BIRDS OF THE WORLD

Ralph De Sola, Federal Writers' Project.

AMERICAN EAGLE (HALIAEETUS LEUCOCEPHALUS), photographed on the Fourth of July in the National Zoological Park, Washington, D. C. The bird that serves as the national emblem of the United States is now becoming rare and is in some danger of complete extermination. It is a harmless and inoffensive species that deserves complete protection.

BIRDS OF THE WORLD

AN ILLUSTRATED NATURAL HISTORY

PREPARED BY WORKERS
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PREFACE

In view of the fact that over 10,000 species of birds are known to inhabit the earth today, it is not strange that many of them are almost unknown, even to bird experts. Years of travel and painstaking study would certainly be necessary if any one individual were to try to list even the major characteristics of every species of feathered creature in North and South America, Europe, Asia, and the Indo-Australian and Polar regions.

The editors of BIRDS OF THE WORLD have not attempted to describe all birds existing today, or even to list them. This book is not intended to be a field key to birds on the wing, or a dictionary of every known species. Great care has been taken, however, to include birds which are truly representative of the principal orders, typical of their kind, and, above all, interesting in themselves.

Birds, after all, are not all of a kind. The difference between a woodpecker and an ostrich, to take an example at random, is fully as great as the distinction between two such mammals as a monkey and a mouse. Actually, the only outstanding characteristic which all birds have in common is their feathers. And even their feathers are not put to the same uses. The wing feathers of some birds are used for flight; others, like the penguin, don't fly at all, but do use their wings with equal skill in swimming.

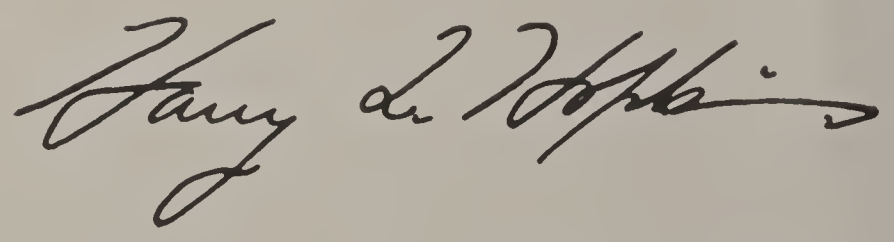
From the strictly scientific point of view, birds are really "glorified reptiles," and they still possess many of the characteristics of their reptilian ancestors. They lay eggs, like their forefathers, and the scale-like skin on their feet and legs is a feature which birds still have in common with many of their crawling cousins. Feathers themselves, in fact, are really modified scales, and they are moulted occasionally just as snakes shed their skins.

In many ways, however, birds can be proud of the progress they have made from their lowly beginning. Even man, who only recently learned to fly after hundreds of years of trying, has not been able to make an airplane

FOREWORD

Birds of the World is one of the publications written by members of the Federal Writers' Project of the Works Progress Administration. Designed primarily to give useful employment to needy unemployed writers and research workers, this project has utilized their experience and abilities in the preparation for the American people of a portrait of America—its history, folklore, scenery, cultural backgrounds, social and economic trends, and racial factors.

Many books and brochures are being written for the American Guide Series. As they appear in increasing numbers we hope that the public will come to appreciate more fully not only the unusual scope of this undertaking, but also the devotion shown by the workers—from the humblest field worker to the most accomplished editor engaged in the final critical revision of the manuscript. The Federal Writers' Project, directed by Henry G. Alsberg, is in the Division of Women's and Professional Projects under Ellen S. Woodward, Assistant Administrator.



Harry L. Hopkins
Administrator

CONTENTS

FLIGHTLESS LAND BIRDS

PENGUINS

DIVING BIRDS

ALBATROSS GROUP

PELICAN GROUP

WADING BIRDS

DUCKS, GEESE AND SWANS

BIRDS OF PREY

GAME BIRDS

CRANES AND RAILS

JACANAS, PLOVERS AND GULLS

PIGEONS AND DOVES

CUCKOOS

PARROTS AND MACAWS

OWLS

OIL-BIRDS, FROGMOUTHS AND WHIP-POOR-WILLS

SWIFTS AND HUMMINGBIRDS

TROGONS

KINGFISHERS, HORNBILLS, TOUCANS AND WOODPECKERS

PERCHING BIRDS

BIRDS OF THE WORLD

FLIGHTLESS LAND BIRDS

(Ostriches, Rheas, Cassowaries, Emus and Kiwis)

These are believed to be descended from primitive birds that were originally able to fly, the stock branching off from the main line of descent at a very early period in evolutionary history. Many are fast approaching extinction, a fate which their gigantic cousin, the moa, met some five hundred years ago. The moa of New Zealand attained the height of twelve feet. Another extinct relative, the elephant bird or roc of Madagascar, though it did not exceed the height of the ostrich, was remarkable for its massive limbs and great eggs which measured nearly thirty-four inches in circumference. Such an egg would hold more than two gallons or equal the contents of one hundred and fifty hen's eggs.

Except for the kiwi, the flightless birds are large and heavy, with powerful legs and small heads. Their wings are degenerate, consisting of one or two stubby fingers. In several cases, notably the emu and the ostrich, the toes terminate in a strong claw, capable of inflicting a serious wound. Nearly all of them lack the keel, typical of flying birds. The sternum or breastbone is flat or raftlike, and this accounts for the name *Ratitae* (Latin *ratis*, raft).

Their plumage differs from that of their flying relatives. Flying birds have distinct and firm feathers arranged in definite areas of the body, particularly the wings and tail. Flightless birds have a soft and fluffy coat that covers the body uniformly.

Ostriches:	South African Ostrich.
Rheas:	Great-billed Rhea.
	White Rhea.
Cassowaries:	Common Cassowary.
	Violet-necked Cassowary.
Emus:	Emu.
Kiwis:	Kiwi.

OSTRICHES

In addition to being the largest and most powerful of present-day birds, the ostrich is one of the swiftest of all land animals. Its short wings, though useless in flight, help lift its three hundred pounds, enabling it to speed over the desert at a rate of sixty miles an hour. This speed, however, does not avail the ostrich much, for the giant bird runs in a circle when pursued by the hunters and jackals which constitute its chief enemies. Despite this phenomenal stupidity, it does not, as popularly supposed, bury its head in the sand as a means of hiding. Its chief defense lies in the force of its peck and in its kick, which is said to be far mightier than that of a mule.

Ostriches go about the desert wastes in groups of from three to a dozen, each male usually accompanied by a harem of three to four wives. The wide variety of the ostrich diet is well known. They feed on grasses, seeds, fruits, insects, small mammals, lizards and snakes, and are fond of salt. In captivity their appetites are perverse. Ostriches sometimes succumb to their indiscriminate appetites. An autopsy performed on one female specimen named Wilhelmina at the Tropical Zoological Gardens at Miami, Florida, showed that its stomach contained a startling variety of objects that have been enumerated in the Preface.

Though timid and suspicious by nature, they frequently herd with zebras and antelopes and maintain peaceful relations with these creatures.

In the mating season, the males, which average eight feet in height, utter a loud *boom-boom* to impress their wives. In this they appear to be successful, for the combined harem will lay from forty to fifty eggs, weighing some three pounds apiece. The eggs are laid in a common nest, which is a slight hollow scratched out in the warm sand. The male assumes his share of the responsibility for hatching out the eggs, sitting on them all night. During the day he is relieved by one of his wives, but remains nearby. Ostriches exercise extreme care in concealing their eggs and go to great lengths to avoid being seen going to and from their nests. Only about twenty eggs are hatched normally, the period of incubation being six weeks; some of those remaining are used for food by the chicks, who, though able to run about as soon as they are born, have not their parents' hardy stomachs.

New York Zoological Society.

SOUTH AFRICAN OSTRICH (STRUTHIO AUSTRALIS). *Height:* 8 feet. *Weight:* 300 pounds. *Range:* South Africa with related species in Central and North Africa, Arabia and Palestine.

Captive ostriches swallow golf balls, whole oranges and apples, and other less digestible objects to the dismay of their keepers. In the wild they feed on vegetation and small animals. Contrary to popular opinion, ostriches don't hide their heads in the sand.

Ralph De Sola, Federal Writers' Project.

EGGS OF OSTRICH, CHICKEN, AND HUMMINGBIRD COMPARED. African natives relish ostrich eggs, a single one of which contains as much substance as two dozen hen's eggs. They use the empty shells as pots. These shells are sometimes eight inches long and one-sixteenth of an inch thick.

RHEAS

RHEAS, popularly known as American ostriches or nandus, roam over the pampas of South America in groups of from four to thirty.

They resemble the ostrich superficially, but are distinguished from it by their smaller size, their better developed wings and the fact that they have three toes instead of two. The rhea's head and neck are covered with feathers.

Rheas live on grasses, seeds and berries. They rely for their safety chiefly upon their swift legs and keen sense of sight. When the rhea is pursued, it often escapes by squatting suddenly among the low gray bushes of the pampas, which blend perfectly with its own slate gray coloration. Somewhat more intelligent than the ostrich, rheas are capable of running in a straight line, but frequently fall victims to their insatiable curiosity. When cornered, they defend themselves with vigorous kicks.

The Indians capture rheas by means of the *bola,* a long leather thong to the opposite ends of which small lead weights are attached. When the weights are skillfully thrown, the bird's legs become entwined in the thong. Until the passage of protective legislation in Argentina, rheas were killed in great numbers for their skins, which were made up into native rugs, and their feathers, which became brooms. Today these once common birds are seldom seen. The enemies of the rhea include the puma and the wild dog.

Each female rhea lays about a dozen creamy yellow eggs in an excavation dug by her mate. As three or four females are attached to one male, who cares for their combined output, the nest often contains from thirty to sixty eggs. When the male has begun to sit, he will drive away females who wish to lay more eggs, thus forcing them to scatter their supplementary eggs at random over the pampas. On a hot day these eggs are highly explosive and superstition has it that they are a serious menace to the unwary traveler, but it must be said that there is no true evidence in support of this alarming belief.

When not molested, rheas approach houses and become as friendly and tame as domestic animals.

New York Zoological Society.

GREAT-BILLED RHEA AND EGGS (RHEA AMERICANA). *Length:* 4½ feet. *Range:* South American pampas from Paraguay to Patagonia, with a related species in Southern Brazil.

Ralph De Sola, Federal Writers' Project.

WHITE RHEA (RHEA ROTHSCHILDI). *Length:* 3 feet. *Range:* Central Brazil to Patagonia.

Few of these birds are left today because someone invented the feather duster, which employs the fluffy wing feathers of the unfortunate rhea. The albinistic variety is now almost extinct; surviving birds are confined almost exclusively to rhea farms.

CASSOWARIES

THE CASSOWARY is one of the flightless birds inhabiting forests. Though it is extremely wary and usually most active after dusk, its presence is easily detected by its harsh guttural note, which can be heard several miles away.

Cassowaries are able to leap and bound with great speed through the thickest jungle. In this they are aided by a tall smooth helmet of horn, which protects their heads and shoves aside impeding shrubs and vines.

The common cassowary's body is covered with dark brown feathers of wiry appearance; its featherless head is blue. To its neck are attached six or eight bell-like balls of bright blue or scarlet. These ornaments and its shiny black helmet make it the most colorful bird of the flightless group. It lacks tail feathers.

The cassowary will eat berries, figs, whole oranges, grasshoppers, cockroaches, spiders, caterpillars, and will swallow pebbles. In confinement it is fed bread, plantains and sweet potatoes and is as promiscuously voracious as the ostrich. A popular book shows a photograph of a wooden spool, a doll, a rubber ball, a powder compact and an assortment of bottle caps removed from the stomach of one former resident of the New York Zoological Park. However this jungle bird's sole enemy, other than itself, is man who hunts it for its delicious flesh and also for its skin, of which the ranchers make hearth rugs and door mats.

Cassowaries are extremely powerful, and the sharp nail of their inner toe is a dangerous weapon. With one forward or sideward kick the mighty bird can easily knock a man down.

Cassowaries pair off and usually roam in a group of four or five couples. They mate during August and September. The eggs, measuring from three to six inches in length, are laid in beds of green moss in the depths of the jungle. They are rendered practically invisible by their exquisite emerald color. The incubation period lasts for two months. The chicks are a dull rusty brown. When they are a few months old, the birds gather in flocks of several families for mutual defense and protection of the chicks.

New York Zoological Society.

COMMON CASSOWARY (CASUARIUS CALEATUS). *Height:* 5 feet. *Range:* Island of Ceram. Other species are known to inhabit Australia and New Guinea.

When tame, these birds follow their masters like pet dogs. If teased, they can knock a strong man down with a swift kick.

Ralph De Sola, Federal Writers' Project.

VIOLET-NECKED CASSOWARY (CASUARIUS VIOLICOLIS). *Range:* Aru Islands, near New Guinea.

EMUS

Next to the ostrich, the emu is the tallest of living birds, attaining an average height of five to six feet. It inhabits the inland plains of Australia, having been nearly exterminated in the more populous sections of the continent. The emu is hunted for its oil and for its flesh, which in the young bird is sweet and tender. An emu leg provides four or five hungry natives with a good meal.

At a distance the emu's dull-brown plumage appears more like hair than feathers. Its body feathers are double, having two distinct shafts and webs. Emus differ from cassowaries in having head feathers; from ostriches in being shorter and squatter, and in having three toes instead of two. They are the wariest of the flightless birds, and are considered by some scientists to be the most primitive type of living bird.

In the mating season the female emu emits a low booming sound by expanding and contracting a large membranous bag connected to her windpipe. She lays six or seven eggs in a cavity in the sand. The eggs, colored a beautiful dark bottle-green, are hatched by the male, the incubation period lasting eight weeks.

Emus thrive in captivity and become quite tame. Some specimens have lived for more than a quarter of a century. A cruel practice of the Australian natives when they capture an emu is to break its small wings. The reason for this custom is unknown, as the wings would be of no help to the emu in escaping.

New York Zoological Society.

EMU AND YOUNG (DROMAEUS NOVAE-HOLLANDIAE). *Height:* 6 feet. *Range:* Southeastern Australia.

Emus are strictly monogamous. Males rear their young after hatching the eggs. The eggs are very palatable, and a single one will make a meal for a family of bushmen. The eggs require fifty-six days to incubate—the longest period known in birds.

New York Zoological Society.

ADULT EMU. The emu is among the largest of present-day birds, being surpassed only by the cassowary and the ostrich. In past times it was to be seen in almost all parts of the Australian continent and throughout the nearby island of Tasmania. Today, however, it is found only in relatively unsettled districts of Australia. Emus have been extinct in Tasmania since 1860.

KIWIS

CONSTANTLY sniffing, the grayish-brown kiwi comes out at night to search for worms and berries. No larger than a good-sized hen, it has a slender beak six inches long, with nostrils at the end. Its senses of smell and touch are unusually keen. Finding a worm, it draws it slowly and deliberately from the ground, careful not to break it, and with a backward flip of the head, swallows it whole. The kiwi's eyes have degenerated as a result of its nocturnal life, and it can scarcely see in the daytime.

By day the kiwi hides in dense fern beds, rocky crevices, hollow trees or deep holes which it digs in the ground. One traveler reports that it hatches its single egg by sitting under it rather than on it, accomplishing this seemingly impossible feat by placing itself in a hole beside and under the egg's resting place. Another theory is that it covers its egg with moss and dry leaves, which in decaying generate sufficient heat for incubation. The kiwi has the largest egg in proportion to its own bulk of any living species of bird. When disturbed in the daytime, this curious bird emits a wide, grotesque yawn.

The kiwi has no visible wings, but its powerful legs compensate for this. It has a sharp spur toe on the rear of its feet, which serves as a weapon. Like the other flightless birds, the kiwi has a powerful kick and is a swift runner. Its chief enemies are men, dogs and wildcats. Useful to man for its skin, it has been well nigh exterminated. It runs with head and neck extended like an ostrich.

American Museum of Natural History.

KIWI (APTERYX OWENI). *Length:* 1½ feet. *Range:* New Zealand.

These timid birds kick at their own shadows. When danger approaches, the female defends the nest and the male runs away. A weary kiwi will use its long bill as a crutch.

Ralph De Sola, Federal Writers' Project.

RUFOUS TINAMOU (RHYNCHOTUS RUFESCENS). *Length:* 1 foot. *Range:* South America: Argentina, southern and eastern Brazil.

While the tinamous resemble partridges and other fowl-like birds, their anatomical structure shows a close relationship to the flightless birds. The males undertake the hatching of the eggs which are laid in slight hollows beneath overhanging bushes. The chicks run as soon as they are hatched. Unlike all other "flightless birds" tinamous can fly.

PENGUINS

PENGUINS are as graceful in water as they are awkward on land. Completely unfitted for flight, the wings of these birds are reduced in size and flattened, forming perfect swimming paddles. These paddles or flippers move simultaneously in the water. Observed from the decks of ships, penguins have often been mistaken for dolphins as they leap through the surf.

Unlike flying birds, which have large keels for the attachment of flying muscles, the penguins have enlarged shoulder blades to which the powerful muscles that drive the flippers are attached.

With a single leap, the penguin can leave the water, landing with both feet on passing ice floes. Once ashore, the scale-like and close-fitting feathers are given a thorough shaking to rid them of water. The importance of this is seen when one considers the extreme Antarctic cold that many species must withstand. This shaking is not done in the manner of a dog emerging from the water. The penguin's body does not move; the skin, however, is vibrated by a unique set of muscles. A dense layer of fat just under the skin gives the bird added protection.

Standing erect, its four toes pointed forward and its now useless flippers drooping, the penguin resembles a flatfooted little man in a full-dress suit. The pure white breast and the gray or blue-gray back is fairly uniform in all the species. Some species, however, exhibit distinctive markings. The king penguin, found in abundance in the Straits of Magellan and the Falkland Islands, displays bright orange patches on the head and neck. The rock hopper, a species that inhabits islands off the coast of South Africa, is perhaps the most colorful of the group. Its head is adorned with long golden feathers.

Penguins range in size from the little sixteen inch blue penguin of Australia and New Zealand, to the enormous and dignified emperor, an Antarctic species which attains a height of four feet and weighs from sixty to seventy pounds.

Penguins: Emperor Penguin.
Cape Penguin.

PENGUINS

In keeping with their sober costumes, penguins observe a proper decorum in their relations, whether they meet casually or in a mood for courtship. In the latter case, the male Adelie penguin will take a pebble in his mouth and lay it before his beloved as an indication of his serious intentions.

In October the male scrapes a hollow in the soil of the rookery or nesting ground and collects stones, one by one, to form a circle around the nest. Stones are few in the Antarctic, and the penguin is not averse to stealing one occasionally in the absence of his neighbor. When the returning home-maker discovers his loss, there is a great to-do. The whole rookery sets up a squawk as the two contestants engage in battle.

Penguins lay their eggs in the coldest and most desolate regions, usually far from the water. The incubation period lasts for seven weeks. To keep the eggs from freezing, king penguins carry them between belly and feet, male and female sharing this task.

Thievish and quarrelsome despite their manners, penguins frequently steal one another's food, stones and even eggs. In the resulting fights they inflict savage wounds with their pointed beaks. Unmated males, or "hooligans," band together in raiding parties and rob the nests of their settled neighbors, menacing the entire community until they are driven off.

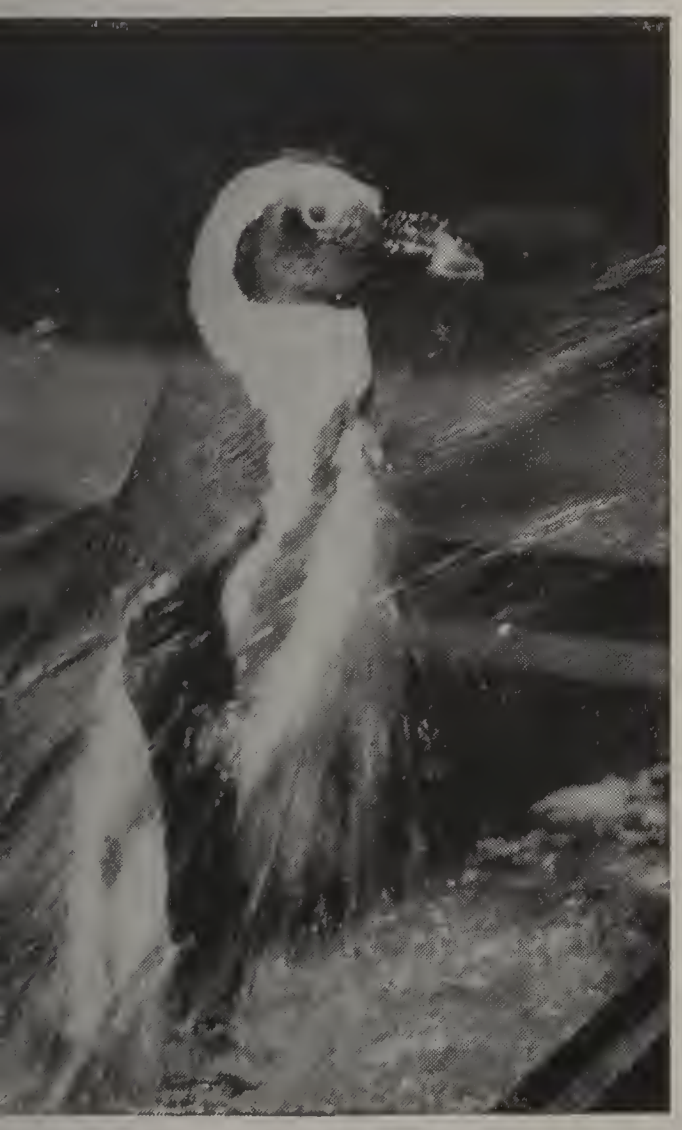
Death comes to the penguins from the sea and air in the persons of the skua gull, the leopard seal, and the killer whale who eat their fill of the defenseless birds. Penguins have no fear of human hunters, often sending delegations forward to inspect the visitors.

Penguins in captivity show many other human characteristics aside from their white shirt fronts. A pair grew so attached to one another that when one died, the other pined away and refused all nourishment. By way of consolation for the bereaved bird, a mirror was introduced into its lodging. Looking into the mirror, the penguin thought its mate had been restored to life, but seemed puzzled by the "other bird's" imitative habits.

American Museum of Natural History.

EMPEROR PENGUINS (APTENODYTES FOSTERI). *Length:* 4 feet. *Weight:* 60 to 75 pounds. *Range:* Antarctica.

Awkward and clumsy on land, penguins are at home in the wildest surf, swimming and diving with the ease of dolphins.



New York Aquarium.

CAPE PENGUINS (SPHENISCUS DEMERSUS). Also called Black-footed Penguins. *Range:* Rocky Islands off Cape of Good Hope, South Africa.

The parental instinct in penguins is so strong that they will attempt to hatch stones if eggs are lacking. This specimen photographed in the New York Aquarium by S. C. Dunton showers before retiring to its shelter.


R

DIVING BIRDS

(Divers, Auks and Grebes)

The birds of this group, although they differ considerably, are sufficiently similar in appearance to warrant considering them in one group.

They are all aquatic birds of medium or large size, ranging in length from the little auk, less than a foot long, to the great northern diver, which attains a length of three feet. The grebes fall between these two extremes, few exceeding twenty inches. In addition to being strong fliers, these birds are thoroughly adapted to life on the water. They are all expert divers and swimmers. They find travel on land cumbersome and resort to it only during the breeding season. Short legs placed far back and webbed or lobed toes are their distinguishing characteristics. Most of them have moderately long necks (some of the auks excepted), and the sharp-pointed bills so essential to fishing birds.

The great northern divers are circumpolar in distribution and should not be considered game birds. As in the case of the wary grebes, they dive into the water at the very instant a gun-shot is heard, not to reappear until several minutes later at a safer distance.

The spruce and stocky little Arctic auks resemble the Antarctic penguins more than they do their immediate relatives, the divers. Like the penguins, they wear the formal dark jacket and white vest, and stand erect.

The grebes, in contrast to the auks, spend the greater portion of their lives in freshwater lakes. It is only during the winter months that they take to the open sea. The webbed feet typical of the aquatic birds are lacking in the grebes. Their toes are flattened into broad and unconnected lobes, each lobe terminating in a wide, flat nail. In swimming under water, they propel themselves with powerful strokes of their lobed feet, their wings lying flat at their sides. Any of these birds, however, may use their wings in swimming.

Divers: Great Northern Diver.
Auks: Little Auk.
Grebes: Western Grebe.

DIVERS

The cry of the great northern diver, or loon, is weird and melancholy, much like the voice of a human in distress.

