

CLEVELAND ZOO

A photograph of a tiger walking across a rocky, naturalistic enclosure. In the background, there is a large, light-colored rock wall with several dark, cave-like openings. A small pond is visible in the middle ground. The scene is surrounded by green trees and grass. The overall tone is natural and somewhat somber due to the muted colors.

GUIDE BOOK

VELDT EDITION



The Cleveland Zoological Society is indebted to you, the visiting public. Your patronage aids in expansion and improvements of the Zoo. Revenues received are returned to the public; they help defray operating costs and provide new exhibits.

The Cleveland Zoo is dedicated to preserving animals and providing wholesome family entertainment and enjoyment. The Zoo is yours—a living heritage to be enjoyed again and again. We hope you will visit often.

COVER:

"Rajah", male Bengal Tiger in the Gordon Stouffer Memorial Veldt, dedicated April 25, 1962.
Photo by Rebman Photo Service, Inc.

1962

OFFICIAL GUIDE BOOK

Photographs and Map

Cleveland Zoological Park

Brookside Park

Cleveland 9, Ohio

44109

ASSISTANT DIRECTOR

By Ronald T. Reuther, General Curator (1959-1962),

and Leonard J. Goss, Director

Max M. Axelrod

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Third Edition

1962

The Cleveland Zoological Society

CLEVELAND ZOOLOGICAL PARK

Brookside Park — Cleveland 9, Ohio — Ontario 1-6500

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The Cleveland Zoological Park is operated for the City of Cleveland by the Cleveland Zoological Society.

HISTORY OF THE CLEVELAND ZOO

The people of the Cleveland area have long shown their interest in natural history. As years brought growth, with fewer opportunities for residents to enjoy nature, there developed during the 1870's an increasing awareness of the need for parks. Wade Park, containing a herd of American Deer, was given to the City by Jephtha H. Wade on September 15, 1882. This gift marked the founding of the Cleveland Zoological Park.

Because of development around Wade Park, the Zoo was moved, beginning in 1907, to the present location—Brookside Park. This move was completed by 1914.

As the Zoological Park and the City grew, it soon became evident that successful operation of a zoological park required continuous scientific guidance. The management of the Zoo was entrusted by City Council to the Cleveland Museum of Natural History as of October 1, 1940. The inspired leadership of Harold T. Clark, for many years President of the Cleveland Museum of Natural History, was responsible for the improvement and expansion of the Zoo started at this time. In February, 1942, Fletcher A. Reynolds became Director of the Cleveland Zoo, and joined with President Clark in achieving milestones of progress and seeing the Zoo become one of the community's greatest recreational and educational assets.

City Council in October, 1944, approved the acquisition of a portion of Brookside Park lying east of Fulton Road, thus increasing the area of the Zoo to 110 acres.

In 1946 and 1952 Cleveland voters approved \$1,000,000 bond issues. These made possible great achievements in the Zoological Park, including the Bird Building and Pachyderm Building opened in 1950 and 1955, respectively.

On April 18, 1957, the newly formed Cleveland Zoological Society was entrusted with operation of the 75-year-old Zoo. Formed of interested civic leaders, this organization is the responsible body which operates the Zoological Park under contract with the City.

Following the death in December, 1957, of Fletcher Reynolds, Dr. Leonard J. Goss assumed the directorship May 15, 1958.

Since 1942 the collection has been added to and virtually rebuilt from private funds. An important contribution from the owners of the Cleveland Browns football team made possible an expedition to secure gorillas and other animals from the French Cameroons in 1950. Again, in 1955, the collection was greatly enriched as a result of the Cleveland Zoo East African Expedition financed and led by Trustees of the Zoological Society, Frederick C. Crawford, Vernon Stouffer, and the late Gordon A. Stouffer. Animals from this expedition were housed in the new Pachyderm Building. The only captive bongo antelope in the world and a fine collection of rare East African birds were added to the collection as a result of the African Expedition of 1958 led by Trustee Colonel B. C. Goss.

Other important gifts have come from numerous public spirited organizations and individuals, such as generous contributions made by the Hanna

Fund for special needs; pygmy hippopotamuses from the Republic Steel Corporation; a Malay tapir from the Cleveland Arena; sun bears from the Sun Life Insurance Company; the Red Barn in the Children's Farm from the Cleveland Rotary Club; many beautiful plants and trees from the Brooklyn Kiwanis Club and Leon Santamary; and the Ralph Mueller Carillon from Ralph Mueller.

On April 25, 1962, the Gordon Stouffer Memorial Veldt, an outdoor exhibit for lions and tigers, was dedicated. The Veldt was the gift of three Cleveland Zoological Society Trustees and the Beaumont Foundation.

A new Education-Administration Building, a gift of the Hanna Fund, will open in 1963. Overlooking the Waterfowl Sanctuary, this building will contain an auditorium, special facilities for school children, and administrative offices for the Zoo staff.

An annual appropriation by the City, gifts by organizations and individuals, dues from members of the FRIENDS OF THE ZOO, admission fees, and funds derived from concessions maintain the Zoo and provide for its improvement and growth. Anyone who wishes to aid the development and improvement of the Cleveland Zoological Park may become a member of the FRIENDS OF THE ZOO.

FRIENDS OF THE ZOO MEMBERSHIP

Annual Membership	\$10
Sponsor	\$11 to \$200
Donor	\$200 or more

Make checks payable to the Friends of the Zoo,
Cleveland 9, Ohio.

Contributions are deductible under the Federal Income Tax Law.

GENERAL INFORMATION

Animals (individuals)	Approx. 1,500
Species (kinds of animals)	Approx. 400
Annual Attendance	Approx. 750,000
Area of Zoo	110 Acres

LOCATION: In Brookside Park between Denison Avenue, Brookside Park Drive, West 25th Street, and Fulton Road. The Main Entrance is reached from West 25th Street.

HOURS: Open daily, 10:00 A.M. to 5 P.M.
Sundays and Holidays, April 1st to last Sunday in October, 10:00 A.M. to 7:00 P.M.
Closed Christmas and New Year's Day.

PARKING: 25 cents per vehicle.

ADMISSION: Under 12 free. 50 cents per person, 12 years of age and older. Tuesdays (except holidays) free to all.

TALKING BOOKS: Keys are available at various locations throughout the Zoo for 50 cents. The key operates over 50 talking books which tell factual accounts of the animals and their histories.

CARILLON: Music and chimes are played periodically during the day on the Ralph Mueller Carillon.

- TOUR TRAINS:** Continuous round trips April 1 to Labor Day, weather permitting. Each of five segments, 5 cents. Complete trip, 25 cents. Drivers describe animals and points of interest.
- FEEDING HOURS:** 10:30 A.M. and 4:00 P.M. Sea Lions
Fed by public all day during summer
- 1:00 P.M. and 3:30 P.M. Apes
- 1:00 P.M. Birds
- 2:00 P.M. Cats (Not fed Mondays)
- 2:15 P.M. Alligators (Summer Sundays only)
- 2:30 P.M. Monkey Island
- 3:00 P.M. Penguins
- 3:30 P.M. Waterfowl
- All day Hoofed animals and Pachyderms
- CHILDREN'S FARM:** Open daily from Easter to last Sunday in October, weather permitting. Admission 15 cents. Organized groups of 10 or more, 10 cents per child. Children under 1 year free.
- KIDDIELAND:** Open daily, April to November. Amusement rides at popular prices.
- REFRESHMENTS:** Ice cream, cold drinks, hot dogs, peanuts, popcorn, candy, cigarettes, at Concession Stands.
- SOUVENIRS:** At Concession Stands.
- FILM:** At Concession Stands.
- PUBLIC RESTROOMS:** In lower level of Bird Building, near east end of Main Building, and at Upper Parking Lot (No. 3).
- PICNIC FACILITIES:** Benches, tables, and fireplaces are located near Upper Parking Lot (No. 3) and west of Monkey Island near Parking Lot (No. 2).
- EDUCATIONAL ACTIVITIES:** A full-time teacher is provided by the Cleveland Board of Education for guided tours through the Zoo and lectures for school children of the City of Cleveland.
- TRAVELING ZOO:** During summer months, visits playgrounds in the City of Cleveland. Sponsored by Cleveland Press and News, Cleveland Recreation Department, and Cleveland Zoological Park.
- DOGS:** To safeguard the health of the animals and prevent them from becoming frightened, dogs and other pets are not allowed.
- PUBLIC ADDRESS SYSTEM:** Announcements concerning lost children and other emergencies are broadcast over the public address system.

EVOLUTION AND THE STORY OF ANIMAL LIFE

Scientists say that our earth came into being 3 billion years ago. It is thought possible that life may have originated on earth nearly 2 billion years ago. How did life begin? This question has fascinated man ever since he became a thinking creature. One opinion of scientists is that a combination of materials and conditions occurred that spontaneously produced life in the form of primitive single-cells. The birthplace of life, most scientists are convinced, was in tropical water. Even today all living things must have water in some form to survive. No creature can breathe air or digest its food without water. The oldest known traces of life, fossils, dating back 500 million years, are of marine origin. All of the pages of life's history have not been opened, but in those available we may read the rough story of how simple one-celled microscopic forms of primitive life developed into the highly specialized animals of the present day. A tour through our Zoo enables one to see the latest chapter in this fascinating, ever-changing world of life.

THE ANIMAL KINGDOM

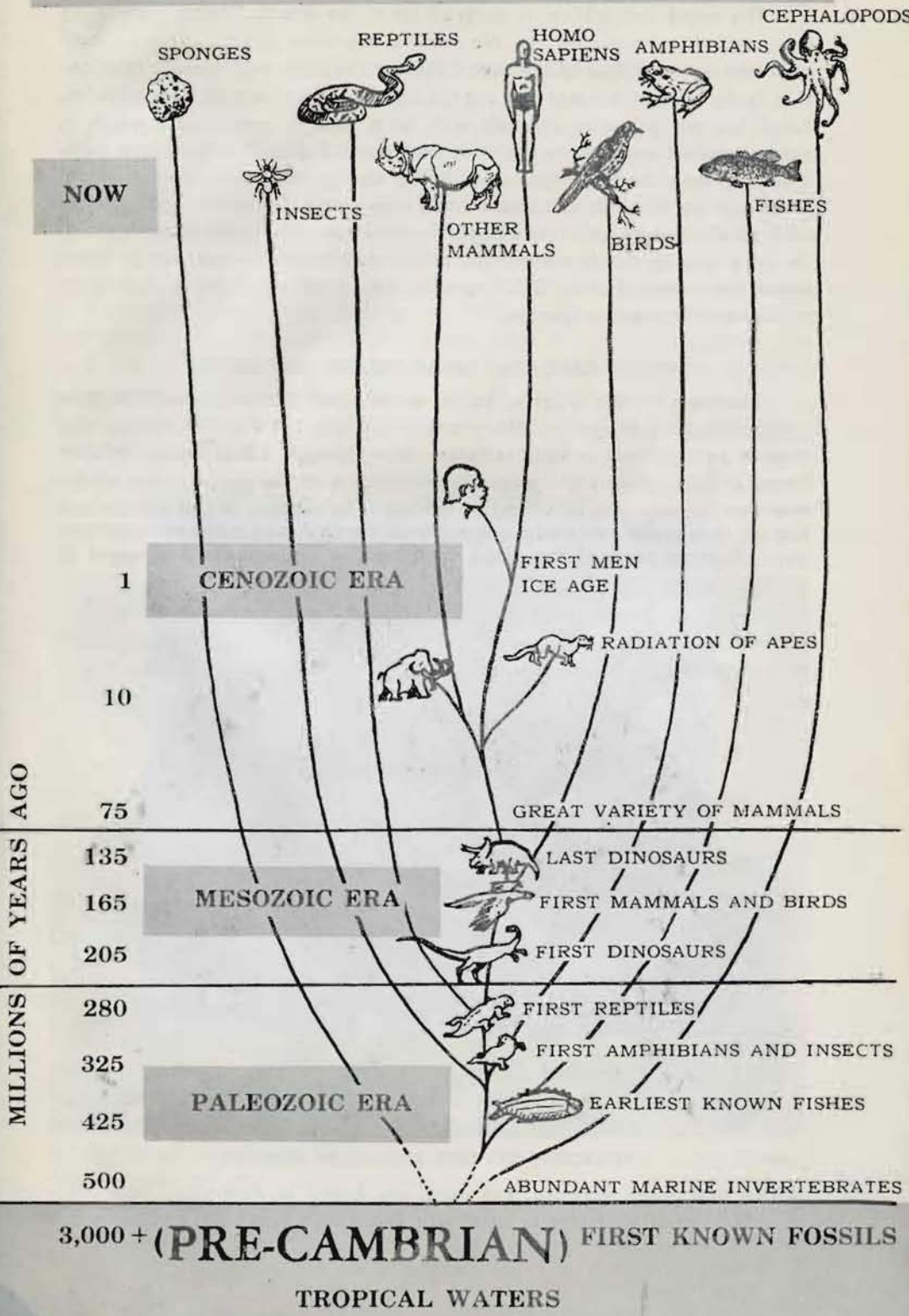
To most people, animal means mammal, although properly used animal refers to any member of the animal kingdom. Thus, [redacted] worms, insects, fishes, amphibians, reptiles, birds, and mammals are all animals. More than 900,000 species of living animals are known. Some of these species are represented by enormous numbers of individuals, but others are extremely scarce. For convenience in study and to indicate relationships between the different kinds, the animal kingdom is divided into various groups.

The principal large divisions are called Phyla (singular Phylum). The Phylum Chordata contains the vertebrates or back-boned animals including fishes, amphibians, reptiles, birds, and mammals. These animals are Classes of animals in this Phylum. These Classes are in turn divided into Orders, Families, Genera, and finally Species. Using man as an example, we can show this relationship as follows:

Kingdom	Animal
Phylum	Chordata
Class	Mammalia
Order	Primata
Family	Hominidae
Genus	Homo
Species	sapiens
Scientific name	Homo sapiens

The more we see and the more we know of the world of nature, the more fascinating it becomes. A peaceful-looking meadow is in reality teeming with animal life. In your own yard, if you submitted it to a close inspection, you would find an astonishing number of animal forms—insects, amphibians, reptiles, birds, and mammals to name some. How exciting it is, then, to contemplate broadening that focus to take in all the forests and fields, all the mountains and valleys, all the rivers and oceans; from the frigid polar regions to the humid jungles of the tropics. Glimpses of this breath-taking, ever-fascinating, panorama of life can be seen conveniently and pleasureably within the Cleveland Zoological Park.

THE EVOLUTION OF LIFE

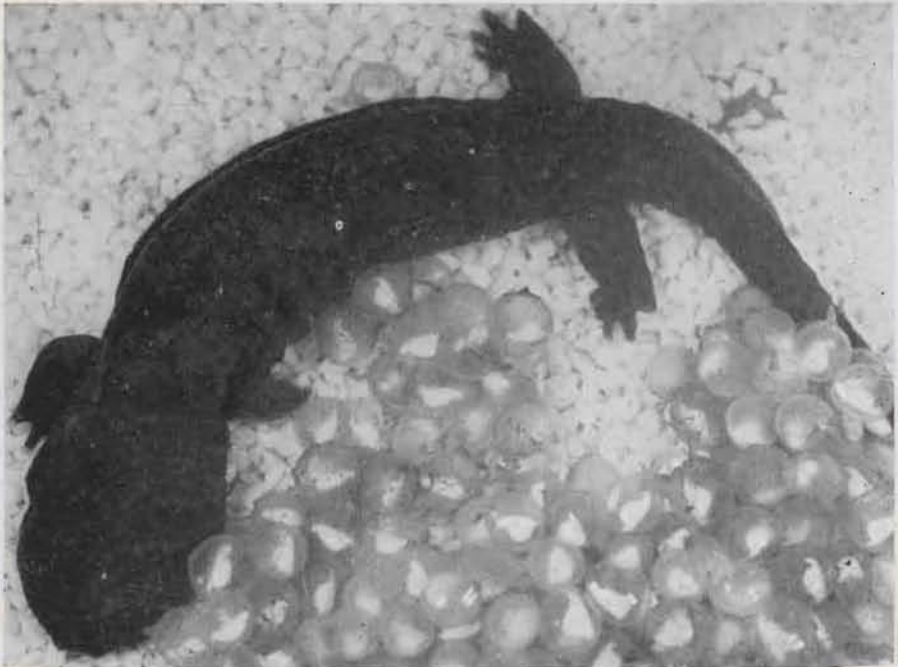


CLASS AMPHIBIA: AMPHIBIANS

The word amphibian is derived from the Greek "amphi" meaning dual, and "bios" meaning life. We use it to mean an animal living on both land and in water. Placed between fishes and reptiles with greater relationship to the latter, the Amphibia are the lowest and earliest land vertebrates. Amphibia are primitive animals with bare, soft or warty skin, which is richly supplied with mucous glands and devoid of scales. They are cold-blooded, their body temperature being dependent upon their environment. All go through a transformation of forms from young to adults, after hatching from gelatinous eggs. They are found on land, under ground, in trees, and in fresh water, but not in salt water. There are 3 living orders comprised of about 2,500 species. We exhibit some of the more spectacular and interesting species.

ORDER CAUDATA: SALAMANDERS AND ALLIES

Members of this order of tailed amphibians and their near relatives number about 150 species. Many are lizard-like, but may be readily distinguished by their naked, scaleless skin through which many species breathe. Salamanders are primarily inhabitants of the humid areas of the Northern Hemisphere, occurring as far north as Alaska. Unlike snakes and lizards, they prefer low body temperatures. North America has more species than all other parts of the globe combined. A few species are found in



HELLBENDER AND EGGS—*Cryptobranchus alleganiensis*

Africa and South America, but none are found in Australia. Most Salamanders are of moderate or small size, less than a foot long, and some are

very small, nearly worm-like, with very weak limbs. Salamanders can re-grow limbs and tails.

FAMILY CRYPTOBRANCHIDAE: HELLBENDERS

This family includes but 2 living genera, one in eastern Asia and one in the eastern United States. The largest living amphibian, the JAPANESE GIANT SALAMANDER (*Megalobatrachus japonicus*), which is known to reach a length of 5 feet, lives in mountain streams of China and Japan. This species is a popular food among the Orientals and is now raised commercially for food. Large specimens may weigh nearly 100 pounds. Seldom seen in captivity, this Salamander is long-lived, specimens having lived 52 years and possibly 55 years in captivity. In the United States the family is represented by a single species, the HELLBENDER (*Cryptobranchus alleganiensis*) with 2 races. While our species does not attain as large a size as its Asiatic relative, it is one of the larger Salamanders, reaching 29 inches in length. The Hellbenders are inhabitants of cold streams, aquatic throughout life, and are restricted to the eastern United States. One in captivity lived 29 years.

FAMILY PROTEIDAE: MUDPUPPIES

This family also has but 2 living genera. One is represented in Europe by a small, pale, eel-like, cave dweller, the OLM (*Proteus anguineus*). The second genus occurs in the eastern United States where there are 3 species. They are entirely aquatic, being found in streams, ponds, and lakes. The MUDPUPPY (*Necturus maculosus*) has permanent gill stalks protruding from each side of the head through which it obtains oxygen from the water. The maximum length recorded for this animal is 17 inches.

FAMILY SIRENIDAE: SIRENS

Two genera and 3 species make up this family which is restricted to the eastern United States. All are completely aquatic, with an elongated, eel-like body, and minute forelimbs only. They are inhabitants of sluggish streams, ponds, and ditches. One species, the LESSER SIREN (*Siren intermedia*), ranges northward in the Mississippi Valley to lower Lake Michigan, and lays the maximum number of eggs, up to 555, of any American Salamander. The GREATER SIREN (*S. lacertina*) has lived 25 years in captivity. The maximum recorded length is 36 inches.

FAMILY AMBYSTOMIDAE: MOLE SALAMANDERS

This family of 3 genera and 13 species in the United States is one that contains some of our best known Salamanders. The family is also represented in Canada and Mexico, and includes the TIGER SALAMANDER (*Ambystoma tigrinum*), the SPOTTED SALAMANDER (*A. maculatum*) and the MARBLED SALAMANDER (*A. opacum*), all of the eastern United States. These species are mainly land dwellers as adults and normally do not have gills with which to breathe. Like Moles, these amphibians stay underground most of their lives.

FAMILY SALAMANDRIDAE: NEWTS AND ALLIES

This family is found in North America, Europe, Asia, and northern Africa. In North America it is represented by 2 genera and 5 species. The members of the family always possess 4 limbs, have no gills in the adult stage, and breathe primarily by means of lungs. Aquatic and terrestrial Newts of our ponds, lakes, and larger streams belong to this family. The EASTERN NEWT (*Diemictylus viridescens*) is probably the most commonly seen of American Salamanders. A large species, the CALIFORNIA NEWT (*Taricha torosa*), occurs only along the Pacific Coast of the United States. The GREAT CRESTED NEWT (*T. cristatus*) of Europe has lived in captivity 29 years.

FAMILY AMPHIUMIDAE: AMPHIUMAS

This family occurs only in the southeastern United States and contains but a single genus and species, the latter with 2 races. The AMPHIUMA (*Amphiuma* means) is primarily an aquatic animal and is an inhabitant of swamps, muddy lakes, drainage ditches, and sluggish streams. It sometimes reaches 40 inches in length. This is the "Congo-eel" of fishermen and country folk.

FAMILY PLETHODONTIDAE: WOODLAND SALAMANDERS

This family is the largest of living Salamanders. Representatives occur in Europe, Central and South America, and North America including Alaska. The family is predominately North American with 16 genera and 56 species known from that continent. They are small and medium sized, with adults usually lacking gills. All are lungless, breathing by means of a vascularized throat area and the skin. Species of this large and diverse family are aquatic, semi-aquatic, terrestrial, or arboreal. A typical species of this family is the SLIMY SALAMANDER (*Plethodon glutinosus*) of North America. The ARBOREAL SALAMANDER (*Aneides lugubris*) is found on the Pacific Coast of North America and, as its name indicates, lives mostly in trees. Unlike most other Salamanders, it can use its tail as a grasping organ. The GREEN SALAMANDER (*A. aeneus*) of the Appalachian Mountains is one of the most beautifully colored of all Salamanders.

ORDER SALIENTIA: FROGS AND TOADS

Members of this order are easily recognized in the adult stage by short bodies, elongate legs for jumping or hopping, and absence of tails. The adults, having no gills, breathe by means of lungs. The larval stage is the familiar tadpole or pollywog. The approximately 2,200 species are virtually cosmopolitan on the land area of the world, being absent only from the perpetually frozen polar areas, the drier deserts, the salt water seas, and some oceanic islands. The term Toad is frequently used as part of the common name for members of one family or one genus of Frogs, and sometimes to indicate an amphibian supposedly quite different from the Frogs. However, Frog is the vernacular name for all of the tailless amphibians and Toads are thus, Frogs. About 12 living families of Frogs are currently recog-

nized. Frogs have been used since 1934 to diagnose human pregnancy and in 1947 it was found that virtually any species of male Frogs could be used in this simple, reliable test. Injecting human urine, which in the early stages of pregnancy contains large quantities of female hormones, causes male Frogs to extrude spermatozoa within 2 hours.

FAMILY ASCAPHIDAE: TAILED FROGS

This family contains only 2 genera, one in western North America and one in New Zealand. The North American species, the TAILED FROG (*Ascaphus truei*), is the most primitive of American Frogs. It is a small aquatic Frog inhabiting mountain streams and is the only species of Frog in which fertilization of the eggs takes place within the female's body. The other living representative of this family is a genus of Frogs inhabiting mountain streams of New Zealand; the only amphibians native to New Zealand.

FAMILY PELOBATIDAE: SPADEFOOT TOADS

Members of this family occur in Europe, Asia, and North America. All are nocturnal, burrowing terrestrial Frogs, with vertically elliptical pupils. They have a prominent tubercle on the inner side of the foot, used in digging loose earth or sand. The United States has 4 species. Two of the species are the EASTERN SPADEFOOT TOAD (*Scaphiopus holbrooki*) of Texas and Florida to Massachusetts, and the WESTERN SPADEFOOT TOAD (*S. hammondi*) ranging from Montana to Texas and westward.

FAMILY LEPTODACTYLIDAE: SOUTHERN FROGS

This family of largely tropical forms is found mainly in Australia and South America, but with a number of genera and species in Central America and 5 species in southern Texas and southern Arizona. Some members of this family are large and of various brilliant colors. The GREENHOUSE FROG (*Eleutherodactylus ricordi*), native of Cuba and the West Indies, has been introduced and is now well established in Florida. All are secretive species, with interesting but poorly known breeding habits, including development of eggs on land. The PAINTED FROG (*Leptodactylus pentadactylus*) of South America is handsome and as large as the North American Bullfrog. Another striking species is the DOMINICAN FROG (*L. fallax*) with big, luminous eyes. The BRAZILIAN HORNED FROG (*Ceratophrys cornuta*) of Brazil and Argentina has a horn-like appendage on each upper eyelid and is a large, beautiful member of the family. It can swallow Mice whole.

FAMILY BUFONIDAE: TOADS

This family is almost cosmopolitan in distribution, being natively absent only in Australia, New Guinea, Polynesia, and Madagascar. Only one genus occurs in North America, containing 13 species. It is represented in every state and the provinces of southern Canada. Members of this family range in adult size from one to 7 inches and are characterized by a more or less warty skin. The warts on Toads are actually small glands that produce a poison that serves as a defense mechanism. The MEXICAN BURROWING

TOAD (*Rhinophrynus dorsalis*) is sharp-nosed and feeds largely on Termites. The AMERICAN TOAD (*Bufo terrestris*) is seen and heard in great numbers in the spring after rains. Males inflate balloon-like pouches on their throats which emit a melodious drone. These Toads lay as many as 8,000 eggs at a time. The GIANT NEOTROPICAL TOAD (*B. marinus*) is abundant in Central and South America, sometimes reaching 9 inches in length. It has been introduced throughout the tropics to control insects infesting sugar cane plantations. Females may lay 32,000 eggs at a time. Its range extends from southern Texas through the lowlands of Mexico to Brazil. The ASIATIC TOAD (*B. bufo gragarizans*) of Asia is as large as the preceding species and also has been introduced to help control insects in the tropics. Another large species is the COLOMBIAN GIANT TOAD (*B. blombergi*) of Colombia. The PARADOX FROG (*Pseudis paradoxus*) is unique in that its tadpoles reach 10 inches in length and then shrink progressively until they metamorphize into 2-inch adult Frogs. This is the paradox. These Frogs are found only in Trinidad and Venezuela.

FAMILY HYLIDAE: TREE FROGS AND ALLIES

This is the largest family of Frogs in North America and is world-wide in distribution occurring on all continents except Antarctica. They are generally small and have toes with expanded "adhesive" discs used in climbing trees, rocks, and other surfaces. The LEAST TREE FROG (*Hyla ocularis*) of North America measures only $\frac{5}{8}$ ths of an inch in total length. The SPRING PEEPER (*H. crucifer*) is invariably the first songster among Frogs in spring in eastern North America. WHITE'S TREE TOAD (*H. caerulea*) of Australia is noted for its reverberating cries. The female MARSUPIAL FROG (*Gastrotheca ovifera*) of South America incubates her eggs in a pocket in her back. After hatching, 20 to 40 young exit through a slit at the rear of the pocket.

FAMILY MICROHYLIDAE: NARROW-MOUTHED TOADS

These small, burrowing Frogs inhabit mainly tropical and sub-tropical lands around the world. The NARROW-MOUTHED TOAD (*Gastrophyne carolinensis*) occurs from Maryland and Indiana to Florida and Texas. It is nocturnal and has a voice like the bleat of a Lamb. The SHEEP FROG (*Hypopachus c. cuneus*), ranging from southern Texas to Veracruz, also has a Sheep-like bleat.

FAMILY RANIDAE: TYPICAL FROGS

This family includes the familiar true Frogs and their allies. The family is cosmopolitan except for Australia. There is but a single species in South America and the family reaches its greatest diversity in the Old World. The large, world-wide genus *Rana* is the sole member of the family in the Western Hemisphere. The HAIRY FROG (*Astylosternus robustus*) of the rain-forest of Africa is unusual in that the male has hair-like extensions from the skin. The largest tailless amphibian now living is the GIANT FROG (*Rana goliath*) of the Cameroons of Africa. It may be a foot long and weigh 15 pounds. The largest Frog of North America is the AMERICAN BULLFROG (*R. cates-*

beiana). Females of this species lay as many as 20 to 30 thousand eggs at a time. Females are larger than males and may measure up to 7¼ inches. Originally native to eastern North America, the Bullfrog has been widely introduced throughout the world, because its legs are in considerable demand as food. In 1953 the Federal Government estimated that 171,000 pounds of Frog legs, of this species, valued at \$46,000, were collected for food. The LEOPARD FROG (*R. pipiens*) is the most widely distributed Frog in North America. The BORNEAN FLYING FROG (*Rhacophorus pardalis*) actually glides from tree to tree. The webs between its toes are large, it has a membrane bordering the forelegs, and the body can be flattened and widened. A similar species is the JAVAN FLYING FROG (*R. reinwardti*).

FAMILY DENDROBATIDAE

This family of arboreal tropical forest Frogs is restricted to tropical America and Madagascar. Males of the CUBAN TREE FROG (*Sminthillus limbatus*) and the GOLD AND BLACK POISON FROG (*Dendrobates auratus*), carry their Tadpoles on their backs. Both of these Frogs are particularly beautiful and noted for highly toxic secretions of their skin glands. It is said the secretion is employed by the Indians as an arrow poison. The Cuban Tree Frog is the smallest Frog in the world, being only ¾ of an inch when grown.

FAMILY RHINODERMATIDAE

The male SOUTH AMERICAN FROG (*Rhinoderma darwini*) carries developing eggs in his vocal pouch. The eggs are passed through a small slit on each side of his tongue after being laid by the female. After the 11 to 15 eggs hatch, the fully formed young exit by the mouth. This species is restricted to Chile.

FAMILY PIPIDAE

This family consists of 4 genera, 3 in Africa and one, the amazing SURINAM TOAD (*Pipa pipa*) and its relatives, in South America. These Frogs commonly feed under water and most have lost their tongues and eyelids. The Surinam Toad female carries its eggs in individual chambers in the skin on its back. These chambers are formed where the eggs are deposited by the male and gradually sink into the skin. Each chamber is covered by a lid. The eggs remain in these chambers until the young hatch. This amazing species swims rapidly, is habitually aquatic, and very clumsy on land. A flap of skin, resembling a worm, hangs in front of its mouth and acts as a lure for the fish upon which it primarily feeds. The SMOOTH-CLAWED TOAD (*Xenopus laevis*) of tropical Africa was extensively used in diagnosing human pregnancy at one time.

FAMILY DISCOGLOSSIDAE: WATER TOADS

Water Toads, of 4 genera and a handful of species living in Europe, Asia, and the Philippines, make up a family of little importance. The well-known MID-WIFE TOAD (*Alytes obstetricans*) of Europe is so-called because

the male takes care of the newly laid eggs. The egg mass is carried on his hind legs and body until they are deposited in some pool or stream, just prior to hatching.

ORDER APODA: CAECILIANS

The Caecilians are greatly elongate, limbless, burrowing or aquatic amphibians that inhabit tropical regions of the world. Externally, they look like large Earthworms. The order contains a single family with about 75 species.

FAMILY CAECILIDAE

In all members of this order, the eyes are either lacking or entirely useless. Due to their secretive, burrowing nature they are poor subjects for exhibition. Those that live in water swim like Eels, with sinuous movements of their body. Most Caecilians are a foot or less in length, but one kind (*Typhlonectes compressicauda*), of northern South America, has a snake-like body 5 feet long and is the largest member of the order.

CLASS REPTILIA: REPTILES

Like amphibians, reptiles are a class of backboned or vertebrate animals that depend on external sources for their body warmth. Reptiles are the first group among vertebrates adapted for life in dry places on land, though some reptiles have since returned to the water. Reptiles differ from amphibians in having an outer body covering of scales or horny plates and all adult reptiles breathe by means of lungs. Reptiles lay shelled eggs that develop on land, or they bring forth their young alive. Reptiles occur on land, underground, in trees, in fresh water, and in the seas. The greatest concentration of species is found in warm tropical regions. The Class Reptilia is divided into 5 living orders composed of over 4,000 species. Crocodilians are the largest reptiles in existence as far as weight is concerned, some weighing more than a ton.

ORDER CHELONIA: TURTLES

Turtles are an ancient order of reptiles, world-wide in distribution in tropical and temperate areas with the exception of New Zealand and western South America. The 211 species inhabit land, fresh water, and salt water. Their food habits are diversified; some are herbivorous, some carnivorous, and some omnivorous. All species deposit their eggs in a hole in the earth, cover them, and leave them for nature to hatch. The term Turtle is commonly used to designate aquatic kinds while those that do not enter the water are commonly called Tortoises. All are long-lived and enclosed in a hard case, usually of bone overlaid with horny plate. Some females produce fertile eggs for 3 years after being separated from males.

FAMILY CHELYDRIDAE: SNAPPING TURTLES

Only 2 species of Snapping Turtles now exist and both are found only in the Americas. The COMMON SNAPPING TURTLE (*Chelydra serpentina*) is found in ponds and streams throughout most of eastern North America and in Central America. This species is aggressive and can inflict a painful bite. The ALLIGATOR SNAPPING TURTLE (*Macrochelys temmincki*) is the



ALLIGATOR SNAPPING TURTLE—*Macrochelys temmincki*

other species of this family and is found in the lower Mississippi Valley and the Gulf States. It is the largest fresh-water Turtle in the world and has attained a weight of 236 pounds. One individual lived 58 years and 9 months in captivity. This reptile has a worm-like appendage in the mouth which is used as a lure for fish on which it feeds.

FAMILY KINOSTERNIDAE: MUSK AND MUD TURTLES

This family is restricted to the Western Hemisphere, with 4 species in the United States and many more in Latin America. These are small, relatively secretive, aquatic Turtles. The smallest Turtle in our country is the STRIPED MUD TURTLE (*Kinosternon bauri*) with a maximum shell length of 3 inches. The species play an important role as scavengers and feed on carrion. When disturbed they emit an acrid, pungent odor which gives the STINKPOT (*Sternotherus odoratus*) of the eastern United States its name.

FAMILY DERMATEMYIDAE: MAW'S TERRAPIN

This family, represented by one species, is restricted to Central America. MAW'S TERRAPIN (*Dermatemys mawi*) resembles the Common Mud Turtle of the eastern United States and sometimes reaches 15 inches in length. One lived in captivity for 8 years.

FAMILY PLATYSTERNIDAE: BIG-HEADED TURTLES

The sole representative of this family is the BIG-HEADED TORTOISE (*Platysternum megacephalum*) which inhabits south China, Thailand, and Burma. The disproportionately large head of this species is truly amazing. Little appears to be known about this reptile.

FAMILY TESTUDINIDAE: LAND TORTOISES

This family includes the Land Tortoises of Africa, Asia, Europe, and the Americas. These Tortoises rarely or never go in water. Three species of the same genus occur in North America. The DESERT TORTOISE (*Gopherus agassizi*) occurs in the deserts of the southwestern United States and ranges into northern Mexico. One specimen lived 18 years in captivity. This species will drink water in large amounts on occasion, though it can obtain water from foods eaten. The GOPHER TORTOISE (*G. polyphemus*) inhabits the southeastern United States. The huge giant Tortoises are included in this family. They were originally found in only 3 areas of the world, all island groups. The ELEPHANT TORTOISE (*Testudo gigantea*) originally inhabited



ELEPHANT TORTOISE—*Testudo gigantea*

the Aldabra Islands in the Indian Ocean, northwest of Madagascar. One individual in our collection weighed 301 pounds in 1959, but individuals sometimes weigh over 600 pounds. An individual of this species is known to have lived 152 years in captivity before it was accidentally killed, and its actual age is estimated at not less than 180 years. Another group of Tortoises inhabited the Mascarene Islands, which lie east of Madagascar. The GIANT or GALAPAGOS TORTOISE (*T. elephantopus*) comes from the Galapagos Islands about 600 miles off the coast of Ecuador in South America. These Tortoises were known to subsist for as long as 14 months in the hold of a ship without food or water. It has been estimated that over 100,000 Tortoises were taken from the Galapagos Islands by American whalers from 1831 to 1868 for food. Other thousands were taken by whalers of other nations. The record weight is 595 pounds.

FAMILY EMYDIDAE: TERRAPINS

This large family of Turtles occurs in Asia, Europe, North Africa, and the Americas. Many of our best known species belong to this family. Members of this family are aquatic, semiaquatic, or terrestrial. Most enjoy bask-



BOX TURTLE—*Terrapene carolina*

ing in the sun. All have the feet modified for walking, but usually with a web between the toes. The EASTERN BOX TURTLE (*Terrapene carolina*) is common in eastern North America from New England to Yucatan in Mexico. The plastron of this Turtle is hinged at the front and back and when molested the Box Turtle withdraws its 4 limbs as well as its head inside the shell, which can then be closed tightly at both ends. There is a record of one living 138 years. The colorful PAINTED TURTLE (*Chrysemys picta*) ranges

across the United States and Canada. Few Turtles are as attractively marked. The FALSE MAP TURTLE (*Graptemys pseudogeographica*) is one of several species often sold in pet shops.

FAMILY DERMOCHELIDAE: LEATHERBACK TURTLE

The LEATHERBACK TURTLE (*Dermochelys coriacea*) is the sole survivor of this family and lives in tropical and temperate seas around the world. This large reptile reaches more than 8 feet in length and may weigh over three-quarters of a ton. Only the largest Crocodilians surpass the Leatherback in bulk. A powerful swimmer, this Turtle comes ashore only to lay its eggs.

FAMILY CHELONIDAE: SEA TURTLES

This family includes the remaining Sea Turtles, for the most part restricted to the warmer oceans. The GREEN TURTLE (*Chelonia mydas*) is a greatly esteemed ingredient of Turtle soup and visits the shores of all continents with the exception of Antarctica.

FAMILY CARETTOCHELYIDAE: PITTED-SHELL TURTLE

The single species of this family, the NEW GUINEA PITTED-SHELL (*Carettochelys insculpta*), among the rarest of Turtles, lives in the Fly River area of New Guinea. The shell, which may be 20 inches long, lacks the outer covering of horny shields, and in this respect resembles that of the Soft-Shelled Turtles.

FAMILY TRIONYCHIDAE: SOFT-SHELLED TURTLES

This family, restricted to fresh water, occurs in Africa, Asia, and North America and includes the SPINY SOFT-SHELLED TURTLE (*Trionyx ferox*) of the eastern and central United States. This species has lived 25 years in captivity. These Turtles are widely acclaimed as food and in the state of Florida some 146,000 pounds of these Turtles were sold for food in one recent year.

FAMILY PELOMEDUSIDAE: HIDDEN-NECKED TURTLES

This family is restricted to South America, Africa, and Australia. The largest member in South America is the RIVER TURTLE (*Podocnemis expansa*) which grows to a shell length of 30 inches. The Indians in the Orinoco and Amazon River basins depend on the eggs of this species for a large share of their annual food supply.

FAMILY CHELIDAE: SIDE-NECKED TURTLES

Members of this family get their name from the fact that they cannot withdraw their heads into their shells, but can only bend their necks to one

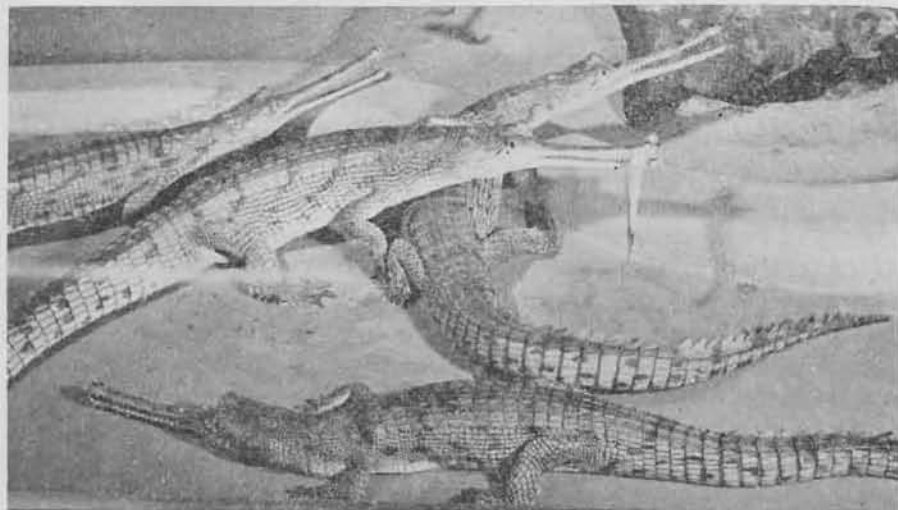
side. Side-necked Turtles live only in South America, Australia, and in New Guinea, where some kinds are abundant. The species most commonly exhibited in zoological gardens is the MATAMATA (*Chelys fimbriata*) of the rivers of British Guinea and northern Brazil. This species has flaps of skin hanging from the chin, throat, and ears. The Matamata uses these appendages to attract fish on which it feeds.

ORDER CROCODILIA: CROCODILIANS

The Alligators, Caimans, Crocodiles, and Gavials together comprise this order which includes the largest reptiles in existence. They are found in rivers or along the margins of oceans or in lakes throughout most of the tropics and into the temperate zone. Only 25 species are recognized and all dwell in water, where they prey upon a vast variety of other animals. All Crocodilians lay eggs with a hard, brittle shell, generally in a nest of mud and debris in which the eggs are incubated by heat generated by decomposition of nest material.

FAMILY GAVIALIDAE: GAVIALS

The Gavials are sparsely distributed in India, the Malay Peninsula, and the East Indies, and are distinguished by their long, slender snouts. The



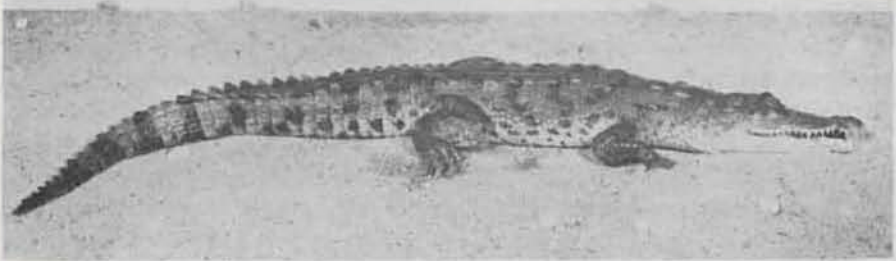
INDIAN GAVIAL—*Gavialis gangeticus*

INDIAN GAVIAL (*Gavialis gangeticus*) reaches a length of 21 feet, 6 inches, and a diameter of about 3 feet. Despite its large size this species is not considered a serious menace where it lives along the Ganges, Brahmaputra, and other rivers of India. It is extremely rare in captivity.

FAMILY CROCODYLIDAE: CROCODILES

The SALT MARSH CROCODILE (*Crocodylus porosus*) is widely known as a "man-eater." A powerful swimmer and preferring waters of the coastal marshes, this species is not uncommonly seen miles from shore. It has the

widest distribution of any Crocodile, occurring in India, Malaysia, and eastward to New Guinea and northern Australia. In bulk, this is the largest living reptile, and it attains a length of 30 feet. The NILE CROCODILE (*C. niloticus*) of Africa also has a reputation as a man-eater and reaches 25 feet at the maximum. The AMERICAN CROCODILE (*C. acutus*) is the only Crocodile inhabiting North America, occurring in extreme southern Florida and ranging through the Greater Antilles and along both coasts of Central America to northern South America. It reaches 23 feet in length. The FALSE GAVIAL (*Tomistoma schlegeli*), found only on the island of Borneo, may attain a length of about 15 feet and has a particularly long and slender snout. This species is extremely rare in captivity. Large captive Crocodiles are to



AMERICAN CROCODILE—*Crocodylus acutus*

be considered highly dangerous. Among all the species, the food consists of fish, waterfowl, and mammals that may approach the water.

FAMILY ALLIGATORIDAE: ALLIGATORS AND CAIMANS

This family is largely restricted to the New World. The only exception is the CHINESE ALLIGATOR (*Alligator sinensis*) which is rare in the wild state and in captivity. This species, which lives in the Yangtze River of China, entered our collection in May, 1949. The AMERICAN ALLIGATOR (*A. mississippiensis*) was extremely abundant in the southeastern United States before the coming of whitemen. It was estimated that over 2½ million were killed in the state of Florida, alone, between 1800 and 1900. Now protected, this reptile is still found in most of its former range. The maximum recorded length is 19 feet, 2 inches, but few, if any, of this length are alive today. There is a record of an individual known to have lived at least 68 years. Alligators grow much faster than is commonly realized. At 10 years they may be more than 8 feet long. After this time, their rate of growth diminishes. South America's largest Crocodylian is the BLACK CAIMAN (*Melanosuchus niger*), said to reach a length of 20 feet. A smaller species, the SPECTACLED CAIMAN (*Caiman sclerops*), inhabits Central and South America and is frequently sold in pet shops in this country as an "Alligator."

ORDER RHYNCOCEPHALIA: BEAKHEADS

FAMILY SPHENODONTIDAE

The TUATARA (*Sphenodon punctatum*) of New Zealand is the sole survivor of an ancient group of reptiles. The Tuatara lives among rocks in a cold climate that few other reptiles could tolerate. Resembling some

Lizards, the Tuatara is often called a "living fossil." It is extinct on the main islands of New Zealand. The only survivors dwell on small islets in the Bay of Plenty and Cook Strait. Its eggs are deposited in a depression dug in the earth and the young do not hatch until almost a year later. Its maximum length is slightly over 2 feet. It has been reported as living in captivity for well over half a century.

ORDER SAURIA: LIZARDS

The Lizards are the most diverse group of reptiles from the standpoint of number of living families, of which there are 21. All lizards detect odors by means of their tongue. A number of species have greatly reduced external limbs or have entirely lost them. In this respect they superficially resemble Snakes. Some lizards lay eggs, whereas others bring forth living young. In size, they range from tiny Geckos, little more than 2 inches in total length, to the Komodo Dragon or Monitor, with a total length of about 10 feet. Lizards are cosmopolitan, occurring on all continents except Antarctica, and are found on many oceanic islands.

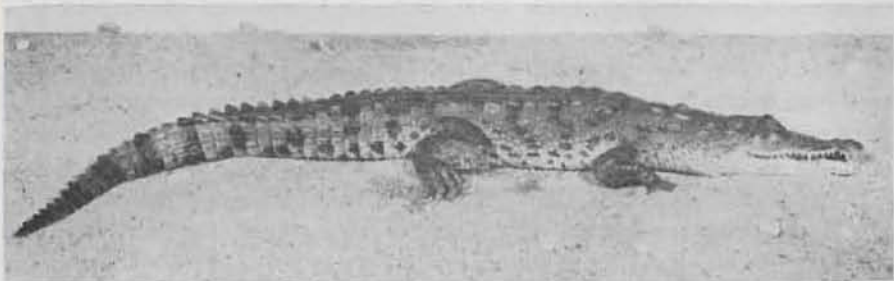
FAMILY GEKKONIDAE: GECKOS

Members of this family are chiefly nocturnal and have large eyes. The digits frequently have dilated areas forming adhesive discs that aid the Lizards in climbing smooth surfaces. This is a large, predominantly Old World family, but occurs on all continents. Geckos are largely insect eaters. The EGYPTAIN GECKO (*Tarentola annularis*) has adhesive digits so well developed that it can run up a pane of glass, or traverse a smooth ceiling. All of the Geckos can voluntarily part with their tails when danger threatens. Tails are usually regrown. Several species have been introduced in the southern United States, and in the southwestern United States several species occur natively. One of the southwestern species is the LEAF-TOED GECKO (*Phyllodactylus tuberculosus*), which lives in dry, hot, rocky areas.

FAMILY IGUANIDAE: IGUANIDS

This large family is primarily of the New World, occurring from southern Canada to southern Argentina and on the Galapagos Islands. In the Old World it occurs in Madagascar and in the Fiji and Friendly Islands. The spectacular COMMON IGUANA (*Iguana iguana*) is the largest species and sometimes reaches a length of over 6 feet. Throughout their vast range from Mexico to Brazil, Iguanas are considered an edible delicacy. The MARINE IGUANA (*Amblyrhynchus cristata*) lives along the coasts of the Galapagos Islands and plunges into the ocean to feed on seaweed or marine algae. It is the only Lizard with maritime habits and is difficult to keep in captivity because it refuses to feed. The AMERICAN CHAMELEON or GREEN ANOLIS (*Anolis carolinensis*) is common in the southeastern United States and is often sold at circuses. This species is in no way related to the true Chameleons of the Old World. The American Anolis is, however, subject to marked color changes in a few moments' time. These color changes are

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brought about by the movement of black pigment in expandable skin cells. Ordinarily this Lizard is pale green when its body is warm or when it has been in the dark. When exposed to bright light, or when its body temperature is low, its color is usually brown. The EASTERN FENCE LIZARD (*Sceloporus undulatus*) of the southern United States is a familiar species. Interesting members of this family are the Horned "Toads." One of the most widely distributed is the TEXAS HORNED LIZARD (*Phrynosoma cornutum*) which occurs in the southwestern United States and well into the Great Plains. Like most of its kind, it is particularly fond of Ants. These Lizards can squirt blood from one or both eyes. Horned Lizards are not long lived in captivity. The CHUCKWALLA (*Sauromalus obesus*) of the American southwest is a heavy-bodied Lizard sometimes reaching a foot and a half in length. The BASILISK (*Basiliscus vittatus*) of Latin America is sometimes called the "Jesus Cristo" Lizard for its ability to run across the surface of the water. If the Lizard slows down or pauses, it sinks to the surface and continues on its way swimming.

FAMILY ANGUIDAE: GLASS LIZARDS

This is a family of the Northern Hemisphere with the exception of a few species in South America. The greatest number of species occur in North and Central America. Three species of Glass Lizards or "Snakes" lack limbs completely. The EASTERN GLASS LIZARD (*Ophisaurus ventralis*) of the eastern half of the United States is the longest North American Lizard, attaining a maximum length of more than 3 feet. The longevity record for Lizards, 32 years in captivity, is held by the SLOW WORM (*Anguis fragilis*) of Europe.

FAMILY HELODERMATIDAE: BEADED LIZARDS

There are only 2 species of poisonous Lizards and both occur in southwestern North America. The GILA MONSTER (*Heloderma suspectum*) is confined to the desert regions of the southwest United States. This Lizard sometimes reaches 2 feet in length and feeds largely on the eggs of ground-nesting birds. Its poison apparatus serves primarily as a protective device. The MEXICAN BEADED LIZARD (*H. horridum*) is the larger of the 2 and lives along the Pacific Coast of northern Mexico.

FAMILY XANTUSIDAE: NIGHT LIZARDS

This family is strictly American, inhabiting North and Central America and Cuba. These small Lizards are primarily nocturnal and bear live young. The ARIZONA NIGHT LIZARD (*Xantusia arizonae*) of central and western Arizona lives in rocky habitat in association with granite rock formations. Ants, other insects, and spiders provide the primary food of this family.

FAMILY SCINCIDAE: SKINKS

Nearly one-fourth of the existing species of Lizards belong to this family. Skinks are abundant in Africa, Asia, and the islands of the western Pacific, but are particularly numerous in Australia. In the United States only 17 species occur. The WESTERN SKINK (*Eumeces skiltonianus*) inhabits the Pacific Coast of North America. It, like all members of this family, has a

protrusible, forked tongue indicating that it has an acute sense of smell. Its food consists largely of insects and their larvae. The normal life span has been estimated at about 5 or 6 years, the oldest individuals being about 9 years of age.

