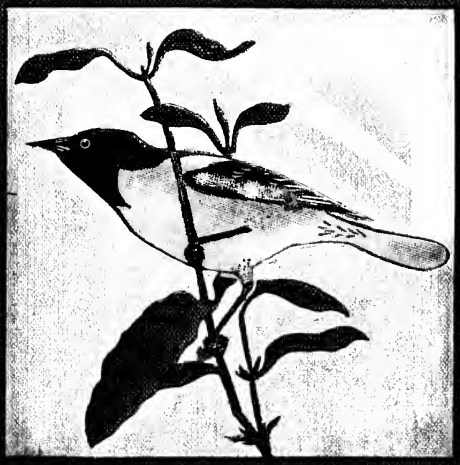
BIRD-LIFE



FRANK·M·CHAPMAN

BIRD-LIFE

Edition in Colors

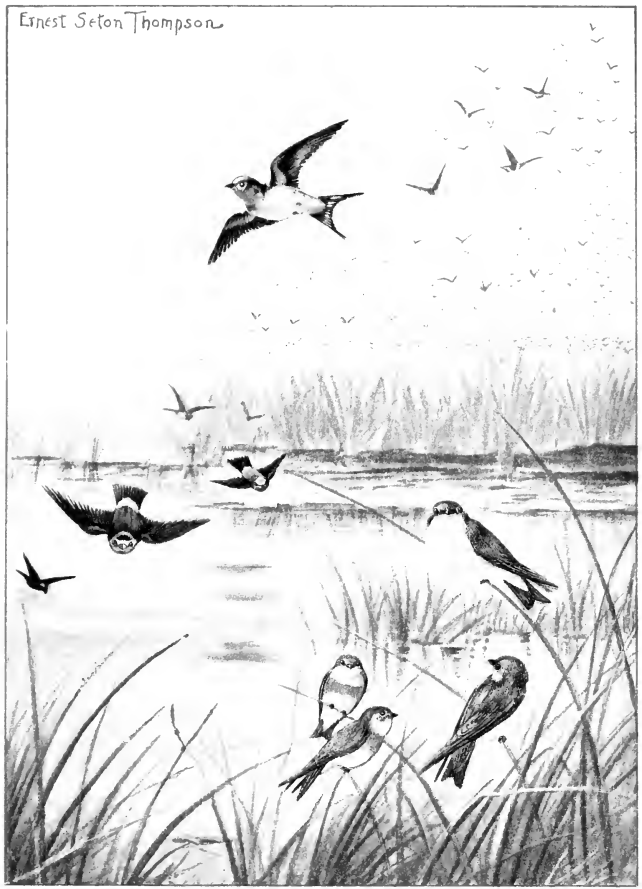


PLATE I. PAGE 156.

BARN SWALLOW.
CLIFF SWALLOW. TREE SWALLOW
BANK SWALLOW.

A GUIDE TO THE STUDY OF OUR COMMON BIRDS

ASSISTANT CURATOR OF THE DEPARTMENT OF MAMMALOGY AND ORNITHOLOGY IN THE AMERICAN MUSEUM OF NATURAL HISTORY; MEMBER OF THE AMERICAN ORNITHOLOGISTS' UNION; AUTHOR OF HANDBOOK OF BIRDS OF EASTERN NORTH AMERICA, ETC.

ILLUSTRATED BY

ERNEST SETON THOMPSON

AUTHOR OF ART ANATOMY OF ANIMALS, THE BIRDS OF MANITOBA, ETC.

WITH SEVENTY-FIVE FULL-PAGE PLATES IN COLORS

NEW YORK
D. APPLETON AND COMPANY
1898

TO

DR. J. A. ALLEN

THIS BOOK IS DEDICATED

AS A TOKEN OF RESPECT AND AFFECTION

FROM ONE WHO

FOR NINE YEARS HAS WORKED AT HIS SIDE.

PREFACE TO THE EDITION IN COLORS.

WITHOUT question, the simplest and most certain way in which to learn to know our birds is by examination of the birds themselves. Not every one, however, has access to an ornithological collection, and failing this, the best substitute for the bird is a colored plate which will accurately represent every shade and tint of its plumage. The widespread demand for a work containing illustrations of this nature is undoubted, but publishers have previously hesitated to expend the large sum necessary to produce satisfactorily colored plates, or have employed the cheap color processes with results far from successful.

The high praise which has been accorded the illustrations in the uncolored edition of Bird-Life is an assurance that bird lovers will therefore doubly welcome a work in which our birds are truthfully portrayed, not only in natural attitudes, but in natural colors as well. Photographic bromide copies of the original drawings for Bird-Life have been carefully colored by an expert colorist under the author's supervision, and are here reproduced by a lithographic process which insures absolute accuracy.

F. M. C.

AMERICAN MUSEUM OF NATURAL HISTORY,
NEW YORK CITY, *October 1, 1897.*

PREFACE.

How unusual it is to meet any one who can correctly name a dozen of our birds! One may live in the country and still know only two or three of the one hundred and fifty or more kinds of birds that may be found during the year. Nevertheless, these gay, restless creatures, both by voice and action, constantly invite our attention, and they are far too interesting and beautiful to be ignored. No one to whom Nature appeals should be without some knowledge of these, the most attractive of her animate forms.

The scientific results to be derived from the study of birds are fully realized by the naturalist. But there are other results equally important. I would have every one know of them: results that add to our pleasure in field and wood, and give fresh interest to walks that before were eventless; that quicken both ear and eye, making us hear and see where before we were deaf and blind. Then, to our surprise, we shall discover that the forests and pastures we have known all our lives are tenanted by countless feathered inhabitants whose companionship will prove a source of endless enjoyment.

I would enter a special plea for the study of birds in the schools; for the more general introduction of ornithology in natural-history courses. Frogs and crayfish serve an excellent purpose, but we may not encounter either of them after leaving the laboratory; whereas birds not only offer excellent opportunities for

study, but are always about us, and even a slight familiarity with them will be of value long after school days are over.

Popular interest must precede the desire for purely technical knowledge. The following pages are not addressed to past masters in ornithology, but to those who desire a general knowledge of bird-life and some acquaintance with our commoner birds. The opening chapters of this book briefly define the bird, its place in Nature and its relation to man, and outline the leading facts in its life-history. The concluding chapters present the portraits, names, and addresses of upward of one hundred familiar birds of eastern North America, with such information concerning their comings and goings as will lead, I trust, to their being found at home.

After this introduction the student may be left on the threshold, with the assurance that his entrance to the innermost circles of bird-life depends entirely on his own patience and enthusiasm.

FRANK M. CHAPMAN.

AMERICAN MUSEUM OF NATURAL HISTORY,
NEW YORK CITY, *January, 1897.*

CONTENTS.

LIST OF ILLUSTRATIONS.

FULL-PAGE PLATES.

Figures in the Text.

BIRD-LIFE.

CHAPTER I.

THE BIRD: ITS PLACE IN NATURE AND RELATION TO MAN.

*The Bird's Place in Nature.**—About thirteen thousand species of birds are known to science. The structure of many of these has been carefully studied, and all have been classified, at least provisionally. Taken as a whole, the class Aves, in which all birds are placed, is more clearly defined than any other group of the higher animals. That is, the most unlike birds are more closely allied than are the extremes among mammals, fishes, or reptiles, and all living birds possess the distinctive characters of their class.

When compared with other animals, birds are found to occupy second place in the scale of life. They stand between mammals and reptiles, and are more closely related to the latter than to the former. In fact, certain extinct birds so clearly connect living birds with reptiles, that these two classes are sometimes placed in one group—the Sauropsida.

* On the structure of birds read Coues's Key to North American Birds, Part II (Estes & Lauriat): Headley, The Structure and Life of Birds; Newton's Dictionary of Birds—articles, Anatomy of Birds and Fossil Birds; Martin and Moale's Handbook of Vertebrate Dissection, Part II, How to Dissect a Bird; Shufeldt's Myology of the Raven (Macmillan Co.).

The characters that distinguish birds from mammals on the one hand, and from reptiles on the other, are more apparent than real. Thus flight, the most striking of a bird's gifts, is shared by bats among mammals. Egg-laying is the habit of most reptiles and of three mammals (the Australian duckbill and the echidnas). But incubation by one or both of the parents is peculiar to birds, though the python is said to coil on its eggs.

Birds breathe more rapidly than either mammals or reptiles, and their pneumaticity, or power of inflating numerous air-sacs and even certain bones, is unique.

The temperature of birds ranges from 100° to 112°, while in mammals it reaches 98° to 100°, and in the comparatively cold-blooded reptiles it averages only 40°.

The skull in mammals articulates with the last vertebra (atlas) by two condyles or balls; in birds and reptiles by only one. In mammals and birds the heart has four chambers; in reptiles it has but three.

Mammals and reptiles both have teeth, a character possessed by no existing bird; but fossil birds apparently prove that early in the development of the class all birds had teeth.

Thus we might continue the comparison, finding that birds have no universal peculiarities of structure which are not present in some degree in either mammals or reptiles, until we come to their external covering. The reptile is scaled, and so is the fish; the mammal is haired, and so are some insects; but birds alone possess feathers. They are worn by every bird—a fit clothing for a body which is a marvelous combination of beauty, lightness, and strength.

There is good evidence for the belief that birds have descended from reptilian ancestors. This evidence consists of the remains of fossil birds, some of which show marked reptilian characters and, as just said, are toothed.

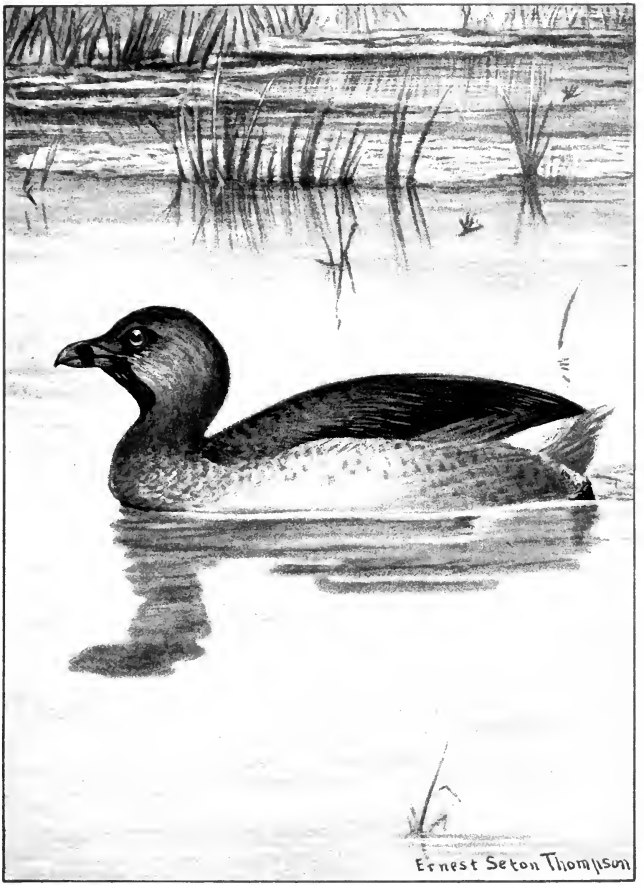


PLATE II. PAGE 84.

PIED-BILLED GREBE.

Length, 13·50 inches. *Summer plumage*, upper parts blackish brown; throat and spot on bill black; fore neck brownish, rest of under parts grayish white. *Winter plumage*, similar, but without black on throat or bill.

It is unnecessary to discuss here the relationships of the birdlike reptiles, but, as the most convincing argument in support of the theory of the reptilian descent of birds, I present a restoration of the Archæopteryx, the earliest known progenitor of the class Aves. This restoration is

FIG. 1.—Restoration of the Archæopteryx, a toothed, reptilelike bird of the Jurassic period. (About 1/5 natural size.)

based on an examination of previous restorations in connection with a study of the excellent plates which have been published of the fossils themselves.* Two specimens have been discovered; one being now in the British Museum, the other in the Berlin Museum. They were both found in the lithographic slates of Solenhofen, in Bavaria, a formation of the Jurassic period, and, together, furnish the more important details of the structure of this reptilelike bird.

This restoration, therefore, while doubtless inaccurate

* For recent papers on the Archæopteryx see Natural Science (Macmillan Co.), vols. v–viii.

in minor points, is still near enough to the truth to give a correct idea of this extraordinary bird's appearance.

The Archæopteryx was about the size of a Crow. Its long, feathered tail is supposed to have acted as an aëroplane, assisting in the support of the bird while it was in the air, but its power of flight was doubtless limited. It was arboreal and probably never descended to the earth, but climbed about the branches of trees, using its large, hooked fingers in passing from limb to limb.

The wanderings of this almost quadrupedal creature must necessarily have been limited, but its winged descendants of to-day are more generally distributed than are any other animals.* They roam the earth from pole to pole; they are equally at home on a wave-washed coral reef or in an arid desert, amid arctic snows or in the shades of a tropical forest. This is due not alone to their powers of flight but to their adaptability to varying conditions of life. Although, as I have said, birds are more closely related among themselves than are the members of either of the other higher groups of animals, and all birds agree in possessing the more important distinguishing characters of their class, yet they show a wide range of variation in structure.

This, in most instances, is closely related to habits,

* On the distribution of animals read Allen, The Geographical Distribution of North American Mammals, Bulletin of the American Museum of Natural History, New York city, iv, 1892, pp. 199–244; four maps. Allen, The Geographical Origin and Distribution of North American Birds considered in Relation to Faunal Areas of North America, The Auk (New York city), x, 1893, pp. 97–150; two maps. Merriam, The Geographic Distribution of Life in North America, with Special Reference to Mammalia, Proceedings of the Biological Society of Washington, vii, 1892, pp. 1–64; one map. Merriam, Laws of Temperature Control of the Geographic Distribution of Terrestrial Animals and Plants, National Geographic Magazine (Washington), vi, 1894, pp. 229–238; three maps.

which in birds are doubtless more varied than in any of the other higher animals. Some birds, like Penguins, are so aquatic that they are practically helpless on land. Their wings are too small to support them in the air, but they fly under water with great rapidity, and might be termed feathered porpoises. Others, like the Ostrich, are terrestrial, and can neither fly nor swim. Others still, like the Frigate Birds, are aërial. Their small feet are of use only in perching, and their home is in the air.

If now we should compare specimens of Penguins, Ostriches, and Frigate-birds with each other, and with such widely different forms as Hummingbirds, Woodpeckers, Parrots, and others, we would realize still more clearly the remarkable amount of variation shown by birds. This great difference in form is accompanied by a corresponding variation in habit, making possible, as before remarked, the wide distribution of birds, which, together with their size and abundance, renders them of incalculable importance to man. Their economic value, however, may be more properly spoken of under

The Relation of Birds to Man.—The relation of birds to man is threefold—the scientific, the economic, and the æsthetic. No animals form more profitable subjects for the scientist than birds. The embryologist, the morphologist, and the systematist, the philosophic naturalist and the psychologist, all may find in them exhaustless material for study. It is not my purpose, however, to speak here of the science of ornithology. Let us learn something of the bird in its haunts before taking it to the laboratory. The living bird can not fail to attract us; the dead bird—voiceless, motionless—we will leave for future dissection.

The economic value of birds to man lies in the service they render in preventing the undue increase of insects,

in devouring small rodents, in destroying the seeds of harmful plants, and in acting as scavengers.

Leading entomologists estimate that insects cause an annual loss of at least two hundred million dollars to the agricultural interests of the United States. The statement seems incredible, but is based upon reliable statistics. This, of course, does not include the damage done to ornamental shrubbery, shade and forest trees. But if insects are the natural enemies of vegetation, birds are the natural enemies of insects. Consider for a moment what the birds are doing for us any summer day, when insects are so abundant that the hum of their united voices becomes an almost inherent part of the atmosphere.

In the air Swallows and Swifts are coursing rapidly to and fro, ever in pursuit of the insects which constitute their sole food. When they retire, the Nighthawks and Whip-poor-wills will take up the chase, catching moths and other nocturnal insects which would escape day-flying birds. The Flycatchers lie in wait, darting from ambush at passing prey, and with a suggestive click of the bill returning to their post. The Warblers, light, active creatures, flutter about the terminal foliage, and with almost the skill of a Hummingbird pick insects from leaf or blossom. The Vireos patiently explore the under sides of leaves and odd nooks and corners to see that no skulker escapes. The Woodpeckers, Nuthatches, and Creepers attend to the tree trunks and limbs, examining carefully each inch of bark for insects' eggs and larvæ, or excavating for the ants and borers they hear at work within. On the ground the hunt is continued by the Thrushes, Sparrows, and other birds, who feed upon the innumerable forms of terrestrial insects. Few places in which insects exist are neglected; even some species which pass their earlier stages or entire lives in the water are preyed upon by aquatic birds.

PLATE III. PAGE 85.

LOON.

Length, 32·00 inches. *Summer plumage*, upper parts and fore neck black and white; breast and belly white. *Winter plumage*, upper parts dark grayish; under parts white

Birds digest their food so rapidly, that it is difficult to estimate from the contents of a bird's stomach at a given time how much it eats during the day. The stomach of a Yellow-billed Cuckoo, shot at six o'clock in the morning, contained the partially digested remains of forty-three tent caterpillars, but how many it would have eaten before night no one can say.

Mr. E. H. Forbush, Ornithologist of the Board of Agriculture of Massachusetts, states that the stomachs of four Chickadees contained one thousand and twenty-eight eggs of the cankerworm. The stomachs of four other birds of the same species contained about six hundred eggs and one hundred and five female moths of the cankerworm. The average number of eggs found in twenty of these moths was one hundred and eighty-five; and as it is estimated that a Chickadee may eat thirty female cankerworm moths per day during the twenty-five days which these moths crawl up trees, it follows that in this period each Chickadee would destroy one hundred and thirty-eight thousand seven hundred and fifty eggs of this noxious insect.

Professor Forbes, Director of the Illinois State Laboratory of Natural History, found one hundred and seventy-five larvæ of *Bibio*—a fly which in the larval stage feeds on the roots of grass—in the stomach of a single Robin, and the intestine contained probably as many more.

Many additional cases could be cited, showing the intimate relation of birds to insect-life, and emphasizing the necessity of protecting and encouraging these little-appreciated allies of the agriculturist.

The service rendered man by birds in killing the small rodents so destructive to crops is performed by Hawks and Owls—birds the uninformed farmer considers his enemies. The truth is that, with two excep-

tions, the Sharp-shinned and Cooper's Hawk, all our commoner Hawks and Owls are beneficial. In his exhaustive study of the foods of these birds Dr. A. K. Fisher, Assistant Ornithologist of the United States Department of Agriculture, has found that ninety per cent of the food of the Red-shouldered Hawk, commonly called "Chicken Hawk" or "Hen Hawk," consists of injurious mammals and insects, while two hundred castings of the Barn Owl contained the skulls of four hundred and fifty-four small mammals, no less than two hundred and twenty-five of these being skulls of the destructive field or meadow mouse.

Still, these birds are not only not protected, but in some States a price is actually set upon their heads! Dr. C. Hart Merriam, Ornithologist and Mammalogist of the United States Department of Agriculture, has estimated that in offering a bounty on Hawks and Owls, which resulted in the killing of over one hundred thousand of these birds, the State of Pennsylvania sustained a loss of nearly four million dollars in one year and a half!

As destroyers of the seeds of harmful plants, the good done by birds can not be overestimated. From late fall to early spring, seeds form the only food of many birds, and every keeper of cage-birds can realize how many a bird may eat in a day. Thus, while the Chickadees, Nuthatches, Woodpeckers, and some other winter birds are ridding the trees of myriads of insects' eggs and larvæ, the granivorous birds are reaping a crop of seeds which, if left to germinate, would cause a heavy loss to our agricultural interests.

As scavengers we understand that certain birds are of value to us, and therefore we protect them. Thus the Vultures or Buzzards of the South are protected both by law and public sentiment, and as a result they are not only exceedingly abundant, but remarkably tame. But

we do not realize that Gulls and some other water birds are also beneficial as scavengers in eating refuse which, if left floating on the water, would often be cast ashore to decay. Dr. George F. Gaumer, of Yucatan, tells me that the killing of immense numbers of Herons and other littoral birds in Yucatan has been followed by an increase in human mortality among the inhabitants of the coast, which he is assured is a direct result of the destruction of birds that formerly assisted in keeping the beaches and bayous free from decaying animal matter.

Lack of space forbids an adequate treatment of this subject, but reference to the works and papers mentioned below* will support the statement that, if we were deprived of the services of birds, the earth would soon become uninhabitable.

Nevertheless, the feathered protectors of our farms and gardens, plains and forests, require so little encouragement from us—indeed, ask only tolerance—that we accept their services much as we do the air we breathe. We may be in debt to them past reckoning, and still be unaware of their existence.

But to appreciate the beauty of form and plumage of

* Notes on the Nature of the Food of the Birds of Nebraska, by S. Aughey; First Annual Report of the United States Entomological Commission for the Year 1877, Appendix ii, pp. 13–62. The Food of Birds, by S. A. Forbes; Bulletin No. 3, Illinois State Laboratory of Natural History, 1880, pp. 80–148. The Regulative Action of Birds upon Insect Oscillations, by S. A. Forbes, ibid., Bulletin No. 6, 1883, pp. 3–32. Economic Relations of Wisconsin Birds, by F. H. King; Wisconsin Geological Survey, vol. i, 1882, pp. 441–610. Report on the Birds of Pennsylvania, with Special Reference to the Food Habits, based on over Four Thousand Stomach Examinations, by B. H. Warren; Harrisburg, E. K. Meyers, State Printer, large 8vo, pp. 434, plates 100. The English Sparrow in North America, especially in its Relation to Agriculture, prepared under the Direction of C. Hart Merriam, by Walter B. Barrows; Bulletin No. 1, Division of Economic Ornithology and Mammalogy of the United States Department of Agricul-

birds, their grace of motion and musical powers, we must know them. Then, too, we will be attracted by their high mental development, or what I have elsewhere spoken of as "their human attributes. Man exhibits hardly a trait which he will not find reflected in the life of a bird. Love, hate; courage, fear; anger, pleasure; vanity, modesty; virtue, vice; constancy, fickleness; generosity, selfishness; wit, curiosity, memory, reason—we may find them all exhibited in the lives of birds. Birds have thus become symbolic of certain human characteristics, and the more common species are so interwoven in our art and literature that by name at least they are known to all of us."

The sight of a bird or the sound of its voice is at all times an event of such significance to me, a source of such unfailing pleasure, that when I go afield with those to whom birds are strangers, I am deeply impressed by the comparative barrenness of their world, for they live in ignorance of the great store of enjoyment which might be theirs for the asking.