By day these glossy-black, white-striped birds keep a sharp lookout for human hunters. Occasionally they dive into the icy water after a fish. The loon can remain under water as long as eight minutes, exhaling the air from its lungs to make itself heavier than water. It reappears in a far distant spot and so outwits many a hunter. Fishermen have frequently pulled in these diving birds on their lines, as the birds readily take a baited hook while under water.

On land these divers are ungainly, their legs being set so far back on their bodies that they waddle along in the manner of geese.

Great northern divers breed during May and June and are seldom seen flying except during the period of migration. At this time male and female retire from the general flock to fly inland, usually settling on the shores of uninhabited rivers and lakes. Here they build a makeshift nest of grass and mud near the water's edge, and the female lays two eggs which take about four weeks to hatch. The eggs are dark brown, speckled with black. As this color makes them almost invisible in the mud, the birds take no steps to conceal them. The female takes chief responsibility for hatching, lying flat on the eggs so that she can slip into the water at a moment's notice. As soon as the young are born, they take to the water and swim like experts.

In winter the great northern divers migrate as far south as Morocco or Palm Beach.

The smallest and most common member of this family is the red-throated diver which nests in the Arctic region.

American Museum of Natural History.

GREAT NORTHERN DIVERS AND NEST (COLYMBUS IMMER). Also called Loon.
Length: 2½ feet. *Weight:* 10 pounds. *Range:* Arctic Seas.

It is not unusual for these birds to remain under water for eight minutes. They frequently utter horrifying screams.

AUKS

As twilight falls, grayish-black little auks rise from their Arctic cliffs in great swarms and head seaward to find their food. All during the night they forage for shrimps, crabs, snails and small marine worms. At dawn they rise from the sea to return to the shore.

With their webbed feet and rounded tails, they can either paddle over the ocean's surface or swim under water. But the extreme rearward bend of their knees hinders them in walking. When placed on flat ground, in fact, they are not even able to take off. From the cliffs, where they repose in an upright position closely resembling the stance of man, they fall into the air when ready to take flight. Their cry sounds like *pi-u-lee, pi-u-lee.*

In some regions the little auks feed on planktons and floating seaweed. In stormy weather plankton sinks far below the surface of the sea, where the hungry birds are unable to reach it. During great storms thousands of these "ice birds" are driven to the shores of England, half dead from starvation.

During June and July little auks lay single eggs in holes or tunnels deep enough to keep out the Arctic fox, the chief animal enemy of the diminutive birds; in some cases the eggs are placed on high ledges in loose rock as much as two hundred feet above sea-level. The pale greenish-blue egg is about one and one half inches long and takes twenty-four days to incubate. The parents bring their chicks mouthfuls of shrimp and crabs until they are full-grown.

The auks are almost completely marine, spending the major portion of their lives on the open ocean, many miles from shore. They come in only to breed, and then they gather in vast communities on the rocky shores. With the common razorbills of the English coast, the guillemots that inhabit both the Atlantic and Pacific coasts of North America, and the puffins or sea-parrots of the Arctic, they form a distinct family of small and compact aquatic birds. The puffins are amazingly grotesque with their enormous, brilliantly colored beaks.

New York Zoological Society.

LITTLE AUK (ALLE ALLE). *Length:* 8 inches. *Range:* North Atlantic Ocean from Iceland to New Jersey.

The single large egg laid by the little auk on the ledge of its cliffside home is pointed at one end so that if dislodged, it will roll safely in a circle.

Carol Stryker, Staten Island Zoological Society.

LITTLE AUK. Also called Dovekie. In winter little auks frequently fly southward from their Arctic home. Flocks of these birds are seen in New York harbor after severe storms. This little fellow, accompanied by thirty-five of his species, was found in a rain puddle on a Staten Island truck farm.

GREBES

THE western grebe, an expert diver, makes a floating nest of grass, twigs and rushes. Like a raft with a slight depression in the center, it lies among the reeds by the river bank. Here four or five creamy white eggs are laid, about two and one half inches long. When an enemy approaches, the grebe rapidly covers its eggs with vegetation.

In addition to their diving ability, grebes have a strange gift of regulating their degree of immersion when floating on the water. When they feel safe, their long graceful necks rise far out of the water, but sensing danger, they submerge leaving only the tips of their needle-like bills above the surface. Or else they may dive like a flash, to reappear a full minute later far out of shot-gun range. They never take to wing when pursued, although they can fly well.

The diving bird's slender head, long neck and spear-like bill adapt it for fish catching; in addition to fishes, it eats frogs, insects, seeds and the shoots of aquatic plants.

Though grebes spend most of their time in the water, they fly rapidly and can make long journeys; their only difficulty is the take-off, which is accompanied by much kicking and splattering. In flight their legs are carried well behind, perhaps serving as rudders in the absence of a well-developed tail.

The rearward situation of the diving bird's feet makes walking extremely difficult, so on land it merely rests on its breast or stands upright.

Outstanding members of the grebe family include the fresh-water dabchick of the Old World. To protect its young from danger this small bird tucks them under its wings and dives under water. During the breeding season the male of the great crested grebe is highly ornamented with long tufts and crests of beautiful, silky plumage. For years it has been hunted down, and its wild cry of alarm, *kek-kek*, is well known to feather seekers. The pied-billed grebe is an exclusively American form, and is among the commonest species. Grebes are only mildly gregarious and are seldom seen in large flocks.

William L. Finley, Nature Magazine.

WESTERN GREBE (AECHMOPHORUS OCCIDENTALIS). *Length:* 2 feet. *Range:* Western North America. The parent bird lays four or five eggs on a floating raft of lake grass. The young birds are agile swimmers and divers. Grebes are sturdy fliers, making long journeys during migration.

ALBATROSS GROUP

(Albatrosses, Shearwaters and Petrels)

The birds of this group are often called the *Tubinares*, or tube-nosed swimmers, the Latin name referring to their tubular external nostrils. They are all strong flying birds of the open ocean and with their long, narrow wings and stout webbed feet are admirably equipped for this mode of life. The albatross is a long-distance flier, whose strong flight is characterized by circling and soaring. It feeds by day, and its habits were observed by seafarers at a very early period in maritime history.

Some sixteen or eighteen widely distributed species of albatrosses have been identified in both warm and cold oceanic regions. Outstanding among them is the yellow-billed albatross, or "mollymauk" as the English sailors call it. This bird is found in large numbers on the rocky island of Tristan da Cunha in the South Atlantic, where it builds its cylindrical nest of turf and clay. The wandering albatross, one of the largest flying birds known, with an average wing span of eleven feet, inhabits the South Seas. Hood Island, of the Galapagos archipelago, is the favorite breeding ground of the small sooty albatross. One species which inhabits the southern stretches of the Indian Ocean is almost pure white.

The shearwaters number some twenty-five species and also have a very wide distribution. As a group they are considerably smaller than the albatrosses. There is, however, some overlap, the larger shearwaters exceeding the smaller albatrosses in size. The great shearwater is the largest of the group, measuring some eighteen inches. This bird is common in the Atlantic Ocean. The Manx shearwater is abundant in the British seas and breeds along the shores of the English Channel and on the Isle of Man in the Irish Sea. One of the few American forms is the black-vented shearwater, found along the southern coast of California.

Also included in this group are the petrels, small sea birds endowed with great powers of flight. The stormy petrel of the North Atlantic is familiar to many as "Mother Carey's chicken."

Albatrosses: Galapagos Albatross, Black-browed Albatross.

Shearwaters: Manx Shearwater.

ALBATROSSES

ALBATROSSES are the largest of ocean birds, one species, the wandering albatross of the Pacific, attaining a wing spread of eleven or more feet and a weight of twenty-five pounds. These great white birds follow transoceanic vessels for hundreds of miles. For centuries, they have aroused the admiration of sailors by their tireless and seemingly effortless flight. They have learned to make use of air currents set up by the moving ships, sailing overhead for miles without seeming to move their wings. Sailors frequently catch them with baited fish hooks as they swoop down to snatch up the galley refuse from the ocean surface. Sometimes they are kept as pets. In olden times seamen often used their soft white skin for purses, and carved pipes from their hollow bones.

Travelers and scientists have engaged in a long controversy as to whether the same albatrosses follow the ship day after day or whether different individuals change off. Some assert that the same bird can, without sleeping, follow a vessel for days at a time; others say that they are relieved by different birds of a similar appearance. Both sides offer experiments with tagged birds to prove their case, but the argument is far from being settled.

The wandering albatross was considered by early seafarers to be a bird of good omen. Coleridge drew on this legend in his *Ancient Mariner,* wherein the sailor who shot an albatross was pursued by terrible misfortunes.

In addition to eating refuse from ships, albatrosses feed on fishes and small squids. Generally silent, they sometimes utter a grunting moan, especially during the courtship ritual. On this occasion, they face one another, about a foot apart, rub their bills together and bow to one another in stately ceremony. They will often return the bows of human beings during this period. They breed in large numbers on secluded oceanic islands, this being their only sojourn on land. Their nest consists of a bare space in the shrubbery. The one white egg is laid sometime in May or June. The young, fed on food disgorged by their parents, grow very fat. After their parents have stopped feeding them and before they have grown sufficient feathers to shift for themselves, they live on this stored fat.

New York Zoological Society.

GALAPAGOS ALBATROSSES (DIOMEDEA IRRORATA). *Weight:* 17 pounds. *Range:* Galapagos Islands and western Peru.

Considered among the most graceful of all birds, the albatross soars over the sea for hours on motionless wings.

The Galapagos albatross, a small species, has the shortest tail and the largest bill of any albatross. Its color is dusky brown with white markings. To some travelers, the gait of this bird has suggested the swagger of the gangster. Beebe characterizes it as "the gait of flat feet, fallen arches, and crippled limbs." Though awkward on the ground, this bird is a masterly flier. In order to take off from level ground, it must first run several feet.

E. F. Pollock, Nature Magazine.

BLACK-BROWED ALBATROSS. OR MOLLYMAUK (DIOMEDEA MELANOPHRYS). *Wing Spread:* 8 feet. *Range:* Antarctic Seas and South Pacific Ocean.

A specimen of this species was observed for thirty-four consecutive years consorting and migrating with gannets in the Faroe Islands, far from its native haunts in the Southern Hemisphere.

SHEARWATERS

Resorting to land only during the breeding season, the Manx shearwater flies swiftly and gracefully over the open sea, shearing or skimming close to the waves. About the size of a pigeon, it has a sooty gray back; its breast and underparts are white. It generally hunts for food at night. Occasionally the shearwater dives below the surface of the water, reappearing with a struggling fish in its strong hooked beak. It can remain submerged for about twenty seconds. Its stout webbed feet serve to propel it through the water.

During the summer months this shearwater retires to the most lonely coasts to mate. At this time flocks of these birds dot the turfy islands and sloping cliffs, and the air is filled with their cry, a *cuck-cuck-coo* uttered three times. The Faroes, Norway, Iceland, the Azores and Madeira are favorite breeding spots. In a nest of dried grass situated at the inner end of a burrow, the mother bird lays a single white egg, about two and one half inches long. The male helps in the process of incubation, which begins early in May. The young birds are covered with a thick, fluffy down. They remain in the nest until they are full-fledged and very fat, whereupon they leave the cliffs for the open sea. The fat young birds are considered excellent eating, and one species, which frequents islands near Australia, is for this reason known as the "mutton bird."

In late autumn, their domestic life over, shearwaters shift to more southerly regions. Great flocks of them gather off the coast of England, where they are called "puffin of the Isle of Man," and they have been seen as far south as the Argentine. They are rare in the United States.

New York Zoological Society.

MANX SHEARWATER (PUFFINUS PUFFINUS). *Length:* 1 foot. *Range:* European North Atlantic.

Shearwaters choose a spot high up on a cliff in which to make their burrows. Sometimes one entrance leads to several nests. Skimming the surface of the sea, these birds seem really to be "shearing" the wave tops.


R

PELICAN GROUP

(Pelicans, Boobies, Cormorants, Gannets, Snake-Birds, Tropic Birds and Man-o-War Birds)

Unlike their relatives, the petrels and the penguins, many of the birds in this group inhabit not only the open oceans and sea coasts, but also rivers, lakes and swamps. In the order of their adaptability to inland rather than ocean life, the pelican takes first place among these birds, since the species is often found hundreds of miles in the interior. The cormorants, gannets, snake-birds and man-o-war birds follow. When one considers the flying ability of the birds of this group, it is surprising that they wander so little from the shores on which they breed. They are rarely seen on the open ocean. The booby is most often seen far from shore, but it too makes frequent excursions to land.

In general appearance the birds of this group have marked dissimilarities. Their bills are either pouched as in the pelican, hooked as in the cormorant, or pointed as in the booby. Head and neck sizes also vary considerably. The backward position of the legs, the four-toed feet fully webbed, the long and pointed wings are features common to all of these birds. As is often the case in related animals that do not look alike, the similarities are most apparent in the embryonic and fledgling stages. The young man-o-war bird holds the tip of its bill against its breast in the typical pelican manner. This accounts for its other name, the "frigate-pelican." The fledglings of the boobies and cormorants greatly resemble one another.

The boobies and pelicans are equipped with shock-absorbers, pads of tissue under the skin, that adapt them for plunging into the water from great heights. In the matter of sex sizes we again find a lack of uniformity. The female booby and man-o-war bird are decidedly larger than the males, while in the American brown pelican the reverse is true.

Pelicans:	Brown Pelican.
	White Pelican.
Gannets:	White-bellied Booby.
Cormorants:	Brandt's Cormorant.
	Flightless Cormorant.
Man-o-War Birds:	Man-o-War Bird.

PELICANS

Bound on a fishing expedition, a flock of forty or more brown pelicans takes its leisurely flight in a long oblique line or else in wedge formation. In spite of their great size pelicans fly swiftly, necks drawn in upon the shoulders and feet trailing behind. Medieval mariners, seeing a line of pelicans far in the distance, often fancied they had sighted some enormous sea monster.

Pelicans inhabit not only the tidal waters of the ocean but also swampy districts and inland lakes. Utilizing their ability to transport fish for considerable distances, they often seek their family food supply far from their nests.

The pelican's most prominent feature is its beak, frequently a foot long, beneath which hangs a pouch, capable when distended of holding more than three gallons of water. The beak does not, as the popular limerick would indicate, hold food for a week, but rather serves as a net for catching fish. The bird will plunge straight downward from a height of fifty feet or more, hitting the water with an awkward splash. Sometimes when standing quietly in the water the pelican may spy its prey. It will then immerse its head, sometimes somersaulting completely to make the catch. On returning to the surface, it lets the water run out of its beak until the pouch has contracted, and then swallows the fish. Its stomach serves for storage, as digestion is slow. In feeding its hatchlings, the parent coughs up small morsels; for the larger chicks, it may disgorge whole fishes. The young feed by sticking their heads down the parental gullet.

Brown pelicans breed in colonies on small islands near the mainland, making either a nest of gravel and vegetable rubbish on the ground or one of twigs in mangrove trees. They lay two or three chalky white eggs, which require about one month for incubation.

So great is the pelican's repute as a fisher that in 1918 Texan fishermen demanded its extermination, claiming that the voracious birds devoured more fish than the entire population of Texas. Investigation showed, however, that these pelicans fed mostly on the Gulf menhaden, an oily fish unfit for human consumption. The birds should therefore be left unmolested.

New York Zoological Society.

BROWN PELICANS (PELECANUS OCCIDENTALIS). *Length:* 4¼ feet. *Range:* Tropical America.

The enormous underslung mouth of the pelican is used as a fish net. In captivity pelicans have been known to live for more than forty years.

Ralph De Sola, Federal Writers' Project.

EUROPEAN WHITE PELICAN (PELECANUS ONOCROTALUS). *Range:* Southern Europe and North Africa.

White pelicans often band together and drive schools of fish into shallow water, where they devour them in great numbers. In summer these pelicans are found in and about fresh water. Unlike the brown pelicans they do not plunge for their food.

BOOBIES

Flying at a height of fifty feet or more, a flock of five hundred pale brown boobies sights a school of fish and dives headlong into the sea, descending like a sheet of rain; where a moment before the sky had been clouded with birds, there remains only the foaming spray raised by their plunge. The wings stay open until just before striking the water and then close quickly. According to Evans boobies are frequently caught by sailors, who place fish as bait on floating pieces of wood. So violently does the bird plunge that its beak rams fast into the wood.

Parties of these birds often travel in single file. But when flocks are large, they travel three or four abreast, passing overhead at a rate of about three hundred a minute. They fly with outstretched necks and wings extended.

In America boobies are found along the shores of tropical South America and throughout the West Indies. Their enemies are man-o-war birds, who steal their catch, and crabs, who steal their eggs.

The booby makes no elaborate nest, but places its eggs in a makeshift structure of sticks, stones or dried sea-weed, placed on the ledge of a high cliff. Usually one of their two or three eggs does not hatch out, and the natives of the Cape Verde Islands are said to have based an extensive gambling game on this unusual fact. They bet on which egg is the dud, marking the eggs to identify them.

The young are born without a single feather, but their feathers are quick to grow. Three months after leaving the egg, the chicks take flight. The nestlings eat squids and fish, which they obtain by pushing their beaks into the gullets of their parents.

Boobies seem to possess a high degree of social responsibility. An injured bird will often be fed by members of the flock until it is well. This care of the disabled is also observed among the man-o-war birds.

New York Zoological Society.

WHITE-BELLIED BOOBY (SULA LEUCOGASTER). *Length:* 2½ feet. *Range:* Tropical and sub-tropical seas.

An excellent fisherman, the booby derives its name from *bobo* (dunce), the name given this ludicrous bird long ago by Spanish sailors.

American Museum of Natural History.

BOOBY GROUP ON THE BAHAMAS. Desolate sandy beaches of the West Indies are favorite breeding grounds of boobies.

CORMORANTS

Such is the cormorant's aptitude for catching fish that Chinese and Japanese fishermen tether them to their boats with strings and employ them in place of hook and line. A ring around the bird's neck prevents it from swallowing the larger catch. As soon as one fish is removed from its beak, the cormorant dives after another. A cormorant kept in the London zoo lived twenty-three years.

At liberty these large blackish-green birds fly in V formation. They are often seen swimming easily on the surface of the water and are also able to pursue their prey for some distance underwater, using both their wings and their webbed feet as paddles. They have been found in traps as much as forty feet below the water's surface. Cormorants are very active birds and dive and plunge energetically all day long.

Cormorants have rapid digestion and a phenomenal appetite, eating as much as half their weight each day. Fishermen have from time to time accused them of eating all the available salmon or other fish at certain localities, but investigation showed that they rarely eat fish palatable to man.

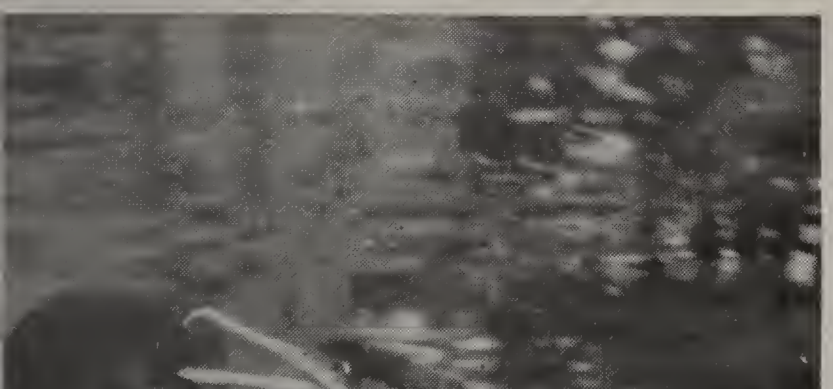
These aquatic birds breed in spring, usually on the narow ledges of high cliffs. The female seems to take the initiative in courtship. The male toys with the nesting material, then passes it to the female who utters the mating call while arranging it. She then spreads her tail like a fan and bends it forward; she shuffles her wings and stretches out her head upside down along her back, swinging it from side to side. The male puffs out the plumage on his head and neck, and blows up his neck sac. Both birds hold their beaks wide open.

Some species of cormorants are of great economic importance to man as producers of guano, found chiefly on the coastal islands of Peru and other parts of western South America. Guano or bird dung is valuable as a fertilizer and has a high nitrate yield.

American Museum of Natural History.

BRANDT'S CORMORANTS NEAR MONTEREY, CALIFORNIA (PHALACROCORAX PENICILLATUS). *Length:* 3 feet. *Range:* Pacific Coast of North America.

The young cormorants bred in these great colonies make a tasty dish for the ever present sea gulls and sea lions.



Ralph De Sola, Federal Writers' Project.

FLIGHTLESS CORMORANTS (NANNOPTERUM HARRISI). *Length:* 2½ feet. *Range:* Galapagos Islands.

The pair pictured are courting.

MAN-O-WAR BIRDS

Soaring at a great height over the South Seas, the immense man-o-war or frigate bird sights a tern or booby bearing a fish in its beak. Itself an excellent fisher, the frigate apparently prefers to let other birds do its fishing. It is a hi-jacker among birds. Darting down like a meteor, it forces the smaller birds to relinquish their prey, either by the mere threat of its presence or, if necessary, by a swift peck which may break its adversary's wing. So swift is its flight that it often catches the dropped fish in mid-air. Despite its remarkable power of flight, the man-o-war clings closely to its breeding areas and is seldom found far out in the ocean.

A full-grown frigate bird has a wing spread in excess of six feet. Its tail, regulated by seven distinct sets of muscles, is well developed and is all important as a rudder in directing the bird's spectacular aerial gyrations. The body plumage of the male is a glossy, metallic black, that of the head bluish-green. Hanging from its neck is a red sac, which it distends in the mating season. The female is less glossy and has a brownish breast.

The frigate bird eats young sea turtles in addition to immense quantities of fish. A chick has been known to disgorge as many as seven flying fishes. These birds are most at home in the air, and consume their food as they fly. At night they roost in trees on lonely islands, only rarely alighting on level beaches, as it is difficult for them to take flight unless they have a short distance to drop.

Many breed in February. Nests are built in trees, brushes or rocks, building material being sticks torn from branches while the birds are on the wing. Into the nest one white oval egg is laid. Father and mother bird take turns in sitting, and one is always present, for otherwise a neighboring frigate bird will steal the nest and eat the egg or chick.

The names frigate or man-o-war, conferred on these belligerent birds by the early Spanish explorers, today seem hardly adequate. But to those seafaring men, centuries before modern war planes, the man-o-war was the most striking symbol of speed, grace and fighting power.

American Museum of Natural History.

MAN-O-WAR BIRD (Fregata aquila). Also called Frigate Bird. *Length:* 3½ feet. *Range:* Tropical and subtropical seas.

The man-o-war bird is a pirate, feeding on the fish caught by other birds. He pursues his victim until the morsel is dropped, then he dives after it, often retrieving his meal before it touches the water.

New York Zoological Society.

HEAD OF MAN-O-WAR BIRD. The hooked beak of this sea bird is used in catching fish.


R

WADING BIRDS

(Herons, Bitterns, Storks and Flamingoes)

Extremely long stilt-like legs adapt members of this group for wading in shallow waters and marshlands in search of food. Most of them are equipped with long, sharply pointed bills for spearing fish. These bills can be submerged almost completely without any impediment to breathing as the small, slit-like nostrils are located at the very base of the bill. The boat-billed herons and the flamingoes are exceptions to this rule and feed by scooping and sifting the mud bottom.

The long and powerful wings of these large birds enable them to fly great distances, though they seldom do so except during migration. They will normally make only short excursions unless pursued. As might be expected of birds that do not take to the deeper waters of the open ocean, they seldom swim either on or under water.

Many wading birds roost in trees and often build nests in their protective foliage, rather than in the more exposed swampland. This perching ability is unusual for aquatic birds and is accounted for by the peculiar construction of the feet, which are equipped for both grasping and wading.

Herons:	Boat-billed Heron.
	Cocoi Heron.
Bitterns:	Least Bittern.
Ibises:	Scarlet Ibis.
Storks:	White Stork.
	Shoe-bill Stork.
	Marabou Stork.
	Wood Ibis.
Flamingoes:	American Flamingo.

HERONS

A DENIZEN of the mangrove swamps of Central and South America, the boat-billed heron is remarkable for its grotesque bill. During the breeding season these birds may be seen singly or in pairs in the dense jungle bordering Brazilian rivers. Though the boat-bill has been known to scientists for more than a hundred and fifty years, little has been learned of its nesting and mating habits because of the pestilential, torrid, insect-ridden and generally inaccessible character of its habitat. Its eggs are believed to be pure white. Observations made of the more common herons indicate that they live in large flocks, build their nests in a colony near together, and lay from three to six whitish or bluish-green eggs in their large nests.