FAMILY TEIIDAE: TEIIDS

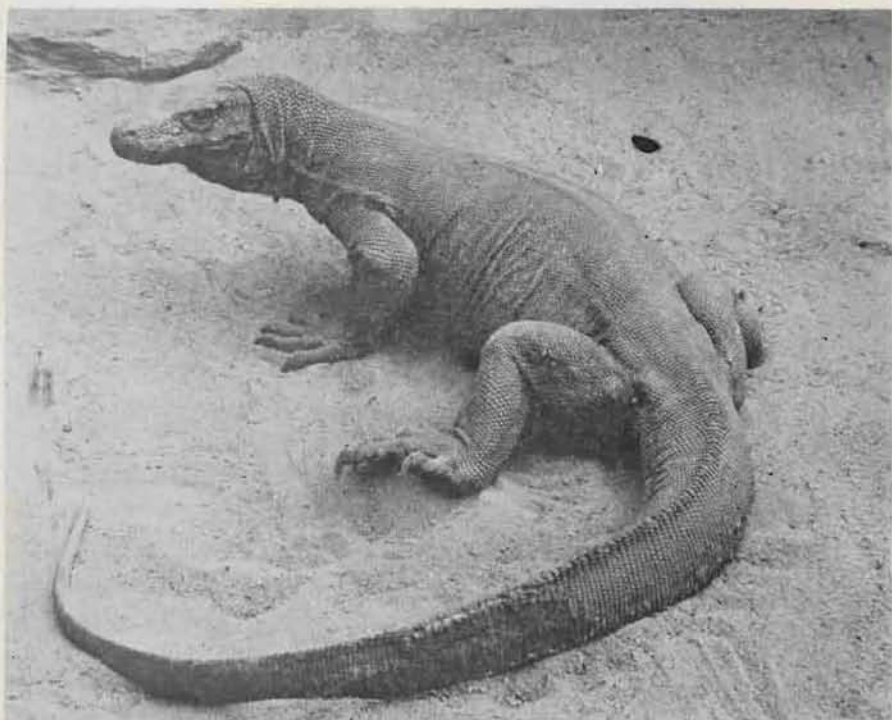
This family is primarily South American, but it also has representatives in North and Central America and in the West Indies. The SIX-LINED RACE-RUNNER (*Cnemidophorus sexlineatus*) occurs in a large part of eastern and central United States. It is an elongate, sleek, very active, and fast species and has been recorded as running 18 miles per hour. This species generally hibernates from October to March or April. The SOUTH AMERICAN TEGU (*Tupinambis teguixin*) is the largest member of the family, reaching a length close to 4 feet, and it has a very swift gait. These Lizards are fond of small Chickens. They are so bold in demeanor that one has to be cautious in entering their enclosure in order not to be bitten.

FAMILY CHAMAELEONTIDAE: OLD WORLD CHAMELEONS

The true Chameleons have a prehensile tail, stout bodies, and large heads, with huge, protruding eye-balls. A Chameleon can gaze forward with one eye and backward with the other. The strangest feature, however, aside from the rapid color changes of these unique Lizards, is the length of the tongue and its darting motions at insects. The tongue may be shot forward to a length as great as the owner's body and it has a sticky knob at the tip which unerringly catches the prey. Chameleons are most abundant and widely distributed in Africa and Madagascar, living in trees and shrubs. Only one species occurs in India. The AFRICAN CHAMELEON (*Chamaeleo chamaeleo*) inhabits the Mediterranean coast of Africa.

FAMILY VARANIDAE: MONITORS

The world's largest Lizards are contained in this family of about 25 species living in Africa, Asia, and Australia and on many of the islands off the coast of Asia. These are heavy-bodied, swift-moving, carnivorous reptiles, with elongate, heavily muscled tails, and long, darting, forked tongues. The KOMODO MONITOR or DRAGON (*Varanus komodoensis*), the largest Lizard alive, did not become known to the scientific world until 1912. This Lizard attains a length in excess of 10 feet and a weight of more than 300 pounds and occurs on the 4 Indonesian Islands of Komodo, Padar, Rintja, and Flores. These Lizards live in caves among the hills and prey on wild Hogs and small Deer that live on the islands. In captivity they are not savage, but have a voracious appetite. The TWO-BANDED MONITOR or KABARA GOYA (*V. salvator*) of southeast Asia and the Malay Islands to the Philippines, is also of spectacular size, growing to a length in excess of 10 feet, but of lighter build than the Komodo Monitor. Australia has a species, the PERENTIE (*V. giganteus*), reaching a length of 10 feet. The NILE MONITOR (*V. niloticus*) is the largest Lizard in Africa, reaching a length of slightly over 6 feet. This species habitually lays its eggs in Termite nests,



KOMODO MONITOR—*Varanus komodoensis*

where they incubate under relatively constant conditions of heat and humidity for nearly 10 months.

FAMILY AGAMIDAE: DRAGON-LIZARDS

The Agamidae are widely distributed in the Eastern Hemisphere, including Africa and Australia. These Lizards have crests, dew-laps, and other ornamental appendages. The FLYING DRAGON (*Draco volans*) is actually a glider. Only birds and Bats, among the vertebrate animals, have the ability to truly fly. This species is but one of more than 3 dozen related species that have appendages enabling them to glide from tree to tree. This appendage is a thin membrane of skin supported by false ribs extending beyond the normal outline of the body. These Lizards sometimes glide through the air for a distance of 60 feet before alighting on the trunk of a tree. All flying Lizards are gaudy, colorful creatures when their "wings" are spread. Flying Lizards live in southern India, Assam, and the East Indian Archipelago to the Philippine Islands. The FRILLED LIZARD (*Chlamydosaurus kingi*) is a spectacular Agamid inhabiting tropical forests of northern Australia and New Guinea. It has a great expandable fold of skin on each side of the neck, which can be erected at will to form a frill nearly 10 inches across.

ORDER SERPENTES: SNAKES

Snakes are the most numerous and diverse of all reptiles and number nearly 3,000 species. Snakes occur on all continents except Antarctica and are most abundant in warm, tropical and subtropical regions. They range



FRILLED LIZARD—*Chlamydosaurus kingi*

from 8 inches to 38 feet in length. Snakes are abundant in Australia where venomous Snakes outnumber the non-poisonous kinds. There are no Snakes in Ireland or New Zealand and there were none on the Hawaiian Islands until they were recently introduced.

FAMILY BOIDAE: PYTHONS, BOAS, AND ALLIES

This family is world-wide in distribution and includes the largest living Snakes. The RETICULATED or REGAL PYTHON (*Python reticulatus*) may reach

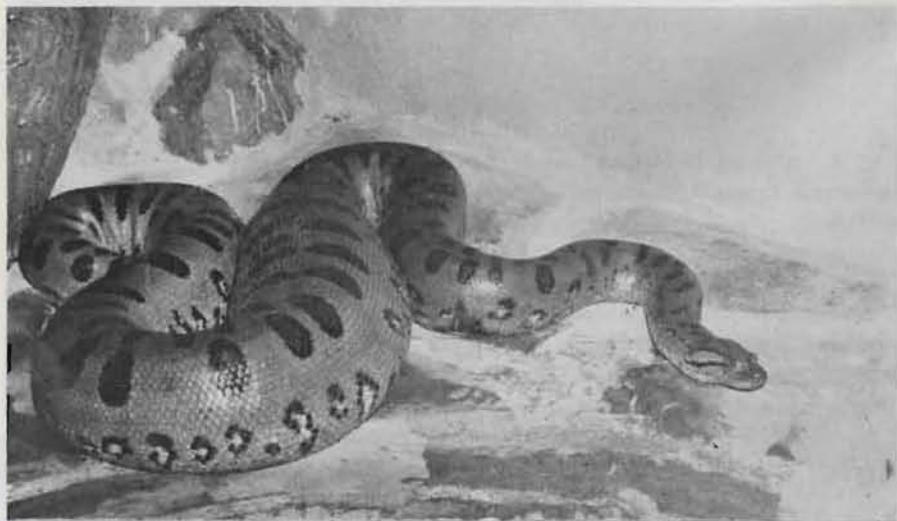


REGAL PYTHON—*Python reticulatus*

33 feet at the maximum, and specimens 28 feet long that weighed 200 pounds have been well authenticated. This Snake lives in southeastern

Asia, the Malay Peninsula, and adjacent islands including the Philippines, and feeds on small mammals including young Pigs. The INDIAN PYTHON (*P. molurus*) ranges from Ceylon and India to southern China and is a smaller species reaching a maximum size of 20 feet. It has a varied diet including small Deer. In captivity it becomes much tamer than the Reticulated Python. The ROCK PYTHON (*P. sebae*) of Africa has been recorded as reaching 25 feet. The SCRUB PYTHON (*P. amethystinus*) of Queensland, Australia, is reputed to attain a length of 21 or 22 feet and is the largest Snake in Australia. It also occurs on New Guinea and the Moluccas. The BALL PYTHON (*P. regius*) of Africa is seldom as long as 4 feet, but is thick-bodied. It is a timid reptile and receives its name from its habit of coiling into a sphere when frightened and hiding its head among its folds. Pythons lay eggs and usually coil about them during incubation, whereas Boas produce live young.

The ANACONDA or WATER BOA (*Eunectes murina*) of South America is the longest Snake in the world. One authentic record of such a Snake killed in Colombia measured 38 feet and several have been recorded approaching this length. The average large adult is 19 to 20 feet long. These reptiles live along tropical river swamps and spend considerable time in



ANACONDA—*Eunectes murina*

the water. An Anaconda lived for nearly 29 years in captivity. The BOA CONSTRICTOR (*Boa constrictor*) found in the lowlands from Mexico to Argentina is the second largest Snake of the Western Hemisphere. Specimens exceeding 12 feet in length are uncommon but one was measured in Trinidad and found to be 18½ feet long, which appears to be the record. All Boas kill their prey by squeezing or constriction. The GREEN TREE BOA (*B. canina*) of northern South America is a beautiful green color and reaches a length of 5 to 6 feet. Several Boas of small size inhabit the western por-



GREEN TREE BOA—*Boa canina*

tion of the United States. Of these, the stout little RUBBER BOA (*Charina bottae*), is the most familiar and reaches a maximum length of 28 inches. This species is very gentle.

FAMILY COLUBRIDAE: RACERS

This family makes up two-thirds of all the Snake species now living. Only one species of this family, the BOOMSLANG (*Dispholidus typus*) of Africa, is poisonous. The BLACKSNAKE or BLACK RACER (*Coluber constrictor*) is a rather typical example of the larger non-venomous Snakes. It grows to a length of 6 feet, is very active, and is a largely beneficial Snake, feeding on Rodents, other Snakes, insects and other small animals. It occurs in several sub species across the United States. The COACHWHIP SNAKE (*Masticophis flagellum*) of the southern and central United States is more slender than its near ally, the Blacksnake, and its scales and form give it the appearance of a braided whip. Water Snakes are plentiful in eastern North America and feed predominately on aquatic organisms. In the neighborhood of fish hatcheries, the COMMON WATER SNAKE (*Natrix sipedon*) becomes a pest, feeding as it does on smaller fish. Water Snakes are commonly mistaken for the venomous Water Moccasin. Several differences distinguish the two

types; the Moccasin has an elliptical rather than a round pupil and has a pit between the eye and nostril. Also, the Moccasin has a tendency to stand its ground rather than attempt to get out of the way of intruders, as the Water Snakes do. The COMMON GARTER SNAKE (*Thamnophis sirtalis*) is one of the most widely distributed and most frequently encountered Snakes in the United States. All the Garter Snakes give birth to fully formed young. There are often more than 20 in a litter and 78 is about the maximum. The EASTERN HOG-NOSED SNAKE (*Heterodon platyrhinos*) is famous for its bag of tricks. Often known as the Hissing or Puff Adder, this stout-bodied, slow-moving Snake makes a vivid pretense of ferocity, holding its ground and hissing loudly as it strikes out at intruders. If molested further, it may flatten the entire front end of its body to form a hood. If these antics fail to alarm the intruder, the Snake may then contort its body, writhing as in agony and then roll over on its back and lie perfectly still, the mouth open and tongue hanging out as if dead. Pick it up and it remains limp and lifeless. But place it on the ground right side up and it promptly rolls onto its back! The Hog-Nosed Snake will not bite, no matter what the provocation. It preys mostly on Toads and other amphibians. The WESTERN BULL SNAKE (*Pituophis catenifer*) is of great value to man because of the part it plays in the destruction of Rodent pests. It sometimes reaches a length of 9 feet. The KING SNAKE (*Lampropeltis getulus*) is well known as the enemy of Rattlesnakes, which they will attack and devour if smaller than themselves. Like other harmless North American Snakes, they are immune to the venom of Pit Vipers. The RAT SNAKE (*Elaphe obsoleta*) is one of the most common Snakes of the eastern United States. A record of 13 years of age exists and the record length is 8 feet, 5 inches, for this species.

FAMILY ELAPIDAE: COBRAS AND ALLIES

The approximately 15 species of Cobras and their relatives include some of the largest and most dangerous Snakes in existence. Markedly different fang mechanisms and venom action distinguish this family of Snakes from the Vipers and Pit Vipers. The Elapidae have short, permanently erect fangs and the venom acts principally on the nervous system. The KING COBRA (*Ophiophagus hannah*) exceeds all venomous Snakes in length, reaching a maximum length of 18 feet, 4 inches. The BLACK MAMBA (*Dendroaspis angusticeps*) of Africa is a close second. The CORAL SNAKE (*Micrurus fulvius*) of the southeastern United States is handsomely ringed with brilliant colors. Coral Snakes of several different kinds inhabit tropical America and are the only New World representatives of this family. The King Cobra can be extremely ferocious and dangerous. Fortunately, this Cobra is not abundant, despite its extensive range throughout southeastern Asia. Unlike other Cobras, the King Cobra restricts its diet almost entirely to serpents. It devours venomous as well as harmless Snakes. The INDIAN COBRA (*Naja naja*) inhabits India, Ceylon, and Malaysia. A big Indian Cobra is about 6 feet long. When angry it rears and widely flattens the neck, by means of elongate movable ribs. When confronted by what appears to be an enemy, even a human being, it sprays venom forward in 2

jets, one from each fang. The Cobra deliberately aims for the eyes. One drop in the eye is enough to cause intense pain. Unless the venom is removed immediately, the structures of the eye deteriorate, which may result in permanent blindness. A single drop in the eye of a Rat is sufficient to cause its death. Mice, Rats, Frogs, and other small animals make up its diet. The EGYPTIAN COBRA (*N. haje*) is famed as the imperial symbol of the Pharaoh Tutankhamen. This Cobra is the largest of the African Cobras, growing to over 8½ feet. This species lives around the edges of the Sahara Desert, along the north coast of Africa, and southward through much of Angola and East Africa. The BLACK-NECKED or SPITTING COBRA (*N. nigricollis*) is a dangerous animal. It is widely distributed in Africa, mainly south of the Sahara Desert and outside the rain-forests. The Black Mamba is one of 4 species of Mambas which are found only in Africa. It is reputed to be the fastest Snake in the world and is greatly feared. It attains a maximum length of 14 feet and is the longest venomous Snake in Africa. Australia has many snakes and more are poisonous than not. The DEATH ADDER (*Acanthophis antarcticus*) is said to account for most of the deaths from Snake bite in Australia and New Guinea. The TIGER SNAKE (*Notechis scutalus*) of eastern Australia, reaching a length of 6 feet, is also held in great respect as it is quick and irritable and its poison is of high toxicity. The TAIPAN (*Oxyuranus scutellatus*) is the largest venomous species of Australia, sometimes reaching 10 to 11 feet in length. It inhabits northern Australia and New Guinea and is relatively rare.

FAMILY HYDROPHIIDAE: SEA SNAKES

The Sea Snakes feed entirely on fish. They are probably descended from the same stock that gave rise to the Cobras and their relatives and all are venomous, though not aggressive. All are excellent swimmers and have flattened, paddle-like tails. On land they are almost helpless, not being able to crawl efficiently. Some of the largest are 8 feet long. Of the more than 50 species, only the YELLOW-BELLIED SEA SNAKE (*Pelamis platurus*) is widely distributed, occurring in the warmer parts of the Pacific and Indian Oceans. Sea Snakes were entirely absent from the Atlantic Ocean until recently introduced via the Panama Canal. Little is known of the life history of these Snakes. Generally they refuse to eat in captivity and slowly waste away unless artificially fed.

FAMILY CROTALIDAE: PIT VIPERS

The Pit Vipers are characterized by a deep pit on each side of the head between the eye and nostril. They are most numerous in the Old World and surpass the Old World True Vipers in length. Pit Vipers are unknown in Africa and Australia, but are relatively abundant in eastern Asia from Korea southward and live in the Malay Archipelago as far south as the island of Timor. One species ranges into eastern Europe. The pits on the sides of the head are "heat receptors," special organs used to detect the presence of warm blooded prey. The BUSHMASTER (*Lachesis muta*) is the largest venomous Snake in the Americas and occasionally strikes without

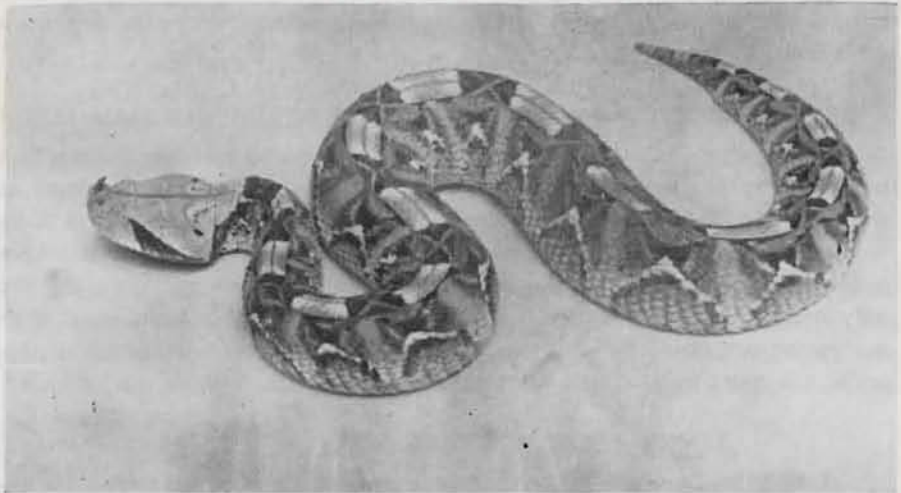
apparent provocation. The Bushmaster is known in forested areas from Brazil and Peru northward to southern Costa Rica. This species differs from all other American Pit Vipers in that it lays eggs, as opposed to giving birth to live young. There have been reports of Bushmasters reaching 14 feet, but this is nearly double the length of most adults. They do not thrive in captivity, often refuse food, and seldom live more than a few months. They strongly resent being handled. The FER-DE-LANCE (*Bothrops atrox*), owing to its wide range and abundance, is the most important venomous Snake of the American tropics. It is known from Brazil and Peru northward to southern Mexico. The bite of a Fer-de-lance, no matter how small, causes intense pain at the point where the venom enters the skin and death may ensue. This Snake is primarily nocturnal. Armadillos devour them regardless of their poison, as do Hog-nosed Skunks, and the introduced Mongoose in the West Indies. The Fer-de-lance is extraordinarily prolific, giving birth to 71 young on occasion, and is a hardy captive. Specimens longer than 6 feet are not uncommon and 10 feet may be the maximum. The ISLAND PIT VIPER (*B. insularis*) of the island of Queimada Grande, off the coast of Brazil, may have the most potent venom of any Snake. This Snake is also unusual for the reason that hermaphroditic individuals are common and are apparently becoming more and more common in their restricted habitat.

Only 3 Pit Vipers occur in the United States, the Rattlesnakes, Water Moccasin, and Copperhead. The WATER MOCCASIN (*Agkistrodon piscivorus*) occurs in the southeastern United States. A specimen has been reported as 5 feet, 9 inches, long, but individuals longer than 5 feet are uncommon. Moccasins are rarely found far from water and live in swamps, bayous, and streams, often basking on banks or on logs extending over water. On being molested, the venomous Moccasin frequently stands its ground, mouth open and tail vibrating. This threatening attitude exposes the white lining of its mouth, hence, the name "Cottonmouth." The MEXICAN MOCCASIN (*A. bilineatus*) ranges from tropical Mexico to Nicaragua. These Snakes feed on a great variety of small animals. The COPPERHEAD (*A. contortrix*) occurs from central Massachusetts to northern Florida, thence westward to Kansas. The record length recorded is 6 feet, 2 inches. The COMMON MILK SNAKE (*Lampropeltis doliata*) of the family Colubridae is often mistaken for the Copperhead in the eastern United States. Rattlesnakes are of universal interest. Nonetheless, the only truly distinctive character of the Rattlesnake is the structure on the end of its tail. The rattle is a frightening or warning device. The segments in the rattle sometimes number 17 or more. A new segment is added to the rattle each time the skin is shed, which may be several times a year, but those on the end are lost through wear. Rattlesnakes are found only in the Americas. Herpetologists recognize about 28 species. Rattlesnakes occur in every state except Maine and possibly Delaware, where they have been exterminated. "Rattlers" 6 feet long are not common and a record length for the EASTERN DIAMOND-BACK RATTLE-SNAKE (*Crotalus adamanteus*) is 8 feet. This species inhabits the southeastern United States. Throughout the southwestern desert regions of North

America lives the WESTERN DIAMOND-BACK RATTLESNAKE (*C. atrox*) which has been measured as reaching 7 feet, 5 inches. The TIMBER RATTLESNAKE (*C. horridus*) of the eastern United States often is 4 to 5 feet long, and the record is 6 feet, 2 inches. The MASSASAUGA (*Sistrurus catenatus*) attains a length of nearly a yard. It occurs in the eastern United States. Rattlesnakes ordinarily do not thrive in captivity. It is known that the life span of old Rattlers may be more than 20 years and possibly 30.

FAMILY VIPERIDAE: TRUE VIPERS

This family is restricted to Africa, Europe, Asia, and the Malay Archipelago, but is absent from the Malay Peninsula. Along with the Pit Vipers they have perfected the venom apparatus to a degree unsurpassed by other Serpents. Both of these families are distinguished by their long fangs which can be folded against the roof of the mouth when not in use. The venom of both has its principal effect on the blood system, causing hemor-



GABOON VIPER—*Bitis gabonica*

rhage, clotting, breakdown of the walls of blood vessels, and dissolution of blood cells. The fangs of the GABOON VIPER (*Bitis gabonica*) can penetrate to a depth of an inch and a half and are among the largest in Snakes. This handsome Snake is the longest and heaviest of True Vipers and has been recorded as reaching 5 feet, 8½ inches, and weighing 18 pounds. These Snakes range over the whole of central Africa and the island of Zanzibar and are not aggressive. The RHINOCEROS VIPER (*B. nasicornis*) receives its name from erectile scales above each nostril. It lives in swampy areas of central Africa. The PUFF ADDER (*B. lachesis*) is the widest-ranging Viper in Africa and occurs in the Arabian Peninsula. RUSSELL'S VIPER (*Vipera russelli*) is the best known and most widely distributed Viper in Asia. It is probably responsible for more deaths than the Cobras. FEA'S VIPER (*Azemisops feae*) is one of the rarest Snakes in collections. Fewer than half-a-dozen specimens are known, these being from upper Burma, southern China, and southwestern Tibet.

CLASS MAMMALIA: MAMMALS

Man is particularly interested in mammals because he, himself, is a mammal. Mammals are of many forms. Most of them are terrestrial, like ourselves, but some like the Bats, fly, and some are aquatic like Whales and Seals. They all have certain characteristics that set them apart from other vertebrates. All mammals have milk glands by which their young are nourished. All have hair at some stage in their development, are warm blooded, and possess 4 limbs or the rudiments of limbs.

The smallest mammals are Shrews and Mice, weighing only a fraction of an ounce. The largest mammal is the BLUE WHALE (*Balaenoptera musculus*) which grows to 105 feet and weighs up to 119 tons.

In the following section we shall describe some of the approximately 3,500 known living species of mammals, many of which may be seen in the zoo. Some because of particular interest are described or pictured even though they may not be represented in the zoo's collection. They are discussed in their evolutionary order from the most primitive to the most advanced.

ORDER MONOTREMATA: MONOTREMES OR EGG-LAYING MAMMALS

This most primitive order of mammals appears to be a connecting link between reptiles and other mammals. The name Monotremata relates to the common opening in these mammals through which both eggs and body wastes are discharged. There are only a few species comprising this unique order found only in Australia, Tasmania, and New Guinea. They are the only mammals that lay eggs. The eggs are incubated, hatched, and then the young are nourished with milk by the female parent. Members of this order are extremely rare in captivity.

FAMILY TACHYGLOSSIDAE: SPINY ANT-EATERS

The Spiny Ant-eaters or Echidnas are extraordinary mammals inhabiting Australia, Tasmania, and New Guinea. Their long, sticky, darting tongue and natural diet of Ants remind one of the Ant-eaters. Their quills, which resemble those of the Porcupine, their bird-like beaks, the pouched females, and their strong digging claws all combine to make this an unusual mammal, indeed. The female lays an egg which is placed in a backward opening pouch on the abdomen, formed during the breeding season, wherein the egg hatches and the young one is carried until it leaves the pouch. The method of transfer of the egg to the pouch is still a mystery, but it is thought that the egg is deposited directly into the pouch at the time of laying. Echidnas are sluggish creatures and dig well, going straight down in a horizontal position digging with their powerful claws. They have no teeth and are nocturnal. The THREE-TOED ECHIDNA (*Zaglossus bruyi*) of New Guinea and Salawati is the largest species. The AUSTRALIAN ECHIDNA (*Tachyglossus aculeatus*) is the species most commonly seen in captivity. An Australian Echidna lived 49 years, 5 months, in captivity.

FAMILY ORNITHORHYNCHIDAE: PLATYPUSES

The one species of this family, the DUCKBILL PLATYPUS (*Ornithorhynchus anatinus*), inhabits the eastern region of Australia and Tasmania. Living along the borders of streams, rivers, and lakes, this semi-aquatic mammal digs a series of intricate tunnels where it lays its eggs in a nesting chamber lined with grass, leaves, twigs or reeds. When the female goes into her nest to lay her one to 3 eggs, she plugs up the tunnel behind her with earth. She curls around the eggs, holding them against her body by means of her tail until they hatch, apparently 7 to 10 days later. After weaning Platypuses feed on small crustaceans, worms, insects and larvae. The first Platypus seen alive on a foreign shore was exhibited in America in 1922. Since then, several have been exhibited in captivity and a positive longevity record exists of 11 years, 5 months. Another record of 14 years is claimed.

ORDER MARSUPIALIA: MARSUPIALS

These primitive mammals are common to the Australian regions. The young emerge from the body of the mother at a very early stage of development and in most species complete their growth in a pouch on the mother's abdomen. Representative types of this strange order are always to be seen in the Zoological Park.

FAMILY DIDELPHIDAE: OPOSSUMS

The COMMON OPOSSUM (*Didelphis marsupialis*) is a rather slow-moving mammal native to the entire eastern half of the United States. This nocturnal and omnivorous species has been introduced in various western states. It is a prolific breeder, giving birth to as many as 14 young at a time.

FAMILY DASYURIDAE: CARNIVOROUS MARSUPIALS

The THYLACINE or MARSUPIAL WOLF (*Thylacinus cynocephalus*) is now restricted to remote sections of Tasmania, but formerly also lived in Australia. This unusual animal is very rare in the wild state and extremely rare in captivity. It is the counterpart, among Marsupials, of the true Wolf. Females have a backward-opening pouch, containing 4 teats, in which the 2 to 4 young are nursed. This animal is about the size of a Collie Dog and is nocturnal. Also included in this family is the TASMANIAN DEVIL (*Sarcophilus ursinus*), formerly of Australia and Tasmania, but now restricted to the latter. It is noted for its carnivorous habits. The pouch of this mammal also opens backward.

FAMILY PHALANGERIDAE: CUSCUSES AND PHALANGERS

One of Australia's strangest animals is the attractive KOALA (*Phascolarctus cinereus*), the true "teddy bear" of the animal kingdom. No more interesting creature for zoological exhibition can be imagined than this docile and amusing species, but unfortunately it is very difficult to maintain outside its native country as its food consists primarily of Eucalypt-



KOALA WITH YOUNG—*Phascolarctos cinereus*

tus leaves and only those of certain types. It was once almost exterminated, but under rigid protection its future seems assured and 2 zoos in the United States have exhibited these animals recently.

FAMILY MACROPODIDAE: KANGAROOS

This family includes Kangaroos, Wallaroos, and Wallabies, which are distinguished by differences in size primarily. All of these mammals can travel with great speed, using only the powerful hind legs. The tail is used for balancing, as a supporting member, and as a defensive weapon. There are no native hoofed animals in Australia, but the herbivorous Kangaroos approach those types in habits and might, thus, be said to replace them. Pouches open forward and a single young or "joey" is as a rule nursed at a time. The GIANT RED KANGAROO (*Macropus rufus*) is one of the largest marsupials and comes from southern Australia. The male is red and the female bluish-grey. They breed freely in captivity and live to 16 years. BENNETT'S WALLABY (*Protemnodon ruficollis bennetti*) is a moderate to small-size member of the Kangaroo family, native to Tasmania. It is hardy and breeds regularly in captivity, having one young at a time. The DUSKY TREE KANGAROO (*Dendrolagus bennettianus*) lives in the mountains and highlands of northern Queensland. It is one of 6 species living in Australia and New Guinea. These Kangaroos spend most of their time in trees, coming to the ground only to drink at night. This species reaches 4 feet in length, about half of which is tail. Its hind limbs have become shorter and broader, and the foot pads are rough, to assist in climbing.



BENNETT'S WALLABY AND YOUNG—*Protemnodon ruficollis bennetti*

ORDER PRIMATA: PRIMATES

Primates include Lemurs, Monkeys, Apes and Man, and except for Man are restricted to tropical and sub-tropical regions of both hemispheres. The differences between the New World and Old World primates are quite distinct and it is interesting to note that none of the Old World group have prehensile tails while many of the New World representatives do. Approximately 244 species make up this order.

FAMILY GALAGIDAE: GALAGOS OR BUSHBABIES

This family of long-tailed, large-eared, very swift, primitive primates is entirely African. There are many species of Bushbabies. The largest is about the size of a House Cat and the smallest not much bigger than a large Mouse. DEMIDOFF'S or the DWARF BUSHBABY (*Galagoides demidovi*) is a most engaging, small, bug-eyed creature that can leap 12 feet or more horizontally or even upwards. It is an inhabitant of the true equatorial forests of Africa from Senegal to the Rift Valley. Very little is known about the habits of this species. It appears to be more generally diurnal than other Bushbabies. The GOGO or MOHOLI BUSHBABY (*Galago senegalensis*) is often kept as a pet and has been bred in captivity. It is found throughout the tropical and semi-tropical area of Africa south of the Sahara. This species is entirely nocturnal and appears rather intelligent with an extensive vocal communication system.

FAMILY LORISIDAE: LORISES AND POTTOS

The members of this primitive family are more or less tailless, small-eared, slow-moving, small mammals spread over Africa and the Oriental Region. The POTTO (*Perodicticus potto*) of Africa is known in pidgin-English as the "softly-softly," a name that appropriately describes its habits. It is nocturnal and deliberate in movement. A unique feature of this species is the fact that spines of vertebrae in the neck region protrude through the skin and are used as a defensive mechanism. The SLENDER LORIS (*Loris tardigradus*) is found in India and Ceylon. Arboreal animals weighing less than a pound, with huge eyes, they are completely nocturnal.

FAMILY LEMURIDAE: LEMURS

The Lemurs are primarily from the Island of Madagascar and with the destruction of their native habitat are rapidly approaching extinction. They are striking animals not commonly seen in captivity. The best known



RING-TAILED LEMUR—*Lemur catta*

and commonest species is the RING-TAILED or CAT LEMUR (*Lemur catta*). This species is extremely clean and neat and is one of the most attractive Lemurs. The RUFFED LEMUR (*L. variegata*) is the largest and most colorful of all Lemurs and measures up to 4 feet in length, half of which is tail. This species, alone among Lemurs, builds nests in trees.

FAMILY Tarsiidae: Tarsiers

The Tarsiers are small mammals found in the East Indies and the Philippines. They are rather highly advanced primates that are rare in captivity. Their fingers and toes end in flattened pads which may be slightly adhesive. The length of head and body is about 6 inches and the tail about 10 inches. The PHILIPPINE TARSIER (*Tarsius syrichta*) is found only in the Philippines and is typically nocturnal in habits and omnivorous in diet.

FAMILY Hapalidae: Marmosets

Marmosets are enchanting little primates living in the tropical forests of the New World. They are popular as pets among the natives, as well as with people throughout the world. The GOLDEN TAMARIN or MARMOSET (Le-



COTTONTOP MARMOSET—*Oedipomidas oedipus*

ontocebus rosalia) is a brilliantly colored mammal. The COTTONTOP or PINCHE MARMOSET (*Oedipomidas oedipus*) is one of the more common species in captivity. The PYGMY MARMOSET (*Cebuella pygmaea*) is one of the smallest primates; adults weigh as little as 4½ ounces and are no larger than a small Rat.

FAMILY Cebidae: NEW WORLD MONKEYS

This family, entirely restricted to the New World tropics, is composed of the Owl, Saki, Squirrel, Capuchin, Spider, and Howler Monkeys. They are quite distinct from the primates of the Old World. Only in this family of primates are found species with prehensile tails. The RED UACARI

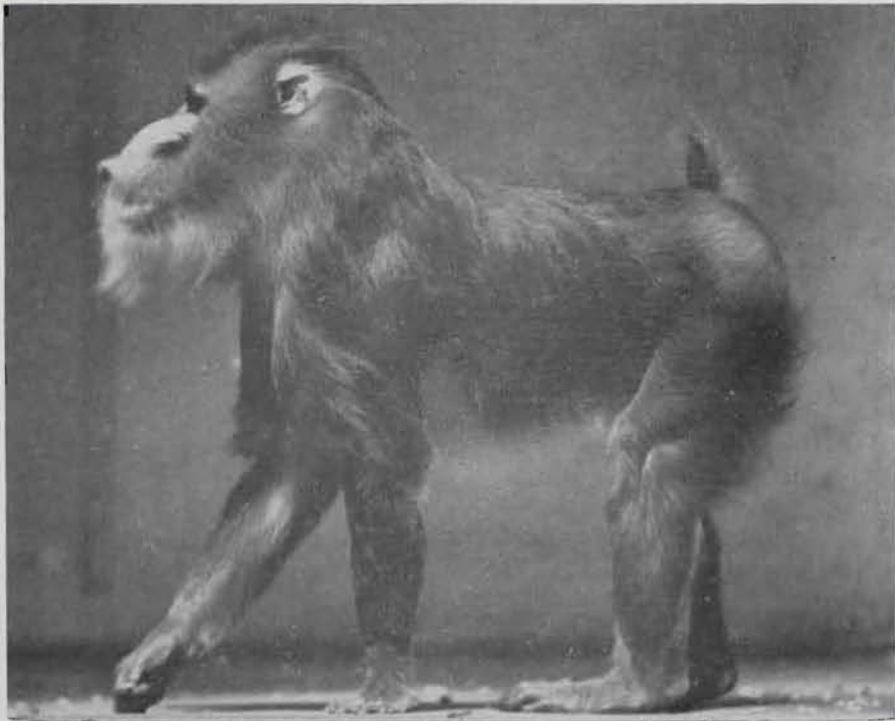
(*Cacajao rubicundus*) is a fantastic animal having naked, bright red skin on the face which turns even more livid when the animal is excited. The SQUIRREL MONKEY (*Saimiri sciurea*) is one of the commonest New World primates and is often seen in captivity. There is some question as to whether this species has 4 races or is actually 4 distinct species, as all appear to intergrade. These primates live in huge tribal units in northern South America and have highly distinctive vocabularies. The Capuchins range from southern Mexico to Argentina. They are also known as Sapaious and Ring-tails. The WHITE-THROATED CAPUCHIN (*Cebus capucinus*) inhabits Central America and is one of the commonest of all primates in captivity. Capuchins in some respects exceed all other primates, even the Apes, in certain abilities and notably in the use of tools. This is the "organ grinder" Monkey and a common pet. Its tail is prehensile. The COMMON WOOLLY MONKEY (*Lagothrix lagotricha*) is a close-furred, moderate-sized, gentle Monkey inhabiting the Amazonian Region of South America. The Brazilian name of "barrigudos" or "bag-bellies" is highly appropriate. The tail of this Monkey is also prehensile. GEOFFROY'S SPIDER MONKEY (*Ateles geoffroyi*) of Central America is one of several species of Spider Monkeys which are common and widespread in Latin America. These pot-bellied, spidery-limbed Monkeys have variable dispositions and can be vicious and dangerous. Their thumbs are reduced or completely absent and the remaining 4 fingers form a kind of hook. Their tails are prehensile. Because of these features they are extremely agile. The Howlers are the largest members of the family and have terrific vocal abilities in addition to agility of movement. The sounds produced by these primates are often referred to as roars and sometimes go on all day and night. Howlers range from southern Mexico to central South America and occur as several species differing in color and size. Some are red, some black, some grey, some brown, and some yellow. Howlers, as a rule, do not thrive in captivity. A particularly outstanding species is the RED HOWLER (*Alouatta seniculus*) of the Caribbean area.

FAMILY CERCOPITHECIDAE: GUENONS, MACAQUES, BABOONS, AND ALLIES

This vast family of Old World primates has many beautiful and unusual species. Most species have cheek pouches in which they store food and none have prehensile tails. The Guenons or Long-tailed Monkeys form a close-knit group found only in Africa south of the Sahara. They are on the whole, large, gregarious, rather gentle primates both in the wild and in captivity, comprising about 100 species. Some of the more interesting are the SPOT-NOSED MONKEY (*Cercopithecus nictitans*), MOUSTACHED MONKEY (*C. cephus*), DE BRAZZA'S MONKEY (*C. neglectus*), DIANA MONKEY (*C. diana*), and the GREEN MONKEY (*C. aethiops*). The PATAS MONKEY (*Erythrocebus patas*) is a terrestrial species found only on open savannas and grass fields across central Africa. The Mangabeys of Africa are large Monkeys much like the Guenons and are great jumpers. They have large cheek pouches in which they store food temporarily. They are unusually quiet Monkeys, but have prominent light eyelids with which it is believed they communicate with one another by blinking. The RED-CAPPED MANGABEY (*Cercocebus torquatus*) is a particularly beautiful animal.

The Macaques form a group of Asiatic Monkeys with one exception, the BARBARY MACAQUE or APE (*Macaca sylvana*) of northwest Africa and Gibraltar. The CRAB-EATING MACAQUE (*M. irus*) has a wide range, extending throughout the most of southeast Asia. This well-known Monkey is never far from the sea or fresh water and often feeds on Crabs and other Crustacea, entering the water to obtain such food. The RHESUS MONKEY or MACAQUE (*M. mulatta*) is possibly the best known of all primates. Called the Bandar in India and Bandarlog in Kipling's stories, this species ranges from Tibet and India to China and Indo-China. The Indians give this species a certain sanctity and Bandars roam unmolested in the temples of India. The Rhesus has played an important part in medical and other scientific research and was extensively used in the development of polio vaccine. It appears to rate a generally high I. Q. as compared to other animals. The PIG-TAILED MACAQUE (*M. nemestrina*) found in Malayasia, has been trained for centuries to harvest coconuts and other fruits for human beings. Other Macaques are the STUMP-TAILED or JAPANESE MACAQUE (*M. fuscata*), and the MOOR MACAQUE (*M. maurus*).

The Baboons are the largest members of the family and are restricted



MANDRILL—*Mandrillus sphinx*

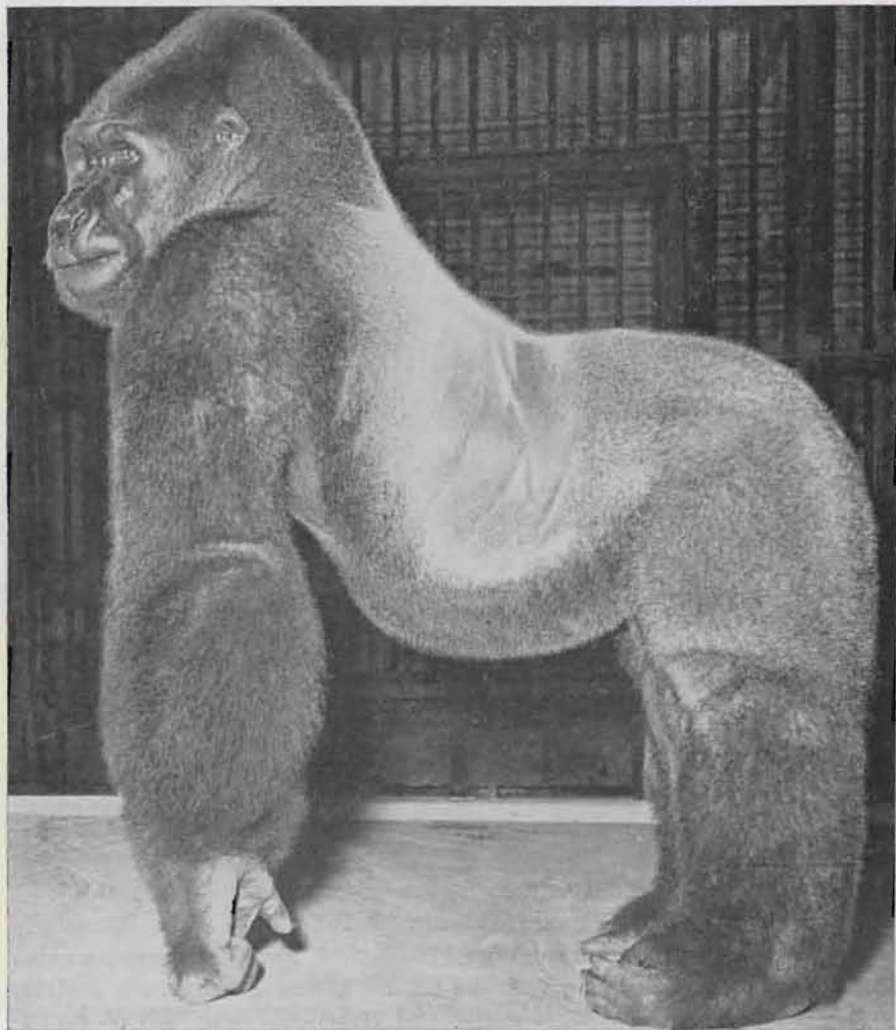
to Africa. The MANDRILL (*Mandrillus sphinx*) is one of the most spectacularly colored animals in the entire animal kingdom. A group of these primates are usually on display along with the DRILL (*M. leucophaeus*), the ANUBIS BABOON (*Papio anubis*), the HAMADRYAS or SACRED BABOON (*P. hamadryas*), and the GELADA BABOON (*Theropithecus gelada*) from Abyssinia.

FAMILY COLOBIDAE: LEAF-EATING MONKEYS

This is a large family spread in a wide belt across Africa, and in Asia from India, Ceylon, and Tibet to China, Java and Borneo. There are about 43 species in all, many with unusual features. The sacculated stomach construction is especially suitable to the digestion of leaves and other coarse green matter. Most of them are shy and retiring and do not do well in captivity. The DOUC (*Pygathrix nemaeus*) of the Indo-Chinese Region is one of the most highly colored animals of the world. The BLACK and WHITE COLOBUS MONKEY (*Colobus polykomos*) is noted for its long, black and white coat and for years thousands of skins of these primates were collected to satiate the whims of fashion. The HANUMAN LANGUR (*Semnopithecus entellus*) has long been a sacred animal in India. The PROBOSCIS MONKEY (*Nasalis larvatus*) is found only on the island of Borneo and has an amazing nose, sometimes 3 inches in length and hanging down over the mouth to below the chin. These animals are very rare in captivity.

FAMILY PONGIDAE: TRUE APES

This family is composed of the true Apes which zoologists believe origi-



LOWLAND GORILLA—*Gorilla gorilla gorilla*

nated from the same ancestral primate form as man. Thus, Apes are not considered to be our direct ancestors, but only relatives. They are sometimes referred to as anthropoid Apes. They lack a tail, stand semi-erect, and possess a relatively high order of intelligence. The Cleveland Zoological Park has exhibited all 4 representatives of the true Apes, including the 3 largest members, the GORILLA (*Gorilla gorilla*) and the CHIMPANZEE (*Pan troglodytes*), both native to Africa; and the ORANG-UTAN (*Pongo pygmeus*) from Borneo and Sumatra. The pair of Gorillas, collected by the Cleveland Zoo West African Expedition in 1950, arrived at the Zoo in July 1950. The female is estimated to have been born in 1947 and the male in 1948. The male has one of the most magnificent physiques of any Gorilla in captivity in the world today. A specimen, known to have been about one year old on arrival, has lived over 34 years in captivity. The first Gorilla born in captivity was born in 1956 and the second in 1959. Our first pair of Orang-utans arrived May 29, 1954, as a gift of the Hanna Foundation, as youngsters 2 or 3 years old. The Chimpanzee is smaller than either of the above 2 species and a few attain a weight of more than 190 pounds. Chimpanzees are used for scientific research purposes and are more responsive than any of the other true Apes. The Gibbons are the fourth group of true Apes. These small and graceful arboreal Apes are



WHITE-HANDED GIBBON AND BABY—*Hylobates lar*

found in southeastern Asia. Their melodious calls are remarkable, but one of the most vocal is the SIAMANG (*Symphalangus snyderi*) from Sumatra, Tenasserim and the Malay Peninsula. The WHITE-HANDED GIBBON (*Hylobates lar*) is most commonly seen in zoological parks and breeds in

captivity. It ranges from Thailand and Burma through Malaya. Gibbons have lived 31½ years in captivity.

FAMILY HOMINIDAE: MODERN MAN

MAN (*Homo sapiens*) is the most advanced animal living, being particularly distinguished by a highly developed brain and hand. Typical mammalian characters present are hair, mammary glands for nursing young, and a 4-chambered heart pumping warm blood. Man is omnivorous in feeding habits and world-wide in distribution.

ORDER EDENTATA: ANTEATERS, SLOTHS, AND ARMADILLOS

This order is highly specialized and restricted to the New World. The name of the order implies a lack of teeth, but only the Anteaters lack teeth altogether. All members have long claws.

FAMILY MYRMECOPHAGIDAE: ANTEATERS

The GIANT ANTEATER (*Myrmecophaga tridactyla*) has a long tubular muzzle with a small mouth through which the elongated, sticky tongue can be protruded about 9 inches to capture Ants and Termites which form its principal diet. This large, coarse-haired mammal ranges from Guatemala to Paraguay and may reach 8 feet in length. One lived over 14 years in captivity. The TAMANDUA (*Tamandua tetradactyla*) is an arboreal Anteater feeding largely on Termites. Its tail is prehensile. It ranges from tropical Mexico through central South America. It is delicate in captivity, compared to the Giant Anteater, and the longevity record in captivity is 5 years.

FAMILY BRADYPODIDAE: SLOTHS

This unique family is composed of the THREE-TOED SLOTH (*Bradypus tridactylus*) and the TWO-TOED SLOTH (*Choloepus didactylus*), both native of Central and South America. These arboreal mammals live most of their lives hanging inverted from tree limbs and are awkward when moving about in any other way. They are slow-moving and subsist mainly on plant leaves. A Two-Toed Sloth has lived 23 years in captivity.

FAMILY DASYPODIDAE: ARMADILLOS

This family of hard-shelled mammals is represented in the United States by only one species, the TEXAS or NINE-BANDED ARMADILLO



GIANT ARMADILLO—*Priodon giganteus*

(*Dasyus novemcinctus*), ranging from southern United States south to Brazil. These burrowing animals are nocturnal and roll into an armored ball if frightened. In recent years this species has been extending its range in the United States. The GIANT ARMADILLO (*Priodon giganteus*) of northern South America is the largest species, attaining 5 feet in length.

ORDER PHOLIDOTA: PANGOLINS AND SCALY ANTEATERS

This order is characterized by a complete lack of teeth and large overlapping scales composed of compressed hair. All 7 species are much like the Armadillos, but not closely related. They inhabit Africa and southeast Asia. The largest species, the GIANT PANGOLIN (*Smutsia gigantea*), attains a length of about 6 feet and inhabits Africa. All are burrowing, nocturnal mammals, feeding on Termites and Ants.

ORDER LAGOMORPHA: RABBITS AND ALLIES

This order of small, herbivorous mammals is composed of Pikas, Rabbits, and Hares, some of considerable economic importance. Commonest in the Northern Hemisphere, and world-wide in distribution, these animals were originally absent only on Madagascar and in the Australian region.

FAMILY LEPORIDAE: RABBITS AND HARES

Members of this family have relatively large, long ears, a short tail, very long hind limbs and feet, and thick, soft fur. The true Hares have young born with eyes open, fully clothed in fur, and are active at birth. Hares are larger than Rabbits. Ten native and one introduced species of Hares live in North America. The BLACK-TAILED JACKRABBIT (*Lepus californicus*) of the grasslands of the western United States is a Hare. It is abundant and can easily outrun a Fox or Coyote. It is said to be able to leap 18 to 20 feet. The COMMON EUROPEAN HARE (*L. europaeus*) lives in Europe and temperate regions of Asia and has been introduced into New England and west through the Great Lakes Region. It reaches a length of 2 feet. In Australia, 24 European Hares set free in 1859 multiplied to the extent that they became a pest and great effort and funds are expended annually to control them.

Rabbits number 8 species in the United States. The EASTERN COTTON-TAIL (*Sylvilagus floridanus*) occurs from Costa Rica north through the United States east of the Rocky Mountains. It is a common native resident in our Zoological Park and may be seen day and night, though its favorite feeding time is twilight. Over 20 million Cottontails of several species are killed annually by hunters in the United States. Cottontails are prolific, having 3 or 4 litters per year of 5 or 6 young at a time. The COMMON EUROPEAN RABBIT (*Oryctolagus cuniculus*) is native to Europe and North Africa and is thought to be the stock from which domestic Rabbits have been derived.

ORDER RODENTIA: RODENTS

These mammals are commonly referred to as the gnawing mammals because of their universal habit of gnawing. The incisor teeth of this order are chisel-like and grow continually. This is the largest order of living mammals; nearly 3,000 species are known.