I count each day memorable that brought me a new friend among the birds. It was an event to be recorded in detail. A creature which, up to that moment, existed

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ture, 1889. The Hawks and Owls of the United States in their Relation to Agriculture, prepared under the Direction of C. Hart Merriam, by A. K. Fisher; Bulletin No. 3, ibid., 1893. The Common Crow of the United States, by Walter B. Barrows and E. A. Schwarz; Bulletin No. 6, ibid., 1895. Preliminary Report on the Food of Woodpeckers, by F. E. L. Beal; Bulletin No. 7, ibid., 1895. (See also other papers on the food of birds in the Annual Report and Yearbook of the United States Department of Agriculture.) Birds as Protectors of Orchards, by E. H. Forbush; Bulletin No. 3, Massachusetts State Board of Agriculture, 1895, pp. 20–32. The Crow in Massachusetts, by E. H. Forbush; Bulletin No. 4, ibid., 1896. How Birds affect the Farm and Garden, by Florence A. Merriam; reprinted from "Forest and Stream," 1896, 16mo, pp. 31. Price, 5 cents.

for me only as a name, now became an inhabitant of my woods, a part of my life. With what a new interest I got down my books again, eagerly reading every item concerning this new friend; its travels, habits, and notes; comparing the observations of others with what were now my own!

The study of birds is not restricted to any special season. Some species are always with us. Long after the leaves have fallen and the fields are bare and brown, when insect voices are hushed, and even some mammals are sleeping their winter sleep, the cheery Juncos flit about our doorstep, the White-throats twitter cozily from the evergreens, Tree Sparrows chatter gayly over their breakfast of seeds, and Crows are calling from the woods. Birds are the only living creatures to be seen; what a sense of companionship their presence gives; how desolate the earth would seem without them!

The ease with which we may become familiar with these feathered neighbors of ours robs ignorance of all excuses. Once aware of their existence, and we shall see a bird in every bush and find the heavens their pathway. One moment we may admire their beauty of plumage, the next marvel at the ease and grace with which they dash by us or circle high overhead.

But birds will appeal to us most strongly through their songs. When your ears are attuned to the music of birds, your world will be transformed. Birds' songs are the most eloquent of Nature's voices: the gay carol of the Grosbeak in the morning, the dreamy, midday call of the Pewee, the vesper hymn of the Thrush, the clanging of Geese in the springtime, the farewell of the Bluebird in the fall—how clearly each one expresses the sentiment of the hour or season!

Having learned a bird's language, you experience an increased feeling of comradeship with it. You may even

share its emotions as you learn the significance of its notes. No one can listen to the song of the Mockingbird without being in some way affected; but in how many hearts does the *tink* of the night-flying Bobolink find a response? I never hear it without wishing the brave little traveler Godspeed on his long journey.

As time passes you will find that the songs of birds bring a constantly increasing pleasure. This is the result of association. The places and people that make our world are ever changing; the present slips from us with growing rapidity, but the birds are ever with us.

The Robin singing so cheerily outside my window sings not for himself alone, but for hundreds of Robins I have known at other times and places. His song recalls a March evening, warm with the promise of spring; May mornings, when all the world seemed to ring with the voices of birds; June days, when cherries were ripening; the winter sunlit forests of Florida, and even the snow-capped summit of glorious Popocatepetl. And so it is with other birds. We may, it is true, have known them for years, but they have not changed, and their familiar notes and appearance encourage the pleasant self-delusion that we too are the same.

The slender saplings of earlier years now give wide-spreading shade, the scrubby pasture lot has become a dense woodland. Boyhood's friends are boys no longer, and, worst of all, there has appeared another generation of boys whose presence is discouraging proof that for us youth has past. Then some May morning we hear the Wood Thrush sing. Has he, too, changed? Not one note, and as his silvery voice rings through the woods we are young again. No fountain of youth could be more potent. A hundred incidents of the long ago become as real as those of yesterday. And here we have the secret of youth in age which every venerable natural-

ist I have ever met has convincingly illustrated. I could name nearly a dozen, living and dead, whom it has been my valued privilege to know. All had passed the allotted threescore and ten, and some were over fourscore. The friends and associates of their earlier days had passed away, and one might imagine that they had no interest in life and were simply waiting for the end.

But these veterans were old in years only. Their hearts were young. The earth was fair; plants still bloomed, and birds sang for them. There was no idle waiting here; the days were all too short. With what boyish ardor they told of some recent discovery; what inspiration there was in their enthusiasm!

So I say to you, if you would reap the purest pleasures of youth, manhood, and old age, go to the birds and through them be brought within the ennobling influences of Nature.

CHAPTER II.

THE LIVING BIRD.

Factors of Evolution.—If while in the fields we observe birds with an appreciative eye, we shall soon be impressed with the great diversity shown in their structure and habits. The Fish Hawk plunges from the air into the water and grasps its prey with merciless talons. The Hummingbird daintily probes a flower. The Woodpecker climbs an upright trunk, props itself with its stiff, pointed tail-feathers, while with its chisel-shaped bill it excavates a grub and then impales it with its spearlike tongue. These birds tell us a wonderful story

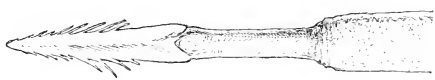


FIG. 2.—End of spearlike tongue of Pileated Woodpecker. (Much enlarged.)

of adaptation to the conditions of life, and, knowing that they have descended from a common ancestor, we ask, "Why do they now differ so widely from one another?" Biologists the world over are trying to satisfactorily answer this question, and it is impossible for me to even mention here all the theories which they have advanced. However, some knowledge of the most important ones is essential if you would study the relation between the bird and its haunts and habits. The Darwin-Wallace theory of Natural Selection, in more or less

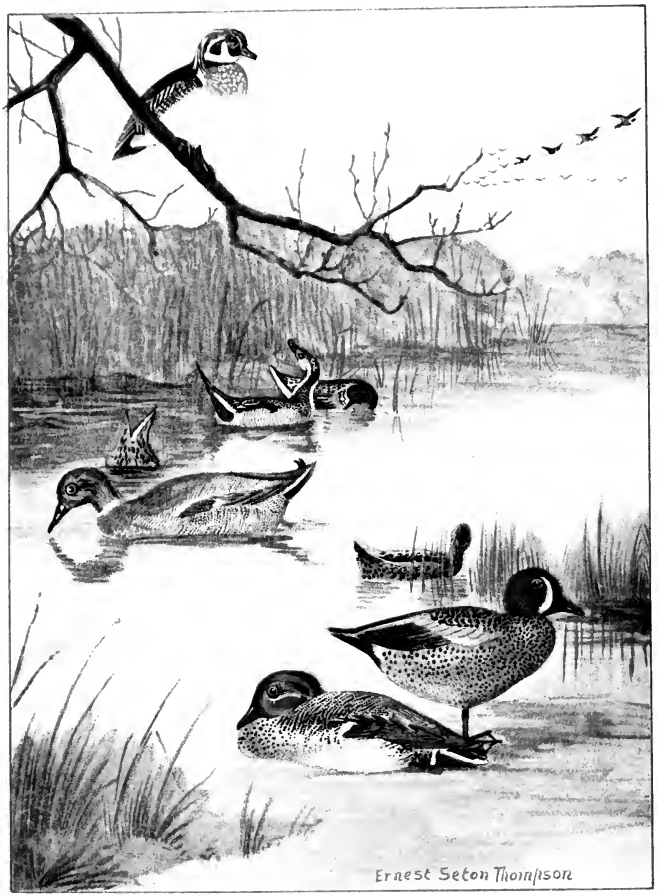


PLATE V. 4 5 PAGE 89.

1 WOOD DUCK.
2 PINTAIL.
3 MALLARD.
4 GREEN-WINGED TEAL.
5 BLUE-WINGED TEAL.
6 CANADA GEESE.

modified forms, is accepted by most naturalists. As originally presented, it assumed that the continued existence of any animal depended upon its adaptation to its manner of life. Among a large number of individuals there is much variation in size, form, and color. Some of these variations might prove favorable, others unfavorable. Those which were favorable would give to the individual possessing them an advantage over its fellows, and, by what is termed *Natural Selection*, it would be preserved and its favorable characters transmitted to its descendants. But the less fortunate individuals, which lacked the favorable variation, would be handicapped in the race for life and be less likely to survive.

Without necessarily opposing this theory, the followers of Darwin's predecessor, Lamarck, attach more importance to the direct action of environment on the animal—that is, the influence of climate, food, and habit. The effect of the first two I will speak of in treating of color; the last we may use to illustrate the difference in these two theories by asking the question, "Is habit due to structure, or is structure the result of habit?" Has Nature, acting through natural selection, preserved those variations which would best fit a bird to occupy its place in the world, and are its habits the outcome of the characters thus acquired, or have the changes which during the ages have occurred in a bird's home, forcing it to alter its habits, been followed by some consequent change in structure, the result of use or of disuse? For my part, I answer "Yes" to both questions, and turn to our stiff-tailed, spear-tongued Woodpecker to explain my reply. I can readily understand how the shape of these tail-feathers is the result of habit, for the same or similar structure exists among many birds having no close relationship to one another, but all of which agree in their peculiar use of the tail as a prop; the Creep-

ers, Woodhewers, and Swifts, even some Finches and the Bobolink, that use their tail to support them when perched on swaying reeds, have the feathers more or less pointed and stiffened. Furthermore, this is just the result we should expect from a habit of this kind. But

a *b*

FIG. 3.—Tip of tail of (*a*) Downy Woodpecker and of (*b*) Brown Creeper, to show the pointed shape in tails of creeping birds of different families. (Natural size.)

I do not understand how the Woodpecker's spear-tipped tongue could have resulted from the habit of impaling grubs, and in this case I should be inclined to regard structure as due to a natural selection which has preserved favorable variations in the form of this organ.

I have not space to discuss this subject more fully, but trust that enough has been said to so convince you of the significance of habit, that when you see a bird in the bush it will not seem a mere automaton, but in each movement will give you evidence of a nice adjustment to its surroundings. Remember, too, that evolution is a thing of the present as well as of the past. We may not be able to read the earlier pages in the history of a species, but the record of to-day is open to us if we can learn to interpret it.

This may be made clearer, and the importance of a study of habit be emphasized, if I briefly outline the relation between the wings, tail, feet, and bill of birds and the manner in which they are used. We are in the field, not in the dissecting room; our instrument is a field glass, not a scalpel, and in learning the functions of these four

organs we shall direct our attention to their external form rather than their internal structure.

The Wing.—Birds' wings are primarily organs of locomotion, but they are also used as weapons, as musical instruments, in expressing emotion, and they are some-

FIG. 4.—Young Hoatzin, showing use of hooked fingers in climbing. (After Lucas.)

times the seat of sexual adornment. As an organ of locomotion the wing's most primitve use is doubtless for climbing. Gallinules, for instance, have a small spur on the wrist or "bend of the wing," and the young birds use it to assist their progress among the reeds. A more striking instance of this nature is shown by that singular South American bird, the Hoatzin (*Opisthocomus cris-*

tatus). The *young* of this bird have well-developed claws on the thumb and first finger, and long before they can fly they use them as aids in clambering about the bushes, very much as we may imagine the Archæopteryx did. In the *adult* these claws are wanting.

Some eminently aquatic birds, as Grebes and Penguins, when on land, may use their wings as fore legs in scrambling awkwardly along; while some flightless birds, for example, the Ostrich, spread their wings when running.

But let us consider the wing in its true office, that of an organ of flight, showing its range of variation, and finally its degradation into a flightless organ. Among flying birds the spread wings measure in extent from about three inches in the smallest Hummingbird to twelve or fourteen feet in the Wandering Albatross. The relation between shape of wing and style of flight is so close that if you show an ornithologist a bird's wing he can generally tell you the character of its owner's flight. The extremes are shown by the short-winged ground birds,

FIG. 5.—Short, rounded wing and large foot of Little Black Rail, a terrestrial bird. (3/5 natural size.)

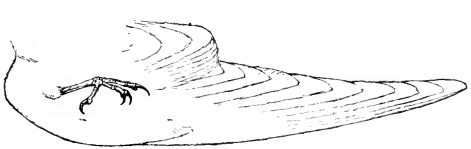


FIG. 6.—Long, pointed wing and small foot of Tree Swallow, an aërial bird. (3/5 natural size.)

such as Rail, Quail, Grouse, certain Sparrows, etc., and long-winged birds, like the Swallows and Albatrosses. There is here a close and, for the ground-inhabiting

PLATE VI.

LITTLE GREEN HERON.
(*Length, 17·00 inches.*)

PAGE 90.

BLACK-CROWNED NIGHT HERON.
(YOUNG AND ADULT.)
(*Length, 24·00 inches.*)

GREAT BLUE HERON.
(*Length, 45·00 inches.*)

birds, important relation between form and habit. Many terrestrial species rely on their dull, protective covering to escape observation, taking wing only when danger is so near that it is necessary for them to get under way at once. Consequently, Quail, Partridges, and Grouse, much to the amateur sportsman's discomfiture, spring from the ground as though thrown from a catapult, and reach their highest speed within a few yards of the starting point, while the Albatross is obliged to face the wind and run some distance over the ground or water before slowly lifting itself into the air. There, however, it can remain for hours or even days without once alighting.

The Frigate Bird, or Man-o'-War Bird, has a body scarcely larger than that of a chicken, but its tail is one foot and a half in length, and its wings measure seven to

FIG. 7.—Frigate Bird. (Expanse of wings, 7 to 8 feet.)

eight feet in extent. Having this enormous spread of sail, its flight is more easy and graceful than that of any living bird. I have seen hundreds of these birds floating in the air, facing the wind, without apparent change of position or the movement of a pinion, for long intervals of time.

From this extreme development of the wing as a flight-organ, let us turn to those birds who have not the power of flight. The Ostrich, Rhea, Emu, and Cassowary are familar representatives of this group. It is generally believed that these birds have lost the power

of flight, and that as their wings, through disuse, became functionless, their running powers correspondingly increased. This, however, is theory, but there are birds which have become flightless through some apparently known cause. They may be found among such widely separated families as Grebes, Auks, Ducks, Rails, Gallinules, Pigeons, and Parrots.

One of the characteristic water birds of our North Atlantic coasts is the Razor-billed Auk. It is a strictly aquatic species, nearly helpless on land, which, as a rule, it visits only when nesting. Its egg is laid in the crevice of a rocky cliff, frequently at some height from the sea. During the winter it migrates southward as far as Long Island. Flight is therefore a necessary faculty, and we find the bird with well-developed wings, which it uses effectively. We can, however, imagine conditions under which it would not be necessary for the Razor-bill to fly. It might become a permanent resident of isolated islands, laying its egg on accessible beaches. Already an expert diver, obtaining its food in the water, it would not be obliged to rise into the air, and, as a result of disuse, the wings would finally become too small to support it in aërial flight, though fully answering the purpose of oars.

Apparently this is what has happened in the case of the Razor-billed Auk's relative, the flightless, extinct Great Auk. The Razor-bill is sixteen inches long and its wing measures eight inches, while the Great Auk, with a length of thirty inches, has a wing only five and three fourths inches in length. Aside from this difference in measurements these birds closely resemble each other. So far as we are familiar with the Great Auk's habits, they agreed with those of the hypothetical case I have just mentioned, and we are warranted, I think, in assuming that the bird lost the power of flight through disuse of its wings.

In antarctic seas we find the arctic Auks replaced by the Penguins, a group in which all the members are flightless. They are possessed of remarkable aquatic

Fig. 8.—Great Auk, showing relatively small wing. (Length of bird, 30 inches; of wing, 5·75 inches.)

powers, and can, it is said, outswim even fish. They nest only on isolated islands, where they are not exposed to the attack of predaceous mammals.

Among Grebes and Ducks we have illustrations of the way in which swimming birds may become temporarily flightless. With most land-inhabiting birds flight is so important a faculty that any injury to the wings is apt to result fatally. It is necessary, therefore, that the power of flight shall not be impaired. Consequently, when molting, the wing-feathers are shed slowly and symmetrically, from the middle of the wing both inwardly and outwardly; the new feathers appear so quickly that at no time are there more than two or three quills missing from either wing. But the

aquatic Grebes and Ducks, protected by the nature of their haunts and habits, lose all their wing-feathers at once, and are flightless until their new plumage has grown.

It might then be supposed that permanently flightless forms would be found among the Grebes and Ducks. But these birds are generally migratory, or, if resident, they usually inhabit bodies of fresh water where local conditions or droughts may so affect the food supply that change of residence would become necessary. However, on Lake Titicaca, Peru, there actually is a Grebe which has lived there long enough to have lost the use of its wings as flight-organs.

Rails are such ground-lovers, and fly so little, that we should expect to find flightless forms among them when the surroundings were favorable for their development. In New Zealand, that island of so many flightless birds, the requirements are evidently fulfilled, and we have the flightless Wood Hens. Here, too, lives the flightless Gallinule, *Notornis*, and in this family of Gallinules, birds not unlike Coots, there are at least four flightless species inhabiting islands—one in the Moluccas, one in Samoa, one on Tristan d'Acunha, and one on Gough Island. The last two islands are about fifteen hundred miles from Cape Good Hope, and have evidently never been connected with a continent. There seems little reason to doubt, therefore, that the ancestors of the Gallinules now inhabiting these islands reached them by the use of their wings, and that these organs have since become too small and weak to support their owners in the air. Other cases might be cited; for instance, the Dodo of Mauritius among Pigeons, and the Kakapo (*Stringops*) of New Zealand among Parrots; but if the illustrations already given have not convinced you that disuse of the wings may result in loss of flight, let

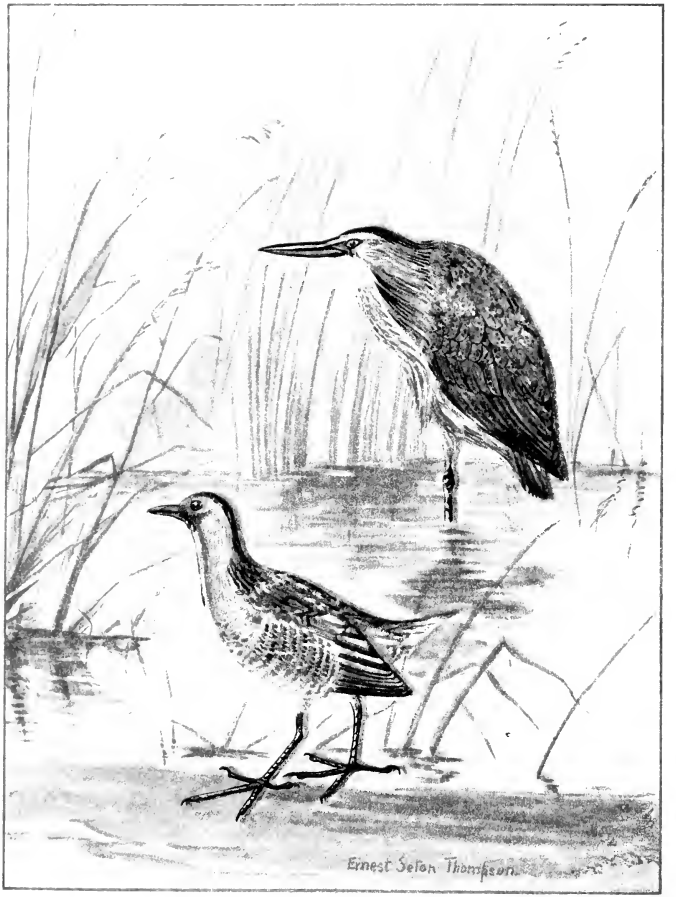


PLATE VII. PAGES 93, 94.

AMERICAN BITTERN.

Length, 28·00 inches. A black streak on neck; body brown and buff; primaries slate-color.

SORA.

Length, 8·50 inches. *Adult*, upper parts olive-brown, black, and white; throat and face black, breast slate, belly white, flanks black and white. *Young*, similar, but face, throat, and breast white, washed with brownish.

me take you finally to the poultry yard, where in the waddling Duck you will see an undeniable instance of degeneration.

As the seat of sexual characters the wing is sometimes most singularly developed or adorned. The males of the Argus Pheasant and Pennant-winged Nightjar have certain feathers enormously lengthened; the Standard-bearer has white plumes growing from the wing; and there are many other cases in which the wing presents sexual characters, not alone through display, but also by use as a musical organ. I do not refer to the whistling sound made by the wings of flying Doves or Ducks, or the humming of Hummingbirds, but to sounds voluntarily produced by birds, and evidently designed to answer the purpose of song.

A simple form of this kind of "music" is shown by the cock in clapping his wings before crowing, in the "drumming" of Grouse, or in the "booming" of Nighthawks, as with wings set they dive from a height earthward. The male Cassique (*Ostinops*) of South America, after giving voice to notes which sound like those produced by chafing trees in a gale, leans far forward, spreads and raises his large orange and black tail, then vigorously claps his wings together over his back, making a noise which so resembles the cracking of branches that one imagines the birds learned this singular performance during a gale.

The birds mentioned thus far have no especial wing structure beyond rather stiffened feathers; but in the Woodcock, some Paradise-birds and Flycatchers, Guans, Pipras, and other tropical birds, certain wing-feathers are singularly modified as musical instruments. Sometimes the outer primaries are so narrowed that little but the shaft or midrib is left, as in both sexes of the Woodcock, when the rapid wing-strokes are accompanied by a

high, whistling sound. In other cases the shafts of the wing-feathers may be much enlarged and horny, when the bird makes a singular snapping sound in flight.

Fig. 9.—Wing of Woodcock, showing three outer attenuate feathers. (1/2 natural size.)

If you recall the supplicating manner of a young bird as with gently fluttering wings it begs for food, you will recognize one of several ways in which the wings may express emotion. Birds also threaten with their wings, as any hen with chicks will testify, and from this

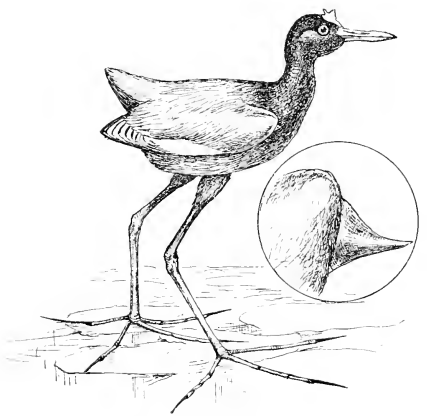


Fig. 10.—Jacana, showing spur on wing (natural size) and elongated toes (1/3 natural size).

gesture to the actual delivery of a blow is but a step. Swans, Pigeons, and Chickens can deal forcible blows with their wings. Screamers, Lapwings, and Jacanas

have formidable spurs on their wings, which they are supposed to use in combat.

The Tail.—Except when sexually developed, the shape of the tail is largely governed by the character of its owner's flight. Male Lyre-birds, Pheasants, Fowls, Hummingbirds, and many others furnish well-marked instances of the tail as a sexual character. Indeed, as the least important to the bird of the four external organs we are speaking of, the tail is more often sexually modified than any of the other three.

The main office of the tail, however, is mechanical, to act as a rudder in flight and a "balancer" when perching. Short-tailed birds generally fly in a straight course, and can not make sharp turns, while long-tailed birds can pursue a most erratic course, with marvelous ease and grace. The Grebes are practically tailless, and their flight is comparatively direct, but the Swallow-tailed Kite, with a tail a foot or more in length, can dash to right or left at the most abrupt angle.

Among tree-creeping birds, which always climb upward, the tail is used as a brace or prop. This character, as has been said, is possessed by all Woodpeckers, by the quite different Woodhewers of South America, the Brown Creepers of temperate regions, and other birds (see Figs. 3 and 4).