The boat-bill is a delicate lavender gray above, a lighter color beneath and on the tail. Its head and the long drooping crest that issues from the crown are blue-black. Its throat and the sides of its face are white, its breast, cinnamon red. The bird has large dark eyes. The plumage of herons in general is distinctive. The sides of the rump are covered with down that disintegrates into a light greenish powder.

Like their heron relatives, the boat-bills live in small colonies and seem to be nocturnal. They are capable of strong flight but usually fly only a few yards to the accompaniment of much flapping. They generally lurk amid the tangled undergrowth of the jungle and although often unseen, their presence is detected by their harsh croaks and squawks. Most herons are seen wading in the marsh with a slow and dignified gait. Fish is the mainstay of the heron bill-of-fare, although they occasionally vary this menu with insects, frogs and snakes. The boat-bill, to judge by the form of its beak, is probably an inept fisherman. It uses its beak to dig into the sand and mud at the river bottom for aquatic worms and small crustaceans.

Other members of the heron family inhabit not only the swamps and marshes but also the sea coasts. Herons are found the world over except in the far north.

Ralph De Sola, Federal Writers' Project.

BOAT-BILLED HERONS (CANCROMA COCHLEARIA). *Length:* 1½ feet. *Range:* Tropical America.

The boat-bill uses its bill as a shovel for turning over mud when the bird searches for worms, frogs and the like.

Ralph De Sola, Federal Writers' Project.

COCOI HERON (ARDEA COCOI). *Height:* 2½ feet. *Range:* Rivers of southern South America.

This heron resembles the great blue heron of North America in haunts, habits, call notes and general appearance. When the swamps of its native land dry up, these herons leave for the river valleys.

BITTERNS

At night the buff-black least bittern often stands motionless in the shallows among the reeds by the water's edge, waiting to spear a passing fish with its bill. On catching its victim, it often mauls it before eating it. Through the night the common bittern's call is heard, first a loud tapping like a mallet striking a stake, then a booming sound like water being poured from a large jug. Naturalists have variously indicated this latter note as *chunk-a-lunk* and *ooble-ooh.*

In addition to fishes, bitterns eat small mammals, birds, shell-fish, insects and worms, all of which they digest with remarkable speed. In the air, they carry the head drawn back on the shoulders; their flight is labored and rather slow. Bitterns are most at home when running and climbing among the aquatic plants by the shore, or lurking in the rushes. They perch with ease, often assuming an upright position with the bill held vertically down. In this pose their mottled color blends with the surrounding rushes, rendering them almost invisible to the hunter.

Bitterns build their nests in swamps by crushing down reeds for a foundation and constructing a loose mat of softer grasses above it. Here, three to five eggs are laid. The domestic life of bitterns is extremely noisy, attended by much hissing and screaming.

American Museum of Natural History.

LEAST BITTERNS (IXOBRYCHUS EXILIS). *Length:* 1 foot. *Range:* North America.

Stretching out their necks, with heads bent low, these birds make their way easily through the tangle of vegetation about their swamp home. Sensing danger, they point their beaks skyward and remain motionless, thus resembling pointed stumps.

Ralph De Sola, Federal Writers' Project.

SCARLET IBISES (EUDOCIMUS RUBER). *Length:* 2 feet. *Range:* Tropical America.

The scarlet ibis is one of the most vividly colored birds. Its brilliant vermilion plumage is visible for long distances. Ibises differ from herons in having downwardly curved bills.

STORKS

For centuries the long-legged white stork has been associated with man and unlike most other birds it seeks out his habitations. These plump, friendly birds frequently build their nests atop chimneys, gable corners or towers, and in many parts of Europe their presence on a farm is regarded as a good omen. Except for a few black wing quills, storks are pure white.

Their nest, made of sticks and reeds, is at first shallow, but each year the birds make additions to it, until in the end it may be several feet high. White storks nest in pairs, the mother bird laying from three to six pure white eggs, which require four weeks to hatch. The female sits on the eggs, while her mate constantly helps her, bringing her frogs, snakes, eggs and young birds to eat. The male stork is faithful enough to return to the same mate for several years in succession. The young are helpless at birth and must be fed by the adults, who insert their long, pointed red beaks into the chicks' gullets. Active by day, storks often roost in trees by night. Sometimes they rest standing on one foot, leaning their beaks against their breasts.

In the fall, when the storks migrate southward to Africa and India, and in the spring when they return, they may be seen flying in V shaped formation, constantly changing their leader. They fly with their long necks stretched forward and legs well back; their flight is graceful, noiseless and swift. Large, powerful wings enable them to reach great heights by soaring and circling.

Storks have no difficulty in walking. They stalk about solemnly in search of food both on dry land and in swamps. They generally make their homes near lakes, creeks or salt lagoons. Reptiles form a large part of their diet, and the birds are esteemed in many regions for their value in holding snakes in check. They also eat small mammals, birds, frogs and insects. They are voiceless, but sometimes make a great clatter by snapping their bills; this habit often betrays their whereabouts.

Not all storks are white. A black stork, long a denizen of the Dresden zoo, lived for thirty years.

New York Zoological Society.

WHITE STORK (CICONIA ALBA). *Length:* 3½ feet. *Range:* Europe.

This most famous of birds breeds in great numbers in some parts of Europe. Its habit of nesting on chimney tops may account for the popular superstition concerning its role as a deliverer of new-born babies.

Ralph De Sola, Federal Writers' Project.

SHOE-BILL STORK (BALAENICEPS REX). *Height:* 5 feet. *Range:* Egypt: along the White Nile.

Abu markub or "he of the shoe" the Arabs call this queer bird. He is as shy as his European cousin is sociable, and lives near ponds remote from human habitations.

FLAMINGOES

As a colony of rosy pink flamingoes feeds in tropical shallows, a few of their number stand aside, on guard duty. About every half hour the sentinels are changed, and such is their alertness that it is almost impossible for a hunter to come within shooting distance.

While searching for food, the bird holds its head under water, its crown down and turned backwards. The beak, sharply bent downward and equipped with a filter, is used as a sort of spoon. In this strange position, the flamingo stirs the mud with its long legs, dislodging crustaceans, mollusks, frogs and insects from their hiding places. Although it consumes a number of aquatic animals, its chief food consists of water plants.

Flamingoes spend most of their time wading slowly and stiffly about the shallows, now and then emitting a loud, harsh cry. They are good swimmers and graceful fliers, although they must gallop awkwardly through the mud to take off. They fly in wedge-shaped flocks, with legs and neck outstretched.

These birds breed in colonies on lakes and salt lagoons. Their nests are conical or cylindrical structures of mud, from two inches to two feet in height, depending on the depth of the water, and are hollowed in the top to receive the one or two eggs. The incubation period lasts for four months, male and female sharing the labor.

The downy chicks, whose beaks, unlike those of the adult bird, are short and straight, run from the shell. For three or four days they remain in the nest, fed by the predigested juices of some mollusk eaten by their parents. The chicks also eat their own egg shell.

In late summer the adult birds lose their flight feathers and are for a time quite helpless.

New York Zoological Society.

AMERICAN FLAMINGOES (PHOENICOPTERUS RUBER). *Length:* 3¾ feet. *Range:* Tropical America.

Nesting in large island colonies, both the males and females of this beautifully tinted bird take turns in hatching the eggs. During incubation, the long legs are folded under the body, the graceful neck is coiled away among the back feathers, and the head rests on the breast.

Clifford Sutcliffe, Federal Writers' Project.

(*Left*)

MARABOU STORK (LEPTOPTILUS CRUMENIFER). *Height:* 4 feet. *Range:* Africa.

Because of their value as street cleaners, these scavengers are protected and are a common sight in many African villages. Captive specimens often serve the villagers for more than fifteen years.

(*Right*)

WOOD IBIS (MYCTERIA AMERICANA). *Height:* 3½ feet. *Range:* Southern United States to Argentina.

This is the only member of the stork family found in the United States.

Ralph De Sola, Federal Writers' Project.

DUCKS, GEESE AND SWANS

The members of this group are perhaps the most familiar of all aquatic birds. Ducks and geese have long been regarded as a highly delectable dish, and swans have ever been prized for their aesthetic appeal.

The ease and grace with which these birds glide upon the water is a matter of common observation. The three front toes are completely webbed, and the short legs drive these paddles with powerful strokes. The phrase "like water off a duck's back" is well founded, for ducks' plumage is dense and is made impervious to water by oil from a gland near the tail. These birds are swift and tireless fliers. During the period of migration their flying wedges or long wavy lines rival the formation precision of a squadron of fighting planes. But on land the gait of these graceful creatures is hardly more than an awkward wobble.

A particularly useful adaptation of this group is the sieve-like bill. When a mouthful of mud and vegetation is taken up, the mud and water drain through the comb-like openings lining the bill.

Geese and swans are faithful mates and pair through life, sharing parental responsibility for nearly a year after the young are hatched. The male duck, however, is irresponsible and will often leave his mate and ducklings to shift for themselves.

Geese and swans are noted for their long lives. A domestic goose attained the age of eighty years and a mute swan, seventy.

Related to ducks, geese and swans, are the screamers, swamp-living birds of southern South America.

Ducks:	Mallard Duck.
Geese:	Canada Geese.
Swans:	Mute Swans.

MALLARD DUCKS

Known almost the world over, the green-headed mallard duck is a regular migrant. With the first autumn frost, V-shaped flocks may be seen flying southward, and for days thereafter the air is full of their quacking. Once winter has set in, mallards are rarely seen in northern climes, but with the first approach of spring, the V-shaped lines return once more from the southland.

Aside from its glossy greenish head, the mallard may be identified by its buff-gray color, its white neck-ring, and a violet wing-patch or speculum bordered before and behind with black and white. These birds were once the most abundant of wild fowl, but of recent years they have begun to grow rare as a result of their popularity among hunters, who covet them for their delicious flesh and the prestige derived from bringing back such trophies.

Mallards are omnivorous, eating almost anything in sight, as they swim and paddle about the marshes. About four-fifths of their diet is vegetable, the remainder is animal. Small frogs, toads, lizards, small fishes, worms, mice, grasses, nuts and aquatic plants are only a few of the items on their menu. In some regions they are held to be most useful to man because of their propensity for eating the crayfish that undermine dykes. This duck's broad, flattened bill is so equipped that with the aid of the tongue it can disengage food from the marshland mud.

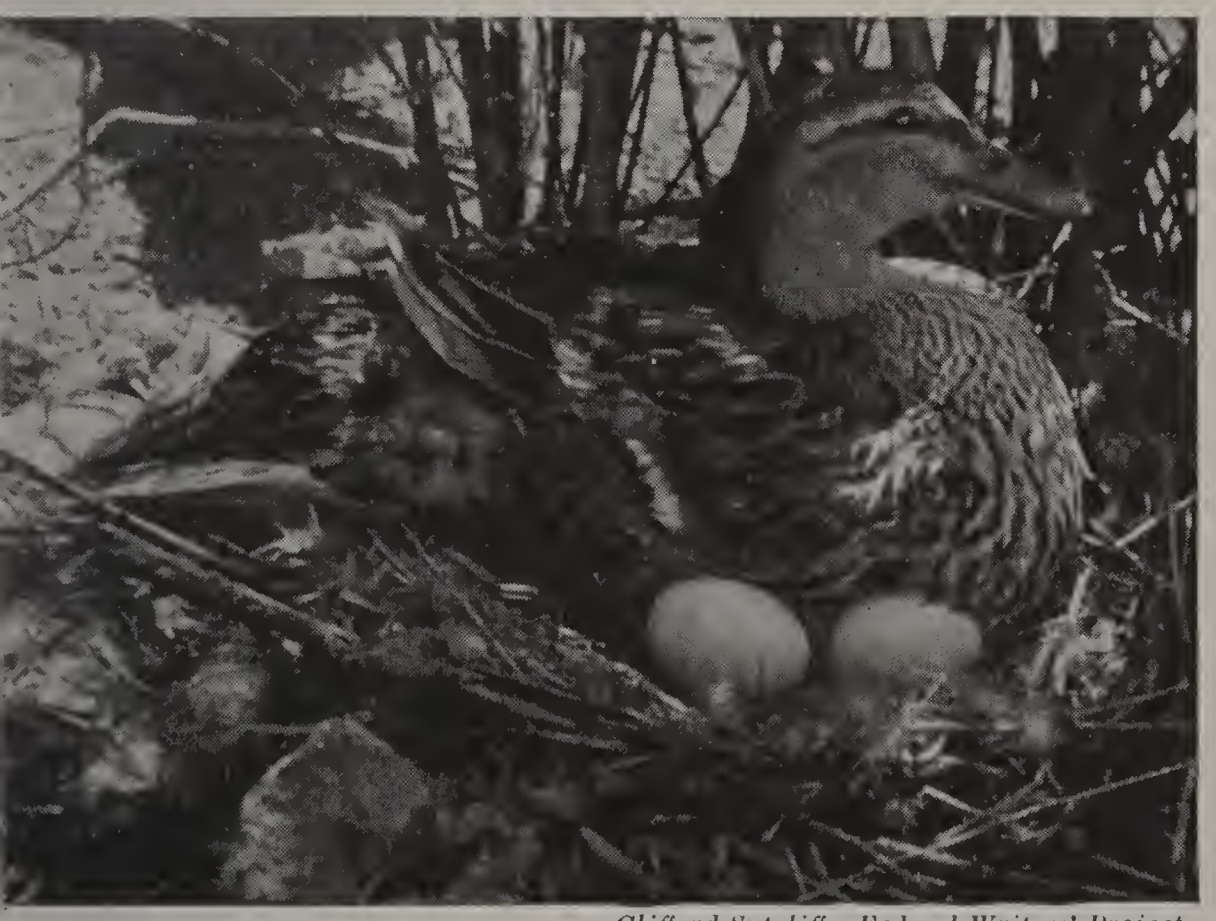
Mallards build their nests on the ground, constructing them of feathers and plant trash. They breed in early spring, the female laying six to ten greenish-yellow eggs upon which she sits for a period of four weeks.

In summer the male bird sheds his brilliant feathers, taking on the more drab and inconspicuous plumage of the female. This moult is aptly called the "eclipse."

New York Zoological Society.

MALLARD DUCKS (ANAS PLATYRHYNCHOS). *Length:* 2 feet. *Range:* Northern Hemisphere.

During the breeding season the male mallards swim about, nodding their heads in all directions and whistling to impress the females. Ducks in the wild are monogamous; domesticated, they become polygamous. The flying speed of the mallard is estimated at a mile a minute.



Clifford Sutcliffe, Federal Writers' Project.

MALLARD DUCK NESTING. The nest is usually built among reeds or high grass near the water, and often contains as many as thirteen eggs. Occasionally two ducks will brood on the same nest at the same time.

CANADA GEESE

WIDELY distributed throughout North America, this largest of geese is known in the West as the honker, owing to its sonorous and varied honking. In the North it is known as the gray goose, and in Quebec as the *outarde*. Hunters in many regions claim to have brought down twenty-pounders, and fourteen pounds is a common weight. The gray honkers are readily recognized by their white cheek-patches.

Canada geese breed only after attaining their third year. Their breeding grounds extend from Alaska to Labrador and formerly south from Oregon to Massachusetts. They once bred in numbers on Anticosti Island in the Gulf of St. Lawrence. Honkers are remarkable for the varied sites they choose for nesting, usually clumps of grass in the marshes, but frequently cliffs and trees. Often they occupy the tree-nests of ospreys who have departed for their winter homes. With the return of these hawks great fights have been known to break out, ending most often in a victory for the ospreys who lay their eggs next to those of the geese and begin to incubate.

The male goose does not help sit on the eggs but stands by to defend the nest. Five to nine pale greenish eggs are laid, and the young are able at birth to eat, walk and swim.

In the autumn Canada geese fly southward to unfrozen waters, their winter habitat extending from New Jersey to California and southward. They fly in wedge formation, usually making their way along the coast, following familiar landmarks.

These birds live in salt flats, tidal streams and marshy ponds, feeding largely on vegetable matter except for the sand and gravel they swallow to aid their digestion. Either they feed on shore, where they pluck up grasses or other plants, or they swim along the shallows, bringing their food up from the bottom by thrusting down their heads.

When intruded upon, these geese will hiss, necks outstretched, and strike with their wings. They are much sought after as game but difficult to shoot owing to their extreme wariness.

New York Zoological Society.

CANADA GOOSE AND GOSLINGS (BRANTA CANADENSIS). *Length:* 3½ feet. *Range:* North America.

These birds have been partially domesticated; their wings are cut to keep them from being lured off by wild geese.

Clifford Sutcliffe, Federal Writers' Project.

CANADA GEESE. The fall migrations of these birds are familiar to all. High overhead, the flying wedge of honking geese speeds on its journey over a thousand miles, in search of a warmer climate.

MUTE SWANS

THE LOW graceful neck, the snow-white plumage and stately bearing of the mute swan have made it an ornament on the ponds and lakes of the world. In England during the Middle Ages it was regarded as the "Royal Bird" and could not be kept without a license or swan mark registered on its bill. At first these marks were conferred most sparingly, but by the days of Queen Elizabeth there are said to have been nine hundred distinct swan marks in England, some held by private persons and some by corporations. The swans of the realm were placed under the control of a royal swanherd, a most elevated dignitary. This official travelled throughout the country, seeing to it that the regulations covering the majestic bird were enforced. The extension of swan rights to the corporations indicated the loosening of feudal restraints.

The young swans or cygnets are considered a great table delicacy and are fattened for this purpose at great expense.

In its wild state this swan breeds from North and Central Europe to Central Asia. It feeds primarily on the seeds of water plants, mollusks and insects. Because of its great size and beauty, it enjoys a considerable place in ancient legends, the best known of which is that of Lohengrin, the Teutonic knight errant, who travelled about in a boat drawn by a swan.

Mute swans usually nest on a small island. The nest is often as much as two feet high and six feet in diameter. Five to nine grayish-olive eggs are laid, which require five to six weeks for incubation. When hatched, the young are covered with sooty-gray down; the first feathers are dark brown, gradually changing to white. It takes about a year for the bird to attain its familiar snow-white color. During this time the patient mother keeps constant watch over her fledgling. The male has been known to rush wildly at any intruder, causing considerable injury with its powerful wings.

New York Zoological Society.

MUTE SWAN AND CYGNETS (CYGNUS OLOR). *Length:* 5 feet. *Range:* Europe and Asia.

These very ornamental birds, though silent, are kept on lakes and ponds all over the world, because of their great beauty.

New York Zoological Society.

HORNED SCREAMER (PALAMEDEA CORNUTA). *Length:* 3 feet. *Range:* South America: Guianas and Amazon Valley.

Young horned screamers are reared to defend the poultry of natives from birds of prey. Their sharp-spurred feet and wing-tips make them formidable warriors. The slender "horn" on the head of adults is usually more than three inches long. Screamers are thought to be related to the ducks, geese and swans.


R

BIRDS OF PREY

(Condors, Secretary Birds, Hawks and Eagles)

The birds of this group are especially adapted for obtaining their subsistence by preying upon their fellows. They are solely flesh eaters and either pursue and capture their victims alive, rob other birds of their catch, or feed on carrion. As a group they are the most feared and hated members of the feathered family. Many species of this group, however, destroy obnoxious pests such as mice and harmful snakes or help clean up carrion. The turkey buzzards, familiar to the residents of the southern United States, fall into the latter class.

The eyes of these birds are often sunk beneath projecting ridges, which lend them a sinister look. Their beetling brows coupled with their loud harsh cries seem to assist the birds of prey in their work by terrifying their victims. However, the destructiveness of birds of prey to game and poultry is generally greatly exaggerated.

Falconry, a favorite diversion of royal families during the Middle Ages, is still practised today by the aristocracy in England, Arabia and Persia. The art consists in patiently training a falcon or hawk to hunt down its prey but not to devour it. The bird is carried on the left wrist, which is protected by a heavy gauntlet. The golden eagle, one of the largest and most magnificent of the birds of prey, is trained to hunt down hares, foxes and even fleet-footed antelopes.

Condors:	Californian Condor.
	Andean Condor.
Secretary Birds:	Secretary Bird.
Vultures:	Bearded Vulture.
	Turkey Vulture.
	Indian Vulture.
Hawks:	Cooper's Hawk.
Eagles:	American Eagle.

CONDORS

In the wild state condors subsist chiefly on carrion. A few of them can devour a dead horse or cow in a surprisingly short time. Gifted with amazing sight, they watch from dizzy heights the activities of beasts of prey on the earth below them. When a puma has gorged himself and abandoned the carcass of his kill, a condor may dash down and eat the remainder. Sometimes they join gulls in eating a dead whale cast up on the shore. But condors do not depend on carrion alone for their food. They kill mammals and birds, and have been known to attack young goats and lambs. Tales of condors flying away with children, however, are purely mythical. Actually, the birds can carry comparatively little weight in their claws.

The Californian condor shares with its South American relative, the Andean condor, the distinction of being the largest and heaviest of flying birds. Its wing spread ranges from eight to nine feet, and some specimens have weighed as much as thirty pounds. Yet, despite this weight they fly with great speed, soaring and gliding over their native mountains.

The Californian condor lays a single egg during the winter months, in a cave or recess among the rugged cliffs. The egg is greenish-gray and measures approximately four by two inches. The nestlings are covered with white down except on the head, which is bare. Theirs is probably the longest infancy in the bird world, growth not being complete until the third year. The youngsters hiss and growl, while the adult birds are silent. Condors breed in pairs, showing hostility to any intruder.

In former days these birds were common, their range extending throughout California and into Oregon and Washington. Today they have been nearly exterminated and are restricted to Southern California, where less than ten families are reported to be in existence. In Lower California, they are somewhat more numerous. Formerly they were known to descend into the open valleys, but today one must usually ascend the most inaccessible peaks to find them.

The dull black condors can be distinguished at a great distance by the white wing tip patches on either side. Their heads are pale orange.

Ralph De Sola, Federal Writers' Project.

ANDEAN CONDOR (SARCORHAMPHUS GRYPHUS). *Length:* 4 feet. *Wing Spread:* 10 feet. *Range:* Andes Mountains of South America.

Many legends tell of condors killing sheep or children, and carrying them off into the mountains. These stories are untrue.

Andean condors are sometimes caught by the Indians who slaughter a discarded horse for them to feed on. Large numbers of the giant birds assemble for the feast. When they have eaten themselves groggy, the Indians lasso them.

(*Left*)

CALIFORNIAN CONDOR (GYMNOGYPS CALIFORNIANUS). *Length:* 4 feet. *Wing Spread:* 10 feet. *Range:* Southern and Lower California.

Condors feed on carrion, and their mountain dwelling is a fetid den of decayed and rotting flesh and bones.

New York Zoological Society.

(*Right*)

TURKEY VULTURE (CATHARTES AURA). Also called Turkey Buzzard. *Length:* 2 feet. *Weight:* 5 pounds. *Range:* Eastern North America.

Vultures are valuable as scavengers of dead and decaying animals. "When they find a dead animal they will not leave it until all but the bones and other hard parts have been consumed." Relatives of this species are found throughout temperate and tropical America.

New York Zoological Society.

SECRETARY BIRDS

With dignified, swaggering gait, pairs of gray secretary birds stalk the arid hills and plains of South Africa, seeking reptiles and other food. Known by the Dutch as *slangenvreeters* (snake-eaters), they are prized by Boer farmers because of their constant warfare against snakes; although some question their value, believing that they also prey on game birds and antelopes. In some localities they are domesticated for use in eliminating insects, rats, lizards, tortoises and snails.

About four feet in height, the secretary bird resembles nothing so much as a grayish-blue rooster wearing a short pair of black trousers and standing on a long pair of stilts. It is also characterized as a "crane with an eagle's beak."

This snake-eater's original name was *sagittarius*, or archer, given it because of its striding gait, which resembles that of a bowman advancing to shoot. This name was later changed to *secretarius*, having reference to the quill pens stuck behind the ears of Victorian clerks which gave a fancied resemblance to this bird.

In attacking snakes, this bird fights with its powerful feet while the stiff feathers of the outstretched wings help the bird balance as its dances around its victim. It recoils after each pounding foot blow, and this fact, as well as the length of its legs, enables it to elude the snake's teeth. If the snake does succeed in biting a feather, the bird pulls it out at once. Occasionally a poisonous snake is able to inflict mortal injury, but that does not prevent thousands of serpents from being devoured each year by their feathered enemies. Snake-eaters have been known to fly high in the air with a snake wriggling in their beaks, dropping the prey to the ground to kill it.