FAMILY SCIURIDAE: SQUIRRELS

This family includes Squirrels, Woodchucks, Marmots, Chipmunks, and Prairie Dogs. They occur in Europe, Asia, Africa, and the Americas, but not in Australia or Madagascar. About 50 species occur in North America. The EASTERN GRAY SQUIRREL (*Sciurus carolinensis*) inhabits forests of eastern North America and is a familiar figure. In captivity this Squirrel may live to 15 years. The EASTERN FOX SQUIRREL (*S. niger*) lives in more open forests of eastern North America. It gets its name from its Fox-like face and is the largest Tree Squirrel in this area. It is known by its relatively large size and reddish, grizzled coat, and is a common resident of the Zoological Park. Adults may weigh about 2 pounds and be 2 feet long. The WOOD-CHUCK or GROUND HOG (*Marmota monax*) is common in the eastern United States, living in burrows and dens in earth and rocks. This is the animal made famous on February 2nd, "Ground Hog Day," as a weather prophet. In nature it may be seen only during spring, summer, and early fall days, as it hibernates the rest of the year. It weighs up to 14 pounds at its heaviest in the fall. A disappearing Squirrel is the BLACK-TAILED PRAIRIE DOG (*Cynomys ludovicianus*) of the central grasslands of North America. This and one other species of Prairie Dog once numbered in the millions, but have given way to farming and civilization. Prairie Dog "towns" contained miles of tunnels and dens and required constant maintenance by the inhabitants. Black-tailed Prairie Dogs weigh about 3 pounds and are about one foot long. The EASTERN CHIPMUNK (*Tamias striatus*) is an inhabitant of forests of eastern North America and a common resident of our Zoological Park. Chipmunks live in dens at the end of burrows in the ground. They store seeds, grains, nuts, and berries to feed upon during the winter.

FAMILY CASTORIDAE: BEAVERS

The AMERICAN BEAVER (*Castor canadensis*) represents a small family



AMERICAN BEAVER—*Castor canadensis*

with species in North America, Europe, and Asia. Beavers are among the largest of rodents, weighing as much as 60 pounds. Strangely, they are rarely bred in zoos in this country.

FAMILY HYSTRICIDAE: OLD WORLD PORCUPINES

A number of species make up this family distributed in Africa, southeastern Europe, and southern Asia. The AFRICAN CRESTED PORCUPINE



AFRICAN CRESTED PORCUPINE—*Hystrix cristata*

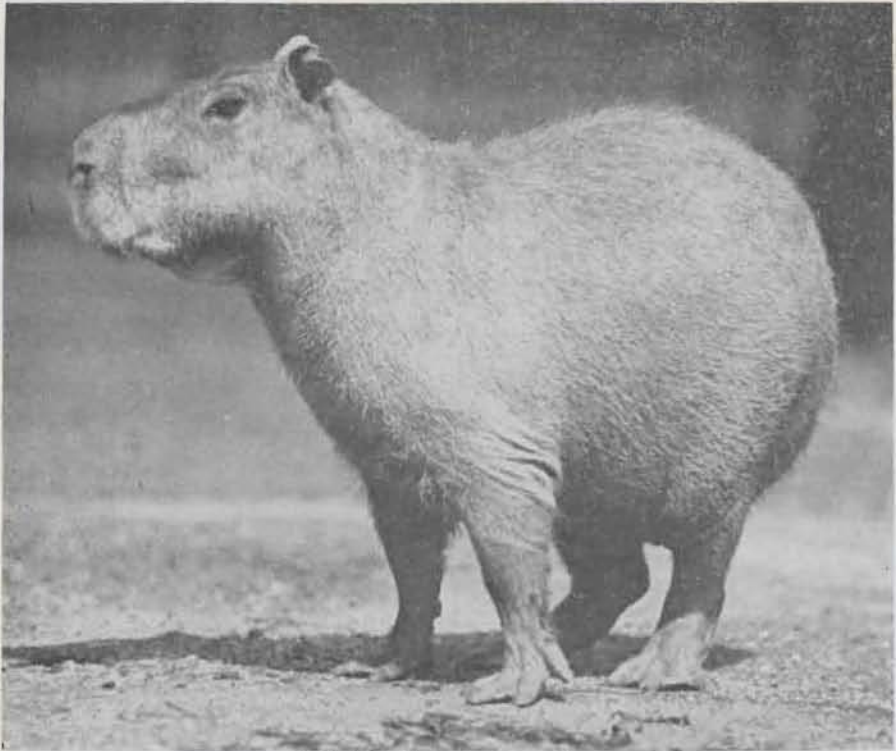
(*Hystrix cristata*) is the largest Porcupine, reaching 3 feet in length with quills over one foot long. It has lived in captivity over 20 years.

FAMILY ERETHIZONTIDAE: NEW WORLD PORCUPINES

The Porcupines of the New World are quite different from those of the Old World. They are found from Alaska to Argentina. They do not throw quills, as is commonly thought. Contact must be made in order to dislodge the quills. The EASTERN PORCUPINE (*Erethizon dorsatum*) occurs throughout most of eastern North America. New World Porcupines are good climbers and some species, such as the BRAZILIAN TREE PORCUPINE (*Coendou prehensilis*), have prehensile tails.

FAMILY HYDROCHOERIDAE: CAPYBARA

This family is represented solely by the largest rodent on earth, the CAPYBARA (*Hydrochoerus capybara*), ranging from Panama to eastern South America. Full grown males may weigh over 100 pounds. It is an inhabitant of water courses, a good swimmer, and completely herbivorous.



CAPYBARA—*Hydrochoerus capybara*

FAMILY CAPROMYIDAE: COYPUS

The COYPU (*Myocaster coypus*) has a wide range in South America and is of aquatic habits. It has been utilized, under the name of NUTRIA, as a source of commercial fur. Thousands have been raised in fur farms and many feral populations have developed in this country, Europe, and Australia.

ORDER CARNIVORA: FLESH EATERS

The flesh-eating mammals comprising the Cats, Bears, Canines, Viverines, Mustelines and their allies, are known as the Carnivores. Many of these animals are predatory and many eat plant material in addition to flesh. The largest species is the Kodiak Bear. Among the smallest Carnivores are the Weasels, representing the family of Mustelines. Carnivores play an important role in the "balance of nature." The destruction of these predatory types has often been followed by excess multiplication of other animals, in some instances of kinds highly injurious to forests and fields.

FAMILY CANIDAE: DOGS AND ALLIES

Wolves, Jackals, Wild Dogs, and Foxes comprise the family Canidae and are distributed over all parts of the world. The TIMBER WOLF (*Canis lupus*) originally inhabited the greater part of North America, but is now exterminated over a large part of this area. The COYOTE (*C. latrans*) is a much smaller animal than the Timber Wolf and inhabits the western

portion of the United States and Mexico. Despite predatory habits which may cause loss to stock breeders, this mammal is highly beneficial. The elimination of Coyotes has produced injurious effects in the consequent over-population of small mammals highly destructive to grain crops. In spite of tremendous effort expended toward extermination, this species is, in many areas of the west, as common as it ever was. Several unusual Dogs rarely seen in zoos inhabit South America. The MANED WOLF (*Chrysocyon brachyurus*) is a rare, long-legged canine of the savannas of southern Brazil, Paraguay, and Argentina and the largest Dog-like animal of South America. Others include the ROUND-EARED DOG (*Cerdocyon microtis*) and the BUSH DOG (*Speothus venaticus*). The CAPE HUNTING DOG (*Lycan pictus*) of Africa is said to be the largest of wild Dogs and is remarkable in its striking pattern and musk-like odor. The RED FOX (*Vulpes fulva*) is distributed over most of Canada and the United States and the breeding of this species for its fur has become an important industry. The RED FOX has 4 distinct color-phases, red, black, silver, and brownish yellow, sometimes called cross. Females may have any combination or all 4 colors in one litter. Silver Fox fur is more fashionable than the other colors and most of it comes from fur farms. The GRAY FOX (*Urocyon cinereoargenteus*) is an animal of lower elevations and ranges throughout the United States and into Canada. The NEW GUINEA WILD DOG (*Canis hallstromi*) inhabits the highlands of New Guinea and is extremely rare in captivity. Only in 1957 was it seen in captivity for the first time.

FAMILY PROCYONIDAE: RACCOONS AND ALLIES

This family is represented in North America by the RACCOON (*Procyon lotor*), and in Central and South America by several species including the



RACCOON—*Procyon lotor*

BROWN COATI (*Nasua narica*) and the KINKAJOU (*Potos flavus*), sometimes called the "honey bear." The Kinkajou is particularly interesting because it has a prehensile tail, as do several animals of the Americas and Australia. This animal has lived 22 years in captivity.

The zoological relationship of the LESSER PANDA (*Ailurus fulgens*) and



LESSER PANDA—*Ailurus fulgens*

the GIANT PANDA has long been debated. Until recently, they were both considered members of the Raccoon family but recent evidence indicates that the spectacular Giant Panda is most closely related to the Bears, while the Lesser Panda is still generally classed with the Raccoons. The Lesser Panda is a beautiful and striking mammal about Raccoon size and is seen in several zoos in this country. Its native range is the middle elevations of the Himalaya Mountains and in southwestern China and extreme northern Burma.

FAMILY URSIDAE: BEARS

The Bears are an important and impressive family of Carnivores. They occur in North America, Asia, and Europe. Only one species occurs in South America, in the Andean Region, and only one species in Africa, in the extreme northwestern tip. Bears belong to the order Carnivora but have omnivorous habits and eat grasses, roots, insects, Ants, eggs, nuts and other fruits, Rodents and other animals. The Polar Bear has the most restricted diet, feeding on fish and Seals primarily. Most Bears sleep in dens during the winter months. Their body temperatures remain



KODIAK BEAR—*Ursus middendorffi*

nearly normal during this time and thus they do not truly hibernate. As mentioned earlier, the KODIAK BEAR (*Ursus middendorffi*) of Alaska is the largest living land Carnivore. One weighed 1,656 pounds and measured 9 feet in length. The Cleveland Zoo's original trio were received in September, 1946, and have raised young regularly. The GRIZZLY BEAR (*U. horribilis*) formerly lived throughout western North America, west of the Missouri River, but has now been exterminated in most of this area. It may be distinguished from the American Black Bear by a distinct hump over the shoulders. An average Grizzly weighs 500 pounds and exceptional ones may weigh 750 pounds. The AMERICAN BLACK BEAR (*Euarctos americanus*) formerly ranged throughout the United States and into Canada. It, too, has been reduced in range but still occurs in many states in fair numbers. A common color phase of this Bear is brown and is known as the CINNAMON BEAR. Arctic regions of the world are home to the POLAR BEAR (*Thalarctos maritimus*). In captivity this Bear seldom rears its young, though one or 2 zoos have good records in this respect. Their weight may reach 1,600 pounds. The SUN BEAR (*Helarctos malayanus*) is the smallest of the true Bears, reaching a length of 4 feet and a weight of 190 pounds, and is restricted in range to Malayasia. It also is rarely bred in captivity. The tongue of this Bear is particularly long and tactile, and thus is useful in obtaining honey and insects from crevices and holes. The name of this animal seems to have come from the yellow crescent on its chest. The only Bear in South America and the smallest New World Bear is the SPECTACLED BEAR



GIANT PANDA—*Ailuropoda melanoleuca*

(*Tremarctos ornatus*), about 2 feet high at the shoulder and about 4 feet long. This Bear inhabits the Andes of Peru and Colombia. It is not often seen in zoos. The EURASIAN BROWN BEAR (*Ursus arctos*) is often seen in animal acts in circuses. It was once common throughout Europe and most of northern Asia. The Siberian race may weigh 800 pounds or more. The HIMALAYAN BLACK BEAR (*U. thibetanus*) ranges from India into China. The JAPANESE BLACK BEAR (*U. thibetanus japonicus*) is thought to be only a race or sub-species of the above species. The Cleveland Zoo has had a group of these Bears, rarely seen in zoos, since 1953. The GIANT PANDA (*Ailuropoda melanoleuca*) has been known to science since 1869 when the first skins were sent out of western China, but it was not until 1937 that a living specimen was seen in this country. Several of these animals have been displayed in zoos in this country and in Europe in the past, but in recent years the Western World has had none until the arrival, in Europe in 1957, of one specimen. This magnificent mammal may weigh well over 200 pounds and reach a length of 5½ feet. It inhabits the mountains of Szechwan and Kansu Provinces between 6 and 14 thousand feet.

FAMILY MUSTELIDAE: WEASELS AND ALLIES

The Mustelidae, composed of the Otters, Weasels, Badgers, Skunks, and their allies, is a large and varied family. They are commonly referred to as the "fur-bearers" and have a world-wide distribution. The AMERICAN WOLVERINE (*Gulo luscus*) occurs in northern United States and Canada. Sometimes called Glutton, this animal has a ravenous appetite. It is not only particularly powerful, but sagacious and destructive and is an enemy of the trapper by molesting his catch and playing havoc with camp larders and packs. In captivity, it is a striking exhibit and often becomes friendly towards people. The AMERICAN OTTER (*Lutra canadensis*) ranges over the greater part of North America. With webbed feet and long, flattened tail, it is very aquatic and is a particularly active animal. Its food is largely fish and Frogs. The fur of the Otter is rather short but luxuriant and lustrous. The famous SEA OTTER (*Enhydra lutris*) of North Pacific shores passes its life offshore in great beds of floating kelp, a type of seaweed. Relentless hunting for its valuable fur reduced its numbers to near extinction, but now protected, it is once again increasing. It eats fish and may dive 100 feet or more in search of shellfish. Spreading the food out on its belly and chest, it then leisurely eats as it floats on its back. This animal has rarely been in captivity. The Skunks belong to this family and are an exclusively New World group composed of 3 genera. Nearly half of the Skunk's food is insects, and Rodents provide an additional portion. Thus, Skunks are very beneficial to mankind. The STRIPED SKUNK (*Mephitis mephitis*) ranges from southern Canada through most of the United States, and is about the size of a House Cat. The SPOTTED SKUNK (*Spilogale putorius*) occurs throughout most of the United States and south through Mexico. It is smaller than the Striped Skunk. The HOGNOSED SKUNK (*Conepatus mesoleucus*) occurs from the central southern United States south to the tip of South America and is as large as the Striped Skunk.

The AMERICAN BADGER (*Taxidea taxus*) also belongs to this family, and is restricted to North America. It feeds on Rodents and other small animals, reaches 30 inches in length, and may weigh 24 pounds. Other Badgers occur in Europe and northern Asia.

FAMILY FELIDAE: CATS

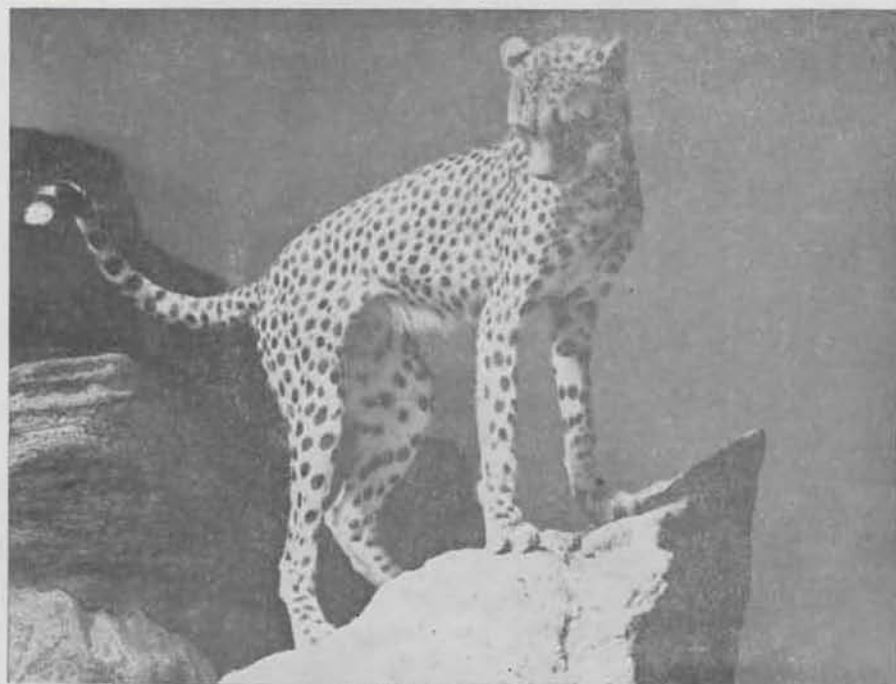
All the Cats of the world are included in this family. Of the large Cats only 2 occur in the New World, the Jaguar and the Puma or Mountain Lion. Many different species of smaller Cats occur throughout the world. The LION (*Panthera leo*) is one of the world's most impressive Carnivores and one of the best known. Formerly occurring in both Africa and Asia, its numbers have been greatly reduced with expanding civilization. In Asia only a small group remains in a restricted area in western India. In captivity the Lion, of all the Cats, is most commonly raised in zoos and few have been imported in recent years. Males generally have more impressive manes in captivity than they do in the wild, due to the lack of wear and tear occur-



TIGER—*Panthera tigris*

ring in captivity. Females do not have manes. A record weight for Lions is 580 pounds and they may reach 25 years of age. The TIGER (*P. tigris*) is strictly an Asiatic animal and rivals the Lion in size and weight. It has tropical races and those that extend into Siberia, where the winters are severe. The most vividly striped Tigers inhabit India and are commonly known as Bengal Tigers. The northern form, or Siberian Tiger, is not so vividly marked, but is larger and has a much heavier coat. Individuals of this race may weigh over 650 pounds. Tigers are, unlike other Cats, quite

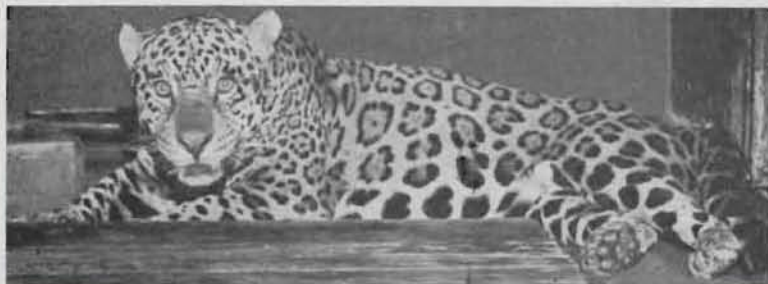
fond of bathing. They have been bred and reared at our Zoo, though as is the usual case, not as frequently as Lions. New-born kittens weigh 2 to 3 pounds. In captivity Tigers have lived as long as 25 years. The LEOPARD (*P. pardus*) has one of the most extensive ranges of any of the big Cats of the world. It inhabits the greater part of Africa and Asia. In India and the Malayan Region, a lustrous black phase, commonly called the BLACK PANTHER, is not uncommon. One mother may have black and normal color-phase kittens in the same litter. The species varies greatly in size, from a total length of 5 feet to a full 8 feet. The SNOW LEOPARD or OUNCE (*P. uncia*) is a large Cat of the high plateau of Central Asia from the Himalayas to the Altai Mountains of Mongolia, at elevations in excess of 10,000 feet. Because of its rugged, remote habitat it is one of the rarest Cats in captivity. It is a very handsome animal with luxuriant, silvery hair, and the tail is thickly furred. The pelage is marked with rosettes of black. This is a lighter-bodied animal than the Leopard, although its heavy coat of hair makes it seem of equal bulk. The CLOUDED LEOPARD (*P. nebulosa*) is strictly tropical, preferring dense, humid jungles where it is very arboreal. Its range is from India into the larger islands of Malaysia. This striking animal varies greatly in size; the head and body of a large male may measure 3 feet and its tail about 30 inches. It is olive, golden, sometimes reddish, with large smoky markings extending along the body. It, too, is rarely exhibited in captivity. The CHEETAH or HUNTING



CHEETAH—*Acinonyx jubatus*

LEOPARD (*Acinonyx jubatus*) has long, slender legs and its body is comparatively slender. Its claws are not wholly retractile as in most Cats and

with the exception of its head, the Cheetah is more Dog-like than Cat-like. This species inhabits Africa and southern Asia. Cheetahs can run at great speed and have been said to run at 70 miles per hour for short distances. They have long been maintained and trained by native potentates of India for hunting the swift Indian Blackbuck and other game. Cheetahs frequent rather open, hilly country and have lived in zoos for



JAGUAR—*Felis onca*

almost 16 years. The JAGUAR (*Felis onca*) is one of the 2 big Cats of the New World; the other is the Puma. The Jaguar looks much like the Leopard but is a more powerful, massive animal; its head relatively larger and its tail shorter. Like the Leopard, there is a black phase, but Black



LIONESS—*Panthera leo*

Jaguars are rare. Jaguars can swim and climb well. The breeding record of these animals, at this zoo, is outstanding and young reared here have been shipped to Mexico, Scotland, and other zoos in the United States. In Latin America this Cat is commonly called "El Tigre," the Spanish name for Tiger. Its range extends from the extreme southern United States through Central and South America to Patagonia. Specimens may reach a weight of 300 pounds. The PUMA, COUGAR, or MOUNTAIN LION (*F. concolor*) ranges from British Columbia to Patagonia. It was formerly found over practically all of North America, but is extinct over much of the northern part of its range. It continues to hold its own in the western United States. Except with the young, which are spotted, the Puma is of uniform gray, tan, or reddish-brown. From 2 to 5 young are born in a litter and, if captive-reared, are often very tame.

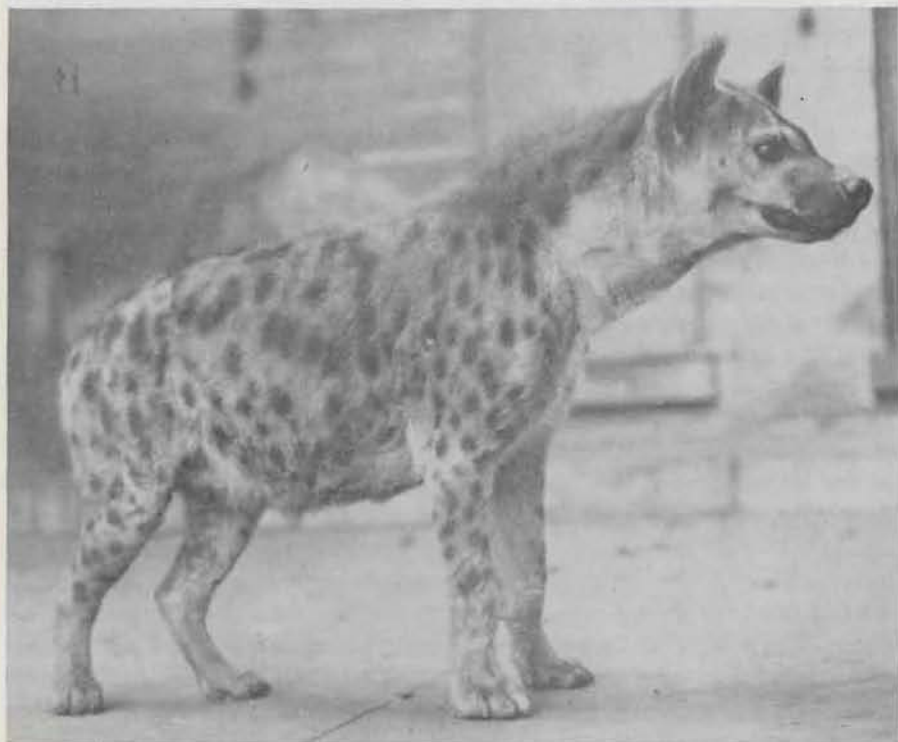
The CANADIAN LYNX (*F. canadensis*) is a large "bob-tailed" Cat with tufts of hair extending from the tips of the ears. Its range is the northern United States and Canada. Its primary diet is the Snowshoe Hare. Lynx live 10 to 12 years in captivity. The BOBCAT (*F. rufus*) is very similar to the Lynx but is usually smaller and without the ear tufts. Its range is south of that of the Lynx, into Mexico. Rodents and other small mammals comprise its diet. The maximum weight is 39¾ pounds. The JAGUARUNDI or EYRA (*F. caracacmitli*) is a small, unspotted, unstriped Cat with an Otter-like head. It ranges throughout the American tropics into southern Texas and is secretive in habits. It is little known and reaches 4 feet in over-all length. The OCELOT (*F. pardalis*) is another tropical species, ranging from the southern border of the United States through Central and South America to Ecuador and Argentina. In color and markings it is similar to the Jaguar, but it is much smaller. Ocelots are sometimes kept as pets, but are unreliable and hazardous. Several other smaller species of Cats occur in tropical America. In the Old World there are many small Cats similar to the small Cats described above. The MARBLED CAT (*F. marmorata*) is strikingly marked and ranges through India to the Malayan Region. The CARACAL (*F. caracal*) found over a large part of Africa, is relatively large and frequents open country. It has sweeping ear-tufts imparting a unique appearance. The SERVAL (*F. serval*) of tropical and southern Africa is even larger than the Caracal and has a relatively short tail about a foot long.

FAMILY VIVERRIDAE: MONGOOSES AND ALLIES

This family includes Civets, Genets, Mongooses and allies. This is an Old World family whose members are largely confined to the Indo-Malayan and African regions. All the species are carnivorous, with a number noted for the habit of killing Snakes. The BINTURONG or BEAR CAT (*Arctictis binturong*) is the largest member of this family. It is an arboreal animal from southeastern Asia. The INDIAN GREY MONGOOSE (*Herpestes edwardsi*) has been introduced in various parts of the world and is considered detrimental because of its predation upon desirable and beneficial native species. Mongooses are not allowed to be imported into many countries because of their predatory habits.

FAMILY HYAENIDAE: HYAENAS

The Hyenas are more closely related to the Viverridae than to the Canidae. The Hyaenidae is a small family of only 4 species completely restricted to Africa and the Indian region. The AARDWOLF (*Proteles cristatus*) of Africa is one of the rarest mammals. It feeds on carrion, lives in burrows, and is nocturnal. An international treaty protecting it has made its capture and transportation practically impossible. Very few of these animals have ever been exhibited in captivity. There are 3 Hyenas, the SPOTTED or LAUGHING HYAENA (*Crocuta crocuta*) and the BROWN HYAENA

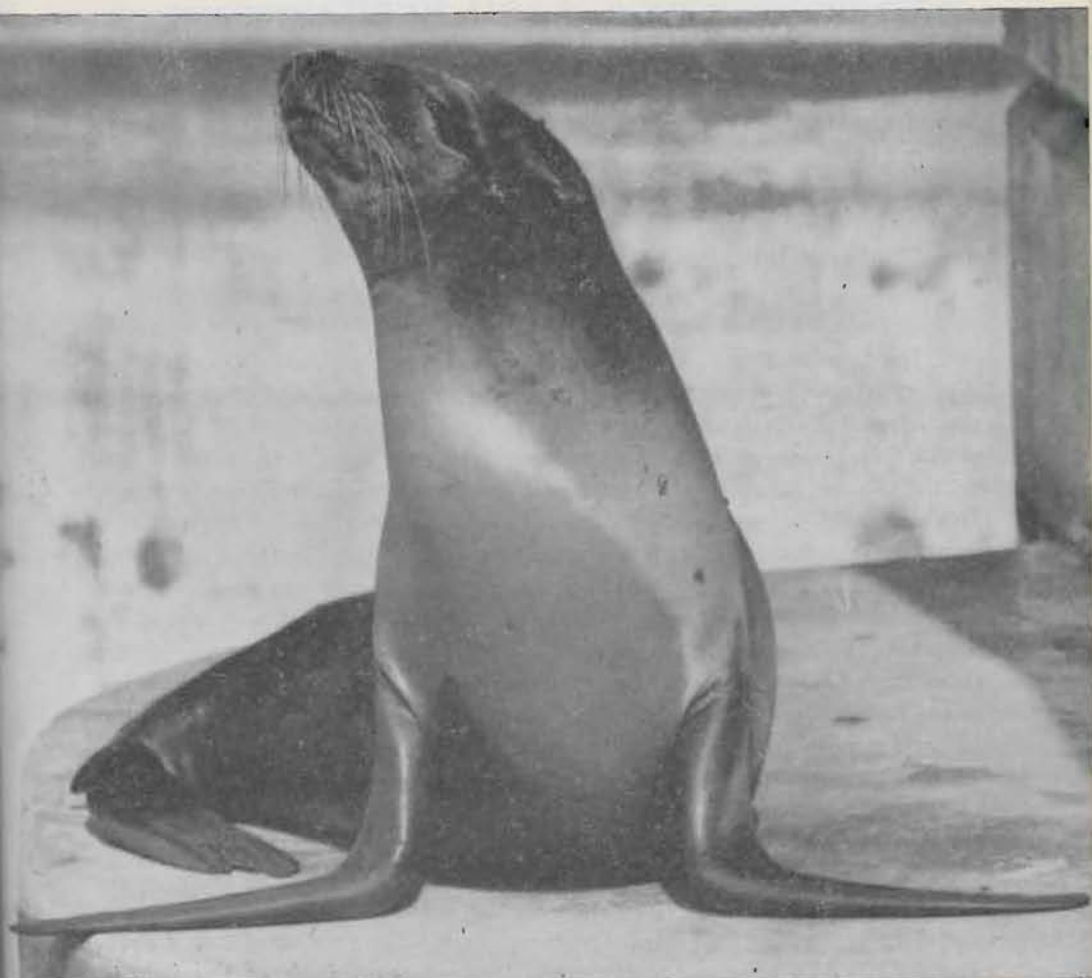


SPOTTED HYAENA—*Crocuta crocuta*

(*Hyaena brunnea*) of Africa, and the STRIPED HYAENA (*H. hyaena*) of southern Asia and northern Africa. All are noted for the great strength of their jaws and teeth, which are powerful enough to crack the bones of the largest animals. The Striped Hyena is now extremely rare.

FAMILY OTARIIDAE: EARED SEALS

Three aquatic families of Carnivores, the Otariidae, the Odobenidae, and the Phocidae are similar in adaptation and habits and are sometimes placed together in a distinct order, the Pinnipedia, which means fin-footed. The milk of these mammals has an unusually high fat content, 20 to 40 per cent, in comparison to that of most other mammals. The milk of human beings and domestic Cattle, for example, averages about 4 per cent. All Seals and Sea Lions feed on fish entirely. The Otariidae or Eared Seals are



CALIFORNIA SEA LION—*Zalophus californianus*

so named because of the external ear, in contrast to the True Seals which have no external ear. They include the California SEA LION (*Zalophus californianus*), which is often improperly referred to as a "seal" in trained animal acts. Sea Lions are commonly exhibited in zoos, where they reproduce. They range the Pacific Coast from Oregon to Mexico, with a related form along the Pacific Asiatic coast. STELLER'S SEA LION (*Eumetopias jubata*) is the largest of all Eared Seals. Full-grown males may reach a length of 13 feet and weigh as much as one ton. The adult male has a large neck and enormous shoulders. Less than 60,000 individuals of this species are estimated to exist along the Pacific coast of North America but others occur along the Pacific Asiatic coast. Evidence presented by fishermen indicates that Sea Lions descend regularly to depths of 360 to 480 feet and may reach a depth of 600 feet. The GUADALUPE FUR SEAL (*Arctocephalus townsendi*) was once thought to be extinct, but has recently been rediscovered. In 1955, at least 28 individuals were counted on Guadalupe Island off Lower California.

FAMILY ODOBENIDAE: WALRUS

The one species of WALRUS (*Odobenus rosmarus*) occurs in 2 races in the Arctic seas. This large mammal has long upper canine teeth which form tusks and are used to dig mollusks and crustaceans from the sea bottom. They are in demand for use as ivory. Males are larger than females, may weigh up to 3,000 pounds, and reach 12 feet in length. They are exhibited in zoos in this country and in Europe, but providing the proper quality and quantity of food for their diet is a real problem.

FAMILY PHOCIDAE: SEALS

The True or Earless or Hair Seals are included in this family. The hind flippers of these mammals cannot be turned forward, and thus they are much less agile on land than the Eared Seals. The HARBOR SEAL (*Phoca vitulina*) is common along coasts and bays of the North Atlantic and Pacific Oceans. The sexes are of equal size and are about 5 feet in length. This species is sometimes called the Leopard Seal because of the spots on its coat. It is often exhibited in zoos. The largest living Seal, the ELEPHANT SEAL (*Mirounga angustirostris*), a huge mammal weighing nearly 3 tons, occurs in 2 races, one along the Pacific coast of North America and the other around Campbell Island south of New Zealand. It is estimated that more than 6,000 individuals now live in eastern Pacific waters. Only a few zoos attempt to exhibit this mammal, because of the sheer physical problem of food supply. Males grow to a length of 18 feet and develop a "trunk" 16 to 18 inches long that normally flops down over the mouth, but which can be inflated and raised almost straight up.

ORDER TUBULIDENTATA: AARDVARKS

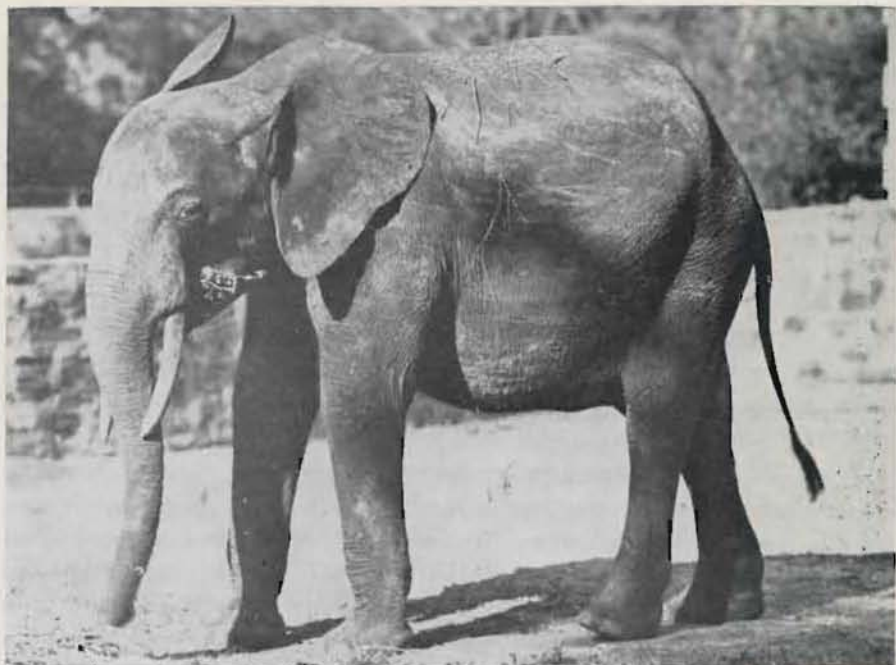
FAMILY ORYCTEROPODIDAE

This unusual order contains only one species, composed of 3 or 4 races. The AARDVARK (*Orycteropus afer*) inhabits Africa, south of the Sahara. This animal may weigh as much as 100 pounds and feeds largely on Termites. A powerful digger, it can bore into hard soil at an astonishing speed. The Aardvark is uncommon in captivity.

ORDER PROBOSCIDEA: ELEPHANTS

FAMILY ELEPHANTIDAE

There are 2 distinct species of Elephants, one in Asia and the other in Africa. These are remnants of a massive group, which in past ages was abundant in many parts of the world, including Europe and North America. The life span of Elephants is frequently exaggerated and there are but few records of them living as long as 50 years. The record for an Indian Elephant is 67 years. The period of gestation is the longest of any land animal, from 19 to 22 months, and an Asiatic Elephant normally bears its first calf at 16 years of age. The largest Elephant ever exhibited was the famous Jumbo of the Barnum and Bailey Circus, an African Elephant whose height was 10' 9" at the shoulder. The record height is of an African male,



YOUNG AFRICAN FOREST ELEPHANT—*Loxodonta africana cyclotis*



ASIATIC ELEPHANT—*Elephas maximus*

13' 2". The AFRICAN ELEPHANT (*Loxodonta africana*) is the larger species and may be distinguished from the ASIATIC ELEPHANT (*Elephas maximus*) by its larger ears and 2 finger-like processes at the end of the trunk; the Asiatic Elephant's trunk has only one such process. A large African bull may weigh over 7 tons. There are 2 generally recognized races of the African Elephant, the FOREST ELEPHANT (*L. a. cyclotis*), which is a small race found in the western rain forests, and the larger BUSH ELEPHANT (*L. a. africana*) found over Africa south of the Sahara and exclusive of most of South Africa. Males are difficult to handle as they get older and for that reason are seldom kept in captivity.

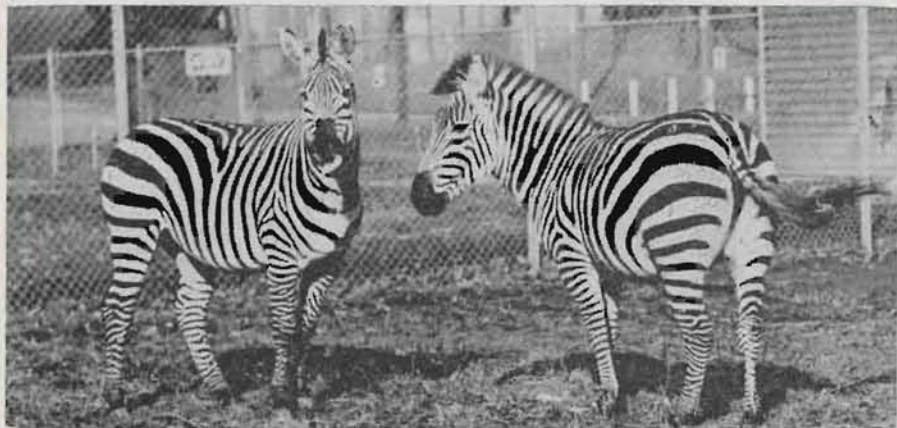
ORDER PERISSODACTYLA: ODD-TOED HOOFED MAMMALS

This order of mammals, few in number, contains several well-known animals. The order is divided into 3 families: the Equidae, the Tapiridae, and the Rhinocerotidae.

FAMILY EQUIDAE: HORSES

Equines are, today, confined to Asia and Africa, though domestic forms have a world-wide distribution. These animals have but a single toe on both hind and fore feet. PRZEWALSKI'S HORSE (*Equus przewalski*) was once common all over the plains of Eurasia but today is confined to a limited area around the Altai Mountains in Siberia and western Mongolia. It is the only true wild Horse in existence today and is thought to be one of the original ancestors of the domestic Horse. A female has achieved a longevity record in captivity of over 32 years. Over 60 individuals of this rare species are now in captivity in a few zoological parks.

There are 3 recognizable kinds of Wild Asses in Asia and 2 in Africa. The ONAGER (*E. hemionus onager*) inhabits southwestern Asia. A relative is the MONGOLIAN WILD ASS (*E. h. hemionus*). The presently most numerous Wild Ass is the KIANG (*E. h. kiang*) of the Tibetan uplands. It is the largest race. The African Wild Asses are grayer in color than the Asiatic forms and have much longer ears. The NUBIAN WILD ASS (*E. asinus africanus*) is thought to be the progenitor of the domestic Donkey. The ABYSSINIAN or SOMALI WILD ASS (*E. a. somaliensis*) is a slightly heavier ani-



GRANT'S ZEBRA—*Equus burchelli bohmi*

mal than the Nubian Wild Ass. It is found in Somaliland, eastern Ethiopia, and southern Eritria and is a very rare animal rapidly approaching extinction.

Zebras are generally divided into 4 distinct species, including the QUAGGA (*E. quagga*) which became extinct in 1883 when the only surviving specimen of the thousands that once roamed South Africa died in the Amsterdam Zoo. Various races of BURCHELL'S ZEBRA (*E. burchelli*) still exist in fair numbers in the wild. GRANT'S ZEBRA (*E. b. bohmi*) is the race commonly seen in zoos in this country and is found on the plains of East Africa. The MOUNTAIN ZEBRA (*E. zebra*) occurs in 2 races in South Africa and is much reduced in numbers as compared to former years. This species has very wide stripes. GREVY'S ZEBRA (*E. grevyi*) is the largest of the Zebras and is found from southern Ethiopia south into northern Kenya. It has narrow stripes. Zebras are distinguished one from another, principally, by the difference in their stripe patterns. It is most interesting to note that African natives insist that the Zebra is a black animal with white stripes, whereas Occidentals automatically assume that it is white with black stripes.

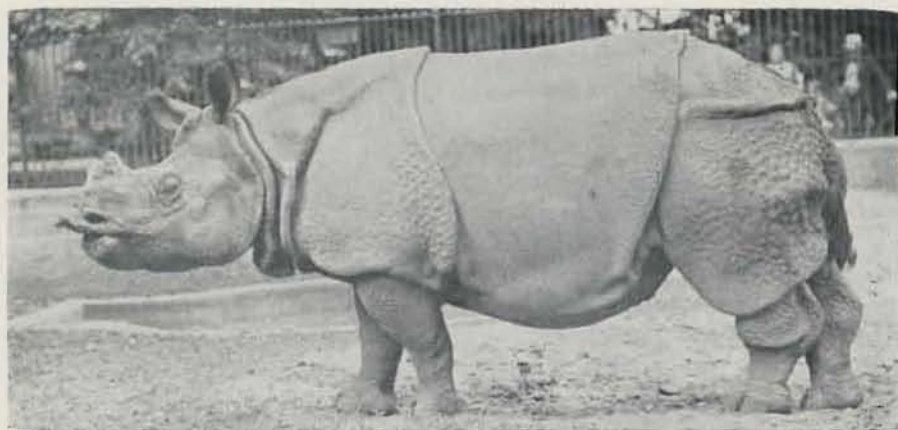
FAMILY TAPIRIDAE: TAPIRS

The Tapirs and the family to follow are thought to be closely related. Tapirs have remained almost entirely unchanged for a remarkably long time and are among the most primitive hoofed animals. Only 4 species are known and they have an unusual distribution; 3 species in Central and South America and one in Malaysia. Tapirs are very fond of water, swim well, frequent dense forests, and are primarily herbivorous. The snout is prominent and prehensile. The young of all species are spotted at birth.

The MALAYAN TAPIR (*Tapirus indicus*) lives in deep forests of southern Burma, Thailand, the Malay Peninsula, and the island of Sumatra. This species is uncommon in zoos and in the wild. It is black and white. BAIRD'S TAPIR (*T. bairdi*) is the largest of the Tapirs, weighing up to 600 pounds. It is limited to Central America, ranging from Panama north into tropic Mexico. The MOUNTAIN TAPIR (*T. roulini*) is a small species that is sometimes called the Hairy Tapir because its body is clothed in relatively soft, twisted, black hair. These animals live along a strip of the upper Andes from central Colombia to northern Peru, and have been recorded from over 15,000 feet altitude. The SOUTH AMERICAN TAPIR (*T. terrestris*) is the smallest of the Tapirs and is rather common from northern South America to Argentina. It is the Tapir most often seen in captivity.

FAMILY RHINOCEROTIDAE: RHINOCEROSES

The Rhinoceroses comprise more species than the Tapirs, but are also mere remnants of what was once a large group of mammals widely distributed. They are now represented by 4 genera comprising 5 species. The "horns" of these animals are a specialized product of the skin. This material has been held in the highest esteem as medicine for centuries, particularly in China, and this has, more than anything else, contributed to the near



INDIAN RHINOCEROS—*Rhinoceros unicornis*

extinction of these animals. The one-horned genus has 2 clearly defined species. One is the GREAT INDIAN RHINOCEROS (*Rhinoceros unicornis*) which is now found only in limited areas of tall reeds in Bengal, Assam, and the river bottoms of southern Nepal. In 1959 it was estimated that about 400 head of this species remained in the wild. Recently it has been bred in 2 zoos in Europe, giving some hope that zoos may play an important role in its preservation. It weighs up to 2 tons and rivals the White Rhinoceros as the fourth largest living land animal, next to the African Elephant. It is said to attain an age of 50 years and the gestation period is about 19 months. Its thick skin is formed into shields and studded with rounded lumps, giving the impression that it was put together in a machine shop. The second species of this genus is known as the JAVAN or, more appropriately, the LESSER ONE-HORNED RHINOCEROS (*R. sondaicus*). This smaller animal was found in Assam, Burma, and Indo-China, south through the Malay Peninsula to Sumatra and Java, but it, too, is greatly reduced in numbers and probably less than 100 live in scattered groups in isolated parts of its former range. The HAIRY-EARED or SUMATRAN RHINOCEROS (*Didermocerus sumatrensis*) has 2 horns and is the smallest and most hairy of the living Rhinos. Its skin folds are less distinct than in any other. Its weight may reach one ton. This species was formerly found throughout Assam, Bengal, and upper Burma, south through the Malay Peninsula to Sumatra and Borneo, but not Java.

The 2 African species are the BLACK RHINOCEROS (*Diceros bicornis*) and the WHITE or SQUARE-LIPPED RHINOCEROS (*Ceratotherium simus*). They are similar in coloration and each has 2 horns, so that a more distinctive characteristic is the difference in the appearance of the lips. The Black Rhino's lips are rounded and the upper lip is prehensile, while the White Rhino's lips are blunt, or squarish and wide, and not prehensile. The Black is most commonly seen in captivity and the most numerous species in the wild. It has been bred in captivity on a few occasions. The first pair displayed in our zoo arrived in 1955 as a result of the Cleve-



BLACK RHINOCEROS—*Diceros bicornis*

land Zoological Society East African Expedition in that year. The White Rhino is the largest of the 2 existing African species and the fourth largest living land animal. In 1957 it was estimated that only about 2,500 White Rhinos remained, in 2 widely separated areas, one in South Africa and another in northeast central Africa. Only in 1956 did the first White Rhinos arrive in this country.

ORDER ARTIODACTYLA: EVEN-TOED HOOFED MAMMALS

The even-toed hoofed mammals form the most impressive order of mammals in number of large species and the beauty of many of its members. This order, comprised of the Pigs and all browsing, grazing, and ruminating animals, is so large that it may be well to sort out the major groups.

First, the Pigs, Peccaries, and Hippopotamuses are separated as the sub-order Suiformes. These animals do not chew a cud. Next, the Camels and Llamas form the sub-order Tylopoda, primitive "cud-chewers." The third and last sub-order, the Ruminantia or "cud-chewers," is the largest group and includes the Mouse Deer, Cattle, Sheep, Goats, Antelopes, Giraffes, the Deer, and the Pronghorn Antelope. These animals, unlike the 2 previous sub-orders, have no teeth at the front of the upper jaw.

FAMILY SUIDAE: OLD WORLD SWINE

This family comprises the Old World Pigs. There is a considerable variety of these animals, some of which are quite spectacular. One of the most striking is the RED RIVER HOG (*Choiropotamus porcus*) of West Africa. Its body coat is thick, smooth and lustrous and either brick-red in color or ruddy-yellow. The color of this animal is so vivid, in fact, that on the west coast of Africa it is also known as the Cameroon Painted Pig. No visitor to a zoo could casually pass an enclosure containing an AFRICAN WART-HOG (*Phacochoerus aethiopicus*). Its skin is nearly naked except for some wisps of hair over the back and at the tip of the tail. Sweeping tusks curl upward from the lower jaw and those from the upper jaw rub against

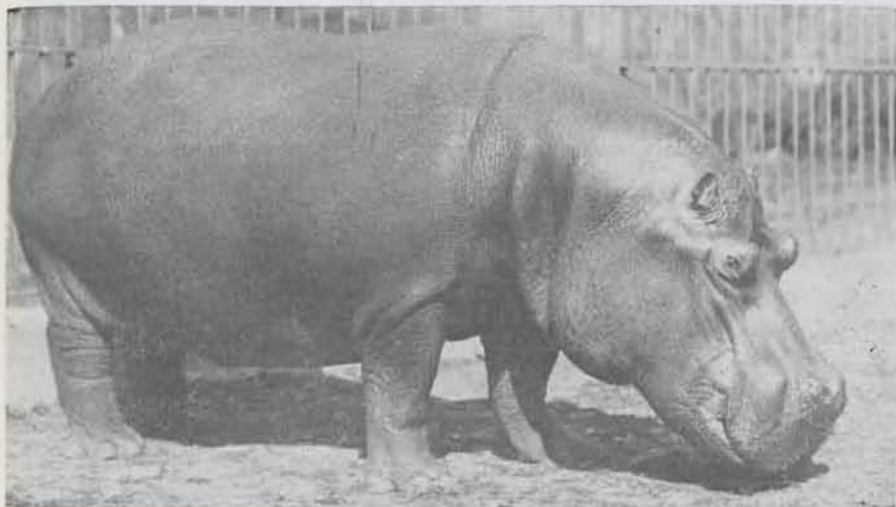
them, wearing the lower ones to knife-like sharpness. The head is massive and has 4 huge projecting knobs or warts. Seen head-on, this Pig is frightening to behold, but from the rear, merely humorous. The BABIRUSA (*Babirusa babirusa*) from the Celebes Islands is as spectacular as the Warthog, and rarely seen in zoos. The EURASIAN WILD BOAR (*Sus scrofa*) is among the largest of the Wild Swine, attaining a weight in excess of 300 pounds. It is found in Europe, North Africa, and southern Asia. This Pig is covered with a coat of long, coarse, black hair. The hunting of the Wild Boar has long been a sport attended with thrills and danger, for this animal may be rated among highly dangerous animals. The importation of Wild Swine has been under strict control by the Federal Government in recent years because of the possible introduction of diseases hazardous to domestic animals.

FAMILY TAYASSUIDAE: PECCARIES

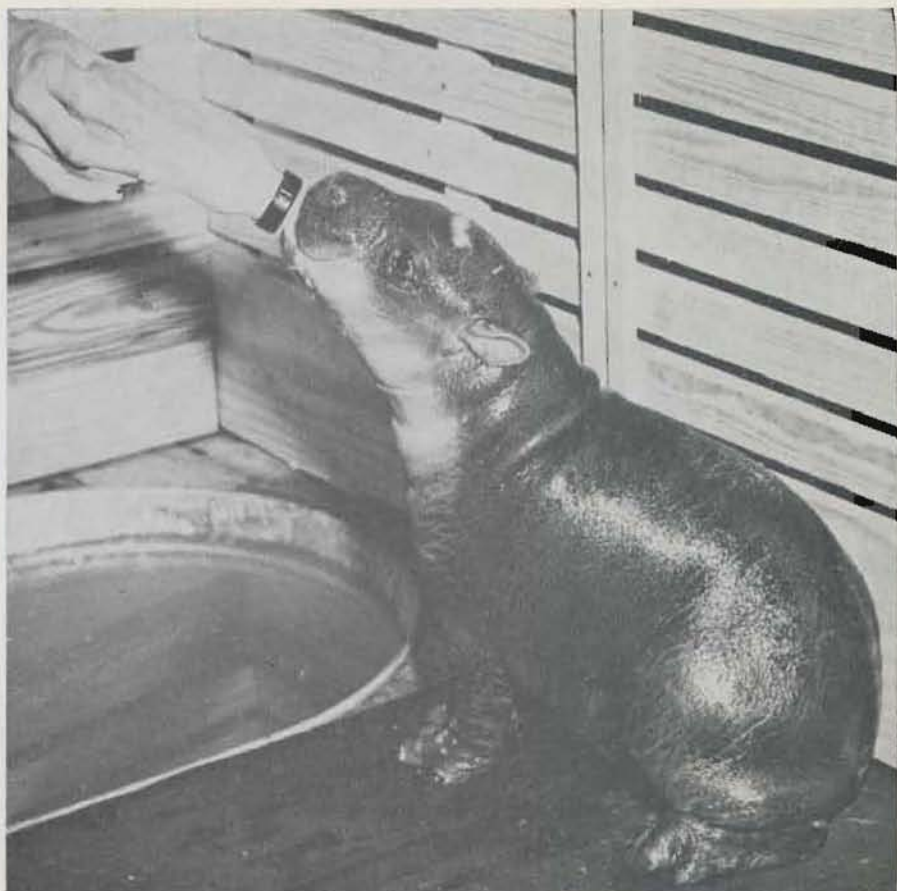
The New World has only 2 species of Wild Swine, the COLLARED PECCARY (*Pecari angulatus*) and the WHITE-LIPPED PECCARY (*P. tayusea*). The Collared Peccary is the commoner and is found from southern United States all the way south to Paraguay. Roaming groups of 12 or more individuals may be insolent enough to attack a human intruder. The white-lipped species is larger and may be rated as a really dangerous animal when traveling in large herds. It ranges from Central America to Paraguay.