The two middle feathers in the tail of the Motmot, of the American tropics, end in a racket-shaped disk, the result of a unique habit. Similarly shaped feathers are found in the tails of some Hummingbirds and Old World Kingfishers, but in the Motmot this peculiar shape is due to a self-inflicted mutilation. The newly grown feathers, as shown in the accompanying figure, lack the terminal disk, but as soon as they are grown, the birds begin to pick at the barbs, and in a short time the shaft is denuded, in some species for the space of an inch, in others for as much as two inches.

This singular habit is practiced by numerous species of Motmots, ranging from Mexico to Brazil. It is therefore of undoubted age, and we can only speculate upon its use and origin. Young birds from the nest, reared

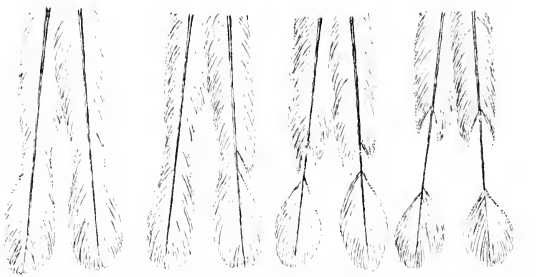


FIG. 11.—Central tail-feathers of Motmot (*Momotus subrufescens*), showing newly grown feathers (at the left) and results of self-inflicted mutilation.

in confinement where they were isolated from others of their kind, trimmed their tail-feathers soon after they were grown.*

The habit, therefore, is inherited, but the mutilation, although it has doubtless been practiced for countless generations, has not become inherent, unless we consider the constriction in the vane of the feather at the place where it is to be trimmed an indication of inheritance.

The Motmot gesticulates with its tail in a remarkable manner, swinging it from side to side, so that it suggests the pendulum of a clock, or sweeping it about in circles with a movement which reminds one of a bandmaster flourishing his baton. We shall find in other species, also, that the tail, more than any other organ, is used to express emotion. Recall its twitching and wagging; how it is nervously spread or "jetted," showing the white

* See Cherrie, The Auk (New York city), vol. ix, 1892, p. 322.

PLATE VIII. PAGE 94.

AMERICAN COOT.

Length, 15·00 inches. Head and neck blackish, body slate; under tail coverts, tips of secondaries, and end of bill white.

CLAPPER RAIL.

Length, 14·50 inches. Upper parts pale greenish olive and gray; throat white, breast pale cinnamon, flanks gray and white.

outer feathers, as in the Meadowlark. The tail may also be expressive of disposition. Compare the drooped tail of a pensive Flycatcher with the uptilted member of an inquisitive Wren.

But it is when displaying its beauties that a bird speaks most eloquently with its tail. Can anything exceed the pompous pride of a Turkey cock strutting in swollen glory, with tail stiffly spread? The Peacock erects his tail in a similar manner, but it is entirely concealed by the train of gorgeous feathers which it partially supports.

The Feet.—As the feet share with the wings the responsibilities of locomotion, there is often a close relation between these organs. For example, short-winged terrestrial species like Quails, Grouse, and Rails have well-developed feet, but such aërial creatures as Swifts and Swallows have exceedingly small feet (see Figs. 3 and 4). The aquatic Grebes and Divers are practically helpless on land, but the Ostrich can outrun the horse; while in the perching birds the foot is so specialized that by the auto-

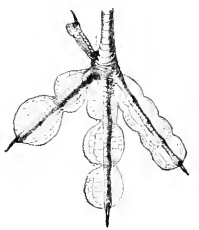


FIG. 12.—Lobed foot of a Coot, a swimming bird of the Rail family. (1/3 natural size.)

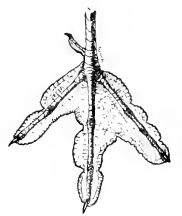


FIG. 13.—Lobed foot of a Phalarope, a swimming bird of the Snipe family. (Natural size.)

matic action of certain tendons the birds are locked to their perches while sleeping. A webbed foot implies ability to swim, and we find this character present in all the

water-loving Divers, Auks, Gulls, Cormorants, and Ducks. In the wading Herons and marsh-inhabiting Rails and Gallinules the web is absent, but it reappears in the form of lobes on the toes of the aquatic Coots of the same family.

Some shore-inhabiting Snipe have the bases of the toes united by webs, but the Phalaropes, of two species, have lobed toes not unlike those of the Coots, and are true swimming Snipe living on the sea for long periods.

Length of foot is largely dependent upon length of neck. This is illustrated by the Herons, and is particularly well shown by the long-necked Flamingo, which has a foot twelve inches long. Its toes are webbed, and it can wade in deep water and search for food on the bottom by immersing its long neck and its head.

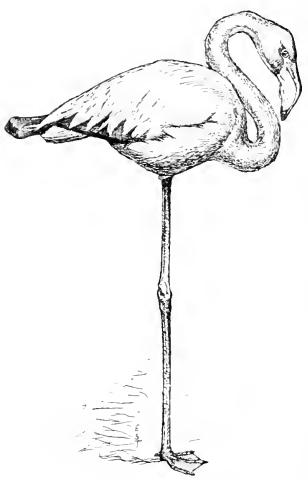


FIG. 14.—Flamingo, showing relative length of legs and neck in a wading bird. (Much reduced.)

In the tropical Jacanas the toes and toe-nails are much lengthened, enabling the bird to pass over the water on aquatic plants. I have seen these birds walking on small lily leaves, which sank beneath their weight, giving one the impression that they were walking on the water (see Fig. 10).

Many ground-feeding birds use the feet in scratching for food; Chickens are familiar examples. Towhees and

Sparrows use both feet in searching for food, jumping quickly backward and throwing the leaves behind them.

Parrots use their foot as a hand. Some Hawks carry nesting material in it, and all birds of prey strike their quarry with their strongly curved claws, which are then used to carry, or hold it while it is being torn by the bill. The foot of the Fish Hawk is a magnificent organ. The nails are strong and well curved; the inner surface of the toes is set with sharp, horny spikes, and the outer toe is partly reversible, so that the bird grasps its slippery prey from four different points.

FIG. 15.—Foot of Fish Hawk, showing large claws, and spicules on under surface of toes. (⅓ natural size.)

As a weapon the foot is especially effective, the use of spurs being too well known to require comment. Ostriches kick with their feet, and can, it is said, deliver a blow powerful enough to fell a man.

But by far the best instance of modification in the structure of the feet is furnished by Grouse. It is an

FIG. 16.—Naked toes of Ruffed Grouse in summer; fringed toes of Ruffed Grouse in winter. (⅔ natural size.)

unusual case of seasonal adaptation in form. During the summer the toes of Grouse are bare and slender, but as

these birds are largely ground-haunters, and most of them inhabit regions where the snowfall is heavy, the toes in winter acquire a comblike fringe on either side. Practically, therefore, Grouse don snowshoes in the fall, and wear them until the following spring.

The Bill.—Of the four organs we are considering, the bill is beyond question the most important. We have seen that a bird may be wingless and practically tailless, and may almost lose the use of its feet; but from the moment the bill breaks the eggshell and liberates the chick, the bird's life is dependent upon its services. The variety of offices performed by the bill, and the correspondingly numerous forms it assumes, are, doubtless, without parallel in the animal world.

The special modification of the fore limbs as flight-organs deprives birds of their use for other important services, and consequently we have a biped which, so far as their assistance goes, is without arms or hands. As a result, the duties which would naturally fall to these members are performed by the bill, whose chief office, therefore, is that of a hand.

Occasionally it is sexually adorned, as in the Puffins, several Auks, Ducks, and the White Pelicans, which, during the nesting season, have some special plate, knob, or color on the bill. With the Woodpeckers it is a musical instrument—the drumstick with which they beat a tattoo on some resounding limb. Owls and some other birds, when angry or frightened, snap their mandibles together like castanets. But it is as a hand that the bill gives best evidence of adaptation to or by habit. Among families in which the wings, tail, and feet are essentially alike in form, the bill may present great variation—proof apparently of its response to the demands made upon it.

All birds use it as a comb and brush with which to

PLATE IX. PAGE 97.

WILSON'S SNIPE.

Length, 11·25 inches. Upper parts black, buff, and rusty; throat and belly white, rest of under parts black and buff.

perform their toilet, and, pressing a drop of oil from the gland at the root of the tail, they dress their feathers with their bill. Parrots use the bill in climbing, and its hawklike shape in these birds is an unusual instance of similarity in structure accompanying different habits.

Birds which do not strike with their feet may use the bill as a weapon, but the manner in which it is employed corresponds so closely with the method by which a bird secures its food, that as a weapon the bill presents no special modifications. In constructing the nest the bill may be used as a trowel, an auger, a needle, a chisel, and as several other tools.

But as a hand the bill's most important office is that of procuring food; and wonderful indeed are the forms it assumes to supply the appetites of birds who may require a drop of nectar or a tiny insect from the heart of a flower, a snake from the marshes, a clam or mussel from the ocean's beach, or a fish from its waters. The bill, therefore, becomes a forceps, lever, chisel, hook, hammer, awl, probe, spoon, spear, sieve, net, and knife—in short, there is almost no limit to its shape and uses.

With Hummingbirds the shape of the bill is apparently related to the flowers from which the bird most frequently procures its food. It ranges in length from a quarter of an inch in the Small-billed Hummer (*Microrhynchus*) to five inches in the Siphon-bill (*Docimastes*), which has a bill longer than its body, and is said to feed from the long-tubed trumpet flowers. The Avocet Hummer (*Avocettula*) has a bill curved slightly upward, but in the Sickle-billed Hummer (*Eutoxeres*) it is curved downward to form half a circle, and the bird feeds on flowers having a similarly curved

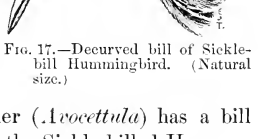


FIG. 17.—Decurved bill of Sickle-bill Hummingbird. (Natural size.)

corolla. In the Tooth-billed Hummer (*Androdon*) both mandibles are finely serrate at the end, the upper one being also hooked, and the bird feeds on insects which it captures on the surface of leaves and other places.

Among the Woodhewers (*Dendrocolaptidæ*) of South America there is fully as much variability, which reflects equally variable feeding habits. Some species have short, stout, straight bills, others exceedingly long, slender, curved ones. Mergansers, Gannets, Anhingas, and other birds that catch fish by pursuing them under water, have sharply serrate mandibles, which aid them in holding their slippery prey.

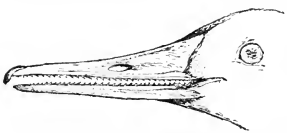


FIG. 18.—Serrate bill of Merganser, a fish-eating bird. (1/2 natural size.)

Some shore birds (*Limicolæ*) use the bill as a probe,

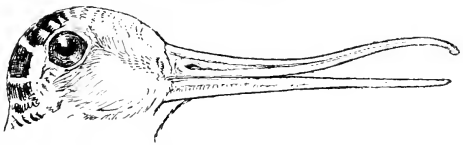


FIG. 19.—Probelike bill of Woodcock, showing extent to which upper mandible can be moved. (2/3 natural size.)

when it may be six inches in length and straight, or curved downward. It has recently been learned that

FIG. 20.—Recurved bill of Avocet. (2/3 natural size.)

several of these probing Snipe, notably the Woodcock, have the power of moving the end of the upper mandi-

ble, which better enables them to grasp objects while probing. In the Avocet the bill is curved upward, and the bird swings it from side to side, scraping the bottom in its search for food. The New Zealand Wrybill has its bill turned to the right for the terminal third, and the bird uses it as a crooked probe to push under stones in hunting for its prey. The Siberian Spoonbill Sandpiper has a most singular bill, which is much enlarged at the end, suggesting a flat-ended forceps. The Roseate Spoonbill, an entirely different bird, has a somewhat similarly shaped bill, a striking instance of the occurrence of the same form in families which are not closely related.

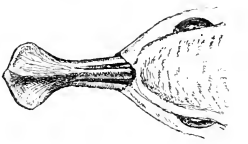


FIG. 21.—Bill of Spoonbill Sandpiper. (Natural size.)

But probably the most remarkable instance of relation

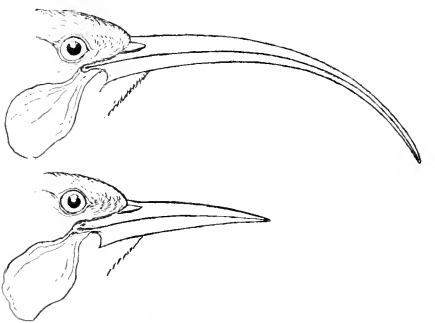


FIG. 22.—Curved bill of female, straight bill of male Huia-bird. (1/2 natural size.)

between the form of the bill and feeding habits is furnished by the Huia-bird of New Zealand. The male of this species has a comparatively short, straight bill, while

that of the female is long and curved. The birds feed on larvæ, which they find in dead wood. The male hammers and chisels away the wood very much as Woodpeckers do, while the female uses her bill as a probe. We have, therefore, the singular case of two forms of the bill arising in the same species as a result of or causing a corresponding difference in habit.

PLATE X. PAGES 87, 98, 99.

COMMON TERN.
(*Length, 15·00 inches.*)

SEMIPALMATED SANDPIPER.
(*Length, 6·30 inches.*)

SEMIPALMATED PLOVER.
(*Length, 6.75 inches.*)

CHAPTER III.

COLORS OF BIRDS.*

THE almost endless range of variation in the colors and pattern of coloration of birds' plumage has attracted the attention of many philosophic naturalists. Why, for example, should birds from some regions always be darker than those from other regions; why should ground-inhabiting birds generally wear a dull or neutral tinted costume; and why should the male, with few exceptions, be brighter than the female?

For answer I will outline some of the leading facts and theories in connection with this interesting subject. In the first place, however, it will be necessary for us to have some idea of the extent of individual change in color, that is, the various phases of color, which a bird may pass through during different periods of its life.†

* Consult Poulton, Colors of Animals (D. Appleton & Co.). Gadow, in Newton's Dictionary of Birds—articles, Color and Feathers. Beddard, Animal Coloration (Macmillan Co.). Keeler, Evolution of the Colors of North American Land Birds; occasional papers, California Academy of Sciences (San Francisco), iii, 1893. Also Allen, reviews of last two works, The Auk (New York city), x, 1893, pp. 189–199, 373–380. Allen, Alleged Changes of Color in the Feathers of Birds without Molting; Bulletin of the American Museum of Natural History, New York city, viii, 1896, pp. 13–44. Chadbourne, Individual Dichromatism in the Screech Owl; The Auk, xiii, 1896, pp. 321–325, and xiv, 1897, pp. 33–39, one plate.

† The term *color*, as here used, means practically the plumage or dress of birds.

Color and Age.—All birds have a special nestling plumage. With those that run or swim at birth, such as Grouse, Snipe, and Ducks, this is a full suit of down, which may be worn for several weeks. With those birds which are helpless when hatched—for instance, Robins, Sparrows, and Orioles—this downy covering is so scanty that they are practically naked. This birth dress is followed by a new growth, known as the "first plumage." Down-covered birds do not acquire this for some time, but with those birds that are born nearly naked it begins to grow soon after they are hatched, and is almost complete when they leave the nest. The first plumage is often unlike that of either parent; for example, the spotted plumage of the Robin. It is worn for several months by some species—certain Snipe and others—but with most land birds it is soon exchanged for the costume they will wear through the winter, usually termed the "immature plumage." This may resemble that of either parent respectively—that is, immature males may be like adult males and immature females like adult females, as with the Bob-white and Cardinal Grosbeak; or the immature birds of both sexes may resemble the adult female, as with the Hummingbird and Bobolink. Again, the immature birds of both sexes may be unlike either of the adults, as with the Eagle and most Hawks; or the immature female may resemble the adult female, while the immature male is unlike either parent, as in the case of the Rose-breasted Grosbeak and Scarlet Tanager. When both parents are alike, the young generally resemble them, and this happens among most of our land birds; for example, the Flycatchers, Crows and Jays, many Sparrows, Vireos, Wrens, and Thrushes.

Immature birds, differing from the adults, may acquire the adult plumage the next spring, as with the Bobolink, or they may then don a second or transition

plumage, and not assume the dress of maturity until the second or even the third spring, which is the case with the Orchard Oriole.

Color and Season.—Quite apart from the changes in color due to age, a bird may throughout its life change costumes with the seasons. Thus, the male Bobolink after the nesting season, exchanges his black, white, and buff nuptial suit for a sparrowlike dress resembling that of his mate. The Scarlet Tanager sheds his gay body plumage and puts on the olive-green colors of the female, without changing, however, the color of his black wings and tail. The following spring both birds resume the more conspicuous coats. A more or less similar change takes place among many birds in which the male is brighter than the female, but, among land birds, when the adults of both sexes are alike, there is little or no seasonal change in color.

*The Molt.**—These changes in plumage, as far as they are understood, are accomplished by the molt, frequently followed by a wearing off of the differently colored terminal fringe which is found on the new feathers of some birds. It has been stated that birds change color without changing their plumage, either by a chemical alteration in the pigment of the feathers resulting in a new color, or by the actual gain of new pigment from the body; but I know of no instance in which this has been proved, nor do I believe that the latter change is possible. The whole subject offers an excellent field for observation and experiment.

There is a great and as yet but little understood variation in the molting of birds. Not only may closely

* See Stone, The Molting of Birds, with Special Reference to the Plumages of the Smaller Land Birds of Eastern North America, Proceedings of the Philadelphia Academy of Natural Science, 1896, pp. 108–167, two plates.

related species molt differently, but the manner and time of molting among individuals of the same species may vary according to their sex, age, and physical condition.

At the close of the nesting season *all* birds renew their entire plumage by molting. The following spring, before the nesting season, most birds molt their body feathers, retaining those of the wing and tail. A few, however, like the Bobolink, have a complete molt at this season also. Others molt only a few of the body feathers, while some birds are adorned at this season with special nuptial plumes.

The beautiful aigrette plumes of the Heron constitute a nuptial dress of this kind. It is for these plumes that the birds have been slaughtered in such enormous numbers that if the demand continues they will speedily become extinct.

Some birds, whose fall plumage is edged with a differently colored tip to each feather, do not molt in the spring, but acquire their wedding dress by the slow wearing off of the fringes to the feathers which have dis-

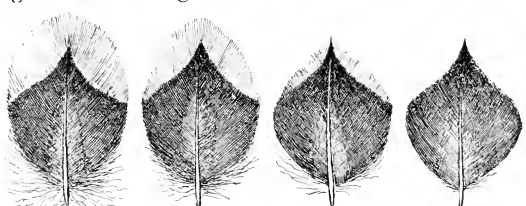


FIG. 23.—Feathers from back of Snowflake, showing seasonal changes in form and color due to wearing off of tips. (Natural size.)

guised them during the winter. The Snowflake, for instance, changes from brown and brownish white to pure black and white by losing the brown tips which have concealed the black or white bases of his feathers.

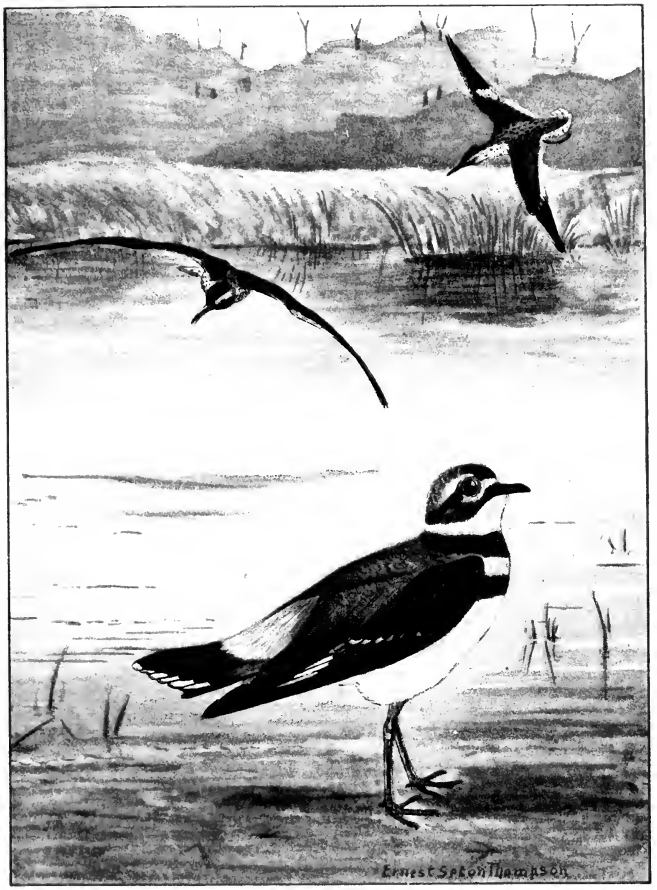


PLATE XI. PAGES 96, 99.

SPOTTED SANDPIPER.

Length, 7·50 inches. *Adult*, upper parts brownish gray and black; under parts white spotted with black; a white patch in wing. *Young*, similar, but without black.

KILLDEER.

Length, 10·50 inches. Upper parts brownish gray, upper tail-coverts rusty; under parts white; two bands on breast, crown and lores black, forehead and nape white.

Much remains to be learned on this subject of the molt, and, although confinement is known to affect its manner and extent, I believe intelligent observation of caged birds will lead to really valuable results.

Color and Food.—In some instances it is known that a bird's color is affected by the nature of its food. It is a common practice among bird fanciers to alter the color of Canaries from yellow to orange-red by feeding them on red pepper. This food, however, is said to have no effect upon adult birds, but must be fed to nestlings. Sauermann's experiments, as quoted by Beddard, show that the red color is not caused by the capsicin or red pigment in the pepper, but by a fatty substance termed triolein. Fed to white fowls, their breasts became red, while the rest of the plumage remained unchanged. It is also stated that dealers alter the color of green Parrots to yellow by feeding them on the fat of certain fishes.

Flamingoes and Scarlet Ibises when kept in captivity lose their bright red colors and become dingy pink or even soiled white, and some animal dealers have acquired a reputation for restoring their natural tints by supplying them with food the nature of which is kept a secret.

Our Purple Finch turns to yellow in captivity. An adult male now in my possession is undergoing his second molt since capture a year ago, and it will evidently leave him without a single red feather. Other wild birds when caged are known to assume more or less abnormal plumages, due, it is supposed, to change in food. There is, however, very little exact information on this subject, and it offers an excellent opportunity for the patient investigator.

*Color and Climate.**—Color is a much more variable character than form. There are but few instances in

* Read Allen, Bulletin of Museum of Comparative Zoölogy (Cambridge, Mass.), vol. ii, No. 3, 1871, pp. 186–250.

which we can show the cause of a given structure; but color responds more quickly to the influence of surroundings, and in many cases we can point to cause and effect with some certainty.

This is best illustrated by the relation between climate and color. Briefly, it has been found that birds are darkest in humid regions and palest in arid regions.

This at first thought seems of small moment, but in reality it is one of the most important facts established by ornithologists. It is an undeniable demonstration of "evolution by environment"—that is, the bird's color is in part due to the conditions under which it lives.