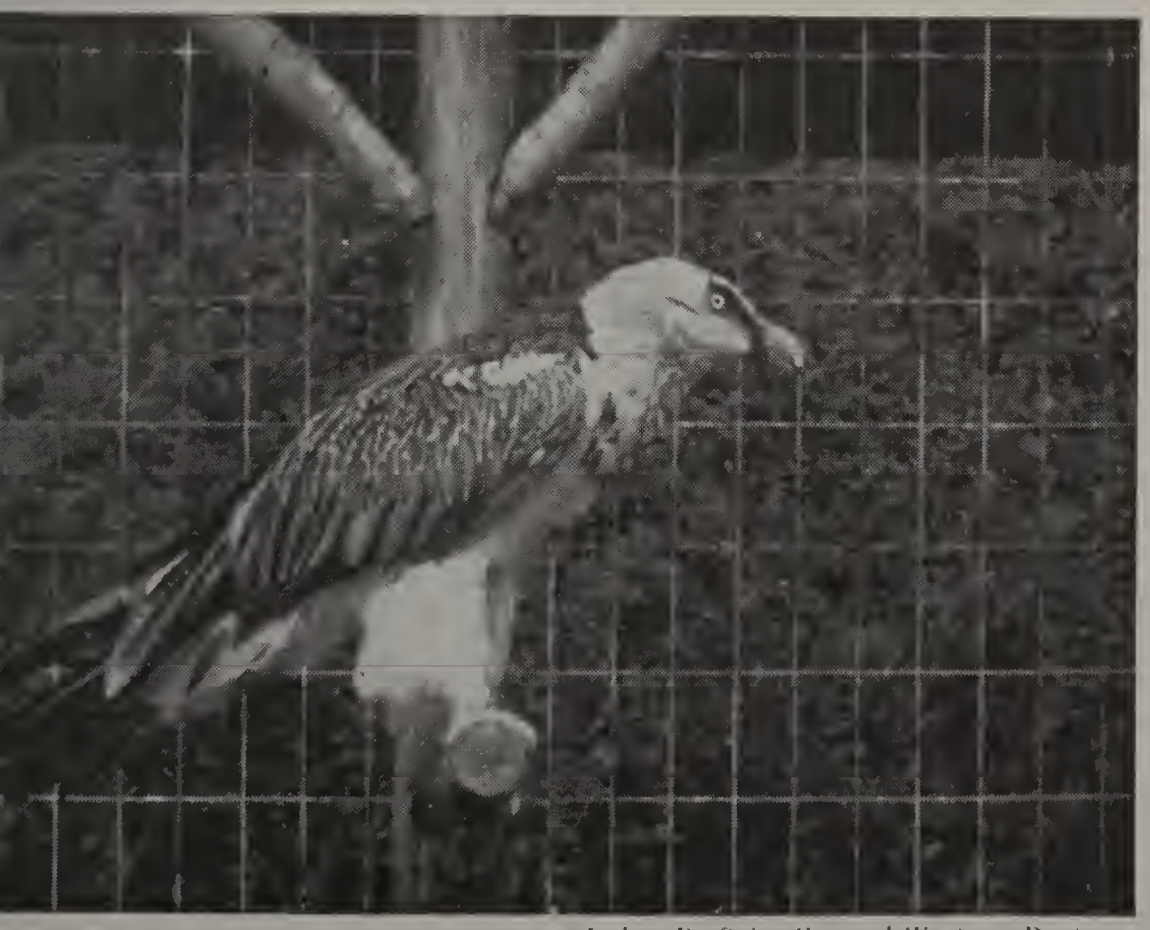
When a pair of secretary birds mate and establish themselves in a locality, they drive all others of their kind away. They confine themselves to one region and occupy the same nest for a long period. The nest is a huge structure of sticks, mud and dried grass, usually situated in a low bush or mimosa tree. Yearly additions are made to the nest. Some observers have reported nests lined with hair, feathers and wool. Two or three dull

New York Zoological Society.

SECRETARY BIRD (SERPENTARIUS SECRETARIUS). *Length:* 4 feet. *Range:* Africa: south of the Sahara.

Secretary birds are the cobra-killers of Africa. Their service to man in destroying harmful snakes has been acknowledged by legislation protecting them from hunters.

white eggs with reddish-brown splotches at one end are laid, usually in August, and hatched out by the female, the entire process requiring six weeks. During this season the male becomes exceedingly pugnacious and will attack any intruder with his feet and wings.



Ralph De Sola, Federal Writers Project.

BEARDED VULTURE or LAMMERGEIER (GYPAETUS BARBATUS). *Length:* 4 feet. *Range:* Mountains of Mediterranean region in Europe and North Africa; Central Asia and northern China.

Fond of bones, the lammergeier will often fly with them to a great height, drop them on the rocks below, and then retrieve the shattered morsels. It is alleged that the Greek dramatist Aeschylus met his death when a bearded vulture dropped a tortoise on his head. A lammergeier living in London, in the zoo to be sure, survived captivity for twenty-three years.

HAWKS

COOPER'S HAWK, commonly known as the chicken hawk (the name describes several other varieties), is noted for its audacity and strength. With a shrill cry it will swoop down on a grouse or barnyard hen quite as large as itself, clutch its victim in its powerful talons and tear it to pieces with its short, hooked beak. It always captures its victim in open chase, disdaining to feed on dead animals and refuse. Like other short-winged hawks, Cooper's hawks do not plunge for their prey, but pursue them in low, raking flight. They are able to dart between trees and through thickets, following their frightened quarry however abruptly it may turn and avoiding obstacles in their paths with amazing skill. In open country their flight consists of a few powerful strokes culminating in long glides. They do not soar and circle, but fly swiftly and directly to their goal.

Cooper's hawks are among the few hawks harmful to poultry. Not only do they carry away large quantities of chickens each year, but they are exceedingly fond of domesticated doves and rabbits. Farmers have long hunted them because of their depredations, but these hawks are still fairly numerous throughout North America. Yet they are not solely destructive from man's point of view, for they feed on rodents, snakes and insects, resorting to this diet when chickens are scarce or well guarded. Aside from man, their enemies are larger birds of prey, foxes and weasels.

The broad-winged and the red-shouldered members of the hawk family are the heartiest snake-eaters of the entire group. But many other members of this rapacious tribe are not above making a meal of snake meat now and then.

The Cooper's hawk's nest is usually built high in a tree, preferably an evergreen. This nest consists of a shallow platform of small sticks, often lined with leaves and bark. The hawk's eggs are normally three or four in number, and are laid in April and May.

The duck hawk, a related species, seems to hold the speed record among all birds. Observed from airplanes these hawks averaged one hundred and seventy-five miles per hour.

American Museum of Natural History.

COOPER'S HAWK (ACCIPITER COOPERI). Also called Chicken Hawk. *Length:* 1½ feet. *Range:* North and Central America.

The long tail of Cooper's hawk enables it to turn at a sharp angle even while in full flight. This tail rudder is a great aid in pursuing its prey, which often includes poultry. The chicken hawk has the worst reputation in birddom for raiding poultry pens, however, this is largely undeserved.

Ralph De Sola, Federal Writers' Project.

INDIAN WHITE-BACKED VULTURE (PSEUDOGYPS BENGALENSIS). *Length:* 2¼ feet. *Range:* India, Burma, Malay Peninsula and Annam.

EAGLES

SWIFT and powerful in its flight, the bald or American eagle is master of its haunts, knowing no enemy but man. Because of its strength and grace, and because it inhabits so large a part of the North American continent, it was chosen as the American national emblem.

The bald eagle usually makes its home near a body of water, since its chief food is fish. To catch these, it plunges from a great height at an angle to its prey, occasionally going beneath the surface. Sometimes its powerful claws kill fish so large the bird cannot lift them, and then it tows them ashore. Most spectacular is its manner of robbing the osprey or fish-hawk of its prey. The osprey seeks to escape its mighty enemy by soaring to great heights, but the eagle circles about, just below it, until finally the hawk is compelled to drop the fish which impedes its flight. The eagle then catches its dinner in mid-air. In Alaska the voracious bird is hated by fishermen, who accuse it of devouring the salmon as they leap up the waterfalls and shallows. Yet despite their strength, they are great eaters of dead mammals and regularly search the ocean shores for dead fish.

Bald eagles nest on cliffs or in large trees in the vicinity of water. The nests are large structures of sticks, usually five to six feet in diameter and of the same height, though there have been reports of nests as high as twelve feet. These structures are strong enough to bear a man's weight. Usually two eggs are laid, sometimes one or three. These are two to three inches in length; when there are two of them, one is almost always larger than the other. Incubation takes almost a month, male and female sharing the labor. The eagle is very much attached to its home; if its eggs are stolen, the bird will return frequently to its nest. If one bird is killed, the survivor takes a new mate and occupies the same nest.

The young remain in the nest for about two and one-half months. In the first year they are a streaked brown and gray color; later they are heavily barred with black, and it is not until their third year that they acquire the adult plumage, uniform dusky brown, with tail, neck and head a pure white.

Ralph De Sola, Federal Writers' Project.

AMERICAN EAGLE (HALIAEETUS LEUCOCEPHALUS). *Length:* 3 feet. *Range:* North America.

The American eagle is a bird of noble and stately appearance whose great strength permits sustained flight. However, the decision of Congress in 1782, to make him the national emblem of the United States met with strong opposition. Benjamin Franklin led this opposition and characterized the bird as "a rank coward," who lives by "sharping and robbing," can be driven off by the "little king bird no bigger than a sparrow," and "is therefore by no means a proper emblem for the brave and honest." There has been a movement for several years to make the turkey our national bird.

Caged eagles, like the one shown above, exhibit in their demeanor the most pitiful hopelessness.

GAME BIRDS

(Megapodes, Grouse, Pheasants, Peafowl, Jungle Fowl and Turkeys)

Since the beginning of Chinese civilization man has found pleasure in displaying or destroying game birds. Pheasants and peafowl have adorned his lawns, and stuffed grouse, ptarmigan, turkey, quail and partridge have decorated the walls of his hunting lodges. Today a table serving game fowl is more esteemed than one merely offering domestic fowl.

Domestic fowl are believed to be descendants of the wild jungle fowl of the Malay Peninsula. Careful selection and many years of cross-breeding have produced more than one hundred varieties of domestic fowl. Breeders strive to obtain birds that lay a large number of eggs and are at the same time highly edible. White leghorns, Rhode Island reds, Sussex and Orpingtons are but a few varieties that have resulted from selective cross-breeding.

Although game birds seldom resort to long flights and rely chiefly on their strong legs to scurry from their enemies, they can, once launched in the air, fly at considerable speed. In a recent test a turkey, urged on by a honking automobile, attained a speed of fifty-five miles per hour, a rate unusual for so large and heavy a bird. The European partridge can also fly more than fifty miles an hour. The take-off is somewhat noisy and awkward as the wings of these birds are short and concave. The stiffened and curved primary wing feathers beat the air rapidly and produce a whirring sound.

Megapodes:	Megapode.
Grouse:	Ruffed Grouse.
Pheasant:	Golden Pheasant.
	Lady Amherst's Pheasant.
	Ring-necked Pheasant.
Peafowl:	Indian Peafowl.
	White Peacock.
Fowl:	Jungle Fowl.
Turkeys:	Eastern Wild Turkey.

MEGAPODES

UNHAMPERED by the usual domestic responsibilities of female birds, the mother megapode, or brush turkey, is at liberty to stalk about for food even during the incubation season. This remarkable bird has dispensed with the irksome task of sitting on her eggs.

In early spring, some weeks before the laying period, the brush turkeys set about preparing their nest. Male and female, working together, grasp decaying vegetable matter in the long curved claws of their powerful feet, and throw it backward to a central point. The surrounding earth becomes totally bare, and a conical mound comes into being, frequently attaining a height of six feet and a bottom diameter of fourteen feet.

The birds start to lay their very large eggs at the outer edge of the mound and proceed toward the center, laying about four eggs at intervals of from nine to twelve inches. The eggs are placed at a depth of four to five feet in cavities hollowed out for the purpose by the male, and are then filled in with earth and vegetable matter. As the leaves and grass decay, the vegetable fermentation generates sufficient heat to hatch out the eggs. Temperatures as high as ninety-three degrees Fahrenheit have been measured within megapode mounds.

Sometimes the mounds are used year after year with slight additions and alterations, and are handed down from one generation to another. This accounts for the prodigious size of a mound found on the island of Nogo. The mound measured one hundred and fifty feet in circumference.

No explanation is available as to how the newborn chick makes its way to the surface of the pyramid. In any case the young megapode is the only bird in existence which is hatched out full-feathered and capable of flight at birth. For a few days the chicks remain in the vicinity of the nest, but after that they run about like adults.

The full-grown brush turkey attains a weight of about seven pounds. Its upper plumage is olive brown, its lower feathers brownish-gray. Its naked head and neck are pinkish-red, adorned with a bright yellow wattle. Australians use the feathers of these birds for feather dusters, and hunters

New York Zoological Society.

OCELLATED MEGAPODE (LIPOA OCELLATA). Also called Brush Turkey, Mallee Hen, Native Pheasant. *Length:* 2½ feet. *Range:* Southern and Western Australia.

Megapodes do not nest upon their eggs but build mounds of earth and decaying vegetation. The heat produced by the rotting materials within the mound incubates the eggs. The young are fully feathered and able to fly at birth.

eat their flesh, which is variously reported as tender and succulent, or tough and unpalatable.

Megapodes roam in pairs or small groups, searching for roots, fallen fruit, insects and snails. They run swiftly when alarmed and fly but rarely. Their flight is heavy, noisy and usually brief, concluding in the lower branches of a nearby tree, whence they hop to the higher branches. They are known to fly from island to island in the Indo-Australian archipelago where they range from the Philippines to New Guinea. In captivity they seldom live for more than a dozen years.

The note of the brush turkey is a hoarse croak in the daytime. At night it cackles and mews.

The curassows and guans, turkey-like fowl of Central and South America, are closely related to the megapodes but differ sharply in their nesting habits. Their eggs are laid usually in bulky nests constructed of sticks, leaves and grass placed on the upper branches of lofty trees. They are considered fine game birds and are frequently tamed but never domesticated.

GROUSE

In early spring, just as the first leaves are sprouting, a muffled drumming is heard in the woods, beginning slowly and softly and quickening in tempo and increasing in volume until it resembles a roll of muffled thunder. This drumming is part of the mating ritual of the male ruffed grouse.

There was formerly much difference of opinion as to how this sound was produced. Recently the matter has been settled by means of the high-speed camera. Pictures taken by Dr. Arthur Allen show the male bird standing erect on a fallen tree trunk. He raises his feathers, lifts the ruff about his neck, droops his tail and wings, and then throws his wings forward and upward. The drumming sound results from the air compression made between strokes. It is thought that the male makes this sound for two reasons: to make his presence known to the female and to warn other cocks not to encroach on his territory.

Grouse make their nests in thick woods, where their russet-brown coloring blends with the underbrush. The nest consists of a hollow in the ground, lined with hardwood leaves, pine-needles and feathers. In late April and in May the female lays an egg a day until nine to twelve eggs are laid. The eggs are a glossy cream color with occasional brown spots. Incubation requires twenty-one days, the mother bird brooding alone. When a sitting female is surprised, she waits until the intruder is quite close and then leaves the nest with a great whir of her wings. The young remain in the nest only until their down dries, but the family stays loosely united through the winter. The female grouse is highly devoted to her brood, teaching them to scratch for insects, to hunt berries and seeds; and she is careful to keep them away from damp places. If an intruder approaches her chicks, the mother bird's ruff will bristle with rage, and she will utter a shrill, whining cry, resembling *pee-ee-ee-u-rrr*, followed by *puk-puk-puk*. The chicks respond *tsee-tsee-tsee* and disappear with incredible swiftness among leaves or twigs. The female will even attack dogs when defending her young.

American Museum of Natural History.

RUFFED GROUSE (BONASA UMBELLUS). *Length:* 1½ feet. *Range:* Eastern North America.

This game bird will often seek shelter from the winter night by plunging into a snow drift. Sometimes rainfall crusting the snow traps the grouse in an icy prison, with fatal results.

PHEASANTS

THE GOLDEN PHEASANT, a native of Tibet and western China, is noted for its resplendent plumage. The male bears a golden-yellow crest, a mantle of metallic green, and an orange-red ruff extending a third of the way down his deep blue back. His underparts are scarlet, his rump a golden-yellow, and his tail, twice as long as the rest of his body, is black with pale brown spots. The female, however, has neither crest nor ruff, and is mostly brown, barred and mottled with black.

These birds are little known in their wild state, where they are timid and extremely wary. They are, however, familiar denizens of aviaries and for centuries have been kept by the Chinese. They thrive in captivity, living for about twenty years. They will interbreed with many sorts of domestic fowl.

Golden pheasants breed in April and lay about thirty eggs in the course of one season. The splendid males strut before the females, who pretend to be unimpressed. Little is known of their nesting habits as they inhabit wooded mountains and are most expert in concealing their homes. The wild birds are frequently trapped by natives in search of food, and are also preyed upon by owls and eagles. Yet owing to their fertility, they seem to be in no danger of extinction. Their flight is weak and irregular, and when pursued they usually run into the deep cover of the woods.

In captivity golden pheasants eat potatoes and grain, especially Indian corn meal, and the larvae of blue-bottle flies. They also relish the leaves and buds of dwarf bamboo trees, spiders and many kinds of insects.

Pheasants are alleged to be gifted with an unusual sense of hearing. On January 24, 1915, some pheasants at a point two hundred and sixteen miles from the naval battle of Dogger Bank, are reported to have shrieked themselves hoarse. No human being present could hear a sound of the thundering explosions issuing from the North Sea.

The monals are pheasants of brilliant metallic coloration inhabiting the highest forest regions of the Himalaya Mountains. Other species include the beautiful argus pheasant, so-called because of the extraordinary "eyes"

New York Zoological Society.

GOLDEN PHEASANT (CHRYSOLOPHUS PICTUS). *Length:* 3 feet. *Range:* China. This beautiful bird is not very well known in its wild state, but can be found, domesticated, in aviaries all over the world.

on the wings, that give the illusion of solid spheres, the multicolored Amherst pheasant of China, the male of which species struts before the female and displays only the feathers on the side facing her; and the lovely black and white silver pheasant.

The hoatzin is another curious creature classified among the game birds. It is remarkable for the claws found on the wings of young specimens and for its capacious crop which resembles a gizzard. The claws, found on the first and second fingers of the wings, serve the bird in climbing. Clawed wings are a remnant of past ages when birds first evolved from reptiles.

Ralph De Sola, Federal Writers' Project.

LADY AMHERST'S PHEASANT AND RING-NECKED PHEASANT (CHRYSOLOPHUS AMHERSTIAE AND PHASIANUS TORQUATUS). *Length:* 4 feet. *Range:* China and Tibet; *Range:* North America.

These pheasants thrive in captivity and serve to decorate aviaries. It is alleged that Lady Amherst's pheasant was introduced into England by the Romans. The ring-necked pheasant was introduced into North America and is bred as a game bird by sportsmen.

PEAFOWL

Because of its strutting gait and brilliant plumage, the male peafowl, or peacock, has become a symbol of pride and vanity, though in reality it is no more vain than any other male bird. The most characteristic features of the male are his small head of dark, metallic green color, and his great fan-like train, which sometimes attains a length of five feet or more. The tail is dark brown and not over-sized, but attached to it is a bronze-green train of long feathers, each bearing a deep blue "eye" surrounded by four rings of iridescent blue-green, gold-bronze, gold and brown. The male does not achieve his full plumage until his third year. His mate, like many female birds, lacks the ornamental tail and is a dull brown color.

Many tribes of India and Ceylon regard the peacock as sacred and prohibit its slaughter. The bird is easily domesticated, frequently lives more than thirty years, and adorns many private gardens where, in addition to being beautiful, it is useful in killing snakes and insects. It also eats grain, berries, small birds and frogs.

Wild peafowl inhabit nearly the whole of India, ranging up to a height of five thousand feet in the Himalayas. In regions where they are wild they make their nests in the dense undergrowth near a stream. They issue from the jungle into the open fields at evening and morning to feed, and return to the jungle during the heat of the day. At night they roost in tall trees. Peacocks fly well, though they must run swiftly in order to take off. However, they rely chiefly upon their strong legs to escape from hunters, jackals and wildcats. Despite their heavy trains they are able to run through the jungle at a high speed. In localities where they are protected they lose their timidity and breed in the long grass or shrubbery near villages.

Peacocks are polygamous, and except when the hens are sitting, they are seen in family groups of four to eight. In spring, the courting season, the males strut about before the females, displaying their multi-colored charms. Peafowls build their nests on the ground or in hollows of large trees. Each female lays from four to six eggs, varying in color from pale cream to warm buff.

New York Zoological Society.

INDIAN PEAFOWL (PAVO CRISTATUS). *Length:* 3½ feet. *Range:* India and Ceylon. These birds are regarded with superstitious reverence by the Hindus, and are permitted by them to go about unmolested. The decorative males are kept in parks and on private estates all over the world. Alexander the Great is reputed to have brought the first peafowl to Europe. These birds were exhibited for an admission fee in ancient Athens.

The wild birds are hunted throughout India for their tail feathers, and the flesh of the chicks has long been considered a delicacy. Peacock wings were served at Trimalchio's banquet, celebrated by Petronius. During the Middle Ages one of the most solemn oaths was sworn "on the peacock." For this occasion the bird was served up at table, garnished with its own plumage.

Clifford Sutcliffe, Federal Writers' Project.

WHITE PEACOCK. This albinistic phase of the Indian peafowl although startling is by no means rare. It is the result of domestication. Another breed, produced in captivity, is called the Japanese peacock. Its principal color is blue. Two other species of peafowl are known, one from Burma and Java, the other from the Belgian Congo. The African species was discovered and described by Dr. James P. Chapin.

JUNGLE FOWL

JUNGLE FOWL are the ancestors of most varieties of domestic poultry, and some species are still capable of breeding with their domestic relatives. Today interesting experiments in this cross-breeding are being carried on with a view to increasing the fertility and size of chickens.

The jungle fowls nest deep in the forest, but like to feed at the edge of cultivated areas. After a Burmese peasant has cut his grain, the fowl frequently come from the brush in parties of ten to twenty to pick over the leavings. During the heat of the day, they retire to the jungle where they roost in the trees; at morning and evening they come forth to feed. Hunted for their meat, which is said to be tastier than that of domestic chicken, they are extremely wary in eluding capture.

In size, the jungle fowl resemble the barnyard varieties. Their coloring, however, is a mixture of rich crimsons, copper greens and iridescent blues. The head is surmounted by a crest of skin, a loose red wattle hangs from the neck and the face is featherless. The males are adorned with a splendid crimson crest and armed with long, curved spurs. These birds are swift runners, flying only when pursued, and then for short distances. They live on grain, seeds, and the shoots of plants as well as on insects, snakes, lizards and worms. Their call is a sharp, short crow like that which awakens farm-folk, and as they go about their daily pursuits they engage in the conversational cackling of barnyard fowl. Both male and female cackle wildly when frightened, but the female emits no smug note of self-satisfaction after laying an egg.

Jungle fowl mate from November to March in the plains and from March to April in the highlands, where they have been known to nest up to a height of five thousand feet. They lay their eggs, numbering from five to seven, on a pile of fallen leaves or vegetable rubbish, within a clump of bamboo or other dense thicket. The pale buff eggs are somewhat smaller than the grocery store variety. The male bird, unlike the polygamous domestic rooster, is comparatively faithful to his mate. He helps guard the nest and also attends to feeding and caring for the young.

American Museum of Natural History.

RED JUNGLE FOWL (GALLUS GALLUS). *Length:* 2 feet. *Range:* Malaya.

The aggressive males of the jungle fowl often retire to secluded corners of the forest to fight among themselves, many times battling to the death. Domestic poultry are an offshoot of the jungle fowl.

WILD TURKEY

THE EASTERN wild turkey, now nearly extinct, is the largest and grandest of American birds. One bird may weigh from twenty to thirty pounds and will furnish delicious food for the largest family. Wild turkeys were so abundant a hundred years ago that a full-sized bird sold for as little as twenty-five cents. These are the birds which afforded the Pilgrim Fathers their first Thanksgiving dinner.