FAMILY HIPPOPOTAMIDAE: HIPPOPOTAMUSES

The COMMON HIPPOPOTAMUS (*Hippopotamus amphibius*) and the much smaller PYGMY HIPPOPOTAMUS (*Choeropsis liberiensis*) make up this family. The Pygmy is the more primitive type and is the size of a large Pig. First exhibited in the Dublin Zoo in the eighteen-sixties, the Pygmy Hippo was not seen in America until 1912. It is very secretive, living in swampy forests, and has a restricted distribution in Liberia and Nigeria, West Africa. This species has bred frequently in captivity. Our female received in May, 1955,



HIPPOPOTAMUS—*Hippopotamus amphibius*



YOUNG PYGMY HIPPOPOTAMUS—*Choeropsis liberiensis*

reportedly captured in Nigeria. She is estimated to have been born in April, 1955. The Common Hippopotamus is widely distributed throughout the river systems of tropical Africa. It frequently conflicts with the raising of crops as it is primarily a grazing, herbivorous mammal. The Hippopotamus breeds readily in captivity and the supply of these animals for the zoological parks of the world is mostly maintained in this manner. However, the first pair of Hippos displayed here were wild-captured animals received in 1955 as part of the fine collection obtained by the Cleveland Zoological Society's East African Expedition. These animals reach a weight of 4 tons and have a normal life span in captivity of 30 to 40 years. The record age is 49 years, 6 months and 19 days.

FAMILY CAMELIDAE: CAMELS

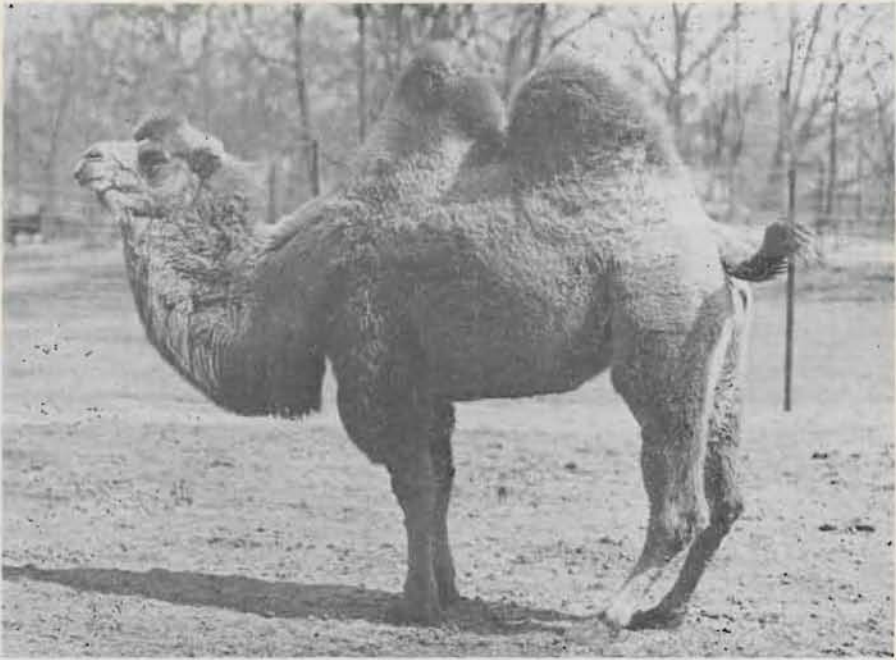
The Camels and Llamas make up a group that has almost disappeared in the wild state. There are but 6 kinds in the family. Despite the relatively small number of its species, this family is more valuable to mankind than any other group of the even-toed mammals. Its members are



DROMEDARY—*Camelus dromedarius*

important as beasts of burden and for their hair and wool. Of the 2 Old World species of camels, the Dromedary and Bactrian, all remaining individuals are or have been domesticated. The DOMEDARY or ARABIAN CAMEL (*Camelus dromedarius*) is the one-hump Camel of the hot and arid regions of Africa and Arabia. Without this animal, which has been called "the ship of the desert," vast portions of desert, with their island oases, would be uninhabitable by man. The Dromedary has the ability to endure great heat, to carry burdens, and to travel great distances over desert sands, by means of its broadly flattened feet. It endures privations of food, while its stomach, owing to the presence of many cells, serves as a very efficient water reservoir. Camels have been known to go 34 days without drinking, but this is very unusual. Now unknown in the wild state, the Dromedary is domesticated in northern Africa and Arabia, and has been introduced into Italy, Spain, South Africa, and Australia. It breeds readily in captivity. The BACTRIAN CAMEL (*C. bactrianus*) is a slightly larger and more heavily built animal than the Dromedary and has 2 humps. It is found in nearly all the barren regions of Central Asia lying between Asia Minor and China and southern Siberia. It can withstand excessively cold weather and in winter is clad in luxuriant, long, shaggy hair, which in spring is shed in big matted patches.

The New World branch of the family is restricted to South America and is made up of the Guanaco, Vicunia, Llama, and Alpaca. The Guanaco and Vicunia are truly wild species, living high in the Andes. The Llama and the Alpaca are domesticated and have been derived from the wild forms.



BACTRIAN CAMEL—*Camelus bactrianus*

The LLAMA (*Llama g. glama*) is the largest of the 4 forms and is unknown in the wild state. Some authorities believe this animal is derived from the wild Guanaco. The hair varies in color from brown and black to white. The strength, size, sure-footedness and comparative abundance of the Llama make it an excellent beast of burden. If it feels overloaded, this strong-willed mammal immediately sits down and refuses to move, even when severely cudged. The relationship of the 4 forms of South American Camel-like cud-chewers is unsettled. The GUANACO (*L. g. huanacho*) is found in Peru, Chile, Patagonia, and Tierra del Fuego and up to heights of 15,000 feet. It is a good swimmer and has recently been raised extensively on farms for its wool. The ALPACA (*L. g. pacos*) also is thought to have been derived from the Guanaco. It is a smaller animal than the Llama, but more luxuriantly clad. This animal is found in Peru and Bolivia. The VICUNIA (*Vicugna vicugna*) lives in both the wild and domesticated state. Unlike most members of the Llama group, it does not have an excessively luxuriant coat. It is the smallest of the group and ranges over Ecuador, Peru, Bolivia, and Chile.

FAMILY TRAGULIDAE: CHEVROTAINS

Members of this family, known as Mouse-Deer or Chevrotains, although somewhat Deer-like in appearance, are anatomically more like Pigs and Camels. They are small, dainty mammals. Rather abundant in the regions they frequent, Chevrotains are shy and wary and primarily vegetarians. Several species inhabit tropical Asia. The INDIAN CHEVROTAIN (*Tragulus meminna*) lives in the forests of Ceylon and southern India. It weighs about 5 or 6 pounds and is white-spotted. The AFRICAN WATER CHEVROTAIN

(*Hyemoschus aquaticus*) is somewhat larger than the Asiatic species, reaching 14 inches at the shoulders. It frequents the lakes and swamps of the Cameroons and the Congo and is the only species in Africa.

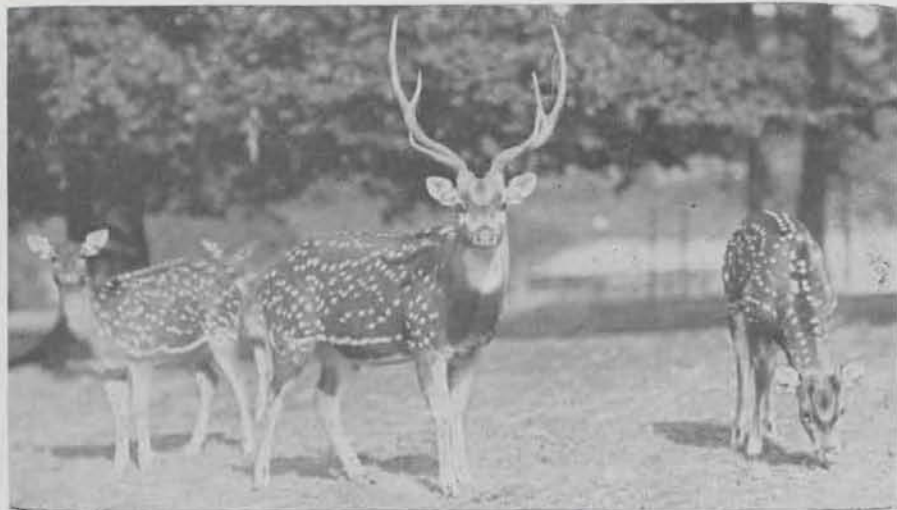
FAMILY CERVIDAE: DEER

This family is unique among hoofed animals, in that males usually have branching head weapons, called antlers, which are shed every year in contrast to the horns of the Bovidae, which are permanent. Except in the Reindeer and Caribou, the females normally have no antlers. As the young animals grow, each successive set of antlers has longer and a greater number of tines or branches, up to an adult maximum. In the Old World, Deer are found over the greater part of Europe and Asia, but do not occur in Africa south of the Sahara. North America has several of the largest and most impressive species while South America has a few species. There are close to 100 forms of Deer.

The ALASKAN MOOSE (*Alces alces gigas*) is the largest Deer of the world and inhabits Alaska. It attains a height at the withers in excess of 7 feet and when fully grown weighs up to 1,800 pounds. The COMMON or AMERICAN MOOSE (*A. a. americana*) has a much wider range, including northern United States and most of Canada. Moose are not hardy in captivity and thus are rarely exhibited. In Europe these animals are known as Elk. The WAPITI or AMERICAN ELK (*Cervus canadensis*) is the second largest Deer of the world and attains a maximum weight of 1,000 pounds. At one time, it inhabited the greater part of North America, but through shooting and encroaching civilization its range has been much reduced, so that today it is found only in the Rocky Mountain region and the Far West. Yellowstone National Park has large herds of this mammal, now estimated to number 40,000 specimens. Allied species inhabit Europe and Asia. The WOODLAND CARIBOU (*Rangifer caribou*) while among the larger Deer of the world and the third largest in size in America, is a much less impressive mammal than the Elk. Caribou when domesticated are known as Reindeer. Differing from all other members of the Cervidae, both male and female Caribou or Reindeer have antlers. Four species inhabit northern parts of both hemispheres. The Woodland Caribou is found from the extreme northeastern parts of the United States into Canada and westward as far as the Great Slave Lake. The range of the Caribou genus extends completely across upper North America and into the Arctic, where food may be mostly limited to lichens. All of the species have very broad flattened hoofs which assist them in traveling over deep snow and marshy ground. The Caribou is the most sociable, as well as the most migratory, of all Deer. Some groups travel hundreds of miles during the exodus from open tundra to the shelter of the northern forests and these herds often number thousands of animals. Caribou meat is the staple food of the Northern Indian, the Eskimo, and the Laplanders, and use is made of every part of the animal.

The MULE DEER (*Odocoileus hemionus*) is found throughout the Rocky Mountain region and the Far West. It receives its name from its very large ears. Full-grown bucks of this species weigh up to 300 pounds. The CO-

LUMBIAN BLACK-TAILED DEER (*O. columbianus*) is a smaller, West Coast species, with shorter ears. The WHITE-TAILED DEER (*O. virginianus*) is the familiar Deer of North America east of the Rocky Mountains. The name White-tailed Deer comes from the habit of this species of bounding away with its snowy-white tail erect—a vivid picture which stirs the pulse even of the veteran hunter. This Deer figured prominently in the history of early American settlers. It furnished an important food supply and from it the pioneers obtained their buckskin garments. Once extinct in Ohio, it has again become common and may be seen in the wild within Cuyahoga County. The American tropics are inhabited by several species of Deer, including the good-sized SOUTH AMERICAN MARSH DEER (*Blastocercus dichotomus*), the PAMPAS DEER (*B. bezoarticus*), and the genus of small Deer known as Brockets, typified by the RED BROCKET (*Mazama americana*). Some of the Brockets are the smallest true Deer of the world. Of smaller size than the American Elk but ranking among the world's finest Deer is the EUROPEAN RED DEER (*Cervus elaphus*). This Deer exists abundantly in the great parks and forest preserves of Great Britain and Europe. Its range is from Norway to Africa north of the Atlas Range, and Asia Minor. This species was introduced into New Zealand where it is now overly abundant. The FALLOW DEER (*Dama dama*) occurs in several color phases, white, black, and brown. Its original range was the Mediterranean region of Europe and Asia, but it has been widely introduced throughout Europe. Among the Asiatic Deer we exhibit several species including the AXIS DEER (*Axis axis*) whose habitat is India and Ceylon. One of the most



AXIS DEER—*Axis axis*

beautiful Deer, it is vividly marked at all times of the year with large white spots on its reddish coat. The BARASINGHA DEER (*Cervus duvauceli*), also of India, is considerably larger than the Axis. It is striking in its golden-yellow summer coat because of faint, white spots. Our herd reproduces well and we often have a surplus of this Deer. The SIKA DEER

(*C. nippon*) ranges throughout eastern Asia and Japan and some races are spotted in summer pelage. We exhibit the Japanese race of this species and have a good breeding herd. The MUNTJAC or BARKING DEER (*Muntiacus muntjak*) is a small Deer of southern Asia. The male has tusk-like upper canine teeth unlike those of any other Deer. The Muntjac utters a sharp, Doglike bark, hence the name "Barking Deer", as a mating call or as a cry of alarm. PERE DAVID'S DEER (*Elaphurus davidianus*) is a strange



PERE DAVID'S DEER—*Elaphurus davidianus*

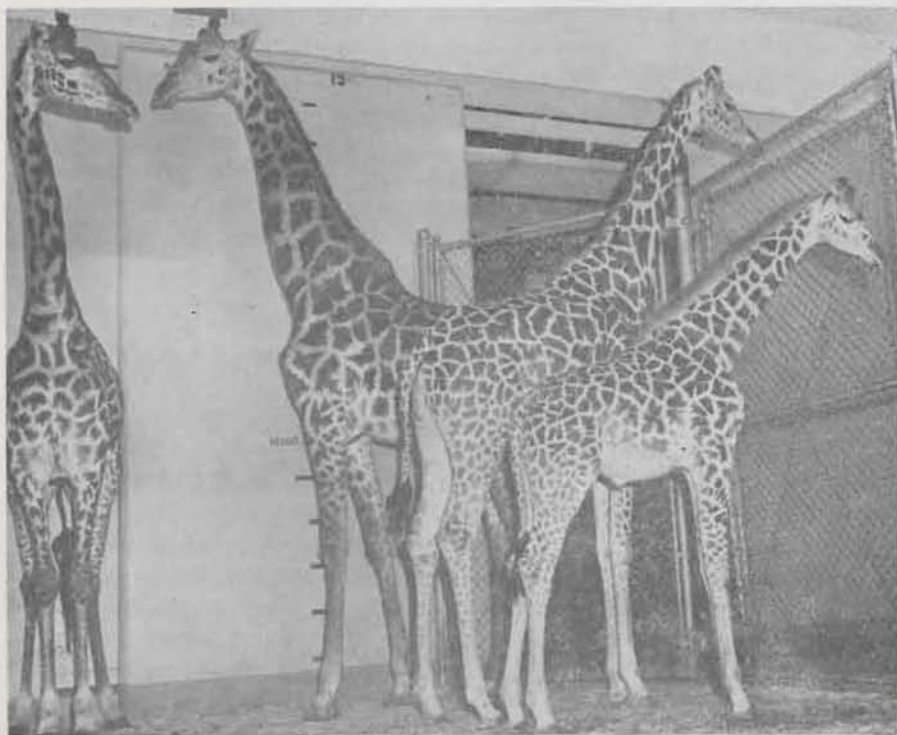
animal with an interesting history. Believed to have been native to northeastern China it is now extinct in the wild state. Specimens were first brought to the attention of the western world by the famous French naturalist and missionary Armand David in 1865. He first saw the only existing herd in the gardens of the Imperial Chinese Palace at Peiping. The Deer had been royal property for a very long time and no one knows exactly where they came from. Pere David, through bribery, was able to obtain a few specimens which were taken to Europe where they began to breed. This was fortunate, because all the remainder of the herd was slaughtered in the Boxer Rebellion in 1900. The few animals existing in Europe were then gathered by the Duke of Bedford at Woburn, England, and this nucleus herd of 18 animals eventually increased to over 300 from which many specimens have been distributed throughout the world to various zoos. Our original trio came from the Whipnade Zoo near London, England, in 1955. The Chinese called this Deer, Ssu-pu-hsiang (the four unlikes). As they put it, this Deer has the tail of an Ass, the hoofs of a Cow, the neck of a Camel, and the antlers of a Stag.

FAMILY GIRAFFIDAE: GIRAFFES AND OKAPI

Only 2 very different kinds of mammals are included in this family which is restricted to Africa—the Okapi of the forests and the Giraffes of the savannas. The Okapi's tongue, like the Giraffe's, is extensile and the

lips again like the Giraffe's, are prehensile. Thus, the tongue and the lips are adapted for picking foliage. There are also resemblances between these 2 mammals in their teeth. The Okapi's limbs and neck are relatively long, although not as exaggerated as in the Giraffe's. One of the most striking resemblances of the Okapi to the Giraffe is found in the horns. In both animals the horns, unlike the horns and antlers of Deer, Antelope, and Cattle, do not grow out from the skull. They are independent of the skull before birth and later grow downward to become firmly fused to the skull.

The OKAPI (*Okapia johnstoni*) was unknown to white man and science until 1900. The famous journalist and explorer Henry M. Stanley passed on the first rumors of its existence to Sir Harry Johnston, at that time Governor of Uganda. In 1899 Sir Harry obtained a few scraps of skin of a mysterious animal from the pygmy natives of central Africa. Two years later he secured a complete skin and 2 skulls of this large animal that had escaped the notice of science until the twentieth century. The first living Okapi to reach an American zoo arrived in 1937. Nowadays, several zoos have breeding pairs. The Okapi lives in deep forests of the Congo, where it associates in small family groups. It is a leaf-eater and browses on forest trees. In color it is brown with a distinctly purplish tinge, striped black and white on the limbs and over the rump, and has light facial markings. The single baby is like the adult in markings and coloration. The male is larger than the female and has small, hair-covered horns. Both sexes have large



BLOTCHED GIRAFFE—*Giraffa camelopardalis*

ears. The record longevity is 15 years, 1 month, and 10 days.

There are 2 distinct types of Giraffes, differentiated by their markings. The BLOTCHED GIRAFFE (*Giraffa camelopardalis*) is the common species found over most of Africa south of the Sahara. There are 11 named races of this species and the trio of Giraffes brought to our zoo by the Cleveland Zoological Society's East African Expedition of 1955 was of this species. The tallest animals in the world, sometimes reaching 19 feet, bull Giraffes may weigh 2 tons. This mammal has only 7 bones in its neck as in the vast majority of other mammals. The bones, however, are greatly elongated. Both male and female have horns, generally 2, but sometimes 5. Giraffes can go almost as long without water as can a Camel. Apparently they cannot swim and deep rivers form impassable barriers to them. In captivity, Giraffes breed well and live for many years, 28 years being the record. The first baby in the Cleveland Zoo was born on March 23, 1959, and was 5' 10" at birth. The RETICULATED GIRAFFE (*G. reticulata*) is found in East Africa and has only the one race. Its netted or reticulated pattern of narrow white lines is vivid and striking. This species is not as common in captivity as the Blotched Giraffe.

FAMILY ANTILOCAPRIDAE: PRONGHORN

This family is represented by only one species, the PRONGHORN (*Antilocapra americana*). In a general way it resembles an Antelope, yet it is not an Antelope, nor is it closely related to any other groups of even-toed hoofed mammals. Scientists have therefore allotted the Pronghorn a family all to itself. Once estimated to number 40 million, ranging throughout the great central plains and western prairies of North America from Saskatchewan and Alberta to central Mexico, this animal was reduced to an estimated 14,000 in the western regions. An estimated 300,000 are alive today. Its horns are unique in being pronged and in the outer horny sheath being shed every year. Both bucks and does have horns, but the female's horns are smaller. The Pronghorn has a top speed of nearly a mile a minute. It does not thrive in captivity, as a general rule.

FAMILY BOVIDAE: ANTELOPES, SHEEP, GOATS, CATTLE, AND ALLIES

This large and varied family, numbering over 200 species, is of great economic importance to man, as its members provide food, clothing, fuel, transportation, and motive power to great numbers of people throughout the world. Members of this family all have even-toed hoofs, are ruminants or cud-chewers, and all have permanent, unbranched horns. For the most part, the Bovidae is an Old World family, well represented in Asia and Africa and only moderately so in Europe. No members of the family are native to South America, Australia, or Madagascar. North America has only a few species, but they are spectacular; the Musk Ox, the Bison, the Rocky Mountain Goat, and the Bighorn Sheep. For convenience and to show relationship, members of this family are divided into sub-families and into smaller related groups called tribes.

SUB-FAMILY BOVINAE:

TRIBE STREPSICEROTINI: TWIST-HORNED AFRICAN ANTELOPES

These large African Antelopes have large horns with a pronounced spiral twist. They are also distinguished by having a curious arrangement of vertical stripes on their sides. Included in this group is the **GREATER KUDU** (*Tragelaphus strepsiceros*), one of the finest of all such Antelopes, with lengthy, spiral horns. Kudus have lived in captivity over 11 years. Their range in Africa extends from the Cape to the Anglo-Egyptian Sudan. Another of these Antelopes is the **SITATUNGA** (*T. spekei*). It lives in the big swamps and watercourses of central and eastern Africa. Its hoofs are elongated, enabling it to traverse this marshy terrain. Our herd has reproduced regularly since its arrival in 1951. The **BUSHBUCK** or **HARNESSED ANTELOPE** (*T. scriptus*) lives alone or at most in pairs during the breeding season. It is rather noisy and utters a deep bark when it hears an unusual sound or smells an enemy. On its beautiful russet-colored coat are vivid stripes and spots of pure white. It is found in many parts of Africa, south of the Sahara, and there are over 20 named geographical forms. There are 2 species of Elands, which are the largest Antelopes. The **GIANT ELAND** (*Taurotragus derbianus*) inhabits a belt right across Africa on the southern edge of the Sahara. This animal is rare in captivity. The **COMMON ELAND** (*T. oryx*) inhabits south and east Africa. It is very hardy and common in captivity and reproduces well. Of all Antelopes, the Elands appear to be



BONGO—*Taurotragus eurycerus*

most closely related to Cattle. The BONGO (*T. eurycerus*) is one of the least known and most beautiful of the Antelopes. Its nearest relatives appear to be Elands. The Bongo is a bright reddish hue with pure white stripes on its sides numbering 11 to 14, but, apparently, never being the same number on both sides. It also has several white spots on its head and on its legs. Both sexes and the young are alike in coloration, though bucks are larger than females and darken with age. Both have long horns which make one complete spiral and are yellow tipped. Particularly noticeable are their large ears. This mammal occurs in 2 large areas across the central belt of Africa, south of the Sahara. It is a denizen of dense, tropical forests and is rarely seen, because of its keen sense of hearing which forewarns the Bongo to move away from intruders. The arrival of our Bongo, in 1959, stands as one of the most important historical events of the Zoological Park. "Karen," as she is called, was captured as a baby a week or 2 old in May, 1958, in the Aberdare Mountains of Kenya, East Africa, and brought to the park by Colonel B. C. Goss and Mr. Alan Root, who hand-reared her. She is the seventh Bongo ever to have been exhibited in captivity.

TRIBE BOSELAPHINI

These Antelopes are now confined to southern Asia. Included in the group is the NILGHAI (*Boselaphus tragocamelus*), the largest of the Indian Antelopes, comparable in size to a small Horse. Males only have horns and are dark gray or blackish, while females are of a tan hue. These mammals do well in captivity. The other Antelope included in this tribe is the FOUR-HORNED ANTELOPE (*Tetracerus quadricornis*) of India. Males are unique in having 2 pairs of horns. Females are hornless.

TRIBE BOVINI: CATTLE

These are the most massively formed species of the Artiodactyla or even-toed hoofed mammals. With the exception of the American Bison, all the existing wild kinds are confined to the Old World. The AMERICAN BISON (*Bison bison*) commonly, but incorrectly, called the Buffalo, is the largest of North American hoofed mammals. This species once roamed the North American plains in vast herds of as many as 4 million individuals. One single herd would cover an area 25 miles wide and 50 miles deep. The total number of Bison in North America, when the white man arrived, has been estimated at 60 million. With the development of the West, the building of railroads, fencing, and wholesale slaughter, this magnificent mammal was reduced to only 300 head by 1900. Conservation efforts saved it from extinction and there are now 20 to 30 thousand Bison in the United States and Canada. Yellowstone National Park has a large herd and many zoos have small herds. The record weight of this animal is 3,000 pounds, but the average bull weighs around 1,600 pounds and cows are considerably smaller. The EUROPEAN BISON or WISENT (*B. bonasus*) once lived in many of the forests of Asia and Europe, including England. It is now extinct in the wild state; the few remaining animals, numbering about 300, are in parks and zoos. Larger than the American Bison, the Wisent



AMERICAN BISON—*Bison bison*

lacks the long, shaggy mantle which covers the neck and shoulders of the American form.

The domestic Cattle of today are descended from wild ancestors. One of the most interesting was the AUROCHS (*Bos taurus primigenius*), once found in many parts of Europe and in northern Africa from Egypt to Morocco. This large mammal became extinct as a wild animal early in the 16th century. The last known specimen died in Poland in 1627. Recently, German zoologists have attempted to recreate the Aurochs through carefully controlled breeding and selection with present day Oxen, but the animals thus far created have been officially repudiated and are not like the wild Aurochs. The GAUR (*B. gaurus*) is the largest wild species of Cattle known. Bulls stand 6 feet tall at the shoulder. These sleek-coated animals are dark brown in color and have white "stockings." They are found from central India through Assam and Burma to Thailand, Indo-China and the Malay Peninsula. They are forest animals and prefer hilly country, where they roam about in small herds. The GAYAL or MITHAN (*B. frontalis*) is thought by some authorities to be a semi-domesticated race of the Gaur. It is smaller than the Gaur and its broad, heavy horns are nearly straight, instead of curved like those of the Gaur. These Cattle inhabit eastern Assam and northern Burma. Natives milk and tend them like cows. The KOUPREY (*B. sauveli*) is as big as the Gaur, but lighter. This amazing mammal was unknown to science until 1936 when a living specimen was sent to the Zoological Gardens in Paris. Both sexes have an exaggerated dewlap hanging from the neck. The horns of the females look like those of ordinary cows, but those of the male have many turns and shred open at

the tip, exposing about 5 inches of an inner black horn. Little is known of this animal, which is thought to be found only in Cambodia and Laos. The BANTING (*B. banteng*) is about the size of domestic Cattle, but has Buffalo-like horns joined together at the base over the front of the head by a horny casque. This animal has been domesticated throughout its original range of southern Burma, Malaya, Borneo, Sumatra, Java, Bali, and neighboring islands. The YAK (*B. grunniens*) occurs in 2 forms, wild and domesti-



YAK—*Bos grunniens*

cated. The wild race formerly inhabited most of central Asia from Kashmir to China, but now is common only to the plateau of Tibet. In summer, the Yak ranges up to elevations of 20,000 feet; it winters at elevations of 14 to 15 thousand feet. The domesticated Yak is a somewhat smaller animal. It is used as a beast of burden, for food, fuel, and clothing and is indispensable to the existence of the natives of the region. These animals are regularly reared in zoos. The ASIATIC WATER BUFFALO or CARABAO (*Bubalus bubalis*) is a large mammal; a mature bull stands 5 feet at the shoulder. Its horns are the largest in the whole Bovidae family. This animal loves the water and enjoys nothing better than wallowing in a mud-hole. Here it will stay for hours during the heat of the day, with only its eyes and nostrils exposed, safe from the torment of insect pests. The wild Water Buffalo is an extremely dangerous animal to stalk, being savage and unreliable in disposition. The domesticated form, however, is very different from its wild relatives and can be driven in herds by native children. The domesticated kind is found from Egypt to India and the Philippines and on many islands of Malayasia. It is still found in the wild state in India, Ceylon, Indo-China, and the Malay Peninsula. Our specimens show an amazing intelligence by closing their door in the evening and opening it in the morning themselves. The AFRICAN WATER BUFFALO or CAPE BUFFALO (*Syncerus caffer*) is spread over most of Africa south of the Sahara but hunting and farming have greatly reduced its numbers. It travels in



ASIATIC WATER BUFFALO—*Bubalus bubalis*

herds outside the closed forest, preferring moist, swamp ground. Normally wary and inoffensive when unmolested, it is a dangerous adversary when wounded or aroused. Its horns are massive and arise close together on top of the head where they form a helmet-like shield. Full-grown bulls weigh about 1,500 pounds. The DWARF FOREST BUFFALO or BUSH COW (*S. nanus*) inhabits west and west-central Africa and has several races. It is much smaller than the African Water Buffalo, weighing about 600 to 700 pounds and being about 4 feet tall at the shoulder. The coat is typically red, but bulls turn black with advancing age. The TAMARAO or PHILIPPINE PYGMY BUFFALO (*Anoa mindorensis*) is a small Buffalo of the southern Philippine Islands. The ANOA (*A. depressicornis*) is the smallest of the wild Cattle. It lives alone or in pairs on the wooded mountain slopes of the Celebes Islands. It stands about 3½ feet tall at the shoulders. The longevity record for this species is 28 years, 5 months and 25 days. Although both the Tamarao and the Anoa are fairly common in zoos, practically nothing is known about their habits in the wild.

SUB-FAMILY CEPHALOPHINAE: DUIKERS

TRIBE CEPHALOPHINI

These small Antelopes are restricted to Africa and are very numerous, though not often seen in zoos. There are at least 20 species. Possibly the strangest of all Duikers is the ZEBRA DUIKER (*Cephalophus zebra*), a small species inhabiting West Africa. This mammal has a bright orange coat marked with wide, blue-black vertical stripes. The BUSH DUIKER (*Sylvicapra grimmia*) is plentiful over most of Africa. Duikers are easily tamed and breed in captivity.

SUB-FAMILY HIPPOTRAGINAE: HORSE ANTELOPES

TRIBE REDUNCINI

This is another group of Antelopes entirely restricted to Africa. The

SING-SING WATERBUCK (*Kobus defassa*) of West Africa represents a genus of large, strong-bodied Antelopes living in herds and frequenting swampy places. It breeds rather well in captivity.

TRIBE HIPPOTRAGINI

This group is also restricted to Africa and includes some of the handsomest of Antelopes. The rare GIANT SABLE ANTELOPE (*Hippotragus niger variani*) is a magnificent animal known only from Angola in West Africa. It is a purplish, blue-black animal with heavy forequarters, a long, thick neck bearing a crest from head to shoulders, a deep chest, and enormous horns rising straight from the top of the head and sweeping back in a half-circle. The COMMON SABLE ANTELOPE (*H. n. niger*) has a wider range in southern Africa. The ROAN ANTELOPE (*H. equinus*) has a grizzled roan



BEISA ORYX—*Oryx beisa*

coat. The BEISA ORYX (*Oryx beisa*) is a common animal on the plains of East Africa from the Sudan to Tanganyika. Our first pair was received in 1955. The BEATRIX ORYX (*O. leucoryx*) is found in Arabia. It is very rare in captivity.

TRIBE ALCELAPHINI

This tribe includes the Blesbok, Hartebeests, and the Gnus. The Gnus are unusual-looking animals sometimes referred to as "Horned Horses" and "Wildebeests." They have the head and horns of a Bison, the body of a Horse, and the tail of an Ox. The BRINDLED GNU (*Connochaetes taurinus*) travels in large herds and is one of the fleetest animals in the African veldt. This animal ranges from western Angola to Mozambique and north to



WHITE-TAILED GNU—*Connochaetes gnou*

Nyasaland. The WHITE-TAILED GNU (*C. gnou*) was once common on the flatlands of South Africa, but is now restricted to small herds in the Cape Colony. It is smaller than the Brindled Gnu, with a much more prominent mane.

SUB-FAMILY ANTILOPINAE: TRUE ANTELOPES

TRIBE NEOTRAGINI

Included in this group are the KLIPSPRINGER (*Oreotragus oreotragus*), of rocky, mountainous areas of Africa, and PHILLIP'S DIKDIK (*Madoqua phillipi*) of forested areas of Africa, one of the smallest Antelopes, about 14 inches at the shoulder and weighing 6 or 7 pounds.

TRIBE ANTELOPINI

This group includes a host of medium-sized Antelopes, both African and Indian. The BLACKBUCK (*Antilope cervicapra*) is the fastest of India's Antelopes and can out-distance the Greyhound. It is common in herds on open plains and is frequently seen in zoos, where it commonly reproduces. The GERENUK (*Litocranius walleri*) is noted for its habit of standing on its hind legs to feed from bushes. It has a further adaptation for this form of eating; its extraordinary long, slender neck, and legs that are very long for the size of its body. This Antelope inhabits East Africa from Abyssinia south to Tanganyika. The 60 or so species of Gazelles are included in this tribe. The GOITERED GAZELLE (*Gazella subgutturosa*) inhabits the vast desert

areas of Asia Minor to central Asia. The name is derived from the swollen condition of the male's throat during mating time. This animal, which stands about 26 inches at the shoulder, is said to be able to run 60 miles an hour.

SUB-FAMILY CAPRINAE: GOATS, SHEEP, AND ALLIES

TRIBE SAIGINI: GOAT ANTELOPES

The CHIRU (*Pantholops hodgsoni*) belongs to the Goat Antelopes. This interesting mammal is native to the barren plateau of Tibet and is extremely rare in captivity. It has a very thick, full coat to protect it from the extreme climate of the high altitude. Peculiar swellings on each side of the animal's muzzle may serve as some sort of air conditioner. Related to it is the SAIGA (*Saiga tatarica*) of the Steppes of south-central Asia. This preposterous-looking mammal has a muzzle that appears swollen, and is convex, with the nostrils opening downward. As in the Chiru, the many small hair-lined channels in the muzzle doubtless serve to filter the particles of dust and sand from the air and to warm the air during cold weather. The Saiga is rare in captivity.

TRIBE RUPICAPRINAE: ROCK GOATS

The Rock Goats include the GORAL (*Naemorhedus goral*), ranging from the Himalayas to southern Siberia, the SEROW (*Capricornis sumatraensis*), found from China and Japan south to Sumatra, the CHAMOIS (*Rupicapra rupicapra*) and the ROCKY MOUNTAIN GOAT (*Oreamnos americanus*) of western North America. These cud-chewers all have especially adapted hoofs to give them sure footing in their precipitous rocky ranges and all are rare in captivity.

TRIBE OVIBOVINI: OX GOATS

Two peculiar mammals form this tribe. The TAKIN (*Budorcas taxicolor*) is a rare animal, little known, living in exceedingly rough mountainous country from Bhutan to southern Shensi Province in China at elevations of 8 to 14 thousand feet. The Takin makes elusive prey in the dense thickets of bamboo and brush that cover its habitat. This animal's head bears a striking resemblance to that of the Moose, but its body is smaller and stouter and clothed in a shaggy coat. The MUSK OX (*Obvibos moschatus*), a native of the barren wastes of the American Arctic, is the nearest relative to the Takin and a close relative to the Chamois and the Rocky Mountain Goat. This magnificent, heavily coated animal once occurred all across northern Canada and into Greenland, but is today reduced to isolated populations. The adult male is larger than the female and may weigh up to 900 pounds. It is uncommon in captivity.

TRIBE CAPRINI: GOATS AND SHEEP

The true Goats and Sheep are included in this sub-family. The original derivation of the domesticated varieties is unknown. The HIMALAYAN TAHR (*Hemitragus jemlahicus*) lives at high elevations in the Himalayas and is wary, sharp-sighted, and like all Goats, very agile on rugged terrain. It is commonly seen in zoos and reproduces regularly. Our herd originated from a trio received in 1941. The NUBIAN IBEX (*Capra ibex*



NUBIAN IBEX—*Capra ibex nubianus*

nubianus) is one race of a wide-spread species occurring in Africa and Asia. Our large herd stems from an original importation in 1955 of 2 pairs and is the finest in America. This race is now rare, both in captivity and the wild.

Sheep are difficult to separate from Goats and the differences are indistinct. The AOUDAD or BARBARY SHEEP (*Ammotragus lervia*) is found all around the Sahara and is the only indigenous Sheep of Africa. This animal is seen in many zoos and breeds abundantly. The SIBERIAN ARGALI (*Ovis a. ammon*) is the largest of all living wild Sheep. Other races inhabit the highlands of central Asia from Bokhara to Mongolia and Kamchatka. It may attain a shoulder height of 4 feet and a weight of 350 pounds. The Cleveland Zoo first exhibited this species in America in 1955 and it is still exceedingly rare in captivity. Another race of this species is the MARCO POLO SHEEP (*A. a. poli*). In the thirteenth century the famous Venetian traveler Marco Polo first discovered, for the western world, this splendid form. It lives in herds on the Pamir Plateau of southern central Asia, often above cloud level. It, too, was first exhibited in America at our zoo. The BIGHORN SHEEP (*O. canadensis*) lives in mountainous regions of western North America and Siberia. In 1956, not more than 18,000 of these animals were estimated remaining. The DALL SHEEP (*O. dalli*) is a pure white relative of the Bighorn, living in Alaska and the western provinces of Canada. It is uncommon in captivity.

CLASS AVES: BIRDS

All birds have feathers that clothe and insulate their bodies to make a regulated body temperature possible, and those of the wings and tail provide for flight. No other animals possess feathers. Birds have evolved from reptiles and differ notably from mammals in the type of body covering, the ability to fly, and in the manner of reproduction.

The largest living bird is the Ostrich of Africa, the smallest is the Bee Hummingbird of Cuba.

The migration of birds is a well-known phenomenon of life corresponding with the seasons. This is only one of many fascinating aspects about the life history of birds. In the following pages we will briefly describe some of these interesting facts. Certain species may not be represented in the collection, but are discussed because they are particularly noteworthy.

The class Aves is divided into lesser groups in the same manner as other animals. Approximately 8,600 species of 30 different orders are recognized and we will discuss each order in the following pages, in sequence from the most primitive to the most advanced types.

ORDER SPHENISCIFORMES: PENGUINS

FAMILY SPHENISCIDAE

This order is represented by 16 species of Penguins living entirely in the seas and along the coasts of the southern hemisphere. All Penguins are flightless. They are robust birds of medium and large size. The feet are webbed and flat. Although Penguins are undoubtedly descendants of flying birds, their wings are very short, flipper-like and devoid of quills except in the embryo. Penguins are the most completely aquatic living birds. They propel themselves through the water by means of their flippers or wings; the feet serving only as a rudder. Great schools of Penguins remain at sea for months, coming ashore only to breed. They abound around the edges of Antarctica and sometimes breed hundreds of miles inland, performing prodigious marches to and from the sea; their only source of food being fish and shell-less mollusks. Although Penguins are virtual symbols of Antarctica, only two species actually inhabit that continent. Penguins do not thrive in captivity and appear to have little resistance to infections in temperate climates.

The EMPEROR PENGUIN (*Aptenodytes forsteri*) is the largest Penguin and has the most southerly range of any bird in the world. It reaches 4 feet in height and 90 pounds in weight. Almost immediately after the egg of an Emperor Penguin is laid, the male takes full charge and the female goes off to sea for 2 months. All during this period the male does not eat. Shortly after hatching time, the female returns but no longer remembers its long-suffering mate, and solicits various males for chicks. The chicks are first fed with a special crop secretion produced by the male. As they get older, both sexes feed the down-covered young chicks regurgitated seafood. This species is rarely exhibited in captivity because of the difficulty

in obtaining it. The KING PENGUIN (*A. patagonica*) is somewhat smaller but similarly marked. It breeds at the southern tip of South America and on various southern islands such as South Georgia and Kerguelen, and wanders north to the shores of New Zealand and Tasmania. In incubation, the single egg of the King and Emperor Penguin rests on the feet and is held in a pocket-like, feather-lined fold of the lower abdomen. King Penguins are generally exhibited in the larger zoos but infrequently breed. Our first specimens arrived in 1955. The MACARONI PENGUIN (*Eudyptes chrysolophus*) of the southern Atlantic and Indian Oceans owes its name to its peculiar head feathers, which resemble pieces of macaroni. The ADELIE PENGUIN (*Pygoscelis adeliae*), along with the Emperor Penguin, inhabits the Antarctic and breeds on its coasts. Two eggs are laid by this species and here, also, the female leaves the male who incubates and fasts, but for a shorter time than the Emperor. The HUMBOLDT PENGUIN (*Spheniscus humboldti*) is commonly exhibited in zoos and inhabits the equatorial waters at the northern terminus of the Humboldt Current off the west coast of South America. We have bred this species and the BLACK-FOOTED PENGUIN (*S. demersus*) of the coasts of South Africa.

ORDER STRUTHIONIFORMES: OSTRICH
FAMILY STRUTHIONIDAE

The OSTRICH (*Struthio camelus*) is peculiar in that it has only 2 toes,



OSTRICH—*Struthio camelus*

whereas all other birds have 3 or 4. Ostriches, the only members of this order, formerly lived over much of Asia and until recently lived in Arabia and Syria. Today they are found only in the sandy grasslands of Africa. Male Ostriches have the body plumage black, while the females are grayish. Unlike most other Ratites, which include the Ostrich, Rheas, Emus, Cassowaries and Kiwis, the female participates in incubation, but only during the day during cold spells. Otherwise, by day, the eggs are left alone under a partial covering of sand. The male does all of the nocturnal incubation. The eggs weigh about 3 pounds each and hatch in about 6 weeks. Ostriches can go without water for days, but relish frequent drinking and bathing. They thrive in captivity and have a life span about equal to that of human beings.

ORDER RHEIFORMES: RHEAS

FAMILY RHEIDAE

Sometimes called the American Ostriches, the Rheas of southern South America, are the largest birds found in the New World. Like their nearest relative, the Ostrich, they are flightless and practice harem polygamy. The male is larger and acquires 6 or more females for his harem. All the females lay their eggs in a single nest on the ground, which the male alone attends, performing all the incubation. He also rears the young. Wild Rheas feed on vegetable matter of many kinds, as well as on land mollusks, lizards and worms. Young Rheas are frequently kept as pets in South America. Like Cassowaries and Emus, Rheas swim well. The family includes only 2 species. The COMMON RHEA (*Rhea americana*), which inhabits the pampas and the highland savannas of Brazil and Argentina, is the larger and more abundant species. It also is the one most commonly seen in zoos. The LONG-BILLED or DARWINS RHEA (*Pterocnemia pennata*) is smaller and is found in the mountains of Peru, Bolivia, Chile, and Argentina. It is rarely exhibited in zoos.

ORDER CASUARIIFORMES: CASSOWARIES AND EMUS

FAMILY CASUARIIDAE

Cassowaries, the third largest birds in the world, are extremely powerful and can easily kill a man by means of a razor-sharp, elongated nail on the inner toe of each foot. They are large, flightless birds, occurring only in the New Guinea region, on various islands, and along the northernmost fringes of Australia. Unlike their nearest relatives, the Emus and the other Ostrich-like birds, Cassowaries dwell in thick forest and along jungle rivers. The primary character of the 6 known species is a bony helmet or casque worn like a crown and used in fending off obstructions as the huge bird rushes through thick underbrush. The bare skin of the head and neck is usually brilliantly colored. Despite their size, Cassowaries are wary, skulking, and hard to detect in the wild. When frightened they can run at speeds of 30 miles an hour and can swim with a facility that must be seen to be believed. Female Cassowaries, like female Hawks and a few other birds, are larger than their mates. These primitive birds feed almost entirely on fruit, but insects and plants are also eaten. As with all similar birds, it is the male

that attends to domestic chores. The female deposits 3 to 6 huge, pear-green eggs on a mat of leaves, near the foot of a tree, and the male then assumes his duties. Any of the 6 known species may be seen in various zoos, but we exhibit the AUSTRALIAN CASSOWARY (*Casuarius casuarius*)



AUSTRALIAN CASSOWARY—*Casuarius casuarius*

which reaches a height of more than 5 feet and has the largest helmet in the family. A WESTERMAN'S CASSOWARY (*C. westermanni*) has lived 31 years in captivity.

FAMILY DROMICEIIDAE: EMUS

The second largest of living birds, the Emu of Australia is rapidly becoming extinct in many areas. A close relative of the Cassowaries, the Emu is a friendly bird which sometimes stalks men for the sole purpose of examining them. Formerly, several species inhabited the Australian region, but now only one species remains alive, the COMMON EMU (*Dromiceius novaehollandiae*) of eastern Australia. It is the national bird of Australia. Emus breed readily in captivity and are hardy.

ORDER APTERYGIFORMES: KIWIS

FAMILY APTERYGIDAE

This order and family is composed of 3 remaining species of Kiwis. Kiwis are the smallest of the Ratites and the least birdlike of all birds. They are shy, surviving relatives of the extinct Moas of New Zealand. Kiwis differ from all living birds in having the openings of the nostrils near the

tip of the bill. They possess a well-developed sense of smell. They are considered to be "living fossils." Restricted to New Zealand, the Kiwis are threatened with extinction because of predation by introduced Dogs and Swine. With their long, narrow, sensitive bill they probe for Earthworms, doing most of their feeding at night. The egg of the COMMON KIWI (*Apteryx australis*) is larger in proportion to body size than that of any other vertebrate animal in the world. The egg weighs one pound, the adult bird 4 pounds. The incubation, entirely by the male, lasts about 75 days. This bird is the national emblem of New Zealand and is rarely exhibited in captivity.

ORDER TINAMIFORMES: TINAMOUS
FAMILY TINAMIDAE

Tinamous are so distinct from all other birds that they are placed in an order of their own with all species included in the one family. Tinamous are game birds of uncertain ancestry, inhabiting the grasslands and jungles of the New World from Mexico to Patagonia. Probably the nearest surviving relative of the Tinamou is the Rhea. In Tinamous, as in Rheas and other Ratites, the role of the sexes in parental care is reversed. Incubation lasts 21 days. The male rears the precocial young which soon learn to fly and to care for themselves. Female Tinamous are larger and more aggressive than their mates. We have exhibited several species, including the RUFIOUS TINAMOU (*Rhychotus rufescens*) of South America and the PILEATED TINAMOU (*Crypturellus soui*) of Central and South America.

ORDER GAVIIFORMES: LOONS
FAMILY GAVIIDAE

Four species comprise the family, the only one in the order. Loons are the most gifted of all diving birds, being able to penetrate deeper and stay under water longer than any other bird. Loons have been caught in fish nets set as deep as 160 or 180 feet below the surface. They live largely on fish, which they out-swim and capture on dives which may last as long as a quarter of an hour, during which the birds may swim, completely submerged, for 2 or more miles. The propelling force is the rapid sculling motion of the webbed feet. Loons live in colder regions of the Northern Hemisphere. All Loons live almost continuously in water and move with great difficulty on land. They cannot take off from land because of their structure and relative weight. The call of the Loon resembles prolonged, wild, almost maniacal laughter and truly conveys the spirit of the wilderness. Two eggs are laid in a shallow nest on shore. Incubation lasts 28 to 30 days and is performed alternately by the sexes. The newly hatched young often ride pick-a-back on the backs of the parents. The best known Loon of America is the COMMON LOON (*Gavia immer*).

ORDER PODICEPEDIFORMES: GREBES
FAMILY PODICEPIDAE

Grebes, of which 18 species are known, are virtually cosmopolitan in their distribution. Although related to the Loons they are included in a separate order and in one family. Marvelous swimmers, the Grebes, like

the Loons, can compress the plumage and the air in their internal reservoirs, and make themselves settle and disappear beneath the surface much like a submarine. Grebes have more feathers than any other bird, by actual count. These birds are infrequently exhibited in captivity. The HORNED GREBE (*Colymbus auritus*) is the best known American species and is also found in the Old World where it is known as the Slavonian Grebe. Generally a few PIED-BILLED GREBES (*Podilymbus podiceps*) are to be seen on our waterfowl sanctuary.

ORDER PROCELLARIIFORMES: ALBATROSSES AND ALLIES

This order includes 4 families of sea birds of which the Albatrosses are the best known. Members of this order have rarely been seen in captivity because of their specialized marine feeding habits. New information concerning their salt requirements has been discovered, which may allow these impressive birds to be seen more commonly in captivity.

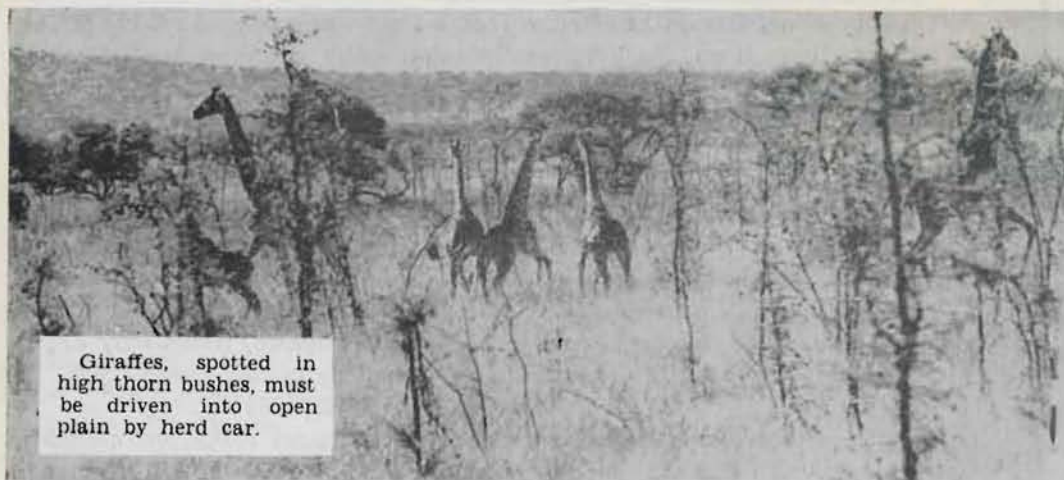
FAMILY DIOMEDEIDAE: ALBATROSSES

Recent evidence indicates that some Albatrosses make one or more trips around the world annually. The WANDERING ALBATROSS (*Diomedea exulans*), breeds on extreme southern islands near Antarctica and occurs circumpolar in the Southern Hemisphere. The ROYAL ALBATROSS (*D. epomorpha*) breeds on Campbell and other islands more northerly than does the Wandering Albatross and also occurs circumpolar in the Southern Hemisphere. It has the longest incubation period of any bird, 77½ to 81 days and has as large a wing span as any bird, nearly 12 feet. The BLACK-FOOTED ALBATROSS (*D. nigripes*) is the most abundant species of the north Pacific Ocean and is common along the Pacific coast of North America. It formerly nested on islands from the Hawaiian group to Japan and Ocean



LAYSAN ALBATROSS—*Diomedea immutabilis*

How To Catch



Giraffes, spotted in high thorn bushes, must be driven into open plain by herd car.



Once in open plain, giraffes are pursued by fast catching car with catcher strapped in seat on front left fender.



A giraffe, roped from catching car, is calmed down before being loaded on truck.

h a Giraffe

Safari crew makes ready to handle four long legs in boosting balky giraffe onto truck.



Ready for new home in Cleveland Zoo, giraffe is headed for next stop—on board New York-bound ship.



Island, but is now restricted to the Leeward group including Midway. The LAYSAN ALBATROSS (*D. immutabilis*) also nests on these islands. This species and the Black-footed have caused some hazard to aircraft operations at Midway.