For example, our common Song Sparrow, which inhabits the greater part of North America, varies so greatly in color in different parts of its range that no less than eleven subspecies or geographical races are known to ornithologists. The extremes are found in the arid deserts of Arizona, where the annual rainfall averages eight inches, and on the humid Pacific coast from Washington to Alaska, where the annual rainfall averages about eighty inches.

The Arizona Song Sparrows are pale, sandy colored birds, while those from Alaska are dark, sooty brown. One would imagine them to be different species; but unlike as are these extremes, they, with the other nine races in this group, are found to intergrade in those regions where the climatic conditions themselves undergo a change. That is, as we pass from an arid into a humid region, the birds gradually get darker as the average rainfall increases.

If now we study other birds living in these regions, we find that many of them, especially the resident species, are similarly affected by the prevailing climatic influences—that is, many Arizona birds are bleached and faded in appearance, while all the thirty odd Northwest

Pacific coast races are darker or more heavily streaked or barred than any of their congeners. It is of importance to observe that these differences are shown by young birds in fresh plumage—evidence that the characters acquired through climate have been inherited.

There are many similar cases, but some species seem more easily affected than others, and throughout their ranges are markedly affected by the conditions under which they live. Thus we have nine races of Screech Owl, eleven of Horned Lark, six of Junco, etc.

These races, or subspecies, are species in process of formation. The extremes are still connected by intermediate or natural links, but if, through any cause, these intermediates should disappear, the extremes would then be left as distinct species.

Color and Haunt and Habit.—The relation of a bird's color to its haunts and habits is a complex subject. Any attempt at its explanation should be based on so exact a knowledge of the *facts* in the case, that I can not too strongly emphasize here the necessity for observations in the field. Only a close study of the living bird will justify us in advancing theories to account for its coloration.

Many explanations have been offered to account for certain colors and markings of birds, but often, I fear, without adequate knowledge of the bird's habits. I shall speak of only four classes of colors; they are *protective*, *deceptive*, *recognition*, and *sexual colors*.

Protective colors render a bird inconspicuous in order that it may escape its enemies. Deceptive colors render it inconspicuous in order that it may more easily approach its prey. In both cases the bird should harmonize in color with its immediate surroundings.

A survey of the birds of the world shows that on the whole this is true. Thus almost all ground-inhabiting birds, such as Snipe, Plover, Quail, Grouse, Sparrows,

are generally dull brown or gray, like the ground, leaves, or grasses about them, while tree-haunting birds, especially those that live in the foliage or feed from blossoms, are, as a rule, brightly colored. In this class belong Hummingbirds, Orioles, the gayer-plumaged Finches, Tanagers, Warblers, and many others. It is partly owing to this fact that the erroneous idea concerning the brilliant plumage of all tropical birds has become established. The rich vegetation of the tropics furnishes a home to a far greater number of brightly colored birds than are found in temperate regions; still, they are not more numerous than the dull-colored species that live on the tree trunks, in the undergrowth, or on the ground, where, owing to the nature of both their colors and haunts, they are likely to be overlooked.

Between these two extremes there are numerous intermediate groups, most of which conform to the general law of protective coloration. There are, it is true, exceptions, but every close student of bird-life must be so impressed with the dangers to which birds are exposed, that he can not doubt that the chief object of color is usually for its wearer's concealment.

The term "protective coloration" has lately received fresh significance through the studies of Mr. Abbott H. Thayer.* Mr. Thayer proves conclusively that protective coloration lies not so much in an animal's resemblance in color to its surroundings as in its gradation of color. Thus he points to the fact that, as a rule, animals are darker above than below—that is, those parts receiving the most light are darkest, while the parts receiving the least light are palest. In effect it follows that the darker upper parts are brightened, while the paler under parts are

* See his papers on The Law which Underlies Protective Coloration, in The Auk (New York city), vol. xiii, pp. 124–129, 318–320, eleven figures.

PLATE XII. PAGE 101.

RUFFED GROUSE.

Length, 17·00 inches. *Male*, neck tufts long, black; upper parts and tail gray or rusty, black and buff; under parts white, black and rusty. *Female*, similar, but with neck tufts no longer than adjoining feathers.

darkened, the result being a uniform color, with an apparent absence of shadow, tending to render the object invisible.

Mr. Thayer clearly demonstrates his discovery by using several decoys about the size and shape of a Woodcock's body. These he places about six inches above the ground on wire uprights, or in a row on a horizontal rod. One of these decoys he colors uniformly, above and below, to resemble the earth about it, or he may even give it a fine coating of the earth itself. The upper half of the other decoys is treated in exactly the same manner, but their lower half is graded to a pure white on the median line below. At a distance of forty or fifty yards the uniformly colored decoy can be plainly seen, but those which are white below are entirely invisible until one is within twenty or thirty feet of them.

After definitely locating these graded decoys the experiment may be repeated; but the result will always be the same. As one slowly retreats from them they will, as by magic, seem to pass out of existence, while the one which is colored alike both above and below can be seen distinctly.

One of the best arguments for the value of a protective coloration is the fact that the birds themselves are such thorough believers in it. Here we have the reason why—in sportsman's parlance—game birds "lie to a dog." When there is sufficient cover, they trust to their protective coloring to escape detection, and take wing only as a last resort; but when cover is scanty, they generally rise far out of gunshot. Some Snipe and Sparrows, however, attempt to conceal themselves even on bare sand or worn grass by squatting close to the earth, with which their plumage harmonizes in color.

A sitting Woodcock had such confidence in its own invisibility that it permitted itself to be stroked without leaving the nest; but when a light snow fell, and the

bird became a conspicuous dark object against a white background, it took wing on the first suspicion of danger.

I could mention many other similar instances, but the careful observer will soon find them included in his own experience.

Deceptive, or, as Poulton terms it, "aggressive" coloration is perhaps best illustrated by common Flycatchers (*Tyrannidæ*). Although these birds live in and about trees, they are, as a rule, quietly attired in olive-green or olive-gray, and are quite unlike the brilliantly clad, *fruit*-eating Tanagers, Orioles, Parrots, and other birds that may be found near them. Insects are therefore more likely to come within snapping distance than if these birds were conspicuously colored. In the same manner we may explain the colors of Hawks, which are never brightly plumaged.

It is well known that many arctic animals become white on the approach of winter. With Ptarmigans this is doubtless an instance of protective coloration, but the Snowy Owl, who feeds on the Ptarmigan, may be said to illustrate deceptive coloration.

Recognition, signaling, or directive colors have, with more or less reason, been made to include many different types of markings, of which I shall mention only those that are conspicuously shown in flight or by some movement. Such are the white outer tail-feathers of Juncos, Meadowlarks, Towhees, and many other birds, and certain wing and rump patches, which are noticeable only when the bird is on the wing. Markings of this kind are supposed to aid birds in recognizing others of their kind, their special use being to keep the individuals of a family or flock together, so that when one starts the others can readily follow. The theory is open to objections, but these so-called recognition marks are so often found among birds that they doubtless are of some use, though their

exact value remains to be determined by closer observation.

*Color and Sex.**—It is not possible here to discuss at length the vexed question of sexual coloration. But, as a means of directing observation, I present a synopsis of the principal types of secondary sexual characters, with some of the theories which have been advanced to account for them.

SYNOPSIS OF THE SECONDARY SEXUAL CHARACTERS OF BIRDS.

I. STRUCTURAL.

Size.		Male larger than female (usual). Female larger than male (rare).
Plumage.	Color.	Male brighter than female. Female brighter than male (rare).
	Form.	Assumption of plumes, ruffs, crests, trains, etc.: special modification of wing and tail feathers. *a.* Worn by male alone. *b.* Worn by both sexes.
Of the body.		Sole or greater development in male of brightly colored bare tracts of skin, combs, wattles, caruncles, and other fleshy or horny appendages.
Of the feet.		Sole or greater development in male of spurs.
Of the bill.		Male with more highly colored or larger bill than female.

II. FUNCTIONAL.

Pursuit.	By male when similar to or brighter than female. By female when brighter than male.
Display.	By male of accessory plumes and other appendages.
Battle.	By male using spurs, wings, bill, etc.
Music.	Vocal, by male and, rarely, female. Mechanical, by male and sometimes female.
Special habits.	Dances, mock fights, aërial evolutions, construction of bowers, decoration of playgrounds, attitudinizing, strutting, etc. *a.* By male before the female. *b.* Among the males alone.

* Read Darwin, The Descent of Man and Selection in Relation to Sex (D. Appleton & Co.). Wallace, Darwinism (Macmillan Co.).

In explanation of these remarkable differences of form and habit, we have first Darwin's theory of "sexual selection." This is based upon the ardor in love, the courage and rivalry of the males, and also upon the powers of perception, taste, and will of the female.

The spurs of the male, for example, are supposed to have been developed through the battles of the males. At first a mere knob, they were an advantage to the bird possessing them, enabling him to defeat his rivals. The successful male would be more likely to have offspring who would inherit the tendency of their father to have spurs, and thus, by selection, the unspurred cocks would gradually be replaced by those better armed. This is known as the "law of battle."

But the bright colors and gay plumes of the cock have originated, under this theory, through the taste of the female, who, it is assumed, would be more likely to accept the attentions of a bird pleasing in her eye than one who was less strikingly adorned. This has been termed by Lloyd Morgan "preferential mating."

Wallace has accepted the law of battle as an effective agent in producing certain characters, but considers it *natural*, rather than *sexual* selection, and he denies the existence of any important evidence proving female selection. He therefore attributes many secondary sexual characters to a surplus of vital energy, which, because of a bird's perfect adaptation to the conditions of its existence, can expend itself in the production of bright colors and ornamental plumes without injury to their owners. That is to say, Wallace ascribes to the action of natural selection any secondary sexual character which is of practical use to the male in conflicts with a rival, but denies the female any part in the matter of pairing. Darwin, as I have said, attributes to the female an æsthetic taste which renders the brilliant colors or display of the

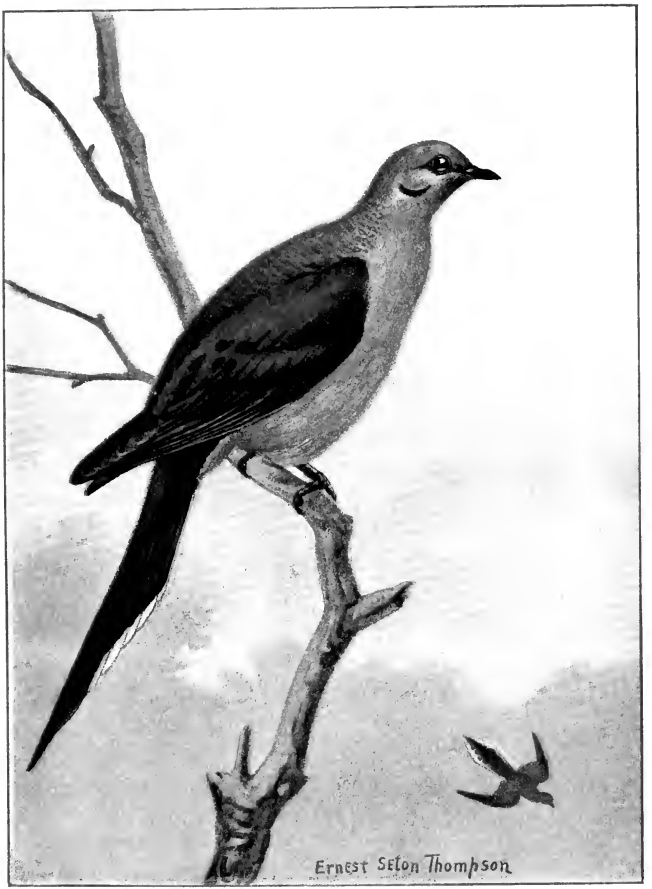


PLATE XIII. PAGE 102.

MOURNING DOVE.

Length, 11·75 inches. Upper parts olive grayish brown, sides and back of neck iridescent; breast with a pinkish tinge, belly buff; outer tail-feathers tipped with white.

male an attractive sight, influencing her choice of a mate.

There is thus a practical agreement in the views of these naturalists on the origin of those sexual characters which may be classed as weapons, and this opinion is, I believe, generally accepted. But the question of female preference, and its influence on the development of bright colors and accessory plumes, still lacks confirmation. Here is an opportunity for every one who can watch wild birds mating.

CHAPTER IV.

THE MIGRATION OF BIRDS.*

To the field student the season of migration is the most interesting of the year. The bird-life of a vast area then passes in review before him. Though living in a temperate region, he may see birds whose summer home is within the Arctic Circle, whose winter haunts are in the tropics. Who can tell what bird he may find in the woods he has been exploring for years?

The comparative regularity with which birds come and go gives an added charm to the study of migration. Their journey is not a "helter-skelter" rushing onward, but is like the well-governed march of an army. We feel a sense of satisfaction in knowing when we may expect to greet a given species, and a secret elation if we succeed in detecting it several days in advance of other observers. We study weather charts, and try to foretell or explain those great flights or "waves" of birds which are so closely dependent upon meteorologic conditions.

* Read Allen, Scribner's Magazine, vol. xxii, 1881, pp. 932–938, Bulletin of Nuttall Ornithological Club (Cambridge, Mass.), vol. v, 1880, pp. 151–154. Scott, ibid., vol. vi, 1880, pp. 97–100. Brewster, Memoirs of Nuttall Ornithological Club, No. 1, pp. 22. Cooke and Merriam, Bird Migration in the Mississippi Valley (Washington, 1888). Chapman, The Auk (New York city), vol. v, 1888, pp. 37–39; vol. xi, 1894, pp. 12–17. Loomis, ibid., vol. ix, 1892, pp. 28–39; vol. xi, 1894, pp. 26–39, 94–117. Stone, Birds of Eastern Pennsylvania and New Jersey, pp. 15–28.

Extent of Migration.—The extent of a bird's migration is, in most cases, dependent upon the nature of its food. Birds that are resident in one place throughout the year generally change their fare with the season, and apparently feed with equal relish on seeds or insects. Those that are dependent upon fruit must migrate far enough to find a supply of berries, while the insect-eaters are obliged to travel even farther south.

Most of the migratory birds of our Western States pass the winter in Mexico. Our Eastern Sparrows and our berry-eaters, like the Robin and Bluebird, winter from the Middle States to the Gulf coast, while the majority of our purely insectivorous species cross to Cuba and winter in the West Indies, or continue to Central America and even northern South America. Snipe and Plover make the most extended migrations, some species breeding within the Arctic Circle and wintering along the coasts of Patagonia.

Times of Migration.—Let us suppose we are about to observe the spring migration of birds at Englewood, New Jersey—a few miles from New York city. Birds arrive here about a week later than at Washington, D. C., and a week earlier than at Boston.

During January and February, while watching for some rare visitor from the North, we shall find that Tree Sparrows and Juncos are everywhere common. Less frequently we may see Shrikes, Winter Wrens, Golden-crowned Kinglets and Brown Creepers, and rarely Snowflakes, Red Crossbills, and Redpolls will be observed. These birds are winter visitants, coming to us from the North in the fall and leaving in March and April.

Of course, in addition to these migratory birds, we shall see most if not all of our commoner permanent residents, or the birds which are with us throughout the year. They are the Bob-white, Ruffed Grouse, Red-

shouldered and Red-tailed Hawks, Barred and Screech Owls, Downy and Hairy Woodpeckers, Blue Jay, Crow, Goldfinch, Song Sparrow, White-breasted Nuthatch, and Chickadee.

Generally speaking, the birds in the front rank of the feathered army which soon will invade the land are those whose winter quarters are farthest north, while those that winter farthest south bring up the rear.

From February 20 to March 10, therefore, we may expect to see Purple Grackles, Robins, Bluebirds, and Red-winged Blackbirds; birds that have wintered but a short distance south of us—if not with us—and who have accepted the slightest encouragement from the weather as an order to advance. All the first comers will doubtless be males, this sex, as a rule, preceding the females by several days.

About the middle of March we may look for the Woodcock, Meadowlark, Fox Sparrow, Cowbird, and Phœbe; their time of arrival being largely dependent upon the temperature—warm weather hastening, and cold weather retarding their movements.

Toward the last of March, Wilson's Snipe, the Kingfisher, Mourning Dove, Swamp and Field Sparrows are due.

Early in April the Purple Finch, White-throated, Vesper, and Chipping Sparrows will announce their return in familiar notes, and at the same time Tree Swallows, Myrtle Warblers, Pipits, and Hermit Thrushes will appear. They will soon be followed by Barn Swallows and Ruby-crowned Kinglets.

The migration is now well under way, and we go to the field with the assurance of meeting some lately arrived feathered friend almost daily. Between April 20 and 30 we will doubtless note among the newcomers, the Green Heron, Spotted Sandpiper, Whip-poor-will,

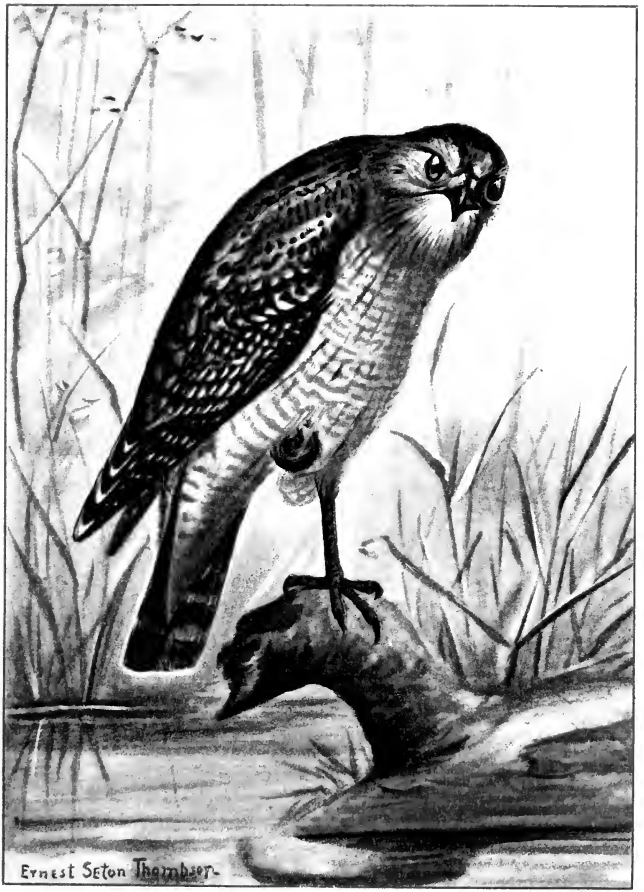


PLATE XIV. PAGE 104.

RED-SHOULDERED HAWK.

Length, 19·00 inches. *Adult*, upper parts blackish brown and rusty ; lesser wing-coverts bright chestnut ; wings and tail black and white ; under parts rich rusty and white. *Young*, less rusty on back, wings and tail largely rusty; under parts white, spotted or streaked with blackish.

Chimney Swift, Least Flycatcher, Towhee, Purple Martin, Cliff and Bank Swallows, Black and White and Black-throated Green Warblers, Oven-bird, House Wren, Brown Thrasher, Catbird, and Wood Thrush. This troop surely is not without musicians. In ringing tones they herald the victory of Spring over Winter.

The season of cold waves has passed, and the birds now appear with the regularity of calendar events. From May 1 to 12 the migration reaches its height. It is a time of intense interest to the bird student, and happy is he who can spend unlimited time afield. Some mornings we may find ten or more different species that have come back to us, and each one may be represented by many individuals. The woods are thronged with migrants, and the scantily leaved trees and bushes enable us to observe them far more easily than we can when they travel southward in the fall. During this exciting period we should see the Cuckoos, Nighthawk, Ruby-throated Hummingbird, Crested Flycatcher, Kingbird, Wood Pewee, Baltimore and Orchard Orioles, Bobolink, Indigo Bunting, Rose-breasted Grosbeak, Scarlet Tanager, Red-eyed, Warbling, Yellow-throated, and White-eyed Vireos, Long-billed Marsh Wren, Wilson's Thrush, Redstart, Yellow-breasted Chat, Maryland Yellow-throat, Yellow Warbler, and others of its family.

Succeeding days will bring additions to the ranks of these species, and there will also be numerous small Warblers to look for, but by May 12 all our more familiar and common birds have arrived. During the rest of the month, as the transient visitants, or species which nest farther north, pass onward, birds gradually decrease in numbers, and by June 5 we have left only those that will spend the summer with us.

The migration over, we can now give our whole

attention to a study of nesting habits. As a matter of fact, the nesting season begins quite as early as the spring migration, the Great Horned Owl laying its eggs late in February. In March and April other birds of prey and the earlier migrants nest. May migrants go to housekeeping soon after they reach their old homes, and by June 5 there are few species that have not nests.

With birds that rear two or three broods, the nesting season may extend into August. With those that have but one brood it may be over early in July. At this time we begin to miss the jolly, rollicking music of the Bobolink. Soon he will leave the meadow he has animated for two months, and with his young join growing flocks of his kind in the wild-rice marshes. His handsome suit of black and white and buff will be exchanged for the sparrowlike Reedbird dress, and in place of the merry song he will utter only a metallic *tink*. This note is characteristic of the season. Day and night we hear it from birds high in the air as they hasten to their rendezvous in the marshes.

July 1, Tree Swallows, who nest rarely if at all near New York city, appear and establish their headquarters in the Hackensack meadows—a first step on the migratory journey. July is a month for wanderers. The nesting season of most one-brooded birds is over; they are not yet ready to migrate, and pass the time roving about the country with their families.

In August birds are molting and moping. The careful observer will find that a few Warblers and Flycatchers have returned from the north and are passing southward, but, as a rule, August is a month to test the patience of the most enthusiastic bird student. Late in the month migrants become more numerous, but between the "flights" or "waves" there are days when

PLATE XV. PAGE 106.

MARSH HAWK.

Length, 20·00 inches. *Adult male*, upper parts gray; under parts white with rusty spots; upper tail-coverts white. *Adult female and young*, upper parts black and rich rusty; under parts rich rusty and black; upper tail-coverts white.

one may tramp the woods for miles without seeing a dozen birds.

September is the month of Warblers. They come in myriads during the latter half of the month, and on favorable nights we may sometimes hear their fine-voiced *tseeps* as they fly by overhead. About the 25th of the month our winter residents, the Junco, Winter Wren, Golden Kinglet, and Brown Creeper, will arrive.

The summer residents are now rapidly leaving us. In a general way it may be said that the last birds to arrive in the spring are the first to leave in the fall, while the earliest spring migrants remain the longest.

October and November are the months of Sparrows. They rise in loose flocks from every stubble or weed field, and seek shelter in the bordering bushy growth. Should the season prove warm, many of these hardy seed-eaters will stay with us well into December, but at the first really cold weather they retreat southward.

This completes the merest outline of the movements of our migratory birds. It will be seen that in reality there are but few periods during the year when some event is not occurring in the bird world. As we accumulate records for comparison, and learn to appreciate their meaning, our interest in the study of migration will increase and be renewed with the changing seasons.

We have found, in this brief review, that our birds may be placed in four classes, as follows:

1. *Permanent Residents.*—Birds that are represented in the same locality throughout the year.

2. *Summer Residents.*—Birds that come to us in the spring, rear their young, and depart in the fall.