The turkey is not, as some believe, a Turkish importation. On the contrary, it was for hundreds of years bred and domesticated by the Incas and Aztecs and was introduced into Europe from Mexico by Vasco da Gama in 1530. Its name is probably derived from its call, *turk-turk-turk.*

In appearance wild turkeys resemble the familiar domestic gobblers. Like the domestic turkey cock, the male is notoriously vain. In the mating season, in April, he expands his body plumage, raises and spreads his fan-shaped tail, swells his naked head ornaments, droops and rattles his wing quills. Thus beautified, he struts about and gobbles for the delectation of his female admirers. At this season the cock has a peculiar mechanism for food storage. A large store of rich fat accumulates on his breast to supply him with energy for his extensive courtship.

The males adopt separate tactics for hens above one year old and for debutantes. In courting the former they affect indifference and strut more pompously, awaiting advances on the part of the female. With the young ladies, they are more energetic and less pompous. Sometimes they rise from the ground, fly about the hen, and then alight to run for some yards at top speed, dragging wings and tail along the ground. Then drawing near the timid female, they allay her fears by purring. Turkey cocks have been known to fight one another viciously for the possession of a hen, both suitors sometimes meeting a warrior's death.

Turkey's nests consist of a hollow scooped in the ground and lined with a few withered leaves. They are usually concealed beside a fallen tree or under a thicket of briars. The eggs, usually eight to fifteen in number, are a dull cream color, sprinkled with red dots. The females are so exceedingly cautious that they always approach the nest from a dif-

New York Zoological Society.

EASTERN WILD TURKEY (MELEAGRIS GALLOPAVO). *Length:* 4 feet. *Weight:* 25 pounds. *Range:* Eastern United States.

This game bird provided sustenance for the first settlers on New England's rugged coast. It has become thereby the symbol of good cheer and "thanksgiving." Benjamin Franklin favored the turkey over the eagle as the national emblem of the United States.

ferent direction. Sometimes two or three mother birds lay in the same nest and take turns in brooding and guarding; the males neglect to take care of the young.

Turkeys do not migrate, but in the fall and winter they wander in search of berries, nuts, grasshoppers, crickets and other insects. At this season, males and females separate into groups, while young and old males also form cliques. They are strong runners and can travel long distances by land. When pressed, they show themselves to be good fliers, flying with tails spread wide and wings beating rapidly. In the presence of hunters, they sometimes try to escape by strutting about deliberately, apparently feigning to be tame birds.

The young have a habit of rolling in abandoned ants' nests to rid themselves of ticks, as the ticks will not tolerate the smell of ants.


R

CRANES AND RAILS

CRANES, rails and related birds are widely distributed, inhabiting plains, marshes and swamps the world over. Individuals like the broad-toed coots are adapted for aquatic life, while others, such as bustards and kagus, are land birds. The group includes the roatelos and monias of Madagascar; the bustard-quail and hemipodes of the Old World; the cranes, found everywhere except in South America; the limpkins of both Americas; the trumpeters, confined to South America; the rails, coots and gallinules of all countries; the sun-grebes or fin-foots of the Old World and South America; the kagus of New Caledonia in the South Pacific; the sun-bitterns of Central and South America; the cariamas of South America; and the bustards of the Old World.

Naturalists have had ample opportunity to observe the interesting habits of the members of this order. In the face of rising flood waters, for example, the monias of Madagascar often move their nests to higher ground where they will be safe. They are held sacred by the natives.

Cranes are remarkable for their long, coiled windpipes, which run like the involved tubes of a French horn into their hollow keels. The loud trumpet-like calls issuing from those instruments are well known to hunters. The trumpeters of South America can maintain their call for a full minute.

The South Sea kagus are known to toss sticks and stones like small boys at play.

Sun-bitterns when alarmed, and also during courtship, make a great display of their wings and tail. Kagus also exhibit this habit.

Bustards, large birds growing to a length of four feet, were formerly abundant in Britain but are now extinct in this part of their range. In limited numbers they are still found in southern Europe, North Africa and parts of Asia.

Cranes: Little Brown Crane.
Sandhill Cranes.
Demoiselle Crane.

Rails: Carolina Rail.

CRANES

In spring and fall lines of slate-blue sandhill cranes could once be seen against the sky, as these long-legged, long-necked birds took their slow, ponderous flight to and from their breeding grounds. In the air they utter the hoarse croaks which have gained them the surname of "whooping cranes." The cranes are the longest of American wading birds, attaining a length of as much as four feet from the tip of their toes to the sparse black hairs of their heads. When migrating they follow a leader in perfect Indian file, but in the nesting season lone birds are sometimes seen soaring and circling about at a great height. In former years sandhill cranes were distributed throughout almost all of North America. Today they breed chiefly in Florida and Louisiana.

Sandhill cranes breed in March, when they assemble in an open spot to hold their ceremonial dances. Males and females hop, skip and jump about one another, bowing and prancing, croaking and calling. In Florida the nest of grass and weeds is placed on the edge of a grassy pond or is made into a floating island. In the western United States it may be located in a dry prairie. Exotic species such as the demoiselle, crowned and Stanley cranes, nest on the ground.

The crane's eggs are two to four in number. The embryo birds have soft bills, but they are equipped with a special egg tooth with which to break through their shell. The young require only a few weeks to become such rapid runners that they can be caught only with the greatest difficulty. The chicks are considered very good eating, and many are shot. They also make excellent pets and learn to defend themselves against dogs and cats.

Sandhill cranes search for food singly. Their diet is well-balanced, including animal, vegetable and mineral food, most of which is swallowed whole. The vegetable element consists mainly of corn, potatoes and sweet potatoes; the animal, of fishes, frogs, snakes, shell-fish, field mice and other small mammals usually swallowed whole; the mineral side is made up of stones and other hard objects swallowed by the bird along with its food, but then regurgitated with the indigestible remainder of its diet.

New York Zoological Society.

LITTLE BROWN CRANE (GRUS CANADENSIS). *Length:* 3 feet. *Range:* North America.

This bird was once thought to be the young of the sandhill crane which it closely resembles. It breeds in the Arctic, from Hudson Bay to Alaska.

American Museum of Natural History.

SANDHILL CRANE GROUP (GRUS MEXICANA). *Length:* 4 feet. *Range:* Temperate North America.

Sandhill cranes are the least common species of American cranes. They flap heavily through the air, following their leader in single file. Cranes are long-lived; a specimen of the common crane reached the ripe age of forty. The ancient Greeks considered cranes a great delicacy and snared them.

RAILS

CAROLINA RAILS, or soras, stand habitually motionless, deep in tangled marshes. These timid, gray-brown birds are virtually invisible among the reeds, and their presence is detected only by the whistling call of *ker-wee, ker-wee,* issuing from the throats of a dozen phantom birds. Even in places where the vegetation is not so thick, it requires a keen eye to see their dull-colored plumage. When alarmed or annoyed, their note is *kuk* or else *peep,* depending on their mood.

Occasionally the soras venture out of the reeds to feed, but their usual diet of insects, worms, mollusks and seeds is found within the marshes. They move their long, slender legs gingerly, bobbing their heads as they walk and darting back to cover at the slightest sound. They are swift runners, as their slender bodies enable them to slip rapidly through the marsh thickets. Their flight is slow and weak, and they prefer running to flying. Sometimes they even swim streams rather than fly. Rails are accomplished divers.

In the fall they live largely on wild rice and oats, and then they grow very fat. At this season they are hunted from flat boats, and as the rail waits until the last minute before taking to feeble flight, it offers an easy mark. Soras inhabiting salt marshes are hunted with the help of the rising tide which drives them to the highest point in the marsh. Here the hunters lie in wait and are frequently able to kill many of the weak-winged birds as they take to the air.

Soras breed in the marshes, making a slight nest of grasses, supported on a tussock. The mother bird lays from eight to fifteen drab-colored, brown-spotted eggs. The young, which are born covered with blackish down, take to the water as soon as hatched.

Carolina rails live in the United States from April to September. In the fall they migrate southward in large numbers.

In the remote Tristan da Cunha Islands of the South Atlantic a species of flightless rail is found. It was discovered by the exploring ship "Challenger" in 1872 and is known locally as the rock chicken.

American Museum of Natural History.

CAROLINA RAIL (PORZANA CAROLINA). Also called Sora. *Length:* 8½ inches. *Range:* Temperate North America.

Extremely shy, rails are rarely seen except after painstaking search. In fall they become fat on wild rice, and are killed in great numbers by hunters.

Clifford Sutcliffe, Federal Writers' Project.

DEMOISELLE CRANE (ANTHROPOIDES VIRGO). *Length:* 2½ feet. *Range:* Southern Eurasia to Africa.

Smallest of all the cranes, the demoiselle, ornamented with white ear tufts, nests on the ground amidst young grain and grass.

JACANAS, PLOVERS AND GULLS

THIS LARGE group of water birds includes a number of important and highly diverse families: the jacanas of tropical America; the oyster-catchers found along the sea beaches of almost every ocean; the plover, lapwings, turnstones and surf-birds of cosmopolitan distribution; the snipe, woodcock, curlews, killdeer and sandpipers, inhabiting suitable localities from Ireland to Japan; the long-legged, curved-beaked avocets and stilts, also cosmopolitan; the phalaropes found on the open oceans of the Northern Hemisphere; the crab-eating plovers of India, Arabia and East Africa; the thick-knees of world-wide distribution; the swallow-like pratinocles and the fast-running coursers of the Old World; the quail-like seed-snipe, that are strict vegetarians and are confined to desolate areas of Peru and Chile; the snow white, pigeon-like sheath-bills of the Antarctic; the skuas and jaegers who live exclusively by preying upon other gulls and may be seen on every ocean; the gulls and far-flying terns familiar to travellers on every body of salt-water; and the wave-shearing skimmers of America, Africa and South Asia.

Many members of this group are curious in their habits. For example there are the turnstones, who turn over shells and pebbles in search of crustaceans; the oyster-catchers, who force open the shells of clams and oysters with their strong knife-like bills; the phalaropes, who reverse the usual domestic relations of birds and relegate all courtship to the more beautiful female, the drab male being left with the burden of homemaking; the woodcocks, famous game birds, who carry their young on the wing; and the coursers, who suddenly squat when they sense danger, and render themselves invisible by blending into the surrounding landscape.

Jacanas: Mexican Jacana.
Plovers: Crocodile Birds.
Gulls: Herring Gulls.

MEXICAN JACANA

THE LONG-LEGGED Mexican jacanas lead a sedentary life on the mud flats of Mexico and the lower Rio Grande, spending most of their waking hours in feeding. They are readily distinguished from other aquatic birds by the naked shield or lappet on their foreheads. Easily alarmed, they take wing with a plaintive cackle, but in the main they fly little. Jacanas make their homes near lakes and ponds, usually choosing those which contain lilies and other masses of floating vegetation. Their extraordinarily elongated toes permit walking or even running on the lily pads with great ease. They feed on minute insect life. Jacanas confine themselves exclusively to this insect diet. They are good swimmers and divers, but the adults do not make much use of these abilities. Mexican jacanas are greenish or purplish-black with apple-green wings.

Highly gregarious, they are sometimes seen with herons, bitterns and gallinules. Occasionally a member of the flock will stretch its neck up straight, assuming the function of lookout. Another will extend its wings briskly until they meet in back; this pose is thought to be a warning signal. The jacanas' only weapons are sharp spurs in the bend of each wing, and these are used only in occasional fights among themselves.

During the mating season in April the males flirt by raising their wings over their backs as if attempting to strike the females. They nest from April to August in fragile floating houses, built of leaves and rushes and supported on lily pads or other plants. Sometimes the nests are placed on the water's edge. Each female lays four glossy brown, curiously veined eggs, which, it is thought, are incubated by the heat of the sun. The young are able to run as soon as they are hatched and very soon learn to dive and swim under water.

After breeding, jacanas undertake a sort of local migration, flying for some distance about the neighborhood, sampling nearby ponds, but never straying far from their favorite breeding ground. As they fly, the yellowish-green patches in their wings flash golden in the sun.

American Museum of Natural History.

MEXICAN JACANA (JACANA GYMNOSTOMA). *Length:* 1 foot. *Range:* Southwestern United States and Mexico.

Enormously long toes allow the jacana to run easily over lily pads and other plants growing in ponds and marshes. It eats seeds as well as insects and crustaceans.

CROCODILE BIRDS

THESE BIRDS are variously called black-backed coursers, black-headed plovers or crocodile birds.

They were first introduced to incredulous Europeans by Herodotus, the historian and naturalist, who wrote:

"As the Crocodile lives chiefly on the river, it has the inside of its mouth constantly covered with leeches; hence it happens that, while all the other birds and beasts avoid it, with the *trochilos* (Crocodile Bird) it lives at peace, since it owes much to that bird, for the crocodile, when he leaves the water and comes out upon the land, is in the habit of lying with his mouth wide open, facing the western breeze; and at such times the *trochilos* goes into his mouth and devours the leeches. This benefits the crocodile, who is pleased, and takes care not to hurt the *trochilos*."

Strange as this tale may seem, it has been corroborated in the main by several modern travellers, who describe the plover as picking the crocodile's teeth and parading on its broad back as if it were a lawn. At the approach of an enemy, the bird, who has sharper eyes than the crocodile, takes flight, thus warning the crocodile of the danger.

These curious African birds can be seen in small groups in swamps, on sandbanks, or even on cultivated land, but never far from water. They skim over the river in swift flight, constantly uttering their monotonous cry, described by explorers as harsh and irritating. The Arabs call this bird *zic-zac* from the sound of its cry. In color the *zic-zac* is slaty brown above, with mantle and crown of greenish-black, bordered with white. Its food consists of beetles, water flies, grasshoppers, insect larvae, and occasionally seeds.

The crocodile birds breed in April and May. The mother bird usually lays two, sometimes three eggs which she buries in the sand and then sits upon. Neither in coming nor in going does she disturb the sand or make any mark in it to indicate the presence of her eggs. She sits over them

American Museum of Natural History.

CROCODILE BIRDS (HOPLOPTERUS SPINOSUS, PLUVIANUS AEGYPTUS, CAETUSIA LEUCURA). Also called Plovers. *Length:* 1 foot. *Range:* Southern Europe and Africa.

Walking unafraid into the jaws of the crocodile, these plovers pick his teeth for particles of food and leeches. They also warn their host of approaching danger by flying off noisily and so awakening the sluggish reptile. In their native tropics they sit over their eggs not to keep them warm, but to protect them from the terrific heat of the midday sun.

not to impart her warmth but rather to shield them from the extreme heat of the African sun. The mother bird will often run down to the water, wet her breast feathers and return to the nest to cool and moisten the hot sand around the eggs. Trespassers, even other plovers, are not tolerated on the breeding ground. The *zic-zac* attempts to distract interlopers by running about and settling down on the sand in many different places. Sometimes in the presence of danger the parent birds protect their chicks by throwing sand over them with their beaks, burying them to a considerable depth.

Another claimant to the title of crocodile bird is the Egyptian spur-winged lapwing, a related plover, so-called from the sharp, jet black spur in the crook of its wing. With this spur it sometimes attacks smaller birds.

HERRING GULLS

ALL ALONG the American coastline, wherever refuse or shell-fish are available, the pearly gray and white herring gulls soar gracefully through the air, screaming as they glide and wheel. These birds do not dive for live fish, but will dart down to seize a dead one or a tasty bit of harbor refuse floating on the water's surface. Gifted with rapid digestion and an enormous appetite, a gull has been known to devour a fish equal its weight within ten minutes. Although useful to man as a scavenger, appreciably reducing the pollution of our harbors, gulls are regarded as enemies by Maine fishermen who accuse them of consuming thousands of young lobsters each year. Gulls will often seize oysters, bear them high into the air, and then drop them on the rocks to crack their shells. In Martha's Vineyard, Massachusetts, the gulls have learned to use the concrete highway for this purpose, causing some inconvenience to motorists. The voracious birds attack ospreys to steal their prey. By no means fussy in their diet, gulls also eat rats, mice and insects.

Gulls usually make a nest of grasses, moss or seaweed on the ground and only in areas where they have been repeatedly robbed will they nest in a tree. These tree nests may be as high as fifty feet from the ground. The female lays three grayish, olive-brown eggs, covered with blotches and scrawls. The downy, mottled young are entirely dependent on their parents until they have developed full plumage and the power of flight. During the first year they are brown in color, but in the second year they acquire the snow-white breast and slate-colored back and wings characteristic of their parents.

Franklin's gull, a bird sometimes found in the interior of North America, has a monument dedicated to it. The grateful citizens of Salt Lake City, Utah, erected the monument in grateful commemoration of services rendered by this bird in destroying grasshoppers that plagued the surrounding country. Another species came to the relief of locust-ridden Nicaraguans who for some months had watched the destruction of their corn, rice and bean crops. They were finally relieved when thousands of gulls flew in from the Pacific and began eating the locusts.

James McAlpin Pyle.

HERRING GULLS (LARUS ARGENTATUS). *Length:* 1½ feet. *Range:* Atlantic Ocean. Gulls seem never to tire as they follow ships or shoals of fishes. They are valuable scavengers in the harbors. Herring gulls have been known to live more than forty years.

Ralph De Sola, Federal Writers' Project.

HERRING GULL. Amid the stormy spray of the Atlantic, gulls nest on rocky inlets and sandy beaches. Their raucous cries were believed in olden times to be the voices of drowned sailors. Those who believe this story can be called "gullible."


R

PIGEONS AND DOVES

Pigeons and doves, found in all parts of the world, and the desert-living sandgrouse of Europe and Central Asia are the only living representatives of this order. Not so long ago, however, the dodo and the solitaire were also among the living members of this group. Dodoes, large birds once inhabiting the island of Mauritius, were killed by Dutch sailors shortly after the discovery of the island. The last dodo was clubbed to death in 1681. The related solitaire, of nearby Reunion and Rodriguez islands, has also become extinct within the memory of man.

The passenger pigeon, now extinct, formerly was present in great numbers throughout Kentucky, Ohio and Indiana. This blue-backed, red-fronted species was destroyed by human hunters. The last known specimen, a female, died in 1914 in a cage in the Cincinnati zoo.

Pigeons are remarkable for the number of domesticated varieties produced and for their economic value to man as food and as messengers. Carrier pigeons are trained by sportsmen, who teach them to "home" and race them for prizes. In wartime they serve as a flying *liaison* between widely separated units of military forces. Carriers surviving the loss of an eye and shrapnel wounds were cited and decorated by governments after the World War. Many pigeons live more than twenty years.

Doves, the collective name of many smaller members of this order, are not readily distinguishable from pigeons. Numerous species inhabit the Indo-Malayan and the Indo-Australian regions where they originated; from those areas members of the group have dispersed to all corners of the globe.

"Pigeon milk" is a nutritious secretion produced in the crops of adult birds and fed by them to their offspring.

Doves: Mourning Dove.

Pigeons: Domesticated Pigeons.

MOURNING DOVE

When the mate of a mourning dove dies, the surviving bird will hang its head, coo plaintively and search diligently for the missing one. Like other doves, mourning doves are monogamous and are most devoted mates.

In winter they live in flocks, but with the coming of spring they scatter in pairs. At this season the male will circle about above the female with his tail extended. When on the ground he will strut about with his brown plumage spread wide, nodding his head and ogling to impress the passively watching female. The billing and cooing of amorous doves often awakens and infuriates the weary sleeper on bright spring mornings. Later on in their romance, male and female take regular turns in tending their eggs, the male sitting by day, his mate by night. It is to the turtle-dove that the biblical poet was referring when he wrote that the "voice of the turtle is heard in our lands."

Mourning doves make their nests in a great variety of sites, but the most typical location is on a horizontal branch of an evergreen tree, not far from the trunk. Sometimes another bird's abandoned nest will serve as a foundation. The nest is built of sticks and lined with small twigs, while sometimes grasses and leaves also are used. The doves mate from May to August and sometimes bear two or three broods a summer. The eggs are usually two in number. The young are born naked and helpless and are cared for with great devotion by their parents. At this season the crops of the adult birds secrete a juice which renders their food digestible to the young and the parents feed their chicks by regurgitating this "tenderized" nourishment.

Doves usually make their homes near water. When thirsty, they alight in an open space near the stream or water hole, and then walk deliberately and gracefully to the drinking place.

The dove's flight is headlong and swift, and countless birds are killed by collision with telegraph wires. They are, in the main, migratory, flying south to the Gulf of Mexico and the West Indies during the winter, returning to more temperate regions in spring.

American Museum of Natural History.

MOURNING DOVE (ZENAIDURA MACROURA). *Length:* 1 foot. *Range:* North America.

Mourning doves are tame, gentle birds and will breed near human habitations in gardens and shrubbery, feeding with poultry.

Ralph De Sola, Federal Writers' Project.

DOMESTIC PIGEONS (COLUMBA LIVIA). *Length:* 1 foot.

Fan-tailed and swallow pigeons result from the interbreeding of common pigeons displaying a tendency towards these unusual characteristics. Darwin drew upon these interbreeds in evolving his evolutionary theories.

CUCKOOS

Cuckoos form an order of birds which includes not only the widely distributed cuckoos, road-runners and anis, but also the plantain-eaters of Africa. Many members of the order, especially cuckoos, are remarkable for their parasitic breeding habits. A mother cuckoo instead of building her own nest will select the nest of some other birds, deposit her eggs in it, and fly off relieved of the responsibility of parenthood. When her youngsters hatch, they will usually eject their foster brothers from the nest.

Cuckoos' eggs usually are colored in tints approximately that of the birds they parasitize. Thus, for example, the great-spotted cuckoo who lays its eggs in the nests of crows and ravens deposits eggs of a crow-like type. Many other instances of this variation in eggs can be cited.

Exceptions to the foregoing are found in the habits of the great-spotted and crested cuckoos of the Old World. These birds, when hatched, live in harmony with their foster brothers. The ani, however, nests communally, two or more females working together to build a large nest. Once the communal nest is finished, the mothers lay their eggs and hatch them side by side. Anis are black-plumed cuckoos found in the American tropics.

The reptile-eating road-runners of the southern United States, Mexico and northwest South America, the yellow-billed and black-billed cuckoos common in North America, and the Old World coucals all differ from the typical members of the group in that they rear their own young. Road-runners, found throughout desert country where they live on lizards, snakes and young turtles, run with head lowered and tail horizontal. When they stop from time to time, their tail assumes an almost vertical position.

Cuckoos: Yellow-billed Cuckoo.

Road-runners: Road-runner.

CUCKOO

THE CUCKOO of Europe is famous for its call, which in many regions is an invariable accompaniment of spring. This gentle, dove-like bird is more frequently heard than seen. Usually one male bird sings alone, but sometimes a group of males will perform together, creating a "cuckoo symphony." Less striking are the notes of the American yellow-billed cuckoo.

The reason for the cuckoo's impressive invisibility is that it spends the greater part of its time hidden away among the leaves, where it eats caterpillars. Its effectiveness in destroying these insect pests is shown by the finding of as many as fifty of them in the stomach of a dead bird. On the wing the cuckoo slips through the trees swiftly and noiselessly. It can be seen with the greatest difficulty.

Male cuckoos are more numerous than females, and the females are not faithful mates. Though they do build nests—platforms of sticks and grass—these birds are careless and indifferent parents. Some species lay their eggs in the nests of robins, sparrows, reed-warblers and other birds, who hatch them out and rear the resulting chicks. The young cuckoos turn out to be just as unsocial as their parents, for when about thirty hours old, they try, often with success, to eject the "legitimate" chicks and eggs from their adoptive nest. This trait persists for about twelve days.

Birds of some species, such as the yellow-billed cuckoo, will not often lay their eggs in the nests of other birds, but are said to occasionally smuggle an egg into the nest of another cuckoo. This cuckoo lays from three to five greenish-blue eggs, often at such wide intervals that a nest may contain fresh eggs and young birds at the same time.

Some cuckoos are migratory, departing south from August through the fall, and flying as far as the West Indies, Argentina, or, in the Eastern Hemisphere, from Europe to South Africa; and returning with the spring.

They are frequently mistaken for hawks by other birds and by peasants. Swarms of small birds will mob a cuckoo, taking it for their dreaded enemy, while peasants shoot it in the same belief.

American Museum of Natural History.

YELLOW-BILLED CUCKOO (COCCYZUS AMERICANUS). *Length:* 1 foot. *Range:* North America.

Cuckoos are often called rain crows because they are supposed to utter their cry most frequently before rainy weather. European cuckoos are notorious for failing to build their own nests. They lay their eggs in the nests of other birds.

S. and H. Woodward—"The Adventures of Chico."

ROAD-RUNNER (GEOCOCCYX CALIFORNIANUS). *Length:* 1 foot. *Range:* Deserts of northwest South America, Mexico and southern United States.

Road-runners are rough on reptiles—eating lizards and snakes, harmless and poisonous species included. A recent motion picture shows this plucky little bird killing a rattlesnake. Road-runners are deserving of protection.