**ORDER PELECANIFORMES: TROPIC BIRDS,
PELICANS, AND ALLIES**

This order is composed of aquatic birds, all of which have the 4 toes of each foot joined together by a web. All of the 6 families feed principally on fish.

FAMILY PELECANIDAE: PELICANS

The 8 known species of Pelicans are chiefly inhabitants of tropical and warm areas. In all species the sexes look alike. Pelicans move their enormous pouched bill from side to side underwater, with the pouch open and deep, to catch fish on which they feed. The capacity of some of these bags may exceed 12 quarts. In addition to catching food, the sac or bag is believed to assist these birds, which nest in excessively hot places, in keeping cool; in such places it sags and may provide an extensive surface for evaporation. The young are fed by regurgitation. The BROWN PELICAN (*Pelecanus occidentalis*) in summer ranges from southwestern Canada to southern South America and does all of its fishing in salt water. The 5 species of White Pelicans make their homes on large inland lakes, where they breed on isolated islands, sometimes by tens of thousands. The EURASIAN WHITE



AMERICAN WHITE PELICAN—*Pelecanus occidentalis*

PELICAN (*P. onocrotalus*) of southern Europe, northern Africa, and southwestern Asia, is the largest of the Pelicans and is white, with black wing-tips. It is very similar to the AMERICAN WHITE PELICAN (*P. erythrorhynchos*), which occurs in scattered regions of North America.

FAMILY PHALACROCORACIDAE: CORMORANTS

Cormorants or Shags, as they are called in the Old World, are almost cosmopolitan in the lakes and littoral regions of the world. In India, China, and Japan 2 species of Cormorants are trained by means of food rewards and whistles to capture fish for their owners. The 30 species of Cormorants are all very similar in structure and highly gregarious. Beneath the water they swim with both the wings and the webbed feet, and they often make very deep dives. The PERUVIAN CORMORANT (*Phalacrocorax bougainvillia*) of the west coast of Central and South America is one of the chief producers of guano fertilizer and is, therefore, sometimes said to be the most valuable wild bird in the world. The DOUBLE-CRESTED CORMORANT (*P. auritus*) is the most widely distributed species in North America and is sometimes seen in our collection.

FAMILY ANHINGIDAE: SNAKEBIRDS

Snakebirds resemble Cormorants and are closely related to them. Snakebirds have 20 vertebrae in the neck, which make it possible to coil their necks back upon themselves and then release with Viper-like speed, spearing fish under water with great facility. The AMERICAN SNAKEBIRD (*Anhinga anhinga*) is one of 4 recognized species and occurs from the southern borders of the United States to Argentina.

ORDER CICONIIFORMES: HERONS, BITTERNS, AND ALLIES

The birds of this order are waders and usually long of leg, neck, and bill. Most of their food is secured in the water, and consists largely of fish, frogs, and crustaceans.

FAMILY ARDEIDAE: HERONS AND BITTERNS

Some 64 species of this family are currently recognized. Like the Snakebirds, they often spear their prey with a rapier-like movement of their bill. Near the waterfowl sanctuary in the Zoological Park, a colony of BLACK-CROWNED NIGHT HERONS (*Nycticorax nycticorax*) has returned regularly year after year, to nest and rear their young. This species breeds over most of the world, being absent only in the Australian area. The beautiful, plumed, white, SNOWY EGRET (*Egretta thula*) ranges from the southeastern United States to Argentina. To obtain the lace-like plumes on the backs of these birds, hunters nearly wiped this species out in North America. Fortunately this mass slaughter was stopped, through the efforts of conservationists who were instrumental in having protective laws enacted. Once again the Snowy Egret is relatively common.

FAMILY BALAENICIPITIDAE: SHOEBILL STORK



SHOEBILL STORK—*Balaeniceps rex*

The WHALE-HEADED or SHOEBILL STORK (*Balaeniceps rex*) of north-eastern Africa is one of the most unusual of birds. Its enormous bill is shaped like an inverted wooden shoe. The specialized bill may be used to dig Lungfish and Turtles from the mud of river bottoms. These birds are hardy but rare in captivity and are becoming increasingly rare in the wild.

FAMILY CICONIIDAE: STORKS

Seventeen species of Stork-like birds occur widely throughout the tropical and temperate regions of the world. Those of the cooler areas are migratory. They are mute, but overcome this shortcoming by loud clatterings of the bill. The WHITE STORK (*Ciconia ciconia*) of Europe, North Africa, and Asia is probably the most famous member of the family and is a zoo favorite. In the Old World are found 3 species of Storks famed for their ugliness. These birds, commonly known as Marabous, have the habits of Vultures and feed largely on carrion. The MARABOU or ADJUTANT STORK (*Leptoptilos crumeniferus*) of tropical Africa, is the largest. One lived for over 35 years in captivity.

FAMILY THRESKIORNITHIDAE: IBISES AND SPOONBILLS

Ibises and Spoonbills, of which 28 species are known, occur in most of the tropical regions of the world. Perhaps the most beautiful of these

birds is the SCARLET IBIS (*Eudocimus ruber*) of tropical South America. The ROSEATE SPOONBILL (*Ajaja ajaja*) ranges from the southern United States to Argentina and Chile and is characterized by its large, flat, spoon-like bill which is used in feeding to filter minute crustaceans from the water.

FAMILY PHOENICOPTERIDAE: FLAMINGOS

Flamingos are among the most beautiful and graceful of all birds. Six highly gregarious species are known. Their unusual bills are used in sieving food from the water and mud. The COMMON FLAMINGO (*Phoeni-*



AMERICAN FLAMINGO—*Phoenicopterus ruber*

copterus ruber) occurs in tropical America. Several zoos have bred this species. The beautiful JAMES FLAMINGO (*Phoenicoparrus jamesi*) from high Andean lakes, is extremely rare in captivity. A Common Flamingo lived 44 years and one month in captivity.

ORDER ANSERIFORMES: WATERFOWL AND SCREAMERS

With the exception of the Screamers, the birds of this group are easily recognized by everyone as Waterfowl. The Screamers, quite different in appearance, nevertheless, possess characters which ally them more closely with this group than any other.

FAMILY ANATIDAE: DUCKS, GEESE, AND SWANS

The Waterfowl, of which there are about 140 surviving species with representatives in virtually every part of the world, compose this family. Many species move in tight flocks from the northern nesting areas along well-established routes to wintering grounds in the southern temperate and sub-tropical zones. Ducks, Geese, and Swans are generally omnivorous, but certain species, such as the Mergansers, feed almost exclusively on fish.

The MAGPIE or SEMI-PALMATED GOOSE (*Anseranas semipalmata*) of New Guinea and northern Australia is a striking bird and lacks webs between the toes. It is so unusual that it is placed in a sub-family by itself. The 8 species of Whistling or Tree Ducks, among the least known of Ducks,

compose a group of their own. They rarely are seen perched in trees, but their wings do cause a whistling sound in flight, hence, the more appropriate name. The FULVOUS WHISTLING DUCK (*Dendrocygna bicolor*), with an unusual discontinuous pan-tropical distribution in both hemispheres, is typical of the group in habits and life history.

The Swans are the largest of the Anseriformes. Mated Swans remain paired for life. Two species of Swans are native to America, the WHISTLING SWAN (*Cygnus c. columbianus*) and the TRUMPETER SWAN (*C. c. buccinator*). The Trumpeter Swan, a race of the EURASIAN WHOOPING SWAN (*C. c. cygnus*), is the largest of all American native Waterfowl. Its name comes from its deep and hornlike call. This magnificent bird was brought to the verge of extinction by farming and overhunting. Fortunately, through concerted conservation efforts, this species has survived the immediate threat of extermination and now numbers about 2,000 individuals in the northwestern United States and southwestern Canada. The United States Fish and Wildlife Service has recently placed pairs of these birds in several zoos. The Whistling Swan is smaller than the Trumpeter, but otherwise very simi-



MUTE SWANS AND CYGNETS—*Cygnus olor*

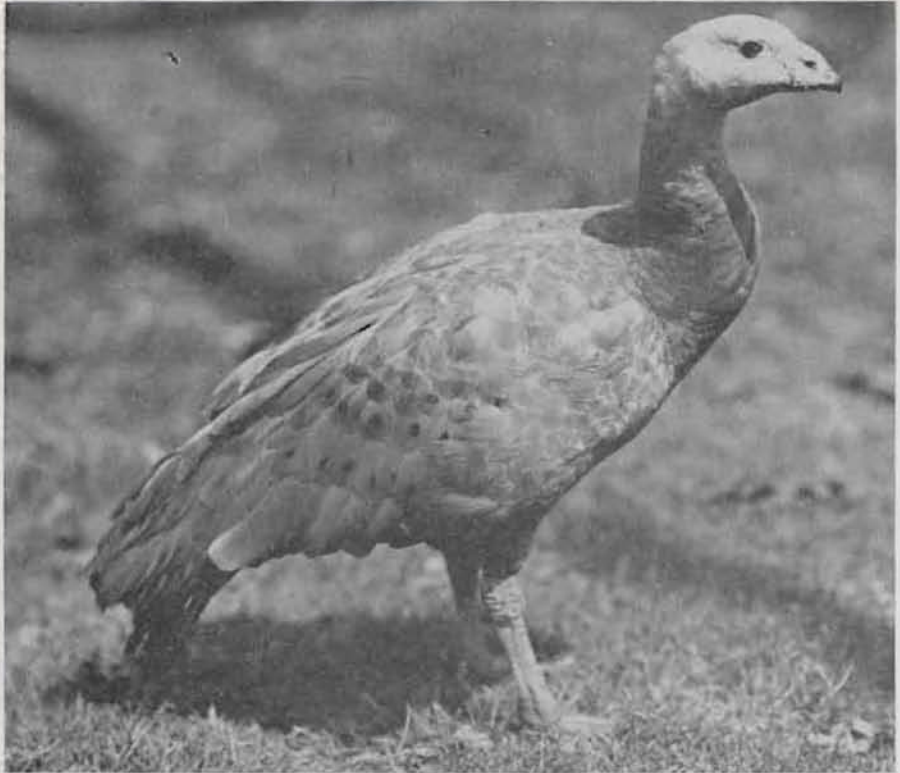
lar and is much more common in North America. The MUTE SWAN (*C. olor*), ranging from northern Europe to Mongolia, still exists in the wild state, but is best known in captivity, where it has been thoroughly established. In England, this Swan has had the status of a royal bird since 1482. The Whooping Swan which breeds in northern Eurasia and BEWICK'S SWAN (*C. columbianus bewicki*), a race of the Whistling Swan, have similar distribution. While all of the foregoing Swans of the Northern Hemisphere have white plumage, 2 of the 3 species of southern latitudes have all or some

black plumage. The BLACK SWAN (*C. atratus*) of Australia and Tasmania is all black with the exception of white wing-tips. It has been introduced in New Zealand and Sweden and does well in captivity. The BLACK-NECKED SWAN (*C. melanocoryphus*) of southern South America and the Falkland Islands is white bodied with a black neck. The COSCOROBA SWAN (*Coscoroba coscoroba*), with a distribution similar to that of the Black-necked Swan, may more properly belong to the Whistling Ducks than to the Swans.

Geese are next to the Swans in size within the Anseriformes. They also mate for life and live for many years in captivity, where they often breed. The SWAN GOOSE (*Anser cygnoides*) of Asia is the ancestor of the domestic varieties of the Chinese Goose. The WHITE-FRONTED GOOSE (*A. albifrons*) has a circumpolar distribution and occurs in several races. The GRAY LAG GOOSE (*A. anser*) of northern Eurasia is considered to be the ancestor of most of the domestic breeds other than Chinese. The BAR-HEADED GOOSE (*A. indicus*) breeds on lakes of high central Asia and winters in northern India, Assam, and northern Burma. The EMPEROR GOOSE (*A. canagicus*), along with the LESSER SNOW GOOSE (*A. c. coerulescens*), breeds and nests in subpolar regions of the Northern Hemisphere and winters in temperate areas of the United States and Mexico. It is now thought the BLUE GOOSE is merely a color phase of this race. THE GREATER SNOW GOOSE (*A. coerulescens atlanticus*) breeds on the coast of northwest Greenland, Ellesmere Land, and adjacent islands and winters along the Atlantic shore of United States. ROSS'S GOOSE (*A. rossii*) breeds in the Perry River region in the center of the Arctic coast of Canada. Nests of this species were first found in 1942. The total population, numbering only about 8,000 individuals, winters in California. The CANADA GOOSE (*Branta canadensis*) of North America occurs in several races differing primarily in size. This is a common game bird, often referred to as "honker." The HAWAIIAN GOOSE or NE-NE (*B. sandvicensis*) is the rarest Goose. It formerly lived on several islands of the Hawaiian Archipelago, but is now restricted to Hawaii. Probably fewer than 50 birds were left in 1947, but through protection and beerding in zoos and refuges, they are slowly increasing. In 1959 over 200 individuals were estimated, mostly in captivity. The BARNACLE GOOSE (*B. leucopsis*) breeds in northeast Greenland, Spitzbergen, and southern Novaya Zemlya and winters in Europe. It rarely breeds in captivity. The BRANT GOOSE (*B. bernicla*) occurs in 3 races, breeding on the Arctic coasts of both hemispheres and wintering along coasts of North America, Europe, and Asia. The rather rare RED-BREASTED GOOSE (*B. ruficollis*) breeds on the Siberian tundra and winters in the Caspian and Aral Seas.

A distinctive group of the Anseriformes is formed by the Shelducks and Sheldgeese. Many of these strikingly colored birds are confusingly called Geese. The RUDDY SHELDUCK (*Tadorna ferruginea*) inhabits southern Europe and Asia and in winter occurs in North Africa. The COMMON SHELDUCK (*T. tadorna*) has a similar distribution and like the preceding species commonly nests in burrows in the ground. Five other species of Shelducks occur in Africa and the southwest Pacific region. The EGYPTIAN

GOOSE (*Alopochen aegyptiacus*) inhabits Africa and has been introduced into England. The ORINOCO GOOSE (*Neochen jubatus*) of northern South America appears closely related to the Egyptian Goose but is much less hardy and is rarely bred in captivity. The ABYSSINIAN BLUE-WINGED GOOSE (*Cyanochen cyanopterus*) of the highlands of Abyssinia and Shoa is extremely rare in captivity. The ANDEAN GOOSE (*Chloephaga melanoptera*) of western South America is a mountainous species. The LESSER MAGELLAN GOOSE (*C. p. picta*) occurs from Chile and southern Argentina to Tierra del Fuego. The GREATER MAGELLAN GOOSE (*C. p. leucoptera*) occurs on the Falkland Islands and has been introduced in South Georgia. The CEREOPSIS



CEREOPSIS GOOSE—*Cercopsis novaehollandiae*

or CAPE BARREN GOOSE (*Cercopsis novaehollandiae*) is native to the islands off western and southern Australia and in Bass Strait. Not more than 6,000 individuals were estimated as living in the wild in 1957. A few zoos have this unusual species and we have been fortunate in breeding them regularly. The ANDEAN CRESTED DUCK (*Lophonetta specularioides alticola*), rare in captivity, is native to the high lakes of the Andes Mountains above 10,000 feet.

The Dabbling Ducks include some 36 species of surface-feeding ducks. The MALLARD (*Anas p. platyrhynchos*), breeding in northern North America, Europe, and Asia and wintering southward, is probably the most widely hunted Duck. All varieties of domestic Ducks, excepting the Muscovy, are

believed to have descended from the Mallard. The NORTH AMERICAN BLACK DUCK (*A. rubripes*) is the most common Duck of eastern North America. It is wary and an excellent game bird. The SPOT-BILLED DUCK (*A. poecilorhyncha*) inhabits eastern Asia. In most of these species the coloration of the sexes differs only in minor points.

The Teals resemble the Mallards but are much smaller. The EURASIAN GREEN-WINGED TEAL (*A. c. crecca*) breeds in northern Europe and Asia and winters south to Africa and southern Asia. The American race (*A. crecca carolinensis*) breeds in northern North America and winters south to northern Central America and the West Indies. The BLUE-WINGED TEAL (*A. discors*) of North America is one of the speediest flyers and one of the strongest migrants. One specimen, banded in Alberta, Canada, was recaptured in Venezuela 3,800 miles away, one month later, thus averaging about 127 miles per day if it traveled non-stop. The CINNAMON TEAL (*A. cyanoptera*) breeds from British Columbia to the Falkland Islands and forms several races within this area. The COMMON SHOVELER (*A. clypeata*) breeds in Europe, Asia, and North America, wintering to Africa, southern Asia, and Central America. Several related species with similar spoon-like bills occur in the Southern Hemisphere. The GADWALL (*A. s. strepera*) breeds in the temperate zone of the Northern Hemisphere, wintering south to Africa, southern Asia, and Mexico. Three species of Wigeons are known; the BALDPATE or AMERICAN WIGEON (*A. americana*), the EUROPEAN WIGEON (*A. penelope*), and the CHILOE WIGEON (*A. sibilatrix*) which inhabits southern South America. A beautiful species is the BAHAMA PINTAIL (*A. bahamensis*), described in 2 races from the Caribbean and South American regions. The NORTHERN PINTAIL (*A. a. acuta*) breeds in the north temperate zone of the Northern Hemisphere and winters to North Africa, southern Asia, Central America, and the Hawaiian Islands. It is one of the most graceful of Ducks. The BAIKAL TEAL (*A. formosa*) of eastern Asia and the FALCATED TEAL (*A. falcata*), also of eastern Asia, are similar and both are exquisite in coloration.

Sea Ducks comprise a group of 21 species among which are the Eiders, Scaoters, the Golden-eyes, the Bufflehead, the Mergansers, the Harlequin, and the Old Squaw Duck. All are expert divers, feeding on mussels and fish, and most species, excepting the Scaoters and Eiders, nest in hollow trees or rock crevices. They are more difficult to keep in captivity and thus are less frequently seen than the Dabbling Ducks. The species most readily kept in captivity is the REDHEAD (*Aythya americana*). The similar CANVASBACK (*A. vallisnera*) of North America is a favorite game bird and occasionally may be seen on our waterfowl sanctuary. The ROSY-BILL (*Netta peposaca*) of southern South America does well on our lake.

Included in the Wood Ducks or Perching Ducks are 2 of the most beautiful Ducks kept in captivity, the MANDARIN DUCK (*Aix galericulata*) of eastern Asia and the WOOD DUCK (*A. sponsa*) of North America. The males of both species are brilliantly colored in the breeding season in the spring. We usually raise young every year. The COMB DUCK (*Sarkidiornis melanotos*) occurs in Africa, Asia, and South America in 2 forms. The

male of this species has a fleshy knob on his head. The SPUR-WINGED GOOSE (*Plectropterus gambensis*) occurs in 2 forms restricted to Africa. This large bird bears strong, bony spurs on the wings. The HOODED MERGANSER (*Mergus cucullatus*) may occasionally be seen swimming on our lake. It is native to North America and is entirely a fish-eater. The NORTH AMERICAN RUDDY DUCK (*Oxyura j. jamaicensis*) is a jaunty little Duck belonging to the group called Spine-tails. Its legs are so far back that walking is very difficult.

FAMILY ANHIMIDAE: SCREAMERS

In tropical and sub-tropical regions of South America are found 3 species of highly unusual birds called Screamers. They are believed to be distant relatives of Waterfowl and Flamingos and like Waterfowl they are aquatic and highly gregarious. Their skin is filled with small bubbles of air which give them extreme buoyancy in water. The sexes are similar in appearance and pairs probably remain together, like Swans, for life. Among other unusual characters are pairs of spurs up to an inch in length on the bend of the wing. Screamers are named for their harsh resounding calls, which can carry for as much as 2 miles. They walk, wade, or swim through flooded forests and marshes. They eat vegetable food, have been tamed for use in guarding barnyard fowl, and have been bred in captivity. The HORNED SCREAMER (*Anhima cornuta*) has a spine up to 6 inches in length growing forward in a curve on the head between the eyes. In the CRESTED SCREAMER (*Chauna torquata*) of southern South America the sexes incubate alternately. A third species is the BLACK-NECKED SCREAMER (*C. chavaria*) found in a limited area of northern Colombia and Venezuela.

ORDER FALCONIFORMES: DAY-FEEDING BIRDS OF PREY

The day-feeding birds of prey, Hawks, Falcons, Eagles, and related birds are included in this order. From the Pygmy Falcons, scarcely bigger than Sparrows, to the Condors and Eagles, there is a tremendous range in size.

FAMILY CATHARTIDAE: NEW WORLD VULTURES

This family includes the longest winged bird alive today, the ANDEAN CONDOR (*Vultur gryphus*). Inhabiting the Andes Mountains of South America, this species has attained a wingspread of 12 feet and has lived 65 years in captivity. Only 6 surviving species of New World Vultures are known. All are recognizable by their naked heads and connecting nostrils. Another unique character is their complete lack of voice. The species most widely distributed is the TURKEY VULTURE or BUZZARD (*Cathartes aura*), ranging from southern Canada to Patagonia. Captive Turkey Vultures have been known to live upwards of 30 years. The BLACK VULTURE (*Coragyps atratus*) ranges from the southern United States through South America. Both of the above species are valuable scavengers and are thus truly useful to man. In Middle and South America occurs the great KING VULTURE (*Sarcorhamphus papa*). Its brightly colored, bare head makes it one of the most colorful of all Falconiformes. In the mountains of southern California the CALIFORNIA CONDOR (*Gymnogyps californianus*) still survives,



TURKEY VULTURE—*Cathartes aura*

but this magnificent bird is on the verge of extinction. In 1953 only 60 individuals were estimated as living. With wings spanning more than 10 feet, this orange-headed bird is the largest flying creature in North America. The food-finding abilities of American Vultures are extraordinary. Their sense of smell may have something to do with food-finding, but their eyesight, which is extremely keen, is thought to be the key factor.

FAMILY SAGITTARIIDAE: SECRETARY BIRD

The SECRETARY BIRD (*Sagittarius serpentarius*) is an imposing creature and gets its name from the spectacular quills on the back of the head, which resemble quill pens. Only the one species is known, ranging from Senegambia and the Egyptian Sudan southward over the whole of Africa to Cape Province. It avidly hunts Snakes for food and feeds its nestlings by regurgitation.

FAMILY ACCIPITRIDAE: KITES, HAWKS, AND ALLIES

These highly varied flesh-eaters comprise 205 species, found throughout the world. In almost all species the female is considerably larger than

the male. The most primitive are the Kites, which occur in most of the warmer regions of the world. All American Kites hunt living prey, chiefly insects and reptiles, while the Old World Kites are primarily scavengers. The WHITE-TAILED KITE (*Elanus leucurus*) ranges from the southern borders of the United States through much of South America. Its numbers have been greatly reduced. One of the best known members of the family is the RED-TAILED HAWK (*Buteo jamaicensis*) found from Alaska south to Panama and the West Indies. Although primarily Rodent eaters, the "Red-tail" and its relatives, such as the RED-SHOULDERED HAWK (*B. lineatus*) of North America, are all too frequently shot as Chicken Hawks.

Several groups of large diurnal birds of prey, not particularly closely related to one another, have been given the general name Eagle. The magnificent GOLDEN EAGLE (*Aquila chrysaetos*), originally found in the wild mountainous areas of most of the Northern Hemisphere, is extinct in several portions of its range, including most of eastern North America and the British Isles. Incubation, chiefly or entirely by the female, lasts about 40 to 45 days. The best known Eagle in North America is the BALD EAGLE (*Haliaeetus leucocephalus*), familiar to all Americans as the emblem of our country. Yearling Bald Eagles are completely brown and are sometimes mistaken for Golden Eagles. The white head and tail develop gradually, becoming purer in color in each succeeding molt. The Bald Eagle is a member of the group known as Sea Eagles. STELLER'S SEA EAGLE (*H. pelagicus*) of the Pacific Coast of Asia is the largest of all Eagles.

Tropical forests, around the world, are the home of a small group of huge, crested, immensely powerful Eagles of which the MONKEY-EATING EAGLE (*Pithecophaga jefferyi*) of the Philippines is an example. This bird apparently subsists largely on a Monkey, the Philippine Macaque, but its habits are actually little known. Most majestic of all is the BATELEUR EAGLE (*Terathopius ecaudatus*) which ranges widely through the grasslands and open forest of Africa. It preys on reptiles, chiefly Snakes, but also, takes young Antelopes and Sheep.

Among the Accipitridae are the Harriers or Marsh-hawks, found in all the major land areas of the world except Antarctica. The 17 species are remarkably similar in structure and habits. Harriers are sizeable birds with a wing span which reaches 4 feet, but they are extremely light, some weighing less than 2 pounds. The female is larger, as in most Hawks. Harriers usually nest on the ground, constructing a nest of reeds, grasses, and sticks. The MARSH-HAWK or HEN HARRIER (*Circus cyaneus*) ranges around the world in the Northern Hemisphere. This species is found in marshy and savanna areas from Canada to Mexico, and wintering birds have been taken in northern South America.

With few exceptions, the Old World Vultures are large and powerful birds with strong bills but without grasping powers in their feet. Among these Vultures are 14 species of Eagle-like, carrion-feeding Raptorial birds, ranging widely through Europe, Africa, and Asia. Some are among the largest of all flying birds with wings spreading 10 feet and bodies reaching a

length of 4 feet. The sexes are fairly similar in size, unlike the Hawks and Eagles. One of the largest of these birds of prey is the GRIFFON VULTURE (*Gyps fulvus*) of southern Europe and Asia. In Nepal and India it haunts the rivers, feeding on human bodies that often fall from funeral pyres before being reduced to ashes. It is usually to be seen in our Zoological Park and one lived 37 years and 6 months in captivity. The most dramatic member of the family is the magnificent BEARDED VULTURE or LAMMERGEYER (*Gypaetus barbatus*) which wears tassels of shiny black feathers hanging from its nostrils, like an oriental mustache. Once common, but now rare in the Alps of Europe, it is still found east into China and in the high mountains of Africa. The food of the Lammergeyer is derived from the bones of animals. To get further nourishment from this source, the Lammergeyer carries the bones to great heights and drops them on certain rocks to fracture them and then feeds on the bone marrow.

FAMILY PANDIONIDAE: OSPREY OR FISH-HAWKS

The sole representative of this family, the OSPREY or FISH-HAWK (*Pandion haliaegus*) is an Eagle-sized, snap-billed Hawk, occurring throughout almost all temperate and tropical regions of the world. It feeds on fish and only rarely does it prey on other marine life. In America the Osprey normally nests in trees and often on telephone poles, whereas in Europe it usually nests on cliff edges. As in other Hawks, the females are larger.

FAMILY FALCONIDAE: FALCONS, FALCONETTES, AND CARACARAS

Among this group of 58 diurnal birds of prey are the magnificent long-winged hunting Hawks that have fascinated sportsmen since Egyptian times. The Caracaras of Central and South America form an aberrant sub-family. A northern-ranging species is the CRESTED CARACARA (*Caracara cheriway*) which feeds largely on carrion. It occurs from the southern United States to the Amazon. AUDUBON'S CARACARA (*C. c. auduboni*) is a sub-species found from Texas to Panama. The Falconettes consisting of 5 species occur in South America and Africa and the Indo-Malayan region. The smallest of the diurnal birds of prey is the PHILIPPINE FALCONETTE (*Microhierax erythrogenys*), 6 inches long and shaped like a Swallow. It hunts like a Flycatcher from the tops of trees and nests in old Woodpecker holes.

The true Falcons, of which there are 37 species, ranging to all the continents and large islands except Antarctica, are among the most aggressive of all birds. The PEREGRINE (*Falco peregrinus*) is generally credited with being the most wide-ranging diurnal land bird known. This single species reaches virtually every portion of the world, from the cold regions of the Arctic to the southern tips of Africa, India, Ceylon, Australia, Tasmania, and South America. The American race is sometimes called the Duck Hawk. A well-known small species of the Northern Hemisphere is the PIGEON HAWK (*F. columbarius*). It is very similar to the Peregrine in general shape and color, but has no ventral barring and is only a foot long. Falconery was once the sport of kings and even today is carried on with

much enthusiasm by its adherents. The GYRFALCON (*F. rusticolus*) inhabits the Arctic around the world and in winter occasionally flies as far south as the northern United States, England, and middle Asia. This 2-foot-long bird is a fierce hunter, preying on Waterfowl and Ptarmigan. The SPARROW HAWK (*F. sparverius*) is about 10 inches long and is perhaps the commonest bird of prey in the Americas. It generally lays 4 to 6 eggs in old Woodpecker holes and is very similar to the EURASIAN KESTREL (*F. tinnunculus*). Although capable of taking birds of fair size when forced by hunger to do so, most of these small Falcons feed largely on insects.

ORDER GALLIFORMES: PHEASANTS, QUAILS, GROUSE, AND ALLIES

The fowl-like or gallinaceous birds are a very large group numbering about 276 species and practically world-wide in distribution. Most are ground dwellers with powerful feet, well adapted for scratching, but some, like the Curassows, live chiefly in trees of heavily forested regions. Gallinaceous birds have many enemies and perhaps to compensate for this they lay, as a rule, a large clutch of eggs numbering up to 20. The appealing, down-covered chicks are able to follow their mother as soon as they hatch.

FAMILY TETRAONIDAE: GROUSE

Many of the 18 species of this interesting family, ranging in size from hen to Turkey, are considered the finest of all game birds. All but a few dwell in the northern portions of the Northern Hemisphere, some living most of their lives in the snows of the Arctic regions. The Ptarmigan, of which 4 species are known, evidence their primitiveness by being monogamous. All have large clutches of eggs which the female incubates and the male defends with much bravery.

The ROCK PTARMIGAN (*Lagopus mutus*) or PTARMIGAN as it is known in Europe, nests on rocky, barren ground in the far north around the world and on mountains in Eurasia. This bird has developed 3 distinct plumages to match the changes in coloration of its habitat. During the breeding season, when the ground is usually exposed, the body plumage is brown, and in autumn, when the vegetation is grayish, the dorsal plumage is gray. In winter, when the ground is snow-covered, the bird is nearly pure white. The Ptarmigan is almost unique among birds in having this triple annual plumage sequence. Among the relatives of Ptarmigans living in North America are the RUFFED GROUSE (*Bonasa umbellus*) and the SPRUCE GROUSE (*Canachites canadensis*). The Ruffed Grouse occupies deciduous woodlands throughout the northern two-thirds of America and is the best known and one of the most popular game birds. It habitually dances on dead logs in forests. A primary part of the dance is the rapid beating of the wings, producing a thumping, drumming sound that carries long distances and is accompanied by low ventriloquial noises. Unfortunately, Grouse are not hardy in captivity and are seldom exhibited.

FAMILY PHASIANIDAE: PHEASANTS, QUAILS, AND PEAFOWL

This family contains the most costly birds in the world as well as a galaxy of species virtually unrivaled in beauty except by the Birds of

Paradise. They number about 170 species and range from about the size of a small Sparrow to that of the universally known Peafowl. In nearly all species, the males are more highly colored than the females and often have spurs. The familiar BOB-WHITE (*Colinus virginianus*) of the eastern United States is so much loved that in some localities it has been listed as a song-bird and entirely protected from shooting. This excellent game bird ranges west to Colorado and south into Mexico. Typical of the 3 species of Quail, occurring in the southwestern United States, south into Mexico, is the CALIFORNIA QUAIL (*Lophortyx californicus*), also known as the Valley Quail. This bird can live for months and even years without drinking water if provided with succulent vegetation. A bird of the high mountain slopes of western North America is the distinctive MOUNTAIN QUAIL (*Oreortyx pictus*) which has a long blackish plume projecting from the head. The EUROPEAN QUAIL (*Coturnix coturnix*) has a very wide range in Eurasia and Africa and is slightly smaller than the average American Quail. Huge flocks migrate to Africa to spend the winter. The HUNGARIAN PARTRIDGE (*Perdix perdix*) is a swift flying, medium sized bird, resident of the middle portions of Europe and Asia between sea level and 15,000 feet. It has been introduced as a game bird into America and is now established virtually all over the western states and in many parts of Canada. The INDIAN CHUKAR PARTRIDGE (*Alectoris graeca*) has recently been liberated in this country in large numbers and apparently is established. The Francolins, of which there are 35 species extending over Eurasia and Africa, are all rather similar in appearance and all are Grouse size. Most of them are found in bushy grasslands. We have exhibited several species, including the SCALY FRANCOLIN (*Francolinus squamata*) and the CRESTED FRANCOLIN (*F. sephaena*). In the Pheasants each male has a harem and takes no part in any phase of nest building or parental care. All are relatively large birds that roost in trees and nest on the ground, with the exception of one group of highly colorful tree-nesting species called Tragopans which build bulky nests of leaves and twigs. They breed near the snow line in the Himalayan Mountains. The SATYR TRAGOPAN (*Tragopan satyra*) is a native of Nepal and Bhutan. The male is a large, orange-scarlet bird having blue ornaments that stand up out of the crown feathers when the male displays to the female. The Short-tailed Pheasants or Monals are among the most literally beautiful of the Pheasants and include the rooster-sized IMPEYAN PHEASANT (*Lophophorus impeyanus*), which is iridescent blue, green, and bronze, giving the impression of bright metal. Of the 3 known species of Monals, the Impeyan is the most commonly seen in zoos. All live high in the mountains of Central Asia. The most cosmopolitan of the Pheasants is the RING-NECK PHEASANT (*Phasianus colchicus*), so popular in America as a game bird. First successfully introduced in Oregon in 1882, the Ring-neck is a hybrid of several Old World races of the species. Ring-necks are hardy birds. They eat seeds and tender plants as well as many injurious insects. The females do all the work of rearing the young. Soon after hatching, the young give up roosting on the ground and join their parents and

sleep in trees. The GOLDEN PHEASANT (*Chrysolophus pictus*) and the LADY AMHERST PHEASANT (*C. amherstiae*) are closely related species, the males of both being distinguished for their beauty. The Golden Pheasant is a fabulous creature of gold, scarlet, green, and black. Because of its color and beauty plus its hardiness and ease of breeding in captivity, it has become a very common zoo bird. In Tibet and China, its original home, it is now quite uncommon. The REEVES PHEASANT (*Syrnaticus reevesi*) which also lives in the mountainous regions of central and western China, is one of the longest birds in the world, reaching a length of 8 feet, counting its very long tail. The SILVER PHEASANT (*Lophura nycthemera*) of southern China and northern Burma is a commonly kept bird and runs free in our zoo, breeding well. SWINHOE'S PHEASANT (*L. swinhoei*) is a beautiful metallic blue Pheasant restricted to Formosa. The Eared Pheasants, also birds of high altitudes of central Asia, are named for the long, pointed, tufted feathers that arise from each side of the head. The BLUE-EARED PHEASANT (*Crossoptilos auritum*) of western China, is the species most often displayed in captivity. The Peacock Pheasants live in the deep forest of southeast Asia. They eat mostly grubs, berries, and other fallen fruit. There are 7 species, 5 of which have bred in captivity. The BRONZE-TAILED PEACOCK PHEASANT (*Polyplectron chalcurom*) from the highlands of Sumatra has a long, narrow tail which cannot be spread. The allied MALAYAN HIGHLAND PEACOCK PHEASANT (*P. inopinatum*) of the mountains of Malaysia has never been kept in captivity. The PALAWAN PEACOCK PHEASANT (*P. emphanum*) of the Palawan Islands is said to be the most beautiful of the species. The GREAT ARGUS PHEASANT (*Argusianus argus*) of Malaya, Sumatra, and Borneo reaches 6 feet in length. The name Argus is derived from a 100-eyed god of mythology and refers to the many "eyes" on the feathers of this bird. This magnificent species is not often seen in zoos although it has bred in captivity. The RED-JUNGLE FOWL (*Gallus gallus*), which ranges in the wild state throughout southeastern Oriental regions from sea level to altitudes of 5,000 feet, is a member of the Pheasant family and is thought to be the ancestor of all domestic poultry. The Red-jungle Fowl has been associated with man at least as long as has the Dog. Asiatic records of it go back more than 3,000 years and the Greeks and Romans knew of it. The Peacocks of Asia and Africa comprise the last group of the family Phasianidae; those of Asia rival the glittering and jewel-like quality of oriental treasure troves. Because they take easily to domestication and are so beautiful, almost every zoo has them on display. Each male generally has a harem of 2 to 5 females. Only males have the spreading tail. The INDIAN or BLUE PEA FOWL (*Pavo cristatus*), found in India and Ceylon, is most commonly seen in captivity and we have a thriving flock that wanders freely about the zoo. The lovely White Peafowl is an albinistic form of the same species. The GREEN PEA FOWL (*P. muticus*) is much rarer in captivity and natively ranges from Burma to Siam to Java. Deep in central Africa lives the CONGO PEACOCK (*Afropavo congensis*), only discovered in 1936 and extremely rare in captivity. It is the only African Pheasant.

FAMILY NUMIDIDAE: GUINEAFOWL

The widely distributed Guineafowl which has become an important domesticated bird throughout the civilized world is descended from the COMMON GUINEAFOWL (*Numida meleagris*) of western Africa, one of 7 known species of a family restricted to Africa and Madagascar. These birds generally occur in flat, bushy grasslands and open fields. Guineafowl are related to Pheasants and other fowl-like birds, except that in the Guineafowl the sexes are marked almost alike. The most aberrant species is the LONG-TAILED or VULTURINE GUINEAFOWL (*Acryllium vulturinum*) of eastern Africa, in which the head is shaped like that of a small Vulture. It is the most handsome of the Guineafowl. Related forms which have been exhibited in the Zoological Park are the rare CRESTED GUINEAFOWL (*Guttera plumifera*) and the HELMETED GUINEAFOWL (*Numida mitrata*). Guineafowl feed on vegetable matter such as seeds, berries, and tender shoots, and on invertebrates and other small animals.

FAMILY MELEAGRIDIDAE: TURKEYS

The wild COMMON TURKEY (*Meleagris gallopavo*) of North America and the tableland of Mexico and the OCELLATED TURKEY (*Agriocharis ocellata*) of the Yucatan Peninsula and adjacent Guatemala and British Honduras are the sole representatives of this family. Both are so similar to Pheasants that it is probable they are descendents of Pheasant stock. The Common Turkey is the most spectacular, largest, and a valuable native American game bird. It has been domesticated and distributed throughout the world. They have now been extirpated on a large part of their former range. The Ocellated Turkey is a bird of exceptional beauty. This magnificent species is remarkably delicate in captivity and may be seen in only a few zoos. Through artificial insemination the number in captivity has been greatly increased. It is a smaller bird than the Common Turkey.

FAMILY MEGAPODIIDAE: MEGAPODES

Birds in this family are given many names. Brush-turkeys, Scrub-fowls, Mallee-fowl, Mound-builders, Thermometer Birds, Incubator Birds, or Megapodes, as they are variously called, are large-footed gallinaceous birds that occur in Australia, New Guinea, Malaya, and the islands of Micronesia east to Samoa and north to the Philippines. Megapodes are the only known birds and, indeed, the only vertebrates above the level of reptiles that exclusively utilize heat other than that of the parents' bodies for the incubation of their eggs. Thus, like the young of Turtles, Alligators, Crocodiles, and Snakes, their young are hatched by natural heat beneath earth, sand, forest litter and volcanic ash, where a temperature of about 92° to 95° F is maintained. Of all the strange birds that were encountered by the armed forces during World War II, none was more interesting than the SCRUB TURKEY (*Megapodius freycinet*). Widespread in many Pacific jungles, its peculiar mounds provided the only dry spots to stand on and in New Guinea, at least, nearly every bivouac area was ringed with their nests. The nesting of this species is particularly interesting as the necessary warmth

for incubation is generated by decomposing vegetation. The nest mounds built by the parents sometimes reach a height of 15 feet, and one nearly 50 feet in diameter was reported from Australia. Each pair of Scrub-fowl remains for many months attending the mound, which must be aerated and have its temperature regulated. The period of incubation lasts up to 63 days. Another interesting member of the Turkey-like Megapodes is the MALEO (*Megacephalum maleo*) of the Celebes and Sanghir Islands. This species is famous for the migrations it makes between its normal habitat and very special areas in which it builds its incubators. At breeding times the Maleos swarm out of the hill forest to the relatively few areas of beaches and the pairs dig holes 45 feet in diameter, each hole serving as a communal incubator, with many females joining to lay the eggs, one to 2 feet down in the same excavation. The Maleo also lays its eggs in soil heated by volcanic action and some nests have been heated by volcanic steam. At hatching the young of this species are perhaps the most highly developed of all birds. Members of this family are rarely seen in captivity.

FAMILY CRACIDAE: CURASSOWS, GUANS, AND CHACHALACAS

Distributed widely through the wooded grasslands and jungles of the New World, from the southern borders of the United States to Argentina, are some 38 species of game birds closely related to other Galliformes and known collectively as Curassows. Curassows breed in captivity. In forests unspoiled by man they sometimes abound in incredible numbers. The GREAT CURASSOW (*Crax rubra*), found from Mexico to Ecuador, is the largest species, the male being more than 3 feet long. Several species of Curassows have crests of feathers on the head which appear to be curls of wax. The HELMETED CURASSOW (*Pauxi pauxi*) of the Andes, from Venezuela to Peru, has on the forehead a large upward-projecting casque that resembles a partially shrivelled fig or cashew nut. Unusual head ornaments appear often on these birds. The Guans are generally smaller and more arboreal than the Curassows. One of the most wide ranging is the CRESTED GUAN (*Penelope purpurascens*), distributed from Mexico to Argentina. The largest group in the family is the Chachalacas. The NORTHERN CHACHALACA (*Ortalis vetula*), which reaches 2 feet in length, is fairly typical. The name is derived from the loud staccato call which can be heard for great distances throughout the jungle. Often several Chachalacas will call together, one out-shouting the other, resulting in a scramble of sounds. The members of the Cracidae build nests of sticks, vines, and leaves in bushes and trees, and generally place them close to the ground. Like the young of all the Galliformes or Chicken-like birds, young Cracidae are covered with down and extremely precocial.

FAMILY OPISTHOCOMIDAE: HOATZIN

The HOATZIN (*Opisthocomus hoazin*) of the hot river valleys of northern South America is one of the most interesting and remarkable of all birds. Two characters serve to distinguish the Hoatzins. First, the young are hatched nearly naked but with functional claws on the second and third digits of the forelimb. The quadrupedal nature of the young bird disappears

after a few days and the wings thereafter develop as wings and the legs as legs. During the period of immaturity the young Hoatzin gets about remarkably well as a quadruped. If in water, the nestling swims and even dives easily and then crawls out, using the bill, legs, and foreclaws in returning to its nest. A second character, totally different from that of any known bird, is the enormous size of the crop. This organ, for food storage, extends over most of the upper third of the body. It penetrates deeply into a huge pocket of the chest made possible by its structural and muscular modifications. In this crop Hoatzins apparently store the tender tree leaves and shoots on which they feed. Another strange feature is that it has eyelashes. The adult has a disagreeable odor which has earned it the name of "Stinking Pheasant." This remarkable bird is extremely rare in captivity and rarely has been seen alive outside South America.

ORDER GRUIFORMES: CRANES AND ALLIES

The members of this order range, in size, from the large Cranes to the tiny Hemipodes, hardly larger than the smallest Quail.

FAMILY MESOENATIDAE: MESITES, ROATELOS, AND MONIAS

The 3 species comprising this small family live on Madagascar and rank high among the many odd forms of life found on this remote island. For one thing, they have functional wings, but do not fly. These 3 species are all Thrush size. BENSCH'S RAIL (*Monias benschi*) lives on the ground in sandy, brushy areas. It feeds on fruit and insects. The open nest is placed in a thick bush that the bird can ascend by walking or hopping. What evidence we have indicates that the male does most or all of the incubating.

FAMILY TURNICIDAE: BUTTON QUAILS

The 13 species of this family are found in the temperate and tropical portions of the Old World. Although related to the Cranes and the Bustards and differing from the true Quails in many ways, these secretive, elusive birds live in brushy grasslands and act very much like miniature Quails. The male incubates the eggs and tends the young while the female, being polyandrous, customarily breeds with several males each season. The STRIPED BUTTON QUAIL (*Turnix sylvatica*) is a very wide-ranging species and is the only representative of this family that occurs in Europe. In every species the female is larger and more brilliantly colored than the male. The PLAINS WANDERER or COLLARED HEMIPODE (*Pedionomus torquatus*) of arid parts of Australia is shaped like a small Quail and has orange-yellow legs. The female is about 5 inches long, an inch or more longer than the male. The Plains Wanderer rarely flies, preferring to hide by squatting in the grass. The chief foods are seeds and insects.

FAMILY GRUIDAE: CRANES

Cranes are tall, stately birds occurring throughout the tropical and temperate regions of the world with the exception of large areas of Oceania and South America. Despite this wide range, only 14 species are known and some are on the verge of extinction. A striking species of this family

is the WHOOPING CRANE (*Grus americana*) of North America, the more spectacular of the 2 species found in the New World. The tallest of American birds, it stands nearly 5 feet in height and has a wing span of 7½ feet. The bill is long and powerful and serves as a sharp hammer for killing Snakes, small Alligators, Frogs, and many other animals. The Whooping Crane is named for its whooping call. Relatively common in the early days in this country, by 1923 Whooping Cranes were thought to be extinct but year after year a few birds continued to appear. In 1959, 39 were known to be living, including 6 in captivity, which is a slight increase over counts of recent years. Three of these birds were reared in captivity. Wintering on the Aransas Refuge in southern Texas, these magnificent birds summer in the Arctic and migrate through the midwestern United States. The SANDHILL CRANE (*G. mexicanus*), the other American species, though greatly reduced in numbers, still nests from Michigan to eastern Oregon and into Canada. Some of the other members of this family are the SARUS CRANE (*G. antigone*) of Indo-Malaya and the Philippines; the NATIVE COMPANION or BROLGA CRANE (*G. rubicunda*) of New Guinea and Australia; the ASIATIC WHITE CRANE (*G. leucogeranus*) of eastern Asia, which has lived over 52 years in captivity; the WATTLED CRANE (*Bugeranus carunculatus*) of Africa; the DEMOISELLE CRANE (*Anthropoides virgo*) of Eurasia and Africa; the STANLEY CRANE (*A. paradisea*) of southern Africa; and the CROWNED CRANE (*Balearica pavonina*) of Africa. Many of these are well-known zoo birds and do well and breed in captivity. For the most part, Cranes are dry-land birds although they may sometimes invade marshy meadows. Their food consists largely of Mice, Frogs, insects, roots, and seeds. Cranes normally lay only 2 eggs and rear only one brood per year. Both sexes participate in incubation, which is about 32 days.

FAMILY ARAMIDAE: LIMPKINS

The Heron-sized LIMPKIN (*Aramus guarana*) of tropical America is the lone survivor of an ancient line of long-legged birds which are related to both the Cranes and the Rails. Limpkins, of which there is a single species with 5 races ranging from Argentina to the Caribbean Islands and the southern United States, are large-headed birds which reach a length of 26 inches. Limpkins usually hunt alone but sometimes go out in small groups, feeding on fresh-water Snails and Mussels and other foods such as small reptiles, Frogs, and invertebrates.

FAMILY PSOPHIIDAE: TRUMPETERS

Trumpeters, of which there are 3 species in a single genus, live in the humid, tropical jungles of South America. Most are Pheasant-sized, generally dark-colored birds, restricted to the forests, where they travel in tight flocks of 6 to about 20. They are highly gregarious, eating, sleeping, and dancing in groups. Specimens seen in captivity are usually tame. The GREEN-WINGED TRUMPETER (*Psophia viridis*) of Brazil is sometimes seen in our collection. It is the largest of the 3 species. Trumpeters do well in zoos, and in South America the young are captured and raised with domestic fowl, where they perform well as watchdogs and become affectionate pets.

FAMILY RALLIDAE: RAILS, GALLINULES, AND COOTS

The Rails are mostly small, furtive birds living usually in swampy regions. Their secretive habits may account for their success as a group. In any case, well over 300 forms are known. Most Rails are birds of weak flight, some being entirely without the power to fly. Of our native North American species, we generally exhibit the small VIRGINIA RAIL (*Raillula limicola*). The Gallinules are mostly birds of brilliant color and are very inquisitive. Gallinules, like Rails, are highly migratory. In 1949 the giant, flightless TAKAHE (*Notornis hochstetteri*) of New Zealand was found after not having been seen for a half a century. In 1958 it was estimated that 30 to 35 birds comprised the total population. One of the best known Gallinules is the MOOR-HEN (*Gallinula chloropus*) known in North America as the FLORIDA GALLINULE. Coots are Rails that are as aquatic as Ducks. They dive even more abruptly, some species staying down and feeding as far as 25 feet below the surface. The AMERICAN COOT (*Fuliga americana*), which ranges from Alaska to South America, is well-known and widely distributed in this country.

FAMILY HELIORNITHIDAE: FIN-FEET OR SUN GREBES

This family consists of 3 birds living in widely separated regions of the world; one in South America, one in Africa, and one in Asia. Sun Grebes live in small tropical and sub-tropical fresh-water streams, usually surrounded by lush vegetation. These birds are usually found alone or in pairs and are very secretive. The smallest of them is the 12-inch AMERICAN FIN-FOOT (*Heliornis fulica*) which ranges from Mexico through South America. It is quite rare and probably never strays away from sluggish, heavily wooded streams.

FAMILY RHYNOCHETIDAE: KAGU

Only a single species, the KAGU (*Rhinocetus jubatus*), of this family is known. This Rail-like relic is on the verge of extinction and is found only on the island of New Caledonia. It is chiefly nocturnal, sleeping by day in rocky niches and under the roots of trees. Its most interesting characteristic is the long, spreading, erectile crest which is used in the bird's quite startling display. It is rare in captivity.

FAMILY EURYPYGIDAE: SUN BITTERN

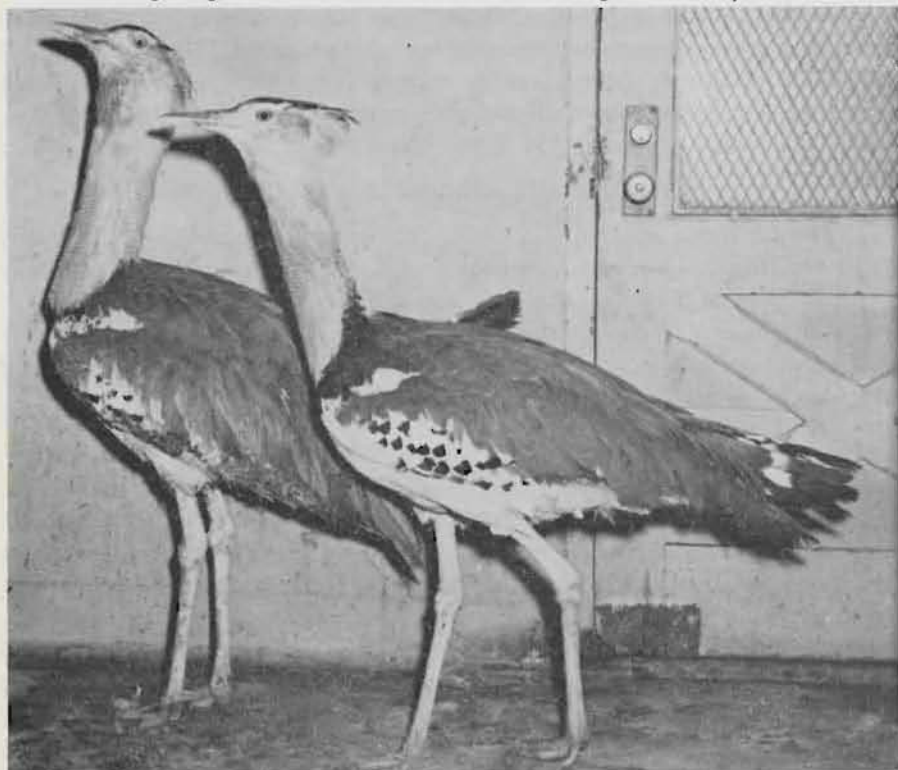
Another relic Crane-like bird is the SUN BITTERN (*Eurypyga helias*) of the New World tropics from Guatemala to southern Brazil. The name Sun Bittern is derived from the sun-like display of its wings and tail. Like the Kagu, it is the last survivor of its family. Sun Bitterns inhabit the floor of the dense tropical forest and swamps and are secretive, occurring singularly or in pairs and feeding on insects and small fishes. It is a rare and beautiful sight when it displays its golden brown wing and tail plumage next to a tropical stream. This display is often maintained rigidly for a minute or more. Although normally quite shy, some Bitterns become quickly acclimated to captivity and can be bred in zoos.