3. *Winter Residents.*—Birds that come from the north in the fall, pass the winter with us, and return to their more northern homes in the spring.

4. *Transient Visitants.*—Birds whose summer home is north and whose winter home is south of us. In traveling from one to the other they pass through the intervening region as "transients."

Manner of Migration.—The Oriole, who builds his swinging nest in your elm tree, will winter in Central America; the Bobolink, who seems so care-free in your meadows, must journey to his winter quarters in southern Brazil. But, unless accident befalls, both birds will return to you the following spring. We are so accustomed to these phenomena that we accept them as part of the changing seasons without realizing how wonderful they are. But look for a moment at a map, and try to form a mental picture of the Bobolink's route. Over valleys, mountains, marshes, plains, and forests, over straits and seas hundreds of miles in width, he pursues a course through trackless space with a regularity and certainty which brings him to the same place at nearly the same time year after year. How much of his knowledge of the route he has inherited, and how much learned during his own lifetime, is a question we may return to later; now we are concerned with actual methods of migration.

Immediately after, or even during the nesting season, many birds begin to resort nightly to roosts frequented sometimes by immense numbers of their kinds, with often the addition of other species. These movements are apparently inaugurated by the old birds, and are in a sense the beginnings of the real migratory journey. Other birds roam the woods in loose bands or families, their wanderings being largely controlled by the supply of food.

During this time they may be molting, but when their new plumage is acquired they are ready for the start. The old birds lead the way, either alone or asso-

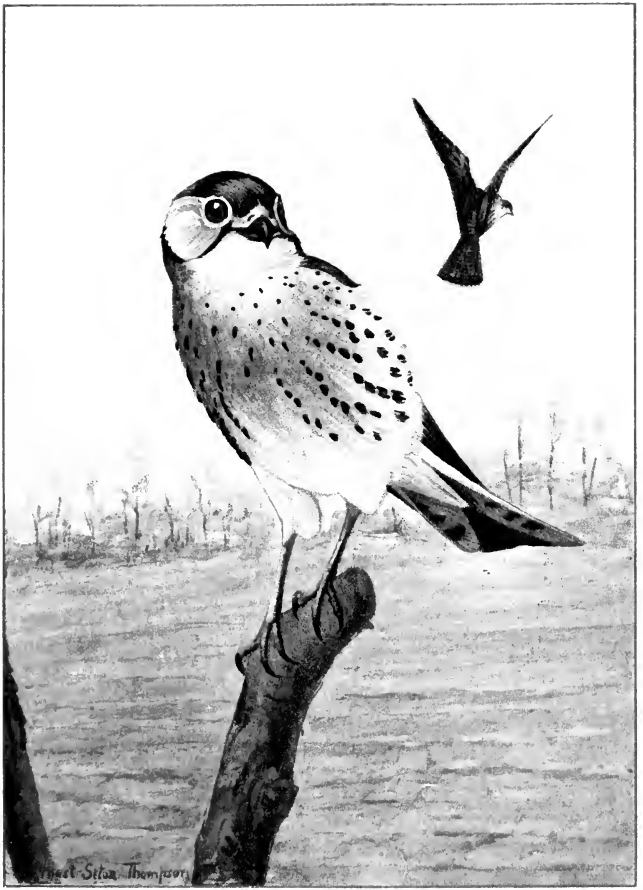


PLATE XVI. PAGE 106.

SPARROW HAWK.

Length, 11·00 inches. *Male*, back reddish brown and black, wing-coverts slaty blue, tail reddish brown marked with black and white ; under parts washed with rusty and spotted with black. *Female*, back, wings, and tail barred with reddish brown and black ; under parts white, streaked with reddish brown.

ciated with the young. Some fly by day, some by night, and others by both day and night. This fact was first established by Mr. William Brewster, who, in his admirable memoir on Bird Migration, writes: "Timid, sedentary, or feeble-winged birds migrate by night, because they are either afraid to venture on long, exposed journeys by daylight, or unable to continue these journeys day after day without losing much time in stopping to search for food. By taking the nights for traveling they can devote the days entirely to feeding and resting in their favorite haunts. Good examples are Thrushes (except the Robin), Wrens, Warblers, and Vireos.

"Bold, restless, strong-winged birds migrate chiefly, or very freely, by day, because, being accustomed to seek their food in open situations, they are indifferent to concealment, and being further able to accomplish long distances rapidly and with slight fatigue, they can ordinarily spare sufficient time by the way for brief stops in places where food is abundant and easily obtained. Under certain conditions, however, as when crossing large bodies of water or regions scantily supplied with food, they are sometimes obliged to travel partly, or perhaps even exclusively, by night. Excellent examples are the Robin (*Merula*), Horned Lark (*Otocoris*), and most *Icteridæ* [Bobolink, Blackbirds, and Orioles].

"Birds of easy, tireless wing, which habitually feed in the air or over very extensive areas, migrate exclusively by day, because, being able either to obtain their usual supply of food as they fly, or to accomplish the longest journeys so rapidly that they do not require to feed on the way, they are under no necessity of changing their usual habits. The best examples are Swallows, Swifts, and Hawks."

While migrating, birds follow mountain chains, coastlines, and particularly river valleys, all of which become

highways of migration. Through telescopic observations it has been learned that migrating birds travel at a great height. The exact height remains to be determined, but it is known that many migrants are at least a mile above the earth. From this elevation they command an extended view, and in clear weather prominent features of the landscape are doubtless distinguishable to their powerful vision at a great distance.

It is when fogs and storms obscure the view that birds lose their way. Then they fly much lower, perhaps seeking some landmark, and, should a lighthouse lie in their path, they are often attracted to it in countless numbers. Thousands of birds perish annually by striking these lights during stormy fall weather. In the spring the weather is more settled and fewer birds are killed.

Although birds are guided mainly by sight, hearing is also of assistance to them on their migrations. Indeed, at night, young birds, who have never made the journey before, must rely largely upon this sense to direct them. It is difficult for us to realize that on favorable nights during the migratory season myriads of birds are passing through the dark and apparently deserted air above us. Often they are so numerous as to form a continuous stream, and if we listen we may hear their voices as they call to one another while flying rapidly onward.

Some idea may be formed of the multitude of birds which throng the upper air on favorable nights during their migration by using a telescope. One having a two-inch object glass will answer the purpose. It should be focused on the moon, when the birds in passing are silhouetted against the glowing background. At the proper focal distance they appear with startling distinctness. In some cases each wing-beat can be detected, and with a large glass it is even possible to occasionally recognize the kind of bird.

PLATE XVII. PAGE 107.

SHARP-SHINNED HAWK.

Length of male, 11·25 inches; of female, 13·50 inches. *Adult*, upper parts slaty gray; under parts white and rusty brown. *Young*, upper parts blackish brown; under parts white, streaked with rusty brown.

Observations of this kind should be made in September, when the fall migration is at its height. On the night of September 3, 1887, at Tenafly, New Jersey, a friend and myself, using a six-and-a-half-inch equatorial glass, saw no less than two hundred and sixty-two birds cross the narrow angle subtended by the limbs of the moon between the hours of eight and eleven. Observations made several years later, in September, from the observatory of Columbia University, yielded closely similar results.

This nocturnal journey of birds may also be studied from lighthouses. On September 26, 1891, I visited the Bartholdi Statue of the Goddess of Liberty, in New York Bay, for this purpose. The weather was most favorable. The first bird was observed at eight o'clock, and for the succeeding two hours others were constantly heard, though comparatively few were seen. At ten o'clock it began to rain; and almost simultaneously there was a marked increase in the number of birds about the light, and within a few minutes there were hundreds where before there was one, while the air was filled with the calls of the passing host.

From the balcony which encircles the torch the scene was impressive beyond description. We seemed to have torn aside the veil which shrouds the mysteries of the night, and with the searching light exposed the secrets of Nature.

By far the larger number of birds hurried onward; others hovered before us, like Hummingbirds before a flower, then flew swiftly by into the darkness; and some, apparently blinded by the brilliant rays, struck the statue slightly, or with sufficient force to cause them to fall dead or dying. At daybreak a few stragglers were still winging their way southward, but before the sun rose the flight was over.

Origin of Migration.—Why do birds migrate? It is true that in temperate and boreal regions the return of cold weather robs them of their food, and they retreat southward. But many, in fact most, birds begin their southern journey long before the first fall frost. We have seen that some species start as early as July and August. Furthermore, there are many birds that come to our Gulf and South Atlantic States to nest, and when the breeding season is over they return to the tropics. Surely, a lower temperature can not be said to compel them to migrate. Even more remarkable than the southward journey in the fall is the northward journey in the spring. Our birds leave their winter homes in the tropics in the height of the tropical spring, when insect and vegetable food is daily increasing. They leave this land of plenty for one from which the snows of winter have barely disappeared, often coming so early that unseasonable weather forces them to retreat.

I believe that the origin of this great pilgrimage of countless millions of birds is to be found in the existence of an annual nesting season. In my opinion, it is exactly paralleled by the migration of shad, salmon, and other fishes to their spawning grounds, and the regular return of seals to their breeding rookeries.

Most animals have an instinctive desire for seclusion during the period of reproduction, and when this season approaches will seek some retired part of their haunts or range in which to bring forth their young. Salmon may travel a thousand miles or more from the ocean, and, leaping the rapids or other barriers in their way, finally reach the headwaters of some river where their eggs may be deposited in safety. Seals migrate with regularity to certain islands, where their young are born. Even our domesticated Hens, Turkeys, Ducks, and Peafowl, if given freedom, will travel a greater or less dis-

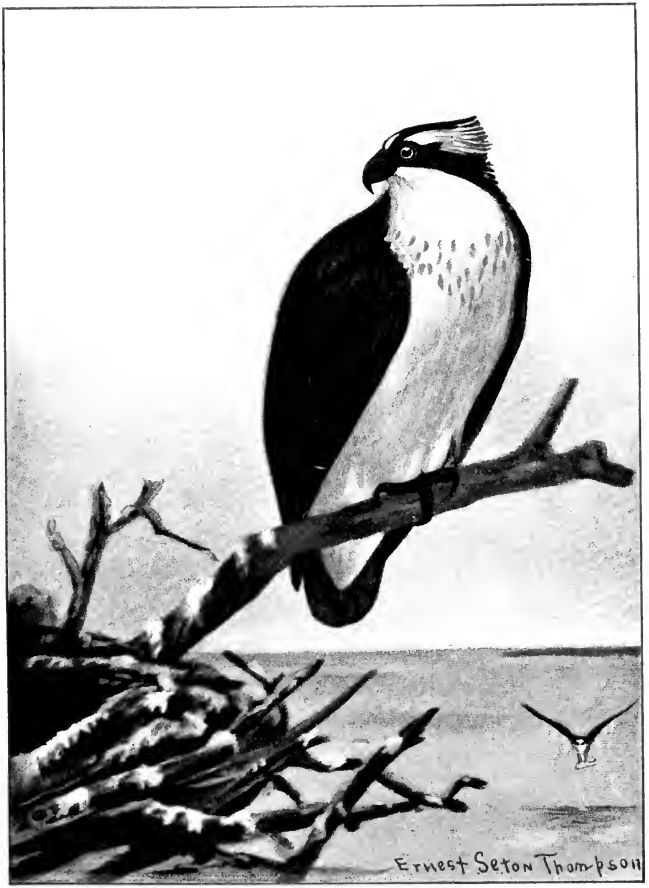


PLATE XVIII. PAGE 107.

AMERICAN OSPREY.

Length, 23·00 inches. Upper parts brownish black ; nape and under parts white ; breast marked with grayish brown.

tance in search of a place where they may conceal their nests.

Many species of tropical sea birds resort each year to some rocky islet, situated perhaps in the heart of their range, where they may nest in safety. This is not migration as we understand the word; but, nevertheless, the object is the same as that which prompts a Plover to travel to the arctic regions; moreover, the movement is just as regular. These sea birds pass their lives in the tropics, their presence or absence in any part of their range being largely dependent upon the supply of food. But, as in the case of the Warbler which migrates from South America to Labrador, they are annually affected by an impulse which urges them to hasten to a certain place. This impulse is periodic, and in a sense is common to all birds. There is a regular nesting season in the tropics, just as there is a regular nesting season in the arctic regions.

There is good reason, therefore, for the belief that the necessity of securing a home in which their young could be reared was, as it still is, the cause of migration. It must be remembered, however, that birds have been migrating for ages, and that the present conditions are the result of numerous and important climatic changes. Chief among these is doubtless the Glacial period. Indeed, Dr. Allen has stated, and the theory has been generally accepted, that the migration of birds was the outcome of the Glacial period. That their journeys were greatly increased and the habit of migration extended during the ice age is apparently undeniable, but, although previous to the Glacial period a warm temperate climate prevailed nearly to the northern pole, there must even then have been sufficient difference between winter and summer climate to render a certain amount of migration necessary. Furthermore, there is a well-defined migra-

tion in the southern hemisphere, where no evidences of glaciation have as yet been discovered.

As I have said, the existing conditions are the result of changes which have been active for ages. No species, therefore, has acquired its present summer range at one step, but by gradually adding new territory to its breeding ground. For example, certain of our Eastern birds are evidently derived through Mexico, and in returning to their winter quarters in Central America, they travel through Texas and Mexico and are unknown in Florida and the West Indies. Others have come to us through Florida, and in returning to their winter quarters do not pass through either Texas or Mexico. This is best illustrated by the Bobolink, an Eastern bird which, breeding from New Jersey northward to Nova Scotia, has spread westward until it has reached Utah and northern Montana. But—and here is the interesting point—these birds of the far West do not follow their neighbors and migrate southward through the Great Basin into Mexico, but, true to their inherited habit, retrace their steps, and leave the United States by the roundabout way of Florida, crossing thence to Cuba, Jamaica, and Yucatan, and wintering south of the Amazon. The Bobolinks of Utah did not learn this route in one generation; they inherited the experience of countless generations, slowly acquired as the species extended its range westward, and in returning across the continent they give us an excellent illustration of the stability of routes of migration.

They furnish, too, an instance of one of the most important factors in migration—that is, the certainty with which a bird returns to the region of its birth. This is further evidenced by certain sea birds which nest on isolated islets to which they regularly return each year.

Of this wonderful "homing instinct," which plays so

PLATE XIX. PAGE 109.

SHORT-EARED OWL.

Length, 15·50 inches. Upper parts black, buff, and rusty; under parts white and brownish black ; eyes yellow.

vital a part in the migration of birds, I have no explanation to offer. We know, however, that it exists not only in birds but in many other animals. It is this instinct, aided by the "heredity of habit," which guides a bird to its nesting ground. The Carrier Pigeon is taught its lines of flight by gradually extending its journeys; a species establishes its routes of migration by gradually extending its range.

CHAPTER V.

THE VOICE OF BIRDS.*

ASIDE from the pleasure to be derived from the calls and songs of birds, their notes are of interest to us as their medium of expression. No one who has closely studied birds will doubt that they have a language, limited though its vocabulary may be.

Song.—Song is a secondary sexual character, generally restricted to the male. With it he woos his mate and gives voice to the joyousness of nesting time. In some instances vocal music may be replaced by instrumental, as in the case of the drumming wing-beat of the Grouse, or the bill-tattoo of the Woodpeckers, both of which are analogous to song.

The season of song corresponds more or less closely with the mating season, though some species begin to sing long before their courting days are near. Others may sing to some extent throughout the year, but the real song period is in the spring.

Many birds have a second song period immediately after the completion of their postbreeding molt, but it usually lasts only for a few days, and is in no sense comparable to the true season of song. This is heralded by the Song Sparrow, whose sweet chant, late in February,

* See Witchell, The Evolution of Bird Song (Macmillan Co.). Bicknell, A Study of the Singing of Our Birds; The Auk (New York city), vol. i, 1884, pp. 60–71, 126–140, 209–218, 322–332; vol. ii, 1885, pp. 144–154, 249–262.

PLATE XX. PAGE 110.

SCREECH OWL.

Length, 9·40 inches. Upper parts gray, or bright reddish brown, and black; under parts white, gray, or bright reddish brown, and black; eyes yellow.

is a most welcome promise of spring. Then follow the Robins, Blackbirds, and other migrants, until, late in May, the great springtime chorus is at its height.

The Bobolink is the first bird to desert the choir. We do not often hear him after July 5. Soon he is followed by the Veery, and each day now shows some fresh vacancy in the ranks of the feathered singers, until by August 5 we have left only the Wood Pewee, Indigo Bunting, and Red-eyed Vireo—tireless songsters who fear neither midsummer nor midday heat.

Call-Notes.—The call-notes of birds are even more worthy of our attention than are their songs. Song is the outburst of a special emotion; call-notes form the language of every day. Many of us are familiar with birds' songs, but who knows their every call-note and who can tell us what each call means? For they have a meaning that close observation often makes intelligible.

Listen to the calls of the Robin and learn how unmistakably he expresses suspicion, alarm, or extreme fear; how he signals cheerfully to his companions or gives the word to take wing. Study the calls of the Crow or Blue Jay, and you will find that they have an apparently exhaustless vocabulary.

It is supposed that birds, like men, do not inherit their language, but acquire it. Thus there are recorded instances of young birds who had been isolated from others of their kind, learning to sing whatever song they heard. On the other hand, it is said that a bird inherits its own notes, at least to some extent, and, while it may not sing the song of its species perfectly, its song will still be sufficiently characteristic to be recognizable. There are, however, very few satisfactory observations on this subject, and keepers of cage-birds have here an excellent opportunity for original investigation.

CHAPTER VI.

THE NESTING SEASON.*

If you would really know birds, you must study them during nesting time. At this season they develop habits that you will be surprised to learn they possess. The humble owner of some insignificant call-note now fills the rôle of a skilled musician. The graceful, leisurely Marsh Hawk gives vent to his feelings in a series of aërial somersaults over the meadows; the sedate, dignified Woodcock tries to express his emotions by means of spiral evolutions which carry him far above his usual haunts; the Night-Hawk dives earthward with needless recklessness; in fact, birds seem inspired by the joy of the season, and all the brightness of a May morning is reflected in their voices and actions.

Mating over, there follow the marvels of nest-building with its combined evidences of instinct and intelligence. In due time the young appear, and the bird, now a parent, abandons the gay habits of the suitor, and devotes every waking moment to the care of its young.

Time of Nesting.—With most birds the nesting season is periodic and annual. With migratory birds it coincides with the season of the year when their summer homes are habitable. But we might suppose that the

* Read In Nesting Time, Little Brothers of the Air, and other works by Olive Thorne Miller. A-Birding on a Broncho, by Florence A. Merriam (Houghton, Mifflin & Co.).

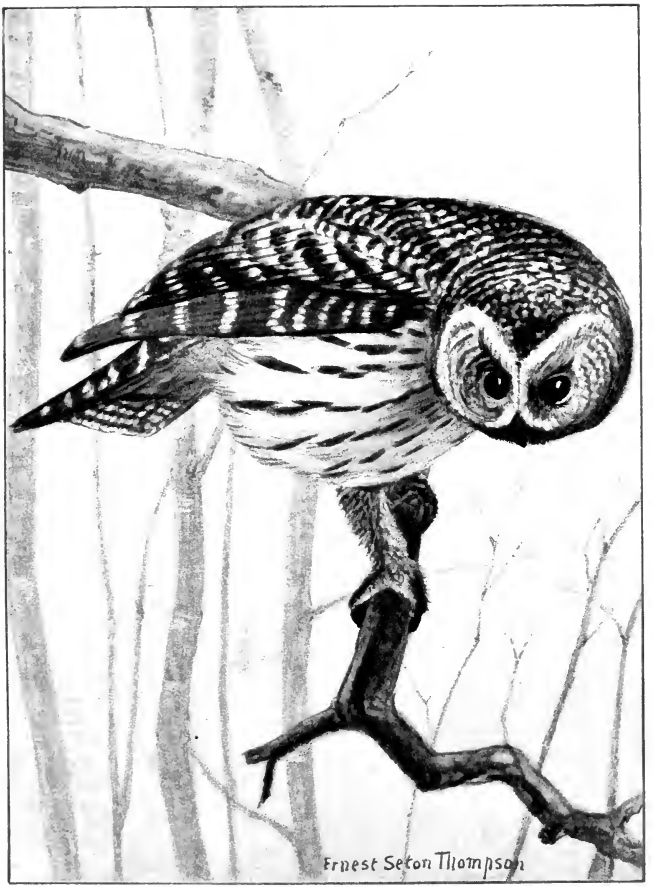


PLATE XXI. PAGE 111.

BARRED OWL.

Length, 20·00 inches. Upper parts blackish brown and white; under parts white and blackish brown; eyes black.

permanent residents of the tropics, where seasonal changes are less marked, could nest at any time. Nevertheless, the breeding season in the tropics is as well defined as it is in more northern regions, and occurs with the return of summer, or the season of rains. It is therefore at a time of the year when food is most abundant.

There is an obvious necessity for this regularity. Old birds can wander over large areas in search of food, but the young of many species must be fed in the nest, and their food supply should be both exhaustless and convenient of access.

Among our birds, the Hawks and Owls, whose young are fed on animal food, are the first birds to nest, while those which feed their young on fruit or insects wait until later in the year.

Mating.—Birds are ardent lovers. In their effort to win a bride the males display their charms of song and plumage to the utmost, and will even enter the lists to do battle for the possession of a mate.

It is not possible to describe here the many peculiar customs of birds during the season of courtship. It may simply be said that every bird will then repay the closest observation. For the scientific-minded there is opportunity to secure evidence bearing upon the theory of Natural Selection; for every one there is endless entertainment in the human traits which birds exhibit.

The Nest.—The first step in nest-building is the selection of a site. There is almost no suitable location, from a hole in the ground to branches in the tree-tops, in which birds may not place their nests. Protection seems to be the chief *desideratum*, and this is generally secured through concealment. Most birds hide their nests. Many sea birds, however, lay their eggs on the shores or cliffs, with no attempt at concealment; but, as a rule,

birds that nest in this manner resort to uninhabited islets and secure protection through isolation.

Some birds nest alone, and jealously guard the vicinity of their home from the approach of other birds, generally of the same species. Others nest in colonies brought together by temperament or community of interests, and dwell on terms of the closest sociability.

The material used by birds in building their nests is as varied as the nature of the sites they select. The vegetable kingdom contributes much the largest share. Grasses, twigs, and rootlets are the standard materials; but plant-down, plant-fibers, bark, leaves, lichens, clay, spiders' webs, hair, fur, and feathers are also used, while in some cases a gummy secretion of the salivary glands furnishes a kind of glue.

Birds have been classified, according to the manner in which they employ these articles, as weavers, tailors, masons, molders, carpenters, felters, etc.

Sometimes both sexes assist in the construction of the nest, or one bird collects the material while the other adjusts it. Again, the female performs the task alone, aided only by the encouraging voice of the male.

The time of construction varies from one to two weeks to as long as three months in the case of the South American Ovenbird, who in June begins to build the nest it will not occupy until October. The Fish Hawk evidently believes in the value of a stick in time, and often repairs its nest in the fall.

Lack of space prohibits a discussion of the influences which assist in determining the character of birds' nests. They may be summarized as follows:

First, necessity for protection.

