, and plains give way to tropical forest. In places rainfall exceeds 500 cm (200 in) annually, and a mild average temperature of 27°C (81°F) prevails.

As in most rain forests, primates dominate. In America they consist of dozens of species of monkeys and marmosets. New World monkeys are only distantly related to those of the Old World. Many species have prehensile tails, a feaure lacking in the Old World monkeys. This "fifth hand" is especially well devel­oped in the spider monkey.

Not all of the rain forest's primates have prehensile tails. Marmosets of the forests of Panama and the Ama­zon basin lack it. And the uakari has a mere stub of a tail, making it the only short-tailed New World monkey.

South America is home to approximately 40 percent of the world's birds, and most of them live in its rain forest. Two groups of rain forest birds are among the most colorful in the world — the hummingbirds and parrots.

Known as "living jewels," hummingbirds are found only in the New World, where they live from southern Alaska to Tierra del Fuego. However, they are primar­ily tropical birds. There are 319 known species which range in size from the world's smallest bird, the 57 mm (2 1/2 in) long Cuban bee hummer, to the giant hummingbird of the high Andes, measuring 216 mm (8 1/2 in) in length.

A second group of colorful rain forest birds, the parrots, are distributed worldwide in the tropics and on all lands in the southern hemisphere excepting the southern tip of Africa and some of the more remote Pacific islands. In the New World, they reach north­ward into southern Arizona and New Mexico, where they are represented by occasional visits of the en­dangered thick-billed parrot.

The only parrot native to the United States is now extinct. In the early 19th century, the Carolina parakeet ranged from North Dakota and central New York south to eastern Texas and Florida. It was especially abun­dant in the Mississippi River bottoms and along the Atlantic seaboard The little bird was slaughtered for sport and to control its depredations on fruit crops The last one was sighted m the Florida Everglades m the early 1920 s

In addition to its wealth of birds, the South Amen can rain forest is the home of a wide variety of other animals The world s slowest mammal, the sloth which spends long periods hanging upside down from tree branches, is a forest dweller So are opossums, anteaters, poisonous frogs, jaguars, tapirs, and several snakes, among them the anaconda, the world s largest An anaconda can measure more than 9 m (30 ft) in length Its prev includes the world s largest rodent, the hog sized capybara, and the caiman, South America s counterpart of the alligator

To the west, the rain forest terminates at the Andes, the mountain ranges stretching the length of South America The highest point m the western hemi sphere, 7,000 m (22,834 ft) tall Mt Aconcagua, is m the Andes

America s smallest deer, the pudu, and one of the world s largest flying birds, the Andean condor, live in these mountains Probably the best known of Andean animals are the guanacos, vicunas, llamas, and alpacas, New World relatives of camels, which are found at high elevations. Llamas have been domesticated as beasts of burden since pre-Columbian times; vicunas and alpacas are prized for their high-quality wool.

The cold water off South America's west coast is rich with plankton, a link in a food chain which reaches up through fish and ends with the millions of sea birds living on the South American coast and nearby islands. Among them, the guanay cormorant breeds in enor­mous numbers. Cormorant rookeries are not particu­larly pleasant places for humans. They reek of drop­pings, dead birds and regurgitated food, and there are flies everywhere. The droppings, called guano, make a superb fertilizer and are harvested commercially in Peru and Chile.

South America's grassland is called the pampas. Al­though similar to the Great Plains of North America, the pampas never was home to the vast herds of wild animals which once roamed North America.

One of the world's large, nonflying birds, the com­mon rhea, lives on the pampas. It was once hunted by gauchos on horseback for its tail plumes, which were used as dusters. A second species, Darwin's rhea, roams the Andean foothills from Peru to Bolivia and south to the Straits of Magellan. It is an endangered species.

The pampas' predators include foxes, skunks, rattlesnakes, hawks, and one which is found only in South America, the rare maned wolf. This mammal looks more like a fox than like a wolf. It is solitary, nocturnal, and wide-ranging. It hunts small mammals, birds, and reptiles and also eats fruits and other plant material.