FAMILY CARIAMIDAE: CARIAMAS OR SERIEMAS

In South America there occur 2 species forming a family of large Crane-like land birds, the Cariamas, which somewhat resemble the Secretary Bird of Africa. The 2 surviving species, while closely related, are generically distinct. One, the CRESTED CARIAMA (*Cariama cristata*), is found in pampas and grasslands, and the other, the BURMEISTER'S CARIAMA (*Chunga burmeisteri*), is found in forests and wooded savannas. Both are restricted to the southern half of South America. The Cariama soon becomes attached to man and breeds readily in captivity. The food of these birds consists of Snails, worms, insects and reptiles of many sorts, including Snakes.

FAMILY OTIDIDAE: BUSTARDS

Chiefly centered in Africa, the Bustards, of which there are 23 species, also occur in Europe and Asia, with one species in Australia. All live in grassy savannas and semi-deserts. Bustards never perch in trees. The GREAT BUSTARD (*Otis tarda*) is one of the largest and heaviest flying birds in the world. It reaches a weight of about 30 pounds, a length of about 45 inches and stands nearly 4 feet tall. This species ranges from Poland and Greece to Siberia, China, and Japan, and winters in India, Persia, and northern Africa. Unfortunately, this great bird has long been hunted for its flesh and in many regions it has now been extirpated. The Great Bustards perform a bizarre group courtship dance with males hissing and barking and inflating huge air sacs. The Cleveland Zoological Society East African



KORI BUSTARD—*Ardeotis kori*

Expedition of 1955 brought to our zoo 3 magnificent KORI BUSTARDS (*Ardeotis kori*), which are popular game birds in Africa.

ORDER CHARADRIIFORMES: SHORE BIRDS, GULLS, AND ALLIES

The Shore Birds are a rather mixed group including, besides the Plovers and Sandpipers, such birds as Seed-snipes, Gulls, and Terns. Most of these birds are found near water.

FAMILY JACANIDAE: LILY TROTTERS OR JACANAS

Seven species comprise this well-marked family of Plover-sized, remarkable birds. They occur in warm, fresh-water marshes of most continents and many islands. A chief distinction is their nails that sometimes reach 4 inches in length, enabling them to walk easily over large areas of floating vegetation. The AMERICAN JACANA (*Jacana spinosa*) ranges from south Texas to Argentina. It performs a kind of dance with wings speard or held aloft, as do most members of this family. Jacanas feed on soft vegetable matter and small invertebrates. The largest of the 7 species is the PHEASANT-TAILED JACANA (*Hydrophasianus chirurgus*) of the Indo-Malayan regions, including Ceylon, the Philippines, and Java.

FAMILY ROSTRATULIDAE: PAINTED SNIPES

Painted Snipes are named for their bright color. Two species are known, one found in southern South America; the other in Africa, Madagascar, the Indo-Malaysian regions, and the Australian region. The AMERICAN PAINTED SNIPE (*Nycticryphes semi-collaris*) appears sluggish by day, but is active at twilight and probably at night. As in only a few other birds, the female Painted Snipe is more colorful, larger than its mate, and takes the initiative in courtship.

FAMILY HAEMATOPODIDAE: OYSTERCATCHERS

Oystercatchers are spectacular Shore Birds occurring along most of the



EUROPEAN OYSTERCATCHER—*Haematopus ostralegus*

warmer coasts of the world. This family consists of 6 species ranging in length from about 16 to 21 inches. Their most distinctive feature is a knife-like bill with a chisel-like tip. The bill is about two and one-half times as long as the head. Its chief function is to spear Mussels, Clams, and Oysters, but it is also used in catching and killing Crabs, Marine Worms and an occasional Cuttlefish. The EUROPEAN OYSTERCATCHER (*Haematopus ostralegus*) has long been studied because of its unusual breeding behavior. The males compete vigorously for the females by dancing instead of fighting. Some wild Oystercatchers have lived to the age of 27 years.

FAMILY CHARADRIIDAE: PLOVERS, TURNSTONES, AND SURF BIRDS

The Plovers, Turnstones, and Surf Birds range from small to medium size and are found throughout the world. The majority are shore-living but many Plovers frequent the uplands. A common North American representative of this family is the KILLDEER (*Charadrius vociferus*) which breeds widely in meadows, pastures, and similar locations. Like other members of the family, the Killdeer is extremely noisy, calling its alarm note at the least sign of danger. A habit of Plovers in general, and this bird in particular, is falling, seemingly crippled, to entice an intruder away from nest or young, and then flying off as soon as the threat is gone. The best known and most widespread Plovers are the 2 species of Golden Plover, which breed in the Arctic around the world and winter in the tropics, often far south of the equator. In migration these birds make long over-water passages and trans-equatorial flights. The AMERICAN GOLDEN PLOVER (*Pluvialis dominicus*) winters south to Patagonia. The most widespread species of Plover is the very striking EUROPEAN LAPWING (*Vanellus vanellus*) of Eurasia. Its eggs have been gathered for market for generations without seeming to diminish the number of this species.

FAMILY SCOLOPACIDAE: SANDPIPERS, SNIPES, AND WOODCOCKS

The Sandpipers are mostly modestly colored birds of generally small size, frequenting sandy beaches or exposed mud flats. Almost all of these birds breed in cold northern regions and winter far to the south. The AMERICAN WOODCOCK (*Philohela minor*) is a popular game bird of North America. All Woodcocks are equipped with long, sensitive bills that are flexible toward the outer end. In probing the ground, the bill is inserted straight down like an awl and it has been shown that in this position the tip can be opened to grasp a worm. A variety of Shore Birds belong to this family. The smallest member is the LEAST SANDPIPER (*Erolia minutilla*), a 6-inch bird breeding in northern Canada and Alaska and wintering south to Brazil, Peru, and the Galapagos Islands. The greatest migration speed thus far recorded for a bird of this family is that of a LESSER YELLOWLEGS (*Totanus flavipes*) which traveled 1,900 miles in 6 days, at most, which is an average daily distance of more than 316 miles. This species breeds in Alaska and Canada and winters mainly in southern South America.

FAMILY PHALAROPODIDAE: PHALAROPES

Phalaropes are rather silent birds with long necks. The name Phalarope, meaning two-footed, alludes to the development of the feet, which are

somewhat like those of the much larger Coots and Grebes in that lobes and scalloped membranes extend from the toes. The Phalarope's extreme buoyancy in water and a characteristic, near vertical, position of the longish neck are primary marks of identification. In migrations large concentrations, sometimes of all 3 species of Phalaropes, collect far out in the equatorial waters of the Atlantic and Pacific. Their food consists of tiny marine animals obtained on or beneath the surface of the water. The RED PHALAROPE (*Phalaropus fulicarius*), known in Europe as the Gray Phalarope, is the northernmost breeder in the family. It nests in the Arctic around the world and winters off the coast of Chile and South America.

FAMILY RECURVIROSTRIDAE: AVOCETS AND STILTS

The 7 beautiful species of this nearly cosmopolitan group of long-legged Shore Birds have long and awl-like bills. The BLACK-NECKED STILT (*Himantopus himantopus*), ranging in America from the United States to Brazil, Peru, and the Galapagos Islands, is a pink-legged Shore Bird standing almost 16 inches tall on puny, long legs. Avocets have a bill that is curved or bent upward, and are among the most graceful of Shore Birds. The AMERICAN AVOCET (*Recurvirostra americana*) of North America breeds north to southern Canada and winters south to Guatemala, keeping west of the Mississippi River during migration.

FAMILY DROMADIDAE: CRAB PLOVER

The CRAB PLOVER (*Dromas ardeola*), the only representative of its family, nests in long tunnels in sandbanks bordering the northern and western shores of the Indian Ocean. It is highly gregarious while feeding. The Crab Plover walks, runs, and swims well. Its chief fare is Crabs but it also feeds on other marine life.

FAMILY BURHINIDAE: THICKNEES OR STONE CURLEWS

Thicknees are Shore Birds that resemble small Buzzards and, like them, have deserted the shore to live in dry savannas often hundreds of miles from the ocean. They are particularly fond of stony, semi-desert country and are sometimes called Stone Curlews or Stone Plovers. The 7 species range from one foot to some 20 inches in height. They are nocturnal and feed on insects, worms, mollusks and occasionally Lizards and small Rodents. The STONE CURLEW (*Burhinus oedicnemus*) of Europe ranges through Asia and North Africa and still breeds in populous England. Stone Plovers thrive in captivity and we have exhibited a number of species.

FAMILY GLAREOLIDAE: PRATINCOLES AND COURSERS

This is an unusual group of 16 species of Plover-like birds, ranging from small to medium in size. As they feed on the wing, some vaguely resemble giant Swallows. Others sleep by day and hunt at night like the Thicknees. The family centers in the warm parts of Africa and Asia but a few species have found their way to Europe and Australia. The CREAM-COLORED COURSER (*Cursorius cursor*) of Africa ranges occasionally to Europe and southwestern Asia. As is typical of this family, both sexes are similarly dressed. Typical of the group is the COLLARED PRATINCOLE

(*Glareola pratincola*), a Starling-sized bird. This Pratincole hunts with the deftness of the Swallow, especially in the early morning and late evening, over low-lying pastures near water. It is gregarious and highly migratory, ranging from the Mediterranean region and northern Africa to Asia and the Phillipines and thence south to the Malay Archipelago. One of the most interesting is the CROCODILE BIRD (*Pluvianus aegyptius*) of southwestern Asia, the Mediterranean region, and much of Africa. Since ancient times it has been questionably credited with entering the mouths of Crocodiles to feed on Leeches.

FAMILY THINOCORIDAE: SEED SNIPE

The Seed Snipes are short-legged relatives of the Shore Birds, looking somewhat like a cross between a Plover and a small Quail. The family is confined to South America and consists of 4 species of plump birds with pointed wings, short bills, and four-toed feet. The PATAGONIAN SEED SNIPE (*Thinocorus rumicivorus*) buries its grayish eggs in dry earth when it leaves the nest. The length of incubation and the role played by the sexes in rearing the young remain unknown.

FAMILY CHIONIDIDAE: SHEATH-BILLS

This family consists of 2 species of Pigeon-sized birds living in bleak islands in the cold, southern oceans, and along the perimeter of the Antarctic Continent, rarely visited by man. Having affinities with the Plovers and the Gulls, they have peculiar growths on the forepart of the head. The name Sheath-bill is derived from a horny, saddle-like casing that covers the base of the bill and partially conceals the nostrils. Little is known of their life history. The WHITE SHEATH-BILL (*Chionia alba*) is snowy white, and is about 15 inches in height. It breeds on the islands of South Georgia, in the South Orkneys, and probably on small islands off the tip of South America.

FAMILY STERCORARIIDAE: SKUAS AND JAEGER

The Skuas and Jaegers are Gull-sized birds of prey inhabiting the seas and seacoasts of the world. They are rapacious and some are much more pugnacious and courageous than even the most daring Falcon. All Skuas and Jaegers breed colonially on isolated islands and tundra-covered wastelands of the far north and the far south. The GREAT SKUA (*Catharacta skua*), breeding in Arctic and Antarctic regions, is nearly 2 feet long. This bipolar breeding distribution is unique among birds. Despite its clumsy appearance it can fly with great speed and obtains much of its food by chasing Gulls and forcing them to disgorge their catch in the air. The Jaegers are smaller and more Falcon-like. They are predacious, robbing Gulls and Boobies of their prey. The PARASITIC JAEGER (*Stercorarius parasiticus*) breeds on islands and coasts of the Arctic Ocean and surrounding area. It winters from the southern United States to the Antarctic Ocean. In fall it is the Jaeger most often seen along our coasts and inland waters, where it is at all times rare.

FAMILY LARIDAE: GULLS AND TERNS

Gulls and Terns are graceful, long-winged seabirds that are nearly world-wide in distribution. The Gulls are heavier and larger than the Terns

and differ from them in having the bill hooked, not pointed. Gulls, comprising 43 species, are found chiefly along the oceanic coasts of the world. They are highly gregarious, scavengers of the sea and coastal rivers. The HERRING GULL (*Larus argentatus*) is the most abundant and best known of all Gulls along the shores of Asia, western Europe, and North America. It is this species that abounds along the New England coast and trails Great Lakes steamers. One lived 49 years in captivity. The BLACK-BACKED GULL (*L. marinus*), a much larger and darker bird, may sometimes be seen associating with it. Gulls are particularly well suited to life in captivity as they are omnivorous. The Terns are more essentially marine than the Gulls and are comparatively longer of wing, giving them greater and more graceful powers of flight. Of the 39 species scattered over most of the waters of the



INCA TERN—*Larosterna inca*

world, one of the most beautiful is the INCA TERN (*Larosterna inca*) of the west coast of South America. The ARCTIC TERN (*Sterna paradisaea*) spends more time in daylight than any other living creature. It breeds during the Arctic summer when the continued daylight of the Arctic prevails, and visits the Antarctic during the long days and the continued daylight of the Antarctic mid-summer. Its migration is one of the most remarkable and longest of any birds. It is estimated that these birds travel at least 25,000 miles each year in migration. The FAIRY TERN (*Gygis alba*) of the warm Atlantic, Pacific, and Indian Oceans, is pure white. This curious little bird nests on tiny oceanic islands and has developed the extraordinary habit of laying a single, pure white egg on a small crotch of a tree limb, well above the ground. All other Terns nest on the ground.

FAMILY RYNCHOPIDAE: SKIMMERS

Skimmers are relatives of Gulls and Terns and are named for their unique feeding habits. In hunting for food, the Skimmer progresses with part of its bill plowing the water and when the bill strikes a fish or Shrimp the Skimmer's head is snapped downward so that it is sometimes immersed up to the eyes, the short mandible at the same time clapping shut on the

prey. The bill is then raised and the meal swallowed in flight. Skimmers occur in the vicinity of seas, rivers, and lowland lakes throughout most of the warmer parts of the world. The AMERICAN BLACK SKIMMER (*Rynchops nigra*), breeding from New Jersey to Argentina and about 19 inches long, has nocturnal feeding habits, as do other Skimmers. This habit is correlated with the nocturnal activity of sea life.

FAMILY ALCIDAE: AUKS, MURRES, GUILLEMOTS, DOVEKIES, AND PUFFINS

There are 22 species of Alcids, most of them inhabitants of the colder regions of the Northern Hemisphere. Several species are important sources of food. Many look like tiny Penguins and some perform highly organized dances. In the Northern Hemisphere these birds are the ecological counterparts of the Penguins, although they are not closely related. Alcids feed chiefly on small fish, crustaceans and the minute marine organisms called plankton. The bulk of the species breed on oceanic cliffs or on the tops of oceanic islands. Most are highly migratory seabirds and go ashore only to breed. The COMMON MURRE (*Uria aalge*) of the North Atlantic is killed in large numbers for food in the Newfoundland area. Perhaps the best known of all Alcids is the ATLANTIC PUFFIN (*Fratercula arctica*), found in the North Atlantic. Standing some 10 inches tall, this bird has an unusually shaped bill that, like the feet and legs, is largely red. Huge colonies of Puffins are known, one such colony in Newfoundland being estimated to contain 50,000 breeding birds in 1944.

ORDER COLUMBIFORMES: SANDGROUSE, PIGEONS, AND DOVES

Two families only are represented among the living members of this large group. Pigeons and Doves are well-known to everyone, while Sandgrouse are unfamiliar to most persons and are rather rare in zoological gardens.

FAMILY PTEROCLIDAE: SANDGROUSE

Sandgrouse resemble Grouse in their coloration and choice of habitat, but are an offshoot of the stock that produced Pigeons. There are 16 known species found in central and southern Eurasia and Africa. They fly relatively little, groups remaining on the ground all day to feed on seeds and vegetable shoots unless scared into taking flight. With great regularity they take wing at dusk and again in the early morning, when they fly to and from special watering holes. Sandgrouse nest in sand, making a slight depression and lining it with a few strands of grass. Two to 3 eggs are laid and the incubation period is 22 to 28 days. They feed the young by regurgitation. Sandgrouse are pugnacious among themselves and are monogamous. Three species of Sandgrouse were received at the Cleveland Zoo as a result of the East African Expedition of 1958: the BLACK-FACED SANDGROUSE (*Eremialector decoratus*), LICHTENSTEIN'S SANDGROUSE (*E. lichtensteini*), and the CHESTNUT-BELLIED SANDGROUSE (*Pterocles exustus*). Lichtenstein's Sandgrouse had never been exhibited in captivity before.

FAMILY COLUMBIDAE: PIGEONS AND DOVES

There is no scientific distinction between Doves and Pigeons, a group of birds ranging throughout the nonpolar land areas of the world. More than half of the world's 289 species of Pigeons are found in the Indo-Malayan and Australian regions. Pigeons are monogamous and proverbially attentive to their mates. The nest is usually a very frail structure and the clutch is usually very small, in most species being 2 eggs. The young are fed by regurgitation, as are the Sandgrouse. In some birds, including Pigeons, a milk-like secretion from the crop is fed to the young for some days after hatching. The largest sub-family, the Fruit Pigeons, is confined to the tropics of the Old World. All of these feed exclusively on berries and other fruit and most of them are very colorful. Fruit Pigeons are less gregarious than other Pigeons and often go about in pairs or small flocks. The widest-ranging member is the SUPERB FRUIT PIGEON (*Ptilinopus superbus*) found from Tasmania to New Guinea and the islands of Indonesia.

The sub-family Columbinae contains an assortment of highly gregarious species. The ROCK DOVE (*Columba livia*), which extends in various wild forms from the British Isles across Asia and into northern Africa, is well-known as the supposed ancestor of our domestic Pigeons. The MOURNING DOVE (*Zenaidura macroura*) of North America and Mexico is one of our most popular game birds and known throughout the country. It is the most wide-spread species of the family in North America today and is frequently seen within the zoo grounds. Our collection of Pigeons was greatly increased as a result of the Cleveland Zoo Expedition to East Africa in 1958 from which we received the very beautiful NAMAQUA DOVE (*Oena capensis*),



BLUE-CROWNED PIGEONS AND SQUAB—*Goura cristata*

a small and delightful bird of the open country; the TAMBOURINE DOVE (*Tympanistria tympanistria*); the SPECKLED PIGEON (*Columba guinea*); and several species of African RING-NECKED DOVES rarely seen in captivity in this country. One of the most highly adorned Pigeons is the bizarre NICOBAR PIGEON (*Caloenas nicobarica*) which reaches 16 inches in length and has long, iridescent, dark green feathers ringing the neck and forming a giant mane. Its home is on the small islands of the East Indies and east to the Solomons. The largest surviving Pigeons are the GOURA or CROWNED PIGEONS of New Guinea. We have several times hatched and reared the BLUE-CROWNED PIGEON (*Goura cristata*).

ORDER PSITTACIFORMES: PARROTS AND ALLIES
FAMILY PSITTACIDAE

The Parrots, Macaws, Parakeets, and Lories constitute one of the best-known bird families. All members are commonly known as Parrots. Whether large or small, crested or plain, gaudy or dull in plumage, they are all recognized on sight as being Parrots. Parrots are the best "talkers" in the animal kingdom, although in this respect there is much variation from species to species. Unlike mammalian pets, Parrots often live more than a half century, and some have lived for 80 years. A large number of them have been bred in captivity. Some 315 species comprise the family, which is found throughout the warmer regions of the world. Most species nest in holes in trees, although a few build huge nests of sticks and some nest in burrows and Termite nests. Almost all lay white eggs. The young of all Parrots are helpless when hatched, have their eyes closed, and are mostly naked. Some are covered with down. Parrots are generally divided into 2 major groups, those with blunt tongues and those with brush-fringed tongues. The former feed chiefly on nuts and buds, the latter on fruit and nectar.



SULPHUR-CRESTED COCKATOO—*Cacatua galerita*

Like Pigeons, many species of Parrots feed the young on partially digested food drawn from the crop. The smallest are the size of Warblers and the largest is actually longer than the greatest Eagle. In Australia, where Parrots and Parakeets are more numerous than anywhere else in the world, their destructiveness is a serious problem. The Cockatoos differ from most other birds in having the crest erectile and usually greatly elongated. The largest species, the BLACK COCKATOO (*Calyptorhynchus magnificus*), is quite unusual. The reddish hue of its naked cheeks varies with the emotional condition of the bird; in other words, it may be said to blush. This giant-billed bird of the New Guinea region, unlike the usually gregarious White Cockatoos, usually occurs alone or in pairs. It is capable of breaking open seeds that a man would have to crack open with a hammer. Typical of the White Cockatoos is the SULPHUR-CRESTED COCKATOO (*Cacatua galerita*) of the Australian region, which is pure white and has a large, erectile yellow crest. This bird abounds in flocks and is a favorite semi-wild pet, found in many native villages. Other Cockatoos are the WHITE-CRESTED COCKATOO (*C. alba*) of the Moluccas, the ROSE-CRESTED COCKATOO or GALAH (*C. roseicapilla*), and the PINK COCKATOO (*C. leadbeateri*) of Australia. Among the most beautiful and affectionate of Parrots are the Lories and Lorikeets. All are brush-tongued birds that feed on nectar and on insects. These Parrots abound in the Australian region. Sometimes they flock in bands of thousands as, for example, does the RAINBOW LORIKEET (*Trichoglossus haematodus*). This species is probably the most typical and widespread of the Lorikeets, occurring throughout the islands of the Australian region and over much of the Malayan region. They have been bred, on several occasions, in our zoo. An oddity of the Parrot family is the famous KEA (*Nestor notabilis*). This bird has the unfortunate reputation of being a Sheep-killer; it is native to South Island in New Zealand. The Kea is the hardiest of Parrots and the only species of this almost purely tropical family that spends part of its life amid snow. One has lived 28 years, 7 months and 28 days in captivity. In recent years, Keas are reported to have developed such a taste for flesh that a few have learned to stand on the back of living Sheep and kill them by ripping through to the kidneys with their sharp, strong beaks. Tropical America is the domain of the Macaws, of which there are many species. The smaller species are generally green and protectively dressed to blend with the roof of the forest in which they dwell. The larger species are brightly colored. All have a heavy and deeply curved beak and a long-pointed tail. The best known are the SCARLET MACAW (*Ara macao*), ranging from Mexico to Amazonia; the BLUE AND YELLOW MACAW (*A. ararauna*), found from Panama to Paraguay; and the RED AND GREEN MACAW (*A. chloroptera*), found from Panama to northern South America. The HYACINTH MACAW (*Anodorhynchus hyacinthinus*) of central Brazil is the most beautiful of all. The CAROLINA PARAKEET (*Conuropsis carolinensis*), which until several decades ago was found in the United States, was related to a large group of smallish New World Parrots, all of which bear some resemblance to the Macaws. The Carolina Parakeet

was the northernmost of the world's Parrots. The last living wild specimen was observed in 1920 in Florida. Once highly abundant, it was hunted to extinction. The TOVI PARAKEET (*Brotogeris jugularis*), which ranges from Mexico to Colombia, is the best known member of a group of small, green Parakeets widely kept as pets. The most accomplished talkers among the New World Parrots belong to the genus *Amazona* of which there are many species in Central and South America. Two examples are the WHITE-FRONTED PARROT or SPECTACLED AMAZON (*Amazona albifrons*) of Central America and the YELLOW-HEADED PARROT (*A. ochrocephala*) of northern South America, one of the largest of the Amazons, reaching a length of 15 inches. This species is sometimes known as the DOUBLE YELLOW HEAD. The YELLOW-NAPED PARROT (*A. auropalliata*) is found from western Mexico to Honduras. In Africa and Madagascar there are several kinds of short-tailed Parrots that are rather like the Amazons in size and structure. One of these, the AFRICAN GRAY PARROT (*Psittacus erithacus*), is conceded to be the finest talking bird in the world. The males make better mimics than the females. In the wild, the African Gray travels in flocks, feeds on nuts and other fruits, and lays 2 to 4 eggs in tree cavities. It is this species that is reputed to have lived in captivity for 80 years. The AFRICAN BROWN PARROT (*Poicephalus meyeri*) is a beautiful, smaller Parrot of Africa. The so-called Lovebirds and their relatives are confined to the Old World. Perhaps the most remarkable is the large RED-SIDED ECLECTUS (*Lariulus roratus*) of the New Guinea region, in which the sexes so differ in color that for a long while ornithologists considered the essentially lettuce-green male and the predominantly red female to be separate species. Parakeets abound in the African, Indian, and Malaysian regions, where they often feed en masse on fields of ripening grain. All are highly gregarious small birds with long-pointed tails. Some are very beautiful, such as the small, greenish BLOSSOM-HEADED PARAKEET (*Psittacula cyanocephala*) of the drier parts of India and Ceylon. The best known member of this group is possibly the INDIAN RING-NECKED PARAKEET (*P. krameri manirensis*). One of the finest members of this genus is the rare DERBIAN PARAKEET (*P. derbyana*), found only in the mountains of western China. The Lovebirds, most numerous in Africa and Madagascar, are very small and usually the sexes are similar in plumage. One, the ROSY-FACED or PEACH-FACED LOVEBIRD (*Agapornis roseicollis*) of southern Africa, has an astonishing habit; it inserts long stems of grass and woody fibers under the feathers of its rump, and flies with them to its nest. Lovebirds in captivity frequently decorate themselves with long strips of paper torn from the bottom of the cage, inserting them under their feathers. The Broadtails and Grass Parakeets consist of smaller, specialized, long-tailed, chiefly Australian Parrots which generally feed on or near the ground in grasslands. One species is the famous "Budgie" or "Parakeet," or BUDGERIGAR (*Melopsittacus undulatus*), which is the most frequently kept Parrot. By means of selective breeding, a great number of color varieties have become well established. The ROSELLA PARAKEET (*Platycercus eximius*) of southeastern Australia is hardy in captivity.

ORDER COLIIFORMES: MOUSEBIRDS OR COLIES

FAMILY COLIIDAE

These birds are very destructive to orchards and in many parts of Africa are treated as pests. The 6 species have no known close relatives and are structurally so different from other birds that they are put in an order by themselves and have drifted from place to place in classification tables. Judging chiefly from behavior, however, there are grounds for believing that they may be an off-shoot of the stock that produced Parrots.

Mousebirds have relatively small, rounded wings that move rapidly in flight. In passing from tree to tree or bush, they go from near the top of one to near the bottom of the next, then climb methodically upward again, feeding on berries and other fruit. These birds are unique in their locomotion; in walking about they shuffle along on the backs of their legs, using them like feet. Mousebirds have the unusual habit of clinging to the sides of limbs, like little pendulums, with the tail hanging almost straight down. Six or more often hang thus together by day, and always at night, this being the normal sleeping position. Colies occur in all the warmer parts of Africa south of the Sahara. The RED-FACED COLY (*Colius indicus*) of southern Africa has bred in our Zoological Park. We also show the WHITE-CHEEKED COLY (*C. striatus*).

ORDER CUCULIFORMES: TURACOS, CUCKOOS, ANIS, ROADRUNNERS, AND ALLIES

A confusing assortment of oddly-behaving birds are grouped together in this order. These birds are bound together by the arrangement of the toes, the first and fourth of each foot being directed backwards. This and other technical characters relate the members of 2 families which at first glance do not appear to be closely related.

FAMILY MUSOPHAGIDAE: TURACOS

The Turacos are the most prominent members of this order; they are active, Cuckoo-like birds of southeastern Africa, ranging in size from that of a small Crow to that of a Pheasant. The 19 known species are divided into 2 groups, those with red in the wings which live in forests and those without red which live in bushy grasslands. Turacos are renowned for their possession of unique pigment in their feathers. One of these pigments, turacin, is red and contains 5 to 8 per cent copper. Turacos are fascinating birds, little understood and of obscure relationships. They are sometimes referred to as Plantain-eaters. In the gallery forests of the Congo region is found the VIOLET PLANTAIN-EATER (*Musophaga rossae*) which reaches 20 inches in length. Another even larger species is the GREAT BLUE TURACO (*Corythaëola cristata*) which reaches a length of 2½ feet. Species which dwell in bushes and river forests bordering lowland grasslands are typified by the GRAY PLANTAIN-EATER (*Crinifer zonurus*), a 20-inch brown and white bird with a greenish-yellow bill. The GO-AWAY BIRD (*Corythaixoides leucogaster*), which is named after its call, is the same size. The deep blue HARTLAUB'S TURACO (*Tauraco hartlaubi*) has concealed areas of red under the wing that look like spurts of fire when the wing is beating. The young

of this family are fed by regurgitation.

FAMILY CUCULIDAE: CUCKOOS, ANIS, ROADRUNNERS, AND ALLIES

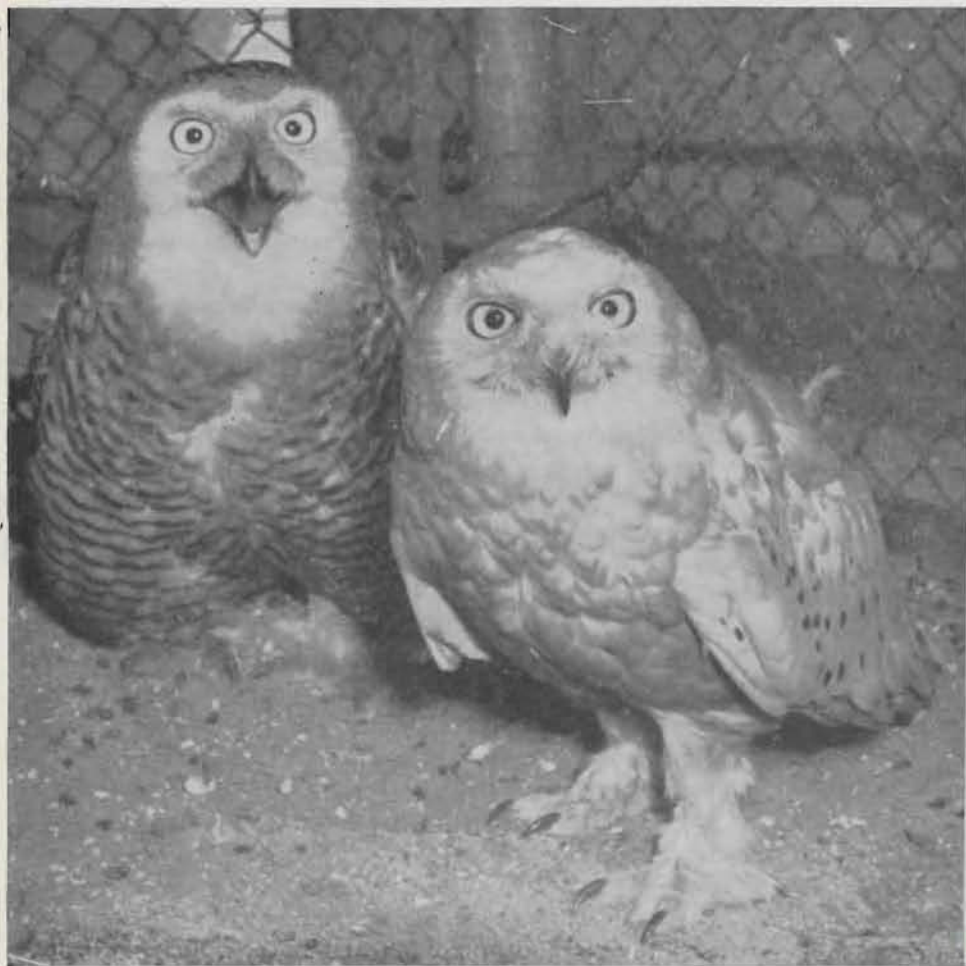
This highly varied family of 128 species is represented in all the warmer land areas of the world. The most primitive, the 37 species of true Cuckoos, are found in the Old World. All indulge in a highly specialized form of nesting behavior; they lay their eggs in the nests of other birds and allow the foster parents to rear their young. Cuckoos feed chiefly on insects, but some also devour Lizards, Frogs, Snakes, and even young birds. A few live largely on fruits. Many Cuckoos migrate long distances between their summer and winter homes to take advantage of seasonally shifting sources of insect food. The migratory abilities of some are highly developed, those of the BRONZED CUCKOO (*Chalcites lucidus*) of the South Pacific, for example, being little short of incredible. The Bronzed Cuckoo lays its eggs in the nests of tiny, non-migratory Flycatchers on the New Zealand Archipelago. The Cuckoos then fly to their winter homes, there to be joined about a month later by their young. To accomplish this reunion the young Cuckoos, without benefit of adult guides, fly about 1,200 miles over the ocean from New Zealand to Australia, then nearly another 1,000 miles northward to the areas occupied by their parents in the Solomon and Bismarck Islands. Since the adults long precede their young to these islands, there seems to be no explanation of this extraordinary feat by juveniles fresh from a foster nest, except to attribute it to instinct. The single egg that a Cuckoo usually deposits in a foster nest is a kind of "kiss of death" to the legitimate offspring, especially since the victim is almost always of a much smaller species. The young parasite, shortly after hatching, pushes the eggs or the legitimate offspring in the nest beside him over the nest rim to their destruction. He thus instinctively gains for himself all the food brought by the foster parents and survives despite what is often a great difference in size between himself and his foster parents. One group of Cuckoos called the Malcohas build their own nests and rear their own young, unlike the true Cuckoos. Some 20 species of both the New and the Old World, ranging from medium to large in size, fall into this category. Examples are the BLACK-BILLED CUCKOO (*Coccyzus erythrophthalmus*) and the YELLOW-BILLED CUCKOO (*C. americanus*), both of which breed in North America and winter in South America. A distinctive group of the Cuckoos are the Roadrunners or Ground Cuckoos of the southern United States, south to South America, and of the Malayan region. These birds are largely terrestrial and medium to large in size. All except 3 species of Roadrunners build their own nests. Ground Cuckoos generally run about rapidly and feed on a large variety of ground-dwelling animals, including Snakes, some of which they are adept at killing. The widely known ROADRUNNER (*Geococcyx californianus*) of western North America, a Snake-killer of note, is some 16 inches in length and has long, strong legs. Another group of Cuckoos are the Coucals, large birds of terrestrial habits, hunting chiefly on the ground for the insects and small creatures which form their food.

ORDER STRIGIFORMES: OWLS
FAMILY STRIGIDAE

The Owls are a group as distinctive as the Parrots. No member of either group could be mistaken for anything else. It is not true that Owls are unable to see by day, although in most species the vision is at its best during the twilight of evening or early morning. In distribution, the Owls are practically cosmopolitan, being found in most parts of the world. Of the 133 species some are as small as Sparrows and others as large as roosters. All are carnivorous, feeding on arthropods, crustaceans, fish, amphibians, small mammals and birds. Their ears are so highly developed that some, and probably many, species can carry out successful attacks on prey in total darkness. The plumage of Owls is almost invariably soft, enabling them to fly in almost complete silence. The majority of small and medium-size Owls nest in cavities in trees, in the ground or in rock niches, but some of the large Owls nest on tundra-covered ground in nests built of grass and feathers. Still others nest in grass swamps or in abandoned nests of Hawks or other birds. Female Owls, like female Hawks, are considerably larger than their mates. All species regurgitate pellets containing the bones, hair and other coarse portions of their prey. Owls engage in migrations of considerable length.

Among the most widespread of small Owls are the Pygmy Owls of the genus *Glaucidium*. The American FERRUGINOUS PYGMY OWL (*Glaucidium brasilianum*) is found from the southwestern United States to Panama. Another small species, the ELF OWL (*Micrathene whitneyi*), is found only in the southwestern United States and in Mexico. It lives in open woodlands and among cactus trees, nesting in a cavity. Scops Owls or Screech Owls, of which 36 species are known, are smallish birds with ear tufts and are found almost throughout the world. The familiar SCREECH OWL (*Otus asio*) of North America and Mexico occurs in 15 sub-species. Many races are highly dichromatic, one color phase being reddish and the other sooty to grayish. Two color phases are found in many other Owls and many of their relatives. Somewhat larger than the Screech Owls but without ear tufts and with longer legs is the BURROWING OWL (*Speotyto cunicularia*) which ranges from Florida and the western United States southward to the pampas of Argentina. It lives on open prairies and grassy savannas, where it nests in colonies, often in cavities drilled in earth by Prairie Dogs and Ground Squirrels. Up to 9 eggs are deposited in an enlarged grass-lined chamber at the end of a curved tunnel sometimes 10 feet in depth. The Fishing Owls are larger than average in size. They feed largely on fish and other denizens of the water, although birds and small mammals are taken as well. One of the handsomest and most interesting of all the Owls is the large AFRICAN FISHING OWL (*Scotopelia peli*) found in both east and west Africa. Well-known are the Great Horned Owls of which there are 11 species around the world. In this group is the largest of the European Owls, the EAGLE OWL (*Bubo bubo*), a bird that lives on the forest edge and in open scrub and hunts on overcast days and at dusk. One of these Owls lived not

less than 68 years. Very similar is the GREAT HORNED OWL (*Bubo virginianus*) of North America. These Owls indulge in maniacal, spine-chilling calls during the nights of the breeding season. They kill large Grouse, Squirrels, Skunks and Chickens, but the bulk of their food consists of Rodents as well as Rabbits. They nest very early in the year, often when the snow is on the ground. A bird of the true Arctic and sub-Arctic is the SNOWY OWL (*Nyctea scandiaca*). More than 2 feet long and one of the most spectacular of all birds, the Snowy Owl keeps to treeless regions, breeding on top of tundra hillocks, often when these are covered with snow and ice. It hunts mostly by day, often persuing birds with Hawk-like speed or gliding on silent wings to pounce on Ptarmigans, Ducks, Lemmings, Arctic Fox, and



SNOWY OWL—*Nyctea scandiaca*

Arctic Hares. Snowy Owls move south in large numbers when food becomes abnormally scarce and in some winters appear in southern areas around the globe and in our own area.

FAMILY TYTONIDAE: BARN OWLS

Barn Owls have a face that is heart-shaped instead of more or less rounded as in most Owls, and they lack the tufted hair-like feathers found in many. Barn Owls are found throughout tropical and temperate areas with the exception of New Zealand and islands of Oceania, such as Hawaii. Their curious facial disk has given rise to the name "Monkey-faced Owls." The COMMON BARN OWL (*Tyto alba*), like most Owls, remains paired for long periods of time and perhaps for life. Recent experiments have proved that Barn Owls can locate small mammals in total darkness.

ORDER CAPRIMULGIFORMES: OILBIRDS, FROGMOUTHS, POTOOS, AND GOATSUCKERS

Members of this order are typified by the Nighthawk and the Whip-poorwill, birds familiar to almost everyone. All have rather wide mouths, soft brownish or grayish plumage, and short legs, and all are more or less nocturnal in habits.

FAMILY STEATORNITHIDAE: OILBIRDS

Deep in certain South American caves lives a marvelous relative of the Goatsuckers, a lone species for which ornithologists have created a separate family. This bird, the OILBIRD or GUACHARO (*Steatornis caripensis*), is the only bird known to be equipped with a radar similar to that of bats and one of the few able to fly in total darkness. Because of its wonderful blind-flying abilities, the Guacharo spends more of its life in near or total darkness than any other bird. The Oilbird appears never to have been kept successfully in captivity although few attempts have been made. This highly specialized creature is slightly larger than a Sparrow Hawk, has a wing span of more than 3 feet, weak feet and legs, and a firm, yellowish bill equipped with a soft hook. It occurs on the island of Trinidad, in Venezuela, and on coastal mountains in Colombia, Ecuador, and Peru. The name is derived from a nearly transparent, odorless oil obtained from the thick layers of yellowish fat which blanket the body of nestlings; an oil which keeps for months without becoming rancid. These light-hating birds long supplied Venezuelan Indians with oil for light as well as cooking and nourishment. To obtain the oil, natives made eerie expeditions into the Oilbird caves at breeding time, slaughtering the squabs by the thousands. The extremely fatty condition of these birds results from one of their principal items of diet, a palm nut from which commercial palm oil is obtained. Recently the Venezuelan Government has insured the survival of the Oilbirds by declaring the Caripe Caves a National Park, complete with electric lights to enable the visitors to see these remarkable "radar" birds.

FAMILY PODARGIDAE: FROGMOUTHS

The 12 species of this nocturnal family are among the strangest of birds. Their home is in the tropics, in forested savannas and open woodlands of the Oriental and Australian regions. The huge mouth is used to capture insects, which are the sole source of food. Frogmouths are nocturnal in habits, taking advantage of their protectively colored plumage by resting quietly in the daytime. It is said to assume a static position on a

limb and then open its huge mouth, exposing the pinkish, rose and yellow-lined surfaces. In doing this the bird assumes the appearance of a bright flower growing at the end of a dead limb. Insects attracted by the flower are said to be 'gobbled up as soon as they touch it.' Frogmouths are rare in collections. Among the species are the TAWNY FROGMOUTH (*Podargus strigoides*) of southeastern Australia and the PAPUAN FROGMOUTH (*P. papuensis*).

FAMILY NYCTIBIIDAE: POTOOS OR WOOD NIGHTJARS

The 5 species of Potoos ranging from Mexico and the Antilles to Brazil are rarely seen. All are nocturnal, and by day their large, slender, Owl-like bodies in their upright positions look like dead tree limbs. Potoos lay a single egg on top of dead stubs and on precarious ledges on the sides of gnarled trees. They feed on insects captured at the end of short forward flights, not by sweeping the air in erratic flights like the Nightjar. The GRAY POTOO (*Nyctibius griseus*) of the jungles of Central and South America is about 40 inches long.

FAMILY AEGOTHELIDAE: OWLET NIGHTJARS

Not much is known about this nocturnal family of Australian and New Guinea Owlet Nightjars. The 7 species range in size from that of a small Parakeet to that of a Dove and resemble small Screech Owls, both in appearance and nesting habits. Most of the species live in forests and forested savannas between sea level and 10,000 feet. As is typical of most members of this order, they capture insects, their only food. The GREY OWLET NIGHTJAR (*Aegotheles albertisi*) is about 6 inches long and extremely shy.

FAMILY CAPRIMULGIDAE: GOATSUCKERS OR NIGHTJARS

The Goatsuckers, a group of 70 highly interesting nocturnal birds, occur almost everywhere in the warmer land areas of the world. They derive their name from an erroneous belief that they take milk from the udders of domestic Goats. It would be better if the birds were called by their alternate name "Nightjar", in keeping with their penetrating nocturnal calls. Nightjars feed by pluming through swarms of flying insects, their only source of food, with their mouths wide open, thus obtaining the insects out of the air with the help of rictal bristles. As many as 500 Mosquitoes have been found in the stomach of a single bird. So big is the mouth that sometimes Nightjars engulf Warblers and other small birds, perhaps mistaking them for night-flying insects. An interesting recent discovery is that members of this family hibernate. The POOR-WILL (*Phalaenoptilus nuttalli*) of western North America hibernates in rock niches. Sometimes the birds remain in a state of torpor through 3 foodless, cold months, with their temperature lowered from near normal of about 100° to about 66° F. and their respiration virtually arrested. The WHIPPOORWILL (*Caprimulgus vociferus*) of the New World winters in Central America and breeds as far north as Manitoba and Quebec. The penetrating notes of these birds are familiar to every camper. The NIGHTHAWK (*Chordeiles minor*) of North America has taken to laying its eggs on gravel-covered

roofs, the texture of which hides the eggs very effectively. By day Nightjars sit with eyes closed and blend so perfectly with their surroundings that they are virtually impossible to detect. The LYRE-TAILED GOATSUCKER (*Uropsalis lyra*) of the New World tropics, a bird with a body only 4 inches long, has tail feathers 27 inches long.

ORDER APODIFORMES: SWIFTS, TREE SWIFTS, AND HUMMINGBIRDS

Three very distinct groups of birds are included in this order but members of only one are apt to be included in a collection of living specimens, since the Swifts, with their intensely specialized feeding habits, are extremely difficult to keep in captivity. The Hummingbirds, on the other hand, once thought impossible to keep in captivity, are now commonly exhibited.

FAMILY APODIDAE: SWIFTS

Swifts are found everywhere except in Puerto Rico and a few island archipelagos. They are related to the Hummingbirds and Nightjars, not to the Gulls which they superficially resemble. Swifts feed by day and entirely upon insects in flight. Often because of cold, retarded seasons, or storms, no food is available for days on end and during such periods these birds resort to a kind of hibernation. Nestlings of the COMMON SWIFT (*Apus apus*) of Europe and Africa can resist cold and starvation by lowering their normal body temperatures more than 50 ° F. The nestlings become torpid and immobile and can remain in this state of lethargy for as long as 10 days and then recover with no apparent ill effects. Swifts have been credited with speeds in excess of 200 miles per hour, but probably about 60 miles per hour is maximum. Among small birds, only the Hummingbirds rival them in air speed. In all Swifts, the salivary glands are highly developed and saliva can be produced in such quantities that it is used in nest building. The nests of certain Swifts are the source of bird-nest soup, which many persons consider delicious. The CHIMNEY SWIFT (*Chaetura pelagica*) of North America settles by the thousands into chimneys at dusk. Each fall millions of these Swifts congregate in flocks and move along well-defined routes to nesting grounds in Amazonia and Peru.

FAMILY HEMIPROCNIDAE: CRESTED OR TREE SWIFTS

This family of 3 species is found in India, Malaya, the Philippines, New Guinea, and the Solomon Islands. In their nesting habits Crested Swifts are very different from most true Swifts. They glue together thin strips of bark to make a tiny spoon-shaped nest which is attached to the side of a lofty, slender limb. These birds make solitary nests instead of nesting in groups in dark cavities. Typical of this group is the CRESTED TREE SWIFT (*Hemiprocne mystacea*) of Malaya and the Australian regions.

FAMILY TROCHILIDAE: HUMMINGBIRDS

The jewels of the bird world, the Hummingbirds, are the smallest and the greatest aerialists of all birds. The name is derived from the distinct sound made by the wings in flight. Recent high-speed motion pictures have demonstrated that the wings may move at the almost unbelievable speed of up to 200 beats per second. Hummingbirds can fly sideward, backward,

upward, downward, and forward. No other birds have succeeded in evolving a similar method of flight. During courtship flights, such as towering and diving and other aerial gymnastics, the wings beat most rapidly. Despite a great diversity of plumage, all 319 species of Hummingbirds are readily distinguishable from all other birds. This distinction is by no means chiefly one of size, because not all Hummingbirds are tiny, the largest, the GIANT HUMMINGBIRD (*Patagona gigas*) of the Andes, being more than 8 inches in length. Today we find Hummingbirds most numerous in Colombia and Ecuador where more than 130 species occur as compared with 18 in the United States. Of the latter, only 8 penetrate any distance from the Mexican border and only the RUBY-THROATED HUMMINGBIRD (*Archilochus colubris*) is found regularly east of the Mississippi River, yet the range of the group extends to Alaska, Labrador, Newfoundland, the Antilles, Galapagos Islands, and even the southernmost tip of South America. None have crossed the great water gap separating the New World from the Old World. Their modifications for feeding are also extraordinary. The tongue is elongated and can be protruded from a long bill that in certain species is relatively the longest known in birds. In the SWORD-BILLED HUMMINGBIRD (*Ensifera ensifera*) of Venezuela, Colombia, Ecuador, and Peru, the bill is much longer than the head and body together. Among Hummingbirds, this marvelous tool takes almost as many forms as the flowers into which it is inserted. In many species it is thin and needle-like, but in others it is sickle-shaped, and even upcurved like the bill of an Avocet. Many species use the tongue to pick up little insects from bark and leaves and even to capture them in flight. Nectar seems to be the chief sustenance of most species, although insects certainly form a portion of the diet of many. Hummingbirds play an important role as dispensers of pollen in flowers. In our zoo Hummingbirds are fed on a fluid mixture of honey, fruit juices, vitamins, meat, and insect larvae. Hummingbirds are most active at dawn and at dusk, when they sometimes congregate in large numbers. High in the Andes, Hummingbirds have been found in a semi-torpid condition in little caves. By night they seem to drop off into a form of hibernation, only to arise when the sun again warms their surroundings. In this manner, presumably, they can rest or lower their extraordinarily high metabolic rate, which far exceeds that of any other bird. Their body temperature, which during periods of activity is over 100° F., sometimes falls as low as 64° F. when they are torpid. Virtually all Hummingbirds are polygamous. Nest building and the care of the young are the responsibility of the female alone. Sometimes 3 broods of one or 2 young are raised in a year by a single female. The nests of Hummingbirds are a marvel of construction and often very charming. In nearly all, saliva is used to cement nest materials. Substances used in nesting are vegetable down, Spider webs, insect silk, thistle bark, and lichens. Despite their extremely small size, a number of Hummingbirds execute long migrations over water to wintering grounds in the tropics. For example, the "Ruby-throat" of North America regularly flies non-stop nearly 500 miles across

the Gulf of Mexico. We have exhibited several species, including the Ruby-throated Hummingbird of North America, and the following species of Central and South America: the rare Costa Rican SNOW-CAPPED HUMMINGBIRD (*Microchera albocoronata parvirostris*), the MANGO HUMMINGBIRD (*Anthracothorax minima*), the GILT-CRESTED HUMMINGBIRD (*Bellona exilis*), the GARNET-BREASTED HUMMINGBIRD (*Lamprolaima rhami*), and the BROAD-WINGED SABER-WINGED HUMMINGBIRD (*Campylopterus latipennis*). The second hatching in captivity and first successful rearing of



STREAMER-TAILED HUMMINGBIRD—*Trochilus polytmus*

the STREAMER-TAILED HUMMINGBIRD (*Trochilus polytmus*) of Jamaica occurred in our zoo. The BEE HUMMINGBIRD (*Mellisuga helenae*) of Cuba and the Isle of Pines is the smallest bird in the world. It reaches a length of about 2 inches and is larger than a Bee, but seems smaller because the bill and tail take up more than half of its total length.

ORDER TROGONIFORMES: TROGONS FAMILY TROGONIDAE

The Trogons are brilliantly colored birds which inhabit tropical forests of the Americas, Asia and Africa, but not Australasia. In spite of their broad distribution the order contains but a single family. The Old World members have seldom been kept in captivity and are rarely imported into America. Trogons relish the dark recesses of tropical forests and are apparently non-migratory. New World Trogons live mostly on berries and other fruits.