Second, conditions imposed by locality. These affect both the site and material, as illustrated by Doves, who nest in trees in wooded countries and on the ground in

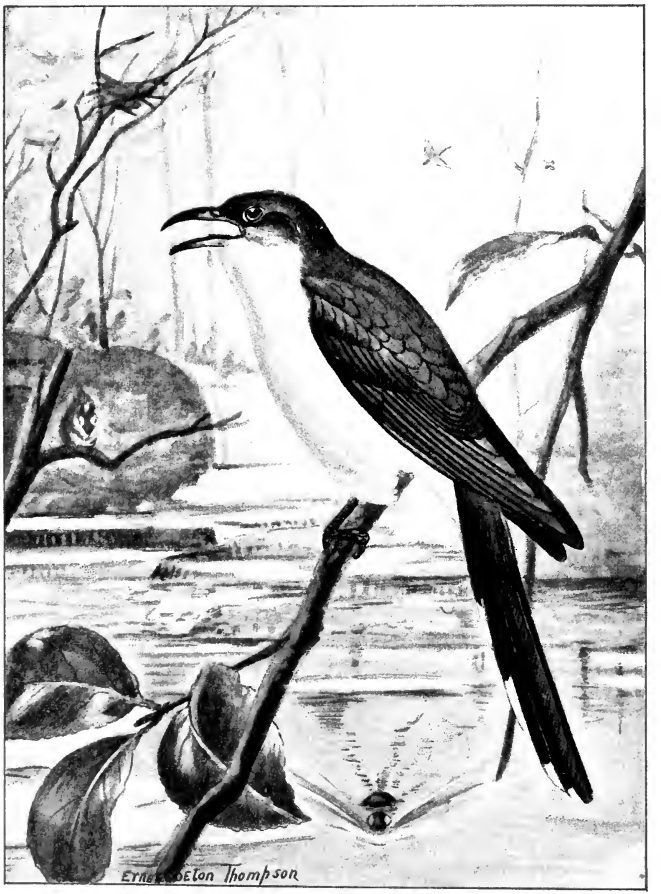


PLATE XXII. PAGE 112.

YELLOW-BILLED CUCKOO.

Length, 12·25 inches. Upper parts glossy olive-brown; outer tail-feathers black, tipped with white; under parts white; lower mandible yellow.

treeless regions, and by birds who substitute strings, cotton, or rags for their usual nesting materials.

Third, condition of the young at birth, whether feathered or naked. The young of what are termed "præcocial" birds are hatched with a covering of downy feathers. Gulls, Ducks, Snipe, Chickens, Partridges, and Quails are familiar members of this group. Their young can run about soon after birth, and a well-formed nest is not needed. But the young of "altricial" birds are hatched practically naked and are reared in the nest, which is therefore not only a receptacle for the eggs during incubation, but a home. Thrushes, Sparrows, in fact all Perching Birds, Woodpeckers, Hummingbirds, and many others belong in this group of altricial birds.

Fourth, temperament, whether solitary or social. Hawks, fierce and gloomy, nest alone, while the cheery, happy Swallows nest in colonies.

Fifth, structure of the bird. The tools—that is, the bills and feet—of some birds are more serviceable than those of others. We should not expect a Dove to build the woven nest of an Oriole, nor a Hummingbird to fashion a Woodpecker's dwelling.

Sixth, feeding habit. In some few cases feeding habit may determine the character of the nest. For instance, Woodpeckers, in securing their food from trees, often make large excavations, which it is quite natural they should have learned to use as nests.

Seventh, inherited habit, or instinct. There seems no reason to doubt that birds inherit their knowledge of nest-building, for in several cases where birds have been taken from the nest and reared alone, they have afterward constructed a nest resembling that of their species. It would therefore appear that inherited habit is a fact. Through it we may explain not only the similarity in the nests of the same species, but also certain habits for

which we can give no satisfactory reason. Thus the Crested Flycatcher's strange custom of using a cast snake-skin in its nesting materials probably originated with the birds in the tropics, where it is still followed by nearly related species of Crested Flycatchers. With them there may be a reason for this habit, but with our bird, living as it does under entirely different conditions, it is doubtless only an inheritance, surviving even when the necessity for it has ceased to exist.

Eighth, change of habit. Some birds are influenced by changes in their surroundings, and alter their nesting habits when it proves to their advantage to do so. Chimney Swifts, who have exchanged hollow trees, in which they were exposed to their natural enemies, for the comparative safety of chimneys, are good examples. But a far better one is given by that prodigy in feathers, the House Sparrow. Is there any available site in which this thoroughly up-to-date bird will not place its nest? It has taken possession of even the hollow spaces about certain kinds of electric lamps, and has been observed repairing its nest at night by their light!

The Eggs.—Usually, little time is lost between the completion of the nest and the laying of the eggs. The number of eggs composing what oölogists term a full set or clutch ranges from one to as many as twenty. At the time of laying, the ovary contains a large number of partly formed eggs, of which, normally, only the required number will become fully developed. But if the nest be robbed, the stolen egg will frequently be replaced. The long-continued laying of our domestic fowls is an instance of this unnatural stimulation of the ovary. Doubtless the most remarkable recorded case of egg-laying by a wild bird is that of a High-hole or Flicker, who, on being regularly robbed, laid seventy-one eggs in seventy-three days!

The eggshell is composed largely of carbonate of lime,

PLATE XXIII. PAGE 114.

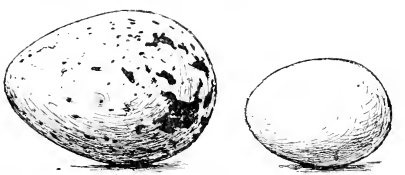
BELTED KINGFISHER.

Length, 13·00 inches. *Male*, upper parts bluish gray; under parts white, a bluish-gray breast-band and sides. *Female*, similar, but breast and sides with reddish brown.

which is deposited in layers. The final layer varies greatly in appearance, and may be a rough, chalky deposit, as in Cormorants and others, or thin and highly polished, as in Woodpeckers.

The colors of eggs are due to pigments, resembling bile pigments, deposited by ducts while the egg is in the oviduct. One or more of the layers of shell may be pigmented, and variations in the tints of the same pigment may be caused by an added layer of carbonate of lime, producing the so-called "clouded" or "shell markings."

While the eggs of the same species more or less closely resemble one another, there is often so great a range of variation in color that, unless seen with the



a *b*

FIG. 24.—Egg of (*a*) Spotted Sandpiper, (*b*) Catbird, to show difference in size of eggs of præcocial and altricial birds of same size. (Natural size.)

parent, it is frequently impossible to identify eggs with certainty. The eggs of præcocial birds, whose young are born with a covering of down and can run or swim at birth, are, as a rule, proportionately larger than the eggs of altricial birds, whose young are born in a much less advanced condition. This is illustrated by the accompanying figure of the eggs of the Spotted Sandpiper and the Catbird.

The period of incubation is apparently closely dependent upon the size of the egg, and varies from ten days in the Hummingbird to forty odd in the Ostrich and, it is said, some fifty in the Emu.

Among some species both sexes share equally the task of incubation. In others, the female is longer on the nest, the male taking her place during a short period each day while she is feeding. Less frequently the female is not at all assisted by her mate, and in some cases—Ostriches, Emus, Phalaropes, and a few others—the male alone incubates.

The Young.—The care of the young and their mental and physical development afford us unequaled opportunities for the study of bird character. We may now become acquainted not only with the species but with individual birds, and at a time when the greatest demands are made upon their intelligence.

We may see the seed-eaters gathering insects and perhaps beating them into a pulp before giving them to their nestlings: or we may learn how the Doves, High-holes, and Hummingbirds pump softened food from their crops down the throats of their offspring.

The activity of the parents at this season is amazing. Think of the day's work before a pair of Chickadees with a family of six or eight fledglings clamoring for food from daylight to dark!

But the young birds themselves furnish far more interesting and valuable subjects for study. None of the higher animals can be reared so easily without the aid of a parent. We therefore can not only study their growth of body and mind when in the nest and attended by their parents, but we can isolate the young of præcocial birds, such as Chickens, from other birds and study their mental development where they have no opportunity to learn by imitation. In this way students of instinct and heredity have obtained most valuable results.*

* Read Lloyd Morgan's Habit and Instinct (Edward Arnold, New York city).

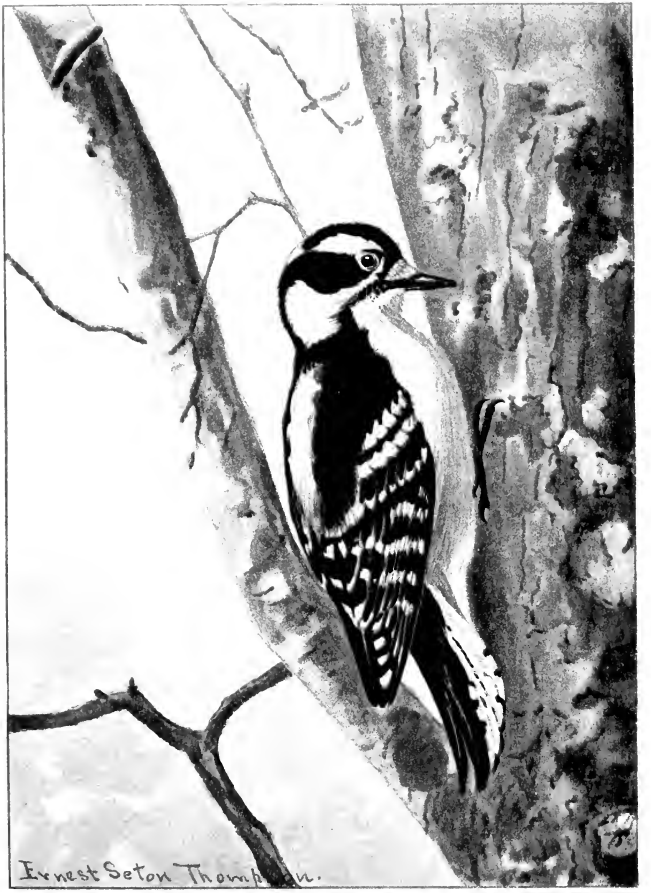


PLATE XXIV. PAGE 115.

DOWNY WOODPECKER.

Length, 6·75 inches. *Male*, upper parts black and white, nape scarlet; under parts white. *Female*, similar, but no scarlet on nape.

CHAPTER VII.

HOW TO IDENTIFY BIRDS.

The preceding outline of the events which may enter into a bird's life-history has, I trust, given some idea of the possibilities attending the study of birds in the field. We come now to the practical question of identification. How are we to find birds, and, having found them, how are we to learn their names?

From April to August there is probably not a minute of the day when in a favorable locality one can not see or hear birds; and there is not a day in the year when at least some birds can not be found. In the beginning, therefore, the question of finding them is simply a matter of looking and listening. Later will come the delightful hunts for certain rarer species whose acquaintance we may make only through a knowledge of their haunts and habits.

Having found your bird, there is one thing absolutely necessary to its identification: *you must see it definitely.* Do not describe a bird to an ornithologist as "brown, with white spots on its wings," and then expect him to tell you what it is. Would you think of trying to identify flowers of which you caught only a glimpse from a car window in passing? You did not see them definitely, and at best you can only carry their image in your mind until you have opportunity to see them in detail.

So it is with birds. Do not be discouraged if the books fail to show you the brown bird with white spots

on its wings. Probably it exists only through your hasty observation.

Arm yourself with a field- or opera-glass, therefore, without which you will be badly handicapped, and look your bird over with enough care to get a general idea of its size, form—particularly the form of the bill—color, and markings. Then—and I can not emphasize this too strongly—put what you have seen into your note-book *at once*. For, as I have elsewhere said, "not only do our memories sometimes deceive us, but we really see nothing with exactness until we attempt to describe it."

It is true that all the birds will not pose before your glasses long enough for you to examine them at your leisure, but many of them will, and in following the others you will have all the excitement of the chase. Who knows what rare species the stranger may prove to be!

From your description, and what added notes on voice and actions you may obtain, the field key and illustrations on the succeeding pages should make identification a simple matter.* You should also take into consideration the season of the year when a bird is present, and not call a summer bird by a winter bird's name. The dates of migration given in the following pages will be of assistance here. They refer to the vicinity of New York city, where, in the spring, birds arrive about a week later

* The publishers' liberality has resulted in securing bird portraits of unusual excellence. Mr. Seton Thompson is an ornithologist as well as an artist; his subjects are personal friends. He has spared no effort to make these pictures characteristic life sketches, and I venture to claim that, as a whole, they excel in truth and beauty any bird-drawings ever published in this country.

than in central Illinois or at Washington, D. C., and a week earlier than at Boston. In the fall these conditions are reversed.

A Bird's Biography.—As a further guide to your observation a list of the principal details which enter into a bird's life-history is appended:

1. DESCRIPTION (of size, form, color, and markings).
2. HAUNTS (upland, lowland, lakes, rivers, woods, fields, etc.).
3. MOVEMENTS (slow or active, hops, walks, creeps, swims, tail wagged, etc.).
4. APPEARANCE (alert, pensive, crest erect, tail drooped, etc.).
5. DISPOSITION (social, solitary, wary, unsuspicious, etc.).
6. FLIGHT (slow, rapid, direct, undulating, soaring, sailing, flapping, etc.).
7. SONG (pleasing, unattractive, continuous, short, loud, low, sung from the ground, from a perch, in the air, etc.; season of song).
8. CALL-NOTES (of surprise, alarm, protest, warning, signaling, etc.).
9. SEASON (spring, fall, summer, winter, with times of arrival and departure, and variations in numbers).
10. FOOD (berries, insects, seeds, etc.; how secured).
11. MATING (habits during courtship).
12. NESTING (choice of site, material, construction, eggs, incubation).
13. THE YOUNG (food and care of, time in the nest, notes, actions flight).

From observations of this kind, consisting of a simple statement of facts, you may philosophize according to your nature on the relation between habit and structure, colors and haunts, and intelligent adaptation to new conditions. Beware, however, lest you be led to draw faulty conclusions from insufficient observation. Do not make the individual stand for its species, or the species for its family, and remember that one is warranted in theorizing only when the facts in the case are facts indeed.

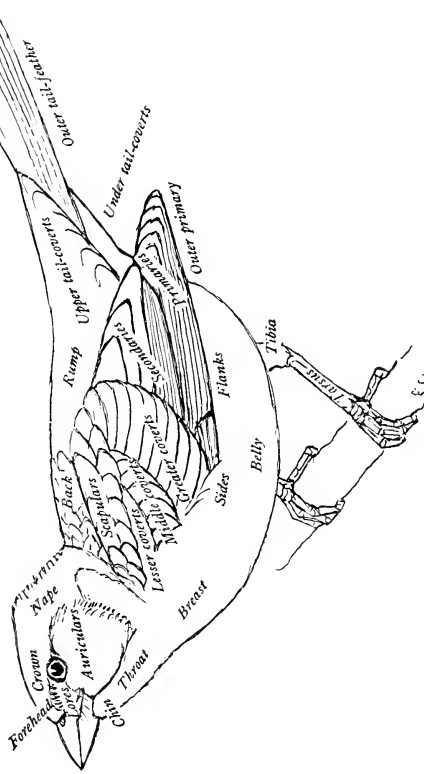


FIG. 25.—Topography of a bird. (House Sparrow, nearly natural size.) The "upper parts" include all the upper surface except wings and tail; the "under parts" all the under surface except wings and tail. The "length" is the distance from tip of the bill to end of the tail.

CHAPTER VIII.

A FIELD KEY TO OUR COMMON LAND BIRDS.

When you have seen a bird with sufficient definiteness to describe its color, form, and actions, reference to the following key will often prove a short cut to its identity. This key is based only on adult males, who, because of their song, often brighter colors, and greater activity, are far more frequently observed than the females. But, knowing the male, you will rarely, during the nesting season, be at loss to recognize his mate.

In order to simplify the key, the water birds, Hawks, and Owls are omitted, in the belief that they will be more readily identified by reference to the plates.

The use of the key may be illustrated by the following example: Let us imagine that you see a Chipping Sparrow (Plate XLV) feeding about your doorstep. You note his size, chestnut cap bordered by white, black bill, brownish, streaked back, and grayish white, unmarked under parts. Turning now to the key, you will see that by exclusion the bird belongs in "Section V" of the "Third Group," and that it should be placed in subsection "1" of this section, which includes birds having the "under parts white or whitish, all *one* color, *without* streaks or spots." You have now two subdivisions to choose from—"A. Back *without* streaks or spots," and "B. Back brownish, streaked." Your bird falls under "B," where again you have two subdivisions, "*a*. Crown rufous or chestnut, without streaks," and "*b*. Crown not rufous or chestnut." Your bird should be referred to "*a*," where you will at once find it described under "*a*^{1}" as the Chipping Sparrow.

It should be borne in mind that living birds do not look as long as they really are. The measurement of "length" is taken with the bird's neck and tail outstretched in a straight line. In life the tail may be raised or drooped, while the neck is drawn in or curved, making the bird look shorter than measurement shows it to be. Remember that the Robin measures ten inches, the House Sparrow six and one-fourth inches, and the Ruby-throated Humming-bird three and three-fourths inches in length, and you will have a basis for comparison.

FIRST GROUP.

BIRDS THAT FEED ON THE WING FOR LONG INTERVALS OF TIME WITHOUT PERCHING.

(*Swallows, Swift, Nighthawk, Whip-poor-will.*)

I. Size large, length over 9·00 inches; the spread wings over 15·00 inches in extent; generally seen only late in the afternoon or at dusk.

1. A bird of the air, flying high, often over housetops in cities; a conspicuous white spot in each wing; note, a loud, nasal *peent*; sometimes dives earthward with a *booming* sound; May to Oct. . NIGHTHAWK, page 118.
2. Haunts, near the ground, not often observed while feeding; call, given from a rock, stump, or similar perch, *whip-poor-will*, vigorously repeated; Apl. 25 to Oct. . . . . WHIP-POOR-WILL, page 119.

II. Size smaller, length under 9·00 inches; the spread wings less than 15·00 inches in extent; may be seen at any time of the day.

1. Plumage entirely black.
   a. Length 5·50 inches; plumage sooty black; usually nests in chimneys; Apl. 25 to Oct. . . . . CHIMNEY SWIFT, page 119.
   b. Length 8·00 inches; glossy, bluish black; nests in gourds or houses erected for its use; Apl. 25 to Sept. . . . PURPLE MARTIN, page 161.
2. Plumage not entirely black; Apl. to Oct. . SWALLOWS, pages 159, 160.

SECOND GROUP.

CLIMBING AND CREEPING BIRDS.

(*Nuthatches, Creepers, Woodpeckers.*)

I. Birds *without* stiffly pointed tail-feathers, that climb either up or down.

1. Length 6·00 inches; back gray, cap black, cheeks and under parts white; note, a nasal *yank, yank*; a permanent resident.
   WHITE-BREASTED NUTHATCH, page 180.

2. Length 4·50 inches; back gray, cap black, a blackish streak through the face; under parts reddish brown; note, high and thin, like the tone of a penny trumpet; Sept. to Apl. RED-BREASTED NUTHATCH, page 181.
3. Length 5·25 inches; upper parts streaked black and white; note, a thin wiry *see-see-see-see*; Apl. 25 to Oct.

BLACK AND WHITE WARBLER, page 167.

II. Birds with stiffly pointed tail-feathers, that always climb upward.

1. Length 5·65 inches; plumage dull brown and black; size small, bill slender; an inconspicuous bird who winds his way up the trunks searching for insects' eggs, etc.; note, fine and squeaky; Sept. 25 to Apl.

BROWN CREEPER, page 178.

2. Plumage with more or less white, size larger, bill stouter, chisel-like, often used in hammering.

A. Length 9·75 inches; head red, back black; flight showing a large white patch in the wing . . . RED-HEADED WOODPECKER, page 116.

B. Length 12·00 inches; crown gray; a red band on the nape; flight showing a white patch on the lower back and yellow in the wings; often flushed from the ground; note, *kĭe-yer* . . FLICKER, page 116.

C. Length 6·75 inches; crown black; back and wings black and white; note, a sharp *peek* . . . . . DOWNY WOODPECKER, page 115.

THIRD GROUP.

BIRDS NOT INCLUDED IN THE PRECEDING GROUPS.

(*Blackbirds, Orioles, Sparrows, Vireos, Warblers, Thrushes, etc.*)

SECTION I. With yellow or orange in the plumage.
SECTION II. With red in the plumage.
SECTION III. With blue in the plumage.
SECTION IV. Plumage conspicuously black, or black and white.
SECTION V. Birds not included in the preceding sections.

I. With yellow or orange in the plumage.

1. Throat yellow.

A. Throat and breast pure yellow, *without* streaks or spots.

a. Length 5·10 inches; cap, wings, and tail black; back yellow; song canarylike, sometimes uttered on the wing; flight undulating, frequently accompanied by the notes *chĭc-o-rée, per-chĭc-o-rée*; a permanent resident . . . . . AM. GOLDFINCH, page 148.

b. Length 5·95 inches; lower belly and wing-bars white; back olive-green; frequents the upper branches, generally in woodland; actions deliberate; song loud and musical, uttered slowly, often with pauses: "See me? I'm here; where are you?"; May to Sept.

YELLOW-THROATED VIREO, page 165.

c. Length 5·25 inches; cheeks and forehead black, bordered by ashy; upper parts olive-green; no wing-bars; haunts thickets and undergrowth; movements nervous and active; call-note *pĭt* or *chack*; song, a vigorous, rapid *witch-e-wée-o, witch-e-wée-o*; May to Oct.

MARYLAND YELLOW-THROAT, page 171.

d. Length 7·45 inches; upper parts olive-green; no wing-bars; a white line before the eye; haunts thickets and undergrowth; song, a striking mixture of whistles, *chucks*, and *caws*, sometimes uttered on the wing; May to Sept. . . . . YELLOW-BREASTED CHAT, page 172.

B. Under parts streaked with reddish brown; length 5·00 inches; general appearance of a yellow bird; haunts shrubbery of lawns, orchards, second growths, and particularly willows near water; song, rather loud, *wēē, chēē-chēē-chēē, chēr-wēē*, or *chēē-chēē-chēē-chēē, wity-o*; May to Sept.

YELLOW WARBLER, page 168.

C. Breast yellow, with a conspicuous black crescent; length 10·75 inches; haunts fields and meadows, largely terrestrial; flight quail-like, outer tail-feathers white, showing when on the wing; song, a loud, musical whistle; a permanent resident . . . . . MEADOWLARK, page 136.

2. Throat white.

A. With yellow on the sides.

a. Length 5·50 inches; rump yellow; breast streaked or spotted with black; tail-feathers marked with white; note, a characteristic *tchip*; Sept. to May, usually rare or local in winter.

MYRTLE WARBLER, page 168.

b. Length 5·00 inches; no black on under parts or white in the tail; yellow extending along the whole sides; back olive-green, iris white; haunts thickets; call, an emphatic "Who are you, eh?"; May to Oct.

WHITE-EYED VIREO, page 165.

c. Length 5·25 inches; tail and wings banded with yellow, showing conspicuously in flight; haunts woodland; movements active, much in the air, tail frequently spread; May to Oct. REDSTART, page 169.