R

PARROTS AND MACAWS

Parrots and macaws are favorites with zoos and private aviaries because of their brilliant plumage and their ability to repeat human speech. Their thick fleshy tongues and the special construction of their voice apparatus permit a wide range of articulations, but the ability is purely imitative and involves little or no comprehension.

The birds of this group are inhabitants of the dense jungles of the tropical regions of the world and are, with few exceptions, tree-livers.

These birds exhibit many curious habits. The gentle and affectionate lories lap up the nectar of flowers by means of their brush-like tongues. The rapacious keas are known to kill sheep by alighting on their backs and tearing through their bodies until the kidneys are reached. The great black cockatoo has a bill so powerful that it can break a kanary nut, which is so hard that it usually requires a heavy hammer to crack it. The crested cockatiels can be taught to perform many tricks. Smallest of the entire group is the pigmy parrot of New Guinea, often no more than two inches long. Parakeets often frequent the cultivated grounds and gardens of India, where they cause much destruction to the grain fields and orchards. The budgerigar, one of the prettiest of the smaller parakeets, is, however, an unpopular pet, for it attacks all the smaller birds in the aviary unless placed in a separate enclosure. The modest love-birds derive their name from the legend that mated love-birds pine away when separated from one another. The hanging parrots of India are unique in that they have the bat-like habit of sleeping head downward, suspended by the feet from a bough. The night-feeding kakapos, or owl-parrots, have completely lost the power of flight. By day they are easily caught, blinking stupidly at their captors. Of all the talkers, however, the African gray parrot is the most loquacious.

Parrots: Yellow-shouldered Amazon Parrot.
Double Yellow-headed Parrot.

Macaws: Red and Blue Macaw.
Blue and Yellow Macaws.

PARROTS

THE YELLOW-SHOULDERED Amazon parrot, or green parrot, is an excellent talker. Capable of imitating almost any sounds produced by man or beast, green parrots have been taught to speak and especially to swear in practically every living language. The traditional tongue of the parrot has, however, been Spanish ever since the days of the Spanish Main.

These birds are long-lived and hardy, many individuals outliving their owners. They show no ill effects from long sea journeys and consequently they are common pets throughout the world, enlivening many a lonely household with their irrepressible profanity, their green, blue and yellow plumage and their wise, winking eyes. Sometimes their remarks are so biting and pertinent that many people believe them to understand what they are saying. At a talking contest for parrots held in England, one entry looked at all the others assembled and croaked: "By jove, what a lot of parrots!"

Green parrots lay eggs in captivity but never bring forth young. The wild birds do not construct a nest, but lay their two white eggs in the hole of a tree amid their native jungles. Male and female care for the eggs together.

In chattering groups these parrots climb about the trees like acrobats, searching for nuts and palm fruit. In the wild state they probably do not drink water. Some scientists maintain that their vegetable food provides them with sufficient moisture, but other observers, of a more romantic turn of mind, assert that water-drinking is incompatible with their seafaring tradition. Still others insist that they do drink water. Be that as it may, parrots have in some respects the most highly-perfected brains of the bird world. Their chief enemy is man, who catches them in nets and nooses and sells them as pets.

Parrots have been well known to the western world ever since Alexander the Great's conquests in India. The Romans kept them as pets and, like many Indian tribes of today, regarded them as a great table delicacy. One Roman aristocrat went so far as to feed them to his lions.

New York Zoological Society.

YELLOW-SHOULDERED AMAZON PARROT (AMAZON BARBADENSIS). *Length:* 1 foot. *Range:* Northern South America: Trinidad and Venezuela.

Taken from the nest at an early age, these parrots make excellent pets. They can be taught to speak, to sing and whistle tunes.

American Museum of Natural History.

DOUBLE YELLOW-HEADED PARROT GROUP (AMAZON ORATRIX). *Length:* 1 foot. *Range:* Central America: Mexico to Honduras.

This pair of parrots illustrates a typical domestic scene in the Central American jungle.

MACAWS

At sunset in the Brazilian jungle, flocks of red and blue macaws take flight, wheeling and gliding through the trees as they separate into pairs and set out for their feeding places. The bright vermilion of their mantles and the light blue of their hind parts contrast boldly with the dark jungle foliage. In the morning they awaken and fly to a common roost, often a decayed tree providing many perches. Here they spread out their wings and tails until the sun's rays have dried the heavy dew that has settled on them during the night. When dry and warm, they fly off in small parties, searching for the palm fruit that constitutes their food. During the noonday heat they seek shelter deep in the jungle, and at evening they meet again at their drinking place, before once again they retire for the night. Their hours of feeding, drinking, drying and sleeping are quite regular.

These birds are the most magnificent of parrots, distinguished by their brilliant colors, their great size, their two-foot tails, their immense hooked beaks and their deafening cries.

When taken young, red and blue macaws become extremely docile. They learn to talk and also to obey their master's commands. Like other parrots, they have been known to live as long as one hundred years, outliving a generation or two of masters.

To teach them to talk, the instructor should stand in an adjoining room where he can be heard but not seen and repeat the same words over and over again.

When captured during adulthood, macaws are vicious birds. They have been known to demolish their cages, to pull off wallpaper and to eat the corners off billiard tables, all the while emitting most ferocious cries. Yet in view of the absence of all the objects mentioned in the macaw's native habitat, its adaptability to new surroundings would seem to betoken unusual intelligence. An adult macaw has been known to kill a bull terrier by tearing its throat open after a prolonged battle. Even tame birds are temperamental, flying into a rage at the slightest provocation. Their food in captivity consists of oats, canary seed, corn, an occasional slice of carrot, turnip or tomato, and now and then a cracker.

New York Zoological Society.

RED AND BLUE MACAW (ARA MACAO). *Length:* 3 feet. *Range:* Tropical South America.

With the first rays of the morning sun, macaws leave their nests in hollow trees and gather at a sunny meeting place to warm themselves. The air of the grove resounds with their screams.

Ralph De Sola, Federal Writers' Project.

BLUE AND YELLOW MACAWS (ARA ARAUANA). *Length:* 3 feet. *Range:* Guianas to Colombia and southward to Paraguay.

OWLS

Owls vary considerably in size. The smallest is the tiny elf owl, a bird no larger than a sparrow. The elf owl lives in the giant cactus of Arizona in holes that the woodpeckers have dug. This little bird feigns death when caught. The great horned owl is one of the largest and fiercest of the group, often attaining a length of over two feet. The American screech owl resembles a small horned owl. The barn owl is well known for its loud cries and its strange heart-shaped face. The short-eared owls of Europe and America, unlike most owls are often seen flying in broad daylight over open marshes and meadows. Even more exposed to view is the hawk owl of the north who prefers to perch out in the open on a tall stump during the day.

The long-eared owl, a denizen of dense pine and spruce forests, has the unusual habit of rising suddenly when approached and turning its head back while in flight to see what startled it. The snowy owl, of northern circumpolar distribution, diverges from the usual grays and browns of its relatives. Adapted to icy regions, it is largely pure white. This bird is known to travel great distances over the open ocean, alighting on ships hundreds of miles out at sea. The American Indians called Richardson's owl, "the blind one," as it is easily caught by hand in the daytime. Most owls live in trees, but the burrowing owl makes its home in a hole dug deep in the ground. The saw-whet owl is so-called because it utters a note like the sound of a saw being filed. The barred owl of eastern North America is frequently driven from its home by jays, cardinals, titmice and even tiny sparrows. Tawny owls are confined to the woodlands of Europe, Asia Minor, Palestine and Barbary. The eagle owls of Europe and Asia exceed the American great horned owl in size and strength. One specimen lived sixty-eight years in captivity and was fully grown when captured.

Owls: Great Horned Owl.
Screech Owl.

GREAT HORNED OWL

In many forests of eastern North America the night resounds with the weird calls of great horned owls. A single bird will set up the cry of *oo-hoo-hoo*, and a chorus of others in the woods will reply *oo-hoo-hoo*. Sometimes in the midst of the uproar an infuriated patriarch owl will silence all the others with a tremendous *waugh-hoo-hoo*. In addition to hooting, these nocturnal birds have mastered a rarer note, a harsh scream, which is one of the most blood-curdling sounds to be heard of a forest night.

As the owl's great eyes are most sensitive to sun-glare, the great buff-black bird dozes by day in some shady grove. By night, despite its bulk, it flies through the trees without so much as a sound. Gifted with a robust frame, sharp claws and a curved, pointed beak, this owl is among the most belligerent of rapacious birds.

Owls have been known to attack eagles, and they habitually eat mammals up to the size of rabbits, and when these are not available, poultry. In regions where rabbits, rats, mice, gophers and prairie dogs are common, the owl is highly beneficial to farmers; but where these are rare, this predacious bird destroys poultry as well as other kinds of birds, hawks included. Where the game is overplentiful, it will even kill more than it can eat, merely taking off the heads of its victims and leaving the bodies intact. The young of turkeys, grouse and geese come within the scope of its depredations.

The great horned owl breeds throughout the winter and spring, usually in February and March. The male bird singles out a mate, flies around her, bows, snaps his bill and goes through other elaborate motions. At first the courted one is indifferent, but after a time she relents and joins in his antics. At length the pair goes house-hunting. Sometimes they renovate the nest of a crow, hawk or eagle. Often they build a bulky structure of sticks on a large branch not far from the trunk of a tree. However, they may just lay their eggs on the ground or in a rocky hollow.

The eggs vary in number from two to four, and occasionally one or more of them fails to hatch because of frost. The incubation period lasts four weeks.

New York Zoological Society.

GREAT HORNED OWL (BUBO VIRGINIANUS). *Length:* 2 feet. *Range:* North America. The adult great horned owl is tamed with great difficulty. Woodmen are aware of its fierce and stealthy prowess and call it "the tiger of the air."

American Museum of Natural History.

GREAT HORNED OWL. Although it has been known on occasion to kill an eagle, the great horned owl is sometimes mobbed by a flock of angry little blue jays.

SCREECH OWL

A SEARCH in the hollow trees of an old apple orchard will often reveal the presence of screech owls, some of which occupy the same hollow for many years. When surprised in daylight, these birds will set up a chattering of their bills like the sound of castanets, and will act quite dazed.

At nightfall, however, they come to life; their ear tufts stand erect, their yellow eyes open wide, and they set up their weird, melancholy whistling, which superstitious persons of all ages have regarded as an evil omen. And at this time they begin their rounds, searching out barns, farmyards, corn cribs and fields for mice and insects. Though they kill an occasional chicken, they are far more beneficial than harmful. Of two hundred and fifty-five screech owl stomachs examined by an investigator only one contained remains of poultry; thirty-eight contained other birds, ninety-one contained mice and the remainder, other small creatures such as lizards, fishes and insects.

None the less screech owls are unjustly persecuted by some farmers. Their other enemies are crows, jays and squirrels, who steal their eggs. Sometimes by day a flock of jays and cardinals will attack a screech owl, drive it off and pursue it with much scolding and chattering.

This bird has two color phases, one gray, the other reddish brown. These phases do not depend on age, sex or season, and both phases are frequently represented in the same brood.

Screech owls in the northern United States mate in May, and in the South even earlier. They build no nest, but lay their four to six white eggs in tree hollows. One observer reports that they go through an elaborate courtship ritual. The female is perched in a dark, leafy tree, "apparently oblivious of the presence of her mate." The male hops about from branch to branch, bows, snaps, flaps his wings, drags his tail, and does everything in his power to attract her attention. Now and then he winks. He groans inwardly and finally sits down as though in utter dejection. Only then does his mistress "lower her haughty head."

New York Zoological Society.

AMERICAN SCREECH OWLS (MEGASCOPS ASIO). *Length:* 10 inches. *Range:* Eastern North America.

These birds are very useful to farmers, as they eat insects and rodents.

Like other owls these birds have their eyes fixed in their sockets and must twist their necks to look to one side. It is popularly believed that if one walks around them, they will twist their neck till it breaks. A small boy on testing this phenomenon found that the bird did twist its neck indefinitely, but that the neck failed to break. Later in life he discovered that "the neck is quicker than the eye." After each revolution, the head twists back to the starting point so quickly that the human eye cannot follow the movement.

OIL-BIRDS, FROGMOUTHS AND WHIP-POOR-WILLS

THE CROW-LIKE night-flying oil-birds of South America, the curious frogmouths or mopokes of India and Australia, the potoos and owlet-frogmouths of the Old World tropics, together with the insect-hunting nightjars, night-hawks and whip-poor-wills, which are cosmopolitan except in the eastern reaches of the Pacific Ocean, form a compact order of birds.

The nightjars or goatsuckers, according to ancient legends, were believed to suck the milk of goats, but modern observations do not confirm these legends. The food of these night-flying birds consists chiefly of moths and cockchafers, which they catch on the wing.

Related to the nightjars are the night-hawks, which lay their eggs on level ground or flat roof tops, and the whip-poor-wills.

Oil-Birds:	Oil-Bird.
Frogmouths:	Frogmouth.
Whip-poor-wills:	Whip-poor-will.

OIL-BIRDS

LARGE NUMBERS of *guacharos* or oil-birds sleep throughout the tropical day in deep, rocky caverns. The indigestible seeds of the fruits eaten by these birds drop to the floor of their cavern home, and some of them sprout into shoots that are pale and colorless from lack of light. The thousands of somber-colored, sleeping birds and these pallid plants make the caverns seem like cities of the dead.

At evening the birds awaken, clacking their beaks and croaking, and leave their caves to search the forest for food consisting of oily nuts, fruits and berries. Their legs and feet are comparatively weak, but their wings are large and strong, and they are good fliers. They are believed to fly on occasion as far as eighty miles for their food, but most often they remain within a restricted area. The oil-bird's beak is strong and deeply notched; each of the large nostrils contains twelve stiff hairs.

Guacharos are said to make a bowl-like nest of mud. Their eggs, two to four in number, are pure white and lustreless. The young contain a great proportion of fat, and while still in their nests are sought by the Indians, who catch them with the aid of torches and long poles. The enraged parents fly about the cave uttering deafening cries, but are unable to protect their chicks. Fires are then lighted at the cavern's mouth, and here the grease from thousands of young birds is melted down. The oil thus obtained is preserved in earthenware pots and used for lamps, for cooking and even as butter. The "butter" is said to be remarkably free from impurities and not to grow rancid even in a year's time.

The young birds are also regarded as a table delicacy by the natives and many white men. Epicures dislike oil-birds because of an alleged "cockroachy" taste.

American Museum of Natural History.

OIL-BIRD (STEATORNIS CARIPENSIS). Also called *Guacharo.* *Length:* 1½ feet. *Range:* Northern South America.

The oil-bird is so named because of the great masses of valuable fat which cover its body, especially when it is young. The flesh of this bird is relished by natives, and its oil is used in place of butter.

FROGMOUTHS

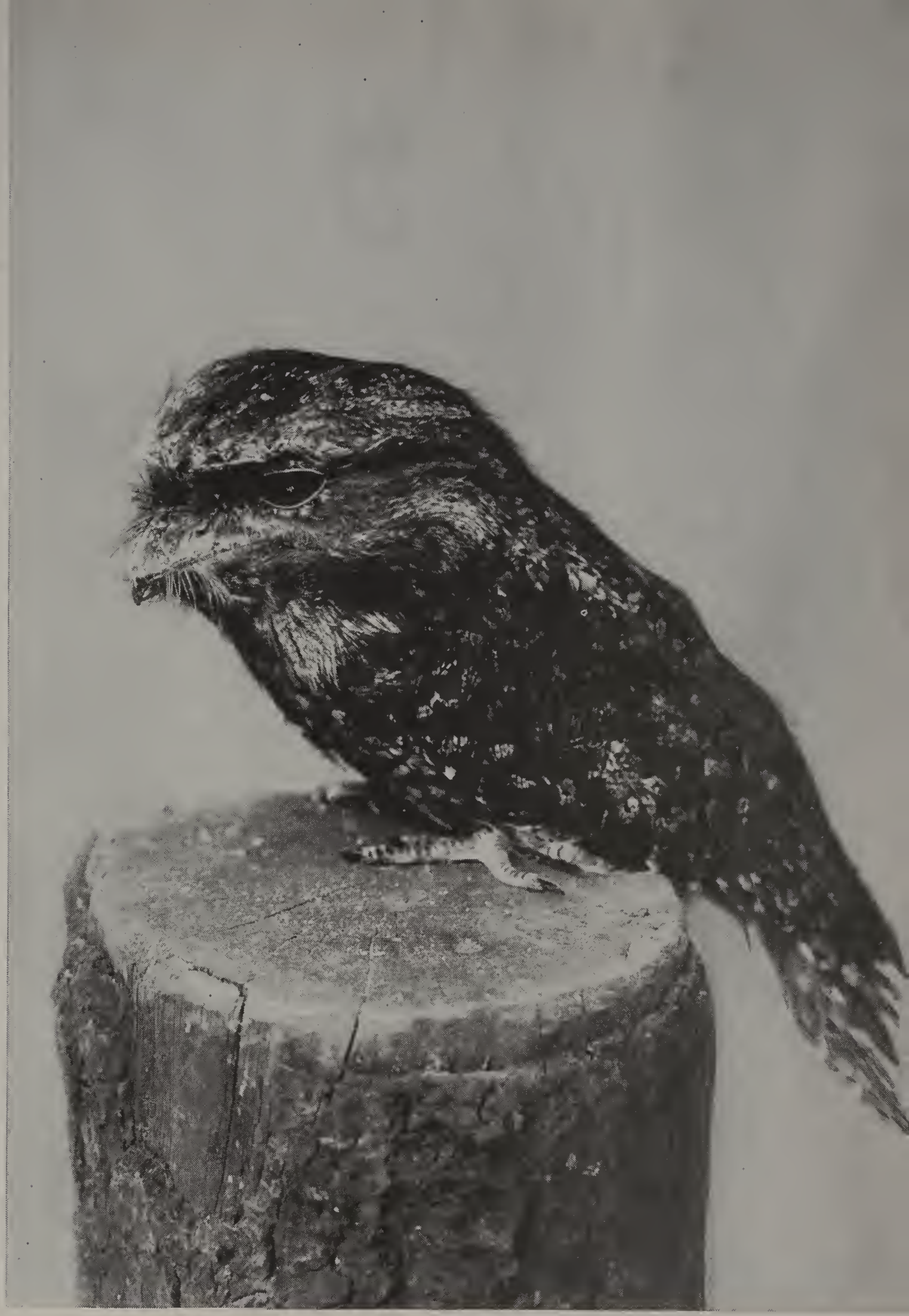
A NATURALIST tells of roaming with a friend through the Australian bush and seeing a frogmouth's nest perched on a eucalyptus bough some twelve feet above the ground. The friend remarked that some boys apparently had thrown a stick across it and was much surprised when the "stick" took wing and flew away. The "stick" was a frogmouth, whose brown and gray protective coloring, coupled with the rough texture of its plumage, made it indistinguishable from the bark of the surrounding trees.

These birds are active only at night; by day they sleep, perched on a eucalyptus bough, not crosswise like other birds, but lengthwise. This position probably makes them invisible to the sharp eyes of soaring hawks and other birds of prey. They sleep so profoundly that they can be captured by hand, and if awakened, they merely flap lazily to another limb, where they resume their slumbers.

At night the frogmouth hunts locusts, grasshoppers and other insects. Not being swift enough to catch them on the wing, it creeps silently along tree branches and surprises them in their sleep. It also eats mice, and berries.

On its nocturnal prowls the frogmouth utters a cry described by some as *mo-poke* and by others simply as a "harsh, indescribable cry." *Mo-poke*, which is *more pork* with an aboriginal accent, is also the cry of the boobook owl. Both birds have enthusiastic partisans, each side arguing that its favorite is the one and original mopoke.

These mopokes breed from August to January on low, swampy islands. The nest, usually situated on a broken eucalyptus or swamp oak bough, is a frail platform of twigs. The eggs, two in number, are oval in form and a spotless white. The male broods by night, the female by day. In seeking a nesting site, the frogmouths are careful to choose a branch matching their own coloring.



New York Zoological Society.

FROGMOUTH (PODARGUS STRIGOIDES). Also called Mopoke. *Length:* 1½ feet. *Range:* Australia, especially New South Wales.

These nocturnal birds sleep so soundly during the day that even the sound of rifle-fire close by may not awaken them. At night they fly about uttering cries which sound like *morepork, morepork!* However, they feed not on pork, but on insects, small mice and little birds.

WHIP-POOR-WILL

THE INCONSPICUOUS, brownish-gray whip-poor-will spends its days concealed amid woods, rocks or dense brush, and for that reason is rarely seen. At nightfall it sallies forth in search of moths, grasshoppers, pismires and other insects. Some optimists are of the belief that it eats mosquitoes. From time to time in its hunt it pauses on a fence-rail or stump, where it gives voice to the note for which it is famous. Superstitious country folk in some isolated regions regard the call of the whip-poor-will as an evil omen, while others variously describe this whistling note as "exceedingly beautiful," "incredibly melodious," and "an offensive destroyer of slumber." In any case, the call usually stops about midnight, except on bright moonlit nights, when it may go on until morning. Late in summer, when the young have been born, the call is rarely heard.

The whip-poor-will mates in April or May, depending on the climate, laying two eggs on the ground or on a bed of leaves. It builds no nest, though pictures of the whip-poor-will's nest can be found in many old bird books. The chicks are born covered with a soft, fluffy down of a yellowish-brown color which blends perfectly with the dead leaves about them. Their protective coloring makes them almost invisible even at a distance of a few feet. The young are fed at first on ants, or on beetles and large moths partially digested and regurgitated by their parents. After two months the youngsters are able to eat whole insects.

American Museum of Natural History.

WHIP-POOR-WILL (ANTROSTOMUS VOCIFERUS). *Length:* 1 foot. *Range:* Eastern North America.

The characteristic call of the whip-poor-will, which gives the bird its name, is heard throughout its native woodland on moonlit nights. These useful insect-eating birds are frequently confused with the night-hawk.

SWIFTS AND HUMMINGBIRDS

THE GREAT speed with which these tiny birds can fly and the extremely rapid motion of their wings account for the names of swifts and hummingbirds. The tiniest of birds are found in the hummingbird family, some individuals weighing less than one-twelfth of an ounce and measuring hardly more than two inches.

Hummingbirds are confined to the Americas and are found in greatest numbers on the slopes of the northern Andes in Colombia. The swifts are cosmopolitan in distribution and are found in Europe, southern Asia and the Americas. In India and China the swifts construct their nests with saliva. The natives of these countries use the nests for making soup. The migratory chimney swallows of the United States are also swifts that cement their nests with saliva. Crested swifts are confined to Asia.

Swifts: Chimney Swift.

Hummingbirds: Sword-billed Hummingbirds.

CHIMNEY SWIFTS

Over large areas of the United States, farm house chimneys are occupied each summer by one or more families of chimney swifts. Previously these diminutive gray birds made their homes in hollow trees, but today civilization has provided them with more comfortable homes. They make a nest of twigs, which they cement to the brick or stone with their saliva. These twigs are torn off dead trees by the birds when in full flight.

The nest of the chimney swift, rather resembling a basket, takes some eighteen days to build. Wet weather interferes with construction, dissolving the saliva-cement. The mother bird lays one brood each year, consisting of four or five (rarely six) eggs. The incubation period lasts eighteen to twenty-two days, male and female relieving one another in sitting on the eggs. The glands providing the glue for nest building are much swollen at nesting time; when the swelling goes down, cheek pouches are formed in which quantities of small insects can be packed.

These birds are beneficial to farmers as they eat caterpillars and other insect pests. When prolonged rain clears the air of insects and drives the caterpillars to shelter, the swifts are apt to be doomed to starvation. In June, 1903, this occurred, and dead swifts were removed from the chimneys of New England by the bushel.

Chimney swifts are friendly, sociable birds. Their flight is exceedingly rapid, and rarely can they be overtaken, even by the swiftest falcons. They fly in zig-zags and curves, twittering shrilly, apparently never resting on trees or on the ground. Utterly fearless, they fly through tempests and thunderstorms. They drink and bathe in streams when on the wing, and occasionally one of them dips in too deep and is unable to rise again. They sleep clinging to a vertical surface such as the inside of their chimney home.

On their migrations chimney swifts often spend their nights in dead trees. One tree is related to have held eight thousand or nine thousand of them at a time. When the birds entered or left the tree, the noise was said to be like "the sound of a large wheel revolving under a powerful stream." It required more than half an hour for all the birds to leave.

American Museum of Natural History.