Some species, the QUETZAL (*Pharomachus mocinno*) for instance, nest in natural cavities without attempting to improve them. Others, such as the MASSENA TROGON (*Trogon massena*) of Central America, excavate nest holes in the bulb-like nests of Termites. The northernmost of New World species is the COPPERY-TAILED TROGON (*T. elegans*) which nests in the mountains of southern Arizona south into Mexico. The diet of Old World Trogons appears to consist largely of insects captured in flight. Finest of all the Trogons and perhaps of all the birds of the Americas is the Quetzal, famed as the sacred bird of the ancient Aztecs and found in Guatemala and Honduras. This splendid creature reaches a length of nearly 4 feet, including its very long tail. The female is much more modestly ornamented than the male.

ORDER CORACIIFORMES: KINGFISHERS AND ALLIES

This interesting order of tropical birds, for the most part with bright colors, exhibits great differences in size between species.

FAMILY ALCEDINIDAE: KINGFISHERS

The rattling calls and spectacular dives of the Kingfishers are familiar



LAUGHING JACKASS—*Dacelo novaeguineae*

throughout much of the world. These big-headed, large-billed birds include such famous types as the large LAUGHING JACKASS or KOOKABURRA (*Dacelo novaeguineae*) of Australia and Tasmania and the BELTED KINGFISHER (*Megaceryle alcyon*) found from northwestern Alaska to central Labrador in summer and to the southern Caribbean islands in winter. The Laughing Jackass receives its name from its raucous call which sounds sometimes like the braying of a Jackass and hearty laughter. Some 80 species of Kingfishers are known, most of them tropical and most concentrated in the islands of the South Pacific. True Kingfishers, the world around, nest in horizontal holes driven as deep as 8 feet into the side of vertical banks of sandy soil. Most forms feed on living fishes; some feed on insects, Lizards, Snakes and other small creatures. The fish-catching Kingfishers are very difficult to keep in captivity, so much so that they are practically never seen in collections.

FAMILY TODIDAE: TODIES

The Todies of Cuba, Isle of Pines, Hispaniola, Puerto Rico, and Jamaica are one of the 2 families of birds found exclusively in the West Indies. The 5 species are Wren-size and deceptively like Flycatchers in some of their habits. All are very colorful, with the bill being largely blood-red. The CUBAN TODIE (*Todus multicolor*) is common in woodlands throughout Cuba.

FAMILY MOMOTIDAE: MOTMOTS

Motmots, of which there are 8 species in Mexico, Central, and South America, are quiet birds of shady tropical forests. Motmots capture flying insects and often bring them back to their special hunting perch where they fracture the exo-skeletons with sharp knocks against the perch and then crush them in their serrated bill. Motmots thrive in captivity and several species may usually be seen here, including the COMMON MOTMOT (*Momotus momota*) and the SMALL-BILLED MOTMOT (*M. subrufescens*). Motmots nest in burrows in cliff banks and hillsides.

FAMILY MEROPIDAE: BEE-EATERS

Bee-eaters, of which 25 different species occur in the warmer regions of the Old World, are delicately beautiful birds of small or moderate size. They summer in Europe, Asia, South Africa, and Southern Australia and winter near the Equator. The COMMON BEE-EATER (*Merops apiaster*) nests sometimes as far north as Scotland and Denmark. Bee-eaters frequently do serious damage in apiaries; however, their diet does not involve Bees alone, but includes other insects and Spiders. In flight, the Bee-eater is graceful and acrobatic. The bird wheels like a Swallow in pursuit of flying insects. Like most specialized birds of insectivorous habits, they are not easily kept in captivity.

FAMILY CORACIIDAE: ROLLERS

As aerial acrobats, Rollers rival Tumbler Pigeons. They seek, particularly in the breeding season, to attract attention in flight by zigzagging, rolling and twisting, and often by rushing upward with the wings closed and then down almost to the ground, screaming loudly. Rollers are solidly built, Jay-like birds, with stoutish bills. Most live in Africa, but some

species occur in the Indo-Malayan and Australian regions. Many species capture Grasshoppers, Ants, other insects, and other small animals. They nest in cavities and crevices in trees, anthills, and mudwalls. The LILAC-CHESTED ROLLER (*Coracias caudatus*) of Somaliland and East Africa south to Angola is extremely quarrelsome. It is said to sometimes capture small birds and even Snakes. It is the commonest Roller in South Africa. The INDIAN BLUE ROLLER (*C. benghalensis*) is similar and may usually be seen in our collection. The BROAD-MOUTHED DOLLAR BIRD (*Eurystomus orientalis*), so named for a silvery speculum the size of a dollar on its wings, has a vast range in Malayasia and the Australian regions.

FAMILY BRACHYPTERACIIDAE: GROUND ROLLERS

Little known and elusive, the Ground Rollers, of which there are 5 species, are confined to the Island of Madagascar. Like true Rollers, the Ground Rollers become very active at dusk, but unlike them they continue their hunting into the night. Ground Rollers have largely given up their arboreal habits, but they have the highly colorful and shining plumage of their diurnal relatives. Usually found alone or in pairs, they are wary and difficult to observe. The most beautiful of the species, the GROUND ROLLER (*Atelornis pittoides*), is fairly common in the high rain forests. It feeds on insects, reptiles, and amphibians.

FAMILY LEPTOSOMATIDAE: CUCKOO ROLLERS

Among the wonderfully odd animals found only on Madagascar and its satellite islands, is the sole surviving species of a family known as the Cuckoo Rollers. In body conformation and in its spectacular aerial maneuvers, the CUCKOO ROLLER (*Leptosomus discolor*) is similar to the true Rollers. Cuckoo Rollers, about 16 inches long, are purely tree-dwelling birds which probably feed almost entirely on insects taken in flight.

FAMILY UPUIDAE: HOOPOE

The HOOPOE (*Upupa epops*), the sole member of its family, is a close relative of the Hornbill, though very different from it in appearance. This highly ornamented bird, once seen, is never forgotten. A foot long, largely terrestrial, bird, it frequents all manner of open and partly open areas from semi-deserts to bushy savannas, and even city parks and suburban laws throughout the warmer parts of the Old World: Europe, Africa, Madagascar, India, Ceylon, and Malaya. An interesting adaptation is that of the female Hoopoe which, when brooding, develops a special oil gland at the base of the tail. This she can use to defend herself on the nest by spraying a musky, blackish-brown liquid. She apparently relies so completely upon the secretion's repellent quality that she can be taken by hand if one can stand the odor. The Hoopoe feeds on worms, Caterpillars, Ant lions, Spiders, Beetles, Crickets and a wide variety of other invertebrates, probing the ground with its bill to obtain these morsels. The nest is a cavity in a tree, house, or anthill, or even occasionally under a stone on a bank. Like Bee-eaters, Hoopoes require special care to keep them in good health in captivity.

FAMILY PHOENICULIDAE: WOOD-HOOPOES

The 6 species of shy, long-tailed, glossy-plumaged birds comprising this little-known family dwell in tropical and southern Africa. They are closely related to the true Hoopoe. Like the Hoopoes, the Wood-Hoopoes emit an offensive odor from the oil glands. All are tree-loving birds and rarely visit the ground. Some dwell primarily in mountain forests and others in bushy savannas. A spectacular example of the family is the CUCKOO-TAILED WOOD-HOOPOE (*Phoeniculus purpureus*) which ranges through tropical, bushy savannas from South Africa north to Angola, Lake Tanganyika, and Sudan. Wood-Hoopoes do well in captivity.

FAMILY BUCEROTIDAE: HORNBILLS

The Hornbills form one of the most spectacular groups of flying birds.



CONCAVE-CASQUED HORNBILL—*Dichoceros bicornis*

Their huge bills, often surmounted by caps of grotesque forms, give them a weird appearance that never fails to attract attention. These structures, though hard and firm, are not as heavy as they appear, being hollow with a rather slight, bony support inside. The general impression, forbidding though it may be, is softened by the presence of well developed eyelashes formed by specialized feathers. Hornbills vary in size from birds hardly larger than a Crow to others that rival a good-sized Turkey. Entirely Old World in distribution, they are confined to tropical regions and most of the species inhabit dense jungles, although some, such as the Ground Hornbills, are found in more open country. The 45 species live in the warm parts of Africa, India, Ceylon, Malaysia, the Philippines, the East Indies, New Guinea, Bismarck Archipelago, and the Solomon Islands. Most Hornbills feed chiefly on berries and other fruit, but as a group they are omnivorous. Some African species feed exclusively on insects, Chameleons, Shrews, Mice, birds eggs, and some Indian species have been observed eating Lizards and Snakes. The nesting habits of the Hornbills are of great interest. The females of many species enter a cavity in a hollow tree where they are sealed in with a cement formed of mud, excrement, and fruit. The males then feed their mates through a narrow slit. The prisoners are not released until the young are able to fly. Hornbills adapt themselves readily to the conditions of captivity. One of the most spectacular of African species is the CASQUED HORNBILL (*Bycanistes subcylindricus*), which is found in the mountain forests to altitudes of at least 8,500 feet. This bird is about 3 feet long and has a prominent black and white casque. The HELMETED HORNBILL (*Rhinoplax vigil*), with its length of nearly 5 feet, is the longest member of the family. The casque is solid ivory. Another very large species is the RHINOCEROS HORNBILL (*Buceros rhinoceros*), the commonest of the family in Malaya. Still another large species is the CONCAVE-CASQUED HORNBILL (*Dichoceros bicornis*) of southwestern India, the Himalayas, and the Malay Peninsula. The INDIAN PIED HORNBILL (*Anthracoceros malabaricus*) is a medium-sized bird with a high, narrow, horn-colored casque. Another species we have shown is the YELLOW-BILLED HORNBILL (*Tockus flavirostris*) of Africa.

ORDER PICIFORMES: TOUCANS, WOODPECKERS, AND ALLIES

The birds of this order differ widely from each other in appearance, but all are climbers and diggers with anatomical similarities. These birds lay white eggs in a hole in a tree or occasionally in the earth.

FAMILY GABULIDAE: JACAMARS

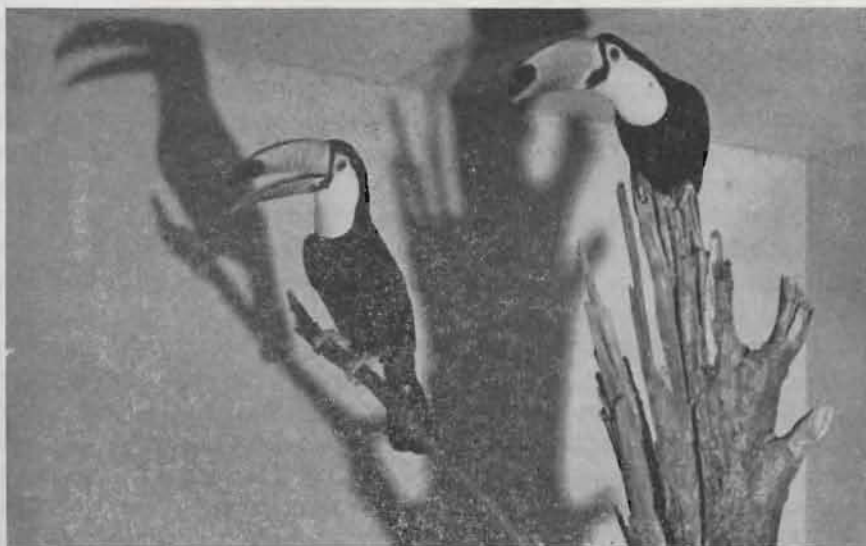
Jacamars are slender birds, ranging from the size of a Sparrow to that of a Jay and dwelling in the tropics from southern Mexico to Argentina. Some 14 species are known. Many are jewel-like with back and chest brilliantly burnished with golden bronze and fiery red. Jacamars have a long bill and are extremely adept at hawking for flying insects. Perhaps the most beautiful of the Jacamars is the GREAT JACAMAR (*Jacamerops aurea*) of Central and northern South America. Jacamars are rarely seen in zoos, due to their specialized feeding habits.

FAMILY BUCCONIDAE: PUFFBIRDS

The 32 species of Puffbirds are tropical birds that capture all of their food on the wing. The head of the Puffbird is usually large and the plumage that envelopes the head and neck is loose and easily puffed out. Hence the common name of the family. They are of generally somber coloration. The MOUSTACHED SOFT-WING PUFFBIRD (*Malocoptila mystacalis*) nests in earth banks in heavy forests as much as 6,000 feet above sea level. Members of this family are rarely seen in zoos.

FAMILY CAPITONIDAE: BARBETS

In the tropics of the New and Old World, exclusive of the Australian region, there occurs a family of stocky birds called Barbets. They usually have large heads with long heavy bills. Colors are usually bright, even gaudy, and some of the forms are really brilliant. Barbets are forest birds for the most part, seeking high in the trees for fruits and insects which form their food. Of the 76 species known, only 12 are found in the New World. Most of them are native to Africa. The fine, hair-like bristles surrounding the large head suggested the name "barbu" (bearded) to the French and from this is derived the popular name. Barbets excavate their nest holes in trees or stumps or in the ground and such cavities may have several entrances. Fortunately Barbets can be maintained in good health for long periods in captivity and thus a good series is generally to be seen in our zoo. Some of the species apt to be seen are the GOLDEN-RUMPED TINKER BIRD (*Pogoniulus bilineatus*), the WHITE-HEADED BARBET (*Lybius leucocephalus*), and the RED-FRONTED BARBET (*Tricholaema diadematum*), all from Africa. Among the New World Barbets are the RED-HEADED BARBET (*Eubucco boucieri*), and the SPOT-CROWNED BARBET (*Capito maculicoronatus*). The PRONG-BILLED BARBET (*Semnornis frantzi*) of the high mountains of Costa



TOCO TOUCAN—*Ramphastos toco*

Rica south to Panama and the TOUCAN BARBET (*S. ramphastinus*) of the sub-tropical Andes of Ecuador and Colombia are among the smallest Barbets in the New World.

FAMILY RAMPHASTIDAE: TOUCANS

Among the most attractive and easily recognizable of all birds are the colorful Toucans, 37 species of which dwell in forests from Mexico to Argentina. They have a greatly elongated large bill and in some species it is almost as bulky and long as the bird that carries it. One of the most perplexing questions concerning both Hornbills and Toucans is the purpose of their huge bills. The general opinion is that they are primarily food-getting devices. As in the Hornbills the enormous bills are structurally very strong yet light in weight due to their honeycomb-like internal structure. The Toucan's huge bill serves as a firm, strong tool for tearing off berries and other fruits. Toucans are found in the warmer parts of Central and South America from sea level to about 10,000 feet in the Andes. They are most numerous in the forests of Amazonia. Toucans roost in trees and nest in tree holes. They are very colorful birds, with much red, yellow, blue, black, and orange in the plumage. One of the smallest species is the EMERALD TOUCAN (*Aulacorhynchus prasinus*) which is about a foot long. It ranges throughout Central America. Among the most colorful and common Toucans is the COLLARED ARACARI (*Pteroglossus torquatus*) of middle America. Other Toucans apt to be seen in our collection are SWAINSON'S TOUCAN (*Ramphastos swainsoni*), the SULPHUR-BREASTED TOUCAN (*R. sulfuratus*), and the finest and largest Toucan, the TOCO (*R. toco*), found from the Guianas to Argentina.

FAMILY INDICATORIDAE: HONEYGUIDES

These relatives of Woodpeckers and Barbets make their home principally in Africa, but also occur in southern Asia, Malaya, Sumatra, and Borneo. The 11 species comprising the family are generally inconspicuous birds ranging in size from about that of a small Sparrow to that of a Starling. All probably feed on insects and some capture these in the manner of Flycatchers. All, or nearly all, capture Bees and have an insatiable hunger for beeswax. This appetite has also given rise to the bird's unique relation to man. Over the ages the GREATER HONEYGUIDE (*Indicator indicator*) has developed an interesting way of enlisting the help of human hunting partners. A hunter in search of honey does not look for a Bees' nest; instead he listens for the call of the Greater Honeyguide. In all likelihood the bird finds him first and quickly begins his brazen solicitation. The hunter knows from long experience that the Indicator will guide him to the nearest Bees' nest. The hunter rewards the Honeyguide with a portion of the loot, and thus the bird achieves its goal with an extraordinary demonstration of instinctive behavior. Another unique capacity of Honeyguides which might lead to discoveries vastly more beneficial to man is their ability to digest wax. These birds also have parasitic nesting habits. The SCALY-THROATED HONEYGUIDE (*I. cariegatus*) also leads men and other animals to Beehives.

FAMILY PICIDAE: WOODPECKERS, SAPSUCKERS, WRYNECKS, AND PICULETS

The well-known Woodpeckers, of which there are 210 species ranging through every wooded area in the world except Madagascar, the Australian region, and many islands of Oceania, are hole-nesting birds that lay glossy white eggs. The bill is shaped like a chisel and the tongue is elongated. Since Woodpeckers prey chiefly on Beetles and other insects that live more or less permanently in dead trees and do not fluctuate seasonally in numbers, Woodpeckers are not forced to migrate and most species are sedentary. One species, the nearly extinct IVORY-BILLED WOODPECKER (*Campephilus principalis*), is found in primeval forests of Cuba. It formerly occurred in the southeastern United States but was last reported in March, 1950. A similar species, but common, is the PILEATED WOODPECKER (*Dryocopus pileatus*) of North America. The YELLOW-SHAFTED FLICKER (*Colaptes auratus*) of North America is unusual, like other Flickers, in that it hunts Ants on the ground. Two species of Sapsuckers form a group that is peculiar to North America and is unusual for its feeding habits. These birds, as their vernacular name suggests, drink the sap of trees. The RED-HEADED WOODPECKER (*Melanerpes erythrocephalus*) of North America frequently hawks for flying insects, flitting out from a vertical trunk like a Flycatcher. The ACORN WOODPECKER (*M. formicivorus*) of western North America supplements its insect food with berries and nuts, and also drills small holes in tree trunks and in each inserts an acorn seed to eat when insect food is scarce. Named for their habit of twisting the head in odd contortions are the Wrynecks. There are only 2 species, the WRYNECK (*Jynx torquilla*) of Eurasia, North Africa, and Japan, and the AFRICAN WRYNECK (*J. ruficollis*) of Africa south of the Sahara.

ORDER PASSERIFORMES: PERCHING BIRDS

About 5,100 of the world's 8,600 known species of birds belong to the order Passeriformes or Perching Birds. Taken as a whole, they are the most advanced of all the birds. Several hundred forms are generally on display in the Zoological Park so that it is impossible to consider all of them here. However, an attempt has been made to discuss representatives of most families and those which are of particular interest. The majority adapt themselves readily, forming a large and beautiful part of our collection.

FAMILY EURYLAIMIDAE: BROADBILLS

Broadbills, a small group of highly colorful Perching Birds, have their center of abundance in the tropic areas of India, Burma, and Malaysia, but one species is found in the Phillippines and 2 genera live in Africa. They range in size between a Sparrow and a Jay. All feed on insects by hawking for them from special perches. Broadbills are superb nest architects. A cluster of nest material is suspended from a high, slender vine and fastened with plant fibers and fungus silk so that the structure resembles a long, slightly pregnant Eel dangling precariously from a thin fishing line. Apparently nothing is known of the incubation period. GRAUER'S BROADBILL (*Pseudocalyptomena graueri*), which is known from only a small area west of Lake Tanganyika, is one of the rare birds of the world.

FAMILY DENDROCOLAPTIDAE: WOODCREEPERS OR WOODHEWERS

These birds range from small to medium in size and are inhabitants of forests of the New World tropics between sea level and about 10,000 feet. 47 species are known and they superficially resemble Woodpeckers. Both sexes are generally brown in color. Woodcreepers, so far as is known, nest only in holes and cavities that are natural or were made by other animals. Some of these species are the WEDGE-BILLED WOODCREEPER (*Glyphorynchus spirurus*), the OLIVACEOUS WOODCREEPER (*Sittasomus griseicapillus*), ranging from Central America to southern Brazil, and one of the larger members of the family, the BARRED WOODCREEPER (*Dendrocolaptes certhia*).

FAMILY FURNARIIDAE: OVENBIRDS

The Ovenbirds comprise a family of some 200 species of generally brownish, small to medium-sized birds dwelling in the Americas south of the United States. They are named for their dome-shaped nests which resemble on a small scale the Indian ovens of olden days. Some of the nests are very large and complex with several chambers and with elaborate quilted linings. They are chiefly insect-eating birds that are found in all kinds of habitats, from sea level to above tree line in the Andes. The RUFOUS OVENBIRD (*Furnarius rufus*), the best known member of the family in southern South America, builds a double-chambered mud "oven" with a side door. It often makes its nest in buildings. The RED-FRONTED THORN-BILL (*Phacellodomus rufifrons*) builds a remarkable nest consisting of columnar clusters that are sometimes 10 feet tall and weigh over 100 pounds. Presumably, several pairs of birds cooperate to build the structure. In North America there occurs a Warbler that is also called the Ovenbird, but it is not a member of this family.

FAMILY FORMICARIIDAE: ANTBIRDS

Two hundred and twenty-one species of Antbirds inhabit the gloomy parts of the New World jungles. Their principal food is insects but some eat small lizards, tiny snakes, and young of small birds. The largest member of this family is the SCALE-BREADED ANT PITTA (*Grallaria excelsa*) of the high Andes of northern South America. One of the best known is the BARRED ANTSHRIKE (*Thamnophilus doliatus*), often seen close to human habitations.

FAMILY CONOPOPHAGIDAE: ANT-PIPITS OR GNAT-EATERS

Ant-pipits comprise a small group of smallish, forest-loving birds of tropical South America. They feed on insects and have somewhat flycatcher-like bills. The largest is the BLACK-CHESTED ANT-PIPIT (*Conopophaga melanogaster*) of Brazil and Bolivia, which is nearly 6 inches long. Very little is known concerning the breeding behavior of these birds except that they lay buffy yellow eggs with dark markings.

FAMILY RHINOCRYPTIDAE: TAPACULOS

Twenty-six species are included in this family of Central and South America and the Falkland Islands. Tapaculos feed principally on insects, buds, and seeds. The LITTLE COCK or GALLITO (*Rhinocrypta lanceolata*) is

a fairly typical species. Tapaculo, a word of Spanish origin, alludes to the apparently immodest way these little birds go about with their tails cocked nearly straight up and their rears exposed.

FAMILY PIPRIDAE: MANAKINS

The Manakins are small birds confined to forests between southern Mexico and Argentina. They are among the most interesting of New World species in that they perform dances that rival those of the Birds of Paradise. Manakins devour insects and small invertebrates as well as small berries. Most are polygamous and males attract their mates to special display grounds by auditory and visual signals. The Manakins may be said to practice polygamy because the male mates with many females and offers no aid whatsoever to the females in nesting and rearing of young. A female builds the nest, incubates the eggs, and rears the young by herself. GOULD'S MANAKIN (*Manacus vitellinus*) of Panama is the size of a large Wren. The BLUE-BACKED MANAKIN (*Chiroxiphia pareola*) performs a well-coordinated aerial dance consisting of a loop-the-loop in which pairs of males take part. On occasion as many as 5 males perform as a group.

FAMILY COTINGIDAE: COTINGAS

The bizarrely ornamented Cotingas form a New World family of 90 species from the southern borders of Arizona and Texas to Bolivia, Peru,



PERUVIAN COCK-OF-THE-ROCK—*Rupicola peruviana*

and Argentina. Chiefly tropical, the family includes the GOLDEN COCK-OF-THE-ROCK (*Rupicola rupicola*) of southern Venezuela and adjacent areas of the Guianas and Brazil, and the PERUVIAN COCK-OF-THE-ROCK (*R. peruviana*) of the Andes. These beautiful birds indulge in strange terrestrial dances. Observers have found as many as 20 males and females clustered about on specially cleared areas on the floor of the jungle performing their dance. Cocks-of-the-Rock build open cup nests of mud and sticks which are decorated with moss and placed on ledges in shallow caves. Cotingas have beautiful crests on the head. Other decorations found in this family are fleshy beards, naked carbuncles, erectile wattles, specially-shaped wing feathers, and long, round, feather-sheathed tassels that hang like aprons when inflated. Almost as variable as the range in color is the nest architecture. Although chiefly fruit-eaters, a number of Cotingas are omnivorous and some devour very large fruits. Others feed chiefly on insects. The ROSE-THROATED BECARD (*Platypsaris aglaiae*) is the most northerly-ranging member of the family, being found in southern Texas and Arizona. This species builds a large, partially pendulous nest entered from the side. The THREE-WATTLED BELLBIRD (*Procnias tricarunculata*) of Central America displays with its mouth wide open. One group of Cotingas, the Umbrella Birds, is among the most remarkable of New World birds. Typical is the ORNATE UMBRELLA BIRD (*Cephalopterus ornatus*), which ranges from Costa Rica to Brazil. It has an immense, retractable, umbrella-like crest of feathers. It also has an immense, tubular, dangling wattle, sometimes extending 13 inches in length, although the bird itself is only 16 inches long.

FAMILY TYRANNIDAE: TYRANT FLYCATCHERS

These restless, active birds are found from northern Canada to the southern tip of South America, and also in the Galapagos and Falkland Islands. Many species are migratory, flying long distances from North to South America. They are represented by 365 species, most of which are concentrated in the tropical portions of America. Tyrant Flycatchers feed on Flies and other insects, capturing them on the wing. The BOAT-BILL (*Megarynchus pitangua*), the largest of the Tyrant Flycatchers, has developed the habits of a small Hawk and captures and eats young birds, Mice, Lizards, small Snakes, Frogs, Spiders and even mollusks. A common member of this family and native to eastern United States is the EASTERN PHOEBE (*Sayornis phoebe*). It makes a saucer-shaped nest of mud, moss, hair, feathers, and rootlets. The BLACK PHOEBE (*S. nigricans*), which ranges from California through most of South America, is always found near water. This well-known bird nests in caves, under bridges, and in houses, building a platform of mud for a nest. A brilliant species is the VERMILION FLYCATCHER (*Pyrocephalus rubinus*) that ranges from the southern United States to Argentina. The FORK-TAILED FLYCATCHER (*Muscivora tyrannus*) is migratory and travels in large numbers. The EASTERN KINGBIRD (*Tyrannus tyrannus*) is widely distributed in North America and winters south to Bolivia. The most ornate of the Flycatchers is the ROYAL

FLYCATCHER (*Onychorhynchus mexicanus*) which ranges from Mexico to northern South America.

FAMILY PHYTOTOMIDAE: PLANT-CUTTERS

Plant-Cutters are stocky birds of temperate zones of Peru, Bolivia, Argentina, and Chile. Near relatives are the Cotingas. Three species are known. The REDDISH PLANT-CUTTER (*Phytotoma rutila*) is a common and relatively colorful bird in much of Argentina.

FAMILY PITTIDAE: PITTAS OR JEWEL THRUSHES

Pittas are Thrush-sized birds almost jewel-like in their beauty. These birds of Africa, India, Ceylon, southern China, Malaysia, the Philippines, New Guinea, and Australia are among the most difficult of diurnal birds to see because of their secretive habits. The 23 species are closely similar, plump birds with over-sized heads, long legs, and short tails. The BLUE-WINGED PITTA (*Pitta brachyura*) is a wide-ranging species found in India and Ceylon, east to Malaysia and the southern Philippines. Probably the most beautiful of the group is the little-known STEERE'S PITTA (*P. steerei*) which dwells on the mossy floors of high, wet, mountain forests in the southern Philippines.

FAMILY XENICIDAE: NEW ZEALAND WRENS

Four species of small birds living in New Zealand comprise this little-known family of Wren-like birds. The ROCK WREN (*Xenicus gilviventris*), native to South Island, makes a globular, firmly-built nest of leaves and grasses and enters it by a very small hole in the side. Nests have been found with some 800 feathers forming the lining of the egg chamber and entrance way. The best known species of New Zealand Wren is the RIFLEMAN (*Acanthisitta chloris*) of North and South Islands. Insects and Spiders are its chief food. Riflemen build ball-like, covered nests much like those described for Rock Wrens.

FAMILY PHILEPITTIDAE: PHILEPITTAS

Philepittas comprise 4 species of small birds found only on the island of Madagascar. Sexes are very differently colored and although both the male and female have bare skin around the eye, only the male develops a large, brightly colored, naked wattle in this area. The VELVETY ASITY (*Philepitta castanea*) is common in the humid forests of eastern Madagascar. The FALSE SUNBIRD (*Neodrepanis coruscans*) belongs to this family although it is very similar to Sunbirds in appearance and its habit of feeding on nectar.

FAMILY MENURIDAE: LYREBIRDS

The largest members of the vast array of Perching Birds are the wonderful Lyrebirds of Australia. Two rooster-sized species comprise the family. The vocal prowess of the males is reported to be almost incredible. As mimics they can master the calls of Owls, the famous Laughing Jackass, the voices of people, industrial noises, the rustling of Parrot wings in flight, and even automobile horns. They build large mounds which serve as a stage on which the resplendent males deliver remarkable concerts and displays.

The SUPERB LYREBIRD (*Menura novaehollandiae*) has an enormously developed tail. ALBERT'S LYREBIRD (*M. alberti*) has a tail much less developed.

FAMILY ATRICHORNITHIDAE: SCRUB-BIRDS

The family of Scrub-birds is represented by 2 species, one of which is exceedingly rare or perhaps extinct. Both are exclusively Australian and are particularly interesting because, in song, ventriloquial powers, and nesting habits they appear to be close relatives of the comparatively huge Lyrebirds. Whereas the latter reach a length of 2½ to 3 feet, the Scrub-birds range only between 7 and 9 inches in length. These primitive Perching Birds feed on insects, small Snails and their eggs, and they creep about in the shadows of the jungle floor, rarely flying; indeed, they are probably incapable of it. The NOISY SCRUB-BIRD (*Atrichornis clamosa*), which may be extinct, was to be found in western and southwestern Australia. In eastern Australia lives the RUFIOUS SCRUB-BIRD (*A. rufescens*), similar to the Noisy Scrub-bird in general appearance and habits, but living much closer to areas of human population. It is still fairly common.

FAMILY ALAUDIDAE: LARKS

This family contains 75 species, most of which are more easily recognized by their song than by sight. Representatives range over most of the non-polar land areas of the world, with a great concentration occurring in Africa. The New World has only one species and Australia only 2. Larks are birds of open areas, deserts, beaches, plowed ground, grasslands, and river edges. They have greatly increased in many areas as a result of the removal of forests by man. Larks habitually sing on the wing, often while soaring, as well as on the ground. All Larks nest on the ground, the female building and attending the nest. The most famous member of the family is the SKYLARK (*Alauda arvensis*), one of the most beautiful of songsters as well as one of the most abundant birds in Europe. Large numbers of Skylarks have been imported by individuals into Australia, New Zealand, Vancouver Island, and Long Island, and in all areas except Long Island they are thriving. The single native species found in North America is the HORNED LARK (*Eremophila alpestris*).

FAMILY HIRUNDINIDAE: SWALLOWS AND MARTINS

Many of the 74 species of Swallows are intimately associated with man, particularly with farmers, who benefit from their insectivorous habits. Swallows are nearly cosmopolitan in distribution. They are wonderfully graceful birds that obtain all their food on the wing, coursing through the air in smooth, flowing flight. Swallows, among the best known of all birds, are subject to several popular misconceptions. In their migration they are remarkably punctual and cover prodigious distances between their wintering and breeding homes, but they are strongly influenced by weather and food supply and do not always arrive on the same day each year. Some species, seemingly overnight, have given up nesting on cliffs and trees to nest in association with man, particularly in his barns and houses. The PURPLE MARTIN (*Progne subis*) breeds in North America and the West Indies and winters southward to Brazil. It nests in natural tree cavities in colonies.

These friendly birds also take readily to man-made houses and are well known and welcome visitors. The CLIFF SWALLOW (*Petrochelidon pyrrhonota*), which breeds in North America and winters in South America, is a hardy colonial bird which builds its bottle-like mud nest under eaves of buildings, under bridges, and on trees and cliffs.

FAMILY PSEUDOCHELIDONIDAE: AFRICAN RIVER MARTIN

This large, Swallow-like bird is little known and its breeding ground was not discovered until 1921 in the middle reaches of the Congo River. The AFRICAN RIVER MARTIN (*Pseudochelidon eurystomina*) secures all of its food on the wing, and because of its specialized feeding habits, like all Swallows, is rare in collections.

FAMILY PRIONOPIDAE: HELMET SHRIKES OR WOOD SHRIKES

Helmet Shrikes are restricted to Africa except for one doubtful species appearing in Borneo. For the most part Helmet Shrikes are dull-colored birds feeding primarily on insects, but also eating small quantities of fruit and even Lizards. The WHITE HELMET SHRIKE (*Prionops poliocephalus*) is typical of the group. The incubation and feeding of the young seems to be performed by random birds belonging to the flock.

FAMILY VANGIDAE: VANGA SHRIKES

Vanga Shrikes comprise 11 species of medium-sized birds restricted to the forests and bushy grasslands of Madagascar. In the geographical isolation provided by this island, these birds have evolved into a great diversity of forms. This is especially noticeable in their bills. Some of the species are the BLUE VANGA (*Cyanolanius madagascarinus*), the WHITE-HEADED VANGA (*Artamella viridis*), and the HELMET BIRD (*Euryceros prevosti*).

FAMILY CRACTICIDAE:

BELL MAGPIES, AUSTRALIAN BUTCHER-BIRDS, AND PIPING CROWS

Eleven species from Australia and New Guinea make up this small family of birds ranging from the size of Jays to that of Crows. Some have extraordinary habits, including tool-using and certain social behavior patterns. The largest members of the family are the Piping Crows which reach more than 20 inches in length. The SQUEAKER (*Strepera versicolor*) appears on the forest edges and grasslands of Australia and like other Piping Crows is rather unpopular with man because of the damage it does to fruit orchards. The WESTERN MAGPIE (*Gymnorhina dorsalis*) is a Magpie-like 17-inch bird, interesting because it happens to favor wire for nesting material and telephone poles for nest sites. One nest contained 238 separate pieces of wire, ranging from something over 4 inches to more than 4 feet in length; the wire weighed nearly 5 pounds and had a combined length of 234 feet. These iron and steel fortresses seem to have no function other than to hold from 2 to 5 greenish-buff eggs.

FAMILY LANIIDAE: SHRIKES OR BUTCHER BIRDS

The Old World is the true stronghold of this family, all but 2 species occurring there. The beak is unique among the Perching Birds in that it is generally Falcon-like, having a strong, rapacious hook followed by a tooth-

like projection that serves in dismembering prey. Shrikes are essentially carnivorous and the largest part of their food consists of insects. Shrikes impale their victims on sharp thorns which hold the carcass while it is dismembered. The 2 members of the family that reach the New World, the **LOGGERHEAD SHRIKE** (*Lanius ludovicianus*), ranging throughout the Northern Hemisphere, and the **NORTHERN SHRIKE** (*L. excubitor*) of North America, are very similar. The latter breeds in Canada and visits the United States in winter. The **GREY-HEADED BUSHSHRIKE** (*Malaconotus blanchoti*), a beautiful inhabitant of Africa, is one of the larger Shrikes. It has a particularly melodious call. Our first specimen arrived in 1959.

FAMILY ORIOLIDAE: OLD WORLD ORIOLES

The true Orioles consist of 34 species of brightly colored, medium-sized birds that occur in Eurasia, Africa, and thence southeast through Madagascar, Ceylon, the East Indies, New Guinea, and Australia. They bear a superficial resemblance to the Orioles of the New World but are not closely related to them. The prevailing colors found in the group are yellow, green, and brown, females being duller than males. The **BLACK-HEADED ORIOLE** (*Oriolus larvatus*) of Africa is an excellent mimic and employs an elaborate courtship display. Typical of the Old World Orioles, these birds eat Caterpillars and other insect food.

FAMILY DICRURIDAE: DRONGOS

The 20 species comprising this sharply circumscribed family are found in Africa, southern Asia, the Philippines, and the islands of the southwest Pacific as far east as the Solomons. Drongos are mostly Jay-sized birds with tails of varying length and ornamentation. Many have crests. Their predominate color is shiny-black with the sexes alike. The primary food of Drongos is insects, ranging from Termites to large Dragonflies, Cicadas, Grasshoppers, and Spiders. The basket-like nest is generally made of lichens, plant fibers, and Spider silk. Drongos are birds of the forests and bamboo jungles. The **GREATER RACKET-TAILED DRONGO** (*Dicrurus paradiseus*) is perhaps the most ornate of the family.

FAMILY ARTAMIDAE: WOOD-SWALLOWS

Wood-Swallows are the finest of Passerine fliers, and excepting the Ravens, the only Perching Birds known to soar. Ten species of these superficially Swallow-like birds live in the Indo-Malayan and the Australian-New Guinea regions. All are highly gregarious. Certain species carry their social life to the extreme. When sleeping together, one bird will stand upon another to form compact knots of birds. Their food consists entirely of insects captured in the air. The largest member of the family is the **WHITE-BROWED WOOD-SWALLOW** (*Artamus superciliosus*) of Australia.

FAMILY STURNIDAE: STARLINGS

The nearly cosmopolitan **COMMON STARLING** (*Sturnus vulgaris*) is a good example of the highly gregarious small to medium-sized birds that make up this originally Old World family of 110 species. The Starling was introduced into this country in 1890 and is now one of our commonest birds and a great pest. Other Starlings that have been widely spread by man are

the famous talking Mynahs and other Mynahs of southern Asia. All Starlings feed primarily on insects and fruits and usually nest in cavities of trees, walls, or cliffs. One species, the GLOSSY STARLING (*Aplonis metallica*), builds large, intricate nests which are pendulous and closely linked together. The Glossy Starling is highly gregarious and is found between sea level and 5,000 feet in New Guinea. The African WATTLED STARLING (*Crotaphaga cinerea*), is seasonally bald. During the breeding season the male sheds the feathers of its head and grows long wattles. The AFRICAN TICK BIRD or OXPECKER (*Buphagus africanus*) and the RED-BILLED TICK BIRD (*B. erythrorhynchus*), both of Africa, are commonly known for their strange habit of riding on backs of a wide assortment of animals, ranging from domestic Cattle to Rhinoceroses. They pluck insects from the animal's skin and also consume insects stirred up by the animal as it moves through an area. The ROYAL STARLING (*Cosmopsarus regius*) of Africa feeds almost entirely on insects and breaks open Termite nests to feed on the inhabitants. It is one of the most beautiful of all Glossy Starlings and is rare in captivity. The SUPERB GLOSSY STARLING (*Spreo superbus*) makes a complex domed nest on the top of horizontal limbs. It is gregarious, numerous, tame, and fearless of man, and highly beneficial. The GREATER INDIAN HILL MYNAH (*Gracula religiosa*), frequently kept as a cage bird and famous for its talking abilities, ranges throughout India, Indo-China, and Malaysia. Other species occur in the same area. These birds feed primarily on fruits and must be trained to talk. Certain individuals show more aptitude in this respect than others.

FAMILY CORVIDAE: CROWS, MAGPIES, AND JAYS

An even 100 species comprise the family Corvidae, which has representatives on all of the non-polar land areas of the world except New Zealand and a few parts of Polynesia. Crows, Magpies, and Jays range from medium to large in size, and some of the Crows are the largest of all Passerines. The great majority are omnivorous, eating carrion, insects, seeds, fruits, the eggs of reptiles and birds, nestlings and even small reptiles. They are active, wily birds that are noted for their "intelligence." Like many of the Parrots and some Starlings, Crows can learn to "speak," and like the Parrots they are good at solving puzzles and at feats of "memory." Splitting the tongue of these birds does not improve their talking abilities. The AMERICAN COMMON CROW (*Corvus brachyrhynchos*) of North America and the CARRION CROW (*C. corone*) of western Europe are typical Crows. These birds gather in roosting flocks which in North America sometimes number 40,000 birds. They are long-lived and uncommonly hard to approach because of their alertness and wariness. The Ravens are the largest of Passeriform birds. The COMMON RAVEN (*C. corax*), which is some 25 inches long, is found around the world in the Northern Hemisphere, a typical distribution of the group. Their diving courtship flights involve spectacular acrobatics. The well-known AMERICAN BLUE JAY (*Cyanocitta cristata*) is colorful, as are most Jays. STELLER'S JAY (*C. stelleri*), of the pine forests of western North America from Alaska south to Nicaragua, is about

a foot long. The CANADA JAY (*Perisoreus canadensis*) readily steals bait from traps and enters houses to eat anything from soap to tobacco. The MAGPIE JAY (*Calocitta formosa*) inhabits arid lowlands of Mexico. This is a bold, inquisitive bird of 20 to 28 inches in length, with a very prominent crest of feathers. Magpies are world-wide in distribution. The BLACK-BILLED MAGPIE (*Pica pica*) ranges around the world in the Northern Hemisphere. The nest of the Magpie is quite an elaborate affair, being a stick structure that is domed and reinforced internally with a kind of mud masonry. The RED-BILLED BLUE MAGPIE (*Urocissa erythrorhyncha*), 17 inches in length, is one of the notable birds of the mountains of Asia. Like many Magpies and Jays, it often goes about in small groups. One of the most unusual members of the family is the RED-BILLED CHOUGH (*Pyrrhocorax pyrrhocorax*) of Eurasia and northern Africa. It has a strong, buoyant, and frequently acrobatic flight. The YELLOW-BILLED or ALPINE CHOUGH (*P. graculus*) frequents remote mountain precipices and steep pasture lands far above tree lines. This species has been seen at 27,000 feet on Mount Everest, which is very near the ceiling for birds.

FAMILY CALLAEIDAE: WATTLED CROWS, HUIAS, AND SADDLEBACKS

This group of odd and interesting birds is restricted to New Zealand. Three species make up the family and all are very different in appearance. The SADDLEBACK (*Philesturnus carunculatus*) was once abundant on all the islands of New Zealand. However, there are no recent reports of them from South Island and Stewart Island. Saddlebacks travel in pairs or small groups and hunt in company with other birds. Their chief food consists of grubs, insects, and berries. The WATTLED CROW or KOKAKO (*Callaeas cinerea*) has been called New Zealand's most versatile and beautiful songster. A large, pendant gape wattle gives the species its name.

FAMILY GRALLINIDAE: MAGPIE-LARKS

This family is composed of 4 species ranging in size from Thrushes to Crows. They live along the shores of rushing forest streams in New Guinea, as well as around waterways and mud flats, and in the open woodlands of Australia. Although apparently different from each other, they all employ the same unusual type of architecture for their nests, which resemble large earthenware bowls. The MAGPIE-LARK or MUDLARK (*Grallina cyanoleuca*) of Australia feeds on insects and small Snails. Recent evidence indicates that perhaps they pair for life. The APOSTLE-BIRD (*Struthidea cinerea*), which is found in open forests over most of Australia, is named after the Apostles because it travels in flocks of about 12. It feeds mostly on the forest floor on insects and seeds.

FAMILY PARADISAEIDAE: BIRDS OF PARADISE

Birds of Paradise, close relatives of Crows, are found only in New Guinea and Australia. 43 species are known. The smallest are Starling-sized and the largest Raven-sized with yard-long tails. In plumage they range from simple type to those with elaborate plumes. The males of many species carry such ornamentation. This appears to require 3 to

5 years for full development. The females are dull and quite different looking. The first plumes to reach Europe were the result of Magellan's Expedition in 1522. So strikingly beautiful were the plumes that the birds were said to be wanderers from Paradise and this accounts for their vernacular name. At one time more than 50,000 skins annually were exported from New Guinea for millinery purposes. Today, plume taking is prohibited. Their great tails and other extraordinary plumes are used in courtship display. The mouths of some species, when open, reveal jade and opal-colored surfaces which are exhibited in the courtship display. Birds of Paradise do not sing, but make a wide variety of sounds ranging from weak peeps and mews to caws, buglings, trumpeting, snaps, hisses, raps, and even clatterings that sound like bursts from a machine gun. Other calls are long, melancholy, bell-like tolls that reverberate ventriloquially. The purpose of these displays is to attract mates, usually as many as the male can entice to his bower or display nest. These polygamous birds keep close to their bowers for many months each year. Some species remain on or near a limb where they display for as long as 10 hours per day, hardly taking time to eat. The usual term of attendance is several hours in the morning and in the late afternoon. A few species indulge in communal dancing, but in others the bower is the territory of a single male and he vigorously defends it against males of his species. Except in the most primitive of species the female alone builds the nest and rears the young. One species nests in holes in trees and another in a dome nest of vines and moss with a side entrance, but most make bowl-shaped nests. As far as is known all of these birds lay one or 2 eggs. The PARADISE CROW (*Lycocorax pyrrhopterus*) of the Moluccas is a silky-textured, Crow-like bird some 15 inches in length. The NEW GUINEA MANUCODE (*Manucodia ater*) male assists the female in the care of the young. The CURL-CRESTED MANUCODE (*M. comri*) of the D'Entrecasteaux and Trobriand Islands is Crow-sized and completely covered with crinkled, highly iridescent feathers, which on the head, form an odd-looking "bun." The TRUMPETER MANUCODE (*Phonygammus keraudreni*), which also occurs in the Australian region, has a broad collar of lanceolate feathers that completely encircles the neck so that, when displaying, the bird seems to be thrusting its head through a feather umbrella. The basic type Birds of Paradise are the WATTLED BIRD OF PARADISE (*Paradigalla carunculata*) and MacGREGOR'S BIRD OF PARADISE (*Macgregoria pulchra*), both of the mountain forests of New Guinea. KING ALBERT'S SICKLE-BILL (*Drepanornis albertisi*) of the high mountains of New Guinea has iridescent purple-blue horns in front of the eyes. The largest of all Birds of Paradise is the BLACK SICKLE-BILL (*Epimachus fastosus*). The RIBBON-TAILED BIRD OF PARADISE (*Astrapia mayeri*) is restricted to the high forests of New Guinea and is the last species of Bird of Paradise discovered and one of the longest of Passerine birds. Its central pair of tail feathers may be 36 inches in length. The MAGNIFICENT RIFLE BIRD (*Craspedophora magnifica*) represents a group of which there are 3 species in New Guinea and Australia. The TWELVE-WIRED BIRD OF PARADISE (*Seleucidides ignotus*) keeps to the sago swamps of central and

western New Guinea. The species is named for the peculiar shape of 6 plumes growing from each flank of the male. A highly interesting group is the Flagbirds. The males of this group have wire-like flag plumes growing from the head near the ears. The KING OF SAXONY BIRD OF PARADISE (*Pteridophora alberti*), a 7-inch bird, has crown plumes that reach 18 inches in length. Another of the Flagbirds, the SUPERB BIRD OF PARADISE (*Lophorina superba*), is Thrush-sized. It has a huge crown fan composed of at least 120 feathers, each 3 to 6 inches long. Other species are the MAGNIFICENT BIRD OF PARADISE (*Diphyllodes magnificus*) and WILSON'S BIRD OF PARADISE (*D. respublica*). Two unusual species are the LADY MacGREGOR BIRD OF PARADISE (*Loria lorinae*) and the GOLDEN-SILKY BIRD OF PARADISE (*Loboparadisaea sericea*), which is small and very little known. The KING BIRD OF PARADISE (*Cincinnurus regius*) is the smallest of the family and one of the most widespread and beautiful. It has recently been bred in captivity. It is sometimes called the Money-bird because of the coin-like tips on its wire-like plumes. The LESSER BIRD OF PARADISE (*Paradisaea minor*) is restricted to the New Guinea region. Countless thousands of these birds were killed for their feathers during the height of the feather trade. The GREATER BIRD OF PARADISE (*P. apoda*) is found in the Aru Islands and on the island of Little Tobago in the West Indies where it was introduced in 1909. The EMPEROR OF GERMANY BIRD OF PARADISE (*P. guilielmi*) hangs inverted during its courtship display.



LESSER BIRD OF PARADISE—*Paradisaea minor*

FAMILY PTILONORHYNCHIDAE: BOWERBIRDS

Bowerbirds are unique among birds in their use of tools and their skill as architects. They range in size from a small Thrush to a small Crow. Their bowers are specially prepared dancing stages on the ground, each bower being built by and belonging to a single male. Some species, probably the most primitive ones, do not build bowers. Some Bowerbirds decorate their clearings with bright objects and erect elaborate houses for other than nesting purposes. In all there are 19 species in Australia and New Guinea. The bowers of each species follow precise patterns. Nearly all are decorated with natural treasures: small shells, insect skeletons, bright lumps of resins, seeds, pebbles, colorful feathers, small fruits of garish colors, in fact, any bright object that can be found. Another peculiarity is the mixing of pigments by 3 species and the actual painting of the walls of the bower. These bowers are intimately related to courtship and sexual behavior. The GOLDEN BOWERBIRD (*Prionodura newtoniana*) of Australia is the smallest of all Bowerbirds and hardly larger than a Starling, yet it builds a stick edifice that sometimes reaches a height of 9 feet. The GOLDEN-FRONTED BOWERBIRD (*Amblyornis flavifrons*) of New Guinea is presumably extinct; identified from plumes many years ago, no evidence of it has since been found. The SATIN BOWERBIRD (*Ptilonorhynchus violaceus*) and the REGENT BOWERBIRD (*Sericulus chrysocephalus*) of Australia and the BLACK-FACED GOLDEN BOWERBIRD (*S. aureus*) of New Guinea are among the most highly developed Bowerbirds and in these species the males are highly colored. In the SPOTTED BOWERBIRD (*Chalamydera maculata*) and the GREAT GRAY BOWERBIRD (*C. nuchalis*) of Australia, the sexes are colored alike. All the Bowerbirds referred to above, except the Golden Bowerbird, are avenue builders, constructing bowers of intricately meshed platforms the size of large doormats and several times as thick. Down the middle of these stick mats they insert 2 firm walls of vertical sticks. These walls are just wide enough for the birds to promenade between without scraping their shoulders. The Satin and the Regent mix a muddy, greyish-blue, pea-green kind of saliva paint in their mouths and apply it generously to the inner walls of their avenues. The Satin uses a wad of bark and the Regent sometimes uses a wad of greenish leaves to assist in spreading the paint. The Spotted Bowerbird is also a painter.

FAMILY BOMBYCILLIDAE: WAXWINGS AND SILKY FLYCATCHERS

In the Waxwings of which there are 3 species ranging around the world in the Northern Hemisphere, the sexes are alike. These are arboreal birds that feed chiefly on berries but also on some insects. In the CEDAR WAXWING (*Bombycilla cedrorum*) of North America a curious habit has developed. A flock will perch on a limb and one member will pass a berry or a similar object to the next member right on down the line. Slightly larger and more colorful are the BOHEMIAN WAXWING (*B. garrulus*) of Europe, Asia, and North America and the JAPANESE WAXWING (*B. japonica*) which breeds in eastern Asia and winters in southern China and Japan.

The Silky Flycatchers consist of 3 species of sharply crested, slender birds found from the southwestern borders of the United States to Panama. Unlike the Waxwings, the sexes are quite differently dressed. These birds are chiefly insectivorous, but they also eat some berries and other fruits. The species are the PHAINOPEPLA (*Phainopepla nitens*) of the southwestern United States and Mexico, the BLACK AND YELLOW SILKY FLYCATCHER (*Phainoptila melanoxantha*) of the highlands of Costa Rica and Panama, and the GRAY SILKY FLYCATCHER (*Ptilogonys cinereus*) of Mexico to Guatemala.

FAMILY DULIDAE: PALM CHAT

The PALM CHAT (*Dulus dominicus*) is found on the West Indian islands of Hispaniola and La Gonave. These are highly gregarious birds and build huge, communal, domed nests. They are purely arboreal, and hunt through trees or bushes searching for berries or flowers which comprise their diet.