B. No yellow on sides.

a. Length 6·75 inches; a yellow line from the bill to the eye; crown black, with a white stripe through its center; haunts in and about thickets and bushy woodlands; song, a high, clear, musical whistle; call-note, *chink* . . . . . WHITE-THROATED SPARROW, page 143.

b. Length 4·00 inches; a yellow, or yellow and orange crown-patch, bordered by black; flits restlessly about outer limbs of trees and bushes; note, a fine *ti-ti*; Oct. to Apl. GOLDEN-CROWNED KINGLET, page. 181.

3. Throat neither yellow nor white.

A. Length 12·00 inches; white rump and yellow in wings showing conspicuously in flight; a black breast-band; note, a loud *kē-yer.*

FLICKER, page 116.

B. Length 9·00 inches; crested; breast ashy, belly yellow; tail-feathers largely pale brownish red; haunts upper branches in woodland; note, a loud questioning or grating whistle; May to Sept.

CRESTED FLYCATCHER, page 123.

C. Length 7·50 inches; throat and head black; brenst, belly, and lower back deep orange; haunts fruit and shade trees; song, a loud, ringing whistle; May to Sept. . . . . BALTIMORE ORIOLE, page 131.

D. Length 7·20 inches; crested; grayish brown; a black line through the eye; tail tipped with yellow; generally seen in small flocks; note thin and weak . . . . . CEDAR WAXWING, page 161.

II. With red in the plumage.

1. With red on the under parts.
   A. Throat red.
      a. Length 7·25 inches; wings and tail black; rest of plumage bright scarlet; call-note, *chip-chirr*; May to Sept.
      SCARLET TANAGER, page 156.
      b. Length 6·20 inches; dull, pinkish red, wings and tail brownish; frequently seen feeding on buds or blossoms; call-note, a sharp *chink*, often uttered during flight; song, a sweet, flowing warble.
      PURPLE FINCH, page 149.
      c. Length 6·20 inches; dull red or green tinged with red; mandibles crossed; generally seen in flocks; feeds on pine cones.
      AM. CROSSBILL, page 147.
      d. Length 5·30 inches; a red crown-cap; back streaked black and brown; breast rosy; feeds on seeds or catkins; Nov. to Mch.
      REDPOLL, page 146.
   B. Throat black.
      a. Length 8·00 inches; breast rose-red, rest of plumage black and white; song loud and musical; call-note, *peek*; May to Sept.
      ROSE-BREASTED GROSBEAK, page 150.
      b. Length 8·00 inches; a conspicuous crest; region about the base of the bill black; rest of the plumage and bill red; song, a clear whistle; resident from New York city southward.
      CARDINAL, page 153.
      c. Length 5·40 inches; wings and tail banded with orange-red, showing conspicuously in flight: movements active; much in the air; tail frequently spread; haunts woodland; May to Oct.
      REDSTART, page 169.
2. No red on the under parts.
   A. Length 9·50 inches; black; shoulders red; haunts marshes; migrates in flocks; Mch. to Oct. . . . . RED-WINGED BLACKBIRD, page 132.
   B. Length 5·25 inches: crown-cap red; chin black; rest of under parts streaked with blackish; feeds on seeds and catkins; Nov. to Mch.
   REDPOLL (im.), page 146.
   C. Length 4·00 inches; under parts whitish; back olive-green; a ruby crown-patch; eye-ring white; movements restless, wings flitted nervously; call-note, *cack*; song remarkably loud and musical; Sept. and Oct.; Apl. and May . . . . . RUBY-CROWNED KINGLET, page 182.

III. With blue in the plumage.

A. Length 11·50 inches; a conspicuous crest; upper parts dull blue; under parts whitish; a black patch on the breast.
BLUE JAY, page 130.
B. Length 7·00 inches; upper parts bright blue; under parts cinnamon-brown . . . . . BLUEBIRD, page 186.
C. Length 5·50 inches; entire plumage indigo-blue; May to Oct.
INDIGO BUNTING, page 152.
D. Length 13·00; bluish gray; haunts near water; feeds on fish, which it catches by darting on them at the surface . KINGFISHER, page 114.

IV. Plumage conspicuously black, or black and white.

1. Black and white birds.
   A. Throat black.
      a. Length over 6·00 inches.
         a^1. Entire under parts black; nape buffy; rump white; a musical dweller of fields and meadows; frequently sings on the wing; May to Sept. . . . . BOBOLINK, page 134.
         a^2. Breast rose-red; rest of the plumage black and white; song rapid, loud and musical; call-note, *peek*; a tree dweller in rather open woodland; May to Sept.
         ROSE-BREASTED GROSBEAK, page 150.
         a^3. Sides reddish brown; rest of the plumage black and white; call-note, *chewink* or *towhèe*; inhabits the undergrowth; often seen on ground scratching among fallen leaves; Apl. 25 to Oct.
         TOWHEE, page 151.
      b. Length under 6·00 inches.
         b^1. Crown black; cheeks white; back ashy; unstreaked; call, *chick-a-dee*, or a musical, double-noted whistle; a permanent resident.
         CHICKADEE, page 179.
   B. Throat and other parts white or whitish.
      a. Length 8·50 inches; upper parts blackish slate-color; tail tipped with white; a bird of the air, catching its insect food on the wing, and occasionally sallying forth from its exposed perch in pursuit of a passing Crow; note, an unmusical, steely chatter; May to Sept.
      KINGBIRD, page 122.
      b. Length 6·90 inches; upper parts washed with rusty; generally seen in flocks; terrestrial; Nov. to Mch. . . . . SNOWFLAKE, page 147.
2. No white in the plumage.
   A. Length 19·00 inches; jet black . . . . . AM. CROW, page 128.
   B. Length 12·00 inches; black with metallic reflections; iris yellowish; migrates in flocks; nests usually in colonies in coniferous trees; voice cracked and reedy; tail "keeled" in short flights; a walker; Mch. to Nov. . . . . PURPLE GRACKLE, page 133.
   C. Length 9·50 inches; shoulders red; haunts marshes; call, *kong-quĕr-rēē*; Mch. to Oct. . . . . RED-WINGED BLACKBIRD, page 132.
   D. Length 7·90 inches; head and neck coffee-brown; frequently seen on the ground near cattle; Mch. to Nov. . . . . COWBIRD, page 137.

V. Birds not included in the preceding sections (that is, plumage without either yellow, orange, red, or blue; not conspicuously black, or black and white).

1. Under parts white or whitish, all *one* color, *without* streaks or spots.
   A. Back *without* streaks or spots.
      a. Back olive-green; gleaners, exploring the foliage for food or flitting about the outer branches.
         a^1. Length 6·25 inches; a white line over the eye bordered by a narrow black one; cap gray; iris red; song, a rambling recitative: "You see it—you know it—do you hear me?" etc.; May to Oct.
         RED-EYED VIREO, page 164.

a^2. Length 5·75 inches; a white line over the eye not bordered by black; prefers the upper branches of rows of elms and other shade trees; song, a rich, unbroken warble with an alto undertone; May to Sept. . . . . WARBLING VIREO, page 165.

a^3. Length 4·00 inches; no white line over the eye; eye-ring and wing-bars white; a tiny, unsuspicious bird; flits about the outer branches of trees and shrubs; wings twitched nervously; note, *cack*; song, a remarkably loud, musical whistle; Sept. and Oct.; Apl. and May . . . . . RUBY-CROWNED KINGLET, page 182.

b. Back olive-green or dusky olive; flycatchers who capture their prey on the wing by darting for it, and while perching are quiet and erect.

b^1. Length 7·00 inches; frequently found nesting under bridges or about buildings; crown blackish; tail wagged nervously; notes, *pee, pee*, and *pewit-phœbe*; Mch. to Oct. . . . PHŒBE, page 124.

b^2. Length 6·50 inches; haunts wooded growths; note, a plaintive *pee-a-wee*; May to Sept. . . . . WOOD PEWEE, page 126.

b^3. Length 5·40 inches; haunts orchards, lawns, and open woodlands; note, *chebec, chebec* . . . . . LEAST FLYCATCHER, page 125.

c. Back gray or bluish gray.

c^1. Length 6·50 inches; a gray, crested bird; forehead black; no white in the tail; note, a whistled *peto, peto*, or hoarse *de-de-de-de*; resident from New York city southward . . TUFTED TIT, page 180.

c^2. Length 8·50 inches; a white band at the end of the tail; a concealed orange-red crest; a bird of the air, catching its insect food on the wing, and occasionally sallying forth from its exposed perch in pursuit of a passing Crow; note, an unmusical, steely chatter; May to Sept. . . . . KINGBIRD, page 122.

d. Back brown.

d^1. Length 5·00 inches; a nervous, restless, excitable bird; tail often carried erect; song sweet, rapid and rippling, delivered with *abandon*; Apl. 25 to Oct. . . . . HOUSE WREN, page 175.

d^2. Length 12·25 inches; slim, brownish birds with long tails; flight short and noiseless; perch *in* a tree, not in an exposed position; note, *tut-tut, cluck-cluck*, and *cow-cow*; May to Oct.

YELLOW-BILLED CUCKOO, BLACKBILLED CUCKOO, pages 112, 113.

B. Back brownish, streaked.

a. Crown rufous or chestnut without streaks.

a^1. Length 5·25 inches; bill black; a whitish line over the eye; a familiar bird of lawns and door-yards; song, a monotonous *chippy-chippy-chippy*; Apl. to Nov. . . CHIPPING SPARROW, page 142.

a^2. Length 5·70 inches; bill *reddish brown*, back rufous or rufous-brown; wing-bars and eye-ring whitish; haunts dry, bushy fields and pastures; song, a musical, plaintive *cher-wee, cher-wee, cher-wee, cheeo, dee-dee-dee-dee*; Apl. to Nov. FIELD SPARROW, page 140.

a^3. Length 5·90 inches; forehead black; crown and wings chestnut-rufous; flanks pale grayish brown; haunts marshes; song, a rapidly repeated *weet-weet-weet*, etc.; Mch. to Nov.

SWAMP SPARROW, page 139.

b. Crown not rufous or chestnut.

*b*¹. Length 6·75 inches; crown blackish, with a central whitish stripe; throat white; breast gray; a yellow spot before the eye; haunts in and about thickets and bushy woodlands; song, a high, clear, musical whistle; call-note, *chink*.

WHITE-THROATED SPARROW, page 143.

*b*². Length 5·20 inches; bill slender; a white line over the eye; tail carried erect; haunts reedy marshes; call-note scolding; song rippling; May to Oct.

LONG-BILLED MARSH WREN, page 177.

2. Under parts white or whitish, *streaked* or *spotted*.

A. Back streaked.

a. Length 6·10 inches; outer tail-feathers white, showing conspicuously when the bird flies; haunts dry fields and roadsides; song musical; Apl. to Nov. . . . . VESPER SPARROW, page 141.

b. Outer tail-feathers *not* white.

*b*¹. Length 6·30 inches; breast with numerous spots tending to form one large spot in its center; haunts on or near the ground, generally in the vicinity of bushes; call-note, *chimp*; song musical; a permanent resident . . . . . SONG SPARROW, page 138.

*b*². Length 6·35 inches; breast grayish with *one* spot in its center; Oct. to Apl. . . . . TREE SPARROW, page 146.

B. Back *not* streaked; breast spotted.

a. Length 11·40 inches; tail 5·00 inches; wing-bars white; upper parts, wings, and tail bright cinnamon-brown; haunts undergrowth; sings from an exposed and generally elevated position; song loud, striking, and continuous; Apl. 25 to Oct. . . BROWN THRASHER, page 175.

b. Length under 9·00 inches; tail under 3·00 inches; no wing-bars; back *reddish* or *cinnamon-brown*.

*b*¹. Length 8·25 inches; breast and *sides* heavily marked with large, *round*, black spots; head and upper back *brighter* than lower back and tail; call-note, a sharp *pit* or liquid *quirt*; May to Oct.

WOOD THRUSH, page 184.

*b*². Length 7·15 inches; breast with wedge-shaped black spots; sides *unspotted*, washed with *brownish ashy*: tail reddish brown, *brighter* than back; call-note, a low *chuck*; Apl. 10 to May 10; Oct. and Nov. . . . . HERMIT THRUSH, page 185.

*b*³. Length 7·50 inches; upper breast *lightly* spotted with small, wedge-shaped, brownish spots; tail the same color as the back; sides *white*; call-note, a clearly whistled *wheĕu*; May to Sept.

WILSON'S THRUSH, page 183.

c. Length under 9·00 inches; tail under 3·00 inches; no wing-bars; back *olive-green*.

*c*¹. Length 6·10 inches; center of crown pale brownish bordered by black; haunts on or near the ground in woodland; a *walker*; song, a ringing crescendo, teacher, *teacher*, TEACHER, TEACHER, *TEACHER*; May to Sept.. . . . . OVEN-BIRD, page 170.

3. Under parts *not* white or whitish, all *one* color, *without* streaks.
   A. Length 8·50 inches; slate-color; cap and tail black; inhabits the lower growth; call-note, nasal; song highly musical and varied; Apl. 25 to Oct. . . . . CATBIRD, page 173.
   B. Length 7·20 inches; grayish brown; conspicuously crested; a black line through the eye; tail tipped with yellow; generally seen in small flocks; note thin and weak . . . . . CEDAR WAXWING, page 161.
   C. Length 5·50 inches; under parts cream-buff; a conspicuous whitish line over the eye; upper parts reddish brown; movements active; tail carried erect; haunts lower growth; notes loud and striking; resident from New York city southward . . . . CAROLINA WREN, page 177.
4. Throat and upper breast black or slate-color, very different from the white or chestnut belly.
   A. Throat black.
      a. Belly and rump chestnut; head, wings, and tail black; length 7·30 inches; haunts orchards and shade trees; song highly musical; May to Sept. . . . . ORCHARD ORIOLE, page 132.
      b. Belly white; sides reddish brown; tail black and white; length 8·35 inches; haunts undergrowths; call-note, *chewink* or *towhee*; Apl. 25 to Oct. . . . . TOWHEE, page 151.
   B. Throat slate-color.
      a. Back and wings slate-color; outer tail-feathers and belly white; length 6·25 inches; haunts generally on or near the ground about shrubbery; Oct. to Apl. . . . . JUNCO, page 145.
5. Throat streaked with black and white; rest of under parts reddish brown; upper parts grayish slate-color; length 10·00 inches . ROBIN, page 186.

OUR COMMON BIRDS.

THE WATER BIRDS.

DIVING BIRDS. (ORDER PYGOPODES.)

GREBES. (FAMILY PODICIPIDÆ.)

THE study of water birds requires special advantages and equipments, among which are a suitable location, much time, and a gun. Our coasts and shores are becoming so popular as "resorts" that many of the former haunts of waterfowl are now thickly populated, and the birds are comparatively rare. Furthermore, the larger number of our water birds nest in the far North and winter in the South, visiting the Middle States only while on their migrations. It is evident, therefore, that if we would become familiar with these birds, we must devote ourselves especially to their pursuit.

There are, however, some species, notably those which frequent bodies of fresh water and nest in this latitude, which deserve to be ranked among our commoner birds. Of these, one of the best known, by name at least, is the Pied-billed Grebe, whose aquatic powers have given it the expressive title of Hell-diver.

Pied-billed Grebe,
Podilymbus podiceps.
Plate II.

Under favorable conditions this little Grebe may breed anywhere from the Argentine Republic to British America, but in the Middle States it occurs chiefly as a spring and fall migrant. When nesting, a quiet, reedy pond or lake is chosen for a home, the nest being made on a pile of decaying vegetation. The eggs, four to eight in number, are dull white, more or less stained by the nesting material, which the parent bird rarely fails to place over

PLATE XXV. PAGE 116.

RED-HEADED WOODPECKER.

Length, 9·75 inches. *Adult*, whole head and neck deep red, back and tail black; upper tail-coverts, greater part of secondaries, and belly white. *Young*, similar, but head, back, throat, and sides grayish black.

them when leaving the nest. The young are born covered with down and can swim at birth. The Pied-billed Grebe is one of our most aquatic birds. When pursued, it prefers diving to flight, and the marvelous rapidity with which it can disappear from the surface of the water, to reappear in a quite unexpected place, justifies its reliance on its own natatorial powers. It can swim under water with only its bill exposed, when it becomes practically invisible.

When on land Grebes progress awkwardly. They can, it is said, stand erect on their toes, but, when resting, support themselves on the whole length of the foot or tarsus (see Fig. 8, the Great Auk).

On the wing Grebes resemble small Ducks, but their pointed bill and their feet stretched out behind the rudimentary tail will serve to distinguish them.

Loons. (Family Urinatoridæ.)

Loon,
Urinator imber.
Plate III.

The Loon, like its small relative the Grebe, is known to almost every one by name, but only those who have visited its summer haunts among the Northern lakes and heard its wild call can be said to know it. Nuttall writes of its cry as "the sad and wolfish call of the solitary Loon, which, like a dismal echo, seems slowly to invade the ear, and, rising as it proceeds, dies away in the air." It "may be heard sometimes for two or three miles, when the bird itself is invisible, or reduced almost to a speck in the distance." The Loon is as aquatic in habits as the Grebe, but is much stronger on the wing. It migrates by day, and probably also by night, and we may sometimes see it passing over—a large, ducklike bird—in March and October.

When on land, it is nearly helpless, progressing awk-

wardly by the use of feet, wings, and bill. For this reason it nests near the water's edge, often where it can slide from the eggs directly into its true element. The nest is a slight depression in the earth, in which are laid two elliptical eggs, in color olive-brown, slightly spotted with blackish.

LONG-WINGED SWIMMERS. (ORDER LONGIPENNES.)

Gulls and Terns. (Family Laridæ.)

No birds are more widely distributed than the Gulls and Terns. Some species are pelagic, visiting the land only at long intervals and when nesting; others live along the coast, and several species resort to inland waters. About one hundred species are known, fifty being Gulls and fifty Terns. The former are, as a rule, larger, stouter birds than the latter, and, generally speaking, are more maritime. The commonest of the ten species found in the Eastern States is the Herring Gull. It nests from Maine northward, and is found southward along our coast from October 1 to April. This is the Gull we see in such numbers in our bays and harbors, flying gracefully and apparently aimlessly about, but in reality ever keeping its bright black eyes fixed on the water in search of some floating morsel, which it deftly picks from the surface. It frequently follows vessels, hanging over the stern day after day, and deserting its post only to feed on scraps thrown overboard from the galley. There are said to be reliable records of these birds following the same vessel from the Irish coast to New York Harbor.

Herring Gull,
Larus argentatus smithsonianus.
Plate IV.

Gulls do excellent service in devouring much refuse that would otherwise be cast ashore to decay; but, useful

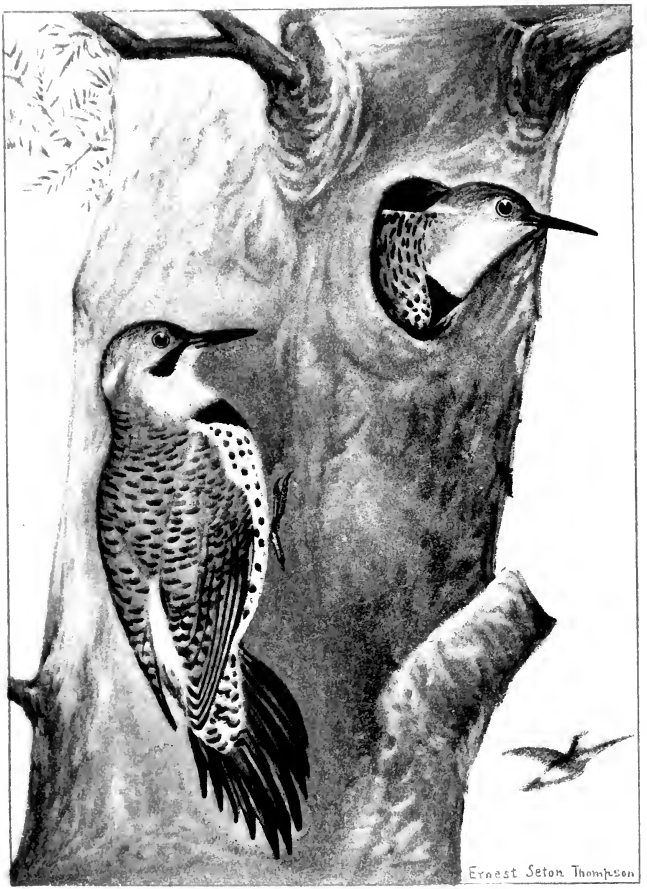


PLATE XXVI. PAGE 116.

FLICKER.

Length, 12·00 inches. *Male*, crown gray, nape scarlet, back brownish and black, rump white; under surface of wings and tail yellow; sides of throat and breast-patch black; belly spotted with black. *Female*, similar, but no black on sides of throat.

as they are as scavengers, I feel that their place in Nature is to animate the barren wastes of the sea. How, when at sea, the presence of a single Gull changes the whole aspect of Nature! The great expanse of water, which before was oppressive in its dreary lifelessness, is transformed by the white-winged Gulls into a scene of rare beauty. Every voyager, be he naturalist or not, admires their grace of form and motion. They seem born of the waves, and as much a part of the ocean as the foamy whitecaps themselves.

The beautiful Terns or Sea Swallows are even more graceful than the Gulls. They are slenderer birds, lighter and more active on the wing, with long, forked tails and pointed bills. They arrive from the South in May and remain until September, nesting in colonies.

Common Tern,
Sterna hirundo.
Plate X.

Terns are littoral rather than pelagic, seldom being found far from the shore. Like the Gulls, they seem so in harmony with their surroundings that no coast view is perfect from which the Terns are missing. They add the requisite touch of life, and make still more impressive the thunder of the surf dashing over rocks or curling in long, combing waves on the beach.

During recent years these birds have been killed in such numbers for millinery purposes that on the middle Atlantic coast the only survivors exist on three or four uninhabited islets. If one protests against the merciless destruction of these exquisite creatures the excuse is, "Well, what good are they?"—an answer betraying such an utter lack of appreciation of beauty that explanation seems hopeless. But can we not learn, before it is too late, that these birds are even more deserving of protection than the works of art we guard so zealously?

TUBE-NOSED SWIMMERS. (ORDER TUBINARES.)

Petrels. (Family Procellariidæ.)

Petrels,
Plate IV.

Petrels, or "Mother Carey's Chickens," are true children of the sea. Their home is the ocean, and they come to land only when nesting. To the landsman, therefore, they are strangers, but to most people who have been to sea they are known as the little, white-rumped swallow-like birds who on tireless wing follow in the wake of the ship day after day, patiently waiting for the food which experience tells them will be thrown overboard.

Two species of Petrels are found off our coasts, Wilson's and Leach's. The former has a yellow area in the webs of the toes and a square tail, while Leach's Petrel has the webs of the toes wholly black and a slightly forked tail. These differences, however, would not be appreciable at a distance. Wilson's Petrel nests in certain islands of the southern hemisphere in February, and later migrates northward, reaching our latitude in May and spending the summer, or what in fact is its winter, in the North Atlantic. It is, therefore, probably the Petrel most frequently seen by transatlantic voyagers at this season.