CHIMNEY SWIFTS (CHAETURA PELAGICA). *Length:* 5½ inches. *Range:* North America.

The picturesque habit of the chimney swifts in making a community home in an unused chimney is a carryover from their ancestors, who resided in the trunks of hollow trees.

HUMMINGBIRDS

THE HUMMINGBIRD spends the greater part of its time in the air, either darting about or "standing still in the air" in the vicinity of some flower. This latter feat is accomplished by means of the rapid vibrations of its wings. The hummingbird gets its name from the sound made by the vibration.

While sucking the nectar or drawing insects from a flower's corolla, it regulates its position with its tail, which enables it to approach the flower or, in a manner of speaking, to fly backwards. The hummingbird, sometimes no larger than a bumble bee, has a long, double tongue, useful in hunting insects.

These little birds perch on trees and bushes when tired, rarely on rocks. They delight in preening themselves. Hummingbirds are unable to propel themselves by means of their legs when on level ground. When in the air, their wings move so fast that they are no more visible than the blades of an airplane propeller. The various species display every conceivable color or combination of colors, but these can be seen and appreciated only when the birds are motionless.

Hummingbirds build a tiny nest of cotton-wool, spiders' webs or other light substances. The nest is well built and usually cup-shaped; it is often covered with lichens for purposes of concealment. It may be situated on branches, or suspended from the tendril of a climbing plant. There is one record of the parent birds adding to the nest as the young increased in size. Two white eggs are laid. The young are born blind and naked. The female is most solicitous in caring for them, while the male is apparently indifferent. Male hummingbirds are very pugnacious. They will attack kingbirds and even hawks without apparent provocation, and they engage in furious fights among themselves. They will grasp one another's beak and whirl one another, or they will chase about as if playing tag.

In Mexico and South America hummingbirds are hunted for their beautiful skins. They are caught with bird-lime or killed by means of clay balls projected from blowpipes.

American Museum of Natural History.

SWORD-BILLED HUMMINGBIRDS (ENSIFERA ENSIFERA). *Length:* 6 inches. *Range:* Northern South America: Venezuela to Peru.

The spear-like bill, as long as the body itself, is employed by these birds to extract insects from long, tubular flowers and blossoms. Some hummingbirds are no bigger than a bumble bee. About five hundred species are known, of which seventeen inhabit the United States.

TROGONS

THE QUETZAL, a trogon, inhabits the mountains of Central America and is considered one of the most beautiful of birds, vying with the birds of paradise in brilliance of plumage. Trogons are birds of moderate size found in the tropics of both the New and Old Worlds. The beautiful feathers of the trogons are so loosely attached that they come off at the gentlest touch. Another distinctive feature of trogon plumage is the complete absence of down. Trogons seize their food on the wing.

The colies or mouse-birds are somewhat related to the trogons. These birds are confined to the Ethiopian region. The name of this bird is probably derived from its mouse-like habit of hugging the boughs of trees as it proceeds along them.

Trogons: Quetzal.

QUETZAL

Deep in the mountain forests of tropical Mexico the quetzal perches motionless, except for the gentle swaying of its rounded head. Its upper plumage is a bright metallic-green washed with gold; the sunlight, filtering through the trees, changes its color here and there to blue. Though this bird is no larger than a dove, its tail, hanging almost vertically, is a full three feet long. From time to time the quetzal jerks its tail feathers apart, showing their rich vermilion and crimson underside.

Spying a fruit, the quetzal darts through the air to pluck it. Despite its extended tail, its flight through the trees is swift and direct although it seldom flies more than a few feet. As it flies, its splendid colors flash in the sunlight.

The tail plumes of this beautiful bird were used by the Aztec emperors as insignia of their rank. When caught, the birds were not allowed to be killed; their tail feathers were merely extracted. Since the Spanish conquest, they have been constantly hunted for their plumes, with the result that they are extinct in some regions and are limited in others to the most inaccessible heights. Today, however, they are protected by the Mexican government.

In addition to fruit, the quetzal eats lizards, caterpillars, small crabs, insects and land snails. This royal bird frequently clings to a tree like a woodpecker; its feet are not well adapted for climbing and not at all for walking. Its note is a soft *whee-oh*, slowly increasing in volume. Some authorities say it is loud though not unpleasant, while to others it is distinctly dissonant.

The female quetzal lacks the elongated tail feathers of her mate and is in general less brilliantly colored. She lays two greenish-blue eggs each year. The young are a dull brown color, mingled with some white and black.

American Museum of Natural History.

QUETZAL (PHAROMACRUS MOCINNO). *Length:* 1 foot. *Range:* Central America: Guatemala, Honduras and parts of Mexico.

The shy quetzal, considered by many the most beautiful of birds, has a golden-green plumed tail a yard long. Aztec chieftains used these plumes as their insignia.

New York Zoological Society.

YOUNG QUETZALS. In 1937 the first captive quetzals were brought to the United States and deposited in good health in the New York Zoological Park. It is anticipated that as they grow they will develop the remarkable tail plumes of the adult bird shown above.


R

KINGFISHERS, HORNBILLS, TOUCANS AND WOODPECKERS

THIS LARGE order contains such impressive birds as the widely distributed kingfishers; the West Indian todies; the Central and South American motmots; the Old World bee-eaters, rollers, hoopoes and hornbills; the ground-rollers of Madagascar; the wood-hoopoes of Africa; the jacamars and puffbirds of Central and South America; the tropical barbets; the honey-guides of the Old World; the Central and South American toucans; and the woodpeckers and piculets found everywhere except in Madagascar and Australia. The flickers are woodpeckers found in parts of the United States and Canada.

Of the many legends concerning kingfishers one of the strangest is from Ovid who claimed that the birds made their nests on the waves. Darwin, who noticed the bare patches on the motmot's tail, suggested that the bird itself nibbled off some of the barbs in order to appear more attractive to its mate. The rollers are so-called because of their peculiar rolling flight which resembles that of tumbling pigeons. Woodpeckers have developed the habit of climbing trees in a spiral path so that they will not miss a peck at any portion of the decaying wood.

Kingfishers:	Belted Kingfisher.
	Laughing Jackass.
Hornbills:	Abyssinian Ground Hornbill.
	Lesser Hornbill.
Toucans:	Toucan.
Woodpeckers:	Pileated Woodpecker.

KINGFISHERS

A BELTED kingfisher perches motionless on a tree limb overhanging the water until its sharp eyes catch sight of a fish beneath the surface. Then it darts down like a bullet, totally submerging itself in its dive. A moment later it reappears, grasping its prey in its powerful beak. Returning to its perch, it kills the fish by beating it against the limb, and swallows it head first. The kingfisher rarely misses its catch. Unlike the osprey that feeds on fish, it does not make use of its claws for fish-catching.

The kingfisher's upper parts are slate-blue, while its breast is rust color. A legend explains that the kingfisher that was released from Noah's ark flew toward the setting sun. On its back the blue sky was reflected, while its breast was scorched by the heat of the sun.

Another legend regarding the kingfisher, known to the ancients as the *halcyon,* explains the origin of the expression "halcyon days." Halcyons, Pliny records, lay and hatch their eggs in mid-winter, and during their brooding time, the sea is calm and navigable.

The kingfisher's nest is an excavation, usually in the bank of a stream or other body of water, though some nests have actually been found in railroad cuts. Male and female share the labor of excavating, digging with their large, powerful beaks and pushing out the loosened soil with their feet. The home consists of a passage about four inches in diameter and from four to twenty feet long, leading to a round chamber with a vaulted ceiling. The same burrow may be used for many seasons. The presence of a kingfisher's nest may often be detected by the masses of regurgitated fish scales and bones in the vicinity. The mother kingfisher lays from five to seven eggs. The young are hatched naked and helpless with closed eyes. They grow slowly, and it is only after a month that they leave the nest. It is interesting to watch their early attempts at catching fish, which at first are quite unsuccessful. Their education in this important activity requires about two weeks of patient trial and error.

American Museum of Natural History.

BELTED KINGFISHER (MEGACERYLE ALCYON). *Length:* 1 foot. *Range:* North America.

This bird is rarely found far from water, and is usually perched on some overhanging limb, on the lookout for the flash of a fish's fin. With a quick plunge this "king of fishing birds" seizes its prey.

New York Zoological Society.

LAUGHING JACKASS (DACELO GIGAS). *Length:* 1½ feet. *Range:* Australia and New Guinea.

The gurgling, startling laugh of this bird an hour before sunrise each day, has earned it the familiar name of the "settler's clock." The natives call it "kookabura."

HORNBILLS

The Abyssinian ground hornbill seals his mate in a hollow tree in the nesting season. The male hornbill runs himself ragged during the two months of his mate's incarceration, to provide her and the little ones with food, which he passes in through a slit left for the purpose. Inside the tree the female lays her eggs and hatches them. The young are born naked and helpless, and the mother bird cares for them until they are nearly or entirely fledged. Then the barrier is broken down, and the female, who has undergone a complete moult, emerges in the pink of condition. The male is most conscientious in supplying his mate with food, and it is said that if he dies during this time from overwork or other causes, another male will come to take his place. This imprisonment protects the mother and her young from snakes and genets, the hereditary enemies of the hornbills.

These black, turkey-like birds are usually found walking solemnly in pairs about dry swamps. Sometimes parties of twenty or more are seen in the early morning, feeding in a clearing. They are top-heavy in appearance because of their great bills, but in reality these are exceedingly light, being made of a strong but highly porous substance. The hornbills' diet consists of frogs, reptiles and grasshoppers. At night these birds roost in trees. Their flight is slow and heavy, and they seldom fly more than a few hundred yards at a time.

As the hornbills stray about the marshes, they frequently utter their curious cry, a deep sonorous grunt on one note, *coo-coo-coo*. The male calls first, and the female immediately replies with the same *coo-coo*, somewhat higher in pitch. They continue this calling for five or ten minutes, seemingly to keep track of one another when concealed among the rushes.

The hunters in some African regions use the head and neck of a slain hornbill as a supposed aid in stalking. Treated with the proper "medicine," they are attached to a hunter's forehead. The hunter then moves in a crouching position, giving an imitation of a hornbill.

New York Zoological Society.

ABYSSINIAN GROUND HORNBILL (BUCORVUS ABYSSINICUS). *Length:* 3½ feet. *Range:* Northern Africa.

This hornbill, which pecks insects out of the dry sun-baked ground of Africa, is sometimes found as high as four thousand feet up, in the hills of Abyssinia.

Ralph De Sola, Federal Writers' Project.

LESSER HORNBILL (ANTHROXOCEROS CONVEXUS). Also called Indian Pied Hornbill. *Length:* 2 feet. *Range:* India.

This seldom seen species was photographed in the Barrett Park Zoo on Staten Island, which, like many of the more modern institutions, frequently exhibits rare birds.

TOUCANS

THE MOST prominent feature of this bright-colored bird is its beak, which in the adult is all of eight inches long, or one third of the bird's entire length. At its base it is three inches wide. Though this protuberance looks clumsy and immensely heavy, in reality its walls are made of a light honeycombed substance so thin that it does not interfere with the toucan's activities. A series of notches at the sides of the beak lend it a saw-toothed appearance.

The toucan lives chiefly on fruits and seeds, and it is said to wreak great havoc on the Argentine orange groves. It also eats small birds and their young, and in captivity exhibits great enthusiasm for mice, reptiles and other animal nourishment, which it savagely tears to pieces. In the breeding season it eats caterpillars and other insects. In eating such small morsels, the toucan throws its head back and swallows them at one gulp. Sometimes it regurgitates food to be chewed again.

The flight of the toucan is easy and graceful. The bird's tail bones seem to be attached to a ball-and-socket joint, permitting great freedom of movement and sudden changes of direction. Sometimes flying toucans flap their wings noisily.

Toucans are gregarious; in the morning and evening they gather in small flocks to bathe and feed, while during the heat of the day, they sit motionless in tall trees. When they feed in company, they post a sentinel, whose harsh warning screams can be heard a mile away. These birds grow extremely noisy in wet weather.

Often toucans will "mob" an owl or other bird of prey, snatching at its tail feathers as they pursue it.

Toucans can be tamed, and become amusing pets.

New York Zoological Society.

TOCO TOUCAN (RAMPHASTES TOCO). *Length:* 2 feet. *Range:* South America: Brazil and Guianas, to northern Argentina.

When feeding in groups, these queer birds post a sentinel. His cry of warning, a sharp scream, can be heard for more than a mile. The big beaks of these fruit-eaters, honeycombed with air spaces, are exceedingly light.

WOODPECKERS

LIKE OTHER woodpeckers, the pileated woodpecker is always in a hurry. Preoccupied with the serious business of getting a living and building a home, this dull black bird with the scarlet crest climbs hastily up the trunks of dead trees, strips off bark, pecks into the dead wood in search of insects and their eggs, hops on the ground looking for ant hills, or flies about seeking wild fruit and berries. It is a solitary, shy bird, incapable of being tamed. Its flight is direct but rather slow.

The pileated woodpecker's long, powerful bill contains a barbed tongue that can extend two and one-half inches beyond it. As the bill bores a hole in some dead tree, the long tongue, which is covered with a sticky saliva, draws out the insects. These birds are exceedingly beneficial to man for their insect destroying habits. They never attack live wood, though when a dead tree is not available instinct may lead them to subject a telegraph or fence pole to the trip-hammer-like blows of their bills. So expert is the pileated woodpecker in stripping trees that it can peel ten feet of bark from a dead pine tree in fifteen minutes.

This woodpecker's note is a loud, nasal *kuk-kuk*. When two birds meet, they make a sound like *wichew*. Woodpeckers mate from April to June, when the male will pursue the female and seek to attract her by drumming with his bill against a tree. The woodpeckers nest in secluded swamps, digging an apartment out of a dead tree, usually at a great height. This home is invariably bedded with fine wood chips. Often a pair will return to the same nest year after year, cleaning out and sometimes enlarging the old nest. The eggs are white and three to five in number. While the female sits on them, the male entertains her by drumming. He too takes his turn sitting on the eggs, though his mate makes no music to divert him. The young are fed by regurgitation and remain in the nest until full-fledged.

American Museum of Natural History.

PILEATED WOODPECKER (CEOPHLOEUS PILEATUS). *Length:* 1½ feet. *Range:* North America.

The long barbed tongue of the pileated woodpecker serves as an excellent spear in impaling insect food. Woodpeckers are also fond of wild grapes.

PERCHING BIRDS

This is the largest order of living birds, containing between five and six thousand species and representing the highest form of avian life. The nervous system of the perching birds is the most highly developed. They depend almost entirely upon their keen senses of hearing, sight and smell in their search for food and in detecting their enemies. Respiration and circulation are extremely rapid, resulting in a body temperature that is the highest for vertebrate animals, and providing an abundance of energy for rapid and sustained flight. Perchers have three toes in front and one hind toe which is long and is moved by its own tendon.

Inasmuch as almost all members of this order are built along the same general lines and exhibit little variety in their mode of living, we have chosen only a few typical and highly specialized representatives.

This great order includes all of the songsters, as well as some songless species. Typical songsters such as the nightingale, skylark, hermit thrush, brown thrasher, cardinal, etc., are equipped with a complex syrinx. This complex syrinx is an extension and evolution of the simple syrinx found in the throat of songless birds. The vocal organ is controlled by four or more pairs of muscles which help to produce some very human tones as well as providing suppleness and rhythm.

Surely without the voices of these feathered creatures our seashores, swamps, streams, fields, woods and hills would be tomb-like with their everlasting silences.

Perchers:

Lyre Bird.	House Wren.	Weaver Birds.
Cassiques.	Thrushes.	Sparrows.
Crows.	Robins.	Bluebird.
Blue Jays.	Cedar Waxwing.	Blackbirds.
Bower Birds.	Vireos.	Purple Grackle.
Birds of Paradise.	Starlings.	Orioles.
Canadian Chickadee.	Warblers.	Cardinal.

LYRE BIRD

THE LYRE bird has received its name from the male's spectacular long tail, the outer feathers of which are so curved as to resemble the frame of a lyre, while the inner feathers run straight, resembling the strings. The female's tail, which is long and wedge-shaped, lacks this distinction. The male's lyre does not reach perfection until his fourth year. Both male and female moult annually after the breeding season, resuming their full plumage the next spring.

The lyre bird's song is liquid and pleasant; this bird can mimic the cries of other birds and even of animals common in its environment, such as the dingo and wild dog.

Lyre birds prosper in captivity, although rarely exhibited. One male is reported to have learned to mimic the human voice, a violin, a piano, a cornet, a saw, a squealing pig and a crying child. The bird was able to utter complete phrases.

In its native haunts in South Australia, the somber brown lyre bird is extremely shy and wary, often seeking out the most inaccessible gullies and ravines. It does not fly when in danger but runs away swiftly on its long powerful legs, holding its tail in a horizontal position and sometimes executing extraordinary leaps. Lyre birds are not gregarious. Each pair takes its own territory and assumes exclusive rights over the local snails and insects. One pair never trespasses on another's domain.

The lyre bird builds a large, well woven, dome-shaped nest either on the ground or in a tree fork, sometimes eighty feet high. An entrance is made at one side of the nest, and here the female deposits her single dark egg. In entering and in leaving the nest, she proceeds backward. The male meanwhile builds mounds of earth upon which he tramples, struts, and displays his tail. The incubation period lasts from August to September. The hen sits on the eggs, sometimes being relieved by her mate.

The lyre bird has short, rounded wings and is a weak flier. To reach its nest, it hops lightly and noiselessly from limb to limb, sometimes half-flying.

The flesh of the lyre bird is tough and unpalatable.

American Museum of Natural History.

LYRE BIRD (MENURA SUPERBA). *Length:* 3 feet. *Range:* Australia.

Only the male has this beautiful lyre-like tail. Each male makes a small, flat mound of earth for himself, on which he struts and sings, showing his tail to advantage.

CASSIQUES

DESPITE the enemies with which its native jungle abounds—snakes, wild-cats and monkeys—the cassiques, tropical relatives of American orioles, do not trouble to conceal their nests. These long, purse-like structures, woven of grass or bark, are suspended from the tips of the highest limbs, which are in most cases so frail that no enemy can reach them. For added protection the cassiques invariably locate their homes near a nest of wasps, whose venomous sting is sufficient to kill a bird and incapacitate any trespasser. It is not known whether the wasps live at peace with their avian neighbors or whether the birds are merely protected by their heavy, scaly plumage.

A hundred cassiques' nests are sometimes found hanging near the top of a single tall tree. Despite the smallness of the side entrances to the nests the birds enter in full flight, creating quite a stir, which, however, fails to disturb the wasps. In the evening the colonies of cassiques are exceedingly active, flying about, crying discordantly and finally diving into the nests. Some of their cries, taken individually, are considered quite musical, but when the whole colony sings at once, the tones clash.

The crested cassique is black in color, with dark-brown underparts. Both the beak and the luxuriant tail feathers are yellow. Its head is surmounted by a thin crest.

In the spring the male goes through a complex display, lowering his head, slapping his wings together and opening his plumage fan-wise. At the same time he utters a loud crackling noise, said to resemble the sound of a tree falling in the forest. The female lays two greenish-blue eggs, spotted with dark brown.

American Museum of Natural History.

CRESTED CASSIQUES (OSTINOPS DECUMANUS). *Length:* 1 foot. *Range:* Tropical South America.

One hundred or more of the bag-like nests of these birds may be seen attached to the limbs of a single tree. Some of the nests are a yard long.

CROWS

THE CROW is generally regarded as man's enemy. Its black color has made it a bird of evil omen like the larger raven, and its appetite is known to be indiscriminate and insatiable. Actually, its fondness for corn, poultry, eggs and young lambs does justify to an extent the farmer's hatred. Moreover, the crow is unimpressed by scarecrows and is exceedingly difficult to shoot, possessing an uncanny instinct as to the purpose and range of guns. As a consequence bounties are offered for these birds in many states.

On the other hand, crows are also beneficial to man. They eat grasshoppers, locusts, caterpillars and other insects harmful to crops. A farmer on the island of Martha's Vineyard offered a bounty of fifty cents apiece for crows, with the result that his grass stopped growing, its roots eaten by an insect grub which the crows had previously destroyed.

Crows make their nests in trees, often as high as sixty feet above the ground. The nests are large, well-built structures of sticks, comfortably lined with shreds of grape or squash vine, cedar bark, grass, seaweed, leaves, rags or fur. In many instances three crows nest together. Whether this indicates polygamy or polyandry is still a moot question. All three help in the nest building and incubating, and live together harmoniously. From three to eight eggs are laid, although it is thought that the larger number is laid by two females.

The young require constant feeding and attention. Parents are particularly valiant in defending their young against eagles, hawks, owls and raccoons.

When taken young, crows make amusing and mischievous pets. They can learn to talk almost as well as parrots.

Henry Ward Beecher once said: "If men wore feathers and wings, a very few of them would be clever enough to be crows." Crows have a highly developed social instinct. A bird which fell into the sea and was unable to rise was helped to shore first by one comrade, then by others. Crows quickly learn where they are safe from guns. Over Puget Sound, where they have the protection of the law, they have grown extremely tame.

New York Zoological Society.

CROW (CORVUS BRACHYRHYNCHOS). *Length:* 1½ feet. *Range:* North America.

Because of its liking for corn this best known of American birds has many human enemies. But it really helps the farmer by killing dozens of harmful insects.

New York Zoological Society.

WHITE CROW. A rare sight is the white crow. It is an albino crow lacking the pigment found in its black brothers.

BLUE JAY

THE BEAUTIFUL and talkative blue jay devotes a great part of his life to bearing out those axioms about honor among thieves and good in the midst of evil. For these garrulous and audacious little birds, who live by robbery, murder and cannibalism, are most attentive to their young and sedulous in the care of their aged and infirm. One group of blue jays, indeed, has been observed caring for an old and partially blinded bird.

Usually inhabiting woodlands, farms and parks, blue jays live on insects, snails, grasshoppers, nuts, fruits and grains. They have been known to kill and eat young pheasants and poultry. Blue jays utter a wide variety of calls and whistles and are equally adept at screaming, chattering and chirping. They are also excellent mimics and delight in imitating the notes of redtails and sparrow hawks to cause confusion among these birds. They migrate according to the availability of nuts, abandoning regions where this dietary item has given out. These and other staples are stored for winter use.

Sometimes a clan of blue jays attacks a screech owl and drives it out of the woods. But, understanding the limits of safety, the jays do not pursue their enemy too far. They will also "mob" the most dangerous hawks, being careful to leave open a line of retreat into a dense thicket where the hawk cannot follow them. The din created by the jays in these combats often can be heard half a mile away.

The blue jay, in nesting, prefers evergreens, but often contents itself with deciduous trees. A new nest is built each year from five to fifty feet above ground, and it is carefully wrought of sticks and twigs and lined with bark and feathers. Early in spring the birds begin to carry sticks for the nest. The sticks are never taken from the ground, but are gathered from trees. The pale olive-green eggs number from four to seven. After the first is laid, the birds cease their usual noise. Incubation requires from fourteen to seventeen days, and the female bird is so devoted to this task that she will frequently remain sitting despite intrusion. If a cat approaches the nest, the jays are quite capable of driving it away.

Claude W. Leister, New York Zoological Society.

BLUE JAY AND YOUNG (CYANOCITTA CRISTATA). *Length:* 1 foot. *Range:* North America.

Nothing arouses the sporting blood of these birds more than the sight of a hawk or an owl. The blue-coated mob swarms around its larger prey with deafening shrieks and usually succeeds in driving off the marauder.

Ameriean Museum of Natural History.

BLUE JAY NESTING. Blue jays like to nest in evergreens. Their nests are loosely constructed of twigs, bark, weeds and pine needles.

BOWER BIRDS

Amid deep, luxuriant brush near the coast of Australia the satin bower birds build their bowers or playgrounds. The base of these structures consists of a somewhat convex platform of interwoven sticks; the bower itself being a wall made of more slender and flexible twigs. The bower is not used as a nest, and indeed the nests of these birds have rarely been seen.

Some observers state that the bowers are built by the females, but it is the brilliant, satiny-blue males who use them most. To this spot they bring all sorts of gay-colored articles: feathers, stones, shells, or, if in the neighborhood of cities, discarded street-car tickets, empty bluing bags and stolen ornaments. They always show a marked preference for blue in choosing their variegated articles, perhaps because that is their own color.

In the bower the birds hop about with mincing steps and drooping wings. Now and then they will pick up an ornament and drop it before another bird, all the while uttering low, humming sounds. The satin bird is something of an artist. Mixing charcoal taken from the natives' fires, with saliva, he paints the walls of his bower almost every day. A strip of bark is held in his beak so that the paint is forced through the sides of his bill.