FAMILY CAMPEPHAGIDAE: CUCKOO-SHRIKES AND MINIVETS

Cuckoo-shrikes range from Africa through the warmer parts of Asia and Malaysia to New Guinea and the Solomon Islands. Some are as large as common street Pigeons; others the size of Sparrows. All have the habit of searching for food among leaves and bark, feeding on insects, berries, and very small Lizards. In general, they are somber birds with the sexes very different from one another, the female being the conspicuous one. The WATTLED CUCKOO-SHRIKE (*Lobatus lobatus*) of Africa is a very rare bird, has conspicuous lobes under the eyes, and is about the size of an Old World Oriole. Minivets differ sufficiently from the Cuckoo-shrikes to warrant the designation of a special sub-family for them. The ORANGE MINIVET (*Pericrocotus flammeus*) is found from India and China to the Philippines and Malaysia. The ASHY MINIVET (*P. roseus*) is less colorful and nests in Asia and Japan, migrating to the Philippines and the Malay region.

FAMILY PYCNONOTIDAE: BULBULS

Throughout the Old World tropics from Africa to the Philippines, Bulbuls are among the most common, most numerous, and best known of all garden birds. Generally they have an abundant amount of plumage on their rump and many species are crested. 109 species are known and except for yellow, bright colors are rare in this group. Bulbuls are quite gregarious, often going about in noisy flocks in search of berries and other fruits, insects, and Spiders. Many species also drink nectar. The YELLOW-VENTED BULBUL (*Pycnonotus goiavier*) is probably the most abundant and best known bird in the Philippines. The family is most numerous in Africa. The BROWN-CAPPED GEELGAT (*P. tricolor*) probably mates for life and like many other Bulbuls is persecuted by farmers for feeding on cultivated fruit. Bulbuls are chiefly sedentary birds although many species move about in a kind of limited migration. The GREEN-TAILED BRISTLE-BILL (*Bleda eximia*) was shown once in 1959 in our collection. The nest and eggs of this species have not been observed. Its range is West and Central Africa.

FAMILY IRENIDAE: FAIRY BLUEBIRDS, IORAS, AND LEAFBIRDS

All members of this family are fruit eaters, ranging widely through the Oriental region of southern Asia to the Philippines and southward to the islands of Indonesia. The BLUE-BACKED FAIRY BLUEBIRD (*Irena puella*) is the most colorful and the largest species, having a length of 10 inches. Typical of the Leafbirds is the GOLDEN-FRONTED LEAFBIRD (*Chloropsis aurifrons*) of the Oriental region. Their outstanding characteristic is the sweetness of their notes and their ability to imitate the calls of many other birds.

FAMILY TIMALIIDAE: BABBLING THRUSHES

The Babblers are an extraordinarily diversified family dwelling in Africa and the Oriental and Australian regions. Most of the species are sedentary and skulk near and on the bottom of forests or among bushes and scrubby grasslands. They generally travel in troops, squeaking, cheering, and babbling. The first captive BLACK-WINGED BABBLERS (*Phyllanthus atripennis*) seen in this country were exhibited in our collection in 1959.



WHITE-CRESTED JAY-THRUSH—*Garrulax leucolophus*

They are native to central Africa. The nest and eggs of this species are unknown. The SPOTTED BABBLER (*Pellorneum ruficeps*) builds a globular nest of fallen leaves, grass, and moss on the floor of thick forests. The NEW GUINEA SCIMITAR BABBLER (*Pomatostomus isidori*) builds a long, hanging nest with a canopied side entrance, suspended from a single strand of vine. Scimitar Babblers have long, slender, and sharply curved bills, superficially resembling the Thrashers of the New World, and have rich voices. A famous member of the family is the SPINY BABBLER (*Turdoides nipalensis*) of Nepal and adjacent areas. It was discovered and then for over 100 years was not seen again until 1949. The COMMON BABBLER or SEVEN SISTERS (*T. striatus*) of India and Ceylon moves about in flocks of about 7, constantly uttering grating noises. The WHITE-CRESTED JAY-THRUSH (*Garulax leucolophus*), ranging widely in the Oriental region, is a member of a group of Babblers sometimes called Laughing Thrushes. This bird is commonly kept in captivity and is noted for its erectile crest. The rare BLUE EUPETES RAIL BABBLER (*Eupetes leucostictus*) of New Guinea is one of the more beautiful members of this family. The unusual WREN-TIT (*Chamaea fasciata*) of California and coastal Oregon is thought by most naturalists to be the only American Babbler. The so-called PEKING NIGHTINGALE (*Leiothrix lutea*), native of Asia, has been introduced successfully into Hawaii and is a common cage bird in America.

FAMILY PICATHARTIDAE: BALD CROWS

In the western part of Africa there live 2 little known, bald-headed species of birds, which, although very different from all other birds, superficially resemble slender Crows. They are the WHITE-NECKED PICATHARTES (*Picathartes gymnocephalus*) and the GRAY-NECKED PICATHARTES (*P. oreas*). They have only recently been seen in captivity. Sexes are patterned alike and feed on animal food. Their relationship to other birds is in dispute and their classification here is tentative.

FAMILY PARADOXORNITHIDAE: PARROTBILLS OR SUTHORAS

A strange group of birds numbering 14 species occurs in the mountains of central Asia and the Orient. Although having bills similar in appearance to those of Parrots, they have no relation whatever with that group. A typical species is GOULD'S PARROTBILL (*Paradoxornis flavirostris*) living in the hills of middle Asia from Assam to China. This group eat insects, berries, and seeds.

FAMILY MUSCICAPIDAE: KINGLETS AND OLD WORLD FLYCATCHERS

Members of this family feed almost entirely on insects captured in flight. The family consists of about 378 species. The typical Flycatchers, many of which are migratory, are widespread throughout the Old World. Few of these are seen in collections because of their specialized feeding habits. The SPOTTED FLYCATCHER (*Muscicapa striata*) is a common garden bird of Europe. The most beautiful Flycatchers and, indeed, among the most beautiful birds of the world are the Paradise Flycatchers, which range from Africa through Asia to Australia. The INDIAN PARADISE FLYCATCHER (*Terpsiphone paradisi*) has 2 middle tail feathers greatly elongated and

ribbon-like. The Fan-tails are a large group of Old World Flycatchers found in Australia, New Zealand, New Guinea, the Philippines, and many remote islands of the Pacific such as the Fijis. All have the habit of waving the long fan-like tail while perched. The WILLIE-WAGTAIL (*Rhipidura leucophrys*) is found in the Australian and New Guinea region and is a typical representative. Included in this family are the Kinglets, or Goldcrests as they are called in the Old World, which are among the smallest of birds and among the world's finest songsters. Kinglets are insectivorous, very active, fearless and unsuspecting, and travel together in a band. The New World species are the RUBY-CROWNED KINGLET (*Regulus calendula*) and the GOLDEN-CROWNED KINGLET (*R. satrapa*).

FAMILY SYLVIIDAE: OLD WORLD WARBLERS

Old World Warblers are generally excellent songsters and in this respect are very different from the Wood Warblers of the New World. 359 species are included in the family. Chiefly insect eaters, they capture their food by searching leaves and crannies, and not by aerial pursuit as do the Flycatchers. Many of these species are highly migratory, breeding in the temperate zone and wintering in the tropics. In southeastern Asia and the Philippines are found the Tailorbirds, interesting members of the family because of their ability to use their bill as a tool for sewing in constructing their nests. A member of this group is the INDIAN TAILORBIRD (*Orthotomus sutorius*) in which it is believed the sexes remain mated for life. Members of the family, the Gnatcatchers, occur between the United States and Brazil and are well represented by the BLUE-GRAY GNATCATCHER (*Poliophtila caerulea*) which breeds in the warmer part of the United States, building beautiful lichen-covered nests. Many of the southwestern Pacific species of this family are colorful birds, such as the BANDED BLUE or MORMON WREN (*Malurus elegans*), so called because of the apparent excess of females in its groups.

FAMILY ZELEDONIIDAE: WREN-THRUSH

This little-known species, the WREN-THRUSH (*Zeledonia coronata*), is an obscure, stocky little bird living between 6,000 and 10,000 feet above sea level in Costa Rica and western Panama.

FAMILY TURDIDAE: THRUSHES AND ALLIES

The nearly cosmopolitan family of Thrushes consists of 304 species of small to medium-sized Perching Birds closely related to the Old World Flycatchers. They are chiefly insectivorous, but eat fruit also. Some of them are among the most exquisite songsters in the world. In the New World, the AMERICAN ROBIN (*Turdus migratorius*) is well known and widely loved. It is considerably different from its Old World relative, the EUROPEAN ROBIN (*Erithacus rubecula*). Confined to the New World are 3 species of Bluebirds. The EASTERN BLUEBIRD (*Sialia sialis*) nests chiefly in eastern North America north to Newfoundland. A close relative is the MOUNTAIN BLUEBIRD (*S. currucoides*) of western North America. The WESTERN BLUEBIRD (*S. mexicana*) ranges from Central America to western Canada. The HERMIT THRUSH (*Hylocichla guttata*) is renowned

for its fine song. In Eurasia and Africa the variety of Thrushes is much greater than in the New World. Some are very colorful. The SNOWY-HEADED ROBIN CHAT (*Cossypha niveicapilla*) is one of the finest songsters in Africa and an excellent mimic. It is little known and was first seen in this country in our collection in 1959, as was the smaller FOREST ROBIN (*Stiphrornis erythrothorax*), also of Africa. The NIGHTINGALE (*Luscinia megarhynchos*) is the peer of Eurasian songsters. The Cochoas are a group of 3 very interesting, rare species of tropical Asia and Malaysia. These are brightly colored birds, keeping entirely to trees. Among them is the GREEN COCHOA (*Cochoa viridis*) of the Himalayas.

FAMILY MIMIDAE: THRASHERS, CATBIRDS, AND MOCKINGBIRDS

Many of the 30 species in this family resemble giant Wrens. All are restricted to the New World where they are concentrated in tropical America. All have highly developed songs and their coloration is generally restricted to grays and browns. Thrashers are Thrush-sized birds of the forest areas and bushy grasslands, occurring over most of North America. The best-known species, the BROWN THRASHER (*Toxostoma rufum*) of eastern North America, subsists, like all Thrashers, chiefly on insects it gathers among dead leaves close to or on the ground. It also eats some fruit. Like so many of the family, the Brown Thrasher is a splendid musician. One of the best-known species is the familiar AMERICAN CATBIRD (*Dumetella carolinensis*) which breeds from British Columbia south to the Gulf of Mexico and winters south to Central America. This Thrush-sized bird has an unmistakable mewling Cat-like call and often lives close to man, coming into his gardens and nesting in his ornamental bushes. The Mockingbirds, of which there are 9 species extending from Oregon, Ohio, and New Jersey southward to Patagonia, are the most gifted of New World songsters. Only one, the COMMON MOCKINGBIRD (*Mimus polyglottos*) occurs in the United States, but all are much alike in form and color and all are superb singers and mimics. Mockingbirds have been introduced in Hawaii where they now live as wild birds. Some time ago some Mockingbirds became marooned on the Galapagos Islands. There they have evolved along distinct lines so that today the 4 species of Galapagos Mockingbirds have a bill longer and much more compressed, and the legs longer and stronger, than any of the continental species. No less than 4 genera of this family are confined to the West Indies and 3 of these are found only in the Lesser Antilles. The rarest species is the WHITE-BREASTED THRASER (*Ramphocinclus brachyurus*), now reduced to a small population in one section of the island of St. Lucia.

FAMILY TROGLODYTIDAE: WRENS

Wrens occur around the world in the Northern Hemisphere and in the New World they are abundant and diversified, especially in Central and South America. None of the 63 species is gaily colored. An unusual characteristic of Wrens is their habit of keeping together in close-knit families to participate in the task of housekeeping, often with the young of one generation assisting the parents in the feeding of their second-brood

brothers and sisters. Wrens are splendid songsters and some of them rival the Nightingale in sweetness of tone. One of the most beautiful of bird songs is that of the ORGAN BIRD (*Cyphorhinus arada*) of Amazonia. Wrens build retort-shaped nests, often with long, flask-like entrance tunnels entered through the side. Cavities in broken and dead trees, old Woodpecker holes, and crevices in cliffs and buildings are also used. Some species of Wrens sleep singly in their false nests or crevices or holes. Others sleep in pairs and some in family groups. The WINTER WREN (*Troglodytes troglodytes*) of Iceland, Europe, Asia, and North America from Alaska south to the Gulf of Mexico, the HOUSE WREN (*T. musculus*) of Central and South America, and the NORTHERN HOUSE WREN (*T. aedon*) of North America, represent the best known group of Wrens. They are among the most extensively studied of all wild birds.

FAMILY CINCLIDAE: DIPPERS OR WATER OUZELS

Dippers are large relatives of Wrens which live a hardy life close to mountain streams throughout vast areas of the New and Old Worlds. They are at home along the edges of plunging, often ice-cluttered, streams, in Alaska, the Rocky Mountains, the cordillera of Central America, the high Andes, and the mountains of Scandinavia, Europe, and Asia including Japan. In such environs they sometimes cope with temperatures of 50° F. below zero and regularly feed beneath the surface of frigid, turbulent waters. Except in the winter in a few northern ranges they are non-migratory and remain in their lofty havens, which in the Himalayas may reach 12,000 feet. Five species are known and all are closely related. The sexes are always alike and the birds are usually found alone or in pairs. On the surface of the water they swim and dive like miniature Grebes. They swim very rapidly under water, propelling themselves with their wings. Their prey consists of Waterbeetles, Caddis Flies, insect larvae, and Snails. They nest close to running streams in clefts around ledges, even those under waterfalls. The nests are large, globular, domed, and have side entrances, resembling the nests of Wrens. The NORTH AMERICAN DIPPER (*Cinclus mexicanus*) is found in high mountains between Alaska and Panama.

FAMILY PRUNELLIDAE: ACCENTORS OR HEDGE SPARROWS

The 12 known species of Accentors are all virtually confined to the Northern Hemisphere in the Old World. All are Sparrow-like in general appearance and are very hardy birds. The MOUNTAIN ACCENTOR (*Prunella montanella*) breeds in Asia and has strayed a few times to Alaska.

FAMILY PARIDAE: TITMICE AND CHICKADEES

Sixty-odd species of small, active, gregarious, unsuspecting, Perching Birds comprise the family Paridae. They are generally sedentary birds and their diet consists of insects, berries, and seeds. They range throughout the non-polar areas of the world with the exception of the Australian region, Polynesia, and the Americas from Guatemala southward. The true Titmice, of which there are 45 species, range around the world in the Northern Hemisphere and Africa. The GREAT TIT (*Parus major*) of Eurasia and Africa is one of the largest species. The BLACK-CAPPED CHICKADEE (*P.*

atricapillus) of North America belongs to this group. The 6-inch, Mouse-colored TUFTED TITMOUSE (*P. bicolor*) of the United States is one of the largest species in the family. The COMMON BUSH TIT (*Psaltriparus minimus*) of western North America builds a beautiful, pendant, felted nest reaching 10 inches in length. It is fabricated of animal hair, leaves, lichens, and mosses and has a side entrance spout. The VERDIN (*Auriparus flaviceps*) is found in the southwestern United States and northern Mexico.

FAMILY SITTIDAE: NUTHATCHES

Nuthatches are most numerous in the Northern Hemisphere and are frequently found close to human habitation. Their universal habit of moving in all directions on the trunks and large limbs of trees is well known. Nuthatches feed mostly on insects and Spiders, but they also feed on small nuts. A few non-typical species occur in Africa and in the Australian region. The WHITE-BREASTED NUTHATCH (*Sitta carolinensis*) of North America, from southern Canada to northern Mexico, is one of the most common and fearless of visitors to winter feeding stations in this country. Another North American species is the PYGMY NUTHATCH (*S. pygmaea*).

FAMILY CERTHIIDAE: CREEPERS

Creepers are slender, stiff-tailed, brown birds that scurry on the vertical surfaces of forest trees almost everywhere in the cooler parts of the Northern Hemisphere. The most wide-ranging of the 5 species is the BROWN CREEPER (*Certhia familiaris*). It dwells as far north as Alaska and northern Siberia and south to Nicaragua in the New World, and to Spain, Iran, Burma, and Japan in the Old World.

FAMILY MOTACILLIDAE: WAGTAILS AND PIPITS

Members of this family are distributed almost everywhere over the land areas of the world. The family consists of 48 species of semi-terrestrial, long-clawed, Sparrow-sized birds. They are insectivorous in their diet. "Tail-wagging" is very common in the Wagtails, hence their name. The species that breeds widely in Eurasia is the PIED or WHITE WAGTAIL (*Motacilla alba*). SPRAGUE'S PIPIT (*Anthus spraguei*) of the prairies of Canada and the northern United States is quite typical of this group.

FAMILY MELIPHAGIDAE: HONEY-EATERS

Honey-eaters are small to medium-sized, nectar-feeding birds of the southwestern Pacific region and Hawaii. All 160 species have the bill gently decurved and the tongue extensile and brush-like, forming an elongated tube through which nectar and nectar-drinking insects are carried to the throat. Their feeding habits are believed to assist in a major way in the pollination of the great eucalyptus forests of the Australian region. The largest member of this family is the PARSON BIRD or TUI (*Prothemadera novaezealandiae*). Once rather common and caught for cage birds because they could be taught to say a few words and to whistle, they are now rare. The BLACK HONEY-EATER (*Myzomela nigra*) of Australia is typical of the family. The RED WATTLE BIRD (*Anthochaera carunculata*) of Australia is more than a foot long, with a red wattle hanging behind each eye. A bird of doubtful affinities is the SUGAR BIRD (*Promperops cafer*) of South Africa.

FAMILY ZOSTEROPIDAE: WHITE-EYES

White-eyes live almost everywhere in the tropical forests of the Old World. The common name calls attention to the prominent rings of silvery feathers that almost invariably surround the eyes. Flower nectar is the major source of food for many species, but as a family they are primarily insect eaters. The family ranges over virtually all of Africa south of the Sahara, the islands of the Madagascar region, and the warmer parts of Asia from Arabia eastward to Japan, the Philippines, and Samoa, and southward to the Malayan and Australian region, including Tasmania, New Zealand, and Macquarie Island. White-eyes have also been introduced into Hawaii, where they are flourishing. The KIKIYU WHITE-EYE (*Zosterops kikuyuensis*) of Africa, chiefly a forest species, is found in small, cheerful flocks of up to 20 or more. It feeds on insects primarily but also eats berries, figs, and other fruit.

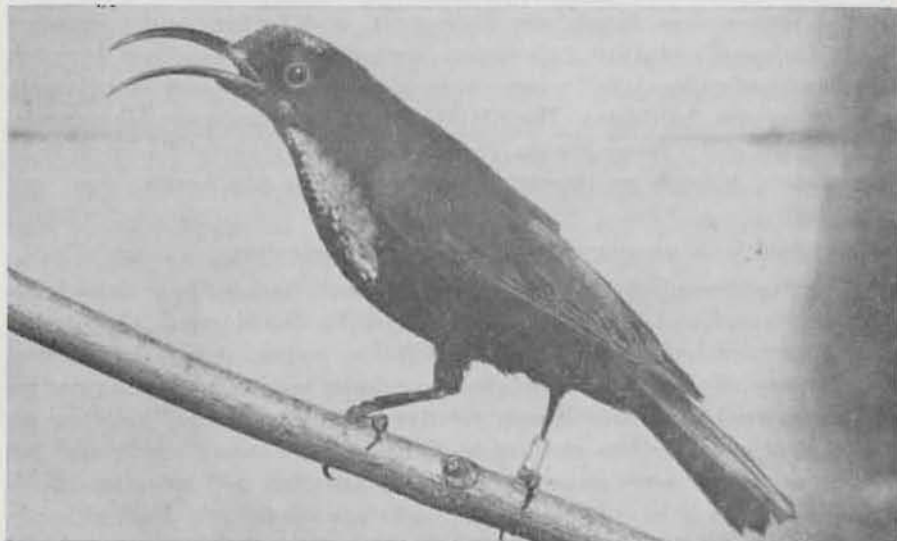
FAMILY DICAEDAE: FLOWERPECKERS

Among the colorful, strictly arboreal, small and medium-sized birds of the Oriental and Australian regions are 54 short-legged, short-tailed birds that feed largely on berries and flower nectar. A few insects and spiders are consumed. These birds have a tubular tongue for sucking nectar, as do the Sunbirds, their nearest relatives. All of the true Flowerpeckers are fond of sticky berries and seeds. These are swallowed whole and the seeds are vented with some of the sticky covering still adhering. Such seeds are apt to adhere to high limbs and since the favorite food of many Flowerpeckers is the seeds of the parasitic mistletoe, they are blamed for the dissemination of this destructive plant. True Flowerpeckers construct nests that are small, pear-shaped, pendent structures entered from the side near the top. One species is the MISTLETOE BIRD (*Dicaeum hirundinaceum*) of Australia. Others are the FIRE-BREASTED FLOWERPECKER (*D. ignipectus*) of India, the THICK-BILLED FLOWERPECKER (*D. agile*), and the RED-TIPPED DIAMOND BIRD (*Pardalotus substriatus*), both of Australia.

FAMILY NECTARINIIDAE: SUNBIRDS AND SPIDER-HUNTERS

Shimmering violets, amethysts, and fiery golds and reds glaze the bodies and flight feathers of these well-named creatures, the Sunbirds. Entirely restricted to the Old World, the 104 species are the ecological counterparts of the New World Hummingbirds, which so often they resemble superficially. However, the 2 families are very different, belonging to separate orders. Sunbirds range in length from some 3½ inches to about 8 inches. Generally the bill is slender and decurved, and the tongue is highly extensible and highly modified for feeding on nectar taken from many different kinds of flowers. Actually the tongue is formed into a tube that divides toward the tip to form 2 or 3 small extensions through which nectar may be drawn into the mouth. Sunbirds feed on insects, berries, and other fruits in addition to nectar. Male Sunbirds are usually very differently colored from the females, which are usually much duller. They are aboreal, essentially non-migratory birds that range from a center of abundance in Africa to the Philippines, New Guinea, and Australia. In addition to nectar,

some Sunbirds devour many kinds of small insects and Spiders. The female alone builds the nest, which is a purse-like, hanging structure some 6 inches long, fitted with a spout-like porch entrance. The male takes no part in incubation. We generally have several species of Sunbirds on exhibit, including the TACAZZE SUNBIRD (*Nectarinia tacazze*), the GOLDEN-WINGED SUNBIRD (*Drepanorhynchus reichenowi*), the AMETHYST SUNBIRD (*Chalcomitra amethystina*), and the SCARLET-BREASTED SUNBIRD (*C. senegalensis*),



SCARLET-BREASTED SUNBIRD—*Chalcomitra senegalensis*

all of Africa. The SHINING SUNBIRD (*Cinnyris habessinicus*) occurs in north-east Africa and Arabia and is a particularly colorful species.

FAMILY VIREONIDAE: VIREOS

Vireos are Warbler-sized birds that are generally solidly colored in greens, grays, and yellows. These small, protectively colored birds are found from Canada to Argentina, including the islands of the West Indies, between sea level and 10,000 feet. About 41 species are known and all feed mostly on insects and their larvae. The RED-EYED VIREO (*Vireo olivaceus*) ranges from Canada to Brazil. The WARBLING VIREO (*V. gilvus*), ranging from Canada to South America, has a beautiful warble and is often seen in parks and city streets. The RUFIOUS-BROWED PEPPERSHRIKE (*Cyclarhis gujanensis*) ranges from Mexico to Chile. This species is a good songster and receives its name from its similarity in feeding habits to the Shrikes.

FAMILY PARULIDAE: WOOD WARBLERS AND HONEYCREEPER WARBLERS

The Warblers constitute a New World group of small, usually colorful birds, that range from Alaska and Newfoundland south through Central America and the West Indies to Argentina. A large proportion of the approximately 125 species are migratory and the sexes are usually dressed very differently. Species in this family often hybridize, making identification questionable. Warblers are generally insect-eaters but a few eat

berries and other fruits. The CHESTNUT-SIDED WARBLER (*Dendroica pensylvanica*) of the eastern United States has greatly increased in numbers due to man-made changes in its habitat—the clearing of the forests of the eastern United States. The YELLOW-BREASTED CHAT (*Icteria virens*) is an able mimic. The customary form of its nest is an open cup in a tree or bush, but the OVENBIRD (*Seiurus aurocapillus*) erects a dome of dead leaves on the ground. The Bananaquits are small, nectar-eating Warblers that have long been classified in a separate family. They are now believed to be Warblers that have become modified for nectar-feeding. They range from Mexico to Argentina and into some West Indian islands. The COMMON BANANAQUIT (*Coereba flaveola*) is a widespread species of tropical Central and South America.

FAMILY DREPANIDIDAE: HAWAIIAN HONEYCREEPERS

This family of birds, ranging in size from small to medium, has evolved in isolation on the Hawaiian Islands and occurs in the large zoogeographical area known as the Hawaiian region and nowhere else. Through the mechanisms of competition and adaptation, sections of the population have become modified to live in vacant ecological niches, and in so doing have assumed striking differences in appearance. Some have Finch-like bills, some have long, slender, curved bills, some have Parrot-like bills and so on. Some species are brilliant, such as the APAPANE (*Himatione sanguinea*) found on the 6 main Hawaiian Islands. One of the largest members of this family is the SICKLEBILL or AKIALOA (*Hemignathus procerus*).

FAMILY ICTERIDAE: AMERICAN BLACKBIRDS, ORIOLES, AND TROUPIALS

The 88 species in this family of the New World range from medium to large in size. Among them are many familiar species. Although the family is chiefly tropical, some offshoots have penetrated the high, cold Andean forests and one species, the RUSTY BLACKBIRD (*Euphagus carolinus*), breeds within the Arctic Circle. Black is the predominate family color, but this is sometimes relieved with yellow, orange, chestnut, and red. Some non-tropical members of the family are highly migratory. The BOBOLINK (*Dolichonyx oryzivorus*), for example, breeds in North America and winters in southern South America. The beautiful, liquid calls of Orioles are among the most beautiful of all bird songs. The MELODIOUS BLACKBIRD (*Dives dives*) is a truly gifted musician. The BROWN-HEADED COWBIRD (*Molothrus ater*) is parasitic on at least 20 species of other birds, laying its eggs in their nests. The MONTEZUMA OROPENDOLA (*Gymnostinops montezuma*) is common in tropical America and is chiefly a fruit-eating, nectar-drinking bird of the forest edge. Its pensile nest is suspended like a slender sleeve, sometimes more than 6 feet in length. As these nests are open only at the top, the birds must clamber down long, swaying tunnels. They nest in colonies of sometimes several hundred. The SPOTTED-BREASTED ORIOLE (*Icterus pectoralis*), native to South America, has been introduced into Florida and is now expanding its range. The BALTIMORE ORIOLE (*I. galbula*) is one of our best-known and beautiful birds of the eastern United States. Its western representative is BULLOCK'S ORIOLE (*I. bullocki*). A larger Oriole

is the TROUPIAL (*I. icterus*) of northern South America and the islands of Aruba and Curacao in the Dutch West Indies. This is a popular cage bird and it has been introduced on several Caribbean islands. The most widely distributed member of the family is the RED-WINGED BLACKBIRD (*Agelaius phoeniceus*), which breeds from Alaska to Central America.

FAMILY CATAMBLYRHYNCHIDAE: PLUSH-CAPPED FINCH

The PLUSH-CAPPED FINCH (*Catamblyrhynchus diadema*) of the temperate and sub-tropical zones of Ecuador, Venezuela, Colombia, Peru, and Bolivia is a rather mysterious Perching Bird with little-known habits. Until more definite evidence of its relationship has been published it may be permitted to stand alone in a family of its own.

FAMILY TERSINIDAE: SWALLOW-TANAGER

The SWALLOW-TANAGER (*Tersina viridis*), a colorful, Starling-sized bird that occurs over the greater part of tropical America from eastern Panama to southern Brazil and Bolivia, is so unusual in its structure and behavior that a distinct family has been established for it. The shape of the bill is correlated with the bird's unusual feeding adaptations, which include a throat that can be stretched to permit the swallowing of very large objects. This species hunts and catches insects on the wing and also feeds on fruit. It forces the fruit down whole whenever possible, causing the elastic pouch under the bill to expand. Its eating capacities are quite remarkable, as is demonstrated by tame birds that regularly eat two-thirds of their body weight in fruit each day.

FAMILY THRAUPIDAE: TANAGERS AND DIGLOSSAS

Tanagers are among the most colorful of the many bright, tropical birds found in the New World. Some of the approximately 220 species are smaller than Sparrows, others are larger than Starlings. Most feed largely on fruit, nectar, insects, and Spiders. Virtually all are sedentary in Central and South America, but 4 colorful species are highly migratory. They are the SUMMER TANAGER (*Piranga rubra*) and the SCARLET TANAGER (*P. olivacea*), found in the eastern United States in the breeding season, and the WESTERN TANAGER (*P. ludoviciana*) of the western United States, and the HEPATIC TANAGER (*P. flava*) of the southern United States to South America. Young are fed by regurgitation by both parents. Some species, such as the TORQUOISE-NAPED CHLOROPHONIA (*Chlorophonia occipitalis*), build roofed nests. Most Tanagers are double-brooded and in some species juvenile birds of the first hatching occasionally assist their parents in feeding later broods. The best-known species in tropical America is the BLUE-GRAY TANAGER (*Thraupis episcopus*), ranging from Mexico to Peru, from sea level to 7,500 feet. Among the very small Tanagers are the Euphonias, which are generally strikingly colored in yellows and steel blues. A good example is the YELLOW-CROWNED EUPHONIA (*Tanager luteicapilla*) of Central America. Euphonias may not belong to this family at all, but rather to the Dicaeidae or Flowerpeckers. The habits and structure of these 2 groups are very similar. In both the alimentary canal is modified to accommodate a diet composed largely of mistletoe berries. The birds swallow the

berries whole. The seeds pass through the birds and stick to the twigs of trees, where, under favorable conditions, they germinate. The BLUE-HOODED EUPHONIA (*T. musica*) and the SCRUB EUPHONIA (*T. affinis*) of Mexico are often seen in captivity. Among other Tanagers is the spectacularly colored CRIMSON-COLLARED TANAGER (*Phlogothraupis sanguinolenta*) that ranges from Mexico to Panama. Others are the MAGPIE-TANAGER (*Cissopis leveriana*), which ranges over most of South America, and the FLAME-CROWNED TANAGER (*Tanagra parzudaki*). The Diglossas or Flower-piercers, of the high mountains between Mexico and Peru, are strange birds having the plumage generally sooty gray to sooty blue-black. All feed largely on nectar which they extract from the corollas of mountain flowers. All Diglossas have the bill peculiarly developed, with the mandible upcurved and needle-sharp. The Diglossa clasps long, nectar-bearing flowers in the open bill, holds the slippery flower with the hook of the upper mandible, punctures the corolla with the lower bill, and apparently sucks out the nectar with the tongue. The GREAT DIGLOSSA (*Diglossa major*) of the high isolated mountain plateaus of southern Venezuela is the size of a small Thrush and deep sooty-blue all over. The BLUE HONEYCREEPER or YELLOW-WINGED SUGARBIRD (*Cyanerpes cyaneus*) is one of the most brilliant of this family and a popular bird in aviaries. It ranges from Mexico to Ecuador and southern Brazil. It has been kept as long as 17 years in captivity.

FAMILY FRINGILLIDAE: CARDINALS, BUNTINGS, SPARROWS, AND ALLIES

A vast assortment of small to medium-sized birds comprises this worldwide and very complex family. Approximately 426 species are included. In general, the Fringillidae have the bill cone-shaped and strong. Most are gregarious, arboreal birds feeding chiefly on seeds, berries, and other fruits. Many engage in migrations, nesting in the seasonally warmer parts of the Northern Hemisphere including the Arctic and wintering in the tropics. Some of the best songsters are found in this family. The CARDINAL (*Richmondena cardinalis*) ranges from North America to northern South America, is a well-known bird, and is the state bird of Ohio. The ROSE-BREASTED GROSBEAK (*Pheucticus ludovicianus*) is remarkable for its beauty and for its fondness for eating destructive insects such as Potato Bugs. Another example is the BLACK-HEADED GROSBEAK (*P. melanocephalus*) of North America. The PAINTED BUNTING (*Passerina ciris*) is a vivid member of this family, ranging from southeastern North America south in winter to the Bahamas, Cuba, and through Central America to Panama. Probably the most beautiful of the smaller American Finches is the INDIGO BUNTING (*P. cyanea*) of the eastern United States. The Sparrows, the Longspurs, the Towhees, and Seed-eaters are also included in this family and occur virtually all over the world. One of the more unusual species is the YELLOW-FACED GRASSQUIT (*Tiaris olivacea*) of Mexico and Central America. The familiar WHITE-CROWNED SPARROW (*Zonotrichia leucophrys*), the WHITE-THROATED SPARROW (*Z. albicollis*), and the SONG SPARROW (*Melospiza melodia*) are among the best-known members of this group in the New World. One of the more beautiful species

is the SNOW BUNTING (*Plectrophenax nivalis*), ranging around the world in the colder parts of the Northern Hemisphere. A large and colorful member is the PINE GROSBEAK (*Pinicola enucleator*), which also ranges around the world in the Northern Hemisphere. In this family also is the HOUSE FINCH (*Carpodacus mexicanus*), which ranges throughout the western United States and Mexico and lives commonly in close proximity to man. The WILD CANARY (*Serinus canarius*) of the Canary Islands is the ancestor of the domesticated Canary. Other related forms are the GREEN SINGING FINCH (*S. mozambicus*) and the BRIMSTONE CANARY (*S. sulphuratus*), both of southern Africa.

FAMILY ESTRILDIDAE: WAXBILLS, GRASS FINCHES, MANNIKINS, AND JAVA SPARROWS

In the Old World tropics, chiefly in Africa, Asia, and Australia, there are many small and often very colorful seed-eating birds, many of which are highly favored as cage birds. Many of the approximately 107 species build complicated nests with side entrances that are entered by means of a spout. At times these little Finches literally swarm up out of the grass, their primary habitat, and some are very destructive to farm crops. One of the most colorful is the GOULDIAN FINCH (*Poephila gouldiae*) of Australia. The ZEBRA FINCH (*P. castanotis*) is the commonest Finch in Australia. The JAVA SPARROW (*Padda oryzivora*) has been widely introduced throughout the world as a cage bird. The CHESTNUT MANNIKIN (*Lonchura malacca*) occurs in southern Asia east to the Celebes and has become so abundant that it is a menace to rice growers, at least in the Philippine Islands. The COMMON WAXBILL (*Estrilda astrild*) of Africa is typical of the genus, building dome nests on the ground, with side entrances. The CUT-THROAT FINCH (*Amadina fasciata*), another member of the family, is also a native of Africa, as is the MELBA FINCH (*Pytilia melba*).

FAMILY PLOCEIDAE: WEAVERBIRDS

Weaverbirds are famous for their extraordinary nests, a number of which are the most carefully woven, most complex, and relatively the largest in the world in relation to the size of the bird. Some that are built by Sparrow-sized birds are as big as tents, others have front and rear spouts that seem to be the product of expert human hands. One prominent member of this family is the ENGLISH or HOUSE SPARROW (*Passer domesticus*), widely introduced throughout the world. The SOCIAL WEAVER (*Philetairus socius*) of Africa builds the most complex of all known avian structures in the form of a communal nest. One species, the CUCKOO WEAVER (*Anomalospiza imberbis*), avoids the duties of nest-building and caring for its young by laying its eggs in the nests of small Grass Warblers. A wide-spread species in the Oriental and Australian region is the BAYA WEAVER (*Ploceus philippinus*). One of the most destructive birds in the world is the RED-BILLED QUELEA (*Quelea quelea*). It is so highly gregarious that its flocks may be likened to locusts, and they are apparently just as destructive. It breeds in tropical Africa and migrates southward in incredible



ADULT MALE LONG-TAILED WIDOW BIRD—*Coliuspasser progne*

numbers. The vast bands of Queleas do great damage to crops and have been known to cause famine among the native inhabitants. In this species the male only builds the nest. One of the larger species is the LONG-TAILED WIDOW BIRD (*Coliuspasser progne*) of the grass belt of southern Africa. During the breeding season it is just under 2 feet long, including the very elongated tail. At other seasons it is only about 9 inches in length, since it molts its tail feathers. The wide-ranging PIN-TAILED WIDOW BIRD (*Vidua macroura*) is a social parasite, letting other birds raise its offspring. Other African species are the WHITE-HEADED BUFFALO WEAVER (*Dinemellia dinemelli*), SPEKE'S WEAVER (*Ploceus spekei*), and JACKSON'S WHYDAH (*Drepanoplectes jacksoni*), which is also sometimes called the Dancing Whydah. Female Whydahs have an elaborate courtship dance.

GLOSSARY

aberrant	deviating from the ordinary or normal type
adaptation	alteration in the structure or function of organisms which fits them to survive and multiply in a changed environment
adhesive disc	the expanded adhesive area on the toe tips
albinistic	being or resembling an albino
albino	an animal with a marked deficiency in pigmentation
alimentary canal	the food passage in any animal from mouth to anus
amphibian	one of a class of vertebrate animals with moist, bare skin
animal	any living thing that is not a plant
anthropoid	resembling man
antlers	one of the solid deciduous "horns," usually branched, of an animal of the deer family
appendage	any member of the body diverging from the axial trunk; as a leg, arm, tail, etc.
aquatic	of or pertaining to water
aves	the class of vertebrates comprising the birds
avian	of or pertaining to birds
balance of nature	the natural relationship of living things
barring	the pattern of transverse marks across the body or across a feather
bend of the wing	the "wrist"
bower	a structure of leaves or twigs for courtship, nesting, or shelter
bred	produced offspring
breeding	to produce and rear offspring
brood	to cover the young of birds for warmth and protection
cage bird	one of a species of bird commonly kept in captivity
calf	the young of bovine mammals and certain others, such as the elephant, seal, whale
canine	of or like a dog; of or pertaining to four pointed teeth situated one on each side of each jaw, next to the incisors; any animal of the dog family
carnivorous	flesh eating
carrion	dead and putrefying flesh
caruncle	a fleshy growth or area, as on the head of a bird

casque	the bony, helmet-like growth on the heads or beaks of some birds
class	the major subdivision of a phylum of animals or plants
clutch	the number of eggs produced or incubated at one time
communal	pertaining to a commune or community
constriction	drawing together, compressing
corolla	the petals of a flower
cosmopolitan	belonging to all parts of the world
crop	a special pouch-like enlargement of the gullet of many birds, in which food is held and where it may undergo partial preparation for digestion
deciduous	falling off or shed at a particular season or stage of growth, as horns or teeth
decurved	curved downward
dewlap	the pendulous fold of skin under the throat of cattle or other animals
dichromatic	having or showing two colors
diet	a particular selection of food
digit	a finger or toe
dilated	made wider or larger, expanded
display	an activity to stimulate an emotional relationship between partners
dissolution	the dissolving of a substance
diurnal	pertaining to the daytime, active during daylight
domestic	living with man, tamed
dorsal	pertaining to, or situated on the back
down	the first feathering of young birds, also the soft under plumage of birds
ecology	the relationship of an organism to its environment
erectile	capable of being erected or set upright
exoskeleton	an external protective covering, especially when hard
extensile	capable of being extended, adapted for stretching out
exterminate	to get rid of by destroying; destroy totally; extirpate
extirpate	see immediately above
extinct	having come to an end; without a living representative
falconry	the art of training falcons and falcon-like birds to attack wild fowl or game
family	the major subdivision of an order of animals

fang	one of the long, sharp, hollow or grooved teeth of a snake, by which venom is injected; a canine tooth
feral	wild, or existing in a state of nature; having reverted to the wild state, as from domestication
fertilization	union of egg and sperm to initiate the development of an embryo; impregnation of animals
flipper	a broad, flat limb, especially adapted for swimming
gallinaceous	belonging to the group or order Galliformes, which includes domestic fowls
game bird	a bird hunted for sport or profit, or protected by law
gape	the mouth opening
genus	the usual major subdivision of a family, usually consisting of more than one species
gestation	the period of time from conception to birth
gill stalks	a projecting organ for aquatic respiration
guano	manure composed chiefly of the excrement of sea birds
habitat	the natural or usual dwelling place of an individual or group of organisms
hawking	the act of catching insects on the wing
herbivorous	plant-eating
hermaphroditic	having both male and female organs of generation
herpetologist	one who studies reptiles and amphibians
hibernation	the act of passing the winter in an inactive or torpid condition
horn	a hard, projecting, hollow and permanent growth on the head of certain mammals
hybrid	the offspring of two animals of different kinds
incubate	warming eggs for the purpose of hatching
indigenous	originating in and characterizing a particular region or country
insectivorous	insect-eating
invertebrate	an animal not having a backbone or vertebrae
lichen	a group of plants composed of fungi in symbiotic union with algae
litter	the number of young born at one birth
littoral	pertaining to the shore of a lake, sea, or ocean
luminous	radiating or reflecting light, shining
mammal	a four-limbed animal having hair and secreting milk
mammalogist	one who studies mammals

mane	long hair growing on the back or about the neck of some animals
mantle	the back and upper surface of the folded wings of birds, especially when the feathers are uniformly colored
marine	of or pertaining to the sea, ocean, or other salt-waters
maritime	of or pertaining to the sea, ocean, or other salt waters
maxilla	a bone of the upper jaw; the upper bill of birds
metamorphosis	in animals a marked change of form from one stage of development to another
migration	the regular periodical movement of animals from one region to another
molt	to cast off an outer covering such as cuticle, scales, feathers, or hair
monogamous	pertaining to the habit of having only one mate
mucous	pertaining to a glandular secretion
musk	a substance secreted in a glandular sac under the skin of the abdomen of the male musk deer, having a strong odor; a similar secretion of other animals
native	originating naturally in a particular country or region
nestling	a young bird in the nest
New World	the Western Hemisphere
niche	the position or function of an organism in a community of plants and animals
nocturnal	of or pertaining to the night; active by night
Old World	Europe, Asia, and Africa; the Eastern Hemisphere
omnivorous	eating all kinds of foods
order	the usual major subdivision of a class of animals
organism	any form of animal or plant life
ornithologist	one who studies birds
pampas	the vast grassy plains of the Andes and south of the forested lowlands of the Amazon basin
parasitize	to live on or in an organism of another species from which nutriment is obtained; to live on others or another without making any useful return
pelage	the hair, fur, wool, or other soft covering of a mammal
phylum	a primary division of the animal or vegetable kingdom
plastron	the ventral shell of a turtle
plumage	the entire feather covering of a bird; feathers collectively

plume	a feather; a large, long, or conspicuous feather
polyandrous	having more than one male mate at one time.
precocial	active, down-covered, and able to move about freely when hatched, pertaining to birds
predation	the act of preying upon other animals
predator	a preying animal
prehensile	adapted for seizing, grasping, or holding
prey	an animal hunted or seized for food
progenitor	an ancestor in the direct line
prolific	producing offspring abundantly
protrusible	capable of being thrust forward or extended
pyre	a pile or heap of wood or other combustible material for burning a dead body
quadruped	four-footed animal
quadrupedal	having four feet
quill	one of the large feathers of the wing or tail of a bird; one of the hollow spines on a porcupine or hedgehog
race	a subdivision of a species, a subspecies
raptor	a predatory bird
ratite	a group of birds having a flat breastbone; ostrich, emu, rheas, kiwis, and cassowaries
regurgitate	to cause the return of partly digested food from the stomach to the mouth
reptile	a cold-blooded vertebrate; snakes, turtles, lizards, alligators, and tuatara
ristal bristles	hair-like feathers about the mouth
ruminant	a herbivorous land mammal that chews a cud, as a cow or deer
ruminating	chewing the cud
sacculated	formed into or with a sac or sac-like dilations
savanna	a plain, characterized by coarse grasses and scattered tree growth
scavenger	an animal that feeds on dead organic matter
sheathed	enclosed, as in a case or covering
snout	the part of an animal's head projecting forward and containing the nose and jaws; the muzzle
species	the basic category of biological classification, intended to designate a single kind of animal or plant

spermatozoa	the minute, mature male reproductive cells which serve to fertilize the egg
spur	a stiff, usually sharp, horny process on the leg or wing of various birds
squab	a nestling pigeon or dove
stag	an adult male deer; the male of various other animals
subspecies	a subdivision of a species; a race
tactile	of or pertaining to the organs or sense of touch
assel	a pendant ornament
teat	the protuberance on the breast or udder in female mammals; where the milk ducts discharge
terrestrial	living on the ground
torpor	a state of suspended physical powers and activities; dormancy, as of a hibernating animal
toxic	of, pertaining to, affected with, or caused by a toxin or poison; poisonous
trunk	nasal appendage of several species of animals
tubercle	a small rounded projection, growth, or area, as on a bone or on the surface of the body of an animal
tundra	the vast, nearly level, treeless plains of the arctic regions of Europe, Asia, and North America
tusk	a tooth developed to great length, usually as one of a pair, in certain animals
ungulate	having hoofs, as a deer or horse
vascularized	being provided with vessels or ducts which convey fluids, as blood and lymph
veldt	the open country, bearing grass, bushes, or shrubs, or thinly forested; characteristic of southern Africa
vertebra	one of the segmented structural units or bones of the spinal column in a vertebrate
vertebrate	an animal having a backbone or spinal column
voracious	devouring or craving food in large quantities
wattle	a fleshy lobe or appendage hanging down from the head region of certain birds
web	a membrane which connects the digits of an animal
withers	the highest part of an animal's back, in the shoulder region
zoogeography	the science treating of the geographical distribution of animals
zoological	of or pertaining to zoology
zoology	the science that treats of animals

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MAP OF THE CLEVELAND

ZOOLO

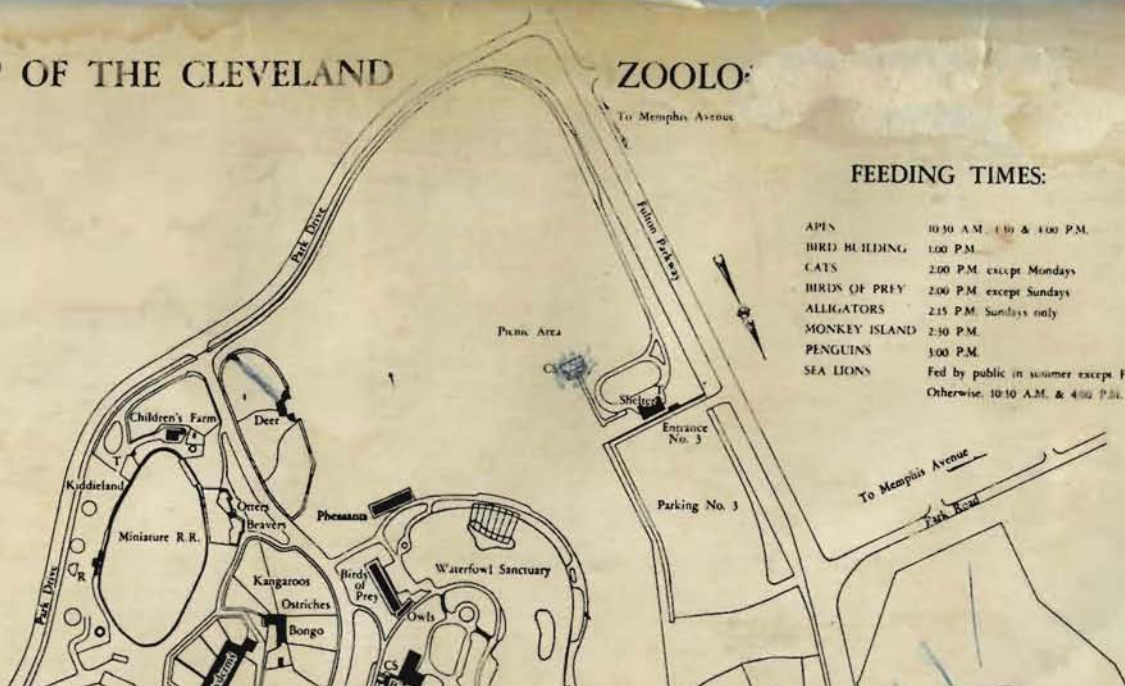
KEY:

- CS COMFORT STATIONS
- I TOUR TRAIN STOPS
- R REFRESHMENTS
- S SOUVENIRS

SCALE: 100 FEET

FEEDING TIMES:

APES	10:30 A.M. 1:00 & 4:00 P.M.
BIRD BUILDING	1:00 P.M.
CATS	2:00 P.M. except Mondays
BIRDS OF PREY	2:00 P.M. except Sundays
ALLIGATORS	2:15 P.M. Sundays only
MONKEY ISLAND	2:30 P.M.
PENGUINS	3:00 P.M.
SEA LIONS	Fed by public in summer except Fridays Otherwise, 10:10 A.M. & 4:00 P.M.



ARKS ZOO LIBRARY

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Flycatcher royal	138	Grouse, spruce	100
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THE AMAZING STORY OF

THE ELEPHANT'S TRUNK

Did you know that every part of an elephant's body is merely an accessory to his trunk? Probably no other animal part gives so much full service.

An elephant's trunk is a massive, swaying thing that can loom far above our heads or delicately pick peanuts from our hand. It's much more than just a nose; it's an extension of the nerves of his brain made by welding together the nose and upper lip, then pulling it out about eight feet and equipping it with a series of muscles, enough to give the elephant power to knock down huge trees, lift a ton of wood, and protect its babies against deadly animals.

The elephant trunk is the best reacher ever invented. Without moving his body or even shifting his head, the elephant can reach almost as high as a giraffe and chew the leaves of a tree. If his delicious leaves should be out of reach, he knocks the tree over and brings his food down to earth. Drinking for the elephant is pie compared to most animals. He merely plunges his trunk into water, sucks it up, then coils under and squirts it into his mouth. His trunk can act as a shower bath, too, when he feels he or one of his friends needs cooling off.

Like an insect's antenna, the elephant trunk is a sensitive feeling and smelling instrument.

Since an elephant can't see more than 75 feet, it is the trunk whipped up and held stiff—almost like a periscope—that makes his images.

Elephant trunk talk is one of the most mysterious communications between

all animals. Elephants mutter to one another when they are in a huddle, but they also communicate by long distance. Somehow, through their trunk they are able to summon their mates from many miles away—a power we know little about.

When an elephant is on the go, his trunk moves restlessly back and forth giving him seesaw balance. The rhythmic swaying of the trunk actually helps the elephant walk. And when he really wants to move, he merely holds his trunk out horizontally to help him step on the accelerator and run in an emergency.

A mighty remarkable instrument, the elephant's trunk. It eats, drinks, talks, senses, smells, balances, works, and protects—and it is even used to hug and caress other elephants.

* * * * *

Another full service instrument you should know about is **Society National Bank**. Thousands of Greater Clevelanders are already doing business here—no matter what their banking needs. Drop in and see us.

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MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



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Michael Turnaukas—p. 14, 24, 25, 33, 42, 61, 68, 69, 81.

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New York Zoological Society—p. 6, 13, 15, 17, 18, 22, 23, 29, 32, 34, 35, 37, 39, 40, 44, 46, 48, 50, 51, 54, 57a, 60, 62, 65, 67, 73, 74, 77, 83, 88, 90, 91, 94, 103, 109, 116, 146.

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