Leach's Petrel nests on our coasts from Maine northward, arriving from the South in May. The nest is made in a burrow in the ground or beneath a rock, and a single white egg is laid. Generally one of the birds spends the day on the nest while its mate is at sea, but at night the incubating bird leaves the nest, its place being taken probably by the one who has been feeding during the day.

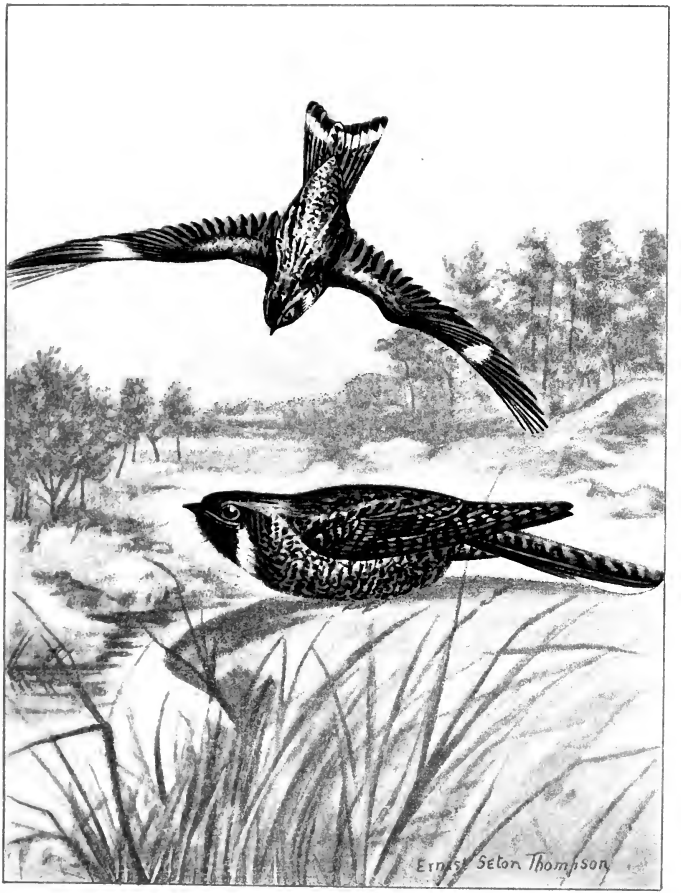


PLATE XXVII. PAGES 118, 119.

NIGHTHAWK.

Length, 10·00 inches. *Male*, above, black, white, and rusty; below, black and white; throat, bands in wing, and tail white. *Female*, similar, but throat rusty; no tail-band.

WHIP-POOR-WILL.

Length, 9·75 inches. *Male*, body black, rusty, and buff; primaries spotted with rusty; tips of outer tail-feathers and breast-band white. *Female*, similar, but breast-band and end of tail rusty.

LAMELLIROSTRAL SWIMMERS. (ORDER ANSERES.)

Ducks, Geese, and Swans. (Family Anatidæ.)

This family contains some two hundred species, and is represented in all parts of the world. It includes five subfamilies: the Mergansers (*Merginæ*), or Fish-eating Ducks; the Pond or River Ducks (*Anatinæ*), the Bay or Sea Ducks (*Fuligulinæ*); the Geese (*Anserinæ*); and the Swans (*Cygninæ*).

Ducks, like all hunted birds, are exceedingly wild, and comparatively few species will come within reach of the student's opera-glass. The group may therefore be reviewed briefly. The Mergansers or Shelldrakes, numbering three species, have narrow, serrate bills which enable them to hold the fish they pursue and catch under water (see Fig. 18).

The River Ducks have little or no lobe or flap on the hind toe. In this group belong our Mallard, Widgeon, Pintail, Blue-winged and Green-winged Teals, Black Duck, Wood Duck, and others. All but the last two nest in the North and are found in our latitude only during their spring and fall migrations, or, if the weather be mild, in the winter. The Black Duck and Wood Duck nest rarely in the Middle States.

River Ducks, Plate V.

All these birds feed in shallow water by "dabbling" or "tipping," terms which will be readily understood by any one who has watched domesticated Ducks feeding.

The Bay and Sea Ducks, on the contrary, are divers, and may descend to the bottom in water more than one hundred and fifty feet in depth. They are to be distinguished from the River Ducks by the presence of a flap or lobe on the hind toe. The commoner members of

this subfamily are the Redhead, Canvasback, Scaup or Broadbill, Whistler, Bufflehead, Old Squaw, Eider, three species of Scoters or "Coots" and Ruddy Duck. These are all northern-breeding birds who visit the waters of our bays and coasts during their migrations or in the winter.

The bill in both River and Bay Ducks has a series of gutters on either side which serve as strainers. The birds secure a large part of their food—of small mollusks, crustaceans, and seeds of aquatic plants—from the bottom, taking in with it a quantity of mud, which they get rid of by closing the bill and forcing it out through the strainers, the food being retained.

Geese are more terrestrial than Ducks, and, though they feed under water by tipping, often visit the land to procure grass, corn, or cereals, which they readily nip off. The white-faced, black-necked Canada Goose is our only common species. Its long overland journeys, while migrating, render it familiar to many who have seen it only in the air. It migrates northward in March and April and returns in October and November, breeding from the Northern States northward and wintering from New Jersey southward.

The two Swans, Whistling and Trumpeter, found in North America, are generally rare on the Atlantic coast.

HERONS, STORKS, IBISES, ETC. (ORDER HERODIONES.)

Herons and Bitterns. (Family Ardeidæ.)

Of the seventy-five known members of this family fourteen inhabit eastern North America. Most of these are Southern in distribution, only six or seven species regularly visiting the Northern States. Their large size

PLATE XXVIII. PAGE 119.

CHIMNEY SWIFT.

Length, 5·40 inches. Sooty black, throat grayish.

renders Herons conspicuous, and, though worthless as food, few so-called sportsmen can resist the temptation of shooting at them when opportunity offers. Several of the Southern species, notably the Snowy Heron and White Egret, are adorned during the nesting season with the beautiful "aigrette" plumes which are apparently so necessary a part of woman's headgear that they will go out of fashion only when the birds go out of existence. One can not blame the plume hunters, who are generally poor men, for killing birds whose plumes are worth more than their weight in gold—the blame lies in another quarter. But I have no words with which to express my condemnation of the man who kills one of these birds wantonly.

Great Blue Heron,
Ardea herodias.
Plate VI.

The presence of a stately Great Blue Heron or "Crane" adds an element to the landscape which no work of man can equal. Its grace of form and motion, emphasized by its large size, is a constant delight to the eye; it is a symbol of the wild in Nature; one never tires of watching it. What punishment, then, is severe enough for the man who robs his fellows of so pure a source of enjoyment? A rifle ball turns this noble creature into a useless mass of flesh and feathers; the loss is irreparable. Still, we have no law to prevent it. Herons are said to devour large numbers of small fish. But is not the laborer worthy of his hire? Are the fish more valuable than this, one of the grandest of birds?

The Great Blue Heron breeds throughout North America, but there are now only a few localities in the northeastern States where it may be found nesting. We usually see it, therefore, as a migrant in April and May, and from August to November.

The Little Green Heron is the smallest, as the Great Blue Heron is the largest, of our Herons. Its small

size, preference for wooded regions instead of marshes, and habit of nesting alone, not in flocks, like most Herons, accounts for its being relatively common. It arrives from the South about April 20, and nests early in May. The nest, as is usual in this family, is a rude platform of sticks and is placed in a bush or the lower branch of a tree, often overhanging the water. The eggs number from three to six, and in color are pale greenish blue. The young, although born with a covering of hairlike feathers, are quite helpless and are reared in the nest. Adults have the crown and back dark, glossy green, the neck reddish brown.

Little Green Heron, *Ardea virescens.* Plate VI.

The notes of this little Heron are a clear whistle and a harsh *squawk*, uttered when it is frightened. It then seeks refuge by alighting in a distant bush or tree, and with upstretched neck and twitching tail watches the intruder.

The Night Heron, or Squawk, doubtless owes its escape from the fate of most Herons to its nocturnal habits. These birds arrive from the South in April and remain until October. They nest in large colonies, a rookery not far from New York city being inhabited by at least one thousand pairs. It is in a low, wooded tract, and the nests are built in the trees at an average height of thirty feet. The eggs number four to six, and in color are pale bluish green.

Black-crowned Night Heron, *Nycticorax nycticorax navius.* Plate VI.

At night, while feeding, these Herons are doubtless distributed over a wide area. When flying, they often utter a loud *squawk*, the origin of one of their common names. It is a surprising sound when heard near by at night, and has doubtless aroused the curiosity of many persons who live near a line of flight followed by these birds in going to and from their nests.

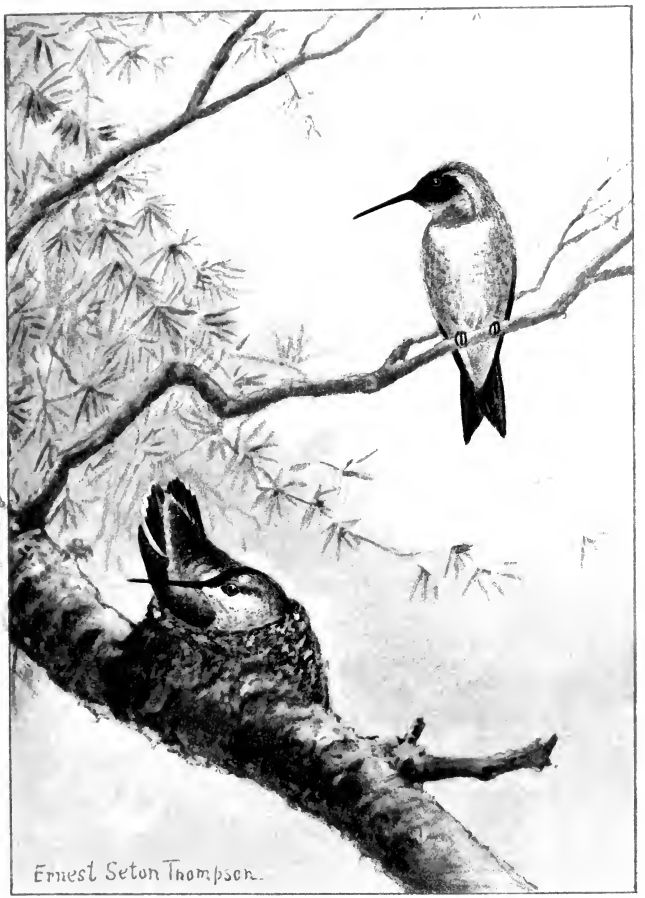


PLATE XXIX. PAGE 120.

RUBY-THROATED HUMMINGBIRD.

Length, 3·75 inches. *Adult male*, upper parts metallic green; throat metallic ruby-red; belly grayish; sides greenish. *Adult female and young*, similar, but throat white.

The Bittern, or Stake Driver, is a summer resident of our larger marshes, arriving early in April and remaining until October. Though by no means common, its notes are so loud and remarkable that even a single calling bird is more likely to attract attention than many smaller abundant species. Under favorable circumstances these notes may be heard for at least three fourths of a mile. They are of two kinds. One is described as the "pumping" call, and is generally written *púmp-er-lunk*, *púmp-er-lunk*, *púmp-er-lunk*, while the other is deceptively like the sound produced by driving a stake in the mud. Mr. Bradford Torrey, one of the few ornithologists who has observed the bird while it was uttering these singular cries, tells us (The Auk, vi, 1889, p. 1) that they are attended by violent, convulsive movements of the head and neck, which suggest the contortions of a seasick person, but that the bird's bill is neither immersed in water nor plunged in the mud, as has been popularly supposed.

American Bittern, *Botaurus lentiginosus.* Plate VII.

CRANES, RAILS, ETC. (ORDER PALUDICOLÆ.)

Rails and Coots. (Family Rallidæ.)

Rails are marsh-inhabiting birds, more often heard than seen. They are very reluctant to take wing, and when pursued seek safety by running or hiding rather than by flying. When flushed, they go but a short distance, and with dangling legs soon drop back into the grasses.

Of the one hundred and eighty members of this family, fourteen inhabit North America and eight visit the northeastern United States. Only three or four of these, however, are abundant, the most numerous and

generally distributed species being our Sora or Carolina Rail, so well known to sportsmen. This bird passes us in the spring in April and nests from Massachusetts northward. It returns in August and lingers in our wild-rice marshes until October. During the nesting season it has two calls—a whistled, *ker-wee*, and a high, rolling *whinny*. In the fall it utters a *kuk* or *peep* when disturbed.

Sora,
Porzana carolina.
Plate VII.

There is no sexual difference in color in this species, but birds of the year lack the black about the base of the bill and on the throat, and have the breast washed with cinnamon.

Our other species of Rail are the King, Yellow, and Little Black Rail, all of which are rare; the Virginia Rail, which is more common, and the Clapper Rail or Marsh Hen, an abundant species in some of the salt marshes along our coasts from Long Island southward. It is a noisy bird with a peculiar cackling call which it utters in a way that suggests the sound produced by some automatic toys.

Clapper Rail,
Rallus crepitans.
Plate VIII.

Its nest is made of dried grasses, the surrounding marsh grass being slightly arched over it. Eight to twelve buffy, speckled eggs are laid, a number which, in connection with the abundance of the bird, has led to the persistent robbing of its nests by men who sell the eggs for food. As a result of this practice the birds have greatly decreased in numbers during recent years.

The Coot, Mud-hen, or Crow-duck differs from the Rails in having lobed toes (see Fig. 12) and in being more aquatic. In fact, it is more like a Duck in habits than like a Rail, but its pointed, white-tipped bill will prevent its being mistaken for one.

American Coot,
Fulica americana.
Plate VIII.

PLATE XXX. PAGE 122.

KINGBIRD.

Length, 8·50 inches. Upper parts grayish black; tip of tail and under parts white; an orange-red crown-patch. *Young*, similar, but without orange-red in crown.

It rarely breeds on the Atlantic coast, but is sometimes common on our marsh-bordered streams in the fall.

SHORE BIRDS. (ORDER LIMICOLÆ.)

Snipes and Sandpipers. (Family Scolopacidæ.)

The successful pursuit of shore birds on our coasts requires a special knowledge of their notes and habits. Thirty of the one hundred known species visit us annually, but of this number only two or three nest, most of the others migrating in May to their breeding grounds in the far North. The return migration takes place during July, August, and September, but with some exceptions these birds are seen only by those who hunt them systematically with decoys.

Only these exceptions and our summer resident species will be mentioned here. Commonest among the latter is the Woodcock, a bird so unlike other Snipe in his choice of haunts that he seems quite out of place in this family. Nor is he, strictly speaking, a summer resident, for there are only three months in the year when the Woodcock is not with us. He comes in March as soon as the frost-bound earth will permit him to probe for his diet of worms, and he remains until some December freeze drives him southward.

Woodcock,
Philohela minor.
Figs. 9 and 19.

Low, wet woods, where skunk cabbage and hellebore thrive, or bush-grown, springy runs, are the Woodcock's early haunts. In August, while molting, he often visits cornfields in the bottom lands, and in the fall wooded hillsides are his resorts. But, wherever he is, the Woodcock leaves his mark in the form of "borings"—little holes which dot the earth in clusters, and show where the bird

has probed for earthworms with his long, sensitive bill, the upper mandible of which, as Mr. Gordon Trumbull has discovered, the bird can use as a finger.

The Woodcock's nest is made of dried leaves, and the four large, pear-shaped eggs are buff, spotted with shades of reddish brown. The young are born covered with rich chestnut and buff down, and can run as soon as dry.

As a songster the Woodcock is unique among our summer birds. Ordinarily sedate and dignified, even pompous in his demeanor, in the spring he falls a victim to the passion which is accountable for so many strange customs in the bird world.

If some April evening you visit the Woodcock's haunts at sunset, you may hear a loud, nasal note repeated at short intervals—*peent, peent.* It resembles the call of a Nighthawk, but is the Woodcock sounding the first notes of his love song. He is on the ground, and as you listen, the call ceases and the bird springs from the ground to mount skyward on whistling wings. He may rise three hundred feet, then, after a second's pause, one hears a twittering whistle and the bird shoots down steep inclines earthward. Unless disturbed, he will probably return to near the spot from which he started and at once resume his *peenting.* This, with the twittering note, is vocal; the whistling sound, heard as the bird rises, is produced by the rapid passage of air through its stiffened primaries.

Our only other common summer resident Snipe is the Spotted Sandpiper. It frequents the shores of lakes, ponds, and rivers, and is also found near the sea, but wherever seen may be known by its singular tipping, teetering motion, which has given it the names of Tip-up and Teter Snipe. It is also called Peet-weet, from its sharp

Spotted Sandpiper, *Actitis macularia.* Plate XI.

PLATE XXXI. PAGE 123.

CRESTED FLYCATCHER.

Length, 9·00 inches. Upper parts brownish olive-green; inner vane of tail-feathers rusty; breast gray; belly pale yellow.

call, rapidly repeated as it flies over the water. After gaining headway it sails for some distance, when its wide-stretched wings show a white bar or band.

The Spotted Sandpiper arrives from the South late in April and remains until October. It nests in the latter half of May, laying four pear-shaped eggs, in color white or buff, thickly spotted and speckled with chocolate, chiefly at the larger end. The young, like those of all Snipe, are born with a covering of downy feathers, and can run as soon as dry. The egg is, therefore, large in proportion to the size of the bird, and measures 1·25 by ·95 inches. (See Fig. 24*a*.)

Unlike the two preceding birds, Wilson's or the English Snipe is not a summer resident in the Middle States, but as a rule nests from northern New England northward, though there are records of its breeding as far south as Connecticut and Pennsylvania. It migrates northward in March and April, and the return journey occurs during September and October. It is not a true shore bird, but frequents fresh-water marshes and meadows, and in rainy April weather, when the lowlands become more or less flooded, it may be found in places where few persons would think of looking for Snipe.

Wilson's Snipe,
Gallinago delicata.
Plate IX.

Like the Woodcock, Wilson's Snipe probes the mud for food, and when on the ground among the grasses its colors and pattern of coloration so closely resemble its surroundings that it is almost invisible.

When flushed, it utters a startled *scaip*, and darts quickly into the air, flying at first in so erratic a manner that it has become famous among sportsmen as a difficult mark.

Like the Nighthawk, Wilson's Snipe sometimes dives earthward from high in the air, making as he falls a sound which Minot compares to that produced by throw-

ing a nail held crosswise in the hand, though it is louder and more full. This performance is generally restricted to late evening and early morning during the spring, but is occasionally practiced in the fall.

Most of our transient visitant Snipe are true shore birds. Many of them are classed as game birds, and have now become so uncommon that, as before remarked, it requires a special knowledge of their ways in order to find them. But there are some species too small to be worthy the sportsman's attention, and they are often numerous on our beaches. They are generally known as Peeps or Ox-eyes, but in books are termed Semipalmated Sandpipers — active little fellows, with black, gray and rusty backs and white under parts, who run along the shore, feeding on the small forms of life cast up by the waves. They are sociable birds, and even when feeding the members of a flock keep together, while when flying they move almost as one bird.

Semipalmated Sandpiper, *Ereunetes pusillus.* Plate X.

These Sandpipers visit us in May, when journeying to their summer homes within the Arctic Circle, and return in July, to linger on our shores until October. Their call-note is a cheery, peeping twitter, which probably suggested one of their common names.

Plovers. (Family Charadriidæ.)

Most Plovers differ from Snipe in possessing three instead of four toes, and in having the scales on the tarsi rounded, not square or transverse. Their bill is shorter and stouter than that of Snipe, and they do not probe for food, but pick it up from the surface.

Although several species visit dry fields and uplands, they are ranked as shore birds or bay birds, and, as with Snipe, the species large enough to be ranked as game

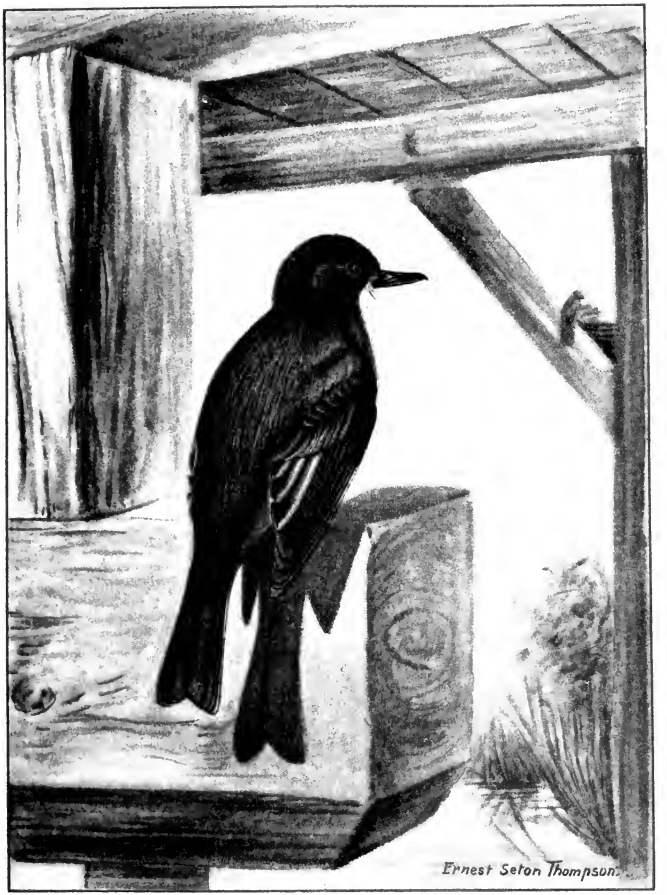


PLATE XXXII. PAGE 124.

PHŒBE.

Length, 7·00 inches. Back dusky olive; crown blackish; under parts white tinged with yellow; outer margin of outer tail-feathers whitish; bill black.

have become comparatively rare. Of the one hundred known species, six visit eastern North America—the Black-breasted, Golden, Piping, Wilson's, Semipalmated, and Killdeer Plovers. Only the last two of these are common enough to deserve mention here.

Killdeer, *Ægialitis vocifera.* Plate XI.

The Killdeer, with the exception of the Piping Plover, is the only bird of this family that nests with us. It is irregularly distributed in the northeastern States, but its noisy call, *killdee, killdee*, and striking markings render it a conspicuous bird even where it is uncommon. It frequents uplands and lowlands, fields and shores, but prefers the vicinity of water. Its nest of grasses is made on the ground, and its four eggs are whitish, spotted and scrawled with chestnut, chiefly at the larger end.

The Semipalmated or Ring-necked Plover looks like a miniature of the Killdeer, but, in addition to other differences, has only one band on the breast. The male has the upper parts brownish gray, the under parts, nape, and forehead white, while the breast-band, crown, and cheeks are black. In the female these black areas are brownish gray. This Plover visits our shores and beaches during its northward migration in May and southward migration in August and September. Thanks to its small size, it is not hunted as game, and for this reason is almost as common as the little Peeps or Ox-eyes, with which it often associates. Its call is a simple but exceedingly sweet and plaintive two-noted whistle.

Semipalmated Plover, *Ægialitis semipalmata.* Plate X.