Originally the bowers may have been devised only for courting, but they are now apparently used for mere play, as they are occupied for fully ten months of the year. According to A. J. Marshall, the dull, gray-green females rarely approach them. In the nesting season, it is the females who take care of all the domestic drudgery.

The bower birds are clever in mimicking the calls of other birds. They eat seeds, berries, wild figs and, to a lesser extent, insects. They are not migratory, but change their location from time to time depending on the food supply. The male is capable of a pleasant, liquid note, but like his mate he can also utter a harsh, guttural cry. In autumn the bower birds come together in small flocks near steep river banks.

New York Zoological Society.

SATIN BOWER BIRD (PTILERHYNCHUS HOLOSERICUS). *Length:* 1 foot. *Range:* New South Wales, Australia.

These architects of the bird world construct beautiful play houses or courting bowers, lining them with shells and bits of colored glass. After courtship they leave their bower and build a nest.

New York Zoological Society.

BOWER BIRDS' BOWER. The bower is the center of courtship and play carried on between the sexes. Male birds build the bowers. Occasionally a female will make a clumsy attempt to build one, only to have it destroyed by her more adept mate.

GREATER BIRD OF PARADISE

EARLY IN the sixteenth century two skins of the greater bird of paradise were presented to the King of Spain by a navigator. The skins were prepared in the native fashion, with both wings and feet removed. Their beauty made a deep impression on the romantic imagination of the time; and it was long thought that these birds, lacking wings, must float through the air supported by their trailing plumes. It also came to be believed that the bird of paradise fed on dew and nectar and that the female laid her eggs on the male's back.

Two and a half centuries later, when Linnaeus was attempting to name and catalogue all known creatures, the legend as to this species' lack of locomotor organs persisted, though Linnaeus himself may have known better. At any rate he conferred on it the name of "apoda," or legless. Not until 1862 were living birds of the species brought to Europe, to explode the myth.

During the first year of life both male and female of the species are an almost uniform coffee-brown in color. After this, however, the males gradually change, until in their fourth year they complete the splendid plumage for which they are famed. Their general color is then bright reddish-brown; forehead, cheeks and throat are metallic-green, while the crown and nape are bright yellow. Long ornamental plumes grow from their flanks, just below the shoulders. These are a deep golden-yellow, changing to pale brown at the top. The two central tail feathers, known as wires, are without barbs and sometimes as much as thirty inches long.

Despite their great beauty, the birds of paradise are more closely related to crows and jays than to any other species. Little is known of them in their native state, except that they are omnivorous, eating many varieties of fruits and insects; and that the males engage in a spectacular ceremony prior to the mating season. Choosing a spreading tree with large scattered leaves, twenty or more of them will play about, raising their wings, extending their necks and elevating their splendid plumes, which they keep in constant vibration. Now and then they fly from branch to branch, filling the air with waving plumes.

New York Zoological Society.

GREATER BIRD OF PARADISE (PARADISEA APODA). *Length:* 1½ feet. *Range:* Aru Islands, west of New Guinea.

Birds of paradise, as their name indicates, are remarkably handsome. They inhabit the Papuan region. The male in the picture has a golden-yellow head, a green throat and golden plumes.

American Museum of Natural History.

ACADIAN CHICKADEE (PENTHESTES HUDSONICUS). *Length:* 5 inches. *Range:* Eastern Canada and northeastern United States.

This brown-capped titmouse derives its name from its call note, *chick-a-dee.*

HOUSE WREN

When the male house wren returns north in spring, he begins to sing in a musical frenzy which sets him trembling in every fibre. Then suddenly he stops and sets about the work of home-making.

He becomes feverishly active, collecting sticks with which he fills all the nesting sites in the vicinity. His favorite nesting spots are woodpecker holes, hollow trees, baskets, and man-made bird houses. By this time the females have arrived, and he looks around for a mate.

The female of the species is shrewish, perhaps because of the male's incurable disorder. Usually her first act is to throw all the sticks out of the nesting site she chooses. The male then goes on with his singing, while the female builds the actual nest, lining the twigs and branches with feathers, cloth or cocoons.

Wrens are active and nervous little birds, constantly hopping and bobbing about, and they are highly belligerent despite their small size. Their food consists chiefly of insects, but they also eat the eggs of other birds. When there is nothing upon which they can expend their irrepressible energy, they fight among themselves or build extra nests. Sometimes a male will build a rough, uncouth nest near the tidy one occupied by his mate; and often a male who has failed to secure a mate occupies his enforced leisure with nest-building for nest-building's sake.

Despite their social irregularities, wrens are devoted parents. They protect their young and feed them constantly, sometimes once every two or three minutes. In some cases wrens mate for life, but often a male will abandon his brooding mate and nest with another female nearby. The female, after hatching out her six to eight eggs, may leave the care of her nestlings to her mate and fly away with a new lover. Occasionally a male mates with two females, dividing his attentions between the two and singing diplomatically where both females can hear him.

Wrens are useful to farmers as destroyers of insect pests. Their chief enemies are cats, blue jays, crows, squirrels and bad weather.

American Museum of Natural History.

HOUSE WREN (TROGLODYTES AEDON). *Length:* 5 inches. *Range:* Eastern North America.

In spring the wren nests near country houses and barns, under eaves, in bird boxes and old jugs. This well-known visitor sometimes makes itself obnoxious by eating the eggs of other birds. It aids farmers and gardeners, however, by destroying hundreds of harmful insects.

THRUSHES

THE GENTLE and lovable wood thrush ordinarily makes its home in dark, damp woods, but often this tawny, black-spotted bird emerges to sing its calm, rippling song on a well-shaded lawn. The song consists of a liquid *quirt* and a sharp *pit-pit.*

The wood thrush is highly migratory, wintering as far south as Mexico and the Canal Zone. It makes its nest in young trees or bushes, of leaves, twigs and rootlets with an inner wall of mud and a lining of finer rootlets. Its eggs, from three to five in number, are greenish-blue, occasionally flecked with brown. Wood thrushes live on insects, fruits and berries.

ROBINS

THE RELATED robins are said to have a highly developed language, capable of expressing alarm, suspicion or caution. They can signal companions to take wing. These black, red-breasted birds act as seed dispersers. They eat the berries of cedar, juniper and wild cherry; the pulp is digested, while the seeds pass through the digestive tract. Farmers, long puzzled over the fact that long rows of cedar trees often sprang up along a rail fence separating two pastures or farms, discovered that the robins perched on the fence were the "planters."

Robins awake and sing earlier in the morning than any other birds. Their song, as they are very sensitive to atmospheric conditions, often presages a coming shower. A passing cloud that cuts off the sunlight for a moment will often bring forth a burst of melody from these birds. Most robins fly south in loosely-shaped flocks in cold weather, large numbers of them wintering in Florida, where they live on palmetto and mistletoe berries. In March the males arrive first at their northern breeding ground. Throughout the summer the males and the young of the first brood often roost apart, returning now and then to their nests to see how mother robin is doing with the second brood. These roosts frequently contain many hundreds of birds. The nests are similar in construction to those of the thrush.

American Museum of Natural History.

WOOD THRUSH AND YOUNG (HYLOCICHLA MUSTELINA). *Length:* 8 inches. *Range:* North America.

This gentle bird usually avoids the settlements of humans, preferring the low woodlands. At times, however, it will leave its secluded habitat to play about on shady lawns. Its song is melodious and clear.

New York Zoological Society.

ROBIN ON NEST (TURDUS MIGRATORIUS). *Length:* 10 inches. *Range:* North America.

Harbingers of spring, robins come in March to northern lawns and gardens. In September they gather for the journey south. The little mother in this picture nested between the feet of a bronze flamingo on the entrance gate of the New York Zoological Park.

American Museum of Natural History.

ROBIN GROUP. After the first broods are ready to fly in June, the robins begin to congregate nightly. Each morning they scatter in search of food.

CEDAR WAXWING

The cedar waxwing breeds in June and July, later than most other birds. In the early spring, the graceful ash-colored birds can be seen flying about in small flocks, often in the company of goldfinches. They fly for short distances, barely grazing the tree-tops, and then pause for a meal of cedar berries or insects. They hardly can be said to sing, but now and then they utter a muted whistle or a series of short peeps, described by Thoreau as a "beady note." The plumage of the waxwing is soft and smooth. Its slaty-gray wings are tipped with horny red ornaments which resemble pellets of sealing wax.

The cedar bird's nest is a bulky affair of grass, leaves, moss and sometimes mud, located in trees at an elevation of from five to twenty feet. The eggs, three to five in number, are pale bluish-gray with black or dark-brown markings. In caring for the young, these birds show unusual tenderness and devotion. At the approach of an intruder their crests tremble in excitement. Often the male bird mounts guard on the tip of an evergreen tree, keeping vigil for hours and now and then flying into the air for a snack of passing insects. Cedar waxwings are considered to be among the most gentle and delicate of birds.

Waxwings migrate irregularly, following the food supply. They winter throughout most of the United States.

American Museum of Natural History.

CEDAR WAXWING (BOMBYCILLA CEDRORUM). *Length:* 7 inches. *Range:* North America.

The waxwing guards its nest with great care. The subdued notes of its call string out into the air like beads. The tips of its quill feathers are flecked with red as if ornamented with sealing wax.

VIREOS

On long summer days when most birds are silent, the red-eyed vireo keeps up an incessant song. This common bird is also known as "the preacher," because of its method of delivery. It seems first to make a point in a few words and then to pause for the audience to reflect. One writer describes "the preacher" as repeating, with pauses between sentences: "You see it—you know it—you hear me—do you believe it?" Each phrase is ended with a rising inflection.

The vireo lives on insects, which it laboriously digs from crevices in the bark of trees or picks from the undersurface of the leaves. It often sings as it works; sometimes it utters a plaintive, nasal note, sounding like *whang*.

It can be recognized easily in shade trees or orchards, as well as in the woods, by its slaty gray cap, a white line bordered by black over the eye, and the red eyes which give it its name. Its general coloring is a dusky-olive.

The vireo weaves its nest of dead sticks, strips of bark, paper and plant down, and hangs it, like a suspended cup, from forked branches. The inside is lined with finer strips of bark and plant tendrils.

Three to four white eggs with a few black spots are laid.

American Museum of Natural History.

RED-EYED VIREO (VIREO OLIVACEOUS). Also called Preacher, Greenlet. *Length:* 6 inches. *Range:* North America.

Incessantly chattering, this orator of the woods closes a phrase with a rising inflection as if awaiting a reply.

STARLINGS

Sometimes these birds will roost amid rushes by the water's edge, packing down the plants by the weight of their numbers. The singing of large groups is an indescribable chattering, but the individual male starling utters a clear, high, long-drawn-out whistle. Not content with their own tunes, starlings also imitate the songs of many other birds. Starlings are walking birds—not hoppers.

Though these birds are now common in the United States east of the Mississippi, they are not native to this country. Sixty of them brought from western Europe were released in Central Park, New York City, in 1890, and forty the following year. Since then they have multiplied tremendously and have adapted themselves to the entire eastern and middle-western regions of the United States. They do not, in this country, engage in regular migrations. They show, however, some tendency to move southward in winter.

In the fall starlings often leave the countryside for the cities, where they crowd together in church towers, and in crannies where their large numbers can keep them warm. Some observers have counted twenty-five hundred to three thousand starlings in a single church tower. By day they repair to the parks and the outlying country to forage for berries and insects, but at night they return to the comforts of the city. In some cities, particularly Washington, D. C., they are so numerous as to be looked upon as pests. An ornithologist's dictum has it that "it's an ill bird that bodes nobody good," and because starlings destroy insects they are generally regarded as beneficial.

The country homes of starlings are nests of grass and twigs in a woodpecker's hole or in a hollow tree. They breed in April, and by the middle of May the young are already uttering their harsh guttural food-cry. The eggs, four to six in number, are pale blue. At the end of May a second brood is sometimes raised. By that time the young of the first brood have already begun to form the flocks which by late summer may contain many thousands of birds.

New York Zoological Society.

EUROPEAN STARLINGS (STURNUS VULGARUS). *Length:* 8 inches. *Range:* Northern Hemisphere.

Gifted with an astounding vocal range, the starling imitates almost any sound. It fares equally well in city or country. It was introduced to New York City in 1890 and since then has spread westward to the Rocky Mountains. Among the Greeks the starlings were known as crop-destroyers. The fields were guarded by men armed with slings to frighten away these birds.

New York Zoological Society.

EUROPEAN STARLING.

WARBLERS

THE YELLOW warbler easily finds his way to the heart of a canary lover, for his song, though not unusually melodious, resembles that of the canary. The cheerful *wee-chee-cherwee*, is often heard in parks or gardens.

The yellow warblers are among the first birds to leave the northern latitudes in the fall, among the last to return in spring. In straggling flocks they migrate as far southward as Brazil and Peru, usually flying at night. Guided by unerring instinct, they never lose their way, but occasionally dash themselves to death against lighthouses, apparently attracted to the light.

Sometimes, in the company of other migrating warblers, they fly by day from tree to tree, gleaning insects as they go. The golden-yellow adult males, chirping merrily, fly ahead, while the duller-colored females and the yearlings bring up the rear. These birds are highly beneficial to man, as they eat many crop-destroying insects. Because they feed exclusively on insects yellow warblers cannot tolerate cold weather, which deprives them of their diet.

The yellow warbler's nest is built in fruit or shade trees or in bushes, usually near water. It is made of fine grasses, hair and much plant down, neatly and compactly felted together. The eggs, four or five in number, are bluish-white, marked with cinnamon.

American Museum of Natural History.

YELLOW WARBLER (DENDROICA AESTIVA). Also called Wild Canary or Yellow Bird. *Length:* 5 inches. *Range:* North America.

In the summer the bright greenish-yellow coat of this warbler is commonly seen about houses and shrubbery.

WEAVER BIRDS

CARRYING huge quantities of grass to a branch of the camel-thorn or mimosa tree, the weaver birds construct an umbrella-shaped mass, resembling a miniature haystack, which they regard as a community apartment house. The construction is almost solid, but the undersurface is honeycombed with little holes having no communication with one another. These are used not only for incubating the weaver bird's eggs but also for shelter against the wind and rain. Each nest is warmly lined with feathers. Twenty or more of these sociable, scaly-brown, red-necked birds gather together in the nesting season to build the common habitation.

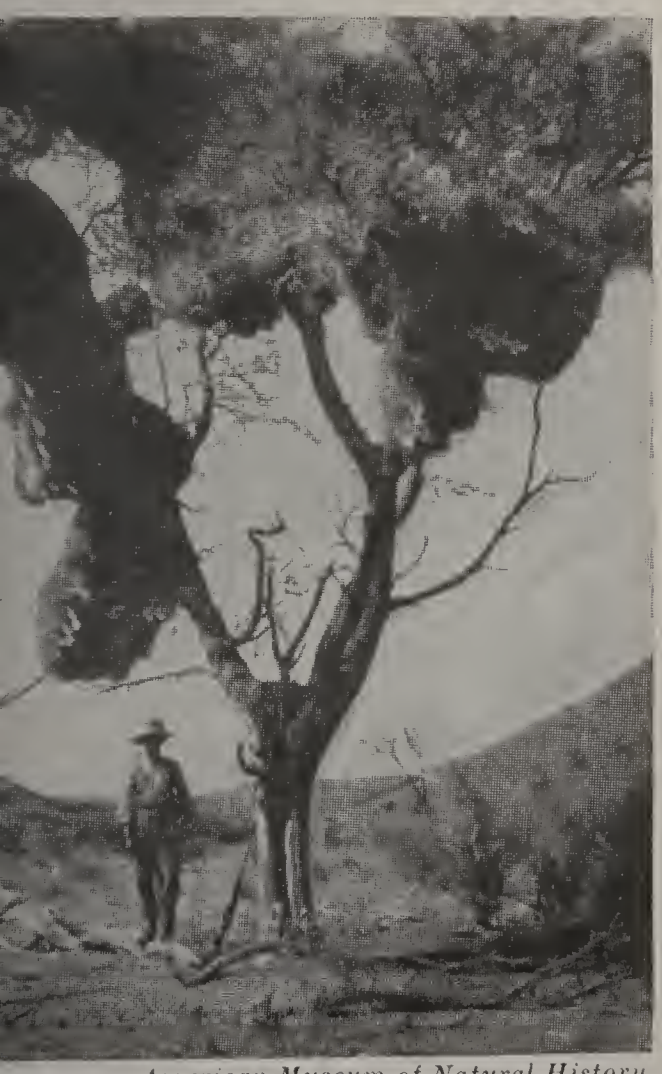
Every year the "haystacks" are added to until there is no more room on the limb, or until the tree gives way beneath the weight. The young birds set to work on nests of their own in bushes near the parental home. Three or four eggs are laid.

The cocks of this species are not always as congenial as their nesting habits would indicate. They are extremely pugnacious and often fight one another to the point of exhaustion. When the weaver birds are not occupied with such domestic concerns, they fly about in great flocks in search of grass seeds, berries and beetles.

New York Zoological Society.

RED-NECKED WEAVER BIRD (PLOCEUS CUCULATUS). *Length:* 5 inches. *Range:* Africa.

Weaver birds are rated among the best architects of birddom. Their intricate nests reveal unusual skill and intelligence.



American Museum of Natural History.

NEST OF WEAVER BIRD (PHILETAERUS SOCIUS). *Range:* Africa.

Several hundred birds combine to build a gigantic grass structure. This is made up of individual rainproof compartments or nests.

SPARROWS

THE ENGLISH sparrow was introduced into North America and the British West Indies in 1851, on the supposition that it would destroy potato bugs, as well as various insects harmful to trees. Its sponsor claimed that it was successful in this, but very soon its belligerent habits drove away other birds which had previously eaten the tree caterpillars. When left alone, the tree caterpillars became more destructive than the insects eaten by the sparrows.

In the horse and buggy era, the sparrows prospered and multiplied exceedingly, finding a ready food supply in undigested seeds. "If," say old New Yorkers, "you never saw a bevy of sparrows twittering on the cobblestones of Canal Street, you have not lived."

In the country, however, they continue to eat corn, vegetables and fruit, and generally to victimize the farmer. These pugnacious little birds drive other birds away and steal their eggs. In large numbers they assault species three or more times their size, particularly robins. Where they are fewer in numbers, they drive other birds away by the "psychological" method of following them around. The victim soon seems to succumb to a persecution complex, imagines himself pursued by the secret police, and leaves the neighborhood. English sparrows have been characterized as "disreputable," "pernicious" and "murderous." They are in short, public enemy number one of the bird world.

Sparrows fight even among themselves. In the mating season three or four males vie for the affections of a female, and it is the most vocal and most warlike who wins her.

The grass and straw nest, lined with feathers, is untidy, filthy and often teeming with vermin. Sometimes it is balanced on the limb of a tree, and then it is large and dome-shaped with the entrance on one side. When it is placed in a hollow tree or a hole in some building, it is much smaller. In their search for nest lining, sparrows have been known to snatch hair from live dogs. Sparrows often steal from one another. One naturalist tells how a female stole a goose feather, much prized by these birds, from a next-door neighbor's nest. Their eggs number four to nine and require two weeks for incubation. Two or three broods are raised yearly.

American Museum of Natural History.

MALE ENGLISH SPARROW (PASSER DOMESTICUS). *Length:* 6 inches. *Range:* Cosmopolitan in temperate climates.

This bird destroys grain and fruit and drives away other birds. It was introduced into North America in 1851 to combat an insect pest—the potato bug.

American Museum of Natural History.

BLUEBIRD (SIALIA SIALIS). *Length:* 7 inches. *Range:* Northeastern North America.

This harbinger of spring is one of the best-liked birds. It nests in tree holes but is sometimes driven out by the imported English sparrow.

BLACKBIRDS

FLYING silently with the precision of a winged army, flocks of as many as several thousand red-winged blackbirds make their way north or south depending on whether it be spring or autumn. When they turn or swoop, the entire flock executes the maneuver at the same instant.

When these birds feed on the ground, those at the rear, when they have exhausted their portion of insects or grain, take wing and fly in a great whirr over the heads of their companions to alight ahead of them. This process is in turn continued by the new rear guard until the flock has advanced to a wood or other barrier. Then all take wing at once and fly to the next field.

These birds nest in swamps, mating in April and May. The jet black males pursue the females or perch before them, raising their wings and bowing in such a manner as best to set off their brilliant red epaulettes. At the same time they utter their note, *kong-quer-kee*.

The nests are situated on tussocks, on bushes at the border of a marsh, or simply in the grass. The materials used in its construction are various grasses and barks in a wet state. For lining fine grass tops and, if available, horsehair are used. It requires about one week for the nest to be built and to dry sufficiently for use. There may be hundreds of such nests in a single marsh. Each female lays from two to five eggs. Sometimes a male secures two or three mates, and all live happily in nests side by side. When the eggs hatch out, the marsh becomes alive with the young, who crawl about before they are able to fly. The chicks often fall into the water, but usually manage to get out again while their fathers perch on high trees and keep a lookout for intruders. The males are courageous enough to attack a bittern or even a hawk to defend their young.

These blackbirds are valuable to farmers for their destruction of caterpillars, canker-worms, weevils, beetles, grasshoppers and other insect pests. They are destructive, however, for their grain-eating habits, particularly in the West where they have been known to devour whole crops. A favorite dish of theirs is wild rice. The good they do is generally believed to outweigh the harm, and they are protected by law in almost all states.

American Museum of Natural History.

RED-WINGED BLACKBIRD (AGELAIUS PHOENICEUS). Also called Swamp Blackbird. *Length:* 9½ inches. *Range:* Eastern North America.

In late April these birds return to the same places they have occupied for years. July finds them in the marshes eating wild rice.

American Museum of Natural History.

PURPLE GRACKLE (QUISCALUS QUISCULA). *Length:* I foot. *Range:* Eastern North America throughout coastal region.

Grackles prey upon the eggs of small birds such as robins, thrushes and bluebirds. This bird's metallic coloring is very attractive.

ORIOLES

In spring Baltimore orioles fly northward in high, continuous flight, first the males, and a few days later, the females. The period of courtship begins at once. The male sits on a limb near his chosen mate, raises himself to his full height, spreads his tail and partly raises his wings to display his orange breast and black front. Then he bows to let the black, white and orange of his upper plumage shine in the sun, uttering meanwhile his sweetest, most supplicating notes. His methods must be effective, for orioles are believed to mate for life.

Orioles most often make their homes by the roadside, near houses, or at the edge of fields, seldom taking to the woods. They prefer elm trees for nesting. The female builds the nest while the male spends his time whistling.

The nest is a neatly-woven purse-shaped structure of vegetable fibre, suspended from a bough at an elevation of from ten to ninety feet. Usually it is open at the top, but sometimes it is covered over with leaves, and then the opening is at one side. The inside is lined with moss, plant down or rags and other materials of human origin. In choosing the latter, the oriole rejects bright-colored objects, showing a preference for gray and white. While weaving the outer frame of her nest, the female often suspends herself head downward.

Orioles return year after year to the same nesting site, sometimes repairing their old nests or taking material from them for use in constructing a new one. In the South they build on the north side of a tree; in the cooler regions on the sunny side.

Baltimore orioles are highly effective insect destroyers, killing many more than they eat. Among their chief victims are moths, caterpillars of all sorts, beetles and their eggs. Their worst habit from the human point of view is puncturing grapes and drinking the juice, and for this reason they are mercilessly hunted in grape-growing regions. They also eat figs, strawberries and cherries.

American Museum of Natural History.

BALTIMORE ORIOLES (ICTERUS GALBULA). *Length:* 7½ inches. *Range:* North America.

While the female weaves the hanging cradle-like nest, the male bird seems content to fly about displaying his beautiful colors. American orioles are not related to the European species.

American Museum of Natural History.

CARDINAL (CARDINALIS CARDINALIS). *Length:* 8 inches. *Range:* Eastern North America.

This black-faced finch is familiar to many as the "red bird." Its brilliant cardinal red provides the fields and woodlands with startling patches of moving color.

Ralph De Sola, Federal Writers' Project.

CONFERENCE. The Board of Directors of the *Society of Stuffed Birds*, as caught by the candid-camera, decide that bird stuffers and not birds should be stuffed. Chairman McCaw (rear center) now offers a resolution to petition humans to stop imitating parrots. Director Toucan (perched at his right) nods assent. Miss Amazon Parrot (at McCaw's left) looks pleased while her brother, Mr. African Gray (standing in front), adds his vote in the affirmative.

INDEX

INDEX

MAP OF THE WORLD

BIRDS OF THE WORLD

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26 M